



# Investing in Prevention

Improving Health  
and  
Creating Sustainability

The Provincial Health Officer's Special Report

P.R.W. Kendall, OBC, MBBS, MSc, FRCPC  
Provincial Health Officer

September 2010



Office of the  
Provincial Health Officer

### **Library and Archives Canada Cataloguing in Publication**

British Columbia. Office of the Provincial Health Officer  
Investing in prevention [electronic resource]: improving health and  
creating sustainability: the Provincial Health Officer's special report.

Author, Dr. Perry Kendall.

Electronic monograph in PDF format.

Issued also in printed form.

"August 2010".

Includes bibliographical references.

ISBN 978-0-7726-6308-5

1. Public health--British Columbia. 2. Health promotion--Government  
policy--British Columbia. 3. Medicine, Preventive--British Columbia. 4. Health  
education--British Columbia. I. Kendall, Perry R. W. (Perry Robert William),  
1943- II. Title. III. Title: Improving health and creating sustainability.

**RA450 B7 B77 2010**

**362.109711**

**C2010-904372-3**

# CONTENTS

<b>Acknowledgements</b> .....	v
<b>Purpose</b> .....	1
Recommendations .....	2
<b>Introduction</b> .....	3
A Healthy Living Strategy for British Columbia: Opportunities.....	4
<b>The Burden of Disease in British Columbia</b> .....	7
Disability Adjusted Life Years – British Columbia .....	8
Chronic Conditions .....	11
<b>Chronic Disease and the Economic Burden of Disease</b> .....	13
Direct and Indirect Costs .....	13
Economic Burden of Chronic Disease in Canada .....	14
Behavioural Risk Factors for Chronic Disease .....	15
Economic Costs of Risk Behaviours .....	18
Economic Burden of Illness and the Economic Costs of Risk Behaviours in British Columbia .....	18
<b>Health Goals and the Determinants of Health</b> .....	21
BC Health Goals .....	21
Determinants of Health and Chronic Disease Risk Conditions .....	22
Health Status Disparities and Health Care Utilization .....	22
Low Income Levels in British Columbia .....	25
Food Security in British Columbia .....	28
Inequalities in Life Expectancy by Geographic Location in British Columbia .....	30
Inequalities in Health Status in British Columbia .....	31
Heart Disease .....	31
Diabetes .....	31
Mental Wellness .....	32
Accessing Services – Dental Care .....	32

Distribution of Behavioural Risk Factors in British Columbia .....	33
Tobacco Use .....	33
Physical Inactivity .....	34
Obesity .....	34
Reducing Health Costs Related to Inequalities .....	35
Reducing Inequalities and Inequities in Health by Addressing the Determinants of Health .....	35
<b>Implications of the Existing Burden on the Publicly Funded Health Care System .....</b>	<b>37</b>
Inpatient Costs .....	37
The Most Expensive Medical Conditions .....	39
<b>A Comprehensive Approach to Prevention .....</b>	<b>41</b>
Factors that Affect Health .....	41
Healthy Living/Health Improvement Model .....	42
Healthy Living/Personal Behaviour .....	43
Public Health Services .....	44
Public Health Renewal .....	45
Key Infrastructure Elements of Public Health Systems .....	46
Public Health Renewal in British Columbia .....	46
Investments in Public Health Services in British Columbia .....	48
Strengthening Clinical Prevention (Primary Care Services) .....	49
Current Delivery of Effective Clinical Preventive Services .....	50
Strengthening Clinical Prevention in Primary Care .....	50
Chronic Disease Management .....	52
The Economics of Prevention .....	54
<b>Summary of Prevention Evidence and Best Practice .....</b>	<b>55</b>
Health Promotion .....	55
ActNow BC .....	56
ActNow BC – Population Health Promotion Strategies .....	58
Expansion of ActNow BC .....	58
Injury Prevention .....	58
The Reduction of Sodium Intake .....	58
The Reduction of Sugar-Sweetened Beverages Intake .....	59
Alcohol Harm Reduction .....	60
Chronic Disease Prevention .....	61

Mental Health Promotion .....	61
Perry Preschool Study .....	63
15 by 15 – A Comprehensive Policy Framework for Early Human Capital Investment in BC .....	64
<b>Investing in Prevention: Conclusion</b> .....	67
<b>References</b> .....	69
<b>Appendix 1: Measuring the Economic Consequences of Illness</b> .....	75
<b>Appendix 2: Overview of Selected Research – Implementing Effective Preventive Clinical Services</b> .....	77

## Figures

Figure 1: Twelve Leading Causes of Death, BC, 2005 .....	7
Figure 2: Disability Adjusted Life Years (DALYs), Percent of Total by Major Disease Category, BC, 2005 .....	9
Figure 3: Relative Contribution of Fatal (YLL) and Non-Fatal (YLD) Outcomes to DALYs by Major Condition, BC, 2005 .....	10
Figure 4: DALYs by Major Condition, by Gender, BC, 2005.....	10
Figure 5: Proportion of Canadians Reporting One or More Chronic Diseases, by Age Group, Canada, 2005.....	11
Figure 6: Proportion of British Columbians with One or More Chronic Diseases, 2005/2006 .....	11
Figure 7: Diabetes Prevalence Projections, Cases and Crude Rates, BC, 1992/1993 to 2015/2016.....	12
Figure 8: The Economic Burden for Major Diseases/Injury Categories in Canada, 2000 .....	13
Figure 9: Economic Burden of Illness, Direct and Indirect Costs, Canada, 2000.....	14
Figure 10: Acute Care, Medical Services Plan and PharmaCare Expenditures by Health Status, BC, 2007/2008 .....	14
Figure 11: Cost per Patient by Health Status, BC, 2007/2008.....	14
Figure 12: Interrelationships between Risk Factors and Different Chronic Diseases.....	15
Figure 13: Body Mass Index, Self-Reported, Adult (Age18 +), Overweight or Obese, by Gender, BC, 2003, 2005, and 2007/2008 .....	16
Figure 14: Fruit and Vegetable Consumption, 5 Times or More per Day, BC, 2003, 2005 and 2007/2008 .....	16
Figure 15: Physical Activity During Leisure Time, Moderately Active or Active, Age 12+, by Gender, BC, 2003, 2005 and 2007/2008 .....	17
Figure 16: Current Smokers, Age 15+, by Gender, BC, 1999 to 2008 .....	17
Figure 17: Smoking During Last Pregnancy, Women Age 15 to 55, BC, 2003, 2005 and 2007/2008 .....	17
Figure 18: Alcohol Use During Last Pregnancy, Women Age 15 to 55, BC, 2003, 2005 and 2007/2008 .....	18
Figure 19: Remaining Life Expectancy at Age 25, Per Cent Expected to Survive to Age 75, by Gender, Canada, 1991 to 2001.....	23
Figure 20: Poor or Fair Self-Reported Health, Age-Adjusted Rates per Thousand Population, by Adjusted Household Income Quintile, Age 18 to 64, Canada, 2005 .....	24

Figure 21: Pan-Canadian Age-Standardized Hospitalization Rates and Self-Reported Health Percentages Across all 15 Census Metropolitan Areas .....	25
Figure 22: Low-Income Rates by Family Type, BC, 1988 to 2008 .....	26
Figure 23: Child Poverty, BC, 1988 to 2008 .....	26
Figure 24: Child Poverty Rate, by Canadian Province, 2008.....	27
Figure 25: Regional Distribution of Food-Insecure Households, BC, 2005.....	28
Figure 26: Percentage of Food Insecure, by Household Income Category, BC, 2007/2008 .....	29
Figure 27: Percentage of Food Insecure in the Past 12 Months, by Income Level and Gender, BC, 2005 .....	29
Figure 28: Life Expectancy by Local Health Authority, BC, 2005-2009.....	30
Figure 29: Prevalence of Heart Disease, by Income Level and Gender, BC, 2005 .....	31
Figure 30: Prevalence of Diabetes, by Income Level and Gender, BC, 2005.....	31
Figure 31: Self-Perceived Mental Health as Excellent or Very Good, by Income Level and Gender, BC, 2005 .....	32
Figure 32: Percentage Who Did Not See a Dentist in the Previous 12 Months, by Income Level and Gender, BC, 2005 .....	32
Figure 33: Prevalence of Daily Smokers, by Income Level Gender, BC, 2005.....	33
Figure 34: Prevalence of Daily Smokers, by Education Level and Gender, BC, 2005 .....	33
Figure 35: Prevalence of Physical Inactivity, by Income Level and Gender, BC, 2005 .....	34
Figure 36: Measured Adult Obesity (BMI $\geq$ 30), by Income Level and Gender, Canada, 2005 .....	34
Figure 37: Estimated Total Acute Care Inpatient Hospital Costs and Share of Total by Clinical Groupings, All Age Groups, 2004/2005.....	38
Figure 38: The Health Impact Pyramid .....	41
Figure 39: Sustainability and Healthy Living/Health Improvement Model.....	43
Figure 40: Public Health Expenditures as a Percentage of the Base Budget, Interior Health Authority, BC, 2002/2003 to 2009/2010 .....	49
Figure 41: The Expanded Chronic Care Model: Integrating Population Health Promotion .....	53
Figure 42: Age Standardized Mortality Rates, Diabetes Mellitus, BC, 1986 to 2008 .....	53
Figure 43: ActNow BC: Whole-of-Government Approach – Conceptual Framework .....	57
Figure 44: Rates of Return to Human Capital Investment at Different Ages .....	62
Figure 45: Major Findings: High/Scope Perry Preschool Study at 40.....	63

## Tables

Table 1: Economic Costs of Risk Behaviours .....	19
Table 2: Economic Burden of Illness in British Columbia, 1998 (Diagnostic Categories Contributing 1 Per Cent or Greater to Total Costs).....	19
Table 3: Comparison of BC Health Goals and BC Government's Five Great Goals .....	21

Table 4: Economic Burden of Illness in Canada: Direct Costs (\$ Millions), 2000 .....	37
Table 5: Total Acute Care Inpatient Hospital Costs for the 15 Most Expensive Medical Conditions, All Age Groups, Canada, 2004/2005 .....	39
Table 6: Status of Public Health Infrastructure Elements .....	47
Table 7: Recent Investments in Public Health Services in British Columbia .....	48
Table 8: Priorities among Effective Clinical Preventive Services – Rankings Based on Clinically Preventable Burden .....	51
Table 9: Priorities among Effective Clinical Preventive Services – Rankings Based on Cost-Effectiveness .....	51
Table 10: Modifiable Risk Factors and Related Chronic Conditions .....	61

## ACKNOWLEDGEMENTS

The Provincial Health Officer gratefully acknowledges the work of Joel Finlay MPH, of KPMG LLP, who assisted with the drafting of this report, as well as undertaking aspects of the research. Also, special thanks to Dr. Trevor Hancock, Public Health Consultant, BC Ministry of Healthy Living and Sport, who has been instrumental in the creation of this report, from its inception through review of the final draft.

The Provincial Health Officer also wishes to thank the following individuals for their expertise and assistance.

### **Andrea Berkes**

Executive Administrative Assistant  
Office of the Provincial Health Officer  
BC Ministry of Healthy Living and Sport

### **Frankie Best**

Project Manager, Tobacco Control Program  
Chronic Disease/Injury Prevention and Built Environment  
BC Ministry of Healthy Living and Sport

### **Lorrie Cramb**

Manager, Healthy Eating  
Chronic Disease/Injury Prevention and Built Environment  
Population and Public Health  
BC Ministry of Healthy Living and Sport

### **Ian Darling**

Research Analyst  
Labour and Social Statistics, BC Stats  
BC Ministry of Citizens' Services

### **Denise De Pape**

Director, Alcohol Harm Reduction  
Communicable Disease and Addiction Prevention  
BC Ministry of Healthy Living and Sport

### **David Galbraith**

Assistant Deputy Minister  
ActNow BC  
BC Ministry of Healthy Living and Sport

### **Andrew Hazlewood**

Assistant Deputy Minister  
Population and Public Health  
BC Ministry of Healthy Living and Sport

### **Del Nyberg**

Director, Sport, Recreation and Volunteers  
ActNow BC  
BC Ministry of Healthy Living and Sport

### **Richard Mercer**

Data Analyst, Surveillance and Informatics  
Corporate Support, Planning and Legislation  
BC Ministry of Health Living and Sport

### **Enza Pattison**

Librarian  
Health and Human Services Library  
BC Ministry of Health Services

**Marilyn Shinto**

Director, Performance Management & Evaluation  
ActNow BC  
BC Ministry of Healthy Living and Sport

**Stephen Smith**

Director, Mental Health Promotion  
Communicable Disease, Mental Health and Substance Use  
BC Ministry of Healthy Living and Sport

**Craig Thompson**

Director, Immunization Programs  
Communicable Disease and Addiction Prevention  
BC Ministry of Healthy Living and Sport

**Laura Uganecz**

Administrative Assistant  
Office of the Provincial Health Officer  
BC Ministry of Healthy Living and Sport

**Natalie Work**

GIS Analyst  
Demographic Analysis Section, BC Stats  
BC Ministry of Citizens' Services

**Andrea Youde**

Administrative Assistant  
Office of the Provincial Health Officer  
BC Ministry of Healthy Living and Sport

**Winnie Yu**

Manager, Chronic Disease/Injury Prevention and Built Environment  
Population and Public Health  
BC Ministry of Healthy Living and Sport

**Report Team:**

**Barb Miles** – Project Management, Writing and Editing

Report Manager  
Office of the Provincial Health Officer  
BC Ministry of Healthy Living and Sport

**Barb Callander** – Copy Editing, Proofreading and References

Manager, Projects and Strategic Initiatives  
Corporate Support, Planning and Legislation  
BC Ministry of Healthy Living and Sport

**Wendy Vander Kuyl**

Research Assistant, Surveillance and Informatics  
Corporate Support Planning and Legislation  
BC Ministry of Healthy Living and Sport

**Anthony Alexander** – Graphic Design

Mercury Art & Design, Victoria BC



# PURPOSE

The Provincial Health Officer of British Columbia is required by the *Public Health Act*, Section 66, to conduct independent analyses on matters relevant to the health of British Columbians and also to comment on the need for legislation, policies or other actions when deemed necessary. This responsibility is served most directly by the production of the Annual Report; however, from time to time, feature reports on specific topics are also prepared.

This report focuses on the rationale for a strengthened provincial strategy for and investment in prevention, thus reducing the burden of disease on families and communities, the need for health care services, and the impact of disease, disability and premature death on the economy. The case for a greater investment in prevention and for specific recommendations, is based on and supported by available evidence.

While some have suggested that prolonging life through health promotion only results in increasing medical costs as people live longer in poor health, this argument is fundamentally unethical and unsubstantiated. Presumably, it would always be cheaper to let people die without medical interventions, yet cost avoidance has never been put forward as an argument against life-saving or life-improving medical or surgical procedures. In addition, there is convincing evidence that today's seniors are healthier than their predecessors. Whether this trend will continue in the absence of concerted and enhanced action is very much the question.

One major concern is the increasing prevalence of obesity and weight-related illnesses, such as high blood pressure (hypertension) and Type 2 diabetes, not only in adults, but increasingly in children. Simply put, many British Columbians

- Consume too much of the wrong food and drink and have reduced access to healthy foods.

- Get too little physical activity and have uneven access to active living opportunities.

These two simple but powerful trends conspire to make British Columbia's population more overweight and obese. This in turn is related to an anticipated rise in the rates of heart disease, stroke, cancer, arthritis and other diseases, much of which could be prevented, or at least delayed. These problems are rooted in a complex set of social, environmental, technological and economic forces operating globally and nationally. Thus, there are few quick or simple fixes—if there were, we would have found and implemented them.

Instead, a long-term, society-wide effort is required, comparable to ongoing efforts that have resulted in British Columbians having the lowest rates of tobacco use in Canada. This is true not only for overweight and obesity, but also for many chronic diseases as well as injuries and mental health problems, which between them account for some 80 percent of the burden of disease in BC today.

This report provides further evidence in support of the existing provincial strategy to reduce the burden of disease in British Columbia. It also outlines the evidence supporting an integrated approach based on:

- Creating physical, social and economic environments and living and working conditions that result in good physical and mental health.
- Helping people make healthy choices.
- Reducing the excess morbidity and mortality attributable to poverty and other forms of inequality.
- Providing evidence-based, cost-effective preventive clinical services (immunization, counselling, screening, preventive medication).

- Focusing on infant and early childhood health and development.

Such an integrated strategy—a whole-of-government approach requiring efforts in population health promotion, public health services, primary care and self-care—will be required to optimize opportunities to improve the overall health of British Columbians.

As health status and healthy behaviours are distributed across a gradient that closely follows socio-economic status (with health outcomes improving at every step), failure to address the differences in health behaviours and health outcomes associated with these socio-economic gradients will result in a continuation of the existing gaps and disparities in health status and health behaviours. It is these disparities that add an additional—and largely preventable—burden of disease on families, communities, the health care system and the economy.

The magnitude of these gaps is captured in a commentary to a Statistics Canada report examining healthy life expectancy by economic status for the decade 1991 to 2001.<sup>1</sup> The commentary notes that cancers represent the greatest burden of disease in Canadian populations and that if all cancers were eliminated, health-adjusted life expectancy at birth would increase by 2.8 years for men and 2.5 years for women. By contrast, differences in health-adjusted life expectancy, at age 25, between the “best off” 10 per cent of Canadians and the average has been estimated at 5.9 years for men and 4.2 years for women. That is approximately twice the impact of all cancers combined!

The fact that cancer has been the object of tremendous public attention while the impacts of socio-economic status on ill health remain so poorly understood and largely ignored in budget-setting exercises presents both a paradox and an opportunity.

This report makes the case that continued and enhanced investment in a comprehensive prevention strategy can improve the health of British Columbians, reduce inequalities in health, and contribute to the financial sustainability of our publicly-funded provincial health care system.

## Recommendations

Government should focus prevention activities in five broad policy areas:

1. Build upon the foundational whole-of-government approach embodied in ActNow BC and commit to ensuring, with community partners, that the healthiest choice is always the easiest choice.
2. Recommit to early childhood development. The report *15 by 15: A Comprehensive Policy Framework for Early Human Capital Investment in BC*, produced by the Human Early Learning Partnership,<sup>2</sup> provides a blueprint for government to follow.
3. Look at those provinces and territories that have committed to poverty reduction (e.g., Quebec, Newfoundland and Labrador, Nova Scotia, Ontario, New Brunswick, Manitoba, and Yukon) and create a “Made in BC” program.
4. Further strengthen the public health services provided by BC’s health authorities, building on the nationally recognized efforts to develop evidence-based core public health programs for BC.
5. Continue to work with the British Columbia Medical Association and other health professional organizations to build a primary care system that will effectively deliver evidence-based lifetime preventive services and integrate prevention into chronic disease management.

# INTRODUCTION

Many jurisdictions in Canada, including British Columbia, have incorporated elements of the following broad goals into their vision for the publicly-funded health care system.

1. High Quality Patient Care
2. A Sustainable, Affordable Health Care System
3. Improved Health and Wellness

Achieving the goal of improved health and wellness depends to a significant degree on actions both within and beyond the health care system, involving population health promotion, public health services, clinical prevention and support for healthy living choices. Achieving this goal will also support the remaining goals. Improving the health and wellness of the population will reduce the burden of disease, which will assist in the achievement of a sustainable, affordable health care system; in addition, it can be argued that the provision of effective, evidence-based health promotion and disease and injury prevention services is an essential attribute of the goal of high quality patient care.

The largest contributor to the burden of disease in British Columbia is chronic disease, followed by injuries and mental health disorders (a number of which can also be considered chronic diseases). Therefore, it is critical to mitigate the risk factors and risk conditions that contribute to the burden of chronic disease (including some mental health disorders) and injury. The adverse risk factors include biological factors that are essentially unmodifiable (genetic inheritance, sex, age, etc.) and behavioural or “lifestyle” factors that are generally modifiable. The main behavioural risk factors for chronic diseases, some mental health disorders, and injury include, but are not limited to:

- Physical inactivity.
- Unhealthy eating.

- Obesity.
- Tobacco use.
- Problematic use of alcohol.
- Risk-taking behaviours (especially in young males).

These behavioural risk factors are set in the context of a wide array of environmental, social, economic, political and cultural risk conditions (referred to as the determinants of health), which influence and shape lifestyle choices, sometimes positively and sometimes negatively. These behaviours and conditions can work both together and independently to reduce an individual’s capacity for good physical and mental health, which has a direct impact on the burden of illness in British Columbia, and the consumption of health care resources.

The World Health Organization (WHO) has concluded that for many of the risk factors for chronic disease, the negative impacts can be reversed quickly and most benefits will accrue within a decade. Even modest changes in risk factor levels can bring about large improvements in an individual’s health. Other studies have examined both the effectiveness and the return on investment of prevention, and they agree that prevention strategies, when properly developed and implemented, can significantly reduce the burden of illness, particularly with respect to chronic diseases, and can be very cost-effective.

Strategic investments to promote and protect health, to prevent ill health and injury, and to reduce the health inequalities that are a consequence of the unequal distribution of health determinants, have the potential to make a measurable impact on the health of British Columbians and, subsequently, on the cost of the publicly funded health care system.

## A Healthy Living Strategy for British Columbia: Opportunities

A Healthy Living Strategy for British Columbia would emphasize the importance of investments in population health promotion, healthy living and disease and injury prevention as the core pillars for the sustainability of the publicly funded health care system.

Better health outcomes for British Columbians can best be achieved when the Healthy Living Strategy is combined with current efforts to safeguard the quality of the province's drinking water, to monitor air quality, to provide protection from communicable diseases through free immunization programs, as well as to provide restaurant and food inspection, child care and community care facility inspection, and emergency preparedness and disaster response. Health surveillance through the tracking and reporting of rates and trends in illness, disease and injury, such as disease outbreaks and emerging infectious agents, also has a key role to play in ensuring a healthy population.

The scope of the policy and program funding support for implementation of the Healthy Living Strategy would include:

- Tobacco control.
- Healthy eating and physical activity and their relationship to healthy weights.
- Reduction of dietary sodium intake.
- Reduction of sugar-sweetened beverages intake.
- Alcohol harm reduction.
- Mental health promotion and prevention of mental disorders.
- Injury prevention.
- Prevention of musculoskeletal diseases.

- Early childhood development programs.
- Clinical prevention.
- Integration of healthy living and prevention services into chronic disease management, in order to prevent worsening of the condition and the development of additional chronic diseases.
- A settings approach—improving the healthfulness of the settings (home, school, workplaces, communities) where people lead their lives.
- Action on the social determinants of health.<sup>a</sup>
- Reduction of inequities in health.

This report provides the rationale for an expanded and comprehensive approach that addresses this range of factors and issues, each of which has an impact on the burden of disease and the economic burden of illness in British Columbia. The burden of illness includes two categories of chronic disease not readily linked to the major behavioural risk factors that are usually considered in healthy living programs:<sup>b</sup> musculo-skeletal conditions and neuropsychiatric conditions, the latter including neurological, mental and substance use disorders.

The proposed comprehensive approach involves the integration of investments in three streams of “preventive/health improvement” strategies:

1. Addressing, through population health promotion, the social, economic, environmental and cultural factors that influence living patterns and lifestyle choices, and also result in health disparities across populations (the determinants of health).
2. Strengthening and expanding population-based healthy living initiatives.
3. Strengthening the provision of effective clinical preventive interventions/services.

<sup>a</sup> According to the World Health Organization, the social determinants of health are the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities—the unfair and avoidable differences in health status seen within and between countries ([http://www.who.int/social\\_determinants/en/](http://www.who.int/social_determinants/en/)).

<sup>b</sup> Healthy living programs focus on tobacco use, physical inactivity, unhealthy eating, unhealthy weights and alcohol use.

Successful implementation of these strategies requires the strengthening of:

- Whole of government approaches and intersectoral action for health at the federal, provincial and local (municipal) levels.
- Public health services.
- Primary care, particularly with respect to clinical prevention and the integration of prevention into chronic disease management.



# THE BURDEN OF DISEASE IN BRITISH COLUMBIA

The primary objectives<sup>3</sup> for the measurement of the burden of disease or illness are:

- to aid in setting health services priorities (both curative and preventive);
- to aid in identifying disadvantaged groups;
- to aid in targeting health interventions;
- to aid in setting health research priorities;
- to provide a comparable measure of output for intervention, program and sector evaluation and planning.

A range of indicators can be used to measure the burden of disease, including mortality; morbidity; premature death and/or disability data; and the financial and economic costs

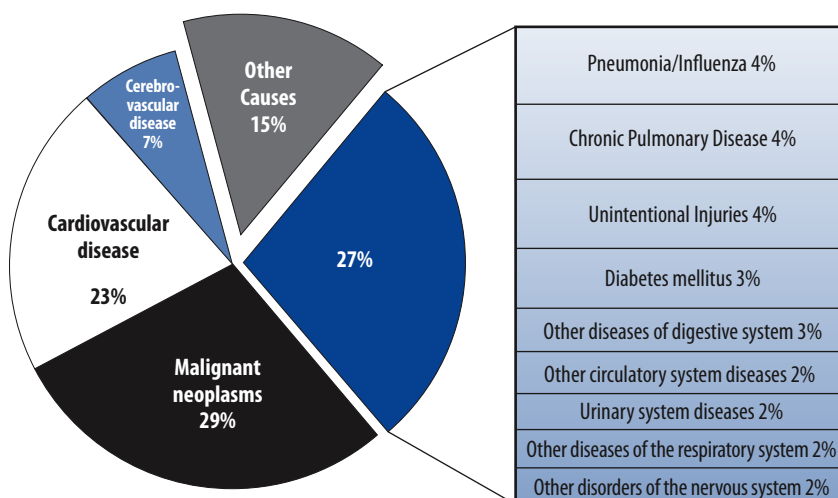
and other indicators that attempt to measure the impact of a disease/illness or injury at both the societal and individual level.

As shown in the discussion that follows, chronic diseases and injuries represent, by far, the largest part of the burden of disease in Canada and British Columbia now and for the foreseeable future. This is true in terms of both the disease burden and the economic burden.

Chronic diseases are the largest causes of death and disability in British Columbia. In 2005, non-communicable, chronic diseases such as cancer, cardiovascular disease and cerebrovascular disease resulted in 19,597 deaths, more than half (57.6 per cent) of all deaths in BC (Figure 1). In addition, health care costs associated with cerebrovascular disease were \$242 million, cardiovascular disease \$944 million and cancer \$1.2 billion in 2005.<sup>4</sup>

Figure 1

Twelve Leading Causes of Death, BC, 2005



Note: Age-Standardized Mortality Rate (ASMR) – per 10,000 standard population (1991 Canadian Census). The ASMR in the current year determined the order in which the causes of death are presented. Leading causes are ranked according to 2007 ASMR. Non-residents are excluded. The output from ICD-10 mortality coding and underlying cause of death selection was modified in BC to reflect the intent of certifiers in this jurisdiction and to provide greater continuity over time. Data using the standard ICD-10 rules for such categories as pneumonia/influenza, diabetes, or cancer should not be compared to the numbers shown in this figure. Due to rounding, percentages do not add up.

Data Source: BC Vital Statistics Agency, 2007.

Source: ActNow BC. (2010). *Measuring Our Success. Progress Report Part 2.*

## Disability Adjusted Life Years – British Columbia

An examination of the broader context for health has led to a variety of approaches beyond traditional mortality, incidence and prevalence reporting. In the late 1980s and early 1990s, the World Bank and the World Health Organization launched a multi-phase initiative to quantify global disease burden.<sup>5</sup> Underlying the support for this project was the understanding that allocating resources to address health needs involves setting a value to health outcomes. The policy objectives of this project were to:

- include non-fatal health outcomes into the health policy debate;
- measure population health and inequalities in health status; and
- estimate the present and future impact of health interventions.

The development of a single metric, incorporating both mortality and disability, allows values to be made explicit, and comparisons of disease conditions more transparent, for the purpose of priority setting. The approach was based on the use of a new composite indicator, the disability adjusted life year (DALY), developed by Dr. Christopher Murray of Harvard University.<sup>6</sup> Subsequent work, largely by Australian researchers,<sup>7</sup> has further refined approaches; it is the results of these efforts that have been applied to the estimate of the burden of illness in British Columbia.

The range of potential applications of the DALY includes:

- Comparing health conditions or overall health status between two populations or the same population over time.
- Quantifying health status inequalities.
- Ensuring that non-fatal health outcomes receive appropriate policy attention.

- Measuring the magnitude of different health problems using a common currency.
- Analyzing the benefits of health interventions for use in cost-effectiveness studies.
- Providing information to help set priorities for health planning, public health programs, research and development, and professional training.<sup>8</sup>

The DALY is similar to the potential years of life lost (PYLL) measure, but extends the concept of mortality gaps to include time lived in “less than good” health. It is important to recognize that the DALY for a particular condition has no meaning as a stand-alone measure; it is meaningful only as a relative comparator between different diseases or risk factors.

The following elements are required for DALY calculation:

- mortality data;
- population data;
- incidence data (the number of new cases in a particular period); and
- weights based on the relative valuation of health conditions.

In British Columbia, we have detailed mortality and population data; however, fully validated estimation of disease incidence is available only for a limited number of conditions (cancer, infectious diseases, congenital anomalies and diabetes). Estimates for the prevalence of other conditions, including mental illnesses and other chronic

The Disability Adjusted Life Year (DALY) count for a disease or risk factor is the sum of future years expected to be lost due to both premature mortality and impairment resulting from the incident condition or risk factor, with the value of years lost to disability discounted according to the seriousness of the disability, so Years Lost to Disability (YLD) is higher for years spent living in severe disability than with minor disability.

$DALY = \text{Years of Life Lost (YLL)} + YLD$



diseases, are based on a variety of sources, including surveys and administrative data derived from the use of health care services. The weights used to discount years spent in disability are a standard WHO set and have not yet been adapted specifically for Canada or BC.

*The Burden of Disease and Injury in Australia* (2007),<sup>2</sup> was the result of an extensive multi-year exercise to refine the epidemiological estimates and to establish a further validation of the weighting methodology. In the DALY estimates reported for British Columbia in this document, where there are gaps in the BC-specific data, we have applied the Australian estimates to the BC population and mortality data. This was the approach used for all of the information reported in a 2001 document, *The Evaluation of the Burden of Disease in British Columbia*,<sup>9</sup> which includes documentation of the rationale and validity of the application of these estimates based on the comparability of the populations.

The following charts summarize the preliminary findings for the estimation of the overall burden of disease (percentage of DALYs) in British Columbia in 2005. The top five disease

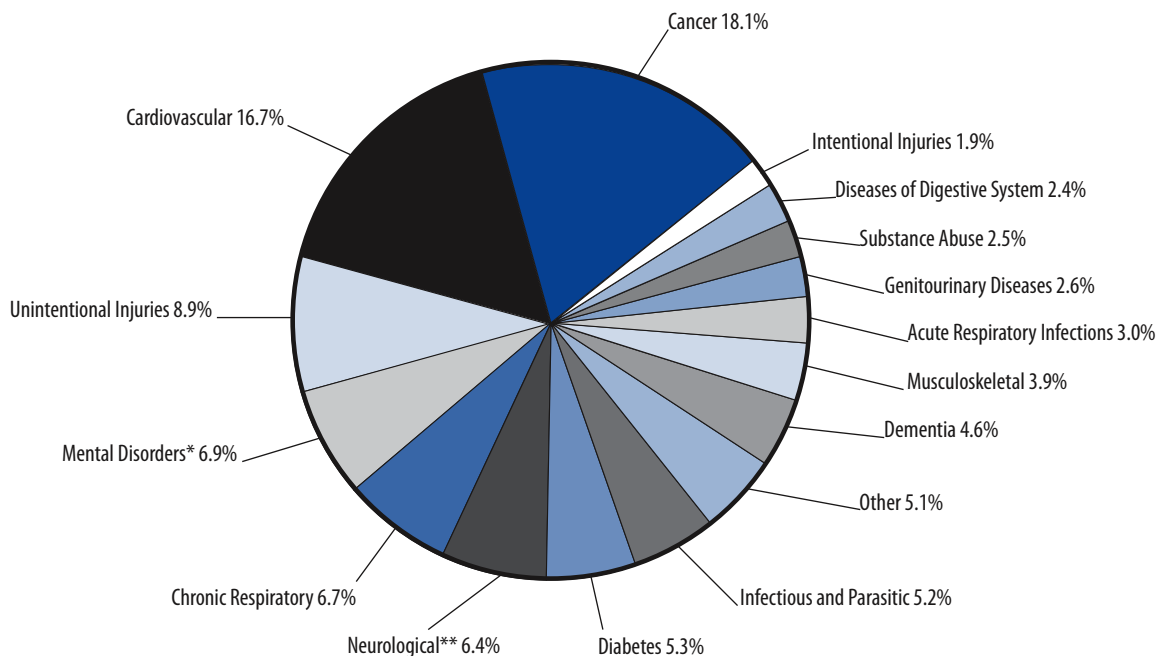
categories overall were cancer (18 per cent), cardiovascular disease (17 per cent), unintentional injuries (9 per cent), mental disorders (7 per cent) and chronic respiratory diseases (7 per cent). These diseases make up 58 per cent of all DALYs for the British Columbia population (see Figure 2).

These findings are consistent with the estimates for other developed countries and reflect the importance of considering non-fatal outcomes. Figure 3 highlights the differences in the patterns of these illnesses. In chronic non-fatal conditions with long duration, a large proportion of the burden is related to non-fatal outcomes (particularly mental disorders and musculoskeletal conditions).

There are major differences in the distribution of burden of illness by gender. This is particularly obvious for mental disorders, dementia and musculoskeletal conditions, with DALYs being disproportionately higher in women, while for cardiovascular diseases, unintentional injuries, infectious diseases and substance abuse, DALYs are disproportionately higher in men (see Figure 4).

Figure 2

Disability Adjusted Life Years (DALYs), Percent of Total by Major Disease Category, BC, 2005



Note: \* Excludes Substance Abuse and Dementia.  
 \*\* Excludes Dementia.

Source: Ministry of Healthy Living and Sport, (2007, November). *Estimating the Burden of Disease and Injury in British Columbia*.

Figure 3

Relative Contribution of Fatal (YLL) and Non-Fatal (YLD) Outcomes to DALYs by Major Condition, BC, 2005

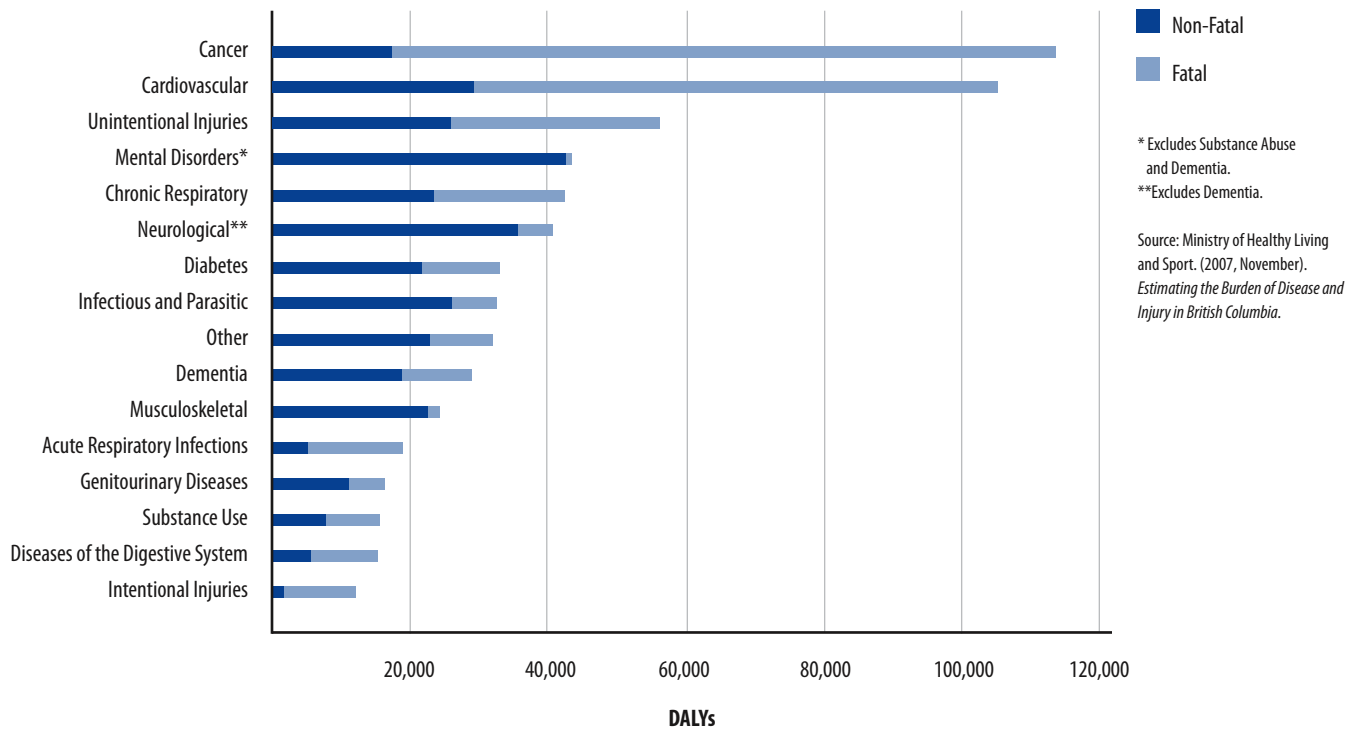
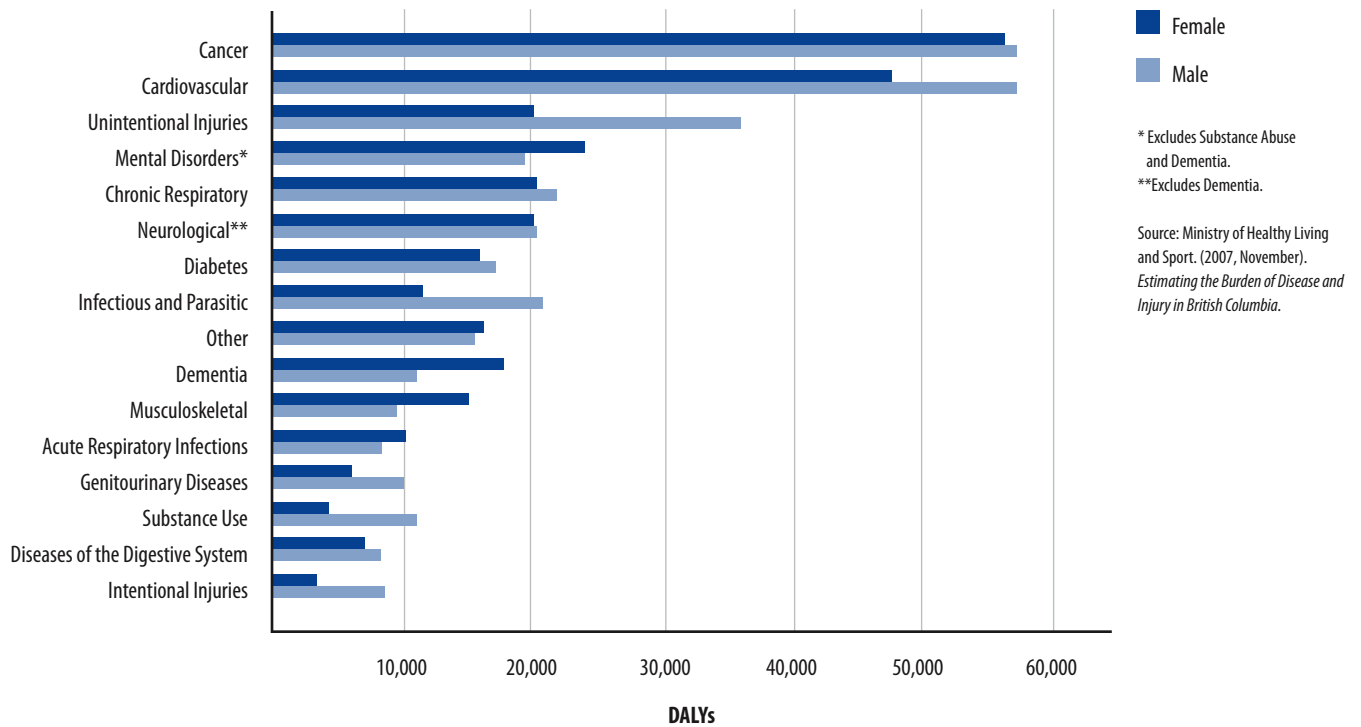


Figure 4

DALYs by Major Condition, by Gender, BC, 2005



## Chronic Conditions

The diseases that cause premature death are reflected in the patterns of ill-health and disability in Canada and British Columbia. The *Chief Public Health Officer's Report on the State of Public Health in Canada, 2008: Addressing Health Inequalities*,<sup>10</sup> notes that close to 3 per cent of Canadians were living with some form of cancer (2003) and approximately 5 per cent of Canadians reported having heart disease (2005). Even more dramatically, the Chief Public Health Officer notes:

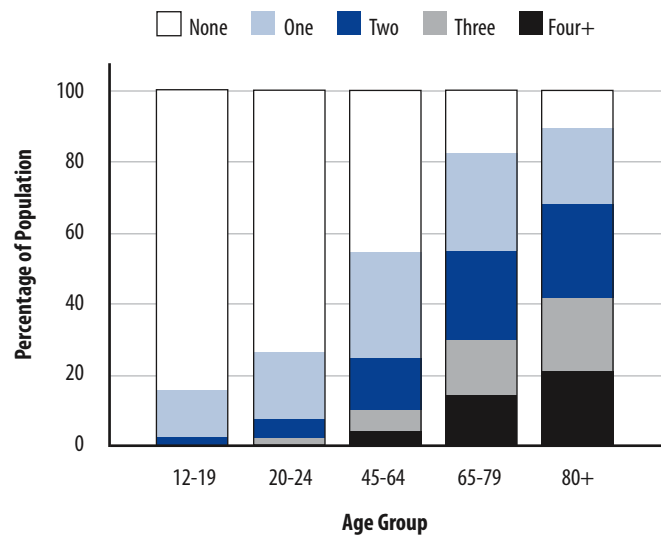
- Almost 1 in 4 Canadians aged 18 and over reported they were obese (BMI 30.0 or over).
- Approximately 1 in 6 Canadians aged 20 and over reported they had high blood pressure.
- Approximately 1 in 7 Canadians aged 12 and over reported they had arthritis or rheumatism.
- Approximately 1 in 12 Canadians aged 12 and over reported they had asthma.

Additionally, as shown in Figure 5, 42 per cent of all Canadians (12 years and over) reported living with at least one chronic disease, while 1 in 3 Canadians aged 65–79 and 40 per cent of those aged 80 and over reported having three or more chronic diseases.

One in three British Columbians is living with one or more diagnosed chronic conditions, and a further 2 per cent of the population is living with four to six chronic conditions. It is estimated that a further 17 per cent of British Columbians may be living with at least one undiagnosed chronic condition (see Figure 6).

This high prevalence of chronic disease, combined with an aging and expanding population (and an expanding elderly population as the Baby Boomers age), constitutes a high burden of disease that the health care system will have to deal with in the years ahead.

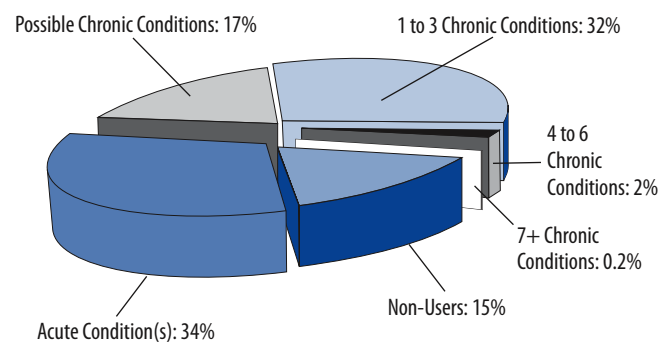
**Figure 5** Proportion of Canadians Reporting One or More Chronic Diseases, by Age Group, Canada, 2005



Note: Chronic diseases include: asthma, arthritis or rheumatism, high blood pressure, bronchitis, emphysema, chronic obstructive pulmonary disease (COPD), diabetes, epilepsy, heart disease, cancer, effects of a stroke, Crohn's disease, colitis, Alzheimers, cataracts, glaucoma, thyroid condition, schizophrenia, mood disorders, anxiety disorder, and eating disorders for persons aged 12+ years.

Data Source: Statistics Canada, Canadian Community Health Survey, 2005.  
Source: Public Health Agency of Canada. (2008). *The Chief Public Health Officer's Report on the State of Public Health in Canada, 2008*.

**Figure 6** Proportion of British Columbians with One or More Chronic Diseases, 2005/2006



Source: BC Ministry of Health (2005/2006) Medical Services Plan (MSP) and Discharge Abstract Database data, Retrieved from <https://www.impactbc.ca/files/.../CDM-LS1-res4teams-presentations.ppt>.

As an example of how the prevalence of a chronic condition can increase, the BC Provincial Health Officer noted in his 2004 annual report on diabetes<sup>11</sup> that

with no reduction in the rate of incidence and with the decline in mortality, the overall prevalence will continue to increase. Assuming that current trends will continue, the crude prevalence rate will rise from 5.2 per cent in 2003/2004 to 8.1 per cent in 2015/2016—an increase of 55 per cent. As shown in Figure [7], the number of persons with diabetes will increase from 220,000 to just over 390,000—an increase of 77 per cent.<sup>c</sup>

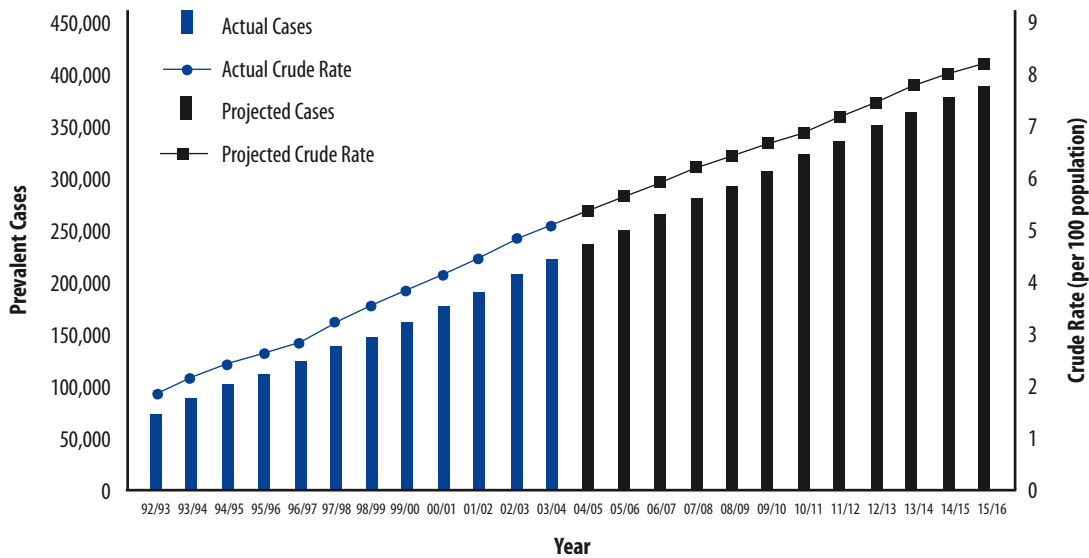
The projected growth of the diabetes prevalence rate in British Columbia is indicative of the significant impact a chronic condition can have on the sustainability of the publicly-funded health care system. As noted in the 2004 Provincial Health Officer’s annual report:<sup>11</sup>

People with diabetes experience much higher rates of hospitalization for other conditions often

associated with diabetes. . . . These conditions are sometimes direct complications of diabetes (such as chronic renal disease, lower limb amputations, etc.) but are often co-morbid conditions (co-existing medical conditions) related to many of the lifestyle-influenced risk factors that lead to the development of Type 2 diabetes (e.g., high blood pressure, heart disease, heart attacks, heart failure, etc.). Over the time period 1992/1993 to 2003/2004, age-standardized rates show that persons with diabetes experienced more than 17 times the yearly rate of hospitalization for amputations, 8 times the yearly rate of hospitalization for chronic renal disease, and 3-4 times the yearly rate of hospitalization for cardiovascular-related conditions compared to those without diabetes.

Similar growth in impacts may be anticipated for other chronic disease such as hypertension, which is even more prevalent than diabetes and, like diabetes, can result in serious medical conditions such as heart disease, stroke and renal disease if left untreated or inadequately managed.

**Figure 7** Diabetes Prevalence Projections, Cases and Crude Rates, BC, 1992/1993 to 2015/2016



Data Source: Population Health Surveillance and Epidemiology, Ministry of Health. (2005).  
 Source: Provincial Health Officer. (2005). *The Impact of Diabetes on the Health and Well-being of People in British Columbia: Provincial Health Officer’s Annual Report 2004.*

<sup>c</sup> For comparison, the prevalence of cancer in Canada in 2003 was close to 3 per cent, and the prevalence of heart disease in 2005 was approximately 5 per cent.

# CHRONIC DISEASE AND THE ECONOMIC BURDEN OF DISEASE

Poor health imposes costs on individuals and society and these costs include:

- The resources required to cure or prevent poor health.
- Lost production while the individual is incapacitated or after he or she has died.
- The discomfort from pain and poor quality of life.
- Anti-social costs (e.g., costs of related crime).<sup>12</sup>

The economic costs are usually classified into direct costs of medical care, indirect costs of ill health (measured usually as lost production) and intangible costs of pain, suffering and anxiety. It can be difficult to put an economic cost on intangibles such as pain and suffering; nonetheless, these are real costs experienced by ill or injured people and their families. Appendix 1 provides an overview of how the costs of illness are typically measured.

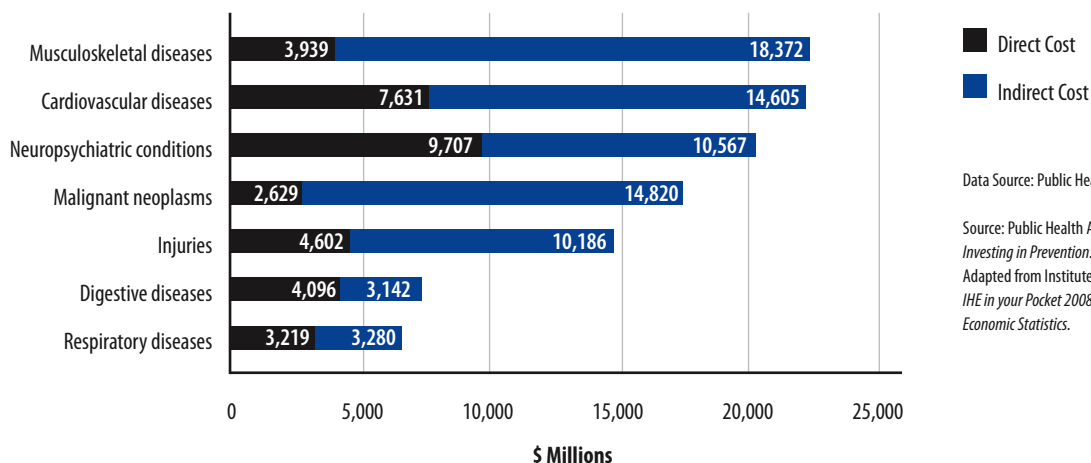
## Direct and Indirect Costs

The annual economic burden of illness in Canada in 2000 was \$188 billion (direct and indirect costs).<sup>13</sup> Figure 8 illustrates these costs for seven major disease and injury categories. Direct expenditures amounted to \$97.9 billion (52.1 per cent of the total economic burden of illness) and included:

- hospital care expenditures;
- drug expenditures;
- physician care expenditures;
- expenditures for care in other health care institutions (non-hospital residential care); and
- additional direct expenditures (expenditures on services of other health care professionals [i.e., non-physicians], capital expenditures, public health and health insurance).

**Figure 8**

**The Economic Burden for Major Diseases/Injury Categories in Canada, 2000**



Data Source: Public Health Agency of Canada, 2008.

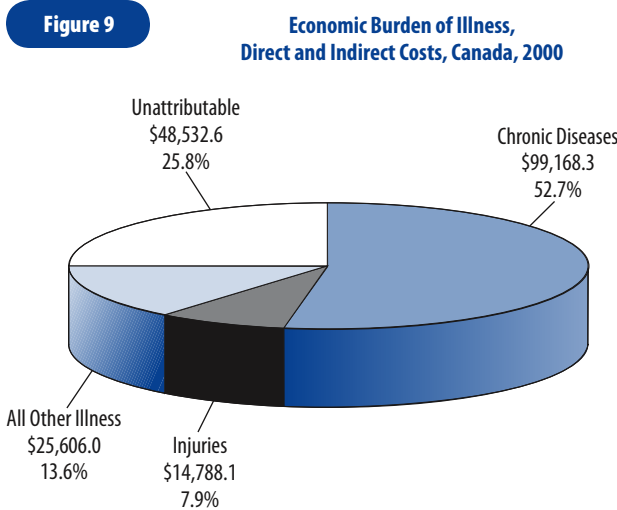
Source: Public Health Agency of Canada. (2009, May). *Investing in Prevention: The Economic Perspective*.<sup>14</sup> Adapted from Institute of Health Economics. (2008). *IHE in your Pocket 2008: A Handbook of Health Economic Statistics*.

### Economic Burden of Chronic Disease in Canada

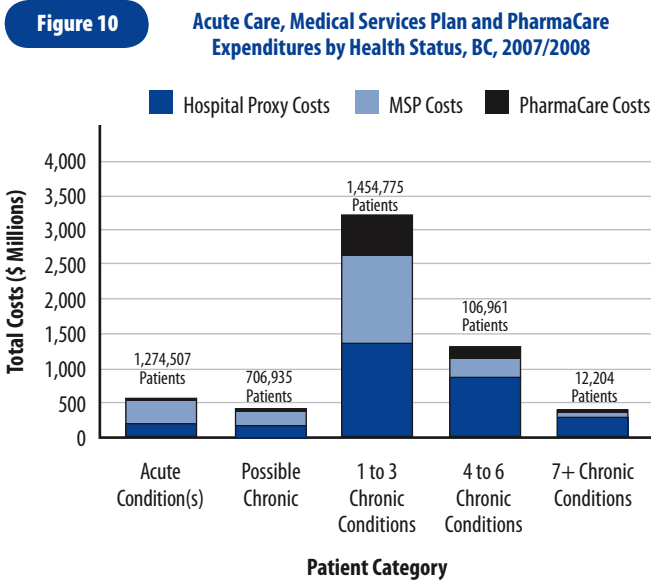
By far the largest proportion of total costs of health care in Canada—both direct (health care) and indirect (lost production)—are attributable to chronic diseases (52.7 per cent) and injuries (7.9 per cent) (See Figure 9).

As noted earlier in this report, one in three British Columbians (32 per cent) are living with one or more diagnosed chronic conditions, and a further 2 per cent of the population is living with four to six chronic conditions. Figure 10 shows the health care costs for these individuals. While people with chronic conditions account for 34 per cent of the BC population, they consume approximately 80 per cent of the combined Medical Services Plan, PharmaCare and acute care budgets.<sup>15</sup>

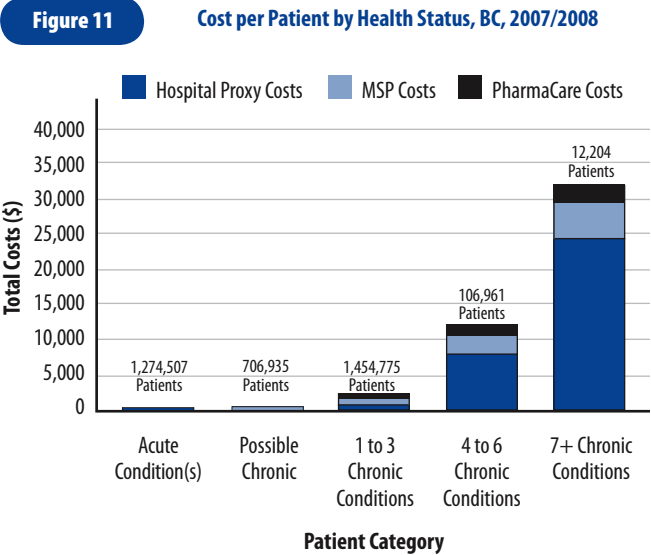
Figure 11 demonstrates that the cost per patient increases significantly for those individuals with more than one confirmed chronic condition.



Note: \$ Millions.  
Source: Public Health Agency of Canada. (2010). *Economic Burden of Illness in Canada 2000*.



Source: BC Ministry of Health Services, (2007/2008) Discharge Abstract Database, Medical Services Plan, PharmaCare data.



Source: BC Ministry of Health Services, (2007/2008) Discharge Abstract Database, Medical Services Plan, PharmaCare data.

## Behavioural Risk Factors for Chronic Disease

Behavioural risk factors for chronic disease are embedded in family, community and societal conditions that shape and influence—and may constrain—the choices people make, or can make. As noted in a landmark US Institute of Medicine report (2001)<sup>16</sup> that discussed health-related interventions at the individual, family, organization, community and societal levels:

- “Interventions must recognize that people live in social, political, and economic systems that shape behaviours and access to the resources they need to maintain good health”; and
- “While biological interventions and exhortations to individuals to change their behaviours are easier to

administer, changes in social factors, policies, and norms are necessary for improvement and maintenance of population health.”

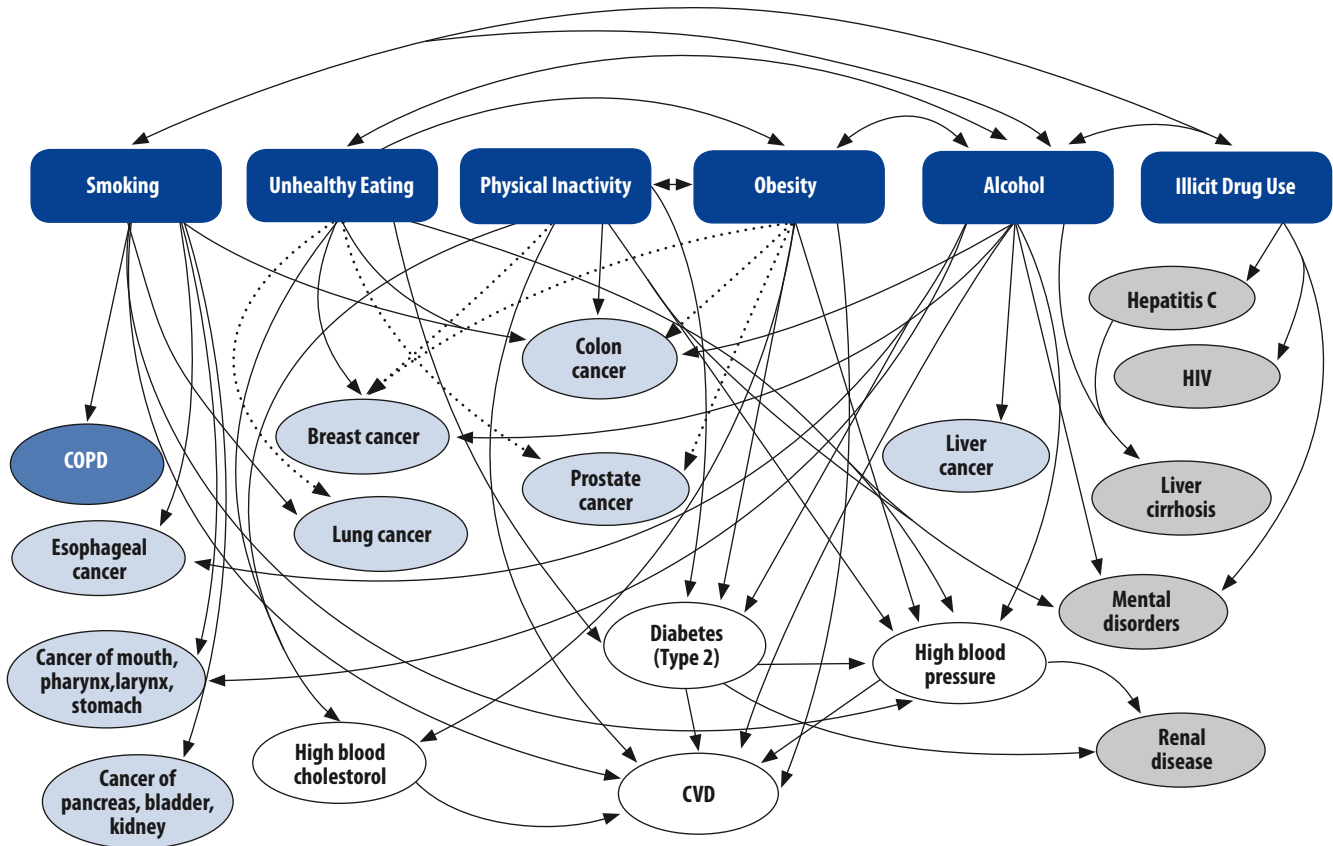
The main behavioural risk factors (proximal risk factors) for chronic disease, some mental health disorders and injury include:

- Obesity.
- Physical inactivity.
- Unhealthy eating.
- Tobacco use.
- Misuse of alcohol.

The complex interrelationships between these risk factors and different chronic diseases are illustrated in Figure 12.

Figure 12

Interrelationships between Risk Factors and Different Chronic Diseases



Note: Alcohol also has a protective effect for CVDs among women and men 45 years and older, depending on the pattern of drinking; the link to diabetes also depends on volume and patterns of drinking.  
 Source: *Chronic Disease in Ontario and Canada: Determinants, Risk Factors and Prevention Priorities*. (2006, March). Prepared for the Ontario Chronic Disease Prevention Alliance and the Ontario Public Health Association.



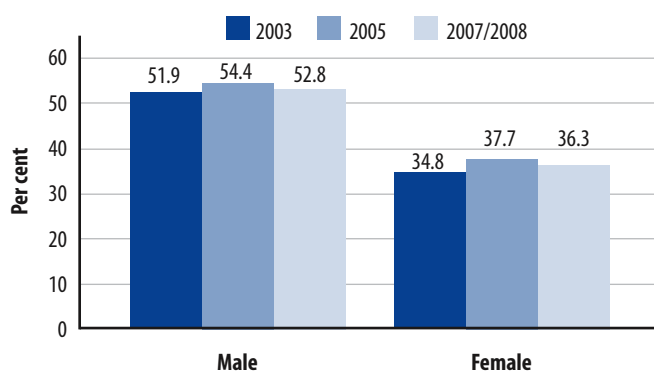
These risk factors can be exacerbated by stressful or even harmful conditions, policies or practices in our homes, schools, workplaces and communities, which can shape, influence and constrain our ability to make healthy choices.

Aside from smoking—which has benefited from an integrated population health promotion approach to reduce tobacco use over the past 25 years, leading to a continual decrease in the percentage of the population that smoke—the prevalence of the risk factors associated with the onset of chronic disease is increasing for Canadians.

Obesity is the second highest preventable, contributing cause of death in BC after cigarette smoking. An estimated 2,000 British Columbians die prematurely each year due to obesity-related illness. Obese individuals are also more likely to die prematurely from all causes of death than those with a healthy body weight. Obesity-related illnesses cost the British Columbia health care system an estimated \$380 million dollars annually. When productivity losses due to obesity—including premature death, absenteeism and disability—are added, the total cost of obesity to the British Columbia economy is estimated at \$730 to \$830 million per year.<sup>17</sup>

Figure 13 shows that females in BC are less overweight or obese than males (36.3 per cent compared to 52.8 per cent) and that rates have remained fairly consistent between 2003 and 2008.

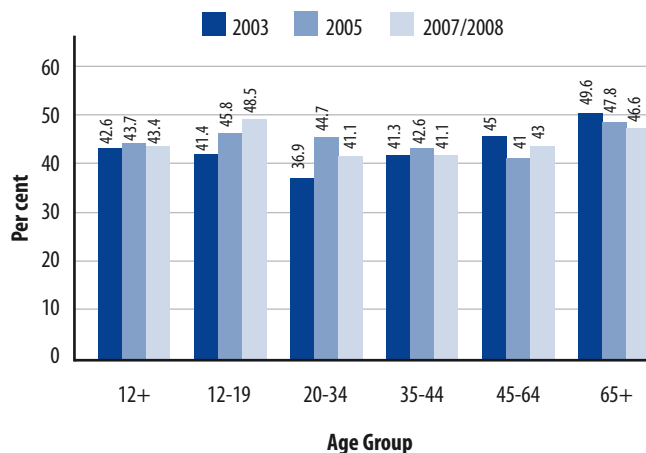
**Figure 13** Body Mass Index, Self-Reported, Adult (Age 18 +), Overweight or Obese, by Gender, BC, 2003, 2005 and 2007/2008



Source: Statistics Canada, Canadian Community Health Survey, CANSIM tables. 2003-05 Table 105-0501; 2007/2008 Table 105-0502.

**Figure 14**

**Fruit and Vegetable Consumption, 5 Times or More per Day, BC, 2003, 2005 and 2007/2008**



Source: Statistics Canada, Canadian Community Health Survey, CANSIM tables. 2003-05 Table 105-0501; 2007/2008 Table 105-0502

Unhealthy eating is one of the most common, yet modifiable, risk factors that contribute to obesity and the development of chronic diseases such as heart disease, diabetes, hypertension, osteoarthritis and certain types of cancer. The *BC Nutrition Survey* (1999) showed that only a very small proportion of adult British Columbians met the minimum recommendations in Canada’s Food Guide for all four food groups on a given day.

In BC, the 12-19 age group had the highest frequency of vegetables and fruit consumption—the only group to show significant improvements since 2003 (from 41.4 per cent to 48.5 per cent in 2007/2008). None of the remaining age groups reported changes that were significant (Figure 14).

Physical activity can benefit British Columbians of all ages and positively impacts the musculoskeletal, cardiovascular, respiratory and endocrine systems. Physical activity contributes to reducing levels of overweight and obesity. Research shows that there is a direct link between the level of physical activity that people engage in and their well-being and lifelong health. The prevalence of British Columbians (12+) classified as active or moderately active in their leisure time has dropped significantly, from 59.9 per cent in 2003 to 57.7 per cent in 2007/2008; however, BC’s level remains the highest in Canada.



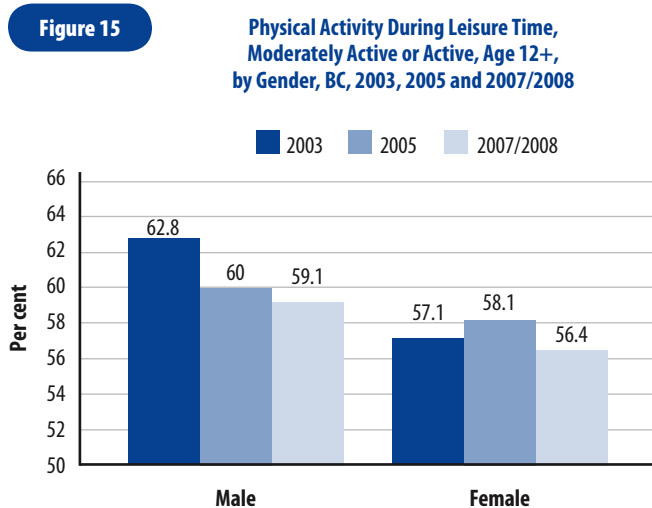
Figure 15 shows that BC males are becoming less active, at 59.1 per cent in 2007/2008 (versus 62.8 per cent in 2003). In 2003, the level of physical activity among males was significantly higher than among females; while males were still more active than females in 2007/2008, the difference between the two was much smaller.

Each year, tobacco use kills over 6,000 British Columbians and costs the BC economy approximately \$2.3 billion. Cigarette smoking is the primary risk factor for diseases of the circulatory system, cancers and respiratory diseases. Passive smoke kills up to 140 people in BC each year.

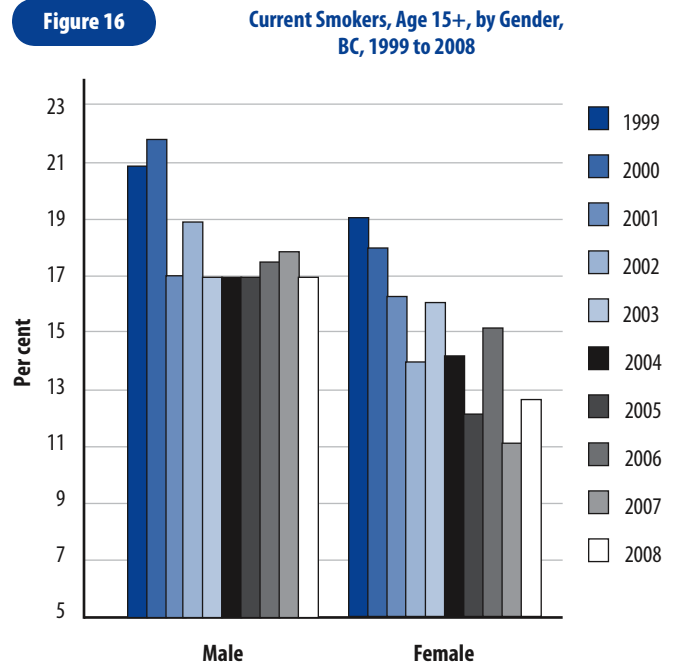
British Columbia continues to have the lowest smoking prevalence rates in Canada of 14.7 per cent, which is significantly lower than the Canadian average of 17.9 per cent. Although BC levels have dropped since 2003, the decrease is not statistically significant.

Figure 16 shows that in 2007, the smoking rate for males was significantly higher than the rate for females in BC. However, in 2008, the difference between the two rates was no longer statistically significant, due to a slight decrease in the rate for males, and a slight increase in the rate for females.

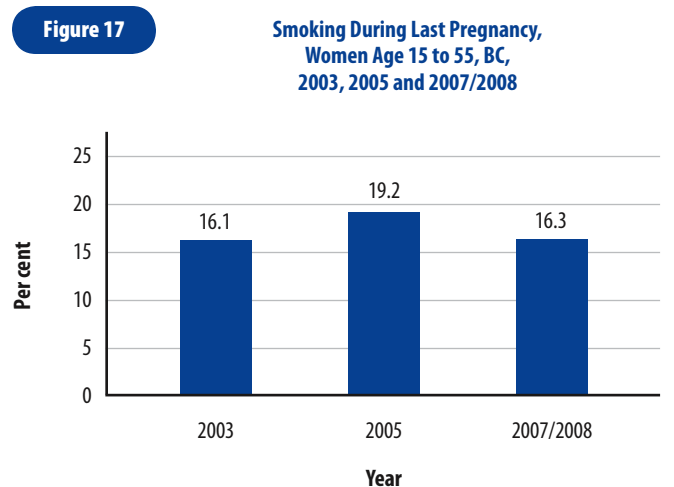
Smoking during pregnancy can lead to low birth weight and pre-term births, which can impact the future development of the child. Figure 17 shows that in 2007/2008, 16.3 per cent of BC women smoked during their last pregnancy, compared to 19.2 per cent in 2005 and 16.1 per cent in 2003.



Source: Statistics Canada, Canadian Community Health Survey, CANSIM tables. 2003-05 Table 105-0501; 2007/2008 Table 105-0502.



Source: Canadian Tobacco Use Monitoring Survey, Annual 2003-2007. Supplementary Tables. Available at: <http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/index-eng.php>.

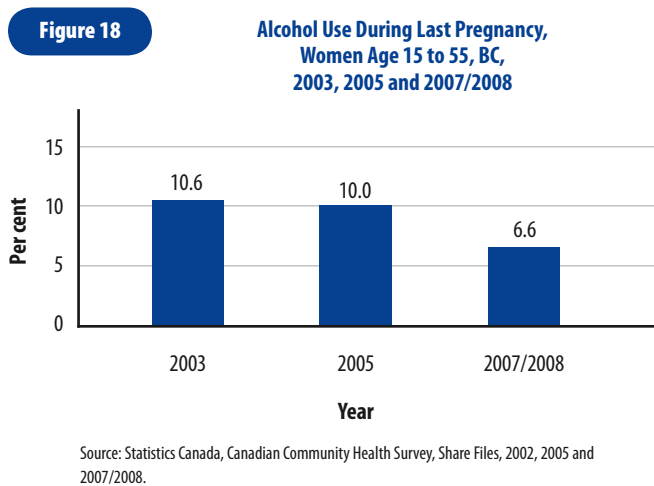


Source: Statistics Canada, Canadian Community Health Survey, Share Files, 2002, 2005 and 2007/2008.

Fetal alcohol spectrum disorder (FASD) is the leading cause of developmental disability among Canadian children. FASD is an umbrella term used to describe the spectrum of disabilities associated with prenatal exposure to alcohol. The prevalence rate of FASD in BC is estimated to be 9.1 per 1,000,<sup>18</sup> although American research suggests the prevalence of FASD in the United States and many Western countries could be as high as 20 to 25 per 1,000.<sup>19</sup>

The most recent study of the economic burden of FASD in Canada indicated that for each child diagnosed with FASD, the associated total adjusted annual costs were \$21,642. The annual cost of FASD in Canada was \$5.3 billion based on individuals ranging in age from day of birth to 53 years of age.<sup>20</sup> In addition to health and economic costs, the personal and social costs are also significant. Individuals with FASD are challenging to parent and often are placed within foster or residential care.

Figure 18 shows that the percentage of women who reported alcohol use during pregnancy has dropped from 10.6 per cent in 2003 to 6.6 per cent in 2007/2008.



## Economic Costs of Risk Behaviours

The annual direct and indirect costs of several discrete risk behaviours have been estimated. There is some overlap (e.g., between physical inactivity and obesity, which results from inactivity and unhealthy eating habits), so these amounts cannot simply be added together for a grand total; nonetheless, the costs are high and are identified in Table 1.

## Economic Burden of Illness and the Economic Costs of Risk Behaviours in British Columbia

The burden of individual and family suffering resulting from these chronic conditions and risk behaviours is compounded by the economic burden borne by the province’s citizens, businesses and government. This economic burden includes both the direct costs of illness to the health care system and the indirect costs (lost productivity) resulting from premature mortality and short- and long-term disability.

The economic burden of illness in British Columbia in 1998 was \$22.03 billion.<sup>21</sup> Table 2 provides more detail regarding the direct and indirect costs of the burden of illness in British Columbia.

The burden of disease and its economic costs remains high in BC. Yet, it is equally clear that there are potential economic benefits to British Columbia in having a healthy population and reducing the burden of disease. Examples of proven or estimated future economic benefits resulting from health improvement and the prevention of disease, disability and injury include:

- The total economic burden (direct and indirect costs) of physical inactivity in British Columbia has been estimated at \$573 million annually.<sup>22</sup> Katzmarzyk<sup>23</sup> has calculated that a 10 per cent reduction in physical inactivity would reduce health care costs attributable to physical inactivity by 7 per cent, resulting in an annual health care cost avoidance of \$161 million nationwide. By extrapolation, Colman<sup>22</sup> estimated that the annual cost avoidance for BC attributable to a 10 per cent reduction in physical inactivity would be \$49.4 million annually (\$18.3 million in direct health care costs and \$31.1 million in economic productivity gains). This 10 per cent reduction in physical inactivity in BC could also save 139 lives annually and avoid 385 potential years of life lost annually.
- Colman has calculated that if all British Columbians had a normal weight (BMI between 20 and 24.9) the province could realize a savings (cost avoidance) of up to \$830 million per year. If all British Columbians had healthy weights and did not smoke, the cost avoidance would be \$2 billion annually.<sup>24</sup> However, these costs would not accrue immediately as the benefits of a normal weight, physical activity and non-smoking accrue over a lifetime.

**Table 1: Economic Costs of Risk Behaviours**

Risk Behaviour	Cost
<b>Physical Inactivity</b>	<ul style="list-style-type: none"> <li>The total economic burden of physical inactivity (direct and indirect costs) in Canada was estimated at \$9.16 billion annually or \$300.4 per capita (1999).</li> <li>Direct health care systems costs: \$9.14 billion (\$283.8 per capita).</li> <li>Estimated indirect costs (see note): \$0.02 billion.</li> </ul>
<b>Obesity</b>	<ul style="list-style-type: none"> <li>The total direct cost of obesity in Canada in 1997 was estimated to be between \$2.1 billion and \$11 billion (or between \$64.4 and \$343.4 per capita).</li> </ul>
<b>Tobacco Use</b>	<ul style="list-style-type: none"> <li>All tobacco-related diseases together cost the Canadian health care system approximately \$4.7 billion a year in direct health care costs. Production losses due to premature death and disability as a result of most tobacco-related diseases cost the Canadian economy an additional \$13 billion a year, for a total economic burden of \$17.7 billion in 2002. The estimated annual per capita cost is \$541 for Canada.</li> </ul>
<b>Alcohol Use</b>	<ul style="list-style-type: none"> <li>Alcohol-related diseases cost the Canadian health care system about \$2.7 billion a year in direct health care costs. Production losses due to premature death and disability as a result of most alcohol-related diseases cost the Canadian economy an additional \$4.6 billion a year, for a total economic burden of \$7.3 billion in 2002. The estimated annual per capita cost is \$223.</li> </ul>
<b>Unhealthy Eating<sup>10</sup></b>	<ul style="list-style-type: none"> <li>The annual economic burden of unhealthy eating in Canada is estimated to be \$6.3 billion, which includes health care costs of \$1.3 billion.</li> </ul>

Note: Indirect costs for physical inactivity may be underestimated, as only production losses due to premature death are included (disability data were not available).

Source: Data in this section are derived from *Economic Cost of Chronic Disease in Canada: 1995-2003 (March 2007)*, by J. Patra, S. Popova, J. Rehm, S. Bundy, R. Flint and N. Giesbrecht. Prepared for the Ontario Chronic Disease Alliance and the Ontario Public Health Association.

**Table 2: Economic Burden of Illness in British Columbia, 1998 (Diagnostic Categories Contributing 1 Per Cent or Greater to Total Costs)**

Diagnostic Category*	Total Cost (\$22.03 billion)		Direct Cost (\$10.95 billion)		Indirect Cost (\$11.09 billion)	
	% of total	Rank	% of total	Rank	% of total	Rank
Musculo-skeletal diseases	12.3%	(1)	3.4%	(7)	21.0%	(1)
Cardiovascular diseases	10.0%	(2)	7.5%	(1)	12.4%	(4)
Injuries	9.1%	(3)	4.1%	(3)	14.0%	(2)
Cancer	7.9%	(4)	2.7%	(9)	13.0%	(3)
Nervous system/sensory disease	5.5%	(5)	3.4%	(6)	7.5%	(5)
Respiratory diseases	5.4%	(6)	3.8%	(5)	7.0%	(6)
Mental disorders	5.3%	(7)	5.1%	(2)	5.4%	(7)
Digestive diseases	3.2%	(8)	4.0%	(4)	2.4%	(8)
Genitourinary diseases	2.0%	(9)	3.1%	(8)	1.0%	(11)
Endocrine and related diseases	1.5%	(10)	1.7%	(10)	1.4%	(10)
Infectious/parasitic diseases	1.4%	(11)	1.0%	(13)	1.9%	(9)
Pregnancy	1.1%	(12)	1.6%	(12)	0.6%	(12)
Skin and related disorders	1.0%	(13)	1.7%	(11)	0.2%	(15)
<b>Total Cost</b>	<b>65.7%</b>		<b>43.1%</b>		<b>87.8%</b>	
<b>(% of costs excluding unattributable, etc.)</b>	<b>98.8%</b>		<b>98.2%</b>		<b>98.9%</b>	

\* Excludes "unattributable", ranked #1 overall, (22.4% of total costs, 45.0% of direct costs, 0.1% of indirect costs); "ill-defined conditions", ranked 6th overall (5.6% of total costs, 3.1% of direct costs, 8.0% of indirect costs); others", ranked 11th overall (3.1% of total costs, 5.6% of direct costs, 0.7% of indirect costs); and "well patient care", ranked 12th overall (2.4% of total costs, 2.4% of direct costs, 2.4% of indirect costs). Combined, these categories accounted for 33.5% of total costs, 56.1% of direct costs, and 11.2% of indirect costs.

Note: Data derived from the charting application at [http://ebic-femc.hc-sc.gc.ca/home\\_e.php?Lang=e](http://ebic-femc.hc-sc.gc.ca/home_e.php?Lang=e).

Source: Health Canada. (2002). *Economic Burden of Illness in Canada*.



# HEALTH GOALS AND THE DETERMINANTS OF HEALTH

## BC Health Goals

Since the early 1990s, British Columbia’s public health system has evolved substantially. The 1990s saw the development of an important context for public health—the adoption of population health goals for the province.<sup>25</sup>

The health goals set out a vision for a healthy population and a framework for action to improve the health of British Columbians. As noted in the 2002 Provincial Health Officer’s annual report, “originally BC’s health goals were established to serve as a guide for creating a unifying policy framework for government planning...and the concepts underlying

the health goals were used primarily in [the] ministry’s [of Health] business plans.”<sup>26</sup> The health goals correlate with government’s Five Great Goals, which define the province’s strategic vision (see Table 3).

The significance of the health goals is that they go beyond the health care system and encompass the many non-medical factors known to influence a person’s health and well-being. These “determinants of health” include how we live and work (Goal 1); our individual capacities, skills and choices (Goal 2); our physical environment (Goal 3); and the system of health services available to us (Goal 4). The health goals also recognize the importance of Aboriginal health (Goal 5) and disease and injury prevention (Goal 6).<sup>27</sup>

**Table 3: Comparison of BC Health Goals and BC Government’s Five Great Goals**

BC Health Goals	5 Great Goals
<b>Goal 1:</b> Living and Working Conditions: Positive and supportive working conditions in all our communities.	<b>Goal 5:</b> Create more jobs per capita than anywhere else in Canada.
<b>Goal 2:</b> Individual Capacities, Skills and Choices: Opportunities for all individuals to develop and maintain the capacities and skills needed to thrive and meet life’s challenges and to make choices that enhance health.	<b>Goal 1:</b> Make B.C. the best-educated, most literate jurisdiction on the continent.
<b>Goal 3:</b> Physical Environment: A diverse and sustainable physical environment with clean, healthy and safe air, water and land.	<b>Goal 4:</b> Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none.
<b>Goal 4:</b> Health Services: An effective and efficient health service system that provides equitable access to appropriate services.	<b>Goal 3:</b> Build the best system of support in Canada for persons with disabilities, those with special needs, children at risk and seniors.
<b>Goal 5:</b> Aboriginal Health: Improved health for Aboriginal peoples.	The New Relationship with First Nations is founded on reconciliation, recognition and respect for Aboriginal rights and title. Its aim is to restore, revitalize and strengthen First Nations and their communities and families to eliminate the gap in standards of living with other British Columbians. The 5 Great Goals can only be achieved if First Nations citizens attain these goals as well.
<b>Goal 6:</b> Disease and Injury Prevention: Reduction of preventable illness, injuries, disabilities and premature deaths.	<b>Goal 2:</b> Lead the way in North America in healthy living and physical fitness.

**The Public Health Agency of Canada has provided the following examples of the determinants of health:**

- **Income and Social Status** – Health status improves at each step up the income and social hierarchy. High income promotes living conditions such as safe housing and the ability to buy sufficient good food. The healthiest populations are those in societies that are prosperous and have an equitable distribution of wealth.
- **Social Support Networks** – Support from families, friends and communities is associated with better health. Effective responses to stress and the support of family and friends seem to act as a buffer against health problems.
- **Education** – Health status improves with each level of education. Education increases opportunities for income and job security, and gives people a sense of control over life circumstances—key factors that influence health.
- **Employment and Working Conditions** – Unemployment is associated with poorer health. People who have more control over their work circumstances and fewer stressful job demands are healthier and often live longer than those involved in more stressful or riskier work and activities.
- **Social Environments** – Social stability and strong communities can help reduce health risks. Studies have shown a link between low availability of emotional support, low social participation and mortality (whatever the cause).
- **Geography** – Whether people live in remote, rural communities or urban centres can have an impact on their health.
- **Physical Environments** – Physical factors in the natural environment (e.g., air and water quality) are key influences on health. Factors in the human-built environment such as housing, workplace safety, and community and road design are also important influences.
- **Healthy Child Development** – The effect of prenatal and early childhood experiences on subsequent health, well-being, coping skills and competence is very powerful. Children born in low-income families are more likely than those born to high-income families to have low birth weights, to eat less nutritious food, and to have more difficulty in school.
- **Health Services** – Health services contribute to the population's health, particularly those designed to maintain and promote health, to prevent disease and to restore health and function.
- **Gender** – Women are more vulnerable to sexual or physical violence, low income, single parenthood and health risks such as accidents, sexually transmitted diseases, suicide, smoking and physical inactivity. Measures to address gender inequality within and beyond the health system improve population health.
- **Culture** – Belonging to a particular race or ethnic or cultural group influences population health. The health of members of certain cultural groups (e.g., First Nations, visible minorities and recent immigrants) can be more vulnerable because of cultural differences and the risks to which the group as a whole are exposed.

Source: Public Health Agency of Canada. (May 2010). What determines health? Retrieved from <http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php>

## Determinants of Health and Chronic Disease Risk Conditions

The determinants of health impact the health of the entire population, but those that adversely affect health (which can be thought of as adverse environmental, social, economic and other risk conditions) tend to be clustered among people suffering various forms of disadvantage. Inequalities in the distribution of the determinants of health across populations contribute to health disparities that can be seen time and again, across all nations and across all settings—homes, schools, workplaces and neighbourhoods.

### *Health Status Disparities and Health Care Utilization*

Health disparities result largely from the uneven distribution of the underlying determinants of health across populations. The evidence indicates that the sections of the population with the most resources—the highest incomes, most education, good housing, good neighbourhoods, good jobs, high personal empowerment, etc.—consistently have the best health and live the longest lives. Those with the fewest resources—the lowest incomes, poor education, bad housing and unsafe neighbourhoods, little or no employment, poor early childhood experiences, little empowerment, etc.—have the worst health and the shortest lives.

In between these extremes there is a gradient of increasingly better levels of health and life expectancy at each step up the socio-economic ladder. At every step there are differences in risk factors, health status, incidence of disease and mortality for a wide range of physical and mental health disorders. This gradient is of concern, because every step down represents an additional burden of illness, and in total represents a very significant burden of illness—a considerable portion of which is preventable—that the health care system then has to address.

A number of studies have demonstrated that the lowest socio-economic status (SES) groups are more often and more seriously sick or injured.<sup>28</sup> Low SES often results in low self-esteem; a lack of knowledge and life skills for making healthy choices; an unhealthy physical environment; a lack of awareness of what constitutes risk behaviours; the stress of working in low wage, precarious employment with little latitude for decision-making; and little opportunity to participate in one's community. The impact can be generational, making low SES both a cause and an outcome of poor health.

In Canada, there is a considerable gap between the most and least healthy. The most important consequences of health disparities are avoidable death, disease, disability, distress and personal suffering. When this health gap is preventable, it is considered to be unjust or unfair, and is regarded as a "health inequity". These inequities undermine the cohesiveness of community and society, challenge the sustainability of the health system and have a measurable impact on the economy. Where the causes are preventable, health inequities can be successfully addressed; nevertheless, they continue to persist and, in some cases, are increasing across the country.

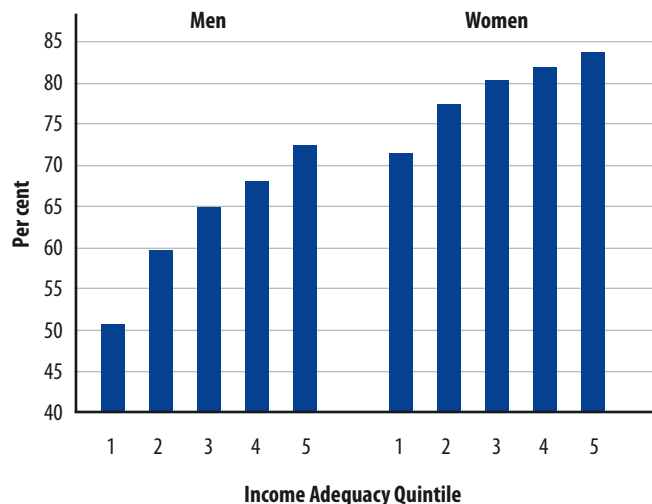
As noted earlier, the health care system is a key determinant of population health. If the health care system and public health programs and services do not address the needs of disadvantaged individuals and groups there is a risk that health disparities will grow. The lowest SES quintile uses approximately twice as much in the way of health care services as the highest quintile. An estimation of health care resources used by Canadian households shows that approximately 20 per cent of total health care spending may be attributable to income disparities. Despite higher overall use of health services, health disparities persist among lower SES groups.<sup>29</sup>

Figure 19 displays the percentage of Canadians (non-institutionalized population aged 25 or older at baseline), expected to survive to age 75, by gender and income adequacy group (1991 to 2001). Not only is there a large gap between the lowest and highest income group, but the gaps between groups is greater from the lowest to the next lowest group than any of the others, for both women and men, showing the marked disadvantage that the lowest income group experiences. There is also a gap between the highest and the next highest income group, even though both groups have good incomes by any measure, thus demonstrating the gradient effect.

The pattern of inequality of survival is also found for other measures of health status. The 2009 Statistics Canada report, *Income Disparities in Health-adjusted Life Expectancy for Canadian Adults, 1991-2000*,<sup>1</sup> found strong evidence of the socio-economic disparities in health. For example, for both men and women, aged 25 years, the difference in remaining health-adjusted life expectancy between the highest and lowest income groups was about 4 years more than the corresponding disparity in life expectancy, which highlights the higher morbidity rate that the lower income groups experience, in addition to their higher mortality rate.

**Figure 19**

**Remaining Life Expectancy at Age 25,  
Per Cent Expected to Survive to Age 75,  
by Gender, Canada, 1991 to 2001**



Source: Statistics Canada. (2008). The Canadian Census Mortality Follow-up Study, 1991 through 2001. *Health Reports*.



These findings<sup>1</sup> were magnified when the impact of specific health conditions were considered. The Statistics Canada study noted that, when health-adjusted life expectancy at age 25 was examined, the difference between the highest income decile and the overall average was estimated at 5.9 years for men and 4.2 years for women—around twice the impact of all cancers combined.

The 2008 Wellesley Institute report<sup>30</sup> further noted that the consequences of health disparities are most pronounced in the lowest 20 per cent of the SES scale. The lowest 20 per cent of the scale, when compared to the highest 20 per cent, have:

- Double the rate of diabetes and heart disease.
- A 60 per cent greater rate of two or more chronic health conditions.
- Triple the rate of bronchitis.
- Double the rate of arthritis or rheumatism.

The Wellesley report also found that the poorest fifth of Canada's population face an alarming 358 per cent higher rate of disability compared to the richest fifth, and that Canada's poor experience major health inequality in many other areas, including 128 per cent more mental and behavioural disorders; 95 per cent more ulcers; 63 per cent more chronic conditions; and 33 per cent more circulatory conditions.

The 2004 report of the Health Disparities Task Group of the Federal/Provincial/Territorial Committee on Population Health and Health Security<sup>29</sup> noted that people in the lower SES groups are more often and more severely sick or injured, and use approximately twice the amount of health care services as those in the highest income group.

The Wellesley Institute report found that the number of Canadians who rated their own health as “poor” or “fair” was roughly four times as high in the bottom quintile of SES groups, as compared to the top quintile (Figure 20).

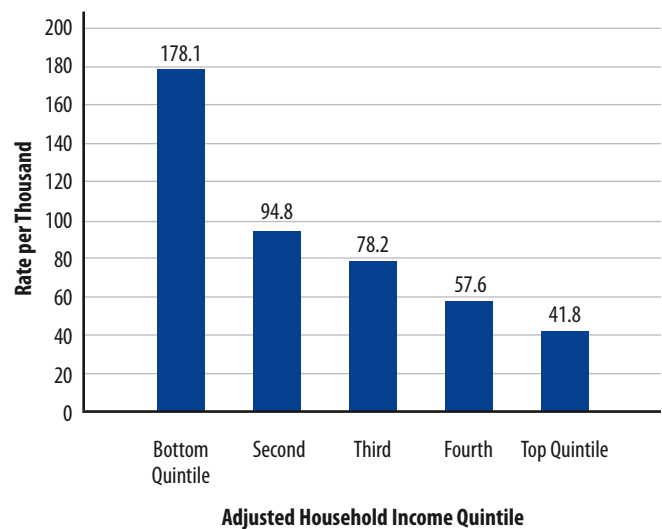
The number of people who rated their own health as “poor” or “fair” varied with income, from 178 per 1,000 in the lowest income quintile (adjusted), to 42 per 1,000 in the top quintile. That is, roughly four times as many respondents in the bottom quintile reported their health as poor or fair as compared to the top quintile; the response rate for poor or fair health in the bottom quintile was roughly double the response rate in the next lowest group. Self-rated poor or fair health decreases dramatically as income quintile increases.

This issue is particularly relevant with respect to hospitalization rates. The evidence indicates that those in the lowest SES group are more often and more severely sick or injured, and their rates of hospitalization are significantly higher than those in the highest SES group (Figure 21).

Thus inequality in the distribution of the determinants of health results in an excess burden of disease that can be attributed to the risk conditions that people experience, and to the risk behaviours that they may adopt in part due to those risk conditions. Clearly, both need to be addressed together if the burden of disease and its economic burden on the health care system and on society are to be reduced.

**Figure 20**

**Poor or Fair Self-Reported Health, Age-Adjusted Rates per Thousand Population, by Adjusted Household Income Quintile, Age 18 to 64, Canada, 2005**

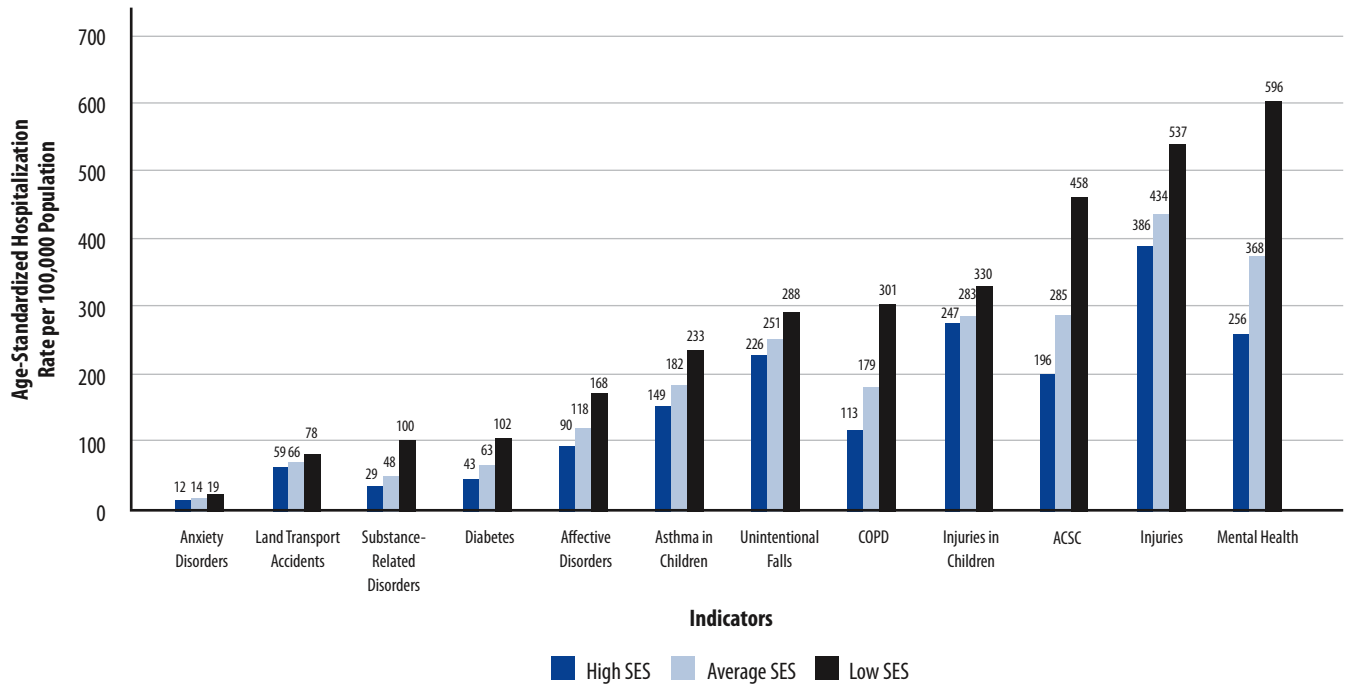


Source: Lightman, E., Mitchell, A., Wilson, B. (2008, December). *Poverty is Making Us Sick: A Comprehensive Survey of Income and Health in Canada.*



Figure 21

**Pan-Canadian Age-Standardized Hospitalization Rates  
and Self-Reported Health Percentages Across all 15 Census Metropolitan Areas**



## Notes:

COPD = Chronic Obstructive Pulmonary Disease

ACSC = Ambulatory Care Sensitive Conditions

Source: CPHI analysis of 2003/2004 to 2005/2006 Discharge Abstract Database and National Trauma Registry Data, Canadian Institute for Health Information, and Canadian Community Health Survey, cycles 2.1 (2003) and 3.1 (2005), Statistics Canada.

As an authoritative report<sup>31</sup> by a Committee of the US Institute of Medicine concludes, factors such as “stress, insufficient financial and social supports, poor diet, environmental exposures, community factors and characteristics, and many other health risks”, which contribute significantly to the risk of disease and death, are probably more effectively addressed at the level of community and environmental interventions than through individual-level interventions.

### **Low Income Levels in British Columbia**

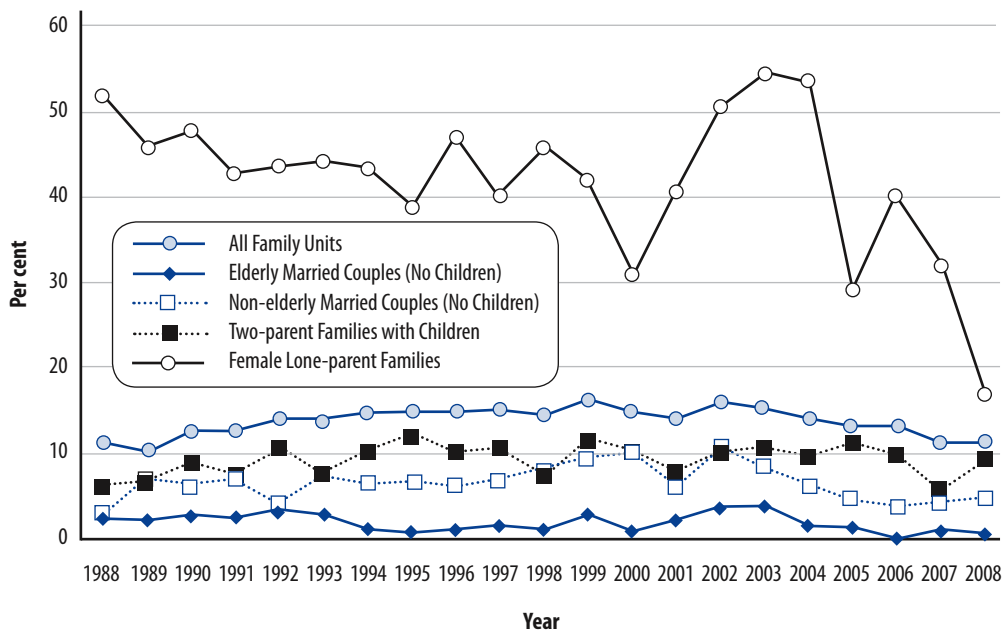
During the last 20 years, British Columbia has consistently had one of the highest rates of low income in the country.<sup>d,32</sup> However the provincial low income rate has been experiencing a declining trend. It is currently 11.4 per cent and is the lowest rate since 1989.

In BC, lone-parent women are the group most vulnerable to poverty, with rates that have been significantly higher than other family types for over 25 years. In 2008, based on after-tax income, about 17 per cent of lone-parent women in BC lived in poverty, as compared to two-parent families with a rate of just over 9 per cent. Although 17 per cent appears high, it is the lowest rate in over 25 years (Figure 22).

<sup>d</sup> Based on after-tax income.

**Figure 22**

**Low-Income Rates by Family Type, BC, 1988 to 2008**

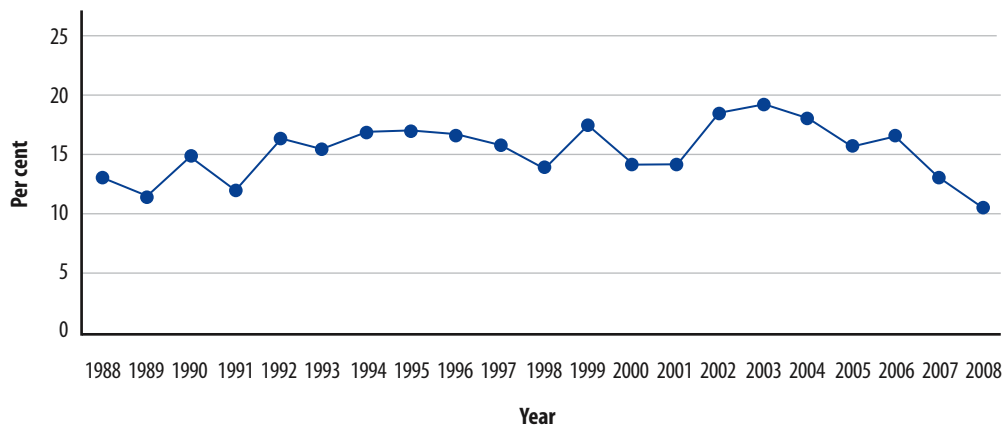


Note: After-tax income cut-offs were determined from an analysis of the 1992 Family Expenditure Survey.  
 Source: Statistics Canada, CANSIM Table 202-0804 - Persons in low income, by economic family type, annual. Data prepared by BC Stats, June 2010.

The child poverty rate in BC, which peaked in 2003 at 19.2 per cent, has declined steadily reaching 10.4 per cent in 2008, the lowest rate in over two decades (Figure 23).

**Figure 23**

**Child Poverty, BC, 1988 to 2008**

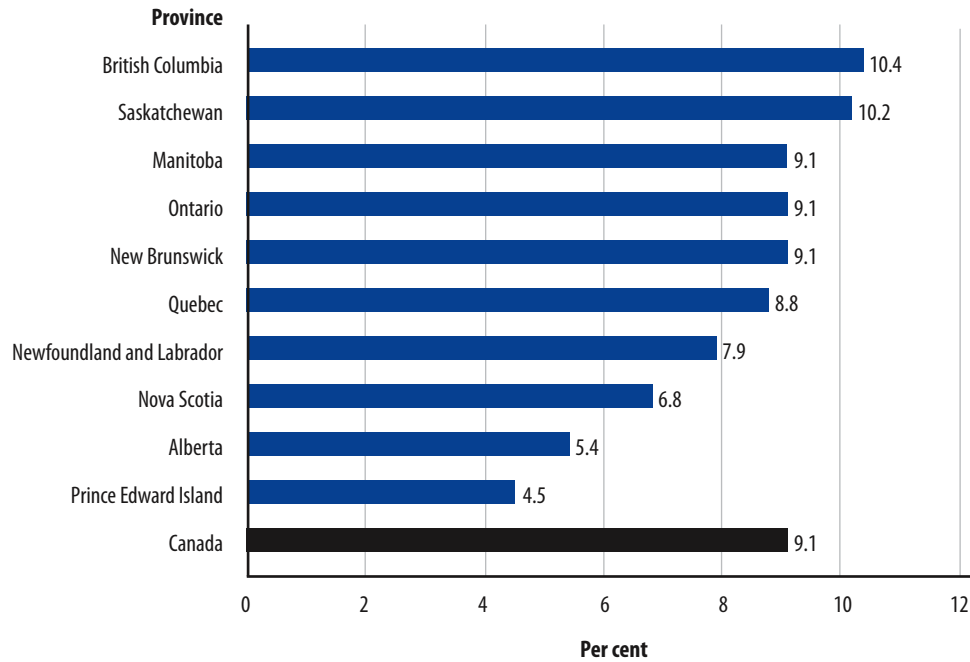


Note: After-tax low income cut-offs (1992 base) were determined from an analysis of the 1992 Family Expenditure Survey data.  
 Source: Statistics Canada, CANSIM Table 202-0802 - Persons in low income, annual 1988 to 2008. Data prepared by BC Stats, July 2010.

While BC continues to have the highest child poverty rate in Canada at 10.4 per cent as of 2008, it is only 1.3 per cent above the national average (Figure 24). Both the national and provincial child poverty rates have dropped to record low levels not seen in over two decades.

Figure 24

Child Poverty Rate, by Canadian Province, 2008



Note: After-tax low income cut-offs were determined from an analysis of the 1992 Family Expenditure Survey.

Source: Statistics Canada, CANSIM Table 202-0802 - Persons in low income, annual. Data prepared by BC Stats, June 2010.

## Food Security in British Columbia

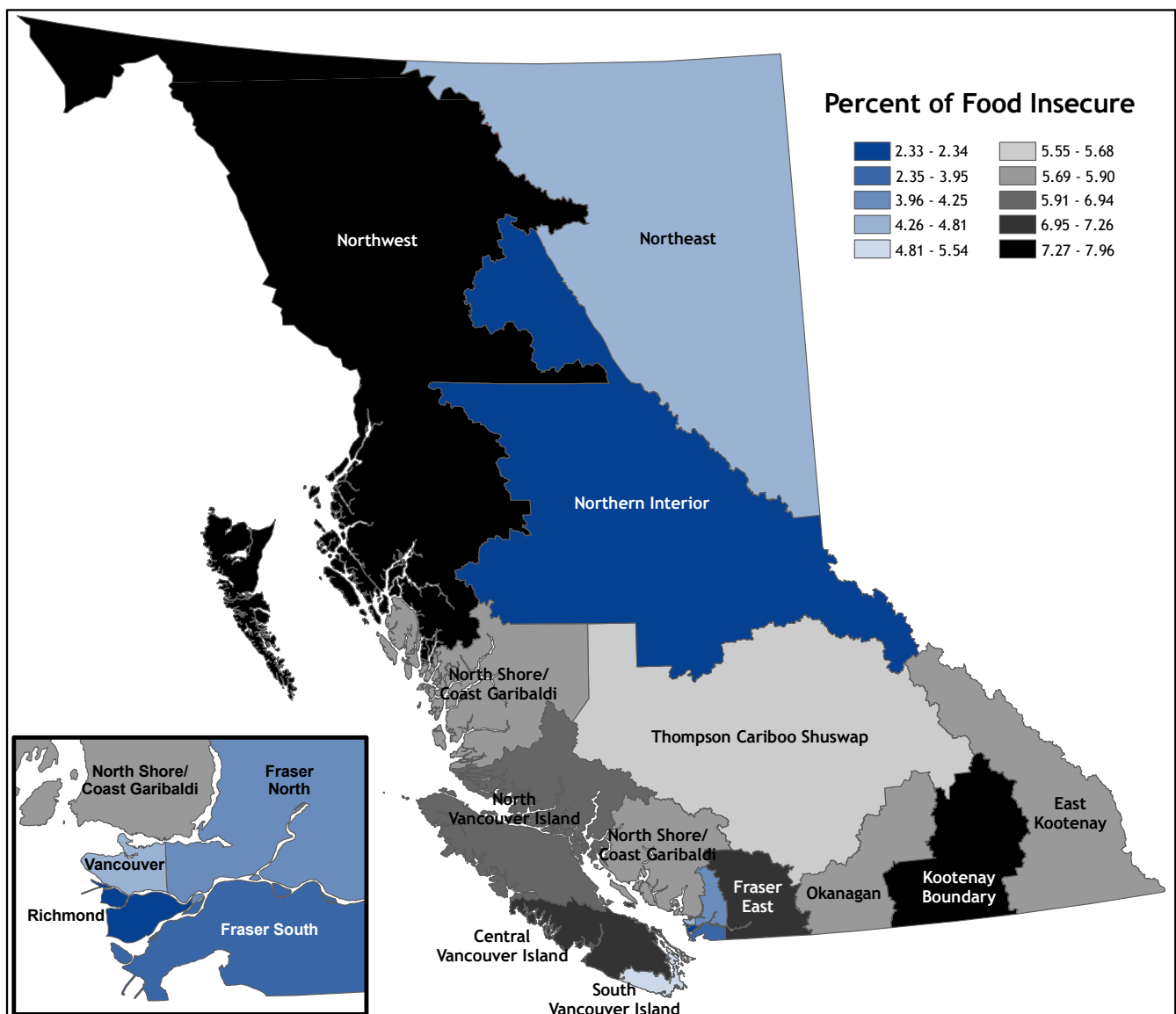
Food security is closely related to poverty. The 1996 *World Food Summit Plan of Action* defines food security as follows:

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle.<sup>35</sup>

As shown in Figure 25, food insecurity is greatest in the northwest part of BC, as well as in Central Vancouver Island, Fraser East and Kootenay/Boundary in the southern part of the province.

Figure 25

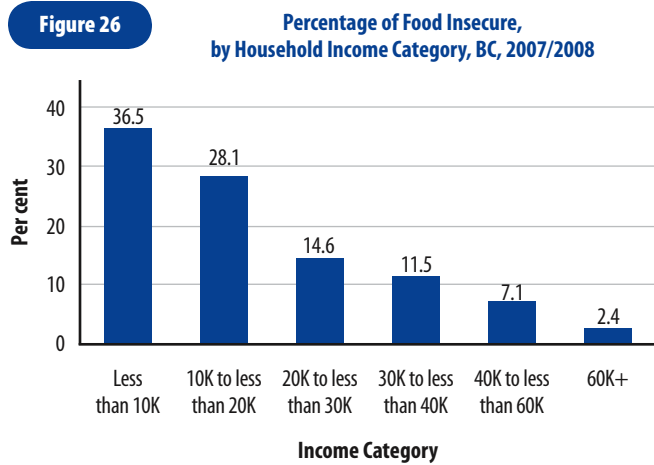
Regional Distribution of Food-Insecure Households, BC, 2005



Source: BC Stats, 2010.

Data Source: Statistics Canada, Canadian Community Health Survey Cycle 3.1 Share File (2005).

Figure 26 shows the extent of food insecurity in BC across income categories, with a high of 36.5 per cent in the lowest income category and tapering to a negligible 2 per cent for households earning over \$60,000 per year.

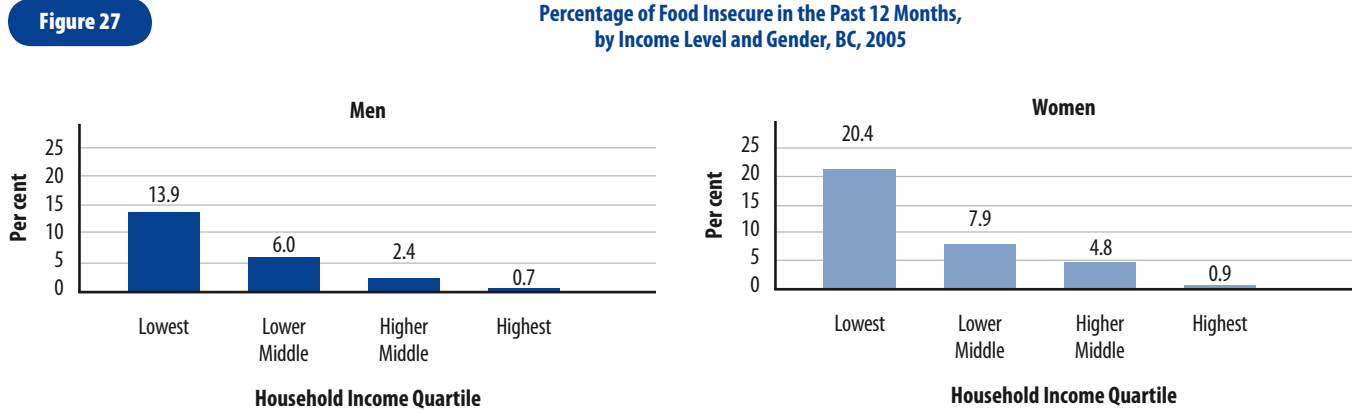


Source: Statistics Canada, Canadian Community Health Survey, Share File, 2007/2008; prepared by the Office of the Provincial Health Officer and Corporate Support, Planning and Legislation, Ministry of Healthy Living and Sport, 2010.

In Figure 27 and Figures 29 to 36, household income has been divided into quartiles and also by gender so that gradients within genders can be identified. The quartiles are broken down as follows:<sup>34</sup>

Income Level	Men	Women
Lowest income	< \$30K per year	< \$22K per yr
Lower middle income	\$30K - \$50K per yr	\$22K - \$40K per yr
Upper middle income	\$50K - \$80K per yr	\$40K - \$70K per yr
Highest income	> \$80K per yr	\$70K per yr

Gender plays a role in determining the extent of inequity on food security. Figure 27 shows that women in the lowest income group are much more likely to be food insecure than men in the lowest income group.



Data Source: Statistics Canada, Canadian Community Health Survey, Cycle 3.1 Share File, 2005.  
 Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.

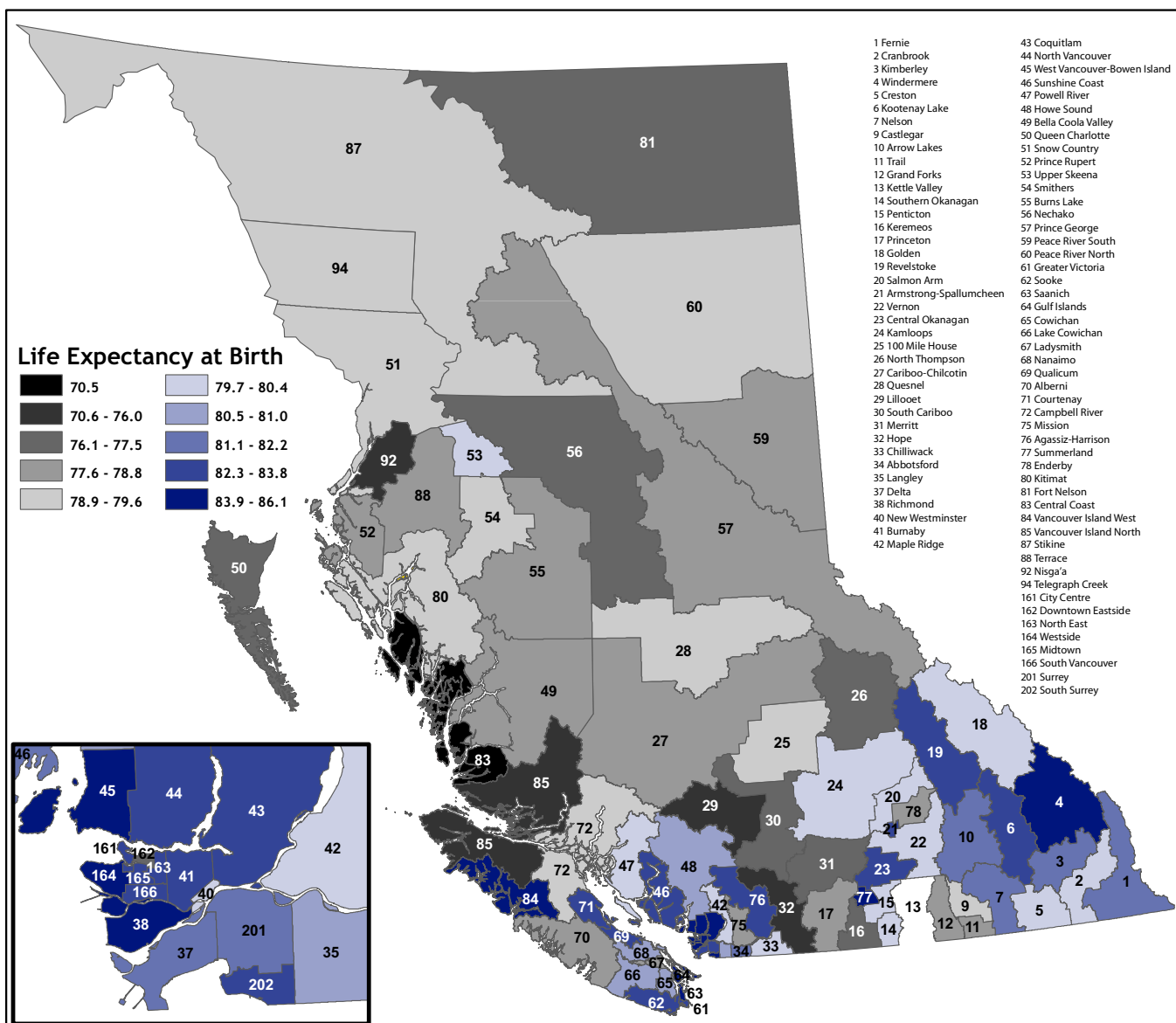
## Inequalities in Life Expectancy by Geographic Location in British Columbia

Life expectancy is a useful measure for comparing the relative health of populations. In BC, the highest life expectancies are found in the southern, urban areas (with the exception of the Downtown Eastside), and the lowest in the north and central

coast regions and northern Vancouver Island (Figure 28). The gap of 10-14 years in average life expectancy between these regions shows a significant degree of health inequality.

Figure 28

Life Expectancy by Local Health Authority, BC, 2005-2009



Note: The value for Local Health Authority 13 was suppressed for data quality reasons.  
 Source: Statistics Canada data prepared by BC Stats, 2010.

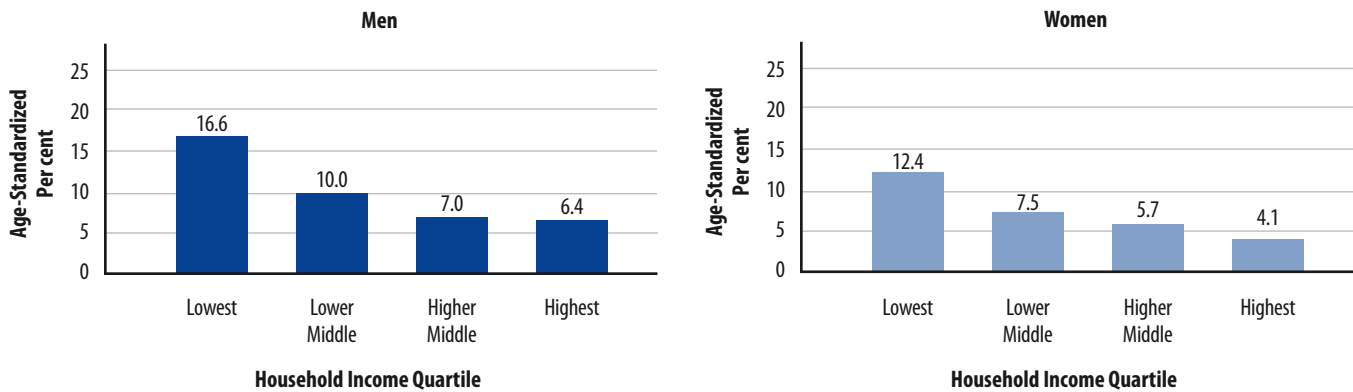
## Inequalities in Health Status in British Columbia

### Heart Disease

BC men from the lowest income group are more than twice as likely to report suffering heart disease as men from the highest income group (Figure 29). Women in the lowest income group are three times more likely to report experiencing heart disease than women from the highest income group.

Figure 29

Prevalence of Heart Disease,  
by Income Level and Gender, BC, 2005



Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.

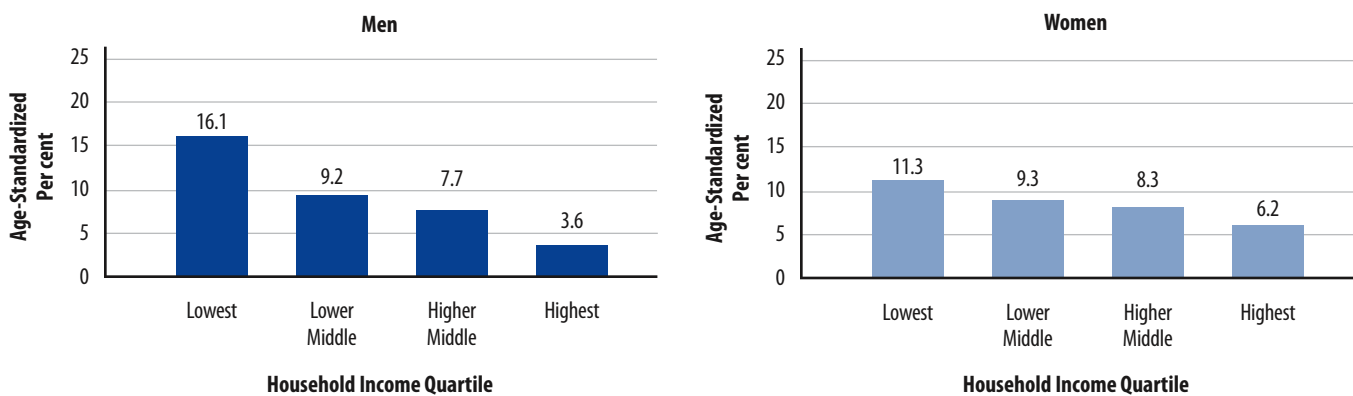
Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequalities in BC – Discussion Paper*.

### Diabetes

Figure 30 shows that BC men from the lowest income group are almost five times more likely to report having diabetes than men from the highest income group. Women from the lowest income group report diabetes at almost twice the rate of women from the highest income group.

Figure 30

Prevalence of Diabetes,  
by Income Level and Gender, BC, 2005



Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.

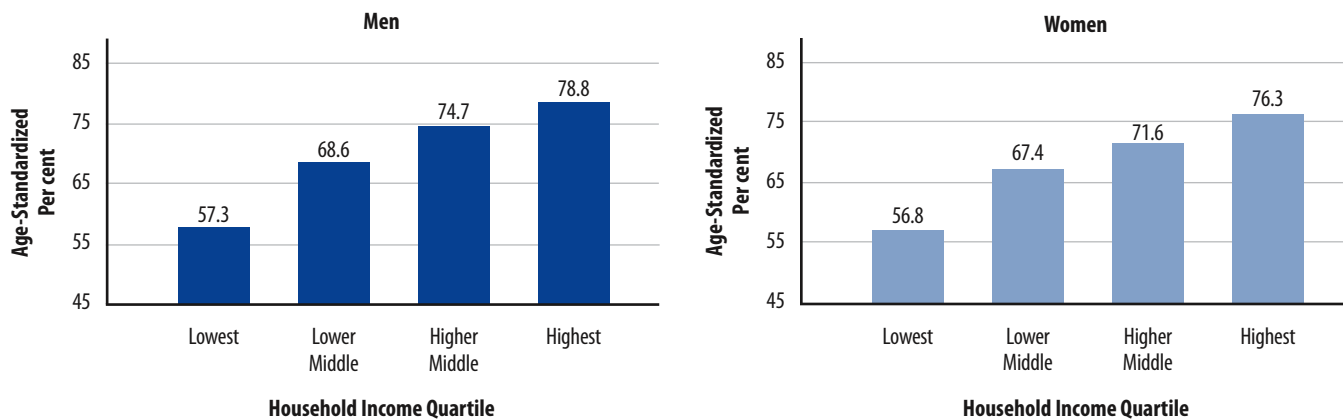
Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequalities in BC – Discussion Paper*.

### Mental Wellness

People with severe and persistent mental illnesses are heavily concentrated within the poorest sector of our society. In 1991, almost 27 per cent of Canadian adults with mental illness were living in poverty, compared with 12.6 per cent of people without a mental health issue.<sup>35</sup> Figure 31 demonstrates that individuals in the lowest income groups have significantly lower self-perceived mental health than individuals in the highest income groups.

**Figure 31**

**Self-Perceived Mental Health as Excellent or Very Good, by Income Level and Gender, BC, 2005**



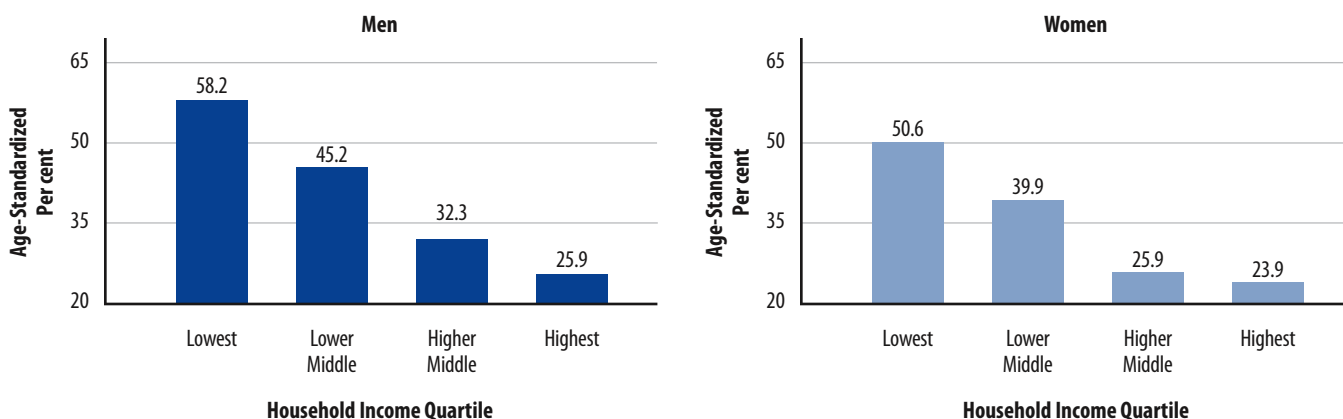
Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.  
 Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.

### Accessing Services – Dental Care

Figure 32 shows clearly that men and women in British Columbia from higher income households, who are more likely to have dental insurance than people with lower incomes, are much more likely to self-report visiting a dentist within the past year.

**Figure 32**

**Percentage Who Did Not See a Dentist in the Previous 12 Months, by Income Level and Gender, BC, 2005**



Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.  
 Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.



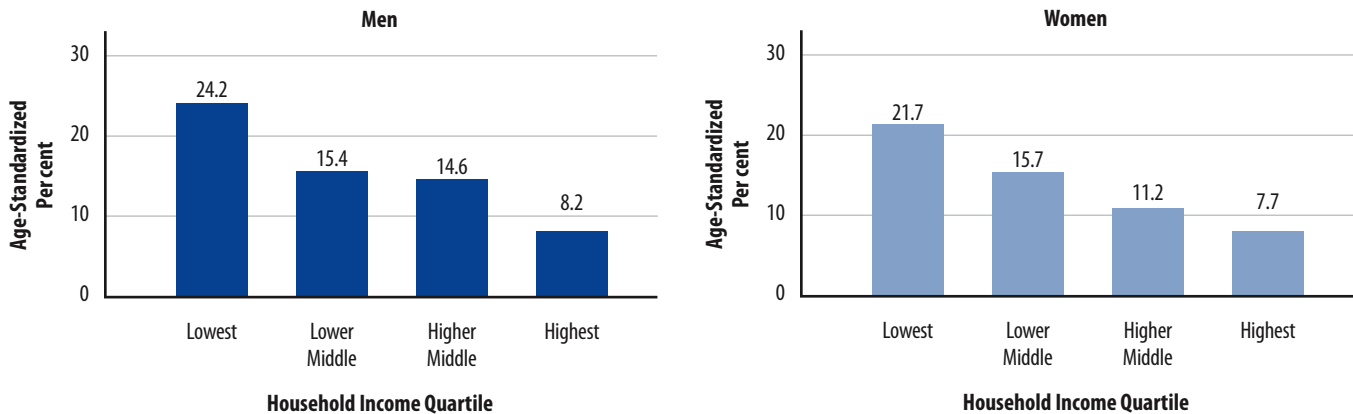
## Distribution of Behavioural Risk Factors in British Columbia

### Tobacco Use

Tobacco use is associated with a range of chronic diseases, including cancer, chronic lung disease, cardiovascular disease and stroke. Even in BC, with the lowest percentage of smokers among Canadian provinces, smoking is directly associated with over 5,000 deaths a year.<sup>4</sup> Figures 33 and 34 show that the prevalence of smoking among BC men and women follows a highly significant gradient based on household income and education level.

Figure 33

Prevalence of Daily Smokers,  
by Income Level and Gender, BC, 2005

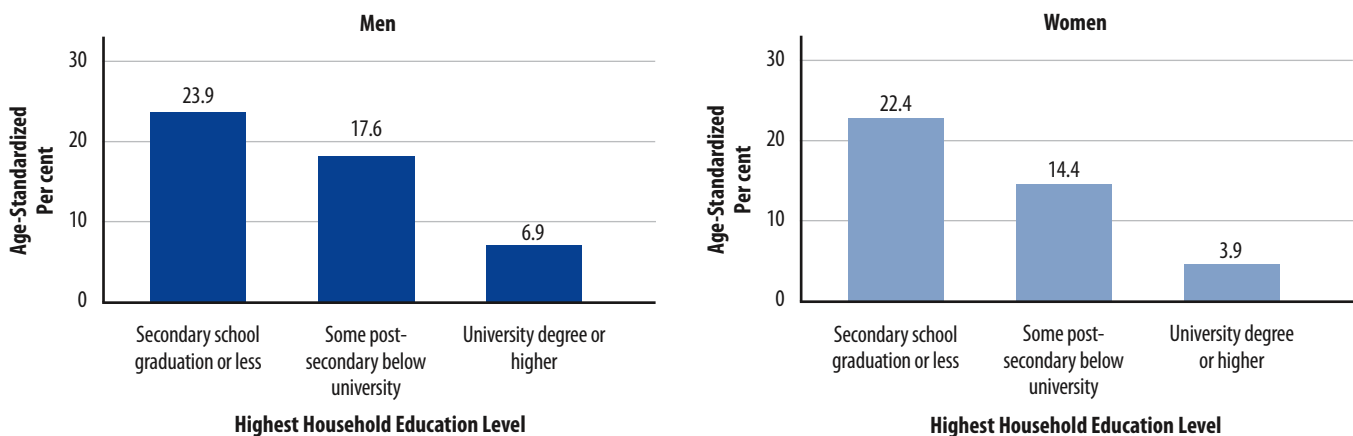


Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.

Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.

Figure 34

Prevalence of Daily Smokers,  
by Education Level and Gender, BC, 2005



Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.

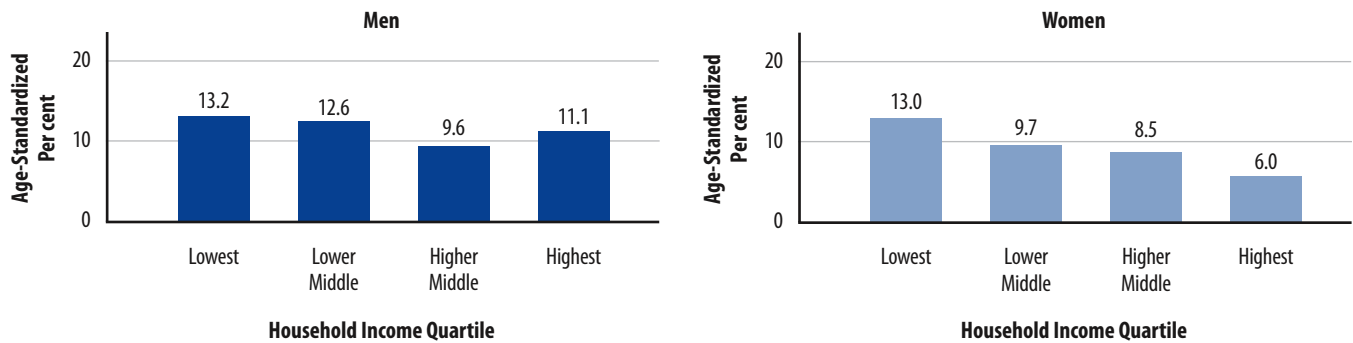
Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.

### Physical Inactivity

Like tobacco use, physical inactivity is a behavioural risk factor that varies according to socio-economic status. Figure 35 reveals that the gradient for women is more consistent than for men, with women in the lowest income group being twice as likely to be physically inactive as women in the highest income group.

**Figure 35**

**Prevalence of Physical Inactivity, by Income Level and Gender, BC, 2005**



Note: The data presented here refer only to activities during leisure time and do not take into account energy expended at work, in transportation, or doing housework.  
 Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.  
 Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.

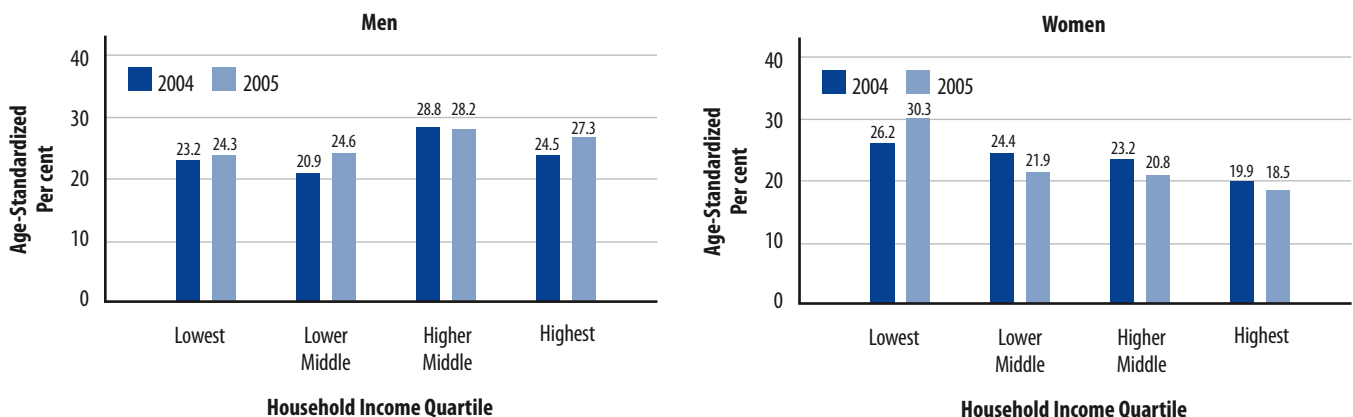
### Obesity

Obesity is strongly related to the development of chronic health conditions such as cardiovascular disease, Type 2 diabetes and various cancers. Cardiovascular disease is the leading cause of death in Canada and accounts for a loss of 4.5 years of life expectancy among Canadians.<sup>10</sup> Obese individuals are 50 to 100 per cent more likely to die prematurely from all causes of death than those with a healthy body weight. People who are obese are also more likely to suffer from mental health issues such as low self-esteem or depression.<sup>24</sup>

Figure 36 shows a small, but not statistically significant, gradient in obesity rate, by household income level for women. The pattern for males is less obvious.

**Figure 36**

**Measured Adult Obesity (BMI ≥ 30), by Income Level and Gender, Canada, 2005**



Note: Canadian data is being used to illustrate this point rather than BC data, because in this situation the BC sample size was too small to support a statistically sound analysis.  
 Data Source: Statistics Canada. Canadian Community Health Survey, Cycle 3.1 Share File, 2005.  
 Source: Provincial Health Services Authority and BC Health Officers Council. (2008 November). *Health Inequities in BC – Discussion Paper*.

## Reducing Health Costs Related to Inequalities

Health care spending varies dramatically worldwide. Despite the wide disparities, higher spending on health care does not necessarily prolong lives. This is evident in a comparison of Cuba and the United States on life expectancy and health care spending. In 2000, Cuba had an average life expectancy of 76.9 years (28th in the world), just behind the United States at 77.0 years. In contrast, Cuba's annual per capita health care spending that year was \$186, among the lowest in the world; this is a small fraction of the \$4,500 per person spent in the United States, which is more than any other country in the world. One reason that countries, such as Cuba, achieve high life expectancy with low health spending is that clean drinking water and preventive health services can be provided at much lower cost.<sup>36</sup>

Simply spending more money on health care is not the most effective strategy for increasing the overall health of a population. The Public Health Agency of Canada (PHAC) supports this conclusion:

...there is mounting evidence that the contribution of medicine and health care is quite limited, and that spending more on health care will not result in significant further improvements in population health. On the other hand, there are strong and growing indications that other factors such as living and working conditions are crucially important for a healthy population.<sup>37</sup>

Canadian Senator Wilbert Keon, co-chair of the Senate Subcommittee on Population Health, and founder and former Director of the Ottawa Heart Institute, goes further, by pointing out that in a time of scarce resources, increased health care spending could be a threat to population health:

...increased expenditures on health care are likely impacting negatively on the general health of our population by virtue of diminished investments in other areas like education (especially early childhood education), public housing, income security and other public services (2008).<sup>38</sup>

## Reducing Inequalities and Inequities in Health by Addressing the Determinants of Health

A recent paper commissioned by the Population Health Promotion Expert Group of the Pan-Canadian Public Health Network<sup>28</sup> reviewed the following six recent reports, each of which addressed the issue of health inequity in Canada:

- *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health*. World Health Organization, Commission on Social Determinants of Health (August 2008).
- *The Chief Public Health Officer's Report on the State of Public Health in Canada, 2008: Addressing Health Inequalities*. Public Health Agency of Canada (June 2008).
- *The Canadian Census Mortality Follow-Up Study*. Statistics Canada (August 2008).
- *Reducing Gaps in Health: A Focus on Socio-Economic Status in Urban Canada*. Canadian Population Health Initiative of the Canadian Institute for Health Information (November 2008).
- *Poverty and Chronic Disease*. Chronic Disease Prevention Alliance of Canada (April 2008).
- *Healthy People, Healthy Performance, Healthy Profits*. Conference Board of Canada (December 2008).

The review of these reports summarized the current understanding and wide range of evidence around the determinants of health and provided the consensus for action required to improve health and reduce inequities in health. The common findings included:

- The determinants of health include income, education, employment, literacy, housing and the built environment, sanitation, air and water quality and the state of our global life support systems, early childhood experiences, food security, social supports, access to preventive health services and general empowerment over the choices in people's lives.
- Unequal distribution of the above determinants undermines the health of millions of Canadians and costs our economy and health care system.

- The population groups most affected in Canada are those at the lowest 20 per cent of annual income, children in poverty, lone-parent families, new immigrants and the Aboriginal population.
- While the gap between the most and least healthy is a matter of great concern, the unequal distribution of health across the entire gradient also has a significant cost in lost lives, worse health and higher costs, and reducing the gradient is important.
- Some trends are worsening, particularly unemployment, food insecurity and the size of the gap between the richest and poorest.
- Canada can do better, particularly when compared to Nordic countries. Evidence from poorer countries like Cuba, China and Costa Rica show that health gaps can be reduced by better support for early childhood development and equal access to preventive health services.
- There needs to be greater leadership and understanding by the public, media, health advocates and corporate leaders about the impact of the determinants of health and the need to address them now.
- There needs to be further research and dissemination of findings and evaluation of interventions.
- There is sufficient evidence for action on early childhood development, child poverty, support and encouragement for business to address the health determinants, affordable housing, and better access to higher education.

The key message from these reports is that inequalities in the distribution of the social determinants of health are undermining Canadian society as a whole. However, they can be addressed through investments in affordable housing, early childhood development, equal access to higher education, improved literacy, and work place initiatives including on-site childcare and good maternity and paternity benefits, that promote more equality of opportunity and less societal disadvantage.

# IMPLICATIONS OF THE EXISTING BURDEN ON THE PUBLICLY FUNDED HEALTH CARE SYSTEM

As noted in Table 4, hospital expenditures represent the largest share of direct health expenditures: 31.2 per cent (\$30.5 billion) of direct health expenditures of \$97.9 billion in 2000. Hospital-related costs for chronic disease and injuries account for 64.8 per cent (\$19.8 billion) of the total hospital costs.

Table 4 indicates that chronic disease and injuries are major contributors to the burden of illness. The data also show that pregnancy and its complications and infectious disease, while they are important issues, are relatively small in comparison to chronic disease and injury with respect to the burden of illness.

## Inpatient Costs

According to a report by the Canadian Institute for Health Information (CIHI), *The Cost of Acute Care: Hospital Stays by Medical Condition in Canada 2004-2005*,<sup>39</sup> the largest share of total hospital costs (46.6 per cent) in 2004/2005 were directed to inpatient curative care. Total acute care inpatient hospital costs in 2004/2005 were estimated to be \$17.05 billion (excluding Quebec). CIHI has categorized these inpatient costs by clinical grouping.<sup>39</sup> Figure 37 provides an estimate of the acute care costs for the top 20 diseases and clinical groupings. The largest share of these costs, 19.3 per cent, was attributable to diseases of the circulatory system, followed by injuries, poisoning and other external causes (10.2 per cent), respiratory diseases (9.5 per cent), neoplasms, (9.4 per cent) and digestive diseases (9.2 per cent).

**Table 4: Economic Burden of Illness in Canada: Direct Costs (\$ Millions), 2000**

	Hospital	Drugs	Physicians	Other Institutions	Additional Direct	TOTAL	% of Total Direct Costs	% of Attributable Costs
Chronic Diseases (a)	\$16,537.9	\$7,427.2	\$7,633.3	\$0.0	\$0.0	\$31,598.4	32.3%	60.5%
Injuries	\$3,265.2	\$366.7	\$970.2	\$0.0	\$0.0	\$4,602.1	4.7%	8.8%
Infectious & Parasitic Diseases	\$484.9	\$557.5	\$397.8	\$0.0	\$0.0	\$1,440.2	1.5%	2.8%
Maternal & Prenatal Conditions	\$2,183.1	\$105.3	\$490.3	\$0.0	\$0.0	\$2,778.7	2.8%	5.3%
All Other Illnesses	\$5,444.0	\$2,905.1	\$3,479.6	\$0.0	\$0.0	\$11,828.7	12.1%	22.6%
Unattributable (b)	\$2,639.4	\$3,724.0	\$5.8	\$9,331.3	\$9,954.9	\$45,655.4	46.6%	
<b>TOTAL</b>	<b>\$30,554.5</b>	<b>\$15,085.8</b>	<b>\$12,977.0</b>	<b>\$9,331.3</b>	<b>\$9,954.9</b>	<b>\$97,903.5</b>	<b>100.0%</b>	<b>100.0%</b>

Notes:

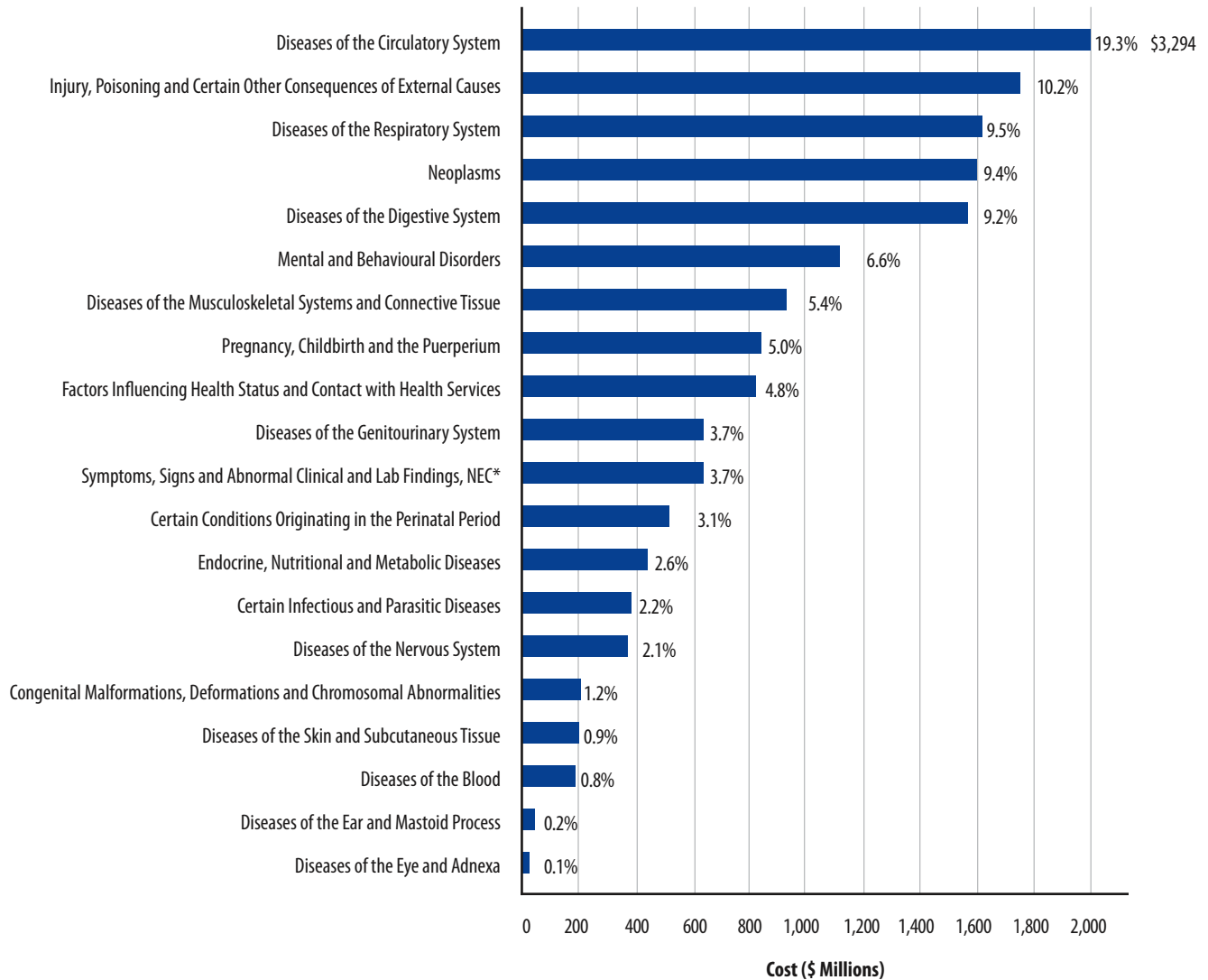
a) Includes mental and substance use disorders (in neuropsychiatric disorders category).

b) Includes data that could not be allocated by ICD-9 code.

Source: Public Health Agency of Canada. (2010). *Economic Burden of Illness in Canada 2000*.

Figure 37

Estimated Total Acute Care Inpatient Hospital Costs and Share of Total by Clinical Groupings, All Age Groups, 2004/2005



Notes:

1. Fee-for-service payments to physicians as well as other costs such as out-of-pocket payments are excluded.
  2. Costs exclude Quebec data.
  3. Diseases of the digestive system does not distinguish between acute or chronic respiratory or digestive disorders.
- Data Source: Discharge Abstract Database, Canadian MIS Database, CIHI; Ontario Case Costing Initiative; Alberta Case Costing Database.  
 Source: Canadian Institute for Health Information. (2008). *The Cost of Acute Care: Hospital Stays by Medical Condition in Canada 2004-2005*.  
 \*Not elsewhere classified.

## The Most Expensive Medical Conditions

The CIHI report<sup>39</sup> found that the two most expensive medical conditions (in terms of acute care inpatient costs) in 2004/2005 were acute myocardial infarction (\$510.8 million) and cerebrovascular diseases (\$509.4 million). The third most expensive medical condition (\$438.7 million) was chronic lower respiratory diseases (except asthma), which includes chronic obstructive pulmonary disease, bronchitis, emphysema and bronchietasis. The 15 most expensive medical conditions are listed in Table 5.

The total inpatient hospital costs for the 15 most expensive medical conditions were approximately \$5.36 billion. Approximately 65 per cent (\$3.54 billion) of the total costs are attributable to 10 of the conditions, which are either chronic conditions (noted in blue) or are related to chronic conditions (e.g., acute myocardial infarction).

**Table 5: Total Acute Care Inpatient Hospital Costs for the 15 Most Expensive Medical Conditions, All Age Groups, Canada, 2004/2005**

Medical Condition (or Grouping of Conditions)	Total Acute Care Inpatient Cost (\$millions)	% of Total
Acute Myocardial Infarction (Heart Attack)	\$510.8	9.5%
Cerebrovascular Diseases (Stroke)	\$509.4	9.5%
Chronic Lower Respiratory Disease - except asthma	\$438.7	8.2%
Heart Failure	\$425.6	7.9%
Complications of pregnancy, predominantly during labour and delivery	\$426.9	8.0%
Mood Disorders	\$409.4	7.6%
Pneumonia	\$387.0	7.2%
Fracture of the femur	\$352.4	6.6%
Complications of pregnancy, predominantly during antenatal period	\$330.6	6.2%
Disorders related to short gestation and low birth weight	\$324.1	6.0%
Diabetes Melitus	\$283.9	5.3%
Schizophrenia, schizotypal and delusional disorders	\$283.8	5.3%
Malignant neoplasms of lymphoid, hematopoietic and related tissue	\$237.7	4.4%
Gonarthrosis (arthritis of the knee)	\$224.4	4.2%
Malignant neoplasms of colon, rectum and anus	\$213.9	4.0%
<b>TOTAL</b>	<b>\$5,358.6</b>	<b>100.0%</b>

Notes:

1. Fee-for-service payments to physicians as well as other costs such as out-of-pocket payments are excluded.

2. Costs exclude Quebec data.

Data Source: Discharge Abstract Database, Canadian MIS Database, CIHI; Ontario Case Costing Initiative; Alberta Case Costing Database.

Source: Canadian Institute for Health Information. (2008). *The Cost of Acute Care: Hospital Stays by Medical Condition in Canada 2004-2005*.





# A COMPREHENSIVE APPROACH TO PREVENTION

A number of recent reports<sup>17,40,41</sup> have highlighted the loss of resources and attention that public health infrastructure in Canada has suffered over recent decades, which has seriously jeopardized the capacity of the system to respond to the demands placed on it.

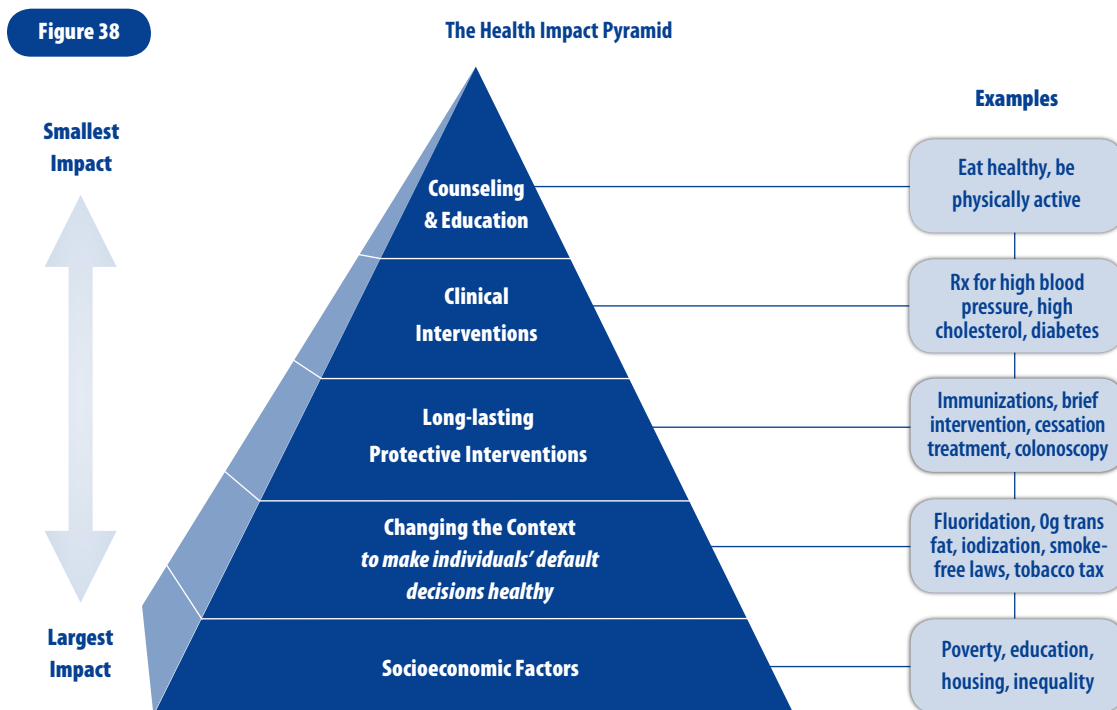
The concerns regarding Canada’s public health system and the realization by all levels of government that the public health and health care systems share the same goal of maximizing the health of Canadians, have resulted, for example, in the establishment of the Public Health Agency of Canada and the Pan-Canadian Public Health Network.

The basic premise of investing in prevention is that in many, but admittedly not all cases, it is less costly to prevent the onset of disease and/or disability from occurring than to treat

the disease or disability—and to deal with the wider economic and social costs, once these conditions have occurred. Investments (funding and integrated policy development) that can be predicted to improve the health of the population can help to moderate the demand for and consumption of health care services.

## Factors that Affect Health

A number of models have been developed that recognize the conditions that enable people to make healthy choices and lead healthy lives. However, a recent framework developed by Frieden<sup>42</sup> provides an easily understood, five-tier pyramid that depicts the impact of five types or levels of public health interventions (Figure 38).



Source: Frieden, T.R. (2010). A Framework for Public Health Action: The Health Impact Pyramid. *American Journal of Public Health*.

The pyramid has five levels. Levels 1 and 2 are population-based and require interventions and public policy actions, mainly on the part of the various levels of government, with less action required by the individual. Levels 3, 4 and 5 are focused more on assisting individuals, but can have an impact on populations where they are universally applied (e.g., immunization and screening programs in Level 3).

The pyramid concept proposes that addressing socio-economic factors has the greatest potential to improve health. Interventions that change the context for individual behaviour (Level 2) are generally the most effective public health actions. One-time clinical interventions (Level 3), such as immunizations, can be more effectively applied than those requiring ongoing care. Clinical interventions (Level 4) are often more effective than counselling and education (Level 5).

Although the effectiveness of interventions tends to decrease at higher levels of the pyramid, those at the top often require the least political commitment. The largest barrier to making fundamental societal changes is often not shortage of funds but lack of political will. The health sector is well positioned to build the support and develop the partnerships required for change.

## Healthy Living/Health Improvement Model

Prevention strategies are fundamental to the sustainability of the health care system as they have the potential to reduce the burden of illness. A recent review of the cost of chronic disease in Canada<sup>43</sup> noted:

Epidemiological studies indicate that a very large proportion of this illness burden is preventable. We have both the knowledge and the means to reduce an enormous burden of unnecessary suffering, disability, premature death, spiraling health care costs, and production losses, and to improve the quality of life of Canadians.

Experience over the past 30 years or more with respect to tobacco control and injury prevention, and more recently, reviews of evidence with respect to mental health promotion,

have taught us that achieving a sustained impact on health (preventing premature death, disease and disability and improving health, well-being and quality of life) requires a comprehensive approach. A comprehensive approach involves the integration of investments in three streams of “preventive/health improvement” strategies:

1. Addressing, through population health promotion, the social, economic, environmental and cultural factors that influence living patterns and lifestyle choices, and also result in health disparities across populations (the determinants of health).
2. Strengthening and expanding population-based healthy living initiatives.
3. Strengthening the provision of effective clinical preventive interventions/services.

While these strategies are mainly directed at helping healthy people stay healthy, they can also be applied as part of a comprehensive chronic disease management approach. The strategies can help those with existing chronic diseases live healthier lives and better manage their disease, and prevent them from developing additional co-morbid chronic diseases, which worsens their health and makes disease management more difficult.

These strategies are applied largely through the provision of public health services. However, providing services that impact the health of the population is often the responsibility of those beyond the health sector. Agencies that have these responsibilities, other than the Ministry of Health Services and the Ministry of Healthy Living and Sport, include other government ministries; non-governmental organizations;

The wave of Canadian baby boomers now turning 60 could be the first generation to turn back the clock and experience a decline in quality of life. Compared to 10 years ago, the rates of obesity in boomers have soared by nearly 60%, a whopping 52% are inactive and yet 80% still think they will enjoy a longer life expectancy than previous generations.

Source: Report Card on Health, Heart and Stroke Foundation of Canada, February 2006.

private sector organizations, municipalities, and community organizations that provide a range of population health promotion and healthy living initiatives.

Figure 39 shows a model for this integrated approach. In this model, the solid lines indicate deterministic links, and the dotted lines and boxes are health care services sectors and their costs.

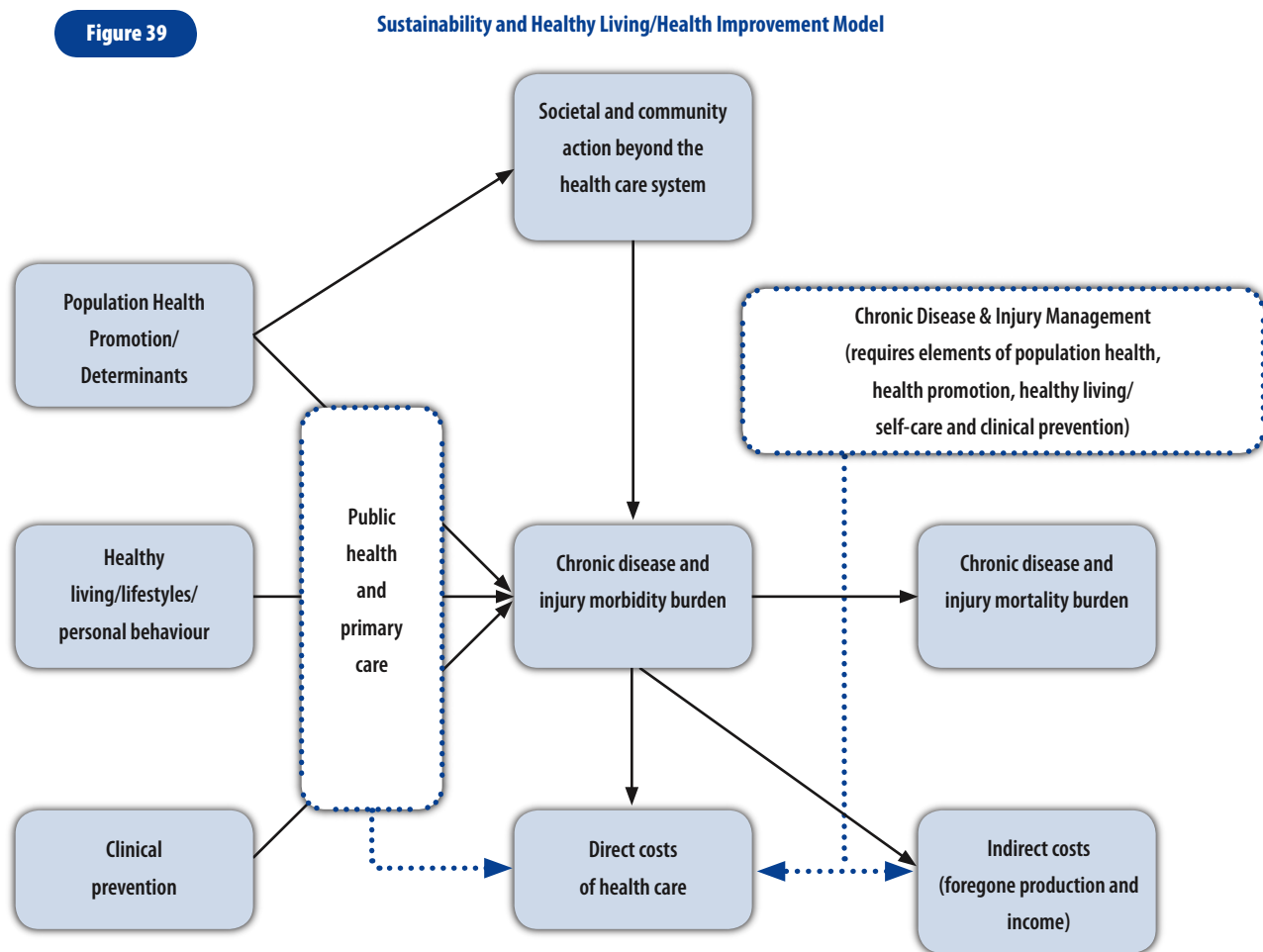
## Healthy Living/Personal Behaviour

The main aim of population health promotion is to create the conditions that enable people to make healthy choices. One of the five strategies of the *Ottawa Charter for Health Promotion*<sup>44</sup> is to support people in developing personal skills for health. While development of personal skills for health is more commonly understood to mean the adoption of personal behaviours that result in good health, a health

promotion approach understands that such personal skills also include the skills to participate in the political process so as to support the development of healthy public policies, or to work with neighbours or colleagues to create supportive environments and strengthen community action.

While it is clear that such personal behaviours, or healthy lifestyles, are shaped and moderated by the broader determinants of health, there are nonetheless important sets of knowledge, skills and behaviour that people can acquire that will lead to improved health. These sets of skills can be thought of as part of the spectrum of self-care skills that include:

1. The skills to engage with one’s neighbours, community organizations, municipal governments, school boards and workplace organizations, among others, to create healthier communities, schools, workplaces and other settings.



Source: Trevor Hancock, Public Health Consultant, Ministry of Healthy Living and Sport, 2010.

2. The skills to improve one's personal health and the health of one's family by adopting protective (e.g., safety, emergency planning), health-promoting (e.g., healthy lifestyles) and preventive (e.g., use of preventive services) behaviours.
3. The skills to look after one's own and one's family's minor ailments and illnesses, and to know when to cease self-care and seek professional assistance.
4. Emergency first-aid skills, to provide care until professional help arrives.
5. Chronic disease self-management, including both disease management and many of the health-promoting and preventive behaviours mentioned in (2) above.
6. Preparing for the end of life, including discussions with one's family and preparation of advance directives, organ donation cards and "living wills" (Dr. Trevor Hancock, 2007).

In the context of prevention, the skills for healthy living that people need to acquire include the first two of the six sets of self-care skills. This includes the healthy living skills that address the set of common risk behaviours (smoking, physical inactivity, unhealthy eating, harmful alcohol and other substance use) that contribute significantly to many of the most important chronic diseases. Adopting these positive healthy behaviours is also an important part of chronic disease self-management. Healthy living also includes the skills to seek and appropriately use clinical preventive services such as prenatal care, immunization or cancer screening.

An important prerequisite for many aspects of knowledge and skill development is both general literacy and a subset of literacy known as health literacy. While the acquisition of skills is not solely dependent on literacy, there is nonetheless a clear relationship between educational level and health status. Higher levels of education and literacy can be expected to contribute to improved population health.

Canada has low levels of health literacy: an estimated 55 per cent of working-age Canadians have less than the level of health literacy needed to make health decisions without calling on others for help. If those over 65 years of age are

added, this number rises to 60 per cent. For people older than 65 years of age, 88 per cent have less than the level of health literacy required to make health decisions without calling on others for help.<sup>45</sup> Further, a review of randomized controlled trial studies has found that 62 per cent of patients with lower reading skill levels were unable or unwilling to engage in self-management.<sup>46</sup>

Thus, in order to increase self-care and healthy living, there must be a commitment to increase health literacy. The low levels of health literacy among seniors is particularly worrisome, as they are relatively heavy users of the health care system and need to develop self-care skills both to keep themselves healthy and, in many cases, to effectively manage their chronic conditions in partnership with their care providers.

In addition, low levels of health literacy among disadvantaged populations may mean that they are less likely to adopt or are delayed in adopting new health behaviours compared to their better-educated and more health-literate counterparts. This is undoubtedly one of the factors that explain the often-observed relationship between unhealthy behaviours and lower socio-economic status (other key factors include the many other risk conditions that these populations experience, as noted earlier). Lifestyle programs that do not explicitly allow for and address low levels of health literacy can actually result in a widening of the health gap and an increase in healthy inequity.

## Public Health Services

Public health is the "science and art of promoting health, preventing disease, prolonging life and improving quality of life through the organized efforts of society",<sup>47</sup> and has as its primary goal promoting and preserving the health and well-being of populations. The essential functions of public health have been defined in Canada<sup>41</sup> as:

- Population health assessment.
- Health surveillance.
- Health promotion.
- Disease and injury prevention.
- Health protection.

Unlike the clinical or personal health services systems, the public health system tends to operate in the background, little known to most of the population unless there is an unexpected outbreak of disease. However, public health and clinical medicine, as part of the overall health system, share the mutual goals of:

- Saving lives and preventing premature death.
- Preventing and reducing disease, disability, pain and suffering.
- Improving the quality of life.

Public health systems and programs focus mainly on the health of the population as a whole, while clinical medicine interventions focus on the health of the individual. While there are some public health interventions that do focus on the individual (e.g., immunization and screening programs), these interventions also provide benefits to the general population.

Ensuring that an effective and modern public health system is in place is one of the most important things that can be done to safeguard and enhance the health status of a population.

## Public Health Renewal

With the growing understanding in the early 1990s of the determinants of health and their impact on the health of individuals and of specific populations, there was a realization that strong government commitment to a fully functioning public health system was essential to maintaining and improving the health of the population.

At the end of the 20th century and the beginning of the 21st century, Canada experienced a series of events that demonstrated the need for enhancements to the public health infrastructure: The Walkerton, Ontario and North Battleford, Saskatchewan waterborne disease outbreaks revealed the impact of complacency and deregulation of drinking water systems; the 2003 outbreak of Severe Acute Respiratory Syndrome (SARS) revealed the lack of surge capacity in the public health system; the outbreak of listeria associated with

Maple Leaf Foods highlighted the need for constant vigilance; the West Nile virus, avian influenza and bovine spongiform encephalopathy (BSE) incidents highlighted our vulnerability to the emergence of new zoonotic disease outbreaks; and finally, although the recent experience with H1N1 demonstrated significant improvements in the functioning of the public health system, the system was clearly and constantly challenged by this event, and many experts feel that the world “dodged a bullet.”

The 2003 report *Learning from SARS: Renewal of Public Health in Canada* (the Naylor report)<sup>40</sup> noted that public health<sup>e</sup> expenditures in Canada amount to 2.6 to 3.5 per cent of publicly-funded health expenditures—and of this, approximately 1 per cent of the public health care expenditures are designated for infectious diseases. The report recommended new federal funding for public health, including providing funding to the provinces and territories to strengthen their public health programming in support of a National Public Health Strategy. The report also noted that public health strengthening was required across the full spectrum of services, including chronic disease prevention, and not just in the area of communicable disease control.

Concurrently, concern was growing about the future health of British Columbians. In 2004, the Legislative Assembly of British Columbia’s Select Standing Committee on Health recognized the need for a greater investment in prevention. The committee’s report noted that in BC, public health and prevention initiatives receive only 3 per cent of the provincial health budget; and, as one ounce is approximately 6 per cent of a pound, BC has “been routinely investing in about half an ounce of prevention.”<sup>17</sup> The committee recommended “that funding for public health initiatives gradually increase from 3 percent to at least 6 percent,” and emphasized that those “investments that promote the general well-being of British Columbians promote good health while benefiting all of society.”<sup>17</sup>

The Select Standing Committee on Health reiterated its recommendation in its 2006 report<sup>48</sup> that “additional resources must be provided to public health to ensure it plays a greater role in the prevention of disease and illness.”

<sup>e</sup> The Naylor report defined public health as including the following essential functions: health protection; health surveillance; disease and injury prevention; population health assessment; health promotion; and disaster response.



## Key Infrastructure Elements of Public Health Systems

In June 2003, the Canadian Institutes of Health Research (CIHR) issued the report entitled *The Future of Public Health in Canada: Developing a Public Health System for the 21st Century*.<sup>41</sup> This report, written by CIHR's Ad Hoc Committee on the Future of Public Health in Canada, examined the state of Canada's public health system, and provided advice on how that system could be better structured and resourced to improve the health of Canadians. The committee assessed the capacity of the Canadian public health system through a series of key informant interviews and literature reviews. The assessment found that, over the years, public health resources had eroded and public health infrastructure lacked the capacity to respond consistently and effectively to significant public health events.

Based on those findings, the committee examined alternative models from other jurisdictions for organizing and structuring public health (England, Australia, New Zealand and the United States), in order to develop a framework for jurisdictions to use as a guide for restructuring and renewing their own public health infrastructure.

The CIHR report identified the following nine key infrastructure elements for a national (and by extension provincial) public health system:

- **Clearly defined essential functions** – core public health functions must be identified as the basis for development of public health system infrastructure and corresponding programs and services.
- **Defined roles/responsibilities at each level (national, provincial/territorial, regional/local)** – legislation, policy documents and regulations are the best means to define roles and responsibilities.
- **Consistent, modern legislation** – replace outdated legislation with legislation that responds to the impacts of modern technology and societal needs.
- **Appropriate delivery structures** – develop capacity and effectiveness of regional/local public health agencies and multi-agency partnerships.
- **Appropriate funding levels** – delivering core services consistently requires sufficient, stable funding.
- **Appropriate numbers of well-trained staff** – Canada has a critical shortage of graduate-level prepared public health professionals, and human resources planning is required to meet the needs of new and existing public health staff and ensure proficiency in core competencies.
- **Information systems to support assessment and surveillance** – support evidence-based practice and fund integration of public health information systems so information can be exchanged in a timely fashion between different levels of responsibility.
- **Access to expertise and support** – address inequities in public health system regional capacity by establishing centres of expertise that would provide scientific expertise to develop standards and guidelines, develop and disseminate evidence for public health interventions, skills, training and expertise.
- **Accountability mechanisms at each level of the system** – establish performance measures for each essential core function to determine the efficacy of programs and services.

## Public Health Renewal in British Columbia

The CIHR public health infrastructure framework has been adopted in BC as the framework for the development of a strengthened and renewed set of public health services. The CIHR framework is consistent and compatible with an earlier model developed by the BC Ministry of Health and is a logical step in the evolution of that model.

Using the nine CIHR infrastructure elements as the template, Table 6 provides examples of the infrastructure initiatives underway in BC for the longer-term renewal process. In particular, BC has invested significantly in a lengthy and academically rigorous process to define essential, evidence-based public health functions. Twenty-one evidence reviews have been completed (including one on health equity in public health), as have 20 model core program papers, and performance improvement planning and reporting on progress is underway in each health authority.<sup>f</sup>

<sup>f</sup> For details, see the comprehensive website at <http://www.pbabc.org/modules.php?name=Contentcore>.

Table 6: Status of Public Health Infrastructure Elements

Public Health System – Key Infrastructure Elements	BC Priority Infrastructure Initiatives
<b>Defined Essential Functions</b>	<ul style="list-style-type: none"> <li>• Core Public Health Functions</li> <li>• Provincial-Level Core Functions</li> </ul>
<b>Defined Roles and Responsibilities</b>	<ul style="list-style-type: none"> <li>• Stewardship role of BC Ministry of Health Services and Healthy Living and Sport</li> <li>• Role of regional health authorities and Provincial Health Services Authority</li> <li>• Role of Provincial Health Officer and regional Medical Health Officers</li> </ul>
<b>Consistent, Modern Legislation</b>	<ul style="list-style-type: none"> <li>• <i>Public Health Act</i></li> <li>• <i>Drinking Water Protection Act</i></li> <li>• <i>Community Care and Assisted Living Act</i></li> <li>• <i>Tobacco Sales Act</i> Amendments</li> <li>• <i>Tobacco Damages and Health Care Costs Recovery Act</i></li> <li>• <i>Food Safety Act</i></li> </ul>
<b>Appropriate Delivery Structures</b>	<ul style="list-style-type: none"> <li>• Regionalized health delivery system and unique role of the Provincial Health Services Authority</li> <li>• Cross-government and non-governmental organizations</li> </ul>
<b>Appropriate Funding Levels</b>	<ul style="list-style-type: none"> <li>• \$30 million investment to increase public health capacity</li> <li>• Strategically targeted investments</li> </ul>
<b>Appropriate Number of Trained Staff</b>	<ul style="list-style-type: none"> <li>• Public Health Human Resource Strategy in development</li> </ul>
<b>Appropriate Information Systems</b> (Provincial Health Assessment and Disease Surveillance System)	<ul style="list-style-type: none"> <li>• Public Health Information Project</li> <li>• Pan Canadian Information System (PANORAMA)</li> </ul>
<b>Access to Expertise and Support</b>	<ul style="list-style-type: none"> <li>• Existing expertise: BC Ministry of Healthy Living and Sport; BC Ministry of Health Services, Provincial Health Services Authority, BC Centre for Disease Control, and regional health authorities</li> <li>• Public health academic community</li> <li>• National Collaborating Centres</li> </ul>
<b>Accountability Mechanisms</b>	<ul style="list-style-type: none"> <li>• Government Letters of Expectations</li> <li>• Core Performance Improvement Plans</li> <li>• Measuring Our Success – ActNow BC Baseline Document</li> <li>• First Nations Health Plan</li> <li>• Provincial Health Officer's reports</li> <li>• Directional Documents – Ministry Service Plan, Annual Service Plan Report</li> </ul>

Source: Ministry of Healthy Living and Sport, undated.

## Investments in Public Health Services in British Columbia

Recent increases in funding have enhanced public health services in British Columbia. Between 2005 and 2008, funding for public health increased by \$8 million each year over the previous year's base, resulting in a \$24 million increase in the budgets of the health authorities in 2007/2008 compared to 2004/2005. These funds were used to strengthen

infrastructure and technical capacity at the health authority level. An additional \$2 million per year was also provided to strengthen the then Ministry of Health's public health stewardship and program role. Table 7 provides a summary of some of the most recent investments in public health services in British Columbia.

**Table 7: Recent Investments in Public Health Services in British Columbia**

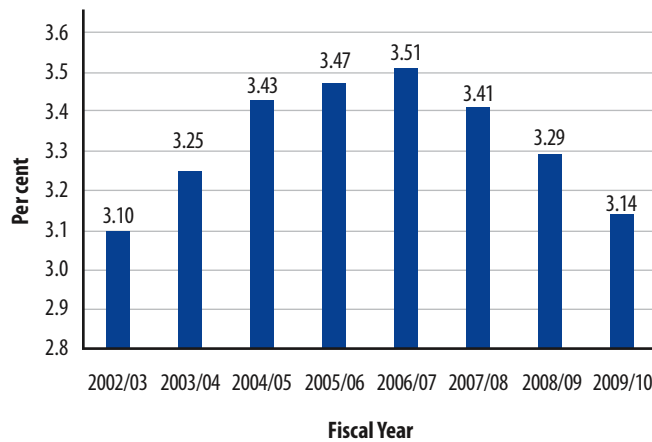
Initiative	Summary of Investment
<b>BC Healthy Living Association</b>	\$25.2 million to support ActNow collaborative action to implement 15 ActNow BC initiatives.
<b>Action Schools! BC</b>	\$25.46 million since 2005.
<b>BC Healthy Communities Initiative</b>	\$1.938 million to Union of BC Municipalities Community Health Promotion Fund, which has provided grants to support health promotion programs and activities in communities focusing on healthy living, the built environment and chronic disease prevention in support of ActNow BC.
<b>Human Papillomavirus (HPV) Vaccine</b>	\$300 million provided by federal government to provinces and territories to launch vaccination program. BC's share is approximately \$39 million over three years.
<b>School Fruit and Vegetable Nutritional Program</b>	\$10.7 million from 2005 to present.
<b>Immunization</b>	Since 2003, BC's vaccine budget has nearly tripled. A variety of new or improved vaccines have been added to BC's immunization schedule since 2003; as a result, BC's publicly funded immunization program now protects against 14 different diseases: varicella, diphtheria, haemophilus influenza type b, hepatitis B, influenza, human papillomavirus (HPV), measles, meningococcal C, mumps, pertussis, invasive pneumococcal disease, polio, rubella and tetanus.
<b>Targeted childhood screening</b>	Funding has been provided to develop and implement an integrated strategy for universal infant hearing screening, early childhood dental health screening, and early childhood vision screening.
<b>Tobacco Cessation</b>	\$8.13 million from 2005/2006 to present.
<b>Tobacco Control</b>	\$6 million from 2005/2006 to present.
<b>Tripartite First Nations Health Plan</b>	\$10 million annually to support First Nations health and wellness.
<b>Additional targeted investments in new public health initiatives include:</b>	<ul style="list-style-type: none"> <li>• West Nile virus larvicide programs and emergency contingency adulticide.</li> <li>• Drinking water protection and information system development.</li> <li>• Emergency management programs and training, plus pandemic planning.</li> <li>• HIV/AIDS follow-up and prevention activities.</li> </ul>



Figure 40 shows that for the Interior Health Authority, while the level of public health investment did increase in the middle of the last decade, in the latter part of the decade it fell back to 2003 levels. This situation, which is the result both of substantial increases in acute care budgets and reallocation to meet increased pressures on the acute care system, is likely a pattern that has been repeated in each health authority across British Columbia.

**Figure 40**

**Public Health Expenditures as a Percentage of the Base Budget, Interior Health Authority, BC, 2002/2003 to 2009/2010**



Source: Interior Health Authority, 2010, internal document.

## Strengthening Clinical Prevention (Primary Care Services)

Clinical prevention is one part of a comprehensive approach to prevention and the improvement of population health. Clinical prevention has been defined as:<sup>49</sup>

Manoeuvres pertaining to primary and early secondary prevention (i.e., immunization, screening, counselling and preventive medication) offered to persons based on age, sex, and risk factors for disease, and delivered on a one-provider-to-one-client basis, with two qualifications:

- (i) the provider could work as a member of a care team, or as part of a system tasked with providing, for instance, a screening service; and

- (ii) the client could belong to a small group (e.g., a family, a group of smokers) that is jointly benefiting from the service.

Clinical preventive services range from prenatal care and well-baby care to immunization, screening and early detection, education and counselling, prophylactic treatment (e.g., prophylactic antibiotics for meningitis contacts) and aspects of preventive treatment for conditions such as hypertension (secondary prevention), which can prevent the onset of a second condition such as stroke (primary prevention). As such, these interventions often straddle the boundary between disease prevention and disease management. The provision of these services can involve the services of family physicians, nurse practitioners, midwives, obstetricians and pediatricians, among others.

Four broad categories of clinical preventive services have been identified by the U.S. Preventive Services Task Force:

- Immunization
- Screening
- Counselling
- Preventive medications

There is a significant, long-standing and still developing evidence base for clinical prevention. Effective preventive clinical services have been identified by the Canadian Task Force on Preventive Health Care<sup>8</sup> and its American counterpart, the U.S. Preventive Services Task Force. Both task forces use a similar categorization of the evidence; the Canadian Task Force categorizes clinical preventive services as follows:

<b>A</b>	Good evidence to include.
<b>B</b>	Fair evidence to include.
<b>C</b>	Conflicting evidence.
<b>D</b>	Fair evidence to exclude.
<b>E</b>	Good evidence to exclude.
<b>I</b>	Those interventions where evidence is currently insufficient to evaluate their effectiveness.

<sup>8</sup> This Task Force suspended operations in 2005 in response to significant funding cuts, but is being re-established by the Public Health Agency of Canada with a strengthened mandate and significant new resources.

It might be reasonable to assume that people would be receiving all the preventive services of which there is good evidence (A), and many of the preventive services of which there is fair evidence (B). Conversely, individuals should not be receiving services in categories “D” or “E”.

In many provinces/territories, many clinical preventive services are already paid for by the publicly-funded health care system (e.g., in British Columbia, these services include prenatal care, well-baby care, immunizations and screening for several forms of cancer). However, other proven effective services are either not covered or are only partially covered by the publicly-funded health care system (e.g., smoking cessation). In addition, as shown in the next section, the rate at which these services are delivered is very low.

### **Current Delivery of Effective Clinical Preventive Services**

Patients in Canada report frequently discussing preventive issues with their physicians. A 2002 survey of 2,500 adults found that among those “who had seen their physician in the past year, three-quarters reported discussing some type of disease prevention with the doctor. In many cases the discussion was initiated by the patient—50 per cent of respondents reported that they had asked their doctor about a prevention topic or topics.”<sup>50</sup>

Yet recent research by Coffield et al.<sup>51</sup> and others in both Canada and the United States has shown that clinical preventive services are provided at much the same low rates as other quality care services. For more detail on the findings of this research, refer to Appendix 2. A number of studies published over the past 15 years have explored barriers to the delivery of preventive services; the barriers identified were similar across many of the studies and included barriers related to patients, physicians, patients and physicians, the system and interventions.

One important reason for the low level of implementation of clinical preventive services was highlighted by Yarnall et al. (2003).<sup>52</sup> They concluded that there was not enough time for prevention in a primary care practice. They took the list of recommended preventive services (both A and B recommendations) from the U.S. Preventive Services Task Force’s *Guide to Clinical Preventive Services*,<sup>53</sup> estimated times to provide those services from the literature, and applied this to a representative practice population of 2,500 people distributed according to the age and sex distribution of the American population. They concluded that it would take 1,773 hours of a physician’s time annually (or 7.4 hours per work day) to provide all these services to children, adults and pregnant women. If only the category A recommendations were followed, it would still require 525 hours a year (2.2 hours per work day), while just doing the top priority preventive services identified would require one hour per work day.

### **Strengthening Clinical Prevention in Primary Care**

The logic of a renewed emphasis on prevention in primary care is that we should implement what we know to be effective in a systematic way. But given the barriers noted earlier, any such effort needs to be focused on only those priority services (Category A recommendations) that are both cost-effective and can be expected to have a significant population health impact.

Research conducted by Partnership for Prevention and HealthPartners Research Foundation<sup>54</sup> in the United States ranked 25 evidence-based clinical preventive services. For each of these services they estimated the associated clinically preventable burden and cost-effectiveness.<sup>h</sup>

As part of a policy review of clinical prevention recently completed in British Columbia, and in order to determine if the American rankings were valid in BC, H. Krueger & Associates applied American models for 10 of the top 15 services<sup>i</sup> to a BC birth cohort of 400,000 individuals.<sup>55</sup>

Dr. Maciosek of Partnership for Prevention and HealthPartners

<sup>h</sup> Clinically preventable burden is defined as the total quality-adjusted life years (QALYs) that could be gained if the clinical preventive service were delivered at recommended intervals to an American birth cohort of 4 million individuals over the years of life that a service is recommended (scored out of 5, where 5 is more than 360,000 QALYs gained in a population of 4 million). Cost-effectiveness is defined as the average net cost per QALY gained in a typical practice by offering the clinical preventive service at recommended intervals to an American birth cohort over the recommended age range (also scored out of 5, where 5 is cost-saving).

<sup>i</sup> Only 10 models were available from the American team.

Research Foundation provided early access to technical documents and clarified additional details on the models.

The analysis revealed that in 3 of 10 services, the combined ranking for clinically preventable burden/cost-effectiveness in BC was significantly different than that of the American study (see Tables 8 and 9). Cholesterol screening and treatment ranked lower in BC than in the United States, while colorectal and breast cancer screening ranked higher in BC. Most of the difference for cholesterol screening and treatment is based

on clinically preventable burden. One possible reason for this is that mortality and morbidity from heart disease in the BC birth cohort appears to be lower than in the American birth cohort.

For colorectal screening and breast cancer screening, mortality due to colorectal cancer or breast cancer in the BC birth cohort appears to be higher than in the American birth cohort, as is the average life years lost per death prevented for both conditions.

**Table 8: Priorities among Effective Clinical Preventive Services – Rankings Based on Clinically Preventable Burden**

Clinical Preventive Services	American Rank	BC Rank
Smoking cessation advice and help to quit – adults	1	1
Discuss daily aspirin use – men 40+, women 50+	2	2
Hypertension screening treatment – adults 18+	3	3
Cholesterol screening and treatment – men 35+, women 45+	4	7
Breast cancer screening – women 40+	5	4
Colorectal cancer screening – adults 50+	6	5
Influenza immunization – adults 50+	7	6
Cervical cancer screening – women 20-75	8	9
Alcohol screening and brief counselling – adults	9	8
Pneumococcal immunizations – adults 65+	10	10

Source: Krueger & Associates. (2008). *Establishing Priorities Among Effective Clinical Prevention Services in British Columbia: Summary and Technical Report.*

**Table 9: Priorities among Effective Clinical Preventive Services – Rankings Based on Cost-Effectiveness**

Clinical Preventive Services	American Rank	BC Rank
Smoking cessation advice and help to quit - adults	1	1
Discuss daily aspirin use – men 40+, women 50+	2	2
Hypertension screening treatment – adults 18+	3	4
Cholesterol screening and treatment – men 35+, women 45+	4	3
Breast cancer screening – women 40+	5	6
Colorectal cancer screening – adults 50+	6	5
Influenza immunization – adults 50+	7	7
Cervical cancer screening – women 20-75	8	8
Alcohol screening and brief counselling – adults	9	10
Pneumococcal immunizations – adults 65+	10	9

Source: Krueger & Associates. (2008). *Establishing Priorities Among Effective Clinical Prevention Services in British Columbia: Summary and Technical Report.*

The estimate of current utilization of these 10 clinical preventive services ranges from a low of 9 per cent for alcohol screening to a high of 73 per cent for cervical cancer screening. The results suggest that only one-third of these 10 clinical preventive services are being delivered at the required level. This suggests that a number of supportive policies, practices and infrastructure will be needed if priority clinical preventive services are to be provided at an acceptably high rate. These priority clinical preventive services include:

- Developing clinical guidelines for those services in a proposed Lifetime Prevention Schedule (LPS)<sup>1</sup> for which suitable BC or Canadian guidelines do not currently exist.
- Supporting information systems and information technology development:
  - Ensuring policy alignment with other secure electronic health record systems (e-Health) initiatives.
  - Working to resolve any outstanding privacy concerns.
  - Including the LPS in all discussions regarding electronic medical records.
- Developing public awareness and education strategies to inform people of the value of using the services in the LPS, and to encourage them to adopt the LPS.
- Developing outreach strategies to engage hard-to-reach populations.
- Working with the Practice Support Program in BC, an initiative of the General Practice Services Committee, in cooperation with the BC Medical Association and the BC Ministry of Health Services, to support the development of a prevention module for primary care practices.
- Working with the Ministry of Advanced Education and university and college programs that train health professionals to ensure clinical prevention is a core component in the education of medical students, family practice residents and other relevant health science students, and in the continuing education of practitioners.

- Working with the professional colleges and other certifying bodies to ensure that competency in clinical prevention is required for maintenance of certification, where appropriate.

## Chronic Disease Management

While chronic disease management is very central to primary care, it is not usually considered to be prevention, or to be part of the work of public health. However, it does fit readily within the context of investing in prevention, because:

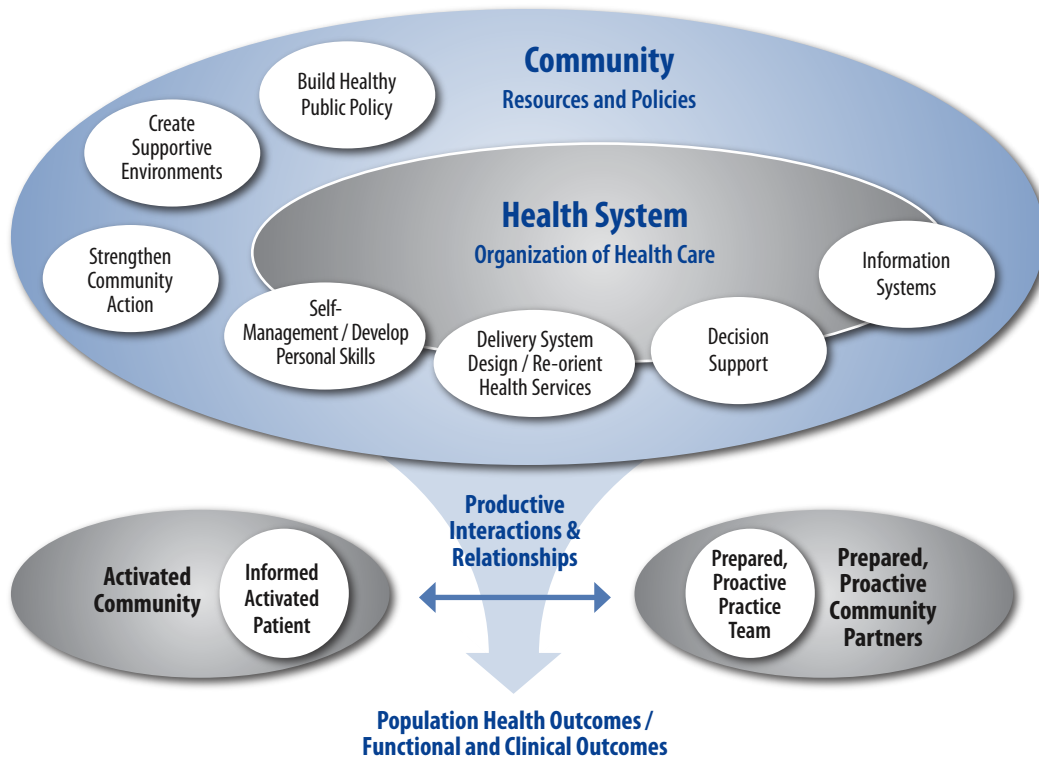
- the management of chronic diseases in most people includes helping them to eat healthier, get more exercise, lose weight, stop smoking and moderate their sodium and alcohol intake; and
- an important part of chronic disease management is preventing the development of a second (or third, fourth, etc.) co-morbid chronic disease. This involves helping people with chronic diseases institute the behavioural changes noted above and ensuring that they are offered all the appropriate clinical preventive services they require (e.g., influenza immunization, cancer screening, hypertension detection and management).

Thus, as noted in BC's Primary Health Care Charter, prevention can be considered the first step in effective chronic disease management.<sup>15</sup> For example, in the Expanded Chronic Care Model developed and adopted by BC (see Figure 41), several aspects of health promotion have been incorporated (healthy public policy, supportive environments, community action, developing personal skills/self-management and reorienting health services/delivery system design), and the outcomes include population health outcomes. The model has been adopted by the Practice Support Program, an initiative of the General Practice Services Committee, in cooperation with the BC Medical Association and the BC Ministry of Health Services as a framework for directing its activities to improve primary health care.

<sup>1</sup> A lifetime prevention schedule identifies the clinical preventive services to be offered in a planned and systematic manner, and is integrated with the health system, including primary care.

**Figure 41**

**The Expanded Chronic Care Model: Integrating Population Health Promotion**

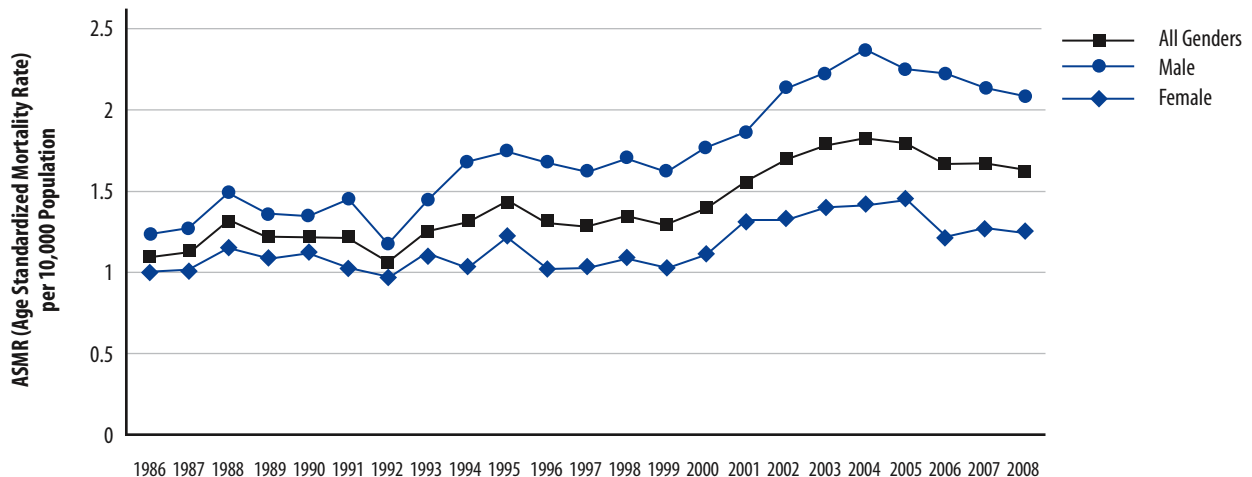


Source: Barr, V., Robinson, S., Marin-Link, B., Underhill, L., Dotts, A. Ravensdale, D. (2002). Adapted from Glasgow, R., Orleans, C., Wagner, E., Curry, S., Solberg, L. (2001). Does the Chronic Care Model also serve as a template for improving prevention? *The Milbank Quarterly*,<sup>56</sup> and World Health Organization. (1986). *Ottawa Charter for Health Promotion*.<sup>44</sup>

Diabetes is one of the diseases targeted by the chronic disease management initiatives of the Practice Support Program. Figure 42 shows that age standardized mortality rates for diabetes mellitus rose significantly from 1992 to 2004, then dropped slightly to 2008. This is an encouraging trend and may be due in part to improved diabetes management.

**Figure 42**

**Age Standardized Mortality Rates, Diabetes Mellitus, BC, 1986 to 2008**



Source: BC Vital Statistics Agency mortality data extracted from VISTA data warehouse, May 2010, by HS IM/IT Informatics.

The BC Primary Health Care Charter<sup>15</sup> identified a number of well-documented, evidence-based approaches for the effective management of individual chronic diseases. These approaches include:

- Developing a patient register.
- Analyzing potential gaps in care.
- Developing clinical practice guidelines and/or service frameworks to articulate evidence-based care.
- Implementing specific initiatives with patient health-outcome targets, with supports such as information technology systems, coaching, training and feedback.
- Specific supports for self-management, particularly for populations experiencing health inequities, such as Aboriginal people.

The first step in this process would be the integration of effective clinical preventive services as per the proposed Lifetime Prevention Schedule.

## The Economics of Prevention

Prevention appears to make good common sense. Investing in prevention and keeping people healthy can reduce the need for more costly treatment later on. In addition, a healthy population can generate greater economic growth, because healthy people have more chances to maximize their potential.<sup>92</sup> Developing a form of economic analysis to substantiate this has its challenges. Appendix 1 provides an overview and summary of the strengths and weaknesses of the different methods for measuring the economic consequences of illness.

A survey of recent evidence by the Public Health Agency of Canada found that some interventions are cost-saving while others are cost-effective. Unfortunately, economic evaluations of Canadian public health interventions are limited in number. Although there are similarities in health interventions between Canada and other countries, more Canada-specific evaluations are needed to determine whether the data from other jurisdictions is applicable or can be adapted to the Canadian context. It is important not to generalize from one program to another because interventions vary in nature, as well as in the context in which they are delivered. These knowledge gaps need to be addressed if economic analysis is to be used routinely in decision making.<sup>93</sup>

Making economic evidence mandatory to decision-making has the potential to delay the implementation of preventive programs because they have yet to be evaluated.<sup>94</sup> In addition, the Public Health Agency of Canada also advises caution when relying on economic evaluations for policy purposes due to the difficulty in gauging the full range of costs and benefits for many preventive health interventions, especially those targeting “upstream” determinants.

Public policy decisions would be easy if interventions could be definitively evaluated on their cost-saving potential alone. However, most often, the effectiveness of interventions varies depending on the delivery setting and target group. Other interventions may not provide measurable economic benefits, but deserve support for non-economic reasons, or their true impact may be too complex to quantify. In the end, public investments to prevent illness and injury and improve the overall health of the population will be driven by Canadian values. Economic analysis can be helpful, but cannot be the primary means for determining which programs to support.<sup>95</sup>



# SUMMARY OF PREVENTION EVIDENCE AND BEST PRACTICE

## Health Promotion

Health promotion refers to the broad concept as defined in the *Ottawa Charter for Health Promotion*.<sup>44</sup>

- Build healthy public policies.
- Create supportive environments.
- Strengthen community actions.
- Develop personal skills.
- Reorient health services.

Due to the many concepts and principles that health promotion encompasses, there are challenges in identifying evidence that directly demonstrates its effectiveness; these challenges are universally accepted by health promotion, population and public health researchers.<sup>57</sup>

Notwithstanding those challenges, two reports from the US Institute of Medicine, *Promoting Health* (2000),<sup>31</sup> and *Health and Behavior* (2001)<sup>16</sup> concluded that effective health promotion interventions need to<sup>58</sup>

- focus on generic social and behavioural determinants of disease, injury and disability;
- use multiple approaches (e.g., education, social support, laws, incentives, behaviour change programs) and address multiple levels of influence simultaneously (i.e., individuals, families, communities, nations);
- take greater account of the special needs of target groups (i.e., based on age, gender, race, ethnicity and social class);

- take the “long view” of health outcomes, as changes often take many years to become established; and
- involve a variety of sectors that have not traditionally been associated with health promotion efforts, including law, business, education, social services and the media.

These findings were recently confirmed and presented in the 2009 Canadian study *What Does it Take to Make a Healthy Province?*<sup>59</sup> The study identified five common lessons learned or characteristics from those jurisdictions around the world with the highest levels of health and best health behaviours. BC was noted as an example of these characteristics through the implementation of its ActNow BC program.

### Characteristics of Healthy Jurisdictions

1. A guiding health imperative must drive overall health strategies.
2. The best strategies for improving population health and health-related behaviours arise during the tenure of strong political leaders.
3. Government must pay attention to societal attitudes about health and make efforts to understand the prevailing political and social structures.
4. To solve broad-based problems, one must seek solutions that can be applied across governments with the participation of the larger civil society.
5. Leading jurisdictions act promptly. They do not necessarily wait for conclusive scientific evidence and are often the first to implement innovative interventions.<sup>59</sup>

## ActNow BC

The 2010 Olympic and Paralympic Winter Games provided the BC government with an opportunity to leverage the enthusiasm associated with the hosting of the Games in order to implement a province-wide initiative designed to optimize the health of British Columbians.

ActNow BC was developed as a prevention (of chronic disease) and wellness platform that focuses on the common risk factors for chronic diseases and provides a strategy for an integrated approach for reducing the main lifestyle risk factors associated with the development of chronic disease. ActNow BC was intended to provide a strategy and brand for leadership of a cross-sectoral, coordinated approach to promoting a healthy and active lifestyle, and a coordinated approach to future strategic investment by government in support of this objective for all British Columbians.

The goal of ActNow BC was to make British Columbia the healthiest jurisdiction ever to host the Olympic Games through the promotion of physical activity, healthy eating, living tobacco free and healthy choices during pregnancy. To accomplish this goal, ActNow BC encouraged British Columbians to make healthier living choices that support a sustainable health system by reducing the burden of chronic disease.

As a prevention strategy, ActNow BC employed a unique approach to health and wellness. In the past, prevention strategies have tended to focus on one disease at a time. ActNow BC targeted common risk factors for chronic disease and took an integrated approach to reducing these risk factors. The common risk factors addressed are physical inactivity, unhealthy eating, overweight and obesity, tobacco use and alcohol use during pregnancy.

A second unique aspect of ActNow BC is that it successfully implemented a whole-of-government approach, whereby all BC government ministries are able to contribute to the goals and objectives of the strategy. This approach was facilitated by the design of ActNow BC as an integrated, partnership-based platform of programs and services. As a result of this approach, ActNow BC programs were designed and delivered

in cooperation with more than 70 partners from other levels of government, non-government organizations, industry associations and the private sector. Figure 43 illustrates the conceptual framework for the whole-of-government approach.

The role of the Ministry of Healthy Living and Sport in this approach included

- Providing strategic facilitation and cross-government coordination.
- Raising awareness of the diverse ways other sectors/ministries can contribute and get recognition.
- Providing expert advice and support in developing ActNow BC initiatives and policy.

A key aspect of the success of ActNow BC was the active partnership with the non-governmental sector. This was accomplished through the provision of a one-time grant of \$25.2 million to the BC Healthy Living Alliance. The Alliance<sup>k</sup> has a unique, cross-sectoral membership that includes disease-based charities as well as other health-related organizations. The Alliance also includes the BC Recreation and Parks Association, which has connections with agencies that deliver health protection initiatives, and the Union of BC Municipalities, which is the voice for municipal government. BC health authorities, the Public Health Agency of Canada and 2010 Legacies Now are non-voting members of the Alliance. The Alliance's mission is to improve the health of all British Columbians through leadership and collaboration to address the risk factors and health inequities that contribute significantly to chronic disease.

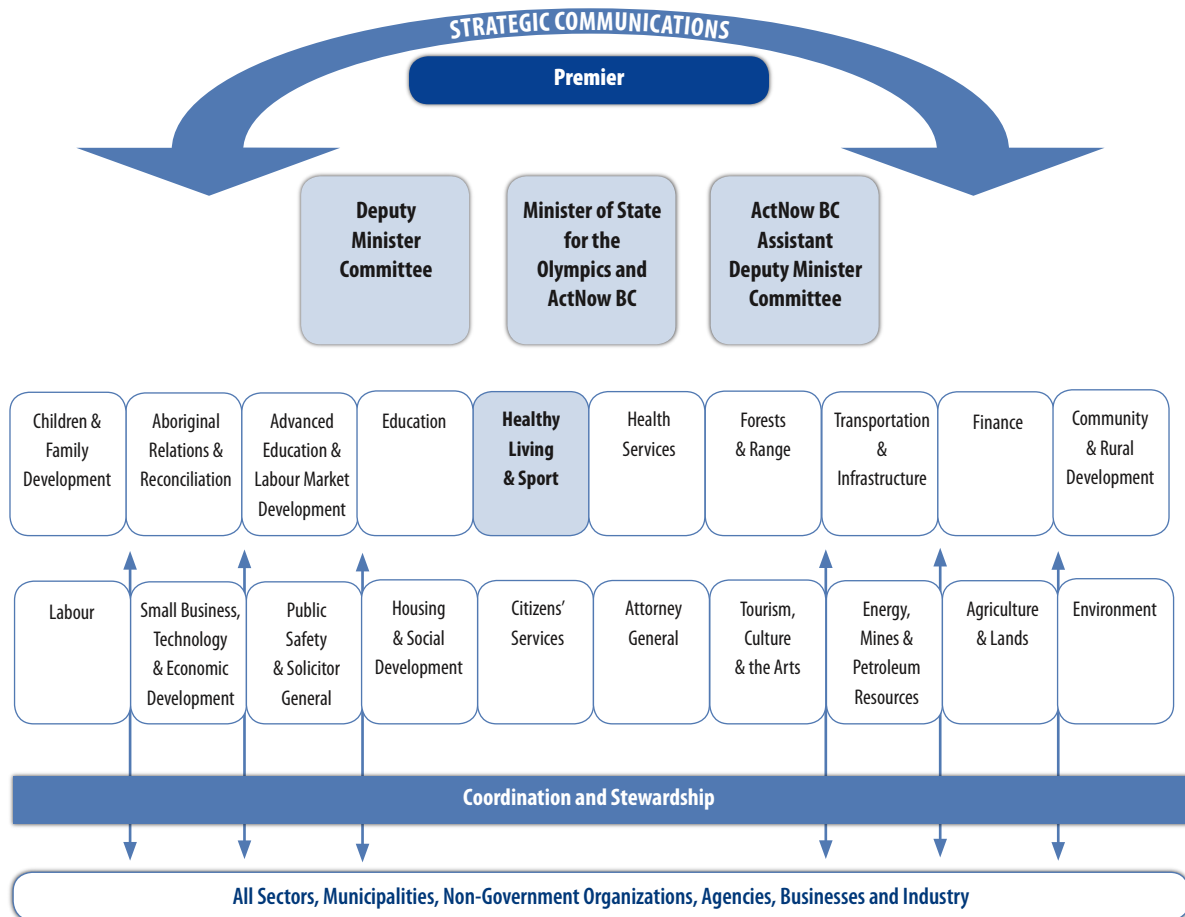
The WHO<sup>60</sup> recently examined ActNow BC and concluded that the approaches taken by the BC government in the development and implementation of ActNow BC are “promising best practices—that can inform other jurisdictions in the development of similar horizontally and vertically integrated initiatives.” The WHO analysis found that the new health promotion programming created by ActNow BC has boosted the profile of many of the existing health promotion activities. ActNow BC has also enhanced elements of a holistic strategy aimed at improving health equity in

<sup>k</sup> BC Healthy Living Alliance members include: BC Lung Association; BC Pediatric Society; BC Recreation and Parks Association; Canadian Cancer Society, BC and Yukon Division; Canadian Diabetes Association; Dietitians of Canada, BC Region; Heart and Stroke Foundation of BC and Yukon; Public Health Association of BC; and the Union of BC Municipalities.



Figure 43

## ActNow BC: Whole-of-Government Approach – Conceptual Framework



ActNow BC facilitates alignment of cross-ministry policy and action to improve the health of British Columbians and to create healthy environments

Source: BC Ministry of Healthy Living and Sport, 2010

Aboriginal communities across the province. The initiative has brought the provincial government and all health promotion stakeholders together to more effectively address health risk behaviours that lead to chronic disease.

Two factors appear to have been integral to the success of ActNow BC:

- High-level leadership:** The BC Premier's ongoing support for ActNow BC has kept the initiative high on the agendas of all ministers, deputies and assistant deputy ministers since 2005, and helped to motivate and facilitate intersectoral coordination.
- Balancing planning and action:** The BC government has been able to "sail the ship while you build it"—moving forward on a whole-of-government initiative despite the fact that not all of the elements, or ideal conditions, are present. Civil society leaders have forged ahead with several programs, overcoming the challenges associated with simultaneously building new partnerships among peers and with the ministries involved in the implementation of ActNow BC.

## ActNow BC – Population Health Promotion Strategies

ActNow BC was designed using the following key elements of a successful population health promotion strategy:

- **A whole-of-government approach** that works across government departments (whether federal, provincial or municipal) to develop coordinated efforts to influence the major determinants of health. This calls for health impact assessments and healthy public policy.
- **An intersectoral approach** at all levels (federal, provincial or municipal) that reaches beyond government to form partnerships with the private, non-governmental organizations and community sectors that are engaged in creating the conditions for health.
- **A settings approach** that reaches people in the physical and social settings where they live, learn, work and play (e.g., homes, schools, workplaces, the health care system, communities, etc.).
- **A capacity-building approach** that works with people and communities to build on their strengths and assets so they can “increase control over and improve their health” (the definition of health promotion in the *Ottawa Charter for Health Promotion*).

### Expansion of ActNow BC

Post-2010 Olympic Games, the Ministry of Healthy Living and Sport is responsible for developing and delivering a five-year strategy for the continued development of ActNow BC. There are four areas where ActNow BC is well-positioned, given its population-based approach, to have an impact beyond its initial focus areas of physical activity, healthy eating, living tobacco free and healthy choices during pregnancy:

- (a) injury prevention;
- (b) the reduction of sodium intake;
- (c) the reduction of sugar-sweetened beverages intake; and
- (d) alcohol harm reduction.

### Injury Prevention

The 2008 report of the Chief Public Health Officer of Canada<sup>10</sup> noted that unintentional injuries are the leading cause of death and hospitalization for children, youth and adults (under the age of 44) in Canada. In British Columbia alone, approximately 424,000 preventable, unintentional injuries occur each year.<sup>61</sup>

The evidence review on unintentional injury promotion, completed in 2007 by the BC Ministry of Health<sup>61</sup> as part of its core program review, noted that injuries are not accidental in that they follow preventable patterns. The review found that multi-faceted initiatives that use at least two of four general approaches have the greatest chance of being successful in reducing the burden of injury. The approaches that were instrumental in preventing injuries include: (a) education; (b) enforcement/legislation; (c) engineering/environment; and (d) economic incentives and disincentives. Population-based and workplace injury prevention initiatives, as part of an expanded ActNow BC, could make a positive impact on the number of preventable, unintentional injuries that occur each year in BC.

### The Reduction of Sodium Intake

In the report, *Reducing Salt Intake in Populations*, the WHO has indicated that “many lines of investigation, including genetic studies, epidemiological studies and interventional studies, have provided evidence for a causal relationship between salt intake and cardiovascular disease.”<sup>62</sup>

Excess sodium intake increases blood pressure, which is a major risk factor for stroke, heart disease and kidney disease and is thus both a health (acute care) and healthy living issue. WHO recommendations indicate that in order to prevent chronic diseases, the average consumption of salt should be < 5 g/day (< 2 g/day of sodium).<sup>62</sup> The report reviewed strategies to reduce the risks associated with cardiovascular disease and found that population-wide salt reduction strategies were the most cost-effective.

Sodium is a hidden, silent killer in our food supply. It's contributing to deaths of tens of thousands of people every year but we are largely disregarding this problem in public policy.

Norm Campbell, Canadian Research Chair, Hypertension Prevention and Control, President of Blood Pressure Canada, as quoted in the *Globe and Mail*, June 23, 2009.

Salt is an acquired taste. People become accustomed to it when they are young and come to prefer it. Most Canadians consume more sodium than is necessary for good health.<sup>1</sup> According to the Heart and Stroke Foundation of Canada,<sup>63</sup> the recommended daily level of salt (sodium) intake is 1,200 to 1,500 mg per day (about 1/2 teaspoon of salt), with the upper tolerable limit for health being 2,300 mg per day or approximately 1 teaspoon (1,500-2,200 mg for children under 14). However, on average, adult Canadians consume approximately 3,400 mg of sodium (approximately 1-1/2 teaspoons of salt) per day. In Canada, about 77 per cent of sodium consumed comes from processed foods and food eaten away from home.

Excess sodium is associated with 30 per cent of all high blood pressure cases in Canada. Almost 20 per cent of Canadian adults have high blood pressure.<sup>64</sup> It is estimated that reducing average sodium intake by approximately 1,840 mg per day would prevent 11,550 cardiovascular disease events each year in Canada, and generate direct health care savings of \$430 to \$540 million annually.<sup>65</sup>

International food producers and fast food operations add more sodium to their Canadian products than they do to the same products marketed elsewhere. According to an analysis done by World Action on Salt and Health, sodium levels are higher in 5 of 18 packaged and fast foods in Canada than in any of the other countries surveyed. There are even significant differences between products sold on the Canadian and American markets, with American products being lower in sodium.<sup>66</sup>

The WHO Forum and Technical Meeting (October 2006) on *Reducing Salt Intake in Populations*<sup>62</sup> concluded that interventions to reduce population-wide salt consumption are highly cost-effective and can best be achieved through a multi-sectoral and interdisciplinary approach where all stakeholders are engaged.

Policies to reduce dietary sodium intake need to be implemented in three main areas:

- Food production through the development of products and/or meals with no added salt or the lowest content of sodium possible.
- Changes in the environment, ensuring that the healthier food items are the easiest choice for the consumer (e.g., through a clear labelling system of all processed foods and meals).
- Through wide and active health promotion and consumer education in all population groups.

Finland started a salt reduction campaign in 1970, attempting to achieve a reduction in sodium consumption through voluntary compliance. In 2008, the Finnish National Public Health Institute concluded that legislation was necessary, including mandatory nutritional labelling and limits for salt content.<sup>67</sup> In April 2010, the United States Institute of Medicine concluded that voluntary measures over the past 40 years have failed to reduce sodium in the American diet to acceptable levels. The Institute is recommending that government establish legal limits on the amount of salt allowed in food products. The goal is to reduce the sodium content of the food supply gradually so that it goes unnoticed by consumers as their taste sensors adjust to lower levels.<sup>68</sup>

### **The Reduction of Sugar-Sweetened Beverages Intake**

Overweight and obesity is a major health concern for British Columbians, especially youth. In 2004, over 25 per cent of BC children and adolescents were classified as obese or overweight.<sup>69</sup> The 2004 *Canadian Community Health Survey: Nutrition* found that beverages account for 20 per cent of the daily calorie intake of Canadians. In youth, almost half of these calories are from sugar-sweetened beverages such as soft drinks and fruit drinks with less than 100 per cent fruit juice. Sugar-sweetened beverages are energy dense and nutrient poor, can displace healthier choices, and may contribute to tooth decay.<sup>70</sup>

<sup>1</sup> Salt is sodium chloride and one gram of salt contains 0.4 grams of sodium.

The consumption of sugar-sweetened beverages has been linked to weight gain and higher body mass index in children and youth.<sup>70</sup> Overweight and obesity are associated with other health consequences such as diabetes and heart disease. Research suggests that the consumption of sugar-sweetened beverages by children and youth is increasing.<sup>70</sup> Environmental factors such as increased availability, affordability and portion size, such as supersizing and free refills, may be contributing to this trend.

British Columbia can target childhood obesity by building on the success of provincial eating policies and programs and creating healthy built environments that will influence healthy lifestyle choices, including reducing the consumption of sugar-sweetened beverages.

### Alcohol Harm Reduction

Problematic alcohol use is a major issue in British Columbia. Estimates of the total direct and indirect social costs of alcohol in BC were \$2.219 billion in 2002.<sup>71</sup> Per capita social costs of alcohol use were \$463 in Canada in 2002 and \$536 in BC, 16 per cent higher than the national average. Compared to other provinces, BC was second only to New Brunswick for social and health costs related to alcohol consumption.<sup>71</sup>

The overall level of consumption in a population is a strong indicator of rates of alcohol-related diseases and injuries. Per capita alcohol consumption in BC has been above the national average since 2002.<sup>71</sup> A substantial portion of the alcohol consumption in BC happens in patterns that exceed guidelines set to reduce health and social harms. This is especially true for younger drinkers.

Alcohol-related health and social harms can be either acute (short term), or chronic (long term). Acute health effects of excessive alcohol use include alcohol poisoning (overdose), acute pancreatitis, acute cardiac arrhythmia, and intentional and unintentional injuries. Long-term health effects include cirrhosis of the liver, an increased risk of hypertension and some types of cancers, cardiovascular disease, as well as depression and anxiety disorders.<sup>72</sup> Social harms include

violence, sexual assault, crime, alcohol-involved traffic deaths, and other intentional and unintentional injuries.<sup>73</sup> Intergenerational effects caused by drinking alcohol during pregnancy include physical, mental, behavioural and learning disabilities with lifelong implications.

Binge drinking is defined as five or more standard drinks on one occasion for men and four or more drinks on one occasion for women, a pattern of consumption that is known to increase the risk of health and social harms. Based on the *Canadian Community Health Survey*, 23.3 per cent of British Columbians (aged 15-39) reported binge drinking. Binge drinking among males was higher at 31.9 per cent, compared to females at 14.9 per cent.<sup>74</sup> People who binge drink put themselves particularly at risk for short-term consequences such as vehicle crashes, injuries, sexual assault, sexually transmitted infections and unwanted pregnancy, as well as longer term consequences.

In the past, young men were more likely to binge drink than women, but the gender gap is narrowing. The 2008 *BC Adolescent Health Survey* found that of youth who had tried alcohol, 44 per cent reported binge drinking in the past month, a rate that has been consistent since 1998.<sup>75</sup> There are studies that indicate that binge drinking increases with age (an age range of 18 to 34 was studied) and income; this is in contrast to smoking and obesity, where prevalence tends to be higher among persons with lower education and income.<sup>76</sup>

Addressing the consequences of the problematic use of a socially acceptable substance such as alcohol is challenging. Best practice alcohol policies can be divided into three groups: those that address economic availability (e.g., alcohol taxes and pricing); those that regulate access (e.g., government monopolies, restrictions on hours and days of sale and outlet density); and other policies (e.g., minimum purchase age, drinking and driving laws, and policies for reducing violence in licensed establishments). Establishing strong partnerships with municipal governments, police, retail sales/hospitality industry and other stakeholders are essential to address these aspects successfully.

## Chronic Disease Prevention

The reduction of the burden of chronic disease is important to the economic sustainability of the health care system; therefore, the prevention of chronic disease is a priority step to managing the burden of chronic illness.

A BC core programs evidence review on chronic disease prevention, completed in 2008,<sup>77</sup> reviewed the available evidence on the effectiveness of initiatives in primary prevention and early detection for a range of chronic conditions, including neurological, sensory, musculoskeletal, digestive and genitourinary disorders, breast cancer, diabetes, heart disease, hypertension, stroke and asthma. The evidence review summarized the association between the chronic conditions and modifiable risk factors and an assessment of the evidence available to support the association. The review found that modifiable risk factors increased the risk of developing the following conditions and diseases (see Table 10).

## Mental Health Promotion

The WHO describes mental health as a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community.<sup>78</sup> In this sense, mental health is the foundation for well-being. It is more than the absence of mental illness;

it is a resource that makes for more resilient and productive individuals, families and communities. Thus, it is fundamental to human social and economic development.

It is understood that the global burden of mental illness is well beyond the treatment capacities of developed and developing countries. The social and economic costs associated with this burden will not be reduced by the treatment of mental illness alone.<sup>79</sup>

In BC, mental disorders are:

- The third largest contributor to the province's overall disease burden (after cancer and cardiovascular disease).<sup>9</sup>
- The largest contributor to disease burden among British Columbians between the ages of 15–34.<sup>9</sup>
- The leading cause of disability in the province.<sup>9</sup>
- Responsible for more than 140,000 BC children (at any one time) experiencing significant symptoms and impaired functioning.<sup>80</sup>

By 2020, it is predicted that childhood mental disorders will become one of the five most common causes of death, injury and disability among children. This will reduce the quality of children's lives, diminish their productivity in later life and have significant intergenerational consequences.<sup>81</sup>

Children's mental disorders are costly from an economic perspective as there is a long-term cost when mental

**Table 10: Modifiable Risk Factors and Related Chronic Conditions**

<b>Smoking</b>	Rheumatoid Arthritis, Inflammatory Bowel Disease, Bladder Cancer, Diabetes (Type 2), Coronary Heart Disease, Heart Failure, Vision Impairment and Stroke.
<b>Overweight/Obesity</b>	Osteoarthritis, Renal and Bladder Stones, Colorectal Cancer, Breast Cancer, Diabetes (Type 2), Coronary Heart Disease, Heart Failure and Stroke.
<b>Physical Inactivity</b>	Lower Back Pain, Colorectal Cancer, Breast Cancer, Diabetes (Type 2), Coronary Heart Disease, Heart Failure, Stroke and Hypertension.
<b>High Salt Intake</b>	Gastric Cancer, Heart Failure and Hypertension.
<b>Alcohol Abuse</b>	Hearing Impairment, Breast Cancer, Heart Failure and Stroke.

Note: Evidence has shown that modest alcohol consumption may reduce the risk of coronary heart disease and heart failure.  
Source: Ministry of Health. (2008). *Evidence Review: Chronic Disease Prevention*.



disorders are not effectively prevented or treated in childhood, including the indirect costs associated with early school termination, unemployment and lost production. The direct costs (including visits to health care providers) and indirect costs (lost productivity) have been estimated at more than \$14 billion in Canada.<sup>82</sup>

The developmental pathways approach acknowledges the protective and risk factors that occur across the lifespan and at key transition points. Recognition is given to the foundation that is laid by a healthy start in the early years and its importance in good mental health later in life. Mental health promotion focuses on enabling and achieving positive mental health at the population level. It seeks to build competencies, resources and strengths and to address the broader determinants of mental health.

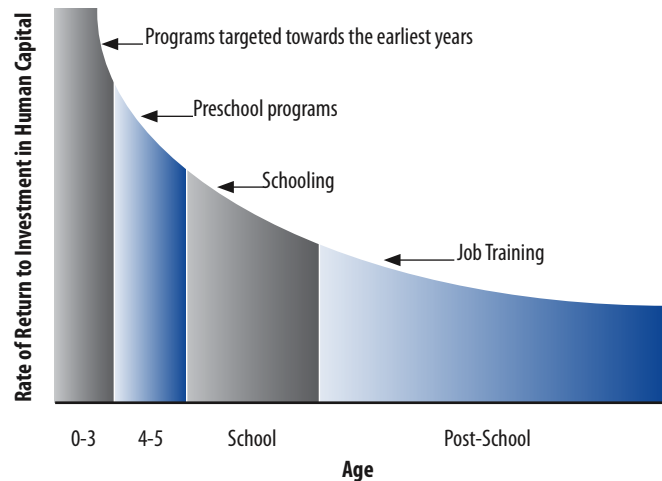
The core programs evidence review on mental health promotion, completed in 2007 by the BC Ministry of Health,<sup>83</sup> noted that there is considerable debate about what constitutes evidence of effectiveness in mental health promotion and which evidence is the strongest. The review found that the evidence of effectiveness is limited and that the strongest evidence is typically framed as the absence of mental illness, rather than the presence of positive mental health. However, a key message from the review is that effective mental health promotion involves multi-level, multi-component and intersectoral policies and programs that: a) create the social environments needed to support positive mental health; and b) enable people to adopt and maintain healthy lifestyles. These are exactly the conditions that promote good physical health.

While not all mental disorders can be prevented through healthy living and modifiable “lifestyle” risk factors, the evidence does suggest that for some mental disorders, prevention is assisted by the “healthy living” factors.

As noted earlier in this report, the burden of illness and disability associated with mental disorders is large, and contributes significantly to the economic costs of illness. The only sustainable approach to addressing this burden involves

Figure 44

#### Rates of Return to Human Capital Investment at Different Ages



Source: Heckman, J.J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*.

expanding the continuum of response to mental disorders to incorporate evidence-based prevention and mental health promotion.

Wherever possible, mental disorder prevention efforts should be structurally integrated with existing health programs and social policies in schools, workplaces and communities. A good example of a multi-outcome intervention is the investment in early childhood development programs.

Early childhood development lays the foundation for health and wellness: a strong foundation in childhood reduces the need to try to fix problems later on. Children who have good language and social-emotional skills are more likely to succeed in school and in life than those who lack these skills. Healthy social and emotional development builds resiliency and significantly decreases the risk of mental health issues later in life. There is now good evidence to suggest that investments in early childhood reap benefits both socially and economically. Figure 44 highlights the value of investment in human development and capacity building at an early age.<sup>84</sup>

## Perry Preschool Study

The value of investing in early childhood development in lower socio-economic status groups has been demonstrated by the highly successful High/Scope Perry Preschool Project. Begun in the 1960s, this longitudinal study focused early childhood interventions on 123 African-Americans born in poverty and at high risk of failing in school.<sup>85</sup> The results of this study and others<sup>86-88</sup> have demonstrated clinically significant benefits from investments in children's mental health (Figure 45).

From 1962–1967, at ages 3 and 4, the subjects were randomly divided into a program group that received a high-quality preschool program based on High/Scope's participatory learning approach and a comparison group that received no preschool program. In the study's most recent phase, 97 per cent of the study participants still living were

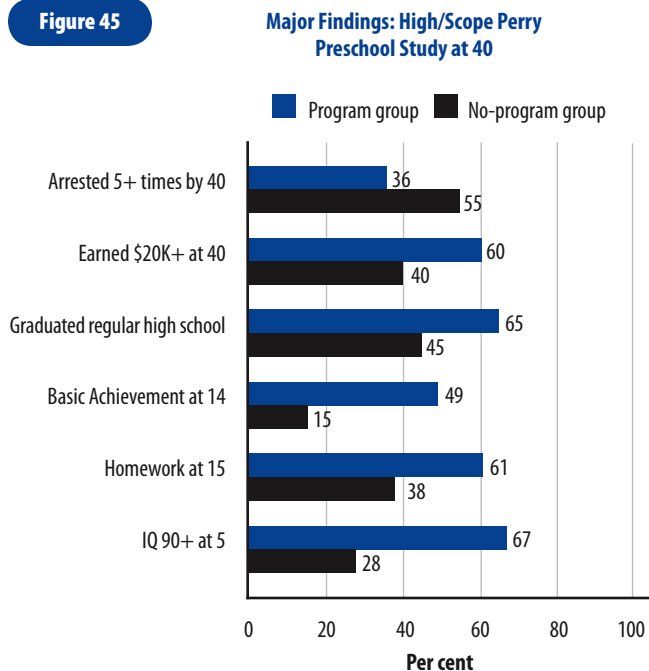
interviewed at age 40. Additional data were gathered from the subjects' school, social services and arrest records. The findings of the study are summarized below.

- Adults at age 40 who had the preschool program had higher earnings, were more likely to hold a job, had committed fewer crimes, and were more likely to have graduated from high school than adults who did not have preschool.
- The study demonstrated a cost-saving for society, with a discounted benefit-to-cost ratio of greater than 16:1, indicating a return of \$16.14 USD per dollar invested (2000 dollars). This finding demonstrates that society at large has the potential to gain from investments in early childhood development programs.<sup>89</sup>

The significance of these results extends beyond the sustainability of a publicly-funded health care system; there are wider societal benefits to mental health promotion, including

- **Reduction in the incidence of crime:** A certain percentage of crime is driven by alcohol and illicit drug use, which carry significant health costs.
- **Increased earnings and improved economic status:** Moving people up the SES gradient improves health status and reduces health care costs.
- **Increased educational attainment:** Attainment of a higher level of education (e.g., high school graduation) raises the prospects for better lifetime employment opportunities (moving people up the SES gradient), leading to improved health status and reduced health care costs.

Figure 45



Source: Belfield, C.R., Nores, M., Barnett, S., Schweinhart, L. (2006). The High/Scope Perry Preschool Program: cost benefit analysis using data from the age-40 followup. *Journal of Human Resources*.<sup>90</sup>  
© High/Scope Educational Research Foundation  
USED WITH PERMISSION

## 15 by 15 – A Comprehensive Policy Framework for Early Human Capital Investment in BC

In August 2009, the Human Early Learning Partnership at the University of British Columbia issued the document *15 by 15 – A Comprehensive Policy Framework for Early Human Capital Investment in BC*.<sup>91</sup> They revealed that “only 71% of BC children arrive at kindergarten meeting all the developmental benchmarks they need to thrive both now and into the future: 29% are developmentally vulnerable.”

The study noted that a rate of child vulnerability above 10 per cent is “biologically unnecessary,” and BC’s current level is three times that rate. As a result, according to the study, BC is facing a loss of human capital, which could result in great economic loss for the province. The study concluded that “...unnecessary early vulnerability in BC is... costing the provincial economy a sum of money that is 10 times the total provincial debt load.”<sup>91</sup>

To counteract this situation, the study recommends investing in reducing early vulnerability as “the early years represent the unique window in the human life course during which citizens’ physical, socio-emotional and cognitive potential are especially malleable to the positive effects of strategic human capital investments.”<sup>91</sup>

The authors noted that a key reason for this heightened vulnerability is the changing role of women in society and a policy context that has not adapted to current socio-economic reality. The post-war expectation that women remain in the home and provide daily caregiving for their dependent children is out of touch with current socio-economic reality. The disconnect between policy on early child development in Canada and the socio-economic context has been highlighted by international research. In a 2008 report by UNICEF comparing government policy and results for young children and their families in 25 developed countries, Canada ranked last.<sup>91</sup>

Top-ranked countries also achieved top international rankings for gender equality, based on World Economic Forum reports that assess how fairly countries share resources and power between men and women. Norway, Finland and Sweden ranked highest, with over 80 per cent of their gender gaps closed. In striking contrast, Canada fell from 14th place in 2006 to 31st in 2008.

The authors further noted that Canada’s worsening gender gap ranking coincides with the weakening of institutional support for gender equality in BC. Since 2001, the BC government’s commitment shifted from a full-fledged ministry, to a Minister of State, and is now at a point where women’s equality no longer receives specific institutional representation.

The authors concluded that a comprehensive government policy that supports parents is the best way to reduce early vulnerability. They suggest focusing on six recommendations for public policy changes that would help reduce early vulnerability from the current level of 29 per cent to 15 per cent by 2015 and to 10 per cent by 2020.<sup>91</sup> The recommendations are as follows:

1. Build on maternity and parental leave to enrich the benefit value, and to extend the total duration from 12 to 18 months, reserving additional months for fathers.
2. Build on existing employment standards to support mothers and fathers with children over 18 months to work full-time for pay, but redefine full-time to accommodate shorter annual working hour norms without exacerbating gender inequalities in the labour market.
3. Build on income support policies to mitigate poverty among families with children.
4. Build on pregnancy, health, and parenting supports to ensure monthly developmental monitoring opportunities for children from birth through age 18 months, as their parents are on leave.



5. Build on early education and care services to provide a seamless transition for families as the parental leave period ends in order to make quality services for children age 19 months to kindergarten affordable and available on a full- or part-time basis, as parents choose.
6. Build on the work of local early child development coalitions in community planning to enhance program coordination between all local services that support families with children from birth to age six.<sup>91</sup>

The quality of human capital in British Columbia is key to the province's long-term economic success. Gaps in abilities that play an important role in determining both labour market and health outcomes are created early in life. And while the poor are most likely to be vulnerable, the majority of vulnerable children in BC are middle-class. The benefits of investing in early childhood development outweigh the costs by more than 6 to 1 over a 60-year period.



# INVESTING IN PREVENTION: CONCLUSION

There are gaps in the evidence with respect to the effectiveness of preventive interventions for chronic disease, injury and mental health, in part because the necessary research has not been undertaken and also due to the ongoing under-funding of population and public health research when compared to biomedical research. Nonetheless, there is a great deal of evidence as to what does work and there are some things that can be said with certainty:

- Chronic disease, injuries and mental disorders exact a very high toll in pain and suffering, direct costs to the publicly-funded health care system, and indirect economic costs to society.
- The risks posed by the proximal (behavioural) risk factors and societal risk conditions (determinants of health) that contribute to the burden of disease are not as low as they could be.
- The burden of chronic disease, injuries and mental ill-health, and the occurrence of proximal risk factors and societal risk conditions, is inequitably distributed across the socio-economic gradient of the Canadian population.
- Much is known about the major risk factors and conditions that contribute to the burden of chronic disease, injury and mental health.
- There is a significant body of evidence on how to reduce the prevalence of many of the risk factors and modify the societal conditions that impact the burden of disease, which would result in a reduction in that burden.
- It is as improper to withhold an effective preventive intervention as it would be to withhold an effective therapeutic intervention.
- There is evidence that a number of preventive interventions are cost-saving for the health care system, and even more are cost-effective when compared to other therapeutic interventions.

Reducing the burden of chronic disease, injuries and mental health and promoting healthy lifestyles are two of the most important issues facing society in Canada and British Columbia—not only because of the economic and social benefits, but because it is the correct thing to do. Investing in prevention and the promotion of health should be undertaken for the same reasons that we treat disease and injury: not just because of the economic gains that will be realized, but because it is the hallmark of a civilized, humane and caring society.



# REFERENCES

1. McIntosh CN, Finès P, Wilkins R, Wolfson MC. Income disparities in health-adjusted life expectancy for Canadian adults, 1991 to 2001. *Health Reports*. 2009 Dec;20(4).
2. Kershaw P, Anderson L, Warburton B, Hertzman C. 15 by 15: A comprehensive policy framework for early human capital investment in BC. Vancouver, BC: Human Early Learning Partnership, University of British Columbia; 2009 Aug.
3. Murray, CJL. Quantifying the burden of disease: the technical basis for disability-adjusted life-years. In Murray CJL, Lopez AD, editors. *Global comparative assessments in the health sector- disease burden, expenditures and intervention packages*. Geneva: World Health Organization; 1994.
4. ActNow BC. Measuring our success. Progress report II. Victoria, BC: ActNow BC; 2010. Available from [http://www.actnowbc.ca/media/ActNowBC\\_Measuring-Our-Success-Progress-Report-II.pdf](http://www.actnowbc.ca/media/ActNowBC_Measuring-Our-Success-Progress-Report-II.pdf).
5. World Bank. *World development report 1993 – investing in health*. New York: Oxford University Press; 1993.
6. Murray CJL, Lopez AD. *The global burden of disease*. Harvard: Harvard University Press; 1996.
7. Beg S, Voss T, Barker B, Stevenson C, Stanley L, Lopez AD. *The burden of disease and injury in Australia 2003*. Canberra: Australian Institute of Health and Welfare; 2007.
8. Murray CJ, Salomon JA, Mathers C. A critical examination of summary measures of population health [GPE discussion paper no.2]. Geneva: World Health Organization; 1999.
9. Strategic Policy and Research Branch, British Columbia Ministry of Health and Ministry Responsible for Seniors. *Evaluation of the burden of disease in British Columbia*; Victoria, BC: Ministry of Health and Ministry Responsible for Seniors; 2001.
10. Public Health Agency of Canada. *The Chief Public Health Officer's report on the state of public health in Canada, 2008: addressing health inequalities*. Ottawa, ON: Minister of Health; 2008.
11. Provincial Health Officer. *The impact of diabetes on the health and well-being of people in British Columbia. Provincial Health Officer's annual report 2004*. Victoria, BC: Ministry of Health; 2005.
12. Wanless D. *Securing good health for the whole population*. London: Department of Health; 2004.
13. Public Health Agency of Canada. *Economic burden of illness in Canada 2000: methodological notes*. Ottawa, ON: Public Health Agency of Canada; 2009.
14. Public Health Agency of Canada. *Investing in prevention: the economic perspective*. Ottawa, ON: Public Health Agency of Canada; 2009.
15. Ministry of Health. *Primary health care charter: a collaborative approach*. Victoria, BC: Ministry of Health; 2007.
16. Institute of Medicine. *Health and behaviour: the interplay of biological, behavioural and social influences*. Washington, DC: National Academy Press; 2001.

17. Select Standing Committee on Health. The path to health and wellness: making British Columbians healthier by 2010. Victoria, BC: The Legislative Assembly of British Columbia; 2004.
18. Public Health Agency of Canada. Fetal alcohol spectrum disorder. Ottawa, ON: Public Health Agency of Canada; 2005.
19. May PA, Gossage JP, Kalberg WO, Robinson LK, Buckley D, Manning M, et al. Prevalence and epidemiology characteristics of fasd from various research methods with an emphasis on recent in-school studies. *Dev Disabil Res Rev.* 2009;15(3):176-192.
20. Stade B, Ali A, Bennett D, Campbell D, Johnston M, Lens C, et al. The burden of prenatal exposure to alcohol: revised measurement of cost. *Can J Clin Pharmacol.* 2009;16(1) Winter:e91-e102.
21. Health Canada. Economic burden of illness in Canada, 1998. Ottawa, ON: Health Canada; 2002.
22. Colman R, Walker S. The costs of physical inactivity in British Columbia. British Columbia: GPI Atlantic; 2004.
23. Katzmarzyk P, Gledhill N, Shephard R. Economic burden of physical inactivity in Canada. *Can Med Assoc J.* 2000 Nov 28;163(11):1435-1440.
24. Colman R. Cost of obesity in British Columbia. Glen Haven, NS: GPI Atlantic; 2001.
25. Provincial Health Officer. Health goals for British Columbia. Victoria, BC: Ministry of Health and Ministry Responsible for Seniors; 1997.
26. Provincial Health Officer. The health and well-being of the people of British Columbia: a report on the health of British Columbians. Provincial Health Officer's annual report 2002. Victoria, BC: Ministry of Health Planning; 2003.
27. Provincial Health Officer. Policy and practice - a report on the use of British Columbia's health goals by B.C. government ministries. A report from the Provincial Health Officer. Victoria, BC: Ministry of Health and Ministry Responsible for Seniors; 2001 Jan. Available from [www.healthservices.gov.bc.ca/pho/pdf/ppfinal.pdf](http://www.healthservices.gov.bc.ca/pho/pdf/ppfinal.pdf).
28. Population Health Promotion Expert Group of the Pan-Canadian Public Health Network. Closing the health gap: synthesis of the significant population health reports of 2008. Ottawa, ON: Pan-Canadian Public Health Network; 2008.
29. Health Disparities Task Group. Reducing health disparities – roles of the health sector: discussion paper. Ottawa, ON: Federal/Provincial/ Territorial Committee on Population Health and Health Security, Minister of Health; 2005.
30. Lightman E, Mitchell A, Wilson B. Poverty is making us sick: a comprehensive survey of income and health in Canada. Toronto: The Wellesley Institute; 2008.
31. Smedley B, Syme SL, Committee on Capitalizing on Social Science and Behavioral Research to Improve the Public's Health. Promoting health: intervention strategies from social and behavioural research. Washington, DC: National Academy Press; 2000.
32. Statistics Canada. Income trends in Canada 1976 to 2006. Ottawa, ON: Statistics Canada. Available from: <http://www.statcan.gc.ca/pub/13f0022x/13f0022x2006000-eng.htm>.
33. Food and Agriculture Organization of the United Nations. Rome Declaration on World Food Security. World Food Summit Plan of Action. Rome: Food and Agriculture Organization of the United Nations; 1996 Nov 13-17.
34. Provincial Health Services Authority, BC Health Officers Council. Health inequities in BC – discussion paper. Vancouver, BC: Provincial Health Services Authority; 2008 Nov.
35. Wilton R. Putting policy into practice? Poverty and people with serious mental illness. *Soc Sci Med.* 2004;58:25-39.
36. University of California, Santa Cruz. Atlas of global inequality. Available from <http://ucatlus.ucsc.edu/spend.php>.

37. Public Health Agency of Canada. *Toward a healthy future: second report on the health of Canadians*. Ottawa, ON: Public Health Agency of Canada; 1999. Available from <http://www.phac-aspc.gc.ca/ph-sp/report-rapport/subin-eng.php>.
38. Keon W. Health for all: questions from the past, lessons for the future. *The Hill Times*. 2008 Jan 21.
39. Canadian Institute for Health Information. *The cost of acute care: hospital stays by medical condition in Canada 2004-2005*. Ottawa, ON: Canadian Institute for Health Information; 2008.
40. National Advisory Committee on SARS and Public Health. *Learning from SARS: renewal of public health in Canada*. Ottawa, ON: Health Canada; 2003.
41. Canadian Institutes of Health Research. *The future of public health in Canada: developing a public health system for the 21st century*. Ottawa, ON: Canadian Institutes of Health Research, Institute of Population and Public Health; 2003.
42. Frieden TR. A framework for public health action: the health impact pyramid. *Am J Public Health*. 2010;100:590-595.
43. Mirolla M. *The cost of chronic disease in Canada*. Ottawa, ON: Chronic Disease Prevention Alliance of Canada; 2004.
44. World Health Organization. *Ottawa Charter for Health Promotion*. Ottawa, ON: World Health Organization; 1986 Nov 21.
45. Rootman I, El-Bihbety D. *A vision for a health literate Canada*. Ottawa, ON: Canadian Public Health Association; 2008.
46. Johnston L, Ammary N, Epstein L, Johnson R, Rhee K. A transdisciplinary approach to improve health literacy and reduce disparities. *Health Promotion Practice*. 2006;7(3):331-335.
47. Acheson D. *Public health in England: the report of the committee of inquiry into the future development of the public health function*. London: HMSO; 1988.
48. Select Standing Committee on Health. *A strategy for combatting childhood obesity and physical inactivity in British Columbia*. Victoria, BC: The Legislative Assembly of British Columbia; 2006.
49. Clinical Prevention Policy Review Committee. *A lifetime of prevention. The report of the Clinical Prevention Policy Review Committee*. Victoria, BC: Clinical Prevention Policy Review Committee; 2009. Available from: [http://www.hls.gov.bc.ca/publications/year/2009/CPPR\\_Lifetime\\_of\\_Prevention\\_Report.pdf](http://www.hls.gov.bc.ca/publications/year/2009/CPPR_Lifetime_of_Prevention_Report.pdf).
50. Martin S. Fewer Canadians have their own doctor. *Can Med Assoc J*. 2002;166(5):646.
51. Coffield AB, Maciosek MV, McGinnis JM, Harris JR, Caldwell MB, Teutsch SM. Priorities among recommended clinical preventive services. *Am J Prev Med*. 2001;21(1):1-9.
52. Yarnall KS, Pollak KI, Østbye T, Krause KM, Michener JL. Primary care: is there enough time for prevention? *Am J Public Health*. 2003;93(4):635-41.
53. U.S. Preventive Services Task Force. [Internet]. Rockville, MD: Agency for HealthCare Research and Quality. Available from: <http://www.ahrq.gov/CLINIC/uspstfix.htm>.
54. Partnership for Prevention. *National Commission on Prevention Priorities: identifying the most beneficial and cost effective preventive services*. Washington, DC: Partnership for Prevention; 2008. Available from: <http://www.prevent.org/content/view/42/70/>.
55. Krueger & Associates. *Establishing priorities among effective clinical prevention services in British Columbia: summary and technical report*. Victoria, BC: Krueger & Associates; 2008.
56. Glasgow R, Orleans C, Wagner E, Curry S, Solberg L. Does the chronic care model also serve as a template for improving prevention? *The Milbank Quarterly*. 2001;79(4).

57. McQueen DV. Evidence and theory. Continuing debates on evidence and effectiveness. In McQueen DV, Jones CM, editors. *Global perspectives on health promotion effectiveness*. New York: Springer Science; 2007. p. 281-303.
58. Rootman I. Presentation to the Select Standing Committee on Health; 2004 Sep 14.
59. Manuel DG, Creatore MI, Rosella LCA, Henry DA. What does it take to make a healthy province? A benchmark study of jurisdictions in Canada and around the world with the highest levels of health and the best health behaviours. Toronto: Institute for Clinical Evaluative Sciences; 2009 Nov.
60. World Health Organization, Public Health Agency of Canada. *Mobilizing intersectoral action to promote health: the case of ActNow BC in British Columbia, Canada*. Ottawa, ON: Public Health Agency of Canada; 2009.
61. Ministry of Health, Population Health and Wellness. *Evidence review: unintentional injury prevention*. Victoria, BC: Ministry of Health; 2007 Nov.
62. World Health Organization. *Reducing salt intake in populations – report of a WHO forum and technical meeting (Oct 5-7, 2006)*. Geneva: World Health Organization; 2007.
63. Heart and Stroke Foundation of Canada. *Dietary Sodium, Heart Disease and Stroke : Heart and Stroke Foundation of Canada position statement*. Ottawa, ON: Heart and Stroke Foundation of Canada; 2009 Apr. Available from: <http://www.heartandstroke.com/atf/cf/%7B99452D8B-E7F1-4BD6-A57D-B136CE6C95BF%7D/DietarySodium-HeartDisease-and-Stroke-PS-Eng.pdf>.
64. Blood Pressure Canada. *Policy – sodium*; 2007. Available from: <http://hypertension.ca/bpc/wp-content/uploads/2007/10/bpc-sodium-policy-with-endorsements-clean.pdf>.
65. Penz E, Joffres MR, Campbell N. Reducing dietary sodium and decreases in cardiovascular disease in Canada. *Can J Cardiol*. 2008;24(6):497-501.
66. World Action on Salt & Health. *New research reveals huge differences in salt contents in global brands [News Release]*. London: World Action on Salt & Health. Available from: [http://www.worldactiononsalt.com/media/wash\\_media\\_release\\_final\\_uk\\_2009.doc](http://www.worldactiononsalt.com/media/wash_media_release_final_uk_2009.doc).
67. World Action on Salt & Health. *Finland salt action summary*; 2009 Mar. Available from: <http://www.worldactiononsalt.com/action/finland.doc>.
68. Henney JE, Taylor CL, Boon CS, editors. *Strategies to reduce sodium intake in the United States*. Washington, DC: National Academies Press; 2010. Available from: <http://www.iom.edu/Reports/2010/Strategies-to-Reduce-Sodium-Intake-in-the-United-States.aspx>.
69. Tjepkemka M, Shields M. *Nutrition: findings from the Canadian Community Health Survey – overweight Canada children and adolescents [Catalogue no. 82-620-XWE2005001]*. Ottawa, ON: Statistics Canada; 2005.
70. Garriguet D. *Beverage consumption in children and teens*. *Health Reports*. 2008;19(4). Available from: <http://www.statcan.gc.ca/pub/82-003-x/2008004/article/6500820-eng.pdf>.
71. Rehm J, Ballunas D, Brochu S, Fischer B, Gnam W, Petra J, et al. *The costs of substance abuse in Canada, 2002*. Ottawa, ON: Canadian Centre on Substance Abuse; 2006 Mar.
72. Babor TF, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, et al. *Alcohol: no ordinary commodity: research and public policy*. New York: Oxford University Press; 2003.
73. Provincial Health Officer. *Public health approach to alcohol policy. An updated report from the Provincial Health Officer*. Victoria, BC: Ministry of Healthy Living and Sport; 2008 Dec.



74. Statistics Canada. Canadian Community Health Survey, Share File 2007- 2008 Combined.
75. McCreary Centre Society. A picture of health: highlights from the 2008 BC Adolescent Survey. Vancouver, BC: McCreary Centre Society; 2009.
76. Naimi TS, Brewer RD, Mokdad A, Denny C, Serdula MK, Marks JS. Binge drinking among US adults. *JAMA*. 2003;289:70-75.
77. Ministry of Health. Evidence review: chronic disease prevention (prepared by H. Krueger & Associates). Victoria, BC: Ministry of Health; 2008 Jun.
78. World Health Organization. Strengthening mental health promotion [Fact Sheet No. 220]. Geneva: World Health Organization; 2001.
79. World Health Organization. Mental health: new understanding, new hope. The world health report. Geneva: World Health Organization; 2001.
80. Waddell C, McEwan K, Shepherd CA, Offord DR, Hua JM. A public health strategy to improve the mental health of Canadian children. *Can J Psychiatry*. 2005;50(4):226-233.
81. National Institute of Mental Health. Blueprint for change: Research on child and adolescent mental health. Washington DC: National Institute of Mental Health; 2001.
82. Knapp MA. Economic evaluations and interventions for children and adolescents with mental health problems. *J Child Psychol Psychiatry*. 1997;38:3-25.
83. Ministry of Health, Population Health and Wellness. Evidence review: mental health promotion. Victoria, BC: Ministry of Health; 2007 May.
84. Heckman JJ. Skill formation and the economics of investing in disadvantaged children. *Science*. 2006 Jun 30;312(5782):1900-2.
85. Schweinhart LJ. High/Scope Perry Preschool Study – historical narrative. Ypsilanti, MI: High/Scope Educational Research Foundation. Available from: <http://www.highscope.org/Content.asp?ContentId=232>.
86. Lynch FL, Hornbrook M, Clarke GN, Perrin N, Polen MR, O'Connor E, et al. (2005). Cost-effectiveness of an intervention to prevent depression in at-risk teens. *Arch Gen Psychiatry*. 2005;62:1241-1248.
87. Olds DL, Henderson CR, Phelps C, Kitzman H, Hanks C. Effect of prenatal and infancy nurse home visitation on government spending. *Med Care*. 1993;31:155-174.
88. Foster EM, Jones D. Can a costly intervention be cost-effective? An analysis of violence prevention. *Arch Gen Psychiatry*. 2006;63:1284-1291.
89. Muennig P, Schweinhart L, Montie J, Neidell M. Effects of a prekindergarten educational intervention on adult health: 37-year follow-up results of a randomized controlled trial. *Am J Public Health*. 2009 Aug; 99:1431-1437.
90. Belfield CR, Nores M, Barnett S, Schweinhart L. The High/Scope Perry Preschool Program: cost benefit analysis using data from the age-40 followup. *J Hum Resour*. 2006;41(1):162-190.
91. Kershaw P, Anderson L, Warburton B, Hertzman C. 15 by 15 – a comprehensive policy framework for early human capital investment in BC. Vancouver, BC: Human Early Learning Partnership, University of British Columbia; 2009 Aug.
92. Suhrcke M, Nugent RA, Stuckler D, Rocco L. Chronic disease: an economic perspective. London: Oxford Health Alliance; 2006.
93. Drummond MF, Sculper MJ, Torrance GW, O'Brien BJ, Stoddart GL. Methods for the economic evaluation of health care programmes (3rd ed.). Oxford: Oxford University Press; 2005.

94. Goldsmith IJ, Hutchinson B, Hurley J. Economic evaluation across the four faces of prevention: a Canadian perspective. Hamilton, ON: Centre for Health Economics and Policy Analysis, McMaster University; 2004 May.
95. Russell LB. Prevention's potential for slowing the growth of medical spending. Washington, DC: National Coalition on Health Care; 2007.
96. Lemelin J, Hogg W, Baskerville N. Evidence to action: a tailored multifaceted approach to changing family physician practice patterns and improving preventive care. *Can Med Assoc J*. 2001;164(6):757-763.
97. McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348(26):2635-2645.
98. Hutchison B, Woodward CA, Norman GR, Abelson J, Brown JA. Provision of preventive care to unannounced standardized patients. *Can Med Assoc J*. 1998;158:185-193.
99. Baskerville N, Hogg W, Lemelin J. Process evaluation of a tailored multifaceted approach to changing family physician practice patterns and improving preventive care. *J Fam Pract*. 2001;50(3):242-9.
100. McVea K, Crabtree BF, Medder JD, Susman JL, Lukas L, McIlvain HE, et al. An ounce of prevention? Evaluation of the "Put Prevention into Practice Program" *J Fam Pract*. 1996;43(4):361-9.
101. Medder J, Susman JL, Gilbert C, Crabtree BF, McIlvain HE, McVea K, et al. Dissemination and implementation of Put Prevention into Family Practice. *Am J Prev Med*. 1997;13(5):345-51.
102. Melnikow J, Kohatsu N, Chan B. "Put Prevention into Practice": a controlled evaluation. *Am J Public Health*. 2000;90(10):1622-5.
103. Goodwin MA, Zyzanski SJ, Zronek S, Ruhe M, Weyer SM, Konrad N, et al. A clinical trial of tailored office systems for preventive service delivery. The Study to Enhance Prevention by Understanding Practice (STEP-UP). *Am J Prev Med*. 2001;21(1):68-9.
104. Yeazel MW, Bunner SH, Kofron PM, Weiss PJ. "Put Prevention into Practice" (PPIP): Evaluating PPIP in two family practice residency sites. *Fam Med*. 2002;34(1):17-22.
105. Goodson P, Gottlieb N, Smith M. "Put Prevention into Practice": evaluation of program initiation in nine Texas clinical sites. *Am J Prev Med*. 1999;17(1):73-8.
106. Gottlieb NH, Huang PP, Blozis SA, Guo JL, Murphy Smith M. The impact of "Put Prevention into Practice" on selected clinical preventive services in five Texas sites. *Am J Prev Med*. 2001;21(1):35-40.
107. Goodson P, Murphy Smith M, Evans A, Meyer B, Gottlieb NH. Maintaining prevention in practice: survival of PPIP in primary care settings. *Am J Prev Med*. 2001;20(3):184-9.
108. Stange KC, Flocke SA, Goodwin MA, Kelly RB, Zyzanski SJ. Direct observation of rates of preventive service delivery in community family practice. *Prev Med*. 2000 Aug;31(2 Pt 1):167-76.

# APPENDIX 1: MEASURING THE ECONOMIC CONSEQUENCES OF ILLNESS

The 2006 publication of the Oxford Health Alliance<sup>92</sup> provides an overview and summary of the strengths and weakness of the three different ways that the economic consequences of illness are measured. These are: (i) the cost-of-illness approach, (ii) the microeconomic approach, and (iii) the macroeconomic approach. These are summarized below.

## 1) Cost-of-Illness Approach

This approach provides a useful method of estimating the economic impact of chronic disease or its risk factors, accounting for both direct medical expenditures and losses due to foregone productivity, and is often used in the field of public health. Cost-of-illness studies estimate the quantity of resources (in monetary terms) used to treat a disease, as well as the size of the negative economic consequences of illness in terms of lost productivity to society or to a specific sector. The costs of illness are divided into three categories; however, only the first two can be easily measured.

- **Direct costs** are the costs of medical care in relation to prevention, diagnosis and treatment of disease. They include costs such as ambulances, inpatient or outpatient care, physician and fees for other health care professionals, rehabilitation, community health services, and medication. Of all the cost components, this is the least controversial measurement, although it still presents a number of challenges.
- **Indirect costs** measures the loss of human resources caused by morbidity or premature death. The measurement of indirect costs is a matter of considerable debate. Some cost-of-illness studies examine the loss of future earnings (the human-capital approach), and limit

the estimate to the working population. Others use the much broader willingness-to-pay method, which assesses what people are willing to pay for relatively small changes in the risk of death. From these figures, economists can estimate the value that people assign to life.

- **Intangible costs** are an attempt to capture the psychological dimensions of illness including pain, bereavement, anxiety and suffering and is the most difficult to measure.

The Oxford Report notes that cost-of-illness studies are limited by conceptual and methodological challenges, as they are not usually directly comparable across countries, disease categories, and time, and the methodologies do not address causality.

## 2) The Microeconomic Approach

The microeconomic approach examines the economic consequences at the individual and the household level. Microeconomic studies offer reasonable possibilities to address causality. This is important for policymakers as this information allows the targeting of efforts to improve economic outcomes (such as productivity increases or poverty reduction).

The three main types of economic consequences that are identified by the microeconomic approach are:

- Consumption (direct spending on goods, including “disease-related spending” and savings).
- Labour supply and labour productivity effects.
- Education and human-capital accumulation.

### **3) The Macroeconomic Approach**

The macroeconomic approach measures the consequences of illness, based on the assumption that diseases or ill health have an impact on economic growth (measured as annual per-person GDP). The macroeconomic perspective is important because of its immediate appeal to economic policymakers (e.g., finance ministers). However, research in this area has been limited to date, partly due to data and methodological challenges.

# APPENDIX 2: OVERVIEW OF SELECTED RESEARCH—IMPLEMENTING EFFECTIVE CLINICAL PREVENTIVE SERVICES

Any effective strategy to reduce the burden of disease must engage primary care practitioners and help them to consistently and fully implement the clinical primary preventive interventions that are known to be effective, or for which there is fair evidence of effectiveness, and to discontinue those practices for which there is no evidence of effectiveness. This will require a combination of education, incentives and support.

## Challenges in Implementing Clinical Prevention

The first challenge is the low rate of implementation of effective and recommended preventive interventions in primary care. Stange et al.<sup>108</sup> directly observed the rates of delivery of services recommended by the U.S. Preventive Services Task Force in the offices of 138 family physicians in Ohio. They found “uniformly low” delivery of all preventive services during illness visits, with generally higher but widely varying rates during well-care visits. In particular they found that “patients were up to date on 55 percent of screening, 24% of immunisation, and 9% of health habit counselling services.”

Lemelin, Hogg and Baskerville<sup>96</sup> studied 46 Health Service Organizations practices in Ontario and found that the proportion of eligible patients who received 8 recommended preventive manoeuvres was 53 per cent, while the proportion of eligible patients who received 5 inappropriate preventive manoeuvres was 21 per cent. This is comparable to the finding that for 38 preventive care quality indicators in the United States, only 55 per cent of patients received the recommended care—exactly the same proportion as those that received recommended care overall, including acute and chronic care.<sup>97</sup>

Hutchinson et al.<sup>98</sup> studied 62 physicians in southern Ontario who were visited by unannounced standardized patients posing as new patients. They noted the proportion of “A”, “B”, “C”, “D” and “E” recommendations of the Canadian Task Force on Preventive Health Care that were performed, offered or advised. They found that “study physicians performed or offered 65.6% of applicable grade A manoeuvres, 31.0% of grade B manoeuvres, 22.4% of grade C manoeuvres, 21.8% of grade D manoeuvres and 4.9% of grade E manoeuvres.”

Coffield et al.<sup>51</sup> undertook a systematic assessment of the value of clinical preventive services recommended for average-risk patients by the U.S. Preventive Services Task Force. Based on a combination of the burden of disease prevented by each service and the cost-effectiveness of the intervention, they identified the following priority interventions relevant to chronic disease prevention—those ranked highest in priority (7 or more out of 10) and yet having the lowest delivery rates (less than 50 per cent in the United States):

- Tobacco cessation counselling for adults.
- Screening older adults for undetected vision impairment.
- Offering adolescents an anti-tobacco message or advice to quit.
- Counselling adolescents on alcohol and drug abstinence.
- Screening adults for colorectal cancer.
- Screening adults for problem drinking.

Other priority interventions for chronic disease prevention that are delivered at a rate greater than 50 per cent in the United States, are:

- Screening for cervical cancer among sexually active women aged 18 and over.

- Screening for hypertension among all persons.
- Screening for high blood cholesterol among men aged 35 to 65 years and women aged 45 to 65 years.

One important reason for the low level of implementation of clinical preventive services was highlighted by Yarnall et al.<sup>52</sup> They concluded that there was not enough time for prevention in a primary care practice. They took the list of recommended preventive services (both A and B recommendations) from the U.S. Preventive Services Task Force's *Guide to Clinical Preventive Services*,<sup>53</sup> estimated times to provide those services from the literature, and applied this to a representative practice population of 2,500 people distributed according to the age and sex distribution of the American population. They concluded that it would take 1,773 hours of a physician's time annually (or 7.4 hours per work day) to provide all these services to children, adults and pregnant women. If only the category A recommendations were followed, it would still require 525 hours a year (2.2 hours per work day), while just doing the top priority preventive services identified by Coffield et al.<sup>51</sup> would require one hour per work day.

However, Yarnall et al. note that “providing only these services excludes a large number of other services that have also been recommended and shown to be efficacious.”<sup>52</sup> They conclude that we have to find a better way to both fund and pay for effective preventive services, either through group visits, patient education, or—“the most promising model currently available”—by using non-physicians, especially nurse practitioners and physician assistants, to provide preventive and wellness services.

The study by Lemelin et al.<sup>96</sup> used a fairly resource-intensive intervention (nurse prevention facilitators) over an 18-month period and demonstrated a modest one-fifth increase in appropriate interventions in the study group (from 52.3 per cent to 62.3 per cent) and a small decrease in inappropriate interventions compared to the control group. In a process evaluation of that same project, Baskerville, Hogg and Lemelin<sup>99</sup> found that the key interventions were audit and

feedback on prevention performance, developing consensus on the practice's prevention plan, and developing reminder systems.

Put Prevention into Practice (PPIP), a program of the Agency for Healthcare Research and Quality, is intended to increase the appropriate use of clinical preventive services, such as screening tests, immunizations and counselling, based on the U.S. Preventive Services Task Force recommendations. This program has identified five key elements of a formal system for delivering preventive services, which increases their delivery in the clinical setting.<sup>m</sup> They are:

- Establish preventive care protocols.
- Define staff roles for delivering and monitoring preventive care.
- Determine patient and material flow.
- Audit the delivery of preventive care continually.
- Readjust and refine your delivery system and standards.

There are lessons to be learned from the implementation of the PPIP program in the United States. McVea et al.<sup>100</sup> examined eight Midwestern family practices that had purchased the PPIP kit and found that the materials were not being used. They concluded that technical support was needed, and that a “one size fits all” approach would not meet the needs of diverse providers, which suggests the need for a more tailored approach. Medder et al.<sup>101</sup> found that after two years of active promotion through the American Academy of Family Physicians, only 27 per cent of Academy members had heard about PPIP. They concluded that simple availability of the kit is inadequate, and that additional strategies might be needed such as the provision of external consultation services to practices, the incorporation of preventive services into Health Maintenance Organizations, and residency training.

Melnikow, Kohatsu and Chan<sup>102</sup> evaluated the extent to which PPIP materials affected the delivery of eight clinical preventive services in a family medicine practice serving a diverse, low-income population. They found that the delivery rates were higher for seven of these preventive services

<sup>m</sup> For more information, consult the Put Prevention into Practice website at <http://www.abrq.gov/clinic/ppipix.htm>.

at six months, but that by 30 months this increase had flattened or decreased. They concluded that while the use of these materials could have a modest impact, “sustained improvement will require substantial system changes and ongoing support.” Goodwin et al.<sup>103</sup> tested a practice-tailored approach in 77 community family practices in northeast Ohio, with particular emphasis on health habit counselling. The intervention consisted of a nurse facilitator who, after a one-day practice assessment, met with the physicians and their staff and helped them choose and implement individualized prevention tools and approaches. They found that this approach increased delivery of the U.S. Preventive Services Task Force interventions from 31 per cent to 42 per cent over a one-year period. Finally, Yeazel et al.<sup>104</sup> looked at the implementation of PPIP in two family practice residency sites compared to two control sites, following a careful planning process to initiate PPIP. They found “only inconsistent or sporadic differences” and concluded that “PPIP had little effect on the delivery of clinical preventive services.”

Goodson, Gottlieb and Smith<sup>105</sup> examined the initiation of PPIP in nine Texas public health clinics. Factors that seemed to predict the successful initiation of PPIP included “a medium

patient load, the ability to serve low-resource populations, prior attempts to implement categorical programs, existence of the philosophy of prevention, and pre-implementation planning.” Gottlieb et al.<sup>106</sup> examined the impact of PPIP in five primary-care clinics in Texas over a three-year period. They found that there were modest increases in a number of screening, health and immunization interventions. Goodson et al.<sup>107</sup> looked at the organizational determinants of the institutionalization of PPIP in these five clinics. The organizational factors they identified were “the site’s institutional strength, the integration of PPIP within extant programs and services, visibility of the program within and outside the site, planning for the termination of grant funding, and presence of a program champion with mid- to upper-level managerial authority.”

From these studies, one must conclude that programs such as PPIP can have some impact on the delivery of preventive services, but this requires providing external resources such as a nurse facilitator, tailoring the interventions to the needs and capacities of individual practitioners and practice environments, finding a champion and finding ways to institutionalize the process.

