



CORE

Public Health Functions for BC

**Model Core Program Paper:
Chronic Disease**

This Model Core Program Paper was prepared by a working group consisting of representatives of the BC Ministry of Healthy Living and Sport and BC's health authorities.

This paper is based upon a review of evidence and best practice, and as such may include practices that are not currently implemented throughout the public health system in BC. This is to be expected, as the purpose of the Core Public Health Functions process—consistent with the quality improvement approach widely adopted in private and public sector organizations across Canada—is to put in place a performance improvement process to move the public health system in BC towards evidence-based best practice. Where warranted, health authorities will develop public performance improvement plans with feasible performance targets and will develop and implement performance improvement strategies that move them towards best practice in the program component areas identified in this Model Program Paper.

This Model Program Paper should be read in conjunction with the accompanying review of evidence and best practice.

Model Core Program Paper approved by:

Core Functions Steering Committee (March 2010)

Population and Public Health, BC Ministry of Healthy Living and Sport (March 2010)

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EXECUTIVE SUMMARY

This paper identifies the core elements that should be provided by British Columbia health authorities to support the prevention of chronic disease.ⁱ It is intended, as part of the BC Core Functions in Public Health, to reflect evidence-based practice and to support continuous performance improvement.

Chronic diseases are characterized by complex causality, multiple risk factors, a long latency period, a prolonged course of illness, functional impairment or disability, and in most cases, the unlikelihood of cure.ⁱⁱ They have a profound effect on the physical, emotional and mental well-being of individuals, often making it difficult to carry on with daily routines and relationships. They are a major contributor to the burden of ill health and premature death, and are associated with significant economic costs (both direct health care costs and lost productivity).

This program is focused on prevention measures for chronic diseases that have not been addressed in other core programs, as well as to provide a value-added approach by stressing the linkages between public health and primary care providers in preventive clinical services. The chronic diseases addressed within this paper include: cardiovascular disease, diabetes, arthritis and other musculoskeletal diseases, sensory disorders (hearing and visual impairment), digestive and genitourinary disorders, cancers, chronic lung diseases, and chronic neurological disorders. The program also recognizes that in supporting stronger linkages with primary care providers, such linkages extend beyond chronic disease prevention.

Although the prevention of a number of chronic diseases has been addressed in other core program papers, many of these are acknowledged in this paper to indicate a comprehensive approach. For example, the cluster of chronic diseases which have common risk factors related to smoking, physical inactivity and poor eating habits (i.e., cardiovascular disease, some of the principal forms of cancer, chronic respiratory disease, and diabetes) are briefly discussed to ensure integration into an overall chronic disease prevention program, even though they are addressed in the Healthy Living core program. Similarly, preventive measures related to chronic communicable diseases, mental disorders, problematic substance use as well as chronic diseases resulting from poor environmental quality, are briefly noted.

A Working Group of representatives from the Ministry of Healthy Living and Sport, Provincial Health Services Authority and regional health authorities, worked together in the development of this paper. The Working Group agreed that the goal of the chronic disease prevention program is to enhance the health and well being of British Columbians by preventing and/or reducing the incidence and prevalence of chronic disease among the population.

ⁱ The diseases considered here are chronic non-communicable diseases. Chronic communicable disease (e.g., TB, HIV/AIDS, hepatitis C) are dealt with in the communicable disease prevention and control core program.

ⁱⁱ National Public Health Partnership (2001). *Strategic Framework for Chronic Disease Prevention* (Background Paper). Melbourne: National Public Health Partnership.

The specific objectives are to:

- Enhance coordinated systemic support for population health initiatives, positive lifestyle behaviours and other protective factors that reduce chronic diseases at all stages of the life course;
- Prevent and/or reduce modifiable risk factors that influence the occurrence and severity of chronic diseases;
- Reduce health disparities among different segments of the population with regard to chronic diseases;
- Increase the early detection of the chronic conditions that can be prevented/controlled through early intervention; and
- Enhance the health-related quality of life of people with chronic illnesses to prevent the deterioration of their condition and the occurrence of additional co-morbid diseases.

A number of key foundations, based on the literature and experience of experts in the field are considered necessary for achieving progress and successful outcomes. These are:

- A population health approach which takes into account social, economic and environmental determinants of health including protective factors, risk factors and vulnerable populations;
- A comprehensive set of universal policies and programs focused across the lifespan/life course and encompassing multiple settings and a “whole of society” approach;
- Multi-sectoral and multi-disciplinary collaboration by primary health care and public health partners, as well as community, regional and provincial partners to integrate health promotion, disease prevention, early identification and early intervention;
- The use of equity lenses to identify systemic barriers and differential impacts of health determinants on the lives of women and men and on vulnerable populations;
- Selected, targeted interventions for at-risk families and vulnerable populations;
- Healthy public policies, capacity building, skills development, and advocacy for best practice implementation by local and regional partners;
- A culture of evidence-based practice, evaluation and continuous quality improvement.

The major program components for chronic disease prevention in regional health authorities are as follows:

- Population health promotion;
- Clinical prevention of chronic disease;
- Prevention as part of chronic disease management and self-care; and
- Surveillance, monitoring, and program evaluation.

Important strategies for each program component, based on the evidence and experience of experts in the field, are:

Population Health Promotion Strategy

- Coordinate and establish a comprehensive multi-sectoral health promotion strategic plan;
- Advocate for policies, by-laws, and social/cultural/environmental conditions that decrease the risk of chronic diseases;
- Strengthen education, awareness and community development to enhance protective factors and reduce risk factors for the population as a whole;
- Target health promotion initiatives to at-risk groups including Aboriginal communities, and other vulnerable population groups (e.g., groups with social, economic and cultural pressures, malnutrition, tobacco use, obesity, depression, problematic alcohol and substance use, violence and abuse).

Clinical Prevention

- Support, promote and encourage their own primary care providers to integrate the following into their practice: primary prevention (immunization, counselling, preventive medication, screening and early detection) for chronic diseases (based on the 2009 *BC Lifetime Prevention Schedule*);
- Promote and support collaborative strategies by developing “practice teams” and other integrated and/or shared initiatives through linkages between primary health care providers, public health and other community health care organizations to strengthen and optimize prevention of chronic diseases and chronic disease management services, including:
 - Information sharing with primary care practitioners, on local population health issues;
 - Identifying community resources and coordinating the development of linkages and networks between primary care practitioners and community agencies;
 - Working together on community population health needs assessments;
 - Joint planning, development and implementation of coordinated and/or integrated prevention strategies including healthy living strategies and other key linkages;
 - Collaborating in development and use of health education programs and materials;
 - Coordinated approaches to auditing the effectiveness of community prevention programs.

- Facilitate/promote among primary care providers, the implementation of information management/information technology (e.g., electronic medical records, electronic access to clinical practice guidelines, patient recall systems, etc.) that support the provision of clinical prevention services;
- Facilitate expanded coverage and access to priority clinical preventive services to achieve higher rates of utilization, especially for those who are disadvantaged (e.g., by age, income, education, geography, etc.), thus reducing inequalities in the availability of effective preventive services and the associated information and support systems.

Prevention as part of Chronic Disease Management and Self-Care

- Health authorities should support the integration of ‘healthy living’ activities and the prevention of co-morbid conditions for people with chronic diseases, in all the chronic disease management activities of their own primary care practitioners, and where appropriate and feasible, should consider doing so with other primary care practitioners in their communities;
- Where appropriate, provide or support the provision of Healthy Living core program services for those with chronic diseases to enable them to improve overall health and reduce progression of their disease;
- Facilitate access to information which assists clients to build expertise in managing their health (e.g., educational materials, websites, self-management programs, etc.);
- Work with community organizations, schools, professional associations, employers and unions to enhance understanding and support throughout organizational cultures for initiatives and strategies that can enhance positive self-care by those with chronic conditions (e.g., reduce environmental hazards / impediments, minimize stress, encourage ‘healthy living’, etc.).

Surveillance, Monitoring, and Program Evaluation

- Gather and assess statistics on chronic disease incidence and prevalence, including local and regional trends, major issues, key risk factors, vulnerable groups and populations to support planning and decision-making;
- Establish program evaluation frameworks and conduct evaluation of new initiatives;
- Encourage continuous improvement through application of findings from new research studies and program evaluation;
- Disseminate knowledge to primary care partners and other health professional community partners.

1.0 OVERVIEW/SETTING THE CONTEXT

As demonstrated in recent Canadian reports, public health needs to be better structured and resourced, in order to improve the health of the population. The Framework for Core Functions in Public Health is a component of that renewal in British Columbia. It defines and describes the core public health activities of a comprehensive public health system. This policy framework was accepted in 2005 by the Ministry of Health and the health authorities.

Implementation of core functions will establish a performance improvement process for public health, developed in collaboration between the Ministry of Health, the health authorities and the public health field. This process will result in greater consistency of public health services across the province, increased capacity and quality of public health services and improved health of the population. To ensure collaboration and feasibility of implementation, the oversight of the development of the performance improvement process is managed by a Provincial Steering Committee, with membership representing all health authorities and the ministry.

What are core programs? They are long-term programs representing public health services that health authorities provide in a renewed and modern public health system. Core programs are organized to improve health; they can be assessed ultimately in terms of improved health and well-being and/or reductions in disease, disability and injury. In total, 21 programs have been identified as “core programs,” of which the program on chronic disease prevention is but one. Many of the programs are interconnected and thus require collaboration and coordination between them.

In a “model core program paper,” each program will have clear goals, measurable objectives and an evidentiary base that shows it can improve people’s health and prevent disease, disability and/or injury. Programs will be supported through the identification of best practices and national and international benchmarks (where such benchmarks exist). Each paper will be informed by an evidence paper, other key documents related to the program area and by key expert input obtained through a working group with representatives from each health authority and the Ministry of Healthy Living and Sport.

The Provincial Steering Committee has indicated that an approved model core program paper constitutes a model of good practice, while recognizing it will need to be modified to meet local context and needs. The performance measures identified are appropriate indicators of program performance that could be used in a performance improvement plan. The model core program paper is a resource to health authorities that they can use to develop their core program through a performance improvement planning process. While health authorities must deliver all core programs, how each is provided is the responsibility of the health authority, as are the performance improvement targets they set for themselves.

It is envisioned that the performance improvement process will be implemented over several years. During that time the process will contribute to and benefit from related initiatives in public health infrastructure, health information and surveillance systems, workforce competence assessment and development and research and evaluation at the regional, provincial and national levels. Over time, these improvement processes and related activities will improve the quality

and strengthen the capacity of public health programs, and this in turn will contribute to improving the health of the population.

1.1 An Introduction to This Paper

This model core program paper for chronic disease prevention is one element in an overall public health performance improvement strategy developed by the Ministry of Health in collaboration with provincial health authorities and experts in the field of public health. It builds on previous work from a number of sources.

In March 2005, the Ministry of Health released a document entitled *A Framework for Core Functions in Public Health*. This document was prepared in consultation with representatives of health authorities and experts in the field of public health. It identifies the core programs that must be provided by health authorities, including chronic disease prevention, and the public health strategies that can be used to implement these core programs. It provides an overall framework for the development of this document.

The evidence review that has informed this paper is *Chronic Disease Prevention in British Columbia: Core Program Evidence Review* (2008), prepared by H. Kruger & Associates for the Ministry of Healthy Living and Sport. The core programs evidence review on healthy living, which focuses on physical activity, healthy eating, and prevention or cessation of tobacco use, also informs this paper.

A Working Group on the prevention of chronic disease prevention was formed, consisting of experts from the Ministry of Healthy Living and Sport, the Provincial Health Services Authority and the regional health authorities. The group provided guidance and direction in the development of the model core public health program paper during meetings in March and June 2009, as well as through telephone and e-mail discussions.

The following chronic diseases are addressed within this paper: cardiovascular disease, diabetes, arthritis and other musculoskeletal diseases, sensory disorders (hearing and visual impairment), digestive and genitourinary disorders, cancers, chronic lung diseases, and chronic neurological disorders. A number of other diseases that can result in long-term or lifetime impairment and disability are not included as they are covered in other model core programs (e.g., communicable diseases such as HIV/AIDS, tuberculosis, hepatitis C, as well as mental disorders, problematic substance use, dental caries and periodontal disease). Non-intentional and intentional injuries are not included as they are also covered in other model core programs. Aspects of healthy living as a preventive strategy are covered by the model core program on healthy living.

1.2 Introduction to Prevention of Chronic Disease

The definition for chronic disease used in *The Framework for a Provincial Chronic Disease Prevention Initiative* (2003)¹ is “chronic diseases are usually characterized by complex causality, multiple risk factors, a long latency period, a prolonged course of illness, functional impairment or disability, and in most cases, the unlikelihood of cure”.² The US Center for Disease Control and Prevention (US CDC) notes that common chronic diseases are those that have a duration of three months or longer, with conditions described as “low intensity”.³ The US CDC considers the

following to be chronic diseases: cardiovascular disease, diabetes, arthritis and other musculo-skeletal disease, cancers, chronic lung disease, and chronic neurological disorders. Although chronic diseases are usually understood to be non-communicable diseases, some organizations—such as the World Health Organization—include certain communicable diseases as well as long-term mental disorders.⁴

1.3 Chronic Diseases Addressed in this Paper

The diseases addressed in this core program include chronic, non-communicable diseases not addressed elsewhere in other public health model core programs. These include:

- Neurological disorders such as Parkinson’s disease, multiple sclerosis, and brain cancer;
- Sensory disorders such as hearing and vision impairments;
- Musculoskeletal disorders including arthritis, lower back pain and repetitive strain injuries. Musculoskeletal disorders such as osteoarthritis are not preventable on the basis of current knowledge, although some conditions are related to obesity (e.g., osteoarthritis of the knee) and osteoporosis is related to diet and physical activity. The main reason for inclusion of musculoskeletal disorders is that they affect more than a quarter of the population, and frequently present as a co-morbidity with depression, and with vascular conditions in older people. There are many opportunities to improve self-management and improve quality of life for people with these conditions in conjunction with health promotion programs.⁵
- Cardiovascular disease including coronary heart disease, heart failure, hypertension and stroke;
- Respiratory disorders such as asthma;
- Digestive disorders such as peptic ulcers, inflammatory bowel disease, gastric cancer;
- Genitourinary disorders including renal and bladder stones, and cancers of the genitourinary system.

Those which are not included, or if included, are not extensively covered, are:

- Chronic communicable diseases (e.g., HIV, hepatitis C, tuberculosis, infections) are addressed in the communicable disease core program.
- Mental health disorders, which are included in the mental health core program. However, it is recognized that depression is a significant risk factor for chronic disease and conversely, chronic disease is a risk factor for depression. Canadians who report symptoms of depression also report experiencing three times as many chronic physical conditions as the general population⁶: for example, women with depression are 80% more likely to experience heart disease than women without depression⁷. People living with a chronic physical health condition experience depression and anxiety at twice the rate of the general population.⁸ There is also an association between depression and diabetes as the presence of one condition is a risk factor for the other.⁹ The association of co-morbid

mood disorders and chronic illness (e.g., diabetes, health disease, cancer, arthritis / rheumatism, and asthma) have been clearly documented.¹⁰

- Injuries, which are included in the unintentional injuries core program.
- Dental caries and periodontal disease are in the dental public health core program.

The chronic diseases linked mainly or entirely to common behavioural risk factors such as smoking, physical inactivity, and poor eating habits, that account for roughly one-quarter of the burden of disease in BC, are the focus of the healthy living core program. However, because of their importance in the prevention of many chronic conditions (i.e., lung cancer, many aspects of cardiovascular disease, COPD, diabetes and chronic kidney disease) they are noted briefly in this paper to ensure they are integrated into a comprehensive approach to chronic disease prevention. Similarly, prevention strategies noted in other core program papers are mentioned to support a coordinated approach with other core programs (i.e., promotion of mental health, healthy children and youth, healthy communities, healthy environments, prevention of problematic substance use, violence and abuse, etc.).

Broad population health promotion interventions that address the broad determinants of health and seek to change overall living and working conditions are included but not dealt with in a comprehensive manner. Although they can be expected to affect most if not all of the conditions addressed, the approach recognizes the focus on social, economic and environmental factors in other core programs, especially the healthy living and healthy community core programs, and the need to integrate broader strategies with other programs.

Finally, disorders for which there are no primary preventive measures are not generally addressed as this paper focuses on primordial and primary prevention, with lesser emphasis on secondary prevention measures (e.g., at this time there are no known preventive interventions for Type 1 diabetes and for Alzheimer's disease).

1.3.1 The Burden of Chronic Disease

Chronic non-communicable diseases are a major contributor to the burden of ill health and premature death. The Public Health Agency of Canada (PHAC) reports that:

- 60% of deaths in Canada in 2008 were attributable to circulatory diseases (heart attack, heart failure or stroke) or cancers¹¹;
- Almost 1 in 4 of Canadians over age 18 reported they were obese (BMI 30.0 or over);
- Approximately 1 in 6 Canadians over age 20 reported high blood pressure;
- Approximately 1 in 7 Canadians over age 12 reported they had arthritis or rheumatism;
- Approximately 1 in 12 Canadians aged 12 and over reported they had asthma.¹²

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An estimation of the burden of disease in British Columbia, in 2005 (measured as “Disability Adjusted Life Years” (DALYs),ⁱⁱⁱ shows that the set of diseases considered in this core program constitute 2/3 of the burden of disease in BC:¹³

Cancer	18.1%
Cardiovascular	16.7%
Chronic Respiratory	6.7%
Neurological	6.4%
Diabetes	5.3%
Dementia	4.6%
Musculoskeletal	3.9%
Diseases of the Digestive System	2.4% ¹⁴
TOTAL	66.7%

Of particular interest is a cluster of chronic diseases which include cardiovascular disease, some of the principal forms of cancer, chronic respiratory disease, and diabetes. This cluster has common risk factors (i.e., smoking, physical inactivity and poor eating habits), and together, these diseases account for almost half of the burden of disease and almost a quarter of the economic burden of illness in British Columbia.¹⁵ Additional risk factors contributing to the burden of chronic disease include: social, economic, and cultural conditions that shape and constrain behaviours; stressful psychosocial conditions in homes, schools, workplaces and communities; environmental conditions; some infections; psychological status; biological risk factors; and genetic predisposition.¹⁶

Chronic diseases are not distributed evenly across the population but are linked to a number of determinants of health. As a result it is important to consider inequalities and vulnerabilities among population subgroups. Factors that contribute to these differences include inherent biological determinants such as sex, genetic abnormalities, and variations in physiological and biochemical functions and differences in social, economic and environment conditions that individuals and groups experience. For example, the burden of chronic disease among BC’s Aboriginal people is higher than the general population: diabetes is more than 3 times as prevalent; heart disease and arthritis are higher; and life expectancy among First Nation people is 7.5 years below other British Columbians.¹⁷

1.3.2 Economic Impacts

These diseases create large adverse—and underappreciated—economic effects on families, communities and countries. In Canada in 2000 chronic diseases accounted for \$99.1 billion (53%) of the total economic burden of illness.¹⁸ If the unattributable costs are removed, the percentage of the economic burden attributable to chronic disease rises to 71.1%. Direct health care costs for people with chronic diseases (which include some mental disorders in the category

ⁱⁱⁱ The DALY is a composite measurement that incorporates both mortality and disability data to quantify disease burden, developed in response to a WHO initiative to measure global disease burden, overall health status between populations, quantify inequality and provide information to help set priorities for health planning and research. It incorporates Years of Life Lost, and Years Lost to Disability.

of neuropsychiatric conditions)^{iv} account for 32% (\$31.6 billion) of the total *direct health costs* in Canada. However, the *indirect costs* (the cost of foregone production) associated with chronic disease are even higher, accounting for approximately 75% (\$67.5 billion) of the indirect costs of all illness in Canada. For example, annual production losses in Canada, attributable to premature death include: a) cancers (malignant neoplasms) amount to approximately \$14 billion; and b) cardiovascular disease amount to approximately \$9.2 billion; while musculoskeletal conditions cost the Canadian economy an additional \$18.3 billion annually in lost production—which is the largest cost component for any category of illness.¹⁹

1.3.3 An Integrated Approach

Because many of the same risk factors contribute to a wide range of chronic diseases, an integrated and collaborative approach is necessary for a comprehensive chronic disease prevention program. This requires integration with other core public health programs (especially Healthy Living) which focus on reducing many of the same risk factors, and most importantly, collaboration with primary care practitioners who play a central role in providing individualized health promotion, disease prevention and early intervention for chronic diseases. It is also important to integrate policy directions and strategic initiatives on chronic disease prevention that have already been developed in British Columbia and thus build upon and strengthen existing coordinated, multidisciplinary and collaborative strategies.

Key partners in prevention of chronic disease are primary care providers. Joint committees of the BC Medical Association, the BC Ministry of Health Services and the Society of General Practitioners of BC, such as the General Practice Services Committee (GPSC), have developed a number of practice recommendations and guidelines for prevention and early intervention for chronic diseases. The Clinical Prevention Policy Review developed a Lifetime Prevention Schedule for BC to identify priorities for clinical prevention services (for all diseases) based on a lifetime prevention approach. The schedule also identifies the collaborative role and relationship with key partners, particularly public health, in delivering these services.

In particular, the schedule proposed in the final report of the policy review (approved December 2009) suggests strengthening the three cancer screening programs in BC (i.e., breast, cervical and colorectal cancer), tobacco cessation services and the other cardiovascular disease prevention services recommended by the Guidelines and Protocols Advisory Committee (see www.bcguidelines.ca/gpac/pdf/cvd.pdf).

1.3.4 Priority Interventions

In addition to the priorities noted above, the evidence review on chronic disease prevention in BC (2008), provides an overview of evidence on the association between modifiable risk factors for specific chronic diseases and the level of evidence/effectiveness for the prevention measures. The executive summary from the evidence review can be found in Appendix 1.

^{iv} Neuropsychiatric conditions include neurological conditions (e.g., Alzheimer's disease and other forms of dementia, Parkinson's disease, migraine etc.), psychiatric conditions (e.g., depression, schizophrenia, bipolar disorder, panic disorder etc.) and addictions (alcohol and drug use disorders).

It is recognized that early detection is an important element in improving outcomes and/or slowing disease progression for some diseases; for example, 40% of blindness is either preventable or treatable if discovered early enough, screening for cervical cancer with the Pap test has had a significant impact on the level of morbidity and mortality from this disease, and recognition and immediate response to the warning signs of stroke can significantly improve long-term prognosis.²⁰ A description of the availability and effectiveness of screening tools and the related potential for early detection to influence the progression and outcomes of the disease is also discussed in the evidence review summarized in Appendix 1.

Studies that compare recommended priority interventions for chronic diseases in Canada, the United States and Australia, are discussed in *Establishing Clinical Prevention Policy in British Columbia*, prepared for the Clinical Prevention Policy Review,²¹ and are reflected in the Lifetime Prevention Schedule for BC.

1.3.5 Universal and Targeted Interventions

In addition to universal interventions directed to the population as a whole, the use of a range of population “lenses” is necessary to identify groups at risk of chronic diseases. For example, a gender equity lens identifies special risks that are unique to the experiences of women, and of men, including gender-specific conditions that require attention. Special measures may be necessary to address systemic barriers and compensate for historical and social disadvantages in order to reduce these risks: thus equity measures lead to greater equality. In the same way, “diversity equity lenses” are necessary to examine population groups that are at higher risk or are more vulnerable to chronic disease due to a wide range of biological, social, cultural and other factors. As well, those with certain other diseases have an increased risk for chronic diseases: for example, mental health disorders are interconnected with a number of chronic diseases, as noted earlier. Depending upon the vulnerabilities of each population, tailored measures are necessary to overcome the barriers and inequities they experience.

In considering the population groups who require tailored programs, it is important to identify the setting in which that population can most effectively be reached. Evidence shows there are certain key settings where integrated programs can be effectively provided, including homes, schools, workplaces, care settings, recreational settings, neighbourhoods or other community settings: many of these are addressed in the healthy communities core program. This suggests that interventions be developed in a collaborative manner to coordinate efforts, share resources and experience, and gain synergy.²²

2.0 SCOPE AND AUTHORITY FOR THE PREVENTION OF CHRONIC DISEASE

In order to implement the program for chronic disease prevention, the respective roles and responsibilities of the Ministry of Healthy Living and Sport, the Provincial Health Services Authority (PHSA), the regional health authorities, and other ministries and levels of government, must be clear.

2.1 International Roles and Responsibilities

The World Health Organization (WHO) Collaborating Centre on Non Communicable Disease Policy is housed in the Public Health Agency of Canada (PHAC). Called the Centre for Chronic Disease Prevention and Control (CCDPC), it is the only centre in the Americas and Europe, and has become a global centre of excellence in the field. Its mandate is to provide strategic leadership in the development and implementation of integrated chronic disease prevention and control strategies and work with relevant stakeholders at national and international levels to ensure an integrated approach to chronic disease prevention and control. The key roles of CCDPC include:

- Leadership in national and international development of integrated strategies, policies, programs on non-communicable disease (NCD) prevention and control and oversee their implementation;
- The development, enhancement and maintenance of chronic disease surveillance programs;
- The development of prevention and screening strategies for chronic disease; and
- The development of integrated chronic disease management strategies.

The CCDPC also co-leads, with the Pan American Health Organization, the development of the Chronic Non Communicable Disease Policy Observatory to promote the expansion of effective NCD policy development and implementation. It fosters strong international collaboration and dialogue, and shares its findings through a variety of channels including publications, websites, international policy dialogues and conferences.

2.2 National Roles and Responsibilities

The Public Health Agency of Canada promotes and supports the prevention of chronic disease by contributing to the development, synthesis, dissemination and application of knowledge.

PHAC is responsible for implementing the WHO Countrywide Integrated Non-communicable Disease Intervention (CINDI) Programme which focuses on reduction of levels of major non-communicable disease through coordinated, comprehensive health promotion and disease prevention measures. The aim is to promote healthier lifestyles in communities and to prevent and control common risk factors. The program is based on the concept of an integrated approach towards prevention and control and recognizes that a few modifiable risk factors are common to

major non-communicable diseases. The approach covers the full continuum of health promotion, disease prevention and health care actions. It is based on cooperative actions to promote healthier lifestyles with priorities on reducing smoking, unhealthy diets, alcohol abuse, physical inactivity, and psycho-social stress. PHAC has coordinated development of a number of national strategies to prevent chronic diseases including the National Strategy for Cancer Control, the National Heart Health Strategy and the National Lung Health Framework.

PHAC also provides resources to support the work of the Canadian Task Force on Preventive Health Care (CTFPHC) which is being re-launched following a period when all its members resigned and it did not function. The Task Force fosters linkages between primary care and community or public health programs; it works with a variety of health professional groups and non-governmental organizations to support development of prevention tools and activities to aid implementation of clinical guidelines in practice. The Task Force Scientific Panel is comprised of independent experts who identify topics of priority for primary and preventive care, review the best available evidence and lead the development of clinical practice guidelines and related recommendations to support preventive practice.

An Integrated Pan-Canadian Healthy Living Strategy was initiated by Federal/Provincial/Territorial Ministers of Health in 2004. The Ministers announced the creation of an Intersectoral Healthy Living Network to move the agenda forward; however, the federal government did not fund the initiative and its only function now is to report annually on progress by federal and provincial governments in the area of healthy living.

2.3 Provincial Roles and Responsibilities

2.3.1 Ministry of Healthy Living and Sport

The mandate of the Ministry of Healthy Living and Sport is to:

- Promote health and prevent disease, disability and injury.
- Protect people from harm.
- Facilitate quality opportunities to increase physical activity, participation and excellence in sport.
- Support the health, independence and continuing contributions of women and older people.

In its stewardship role, the Ministry of Healthy Living and Sport provides leadership, strategic policy direction, legislation and monitoring for public health and sports programs to support the delivery of appropriate and effective public health services in the province. The ministry has a role in addressing health inequalities, with a specific focus on the development of policies and programs to close the gap in Aboriginal health status. The ministry works with the health authorities to provide accountability to government and the public for public health service outcomes.

Specifically in the area of chronic disease prevention, the Ministry of Healthy Living and Sport is responsible for strategic policies and legislation as follows:

- Advising the Minister on policies and legislation related to chronic disease prevention;
- Providing leadership in provincial policy development and long-term planning, including collaboration with provincial Ministries and agencies in the development of chronic disease prevention strategies;
- Consulting and collaborating with health authorities, clinical and academic partners in the development of plans, policies, strategies, best practices, data collection and measurement related to the prevention of chronic diseases;
- Collaborating with the Ministry of Health Services and the General Practice Services Committee (a joint committee of the Ministry of Health Services, the BC Medical Association and the Society of General Practitioners of BC) in developing appropriate initiatives and funding support to enhance chronic disease prevention by primary health care practitioners;
- Leading/facilitating the development of provincial networks and coalitions; and
- Monitoring and reporting on provincial progress in preventing chronic diseases.

2.3.2 Ministry of Health Services

The Ministry of Healthy Living and Sport has a unique relationship with the Ministry of Health Services, which is the primary linkage to the regional health authorities, who have responsibility for actual service delivery of public health programs. The roles and functions of the Ministry of Health Services are predominately focused on:

- Leadership for the delivery of health care services and programs.
- Funding and accountability for regional health authorities.
- Ensuring the long-term sustainability of the health care system.
- Improved patient care.
- Leadership, direction and support to health care service delivery partners.
- Establishment of province-wide goals, standards and expectations for health care services delivery by health authorities.
- Management of the Medical Services Plan, Pharmacare, Ambulance Services and HealthLink BC self-care programs.

2.3.3 Other Provincial Ministries

Other key partners within the government are:

- Ministry of Education shares a Healthy Schools Initiative with MHLS and coordinates support for the healthy living curriculum, as well as Action Schools BC, which strengthens student leadership skills, physical activity, healthy eating, and the Friends for

Life program (a school-based early intervention and prevention program to reduce the risk of anxiety disorders and to build resilience).

- Ministry of Children and Family Development (MCFD) delivers community-based support services to children, youth and families at-risk. MCFD sponsors the Friends for Life program (noted above).
- Ministry of Environment works to enhance the province's air quality, water quality and the health, safety and sustainability of the environment.
- Ministry of Housing and Social Development, and BC Housing, deliver services in employment, income assistance and subsidized housing;
- Ministry of Aboriginal Relations and Reconciliation works to reduce social and economic barriers for Aboriginal people and to support self-government and treaty arrangements;
- Ministry of Agriculture and Lands contributes to the quality of food production, while agencies such as WorkSafe BC encourage healthy working environments.

2.3.4 Provincial Health Services Authority

The Provincial Health Services Authority (PHSA) is responsible for ensuring that high-quality specialized services and programs are coordinated and delivered within the regional health authorities. PHSA operates eight provincial agencies including: BC Mental Health and Addiction Services, BC Children's Hospital, BC Women's Hospital & Health Centre, BC Centre for Disease Control, BC Cancer Agency, BC Renal Agency, BC Transplant and Cardiac Services BC.

One of PHSA's four key strategic directions is population and public health. A steering committee consisting of representation from all PHSA agencies and programs oversees population and public health activity across PHSA. Due to the provincial scope of PHSA's mandate, a dual role for PHSA is emerging: improvements aimed at streamlining population and public health activities within PHSA agencies and programs, as well as potential provincial coordination in areas such as surveillance, consistent messaging, expert advice, and supporting development of healthy public policy.

Key drivers for shaping PHSA's role in core programs are the needs of the regional health authorities, the MHLS and the MHS. As PHSA's role evolves, the opportunity arises to develop mechanisms to: convene and coordinate provincial dialogue; facilitate the identification of common needs and joint problem solving; collaborate with and support regional and provincial partners to meet common needs; and jointly identify available resources for common initiatives.

With respect to chronic disease prevention, PHSA's role includes:

- Managing cancer screening programs for British Columbia;
- Acting as a "knowledge resource" for the province by linking and using health information to reduce the burden of chronic diseases and to support provincial policy

development. This involves contributing to research and knowledge exchange (e.g., a health and wellness survey, evaluation of community food action initiatives, data on income and poverty, a resource guide to promote food secure communities, etc.);

- Research on inequities related to chronic disease, such as gender specific evidence reviews (e.g., women’s heart health, Type 2 diabetes and women’s health, women’s respiratory health);
- Collaborating with provincial ministries, municipalities, the voluntary and private sector to promote active healthy living and healthy public policy for British Columbians;
- Implementing, through BC Mental Health and Addiction Services, a provincial plan to improve mental health literacy to improve public understanding related to promotion of mental health, mental disorder prevention, early recognition, help seeking, self-management and recovery; and
- Participating in primary health care strategies and coordination of initiatives to support shared care and availability of community level data.

2.3.5 Other Provincial Agencies

There are many non-government groups and organizations at the provincial level that are active in supporting chronic disease prevention such as the BC Chronic Disease Prevention Alliance, Heart and Stroke Foundation, the Cancer Society, the BC Lung Association, and Canadian Diabetes Association – Pacific Area.

In addition, the BC Medical Association has worked closely with the ministry in the development of best practices and guidelines for chronic disease prevention provided by primary care providers.

2.4 Health Authority Roles and Responsibilities

The role of regional health authorities overall is to identify and assess the health needs in the region, to deliver health services to British Columbians in an efficient, appropriate, equitable and effective manner, and to monitor and evaluate the services which it provides. In the area of chronic disease prevention, health authorities are responsible for:

- **Population Health Promotion** – Coordination and delivery of a comprehensive multi-sectoral health promotion strategy including advocacy for healthy public policies, provision of public education and awareness, community capacity building and community development including targeted initiatives for groups that are at-risk of chronic diseases.
- **Clinical Prevention** – Promotion, support, and encouragement of the primary care providers they employ to integrate immunization, counselling, preventive medication, and early detection of chronic diseases into their professional practice, as well as facilitate or partner on collaborative measures between primary care, public health and

other health care providers. Where possible and appropriate, such promotion, support and encouragement might be extended to other primary care providers in their communities.

- **Self-care/Self-management Strategies** – Promotion, support, and encouragement of the primary care providers they employ to integrate into their chronic disease management practice, individualized education and support for actions required to manage and control chronic conditions, and to facilitate increased access to additional information that will assist clients in building expertise in managing their health. Where possible and appropriate, such promotion, support and encouragement might be extended to other primary care providers in their communities.
- **Surveillance, Monitoring, and Program Evaluation** – Gather and assess data on chronic disease, local and regional trends, major issues, key risk factors, vulnerable groups/populations, and program effectiveness.

2.5 Local Roles and Responsibilities

Local governments exert important influence on policy and bylaws in areas such as public and community health, housing, social services, community safety, recreational services, and environmental health. The *Public Health Act* requires the development of Local Health Plans which address community health needs and encompass not only zoning and facilities but also measures for community-based health promotion and disease prevention.

As well, many community organizations and groups provide important services and supports that can positively impact, or counteract, modifiable risk factors among vulnerable individuals, families and population groups. These organizations include: social services and family support agencies, local boards of education, service clubs, arts programs, recreation, sports, and leisure programs.

2.6 Aboriginal Communities

It is particularly important, in view of the high rate of chronic disease experienced by Aboriginal people in comparison to the rest of the population, that Aboriginal groups play a central role in the design and delivery of chronic disease prevention programs that are provided to people on First Nations reserves as well as Aboriginal people in other communities. Capacity building and program support for Aboriginal communities can strengthen and support the shift toward self-government of the health care system and facilitate the management, planning and delivery of Aboriginal services.

2.7 Legislative and Policy Authority

The overall legislative and policy direction for chronic disease prevention is derived from:

- The following acts and regulations: *Public Health Act, Health Act, Health Authorities Act*.

- Provincial policy and directional documents, specifically:
 - *A Framework for Core Functions in Public Health* (March 2005).
 - *A Framework for a Provincial Chronic Disease Prevention Initiative* (2003).
 - *Staying Healthy Framework*.
 - *The Primary Care Charter* (2007).
 - *Expanded Chronic Care Model* (2003).
 - The draft interim report of the Clinical Prevention Policy Review.
- Specific policies/priorities that may be established by the health authority, the Ministry of Healthy Living and Sport or the provincial government.

3.0 GOALS AND OBJECTIVES

The goal of the program is to enhance the health and well being of British Columbians by preventing and/or reducing the incidence and prevalence of chronic disease among the population. The specific objectives of the program are to:

- Enhance coordinated systemic support for population health initiatives, positive lifestyle behaviours and other protective factors that reduce chronic diseases at all stages of the life course.
- Prevent and/or reduce modifiable risk factors that influence the occurrence and severity of chronic diseases.
- Reduce health disparities among different segments of the population with regard to chronic diseases.
- Increase the early detection of the chronic conditions which can be prevented / controlled through early intervention.
- Enhance the health-related quality of life of people with chronic illnesses to prevent the deterioration of their conditions and the occurrence of additional co-morbid diseases.

4.0 PRINCIPLES/FOUNDATIONAL CONCEPTS

The Working Group recognizes that chronic disease prevention must be based on current and reliable evidence to ensure that the most effective strategies are used to prevent chronic disease and/or to reduce their long-term effects. A review of the literature identified key principles that are foundational to the success of chronic disease prevention strategies. These include:

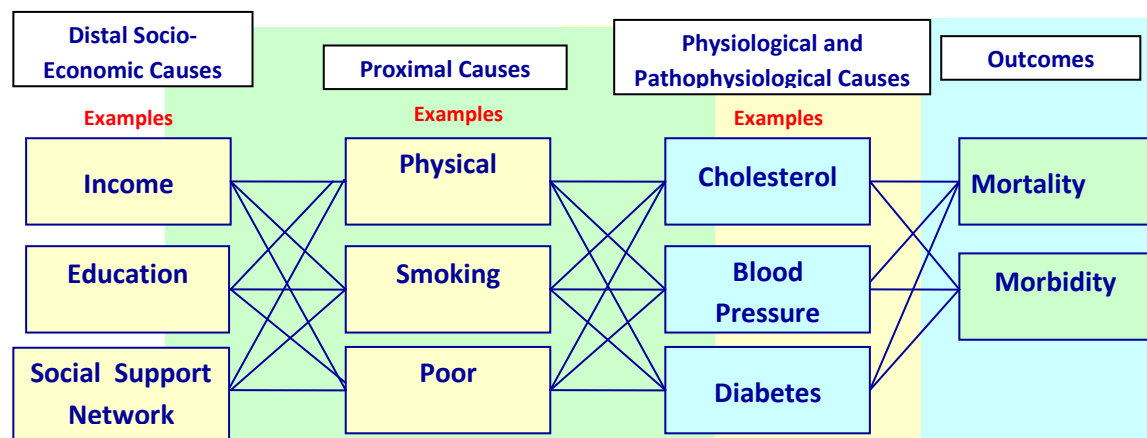
- A population health approach which takes into account social, economic and environmental determinants of health including protective factors, risk factors and vulnerable populations;
- A comprehensive set of universal policies and programs focused across the lifespan/life course and encompassing multiple settings and a “whole of society” approach;
- Multi-sectoral and multi-disciplinary collaboration among primary health care and public health partners, as well as community, regional and provincial partners to integrate health promotion, disease prevention, early identification and intervention and chronic disease management;
- The use of equity lenses to identify systemic barriers and differential impacts of health determinants on the lives of women and men and on vulnerable populations;
- Selected and targeted interventions for at-risk families and vulnerable populations;
- Healthy public policies, capacity building, skills development, and advocacy for best practice implementation by local and regional partners;
- A culture of evidence-based practice, evaluation and continuous quality improvement.

Further discussion on a number of these conceptual approaches follows below.

4.1 Population Health Approach with a Focus on Protective and Risk Factors

The determinants of chronic disease include complex interactions between protective and risk factors, including biological, social and economic factors, the physical environment, and individual behaviours. Some risk factors, such as family history and genetic endowment, cannot be altered; others, such as poverty, an important risk factor, may be influenced through advocacy for healthy public policies. Poor lifestyle choices and psychosocial factors may be shifted through strategic interventions. Protective factors, which reside in individuals, families and communities, may reduce the likelihood of negative outcomes.²³ Protective factors can prevent the initial occurrence of risk factors, work directly to decrease dysfunction, interact with risk factors to buffer their effects, and/or disrupt the pathway whereby risk leads to disease.²⁴ Research continues to explore the interplay between fixed and malleable factors to assess the degree to which interventions influence vulnerability. Figure 1 shows in broad terms the relationship between social determinants of health, personal risk factors, physiological changes and health outcomes.

Figure 1: Chronic Disease Prevention Model (World Health Organization)



Source: Lopez, M. (1999, September). On the comparable quantification of health risks: lessons from the global burden of disease study, *Epidemiology*.²⁵

The BC Chronic Disease Prevention Model²⁶ is presented in Appendix 2. It is a more complex model that identifies specific risk factors as well as protective interventions to prevent or reduce chronic diseases. In summary, it notes:

- Social, economic and cultural factors are a major influence:
 - Education
 - Social and cultural norms
 - Deprivation (i.e., material and relative)
 - Economic
 - Environmental

Key Protective Intervention: Healthy public policy, changing social norms.

- Risk factors:
 - Psycho-social conditions (i.e., social relations, social status, control and power, in home conditions, school, workplace and community)
 - Behavioural risks (i.e., smoking, eating habits, alcohol use, physical inactivity)
 - Environmental conditions (e.g., ETS, toxic substances, etc.), occupational hazards and air pollution.

Key Protective Interventions: Create supportive environments, empowerment, community development, stress management, social-emotional competence, education, behavioural modification.

- Physiological factors:
 - Genetic predisposition (e.g., BrCa gene, resilient personality, familial hypercholesterolemia, atopy, etc.)
 - Biological changes (e.g., high cholesterol, impaired immune system function, DNA damage, reactive airway, impaired GTT, etc.)
 - Infections (e.g., HPV, H pylori, Chlamydia, etc.)

Key Protective Interventions: Early detection, counselling and behaviour modification, preventive treatment (e.g., screening, counselling re genomics/proteomics, immunization, prophylaxis/treatment for infections).

4.2 A Lifetime/Life Course Perspective

Evidence suggests the need to move beyond a “static” model of adult lifestyle risk (while acknowledging the importance of continued action in this area) to one based on a lifecourse perspective which recognizes the interactive and cumulative impact of social and biological influences throughout life. In particular, it is important to focus on early life factors (in utero and early childhood) that create predispositions to chronic disease in adulthood.²⁷

As noted earlier, various societal conditions affect the development of chronic disease and exert their influence on health through two main pathways: either their effects contribute to or result from differential access to the determinants of health (i.e., social programming), or their effect on the psyche and the body directly alters biochemistry, physiology and cellular and organ functioning (i.e, biological programming). In both cases these changes interact with the genetic and acquired biological programming of the individual; their impact, whether positive or negative, accumulates over the course of an individual’s life, affecting their psychological and physiological resilience to challenges to their health, a process that Canada health philosopher Sholom Glouberman termed the “biological embedding of life experience”.²⁸

With respect to lifetime prevention by clinical health care providers, the BC Clinical Prevention Policy Review²⁹ identified broad priorities for clusters of services in the Lifetime Prevention Schedule.

4.3 Comprehensive Chronic Disease Policies

Because of the key importance of chronic disease prevention to population health and wellness, and the large economic burden created by these diseases, a number of policy directions and strategic initiatives have already been developed in British Columbia. This core program will reflect and integrate these policies in order to build upon and contribute to a comprehensive approach.

Key international and national policies include:

- WHO Action Plan for the Global Strategy for the Prevention and Control on Noncommunicable Diseases, 2008-2013.

- WHO, Ottawa Charter for Health Promotion (1986).
- The policies and recommendations of the Canadian Task for Preventive Health Care and the Canadian Pollution Prevention Roundtable.
- National initiatives such as the National Strategy for Cancer Control, the National Heart Health Strategy and the National Lung Health Framework.

Key BC policy frameworks which directly address chronic disease prevention:

- *Lifetime Prevention Schedule for BC* (see Section 5.2)

Approved in December 2009 by the BC Clinical Prevention Policy Review, the schedule identifies priority clinical prevention services, including chronic disease prevention, as well as screening and preventive medication for those with a chronic disease³⁰. The schedule identifies: cardiovascular disease prevention (i.e., GPAC Guideline for tobacco cessation, ASA prophylaxis, hypertension and hyperlipidemia detection and management); cancer screening (as per the BC Cancer Agency) for colon, cervix and breast cancer; adult immunization (i.e., BC Immunization Schedule including DT boosters and influenza and pneumococcal disease); and HPV vaccination of girls to prevent cervical cancer.

- *Primary Care Charter: a Collaborative Approach*³¹

Developed in 2007 by the Ministry of Health, health authorities and health care providers, the charter places a priority on chronic diseases with a multi-faceted strategy focused on meeting patient needs. It recognizes that family physicians constitute the largest workforce in primary health care; thus the BC Government/BC Medical Association Agreement constitutes a major part of the charter. It provides:

- Clear direction and priorities for health authorities and the ministry to use in establishing long-term integrated strategic plans;
- Seven priority initiatives: improved access to primary health care; improved access to primary maternity care; increased chronic disease prevention; enhanced management of chronic diseases; improved coordination and management of co-morbidities; improved care for the frail elderly; and enhanced end-of-life care.
- Priority populations are identified: maternity patients; people at risk for, or living with chronic conditions; the frail elderly; people living with mental ill health and addictions; aboriginal peoples; and people approaching end-of-life;
- Links to the BCMA Agreement to address each of the priorities with enhancements that include dedicated change management funding, funding for Practice Support Program Teams, physician champions to work with local family physicians and health authorities in realigning health care services, and investments in information management/information technology.

- *Framework for a Provincial Chronic Disease Prevention Initiative*

Developed by the Ministry of Health Planning in 2003, the framework³² highlights the needs to:

- Address the set of common risk factors for major chronic diseases simultaneously through approaches that promote and support healthy living;
- Recognize and address the relationship between lifestyle choices and social conditions;
- Consolidate prevention efforts within life settings such as work, school or community for integrated preventive action on multiple risk factors and across life cycles;
- Engage partners within and across the systems that impact health to coordinate inter-sectoral and inter-jurisdictional interventions, as well as horizontal linkages.

- *Expanded Chronic Care Model*³³

This model was adopted for use in BC in 2003 to guide BC health system reorganization. It has prompted significant progress in a number of areas including health system practice and redesign, integration of best practices standards into clinical workflow, and patient self-management (e.g., information technology to improve access to clinical practice guidelines, establish patient recall systems, clinical reports, and sharing information with members of a group practice or practice networks). In addition, patient registers have been developed to enable the ministry to identify prevalence rates and burden of disease, measure performance and gaps, and develop a Provincial Primary Health Mapping Project.

Although the model focuses on clinical care, it incorporates primary, secondary and tertiary prevention elements, recognizing the complexity of the issues and the need for a comprehensive approach (see diagram in Appendix 3). Indeed, it has been noted that prevention is the first step in chronic disease management.

- *Staying Healthy Framework*

The ministry has developed a “staying healthy framework” to provide a system-wide approach to staying healthy which complements the illness care components of the health care system, focuses on public health renewal, population health promotion, prevention services in primary care, and self-care.

- *ActNow BC*

ActNow BC is a cross-government health promotion initiative that supports schools, employers, local governments and communities to improve the health of British Columbians by taking steps to address common risk factors and promote healthy

lifestyles including physical activity, healthy eating and weight, living tobacco-free and making healthy choices during pregnancy.

- *Knowledge Synthesis and Translation Exchange (KSTE)*

A number of provincial agencies including PHSA and BC Centre for Disease Control, provincial ministries and academic institutions are active in research, analysis, distribution/exchange of evidence-based materials relevant to chronic disease.

- *Food Security Charters*

Emerging government policy and regulations, regional and municipal food policies, workplace and school food policies, and sectoral strategies are being implemented at many levels across the province to increase access to safe, healthy food on a local level. For example, food charters have been adopted (or are in the process of being confirmed) in Vancouver, Surrey, Vancouver Island North/Central/South regions, BC Thompson Nicola, North Okanagan and northern BC.

4.4 Multisectoral Program Collaboration and Integration

Collaboration, partnership and integration of initiatives across a wide range of health programs and health professionals, and in multiple community settings is essential for effective delivery of this program. The high prevalence of chronic diseases and their interrelatedness with social, economic, mental health and environmental problems require an integrated approach that targets clusters of related problems, common determinants, co-morbidities and populations at multiple risk.

This involves the delivery of chronic disease prevention through multiple health programs using either an integrated or collaborative approach to enhance concurrent prevention initiatives. The following programs are important partners in this approach:

- *Multidisciplinary Health Care Providers*

Collaborative arrangements with primary care physicians are a key element in providing prevention services, early identification and early intervention. Other health care providers in home and community health care and acute health care services are also important partners - these include acute care and specialized health care practitioners, nurses, dietitians, dental care professionals, speech therapists and other allied health professionals.

- *Other Core Public Health Programs*

- The core program on healthy living is the primary public health program that focuses on key preventive interventions for chronic diseases related to key lifestyle practices, namely tobacco cessation, healthy eating/weights and physical activity.

- Other core programs that address overlapping risk factors and associated prevention initiatives that are linked to chronic diseases are also important partners for collaborative and/or integrated planning and program delivery. The importance of early life experiences and the life course approach in chronic disease prevention, together with the complex aetiology of chronic diseases (see Appendix 2) means that core programs that deal with prevention and healthy outcomes in pregnancy and early childhood, the prevention of stressful circumstances such as violence, the reduction of exposure to toxic contaminants or certain infectious agents, and even oral health are all relevant to chronic disease prevention. These include:
 - Reproductive health and prevention of disabilities.
 - Healthy infant and early childhood development.
 - Healthy child and youth development.
 - Prevention and control of communicable diseases.
 - Mental health promotion and mental disorder prevention.
 - Prevention of harm associated with substances.
 - Prevention and control of communicable diseases.
 - Promotion of dental health.
 - Prevention of violence and abuse.
 - Prevention of unintentional injuries.
 - Healthy communities.
 - Air quality, water quality, and healthy community environments.
 - Food security and food safety.

- *Community Partners*

Collaboration with community stakeholders and partners is not only important for addressing and responding effectively to local needs, but also to establishing key partnerships for program delivery. Local organizations and agencies may include: local governments, physical activity/recreation and sport programs, community food committees, family support services, social services, Aboriginal Friendship Centres and other Aboriginal groups, mental health agencies, child care agencies, women's centres, and multicultural and immigrant agencies.

- *Other Provincial Ministries and Agencies*

As noted earlier, a number of provincial ministries have mandates that support prevention of chronic diseases including Ministry of Education, Ministry of Children and Family

Development, Ministry of the Environment, Ministry of Agriculture and Lands, and provincial agencies such as WorkSafe BC.

- *Provincial Health Non-Governmental Organizations*

Disease focused groups such as the Heart and Stroke Foundation, the Cancer Society, and the BC Lung Association, as well as groups such as the BC Recreation and Parks Association, the BC Healthy Living Alliance, the YMCA, Red Cross, etc.

- *The Private Sector*

The private sector can contribute both as employers who can create healthy working conditions and provide wellness programs for their staff, and as providers of goods and services that are health enhancing (e.g., food products, cars, etc. as discussed in the Conference Board of Canada, Healthy People, Healthy performance, Healthy Profits).

4.5 Collaboration Between Public Health and Primary Care

All provinces and territories are implementing initiatives that change the way primary health care is organized and delivered to enhance health services across the country. First Ministers agreed (2000, 2003 and 2004), to promote the establishment of multi-disciplinary primary health care teams to provide a focus on individual health promotion, prevention of illness and injury, and improved management of chronic disease. As new models have been rolled out across the country, often through funding from the federal Primary Health Care Transition Fund, there have been opportunities for more effective collaboration between primary care and public health. Many of these have occurred at the regional and local levels, as primary health care renewal necessitates adoption of population health approaches, and local level assessment/surveillance.³⁴

Collaborative care models have been introduced with considerable success.³⁵ Chronic disease prevention is recognized as an important component to effective chronic disease management as it decreases the development of second co-morbid chronic diseases, and is also secondary prevention as it helps to delay the progression of disease. In BC, family physicians have been given financial incentives to become involved in collaborative care. They are provided with a number of tools such as flow sheets to document therapy, and they are linked electronically with a central data base to track whether patients are meeting clinical guidelines for both treatment and outcomes. For participating physicians and patients, the results have shown excellent improvements in the quality of care.³⁶

A 2009 literature review for the Canadian Health Services Research Foundation on collaboration between public health and primary care³⁷ found that current collaborative activities include community activities, joint health promotion, health education and prevention initiatives, provision of numerous health services, sharing of information systems, social marketing and community development, development of evidence-based tools, advisory and steering committee functions, completion of needs assessments, quality assurance and program evaluations, support of teamwork and joint management activities, as well as the development and implementation of professional and academic educational initiatives.

Studies have identified the major facilitators for collaboration at an organizational level, as follows.³⁸

- Development of community-based committees or boards with diverse membership.
- Involvement of ‘multi’ professionals.
- Joint planning by public health, primary care and the community.
- Organizational structures and processes that support: team communication, autonomy, minimizing of competition, and opportunities for nurses and nurse practitioners to operate at their full scope of practice.
- Contractual agreements, parallel reporting and common governance structures; mentorship programs for new employees; clear lines of accountability; job descriptions requiring collaboration, and supportive and accessible managers.
- Smaller teams with diverse skills and background, and stable teams with a higher proportion of full-time staff.
- Co-location of public health and primary care organizations and team members.
- Use of standardized, shared systems for collecting data and disseminating information and linked electronic records to enhance access to quality medical information and support for effective interdisciplinary care.
- Shared protocols for multi-disciplinary, evidence-based practice and quality assurance, strategies and processes of care.
- Dissemination of information and evidence-based toolkits and decision support tools.

The research also identifies barriers for collaboration between public health and primary care which require attention during the planning and development stages. For example, at an organizational level, there may be lack of a common agenda, resource limitations, and a lack of knowledge and skills. At an interactional level, attitudes and beliefs, and relationship challenges may present barriers. As well, it is recognized that at a systems level, additional issues such as policy, funding, power and control issues, and information infrastructure issues may require collaboration among all levels of health care management and administration.³⁹

4.6 Linkages and Performance Improvement Planning in Chronic Disease Prevention

The core program in chronic disease prevention (CDP) raises some interesting and important challenges with respect to its place in the health authority's portfolio of core programs and its implications for strengthening linkages to primary care and chronic disease self-management. These are summarized below

4.6.1 Linkage between the Chronic Disease Prevention and Healthy Living Core Programs

There is a significant degree of complementarity between these two core programs (and indeed, with core programs in mental health, healthy communities, etc.). The key point is that they need to be carefully linked. While the Healthy Living program is focused on specific behavioural risk factors (tobacco use, unhealthy eating, physical inactivity) that together account for a significant proportion of chronic diseases, the CDP program is focused on:

- The prevention of all chronic diseases (except mental disorders and chronic infectious diseases), especially those for which 'healthy living' is only part of the solution, and
- All forms of intervention, of which healthy living practices are but one. In particular, there is a strong focus in the CDP program on three forms of clinical prevention that are not part of 'healthy living' but are part of the proposed *Lifetime Prevention Schedule* for BC: immunization e.g., the HPV vaccine to prevent cervical cancer), screening (especially for cancer) and preventive medication (e.g., ASA prophylaxis, lipid-lowering medications etc).

A comprehensive chronic disease prevention strategy would need to closely link, if not integrate, the healthy living and CDP programs; to the extent this has not been done, this may constitute a gap that needs to be addressed.

4.6.2 Linkages to Primary Care and Chronic Disease Management

The *BC Primary Health Care Charter* has identified prevention of chronic diseases as one of seven priority areas for action. Unlike 'healthy living', where the evidence suggests that with the exception of tobacco cessation the direct contribution of primary care providers, especially physicians, is of limited value, there is a considerable body of evidence that suggests their role in other aspects of clinical prevention of chronic disease is important. To the extent that health authorities employ primary care providers and provide primary care directly, they should be accountable for ensuring that their own staff act on the evidence presented here.

Of course, the vast majority of primary care is provided outside of a health authority's direct control, but to the extent that health authorities are working with and supporting primary care providers in improving their practice (e.g., around quality improvement, chronic disease management etc) they should consider their role in also promoting, encouraging and supporting them in making the effective chronic disease practices described here a part of their routine practice.

There is another potentially important link to chronic disease management; the BC Primary Health Care Charter states that “prevention is the first step in effective chronic disease management” (p 24). The prevention of co-morbidity and the adoption of healthy living practices are important in the management of almost everyone with a chronic disease. Thus, again, where health authorities directly provide chronic disease management through their own primary care services, they should ensure that both the evidence-based healthy living services and the chronic disease prevention services described in this model program paper and accompanying evidence review are integrated into the chronic disease management plans of their patients. Where they are working with other primary care providers in their communities to enhance the quality of chronic disease management, they should consider their role in also promoting, encouraging and supporting them in making the effective chronic disease practices described here a part of their routine practice.

Finally, this core program has also identified the importance of healthy living (tobacco cessation, healthy eating, physical activity) in the management of patients with chronic diseases. As part of their performance improvement planning, health authorities may want to consider how and to what extent their ‘healthy living’ services (or the services of others in the community) are or should be targeted to and tailored to those who are living with chronic disease.

4.7 Selected/Targeted Initiatives

It is necessary to focus targeted measures on the needs and issues of specific populations. As discussed earlier (Sections 4.1 and 4.2), universal approaches promote positive healthy behaviours and environments across the life course as well as the prevention of population-wide risk factors. Targeted interventions are aimed at a smaller number of people who are vulnerable or at-risk of acquiring preventable chronic diseases. Widespread health inequalities exist among population groups. For the most part, these are rooted in the social, economic, cultural and environmental determinants of health, in the genetic and biological makeup and/or are acquired during common life experiences.

4.7.1 Sex and Gender-Based Inequalities

A UK report on inequities in health suggest there are three routes to gender inequalities: the first is due to the different biology of the male and female sexes, the second relates to gender differences in social and cultural influences which have a differential impact on men and women and the third is gender inequalities in health due to different male and female cultural roles, with impacts on social, mental and physical health (e.g., poverty among single mothers which may result in poor nutrition for mothers and their children, greater mental health impacts on men who become unemployed, etc.).⁴⁰ Additional inequities may also be linked to the well-documented difference in treatment provided to women and men for heart attack, depression and other conditions.⁴¹

Some examples of sex and gender-based differences:⁴²

- In general, men have a shorter life expectancy than women.
- The mortality rate for cardiovascular disease is about 1/3 higher among men than for women.

- Lung cancer has been decreasing among men, reflecting the decline in smoking rates. Among women, lung cancer is increasing as tobacco industry marketing has targeted women specifically and their smoking rates began to decline later and more slowly than men's.
- Women suffer from a variety of health problems that are unique to their sex (reproductive system) and as well a wide range of diseases that are in part, or in whole, the result of, or are worsened by, gender bias in society. This includes higher levels of stress resulting from the double or triple burden of work they may carry, a greater likelihood to be victims of family violence, different treatment in the health care system, and other factors. As a result, women have a higher rate of morbidity than men, and while they have longer lives, they experience more disability.
- Women in general (as well as people in the older age groups and those with low income), are less likely to be physically active than men, youth and those with higher incomes.
- At all ages, pain is more common among women than men, and overall, women are almost twice as likely to report chronic pain.

4.7.2 Aboriginal People

The burden of chronic disease is higher among BC Aboriginal people, in comparison with the general population, for example:

- Life expectancy for Status Indians is 74.9 years, compared to 80.7 for other British Columbians (2006). The infant mortality rate is twice as high (i.e., 8/1,000 compared to 4/1,000) as the general population.⁴³
- Chronic conditions such as heart disease, diabetes and arthritis are more common among the BC Status Indian population (2006/2007):⁴⁴
 - The prevalence rate of diabetes among the Status Indian population is about 40% higher than among other residents (6.7% for the Status Indian population compared to 4.8% for other residents);
 - The prevalence of stroke among Status Indians is 70% higher than other BC residents;
 - Prevalence of ischemic heart disease is about 25% higher among Status Indians than other residents; while the rate of congestive heart failure is about 75% higher than the rate for other residents;
 - The rate of chronic obstructive pulmonary disease among Status Indians is 60% higher than for other residents.

In addition, the use of screening tests such as mammography and the Pap smear are roughly two-thirds the rate of other British Columbians, and smoking rates are twice as high for Aboriginal people.⁴⁵

Aboriginal people must be full partners in the design and delivery of health initiatives in their communities,⁴⁶ and research evidence must be blended with the knowledge and life experience of Aboriginal practitioners and leaders.⁴⁷ Effective prevention initiatives require culturally sensitive strategies that are situated within an Aboriginal worldview in order to sustain long-term, community-based change.⁴⁸

4.7.3 Socio-economic Inequalities

The Provincial Health Officer has noted that there is a close relationship between income and health. An adequate income is important for health, and conversely, low income is associated with poor health status.⁴⁹ He also notes that within BC, dying prematurely is related to social and economic conditions in the community—the better the ranking on indicators such as education, employment, and income, the lower the rate of premature death.

4.7.4 Diverse Cultural and Ethnic Groups

Persons or groups from diverse cultural or ethnic backgrounds may face health risks due to conditions such as discrimination, marginalization, stigmatization, loss or devaluation of language and culture, and lack of access to culturally appropriate health care and services.⁵⁰

5.0 MAIN COMPONENTS AND SUPPORTING EVIDENCE

The major program components for chronic disease prevention in regional health authorities are as follows:

- Population health promotion;
- Clinical prevention of chronic disease;
- Prevention as part of chronic disease management and self-care; and
- Surveillance, monitoring, and program evaluation.

Strategies for each of the main program components are described in the sections that follow.

5.1 Population Health Promotion

Population health promotion in chronic disease prevention is mainly concerned with addressing the broad ‘upstream’ determinants of health and of chronic disease, and with trying to reduce inequalities in health and in the prevalence of chronic disease. These determinants affect all chronic diseases by affecting the conditions in which people live, influencing their choices and ultimately affecting their physiological responses. For example, a recent report⁵¹ from the BC Healthy Living Alliance makes recommendations for policy initiatives in the following areas deemed of importance to population health and the prevention of chronic diseases: early childhood development and care, education and literacy, income security, housing, food security, supportive environment, and transportation.

Population health promotion also includes coordination of a set of strategic initiatives to: create social and physical environments that support health and make the healthy choice the easy choice; and empower individuals, families, communities as well as at-risk groups to make healthy choices that can contribute to the prevention of chronic diseases. Public health officials can work with primary care and community partners to encourage both healthy living initiatives and interventions for the prevention of chronic diseases.

Health authority initiatives should include:

- Coordinate and establish a comprehensive multi-sectoral health promotion strategic plan:
 - Conduct a needs assessment to establish regional priorities (e.g., analysis of the burden of illness, trends in risk behaviours, chronic disease patterns, disproportionate impact of health determinants on specific population groups, etc.);
 - Develop strategies to reduce risk of those chronic diseases not addressed in other core programs (e.g., hypertension, a number of cancers, etc.);
 - Incorporate health promotion at key life stages and in multiple settings;

- Integrate strategies for the promotion for healthy living (tobacco cessation, healthy nutrition and physical activity) and other core programs (i.e., promotion of mental health, harm reduction, reproductive health, infant, child and youth health, healthy communities and healthy environment).
- Adopt healthy public policies
 - Advocate for evidence-based public policies and for local by-laws which support the prevention of chronic diseases (i.e., healthy municipal policies, including land-use planning policies that encourage physical activity and active transportation; policies to increase healthy affordable food sources, quality child care services, and enhancement of air quality);
 - Advocate to minimize systemic barriers and shift social/cultural contexts which contribute to increased risk of chronic diseases among vulnerable populations (e.g., anti-poverty measures, safe neighbourhoods for low-income people, etc.);
 - Advocacy for evidence-based provincial screening programs for key chronic diseases, as necessary.
- Create supportive environments
 - Work with partners to create built environments in communities that encourage physical activity, access to the outdoors, access to healthy food and other factors that contribute to chronic disease prevention;
 - Work with partners in key settings (schools, workplaces, recreational centres, neighbourhoods, etc.) to create physical and social environments that make the healthy choice the easy choice;
 - Ensure that the health authority's own physical and social environments are supportive of chronic disease prevention and healthy living.
- Strengthen community action
 - Coordinate prevention services with other stakeholders, MCFD, community agencies and groups to deliver initiatives that function simultaneously at multiple levels to reduce risk factors and strengthen protective factors, for example:
 - Promotion of tobacco cessation, healthy diets and physical activity, and reduction of harmful use of alcohol and other substances;
 - Promotion of initiatives to address stressful lifestyles, depression, loneliness, low self-esteem, violence, and/or to enhance parenting skills, family cohesion and stability, social connectedness, etc.);
 - Build upon existing community capacity and community development initiatives with local organizations and stakeholders to increase protective

factors and reduce risk factors for chronic disease, through community-based planning, prioritization, and implementation of initiatives across multiple sectors and multiple settings.

- Target initiatives to at-risk groups including:
 - Support and assist Aboriginal communities and organizations in their community development processes to strengthen protective factors and reduce specific risk factors which threaten the health of their population;
 - Collaborate with other public health care programs and other sectors in addressing key issues for other vulnerable populations, including social, economic and cultural pressures, malnutrition, tobacco use, obesity, depression, problematic alcohol and substance use, violence and abuse (e.g., women victims of violence, discrimination toward visible minorities,), etc.
- Increase public awareness and enhance personal skills
 - Enhance the knowledge and capacity of health authority staff members to assist them in integrating chronic disease prevention into multiple health programs;
 - Encourage, promote and support primary care providers (through champions, medical associations, etc.) in recognizing / addressing key chronic disease risk factors, and in promoting patient education, positive behaviours and healthy attitudes;
 - Increase public education, knowledge and skills through partnerships with provincial, regional and community stakeholders, including:
 - Provide educational resources (e.g., fact sheets, posters, school-based education, websites, workshops, videos, etc.) targeted to priority issues in the region;
 - Public awareness and social marketing campaigns to shift attitudes and encourage safe behaviours (NOTE: small media campaigns are delivered by the health authorities, while federal and provincial governments are generally responsible for developing larger public awareness and media campaigns);
 - Coordinate cross-organizational policies and practices within the health authority to strengthen consistent and integrated public education to reduce the prevalence of chronic disease.
 - Build health literacy among local leadership, schools, child care services, social service agencies, workplaces, and other community groups, highlighting the importance of:

- The long-term and cumulative health impacts of chronic disease protective and risk factors across the lifespan;
 - Reproductive health, healthy child and youth development, and healthy living behaviours (e.g., good nutrition, healthy weights, physical activity, tobacco cessation, moderate alcohol use, stress management and coping skills, social-emotional competence, etc.) for all ages;
 - Safe and secure homes /neighbourhoods, healthy schools and working environments, and strong social and community support systems.
- Re-orient health services
 - Promote increased integration of health services through interprofessional collaborative education sessions, to address ways of counteracting the risk factors for chronic disease by all health care professionals including public health and primary care providers, clinical specialists, nurses, dietitians and allied health care professionals;
 - Work in partnership with local family physicians through Practice Support Program⁵² teams in realigning health care services to attain better health outcomes and improve providers' professional satisfaction.

NOTE: These activities should be implemented in conjunction with local initiatives for core programs on healthy living, reproductive health, healthy infant and early childhood development, healthy child and youth development, healthy communities, healthy community environments, mental health promotion and prevention of mental disorders, preventing harm from substances, prevention of violence and abuse, and other related programs, so that initiatives are coordinated with, and integrated into, existing networks at the community level.

5.1.1 Summary of Supporting Evidence

The World Health Organization *Ottawa Charter for Health Promotion*⁵³ establishes a framework for effective health promotion including: building healthy public policy; creating supportive environments; developing personal skills; strengthening community actions; and reorienting health services.

The WHO *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases*⁵⁴ recommends actions involving the elaboration of comprehensive high-level policies and plans as well as programs related to advocacy, community mobilization, environmental interventions, health system organization and delivery, legislation and regulation. In addition, as “underlying determinants of non-communicable diseases often lie outside the health sector, strategies need to involve both public and private actors in multiple sectors” and “different settings such as schools, workplaces, households, and local communities.” The *Plan* also notes the importance of strengthening human resources capacity, improving training of

physicians, nurses and other health personnel and establishing continuing education programs for all levels of the health care system with a special focus on primary health care.

The BC Healthy Living Alliance's report *Healthy Futures for BC Families: Policy Recommendations for Improving the Health of British Columbians* (September 2009) supports its recommendations with results from opinion polls that show a high level of support among British Columbians for the policies it proposes.⁵⁵ It is also worth pointing out how often smoking, unhealthy diets, physical inactivity and obesity show up as factors linked to chronic diseases. The Executive Summary in Appendix 1 clearly illustrates the need for health promotion in relation to these contributing factors for many chronic diseases.

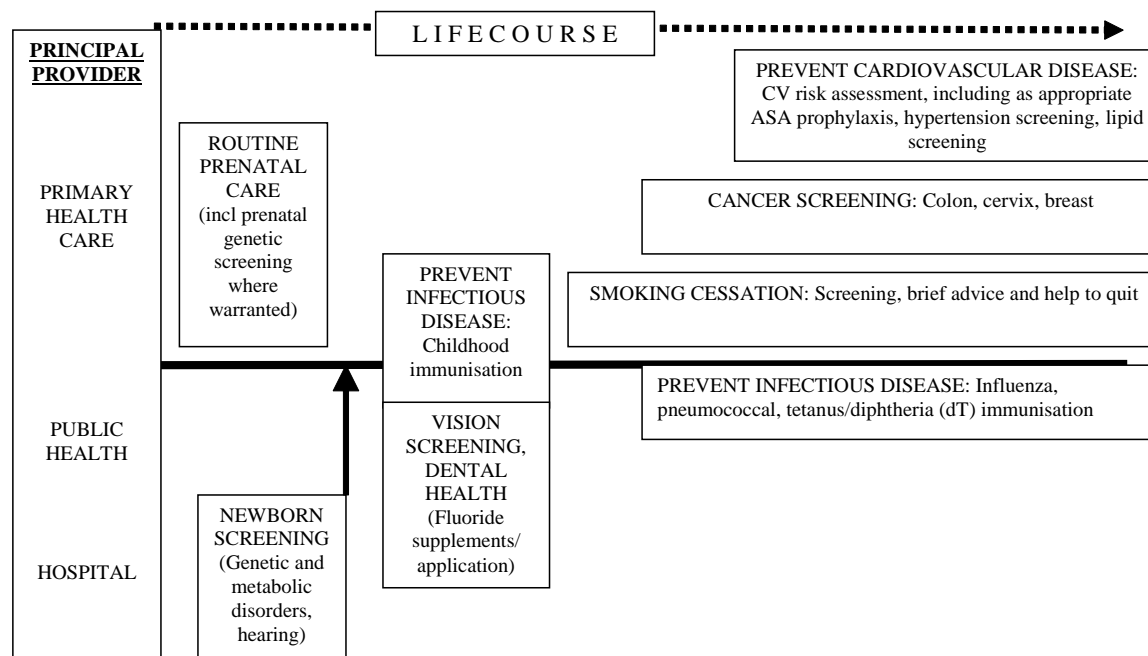
Studies of health promotion initiatives point to a number of factors that increase the likelihood of successful outcomes, including: participatory planning and evaluation;⁵⁶ a focus on real and felt needs of the target population; cultural sensitivity;⁵⁷ short and long-term outcomes;⁵⁸ multiple interventions (linked, multi-level interventions);⁵⁹ accessibility by socially excluded groups;⁶⁰ and program sustainability over time.⁶¹

Collaboration, partnerships and networking across settings is necessary to strengthen the integration of priorities and initiatives and to supplement and strengthen their overall impact. The literature stresses that the weight of evidence confirms that multi-component or comprehensive interventions have higher effectiveness and cost-effectiveness compared to those programs that focus on a single component.⁶² Community development and community capacity building supports the development of knowledge, skills, participation, leadership and other resources needed by community groups to effectively address local issues and concerns.⁶³

5.2 Clinical Prevention of Chronic Disease

Primary health care providers play a central role in the prevention of chronic disease. This role is reflected in the recently adopted *Lifetime Prevention Schedule for BC* (as well as the *BC Primary Health Care Charter* and the *Expanded Chronic Disease Model*). Figure 2 shows the schedule.

Figure 2: Lifetime Prevention Schedule for BC (2009)



Source: Clinical Prevention Policy Review, December 2009.

For enhanced clinical prevention of chronic disease, health authorities should:

- Support, promote, and encourage their own primary care providers to integrate the following into their routine medical practice:
 - Priority clinical prevention services that address chronic disease prevention, as well as screening and preventive medication for those with a chronic disease (based on the schedule⁶⁴):
 - Cardiovascular disease prevention, based on the recently approved GPAC Guideline for tobacco cessation, ASA prophylaxis, hypertension and hyperlipidemia detection and management;
 - Cancer screening (as per the BC Cancer Agency) for colon, cervix and breast cancer;
 - Adult immunization based on the BC Immunization Schedule including DT boosters and influenza and pneumococcal disease; and
 - HPV vaccination of girls to prevent cervical cancer.
 - Counselling to assist clients in reducing (preventable) risk factors through behavioural changes and positive lifestyle choices to lower vulnerability and/or reverse the impact of an emerging chronic disease;

- Provision of preventive treatment as necessary, recognizing that treatment of one condition (e.g., hypertension) can be primary prevention to avoid the onset of a second condition (e.g., stroke).
- Promote and support collaborative approaches, “practice teams”, other integrated and/or shared initiatives through linkages between primary care providers, public health and other community health care organizations to strengthen and optimize preventive services through coordination and alignment of activities and resources. These include:
 - Sharing information regularly with primary care practitioners on local population health issues, including environmental hazards and other community health issues;
 - Identifying community resources and coordinating the development of linkages and networks between primary care practitioners and community agencies;
 - Working together on needs assessment related to key community health problems, addressing both living and working conditions;
 - Joint planning, development and implementation of coordinated and/or integrated prevention strategies to address key community health issues, taking into account local needs, available resources, infrastructure, accountability, information needs etc.
 - Collaborating in development and use of health education programs and materials for patients and the public;
 - Auditing the effectiveness of preventive programs by recording the prevalence of disease risk factors in the community and monitoring the effectiveness of screening and immunization programs;
 - Involving primary care providers in the publication of an annual report on community health and health care services;
 - Coordinating linkage into larger networks for surveillance and research purposes as well as for addressing any emerging health system issues.
- Facilitate/promote (with support from Ministry of Health Services), the implementation of information management / information technology advances that can support the provision of clinical prevention services, including:
 - The electronic medical record system;
 - Electronic access to BC clinical practice guidelines;
 - Use of patient flow sheets;
 - Physician reminder and patient recall systems;

- Clinical and administrative reports for optimal chronic care provision (i.e., patient profiles, practice profiles, patient education reports); and
- Information sharing with members of a group practice or practice network.
- Facilitate expanded coverage and access to priority clinical preventive services to achieve higher rates of utilization, especially for those who are disadvantaged (e.g., by age, income, education, geography, etc.), thus reducing inequalities in the availability of effective preventive services and the associated information and support systems.

5.2.1 Summary of Supporting Evidence

The Clinical Prevention Policy Review approved the Lifetime Prevention Schedule for BC, with priority prevention services based upon research evidence for the clinical effectiveness, potential population health impact and cost-effectiveness of each intervention.⁶⁵ In addition, BC's Guidelines and Protocols Advisory Committee has developed guidelines for primary prevention of cardiovascular disease and for colorectal cancer screening, while the General Practice Service Committee (Ministry of Health Services, BCMA, and Society of General Practitioners of BC) developed, in 2006, an agreement to expand support for "full service family practice", including additional funding for: prevention of cardiovascular disease (i.e., risk assessment of CD); complex patient care (i.e., patients with more than two chronic illness); development of coordinated clinical action plans for community-based patients; and incentives for the management of patients with congestive heart failure, diabetes, and hypertension.⁶⁶

A review of evidence by Canadian researchers concluded that national and international evidence and a variety of working models support the integration of public health functions in primary care. Canada has been a leader in developing models of health system integration that combine individualized approaches to influence personal health behaviour and community approaches to influence the health of the population.⁶⁷ Hannay⁶⁸ notes that both general practitioners and public health physicians share responsibilities for health promotion and disease prevention, and both have a degree of independence that allows them "to act as advocates for the health of the public and individual patients".

Ashton⁶⁹ suggests that the following public health functions are or could be carried out in primary care: preventive medicine; health promotion, liaison and advocacy; education and teaching; planning, evaluation and research; accountability to the public for outcomes, and management of the health care system.

Studies note the importance of recognizing the significant gaps between the community-based, population-health focus of public health and the practice-oriented, individual-focused practice of primary care and that this is attributable to "decades of separation in the education, practice, research, professional culture, perspective, and accountability structure of health professionals and organizations".⁷⁰ However, researchers suggest that it is important to recognize the complementarity of these two traditions and the ways in which they are similar as well as ways in which they are different.⁷¹ "Collaboration between public health and primary care must be based on upon mutual respect and a clear understanding of the roles of each speciality and the constraints of time and resources that they face". As a priority "the creation of opportunities for

general practitioners to build relationships with public health practitioners”, should be stressed including a combination of informal meetings, workshops, other educational opportunities, and “demonstrations of effective collaboration”.⁷²

The WHO *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases*⁷³ recommends that cost-effective primary and secondary prevention interventions be incorporated into the health system with emphasis on primary health care.

The evidence review, *Chronic Disease Prevention in British Columbia*, reviews the evidence on screening and early detection for each of the major chronic diseases; it discusses the feasibility for population-wide screening and notes where targeted screening is appropriate. It also documents the potential of early identification and early interventions to impact the long-term prognosis for each disease (see Appendix 1).

5.3 Prevention as part of Chronic Disease Management and Self-Care

Health authorities can educate, support and empower individuals with chronic disease, and their health care teams, to take action that can prevent the development of additional (co-morbid) chronic diseases, minimize or slow the progression of their disease, and enhance their quality of life. Health authorities should:

- Support the integration of ‘healthy living’ activities and the prevention of co-morbid conditions for people with chronic diseases, in all the chronic disease management activities of their own primary care practitioners, and where appropriate and feasible, should consider doing so with other primary care practitioners in their communities;
- Where appropriate, provide or support the provision of healthy living core program services for those with chronic diseases to enable them to improve overall health and reduce progression of their disease;
- Facilitate access to information to assist clients in building expertise to manage their health, including:
 - Provision of a range of educational and informational materials, e.g., BC HealthGuide, guidelines, pamphlets, etc.;
 - Referral to the ministry’s website on Chronic Disease Management, the University of Victoria’s Chronic Disease Self-Management Program (provided by many health authorities) as well as BC Nurseline, BC Dial-A-Dietitian, etc.;
 - Referral to local community support groups and networks that coordinate support for families and individuals with specific chronic conditions.
- Work with community organizations, schools, professional associations, employers and unions to enhance understanding and support throughout organizational cultures for preventive initiatives and positive self-care by those with chronic conditions (e.g., reduce environmental hazards/impediments, minimize stress, etc.).

5.3.1 Supporting Evidence

There is considerable evidence that adoption of ‘healthy living’ practices can improve the health of those living with chronic disease and reduce the progression of their disease. There is also considerable evidence that development of an additional chronic disease worsens the health of those with a pre-existing chronic disease and also worsens their prognosis.

The WHO *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases*⁷⁴ recommends that action be taken to help people with non-communicable disease to manage their own conditions better, and provide education, incentive, and tools for self-management and care.

Enabling individuals and communities to exert greater control over the factors that determine chronic disease has both direct and indirect impact on their health. The direct impact stems from the well-established role of social support in determining health status and longevity, mediated no doubt through the psycho-neuro-immune system. The indirect impact results from the ability of empowered individuals and communities to create supportive environments, push for healthier public policies, and in other ways, alter the determinants of chronic disease.⁷⁵

In light of the evidence on the importance of stress in altering physiological functioning in ways that contribute to a wide variety of chronic disease, it is necessary to help individuals to better cope with adverse conditions and to manage stress more effectively. However, this also needs to occur through the creation of social and physical environments that reduce the stress to which people are subjected.⁷⁶

BC has developed the Expanded Chronic Care Model, which identifies patient-self management as a key component based on research and best practice in other jurisdictions.

5.4 Surveillance, Monitoring and Program Evaluation

Surveillance and monitoring enables health authorities to clarify the trends and patterns, and measure the relative strength of various protective factors and risk factors among the regional population. Evaluation assists in assessing outcomes, priorities and program successes. Together these activities include:

- Gather regional chronic disease prevalence and incidence rates through collaboration with the Ministry of Health Services and Provincial Health Services Authority;
- Develop tools (with support from Ministry of Health Services and Provincial Health Services Authority) to identify the burden of disease, measure performance and gaps, e.g.:
 - Annual report cards for key chronic diseases, identifying the burden of disease (morbidity, mortality and health care utilization) and related performance measures;

- Primary Health Care Mapping, utilizing patient registers for a range of chronic diseases.
- Analyze and interpret data to identify local and regional trends, major issues, key risk factors, and vulnerable groups, in order to support effective planning and decision-making;
- Disaggregate data to identify inequities (including gender-specific inequities), issues, disorders and outcomes to enable equity-responsive planning and program delivery;
- Establish program evaluation frameworks and conduct evaluations of new initiatives;
- Participate in local research design and studies;
- Encourage continuous improvement through application of findings from new research studies and program evaluations;
- Disseminate knowledge to primary care partners and other health professional and community partners.

5.4.1 Summary of Supporting Evidence

The WHO notes that surveillance of the four major behavioural risk factors and associated biological risk factors, including raised blood pressure, raised cholesterol, raised blood glucose, and overweight/obesity, is an important component of action to assess prevalence.⁷⁷

It is recognized that “although the performance of public health, and prevention programs in particular, are difficult to measure, it is nonetheless likely that we will be able to manage—and improve—core functions in public health if we can measure performance”.⁷⁸ A prevention information system capable of telling us how well we are doing is necessary for this purpose. As well, the public has a right to expect that the public health sector, along with the rest of the health care system, is paying attention to the quality and effectiveness of the interventions it undertakes, and is working to improve that quality.⁷⁹

6.0 BEST PRACTICES

Often, there is no one “best practice” that is agreed upon; rather, there are practices that may have been successful in other settings and should be considered by health authorities. The terms “promising practices” or “better practices” are often preferred to reflect the evolving and developmental nature of performance improvement.

The evidence review *Chronic Disease Prevention in British Columbia* (2008), by H. Krueger and Associates, which was prepared to support the development of this core program paper, provides a thorough discussion of best practices in decreasing risk factors for specific chronic diseases, the efficacy of early detection, and the potential of early interventions to reverse or delay progression of the various diseases. These best practices are identified in Appendix 1. Rather than attempt to summarize the wide-ranging research and evolving analysis in this field, the additional following sources provide best practice recommendations:

- *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases* (2008), by the World Health Organization.⁸⁰
- *A Framework for a Provincial Chronic Disease Prevention Initiative* (2003), by the Ministry of Health Planning.⁸¹
- *Preventing Chronic Disease: A Strategic Framework: Background Paper* (2001), by the National Public Health Partnership.⁸²
- *Creating an Environment for Emotional and Social Well-Being: An Important Responsibility of a Health-Promoting and Child Friendly School* (1999), by the World Health Organization.⁸³

7.0 INDICATORS, BENCHMARKS AND PERFORMANCE TARGETS

7.1 Introduction

It is important to define what one means by the terms *indicators*, *benchmarks* and *performance targets*. An indicator is a summary measure (usually quantifiable) that denotes or reflects, directly or indirectly, variations and trends in, this case, chronic disease prevention. Indicators are more than outcome measures, they constitute an important reflection of some aspect of a given program or service, and their value is that must also drive decision and action. Indicators need to be standardized in some manner so that they can be compared across different organizational entities such as health regions. Benchmarks are reflective of “best” practices. They represent performance that health authorities should strive to achieve. Benchmarks are determined by: reviewing the literature; reviewing the best practice experience in other jurisdictions; or by determining “consensus” opinion of leading experts and practitioners in the field. Performance targets are locally determined targets that represent a realistic and achievable improvement in performance for a local health authority.

A number of key indicators or performance measures for chronic disease prevention have been prepared by the Working Group (see Appendix 4). One can develop indicators related to the inputs, activities, outputs and outcomes (immediate, intermediate or final) of each of the respective components of the program. Thus, it is not necessary to only have outcome-related indicators and benchmarks. Furthermore, indicators need to be understood within a broader context. For example, a low per-capita cost for a specific program could reflect on the efficiency and effectiveness of a given program, or reflect a program that is under-resourced. It is recognized that chronic disease prevention programs are multi-faceted and that it may be difficult to link interventions with direct health outcomes, particularly as initiatives involve multiple factors and multiple sectors, which all play a role in determining outcomes. In general, it is best to consider a number of indicators, taken together, before formulating a view on the performance in this area. Indicators and benchmarks work best as flags to indicate a variance from accepted norms and standards. Further investigation is usually required to determine the causes of any given variance from such norms or standards.

A health authority could establish its performance targets by assessing its current (and perhaps historical) level of performance; then, based on consideration of local factors, determine realistic performance targets. These performance targets would be consistent with the goal of performance improvement, but would be “doable” within a reasonable period of time. Initially, health authorities will set performance targets for a number of indicators. However, over time, and particularly if consistent data collection methods and definitions are applied, it would be realistic for health authorities to share information related to their targets and then develop a consensus approach to determine provincial benchmarks for these indicators. In other words, locally developed performance targets, over time, could lead to the development of provincial benchmarks.

7.2 Indicators for the Program on Chronic Disease Prevention

As outlined throughout this model core program paper, improving chronic disease prevention can significantly impact population health and well-being.

- The Logic Model on Chronic Disease Prevention is presented in Appendix 5.
- The indicators associated with the logic model are in Appendix 4.

The indicators chosen by the working group are considered the most significant in determining the effectiveness of overall performance of strategies for chronic disease prevention. Health authorities will determine which indicators they consider the most important for their purposes, and will focus their efforts on measuring these over time. It is understood that some of the indicators may not be under the control or influence of health authorities, but they can nevertheless, provide important information to assess trends and patterns.

Those indicators and benchmarks which are under the control and influence of health authorities provide a basis for ongoing performance review and evaluation. In many cases, baseline data will need to be established to provide a foundation for comparative analysis in future years. Benchmarks will be determined over time between the Ministry of Healthy Living and Sport and the health authorities. In addition, health authorities may wish to establish local or regional benchmarks and performance targets.

8.0 EXTERNAL CAPACITY AND SUPPORT REQUIREMENTS

8.1 Key Success Factors/System Strategies

The previous sections outlined the main components and best practices that health authorities could include in enhancing the program on prevention of chronic disease. Successful implementation of effective strategies will also depend on having in place key system strategies, including:

- Strong support from the Board and management of the health authorities, from the Ministry of Healthy Living and Sport, as well as strong support from the other key players in the region, such as women's health groups, the school board, individual schools, social service agencies and local governments.
- Collaborative leadership (shared leadership between doctors, health authorities and community partners).
- Allocation by the health authorities of sufficient resources to deliver high quality programs.
- Well-trained and competent staff with the necessary policies and equipment to carry out their work efficiently.
- An information system that provides staff with appropriate support, and provides management with the information it needs to drive good policy and practice decisions.
- High-quality and competent management of chronic disease prevention, including monitoring of performance measures.
- Clear mechanisms of reporting and accountability to the health authority and external bodies.

8.2 Information Management of the Program on Chronic Disease Prevention

It will be important for health authorities to review their existing information and monitoring systems with respect to their ability to measure and monitor performance indicators. This should include:

- Establishing new policies and procedures for some activities to ensure that necessary data is gathered, including information on chronic disease from GPSC;
- Facilitating the process of recording and monitoring data; and
- Establishing baseline levels for new data sets as a foundation to compare and assess trends and differences over time.

Health authorities will also need to consider the impact of program monitoring and evaluation on their staffing resources. Expertise will be needed in the fields of program monitoring, program analysis and program evaluation to ensure effective implementation and assessment of the Core Functions improvement process.

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GLOSSARY

Aboriginal People: An Aboriginal person is identified in accordance to the *Constitution Act* of 1982, Part II, Section 35(2), as "the Indian, Inuit and Métis peoples of Canada". "First Nation" is used to refer to Status Indian people living on reserves.

Benchmark: A benchmark is a reference point or standard against which performance or achievements can be assessed. A benchmark refers to the performance that has been achieved in the recent past by other comparable organizations, or what can be reasonably inferred to have been achieved in the circumstances (OECD).^a

Best Practices: These are activities based on sound scientific evidence, extensive community experience and/or cultural knowledge.^b

Capacity Building: An individual and organizational learning process that involves reflection, analysis, skill building, networking and action aimed at increasing the knowledge, imagination, vision and impact of an organization and the individuals involved in it.^c

Chronic Disease: Chronic diseases are characterized by complex causality, multiple risk factors, a long latency period, a prolonged course of illness, functional impairment or disability, and in most cases, the unlikelihood of cure.^d

Chronic Disease Management: Chronic disease management is a systematic approach to improving health care for people with chronic disease. Health care can be delivered more effectively and efficiently if patients with chronic diseases take an active role in their own care and providers are supported with the necessary resources and expertise to better assist their patients in managing their illness. Chronic conditions impose challenges for those affected, their families and care providers. A patient's ability to follow medical advice, accommodate lifestyle changes, and access resources are all factors that influence successful management of an ongoing illness.^e

Collaboration: Collaboration is a process through which parties who are involved in different aspects of a problem or issue can constructively explore their differences and search for solutions including joint problem-solving, decision-making and collection actions for implementation.^f

Community Development: Community development seeks to empower individuals and groups of people by providing these groups with the skills they need to effect change in their own communities. This often involves the formation of large groups working for a common agenda.^g

Core Functions: The core functions of public health in BC, as shown in the Core Public Health Functions Framework, are:

- A set of core public health programs that are delivered by health authorities. They are organised services (which may be clustered together) intended to result in specific and measurable change in the health status of the populations for whom they are intended.

- A set of public health strategies^h used to varying extent and in varying combinations in the implementation of core programs:
 - Health promotion
 - Health Protection
 - Preventive services
 - Health assessment and disease surveillance
- The capacity/infrastructure needed to develop and implement core programs. This infrastructure is not unique to public health but is common to all large organisations. It includes funding, human resources, IT, information systems, education, training, policy development and analysis, planning and management skills, research and evaluation, etc. Infrastructure exists at both a health authority level and at a provincial level.
- Two ‘lenses’ used to examine and shape the development and implementation of all programs: a population lens (whom is this program intended to reach) and an equity lens

Core Programs: There are 21 core programs in BC, grouped in four broad categories:

- Health improvement
- Prevention of disease, injury and disability
- Environmental health
- Health emergency management

Each is supported by an evidence review and a model core program paper.

- The evidence review is a compilation of evidence and best practice.
- The model core program is an evidence-informed report developed jointly by the Ministry and the health authorities. It is a resource intended as guidance for the health authorities in planning their public health services and in developing their performance improvement plans.

Culture: The understandings, patterns of behaviour, practices and values shared by a group of people. Children and families may identify as belonging to more than one culture.

Determinants of healthⁱ: The range of personal, social, economic and environmental factors which determine the health status of individuals or populations. (WHO, Health Promotion Glossary, 1998) These can include:

- **Income and Social Status:** Health status improves at each step up the income and social hierarchy. In fact, these two factors seem to be the most important determinants of health.
- **Social Support Networks:** Support from families, friends and communities is associated with better health.

- **Education and Literacy:** Health status improves with level of education. Canadians with low literacy skills are more likely to be unemployed and poor, to suffer poorer health and to die earlier.
- **Employment/Working Conditions:** Unemployment, underemployment and stressful work are associated with poorer health.
- **Social Environments:** The importance of social support also extends to the broader community. Civic vitality is reflected in the institutions, organizations and informal giving practices that people create to share resources and build attachments with others.
- **Physical Environments:** Physical factors in the natural environment (air, water quality) are key influences in health. At certain levels of exposure, contaminants in our air, water, food and soil can cause a variety of adverse health effects, including cancer, birth defects, respiratory illness and gastrointestinal ailments.
- **Personal Health Practices and Coping Skills:** Those actions by which individuals can prevent diseases and promote self-care, cope with challenges, and develop self-reliance, solve problems and make choices that enhance health.
- **Healthy Child Development:** New evidence on the effects of early experiences on brain development, school readiness and health in later life confirms early child development as a powerful determinant of health.
- **Biology and Genetic Endowment:** The basic biology and organic make-up of the human body. In some circumstances genetic endowment appears to predispose certain individuals to particular diseases or health problems.
- **Health Services:** Health services, particularly those designed to maintain and promote health, to prevent disease, and restore health and function contribute to population health.
- **Gender:** Gender refers to the array of socially-determined roles, personality traits, attitudes, behaviours, values, relative power and influence that society ascribes to the two sexes.
- **Culture:** Some persons or groups face additional health risks due to their socio-economic environment: marginalization, stigmatization, loss of language and culture, lack of access to culturally appropriate health care and services.

Development: Description of the relatively stable and predictable sequences of growth and change toward greater complexity, organization and internalization that occur at varying and unique rates, patterns and timing, as a result of interactions between biological maturation and environmental influences, including relationships, experiences, social and cultural backgrounds (NAEYC, 1987).

Diversity: Differences and unique attributes within each person based on values and beliefs, culture and ethnicity, language, ability, education, life experiences, socio-economic status, spirituality, gender, age and sexual orientation.

Health Promotion: Health promotion is defined by WHO as ‘...the process of enabling people to increase control over, and to improve their health.’ It involves the population as a whole in the context of their everyday lives, rather than focusing on people at risk for specific diseases, and is directed toward action on the determinants or causes of health.^j It is a process, or a style of working, that uses a combination of strategies (building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, reorienting health services) to improve the overall health, well-being, and quality of life of the population and frequently focuses on the broader environmental, social, economic, political, and cultural conditions that determine health, using socio-political strategies to affect change.

Integration: Service integration and collaboration are related but distinct methods of services delivery. Integration is characterized by features such as common intake and ‘seamless’ service delivery, where the client receives a range of services from different programs without repeated registration procedures, waiting periods, or other administrative barriers. In contrast, coordinated systems generally involve multiple agencies providing services, but in different locations and with separate program registration processes.^k

Population Health: focuses on the underlying and interrelated conditions that influence the health of populations over the life course. These include factors such as education, income, early childhood experiences and the social and physical environments that surround individuals and groups. By addressing these factors, a population health approach aims to reach beyond the limited effectiveness of lifestyle-based interventions and reduce disparities in health outcomes^l.

Prevention: approaches and activities to reduce the likelihood of a disease or disorder affecting an individual, to interrupt or slow the progress of the disorder, or to reduce disability.^m

- **Primordial:** prevention of risk factors, beginning with a change in social or environment conditions.
- **Primary prevention** reduces the likelihood of a disease or disorder developing in an individual.
- **Secondary prevention** interrupts, prevents or minimizes the progress of a disease or disorder at an early stage.
- **Tertiary prevention** focuses on preventing the damage that has already occurred from becoming worse.

Primary Care: Primary care is the health care provided at the first point of contact. It is considered to be the first-contact assessment for provision of continuing medical care through a broad scope of health services including diagnostics, treatment and management of health problems, promotion and prevention activities and ongoing support from professionals, family and community. Primary care providers include general practitioners, family physicians and nurse practitioners.

Risk Factors: Social, economic or biological status, behaviours or environments which are associated with or cause increased susceptibility to a specific disease, ill health or injury.^a

Vulnerable Populations: Individuals may be made vulnerable by a variety of circumstances such as: health status including the presence of chronic or terminal illness or disability; age; functional or developmental status; financial circumstances including access to food and shelter; ability to communicate effectively; personal characteristics; and, being part of a group that experiences stigma and discrimination. Poverty is one of the main causes of vulnerability in most parts of the world. Vulnerability can also be tracked along a life cycle continuum – from birth, youth and early adulthood through to old age. In general, populations are deemed to be vulnerable, while individuals may be deemed to be at risk.

Targeted Interventions: Certain children or families are singled out for targeted interventions, not necessarily because they already have a disorder but because they are at greater risk for developing one. Individuals can be targeted in two ways: the identifying characteristic can lie outside the person (e.g., family in poverty), or the individuals themselves can have the distinguishing characteristics (e.g., behaviour issue).^o

Universal Interventions: Characteristics of this type of intervention are that individual families (and their children) do not seek help and are not singled out for the intervention. Everyone in a geographical area or setting (e.g., school) receives the intervention. Two types of universal programs can be: those that focus on particular communities or settings (e.g., a public housing complex) or those that are province-wide or countrywide, for example.^p

Glossary References

^a <http://www.who.int/hac/about/definitions/en/print.html>

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ⁱ Public Health Agency of Canada <http://www.phac-aspc.gc.ca/ph-sp/phdd/determinants/determinants.html#social>

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APPENDIX 1: THE EVIDENCE BASE FOR A MODEL CORE PROGRAM FOR CHRONIC DISEASE PREVENTION

Taken from: *Chronic Disease Prevention in British Columbia* (2010), prepared by H. Krueger and Associates, for the Ministry of Healthy Living and Sport.

This review of the evidence and best practices in chronic disease prevention is part of a series of evidence reviews prepared for the Core Public Health Functions initiative in BC. As such, it is not a complete review of all chronic disease, or of all approaches to chronic disease prevention. Rather, and consistent with the definition of the chronic disease prevention program in the Core Public Health Functions Framework resource document^c, this review focuses on chronic non-communicable diseases that are not addressed elsewhere, and on disease-specific interventions as much as possible.

The definition for chronic disease is consistent with that used in *The Framework for a Provincial Chronic Disease Prevention Initiative* (2003), namely, “chronic diseases are usually characterized by complex causality, multiple risk factors, a long latency period, a prolonged course of illness, functional impairment or disability, and in most cases, the unlikelihood of cure”.^{ci} This review focuses on chronic non-communicable diseases that are not addressed elsewhere, on disease-specific interventions as much as possible, and on conditions which present a significant burden of disease in BC. Thus the following are not included, or if included, are not extensively covered:

- Chronic communicable diseases (e.g., HIV, hepatitis C, tuberculosis) that are addressed in the Communicable Disease core program
- The common behavioural risk factors that account for roughly one-quarter of the burden of disease in BC, and were addressed earlier in the Healthy Living core program (e.g., smoking, physical inactivity, and poor eating habits)
- Conditions that are largely dealt with through the Healthy Living core program evidence review (lung cancer, many aspects of cardiovascular disease, COPD, diabetes) or through the Harm Reduction core program (e.g., alcoholic cirrhosis) are either not included or only briefly addressed
- Broad population health promotion interventions that address the determinants of health and seek to change overall living and working conditions. Such interventions can be expected to affect most if not all of the conditions addressed here

The focus of the first iteration of this report, completed in April 2006, was a review of the available evidence on the effectiveness of initiatives in primary prevention and early detection in the areas of neurological, sensory, musculoskeletal, digestive and genitourinary disorders and breast cancer. The second iteration, completed in June 2008, added a review of diabetes, heart disease, hypertension, stroke and asthma to the earlier work. ***None of these sections have been updated in the current iteration.***

Ultimately, the evidence of effective strategies will be translated into practice through a process of implementation and performance expectations related to individual health authorities and underserved populations. Consistent with the definition of the public health function as primordial, primary, and early secondary prevention, the review does not include treatment and chronic disease management.

Not all evidence is created equal.

In recognition of this fact, a number of groups have developed methods of grading the strength of available research evidence. One such group is The Canadian Task Force on the Periodic Health Examination (CTFPHE). This group adopted a plan to use explicit analytic criteria to guide its evaluation of effectiveness research. The following table provides the criteria for assigning various grades (from I to III) to published literature.

I	Evidence from at least 1 properly randomized controlled trial.
II-1	Evidence from well-designed controlled trials without randomization.
II-2	Evidence from well-designed cohort or case-control analytic studies, preferably from more than 1 centre or research group.
II-3	Evidence from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments could also be included here.
III	Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.

We have used this approach in estimating the level of available evidence to support the association between specific modifiable risk factors and diseases.

Early in the process of completing this review, it became obvious that a large volume of research information was available, particularly for certain diseases. The broad range of diseases covered in this review, together with a very modest contract to complete this work, meant that the systematic reviews of other groups were utilized whenever they were available. In addition, we focussed on the most promising modifiable risk factors associated with either a significant increase or decreased risk. There were, however, situations in which the lack of an observed association (e.g., cell phone use and brain cancer) was just as important as observed significant associations.

Modifiable Risk Factors and Prevention

The following three tables summarize the observed association between the various diseases and modifiable risk factors, including an estimate of the level of evidence available to support this association. This suggests areas where primary prevention should be considered.

Core Public Health Functions for BC: Model Core Program Paper
Chronic Disease

Chronic Disease Prevention in British Columbia					
Evidence Review for					
Neurological, Sensory, Musculoskeletal, Digestive, Genitourinary, Cardiovascular, Respiratory and Other Disorders					
Disease Group	Disease	Modifiable Factor	Increase / Decrease Risk	Level of Evidence	Note
Neurological Disorders					
	<i>Alzheimer's</i>				
		Integrated lifestyle	↓	II-1	
		Non-steroidal anti-inflammatory use	↓	II-2	Only with long-term use?
		Hormone replacement therapy use	???	I & II-1	See text
		Substandard education	↑	II-2	
	<i>Parkinson's</i>				
		Smoking	↓	II-1	
		Caffeine use	↓	II-2	In men only?
		Pesticide exposure	???	II-2	
		Occupational exposure (farming)	???	II-2	
	<i>Multiple Sclerosis</i>				
		Sunlight and vitamin D deficiency	↑	II-1	
		Organic solvents	↑	II-2	
	<i>Primary Brain Cancer</i>				
		Exposure to vinyl chloride	---	II-2	
		Exposure to radiation from cellular phones	---	II-1	Long-term (10 + years)?
		Exposure to x-ray radiation	---	II-2	Not at normal doses
Sensory Disorders					
	<i>Hearing Impairment</i>				
		Smoking	---	II-2	In elderly
		Alcohol abuse	↑	II-2	In elderly
		Exposure to excessive noise	↑	II-2	
	<i>Vision Impairment</i>				
		Smoking	↑	II-1	
		Accumulated lead exposure	↑	II-2	
Musculoskeletal Disorders					
	<i>Osteoarthritis</i>				
		Overweight / obesity	↑	II-1	
	<i>Rheumatoid Arthritis</i>				
		Smoking	↑	II-1	For seropositive RA
	<i>Lower Back Pain</i>				
		Lumbar supports	---		
		Shoe insoles	???		Insufficient research
		Physical activity / education	↓?	I	
		Assistive devices	↓	II-1	
	<i>Repetitive Strain Injuries</i>				
		Occupation	???		Insufficient research
	<i>Primary Bone Cancer</i>				
		No known modifiable risk factors			
Digestive Disorders					
	<i>Peptic Ulcers</i>				
		Infection by <i>Helicobacter pylori</i>	↑	I	
		Non-steroidal anti-inflammatory use	↑	I	
	<i>Inflammatory Bowel Disease</i>				
		Appendectomy	↓	II-2	
		Smoking	↑	II-2	
		Use of oral contraceptives	↑	II-2	
		Breastfeeding	???	II-2	Limited research
	<i>Gastric Cancer</i>				
		"Dusty" occupations	↑	II-2	
		Moderate wine consumption	↓	II-2	
		High salt intake	↑	II-1	
		Infection by <i>Helicobacter pylori</i>	↑	II-2	
	<i>Colorectal Cancer</i>				
		Overweight / obesity	↑	II-2	
		Physical activity	↓	II-2	

Chronic Disease Prevention in British Columbia					
Evidence Review for					
Neurological, Sensory, Musculoskeletal, Digestive, Genitourinary, Cardiovascular, Respiratory and Other Disorders					
Disease Group	Disease	Modifiable Factor	Increase / Decrease Risk	Level of Evidence	Note
Genitourinary Disorders					
	<i>Renal and Bladder Stones</i>				
		Overweight / obesity	↑	II-2	
		Appropriate diet (esp. water intake)	↓	II-2	
	<i>Cervical cancer</i>				
		Infection by HPV	↑	I	
	<i>Prostate Cancer</i>				
		Lycopene (tomatoes)	↓	II-1	
		Selenium	↓	II-1	
		Green Tea	↓?	II-2	Limited research
	<i>Bladder Cancer</i>				
		Smoking	↑	II-1	
		Fruit consumption	↓?	II-2	
Cardiovascular Disorders					
	<i>Coronary Artery Disease</i>				
		Overweight / obesity	↑	II-1	
		Smoking	↑	II-1	
		Fish high in omega-3 fatty acids	↓	II-2	
		Vegetables and fruit consumption	↓	II-2	
		Physical activity	↓	II-1	
		Modest alcohol consumption	↓	II-1	
		Low-dose aspirin	↓	II-1	High risk individuals only
	<i>Heart Failure</i>				
		Overweight / obesity	↑	II-1	
		Smoking	↑	II-1	
		Alcohol abuse	↑	II-1	
		DASH diet	↑	II-1	See text
		Modest alcohol consumption	↓	II-1	
		Physical activity	↓	II-1	
		Low sodium intake	↓	II-1	
	<i>Hypertension</i>				
		Weight reduction	↓	II-1	
		DASH diet	↓	I	See text
		Low sodium intake	↓	I	
		Physical activity	↓	II-1	
		Modest alcohol consumption	↓	II-1	
	<i>Stroke</i>				
		Hypertension	↑	I	
		Physical activity	↓	II-1	
		Smoking	↑	II-2	
		Overweight/obesity	↑	II-2	
		Excessive alcohol consumption	↑	II-2	
Respiratory Disorders					
	<i>Asthma</i>				
		Avoid house dust mites	↓?	I	
		Avoid environmental tobacco smoke	↓?	I	
		Avoid pet allergens	↓?	I	
		Multifaceted interventions (above 3)	↓	I	See text
		Breastfeeding	↓?	II-2	
		Hygiene hypothesis (preventative exposure to viruses and allergens)	↓?	II-3	See text

Chronic Disease Prevention in British Columbia					
Evidence Review for					
Neurological, Sensory, Musculoskeletal, Digestive, Genitourinary, Cardiovascular, Respiratory and Other Disorders					
Disease Group	Disease	Modifiable Factor	Increase / Decrease Risk	Level of Evidence	Note
Other Disorders					
	<i>Breast Cancer</i>				
	Overweight / obesity		↑	I	
	Physical activity		↓	II-1	
	Alcohol consumption		↑	II-1	
	Chemoprevention		↓	I	Significant side-effects
	Prophylactic surgery		↓	II-1	High risk only
	<i>Diabetes</i>				
	<i>Type 2</i>				
	Overweight / obesity		↑	II-1	
	Smoking		↑	II-1	
	Depression		↑?	II-2	
	Physical activity		↓	II-1	
	<i>Type 1</i>				
	Breastfeeding		↓?	II-2	
	Vitamin D supplementation		↓?	II-2	
	Nicotinamide		---	I	
	Pre-symptomatic insulin		---	I	

Primary Prevention

While these tables provide a useful overview, the following provides a more detailed summary of the effectiveness of primary prevention for the conditions under consideration here.

Alzheimer's Disease

A comprehensive 2001 review of the literature on the primary prevention of Alzheimer's disease summarized risk factors associated with AD into three categories: those that increase risk, those that decrease risk, and those for which the research is uncertain.

Increases Risk	Decreases Risk	Uncertain
<ul style="list-style-type: none"> Genetic mutations Genetic susceptibility (apolipoprotein E e4) Diabetes mellitus Positive family history Substandard education Older age Female sex Significant head injury Cerebrovascular disease 	<ul style="list-style-type: none"> Non-steroidal anti-inflammatory drug (NSAID) use Estrogen use 	<ul style="list-style-type: none"> Alcohol Cigarette smoking Toxins – aluminums, glue, fertilizers, pesticides

More recent research also indicates that an active and socially integrated lifestyle in late life might protect against dementia:

- An integrated lifestyle:* A 2004 review concluded that “Taking into account the accumulated evidence and the biological plausibility of these hypotheses, we conclude

Core Public Health Functions for BC: Model Core Program Paper
Chronic Disease

that an active and socially integrated lifestyle in late life protects against dementia and AD.”

- *Low levels of education:* Several studies have suggested that low levels of education are a risk factor for AD. A variety of hypotheses have been suggested for the association found between low educational attainment and higher risk of AD. These range from bias in detection to the ‘cognitive reserve’ hypothesis.
- *NSAID use:* A significant number of studies have found an association between NSAID use and a reduced risk of AD. The more systematic reviews (meta-analyses) indicate a protective effect of long-term NSAID use on the risk of developing AD.
- *Hormone replacement therapy (HRT):* A 2005 review found that “The majority of trials investigating the neuro-cognitive effects of HRT found benefits associated with estrogen therapy...”

Parkinson’s Disease

Several risk factors and protective factors for PD can be found in the literature.

Increases Risk	Decreases Risk	Uncertain
<ul style="list-style-type: none"> • History of head injury • Depression • Family history of PD • Pesticide exposure • Exposure to MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) • Well water drinking 	<ul style="list-style-type: none"> • Smoking • Caffeine use • NSAID use, specifically Ibuprofen 	<ul style="list-style-type: none"> • Vitamin E intake • <i>Smoking:</i> There appears to be a strong inverse association between smoking and PD; smoking is associated with a decreased risk of PD. However, smoking, if explored as a protective measure against PD, should be looked at with caution. It is still unclear if smoking indeed protects against PD or if further issues exist. It is clear, however, that smoking definitively contributes to a myriad of other health problems, many of which have a much worse prognosis, and worse impacts to the individual and society, than PD. • <i>Caffeine and alcohol:</i> Caffeine consumption was sometimes found to be protective against PD, but results are mixed. Alcohol consumption was found to have no effect on the risk of acquiring PD.

Other environmental risk factors usually associated with PD are pesticide exposure, living in a rural area, living on a farm, farming, exposure to farm animals, and well water use. Research on the associations between these risk factors and the risk of PD is largely inconclusive.

Multiple Sclerosis

A number of risk factors have been investigated with regards to MS. Although the overall research base is weak, risk factors related to MS susceptibility may include low levels of solar UV radiation, low levels of vitamin D, low levels of sex hormones in females, occupational exposure to toxins, and dental fillings or amalgams.

Primary Brain Cancer

- *Vinyl chloride*: The evidence seems to show that there is no increased risk of brain tumours with occupational exposure to vinyl chloride, although this is not the case with regards to hepatic cancer.
- *Exposure to X-ray radiation*: With the current doses of radiation in use today in the medical field, there does not seem to be an elevated risk of brain cancer. However, in the past, the required doses of radiation to produce an accurate image were much higher and were associated with some risk of meningioma.
- *Cell phones*: Based on currently available evidence, it seems reasonable to conclude that there is no risk of brain tumours associated with cell phone usage in the short- or mid-term though long-term or heavy usage has not been ruled out as a potential risk factor.

Hearing Impairment

About half of all hearing losses are preventable. A number of risk factors have been described in hearing impairment, the most important of which is excessive noise. Other main causes of hearing loss include presbycusis, which is age-related hearing loss, infections of the middle ear, and genetic factors. It is also suggested that smoking or alcohol may be risk factors for hearing loss.

One of the main targeted areas of prevention is likely to be hearing protection devices in construction and factory workers and engineers. However, in addition to making hearing protection available, education regarding the importance and use of hearing protection as well as "...development of effective and simple noise controls for the construction..." and other industries is required to reduce noise exposure.

Vision Impairment

Smoking and long-term exposure to lead appear to be related to the risk of cataract development. Smoking also increases the risk of age-related macular degeneration.

Osteoarthritis

The main focus in primary prevention of OA has been on weight reduction, improved diet, estrogen replacement, care with work-related activity, and other protections against joint injury, including exercise combating muscle weakness.

Based on the available research, obesity appears to be a risk factor for the development of OA, especially in the knee. The role of exercise in prevention remains unclear. Evidence is available

on both sides of the debate concerning the impact of regular, strenuous recreational activity on lower limb joints. One review suggested that there was no evidence that physical activity directly prevents OA. Preventing injuries in the first place and careful rehabilitation following injury may also be important in preventing knee OA.

In sum, weight control has dominated the discussion of preventive efforts in OA.

Rheumatoid Arthritis

There are limited primary prevention options currently available for RA. The one exception is the contributory role of long-term smoking. Recent research suggests that “in a certain genetic context, smoking is a potential trigger for RA, and a combination of the two factors is associated with the occurrence of immune reactions long before the onset of RA.”

Given the evidence of a causal link between smoking and RA, reducing the modifiable risk factor of smoking should lead to a decreased incidence of disease, especially the subset of RA associated with specific genetic and immunologic conditions.

Lower Back Pain

The most significant predictor of lower back pain (LBP) appears to be a previous history of back pain. Although there is limited documentation of other risk factors, the most common include; heavy physical work, frequent bending, twisting, lifting, pulling and pushing, repetitive work, static postures, and vibrations. Other risk factors include psychosocial indicators such as distress, depression, beliefs, job dissatisfaction, and mental stress at work.

Lumbar back supports are found to be a common approach in industry to preventing back injury. A review of seven prevention studies and six therapeutic studies concluded that there is no strong evidence in favour of or against lumbar support effectiveness in both prevention and treatment of LBP. The results of this study suggest that lumbar supports not be recommended for primary prevention of LBP.

There is evidence that suggests physical exercise is recommended to prevent workplace absence due to back pain and to prevent the occurrence or duration of further back pain episodes. There is also evidence to suggest water gymnastics as an exercise could be recommended to reduce back pain and work loss during or following pregnancy.

A recent Cochrane review of 19 RCTs concludes that back schools in occupational settings reduce pain and improve function and return-to-work status in the short and intermediate term, but that the clinical relevance of these studies was rated as insufficient. The U.S. Preventive Services Task Force, however, has stated that there is no good evidence to recommend the use of back strengthening exercises as a prevention strategy against LBP and there is limited evidence only that back schools produce modest short-term benefits at best.

An identified area that involves prevention of LBP is education on lifting techniques. This is different from back schools in that it focuses on primary prevention, often in the workplace, as opposed to education and treatment after a back injury or LBP has been presented. The current

research indicates that intensive lifting education programs are not particularly effective. Sessions a few hours in length are moderately useful when workplaces require lifting, and often teach the ‘squat lifting’ or ‘semi-squat’ method. In general, the majority of the research suggests that in instances where lifting devices can be used, such as in a hospital or nursing home, they should be implemented, as they provide a much better result in lowering the incidence of LBP. In instances where lifting devices cannot be used, a short workplace lifting seminar can be useful in teaching the proper method of lifting.

Repetitive Strain Injuries (RSI)

Repetitive strain injury (RSI) is an umbrella term that describes a group of disorders usually impacting the arms and upper body. RSIs are thought to be relatively new diagnoses and are said to be common in the workplace and community. Early identification of potential problems in the work environment is critical to preventing RSI. Areas to be considered include work overload, uncomfortable surroundings, and consideration of poor relationships between staff and supervisors. Ensuring ergonomically sound work environments and providing enough time away from work are essential components of prevention. Very little research exists, however, on the primary prevention or early detection of RSI.

Primary Bone Cancer

Ninety-five percent of those who develop bone cancer have no obvious risk factors. In light of this fact, no primary prevention measures are currently available and there are no guidelines for preventing primary bone cancer.

Peptic Ulcers

The main necessary causes of peptic ulcer disease (PUD) are *Helicobacter pylori* infection and NSAID use. The influence of other risk factors in disease development, such as smoking, depends mostly on which of the two causes is involved.

H. pylori eradication: The potential value of eradicating detected *H. pylori* has been intensely studied, and remains a lively area of research. Although some studies have suggested that universal screening and eradication for *H. pylori* may be cost-effective, most prevention research has focused on the symptomatic patients, i.e., the management of uninvestigated and functional dyspepsia.

The test-and-treat strategy has been shown to be cost-effective compared to anti-secretory therapy (as well as against early endoscopy). Thus, the test-and-treat strategy is now being recommended by many as the preferred option with younger patients with uninvestigated dyspepsia showing no alarming signs. However, the results backing up this approach remain marginal and/or debatable and other reviewers continue to advocate for the rationality of anti-secretory modes of ulcer prevention (and healing). Some researchers have suggested caution around aggressive eradication strategies as there is always the danger of creating antibiotic resistance, and possibly eliminating the value of a range of bacteria in the gastrointestinal tract.

While the “jury remains out” about the advisability of and protocol for *H. pylori* eradication, the scale will probably continue to tip towards such a preventive measure as the other key disease

linkage becomes clearer, namely, the one between infection and gastric cancer. Other preventive measures include:

- *NSAID use*: There are several preventive approaches available, of varying usefulness: Using safer NSAIDs; use of acetaminophen, which is associated with a lower side-effect profile, but it does not control the inflammation which is central to the majority of rheumatoid arthritis pain and disability (for which NSAIDs are used); and use of various gastro-protective agents, although these vary in effect and expense.
- *Smoking*: Smokers are more likely to develop ulcers; as well, smoking impedes ulcer healing and increases ulcer relapse rates. Thus, smoking cessation likely would have a favourable impact on PUD incidence. It could also be positive in terms of PUD progression. Smoking may be a risk factor for complications such as perforation and bleeding, and one long-term study confirmed that mortality rates related to PUD were three times higher in smokers.
- *Alcohol*: While alcohol intake has not been associated with PUD per se, excessive consumption (of beer and spirits more than of wine) has been implicated in the development of *complicated* ulcers that manifest bleeding and perforation.

Inflammatory Bowel Disease

Inflammatory bowel disease (IBD) encompasses two diseases, both of unknown etiology: Crohn's disease (CD) and ulcerative colitis (UC). It has been concluded after consideration of the epidemiological, genetic, and immunological data that UC and CD are "heterogeneous disorders of multifactorial etiology in which hereditary (genetic) and environmental (microbial, behaviour) factors interact to produce the disease."

Among the key modifiable risk factors investigated in association with IBD are smoking, oral contraceptive use, breastfeeding, diet, hormone replacement therapy, and appendectomy. The limited evidence available suggests an increased risk of CD associated with the use of oral contraceptives and the protective effect of an appendectomy associated with UC.

Gastric Cancer

Helicobacter pylori have been strongly associated with gastric cancer. The bacterium is able to invade and colonize the human stomach. There it can interact with gastric epithelial cells, leading to a number of tissue changes and disease conditions, including: inflammation, loss of mucosa (i.e., an ulcer), and development of masses from benign polyps to full cancers. *H. pylori* was first cultured in 1982, and classified as a carcinogen over 10 years ago.

It is known that only certain strains of *H. pylori* are highly pathogenic, so only a subset of the population carrying the bacteria actually experience disease; ultimately only 2% of infected people will get a malignancy. The infected pool is large, however, resulting in stomach cancer being the fourth most common cancer in the world.

The risk factors identified for gastric cancer, apart from *H. pylori*, include high salt intake. The data for smoking and alcohol consumption are less conclusive. Preventive measures include:

- At this point, anti-*H. pylori* therapies remain the best option to control disease, one that is recommended for all *symptomatic* infected individuals according to recent professional consensus statements. Using such an approach with the entire infected population would hardly seem to be feasible. Many uncertainties remain, including the effect of total eradication of *H. pylori* on gastric cancer incidence, and the fact that infection actually seems to be protective against certain cancers.
- Analyzing molecular markers of disease shows great promise as a treatment prompt. Detection of high risk polymorphisms and related gene expression in hosts will also allow for targeted prevention through *H. pylori* eradication. Much more research must ensue before the clinical implementation of this sort of personalized medicine.
- With the possible added risk represented by tobacco use, a clear prevention method is smoking cessation (or encouragements to not take up the habit). Controlling the intake of salted foods may also help. On the other hand, protection against gastric cancer can be added to the growing list of benefits that has been attached to moderate wine consumption.
- Finally, antioxidants in regularly consumed vegetables and fruit are thought to decrease the risk of gastric cancer by up to one third. However, the Cochrane review of antioxidant supplements in the prevention of gastric cancer cast grave doubts on their effectiveness.

Colorectal Cancer

The most important preventable risk factors associated with colorectal cancer include physical inactivity, a low consumption of fibre, and a high consumption of animal fat/red meat. More recent research indicates that both physical inactivity and obesity are risk factors for colorectal cancer.

- Excess consumption of alcohol, probably in combination with a poor diet, and exposure to tobacco products early in life also appear to increase the risk of colon cancer.
- Despite substantial research, the relationship between dietary factors and colon cancer remains inconclusive. Recent epidemiological evidence from long-term and randomized trials does not appear to support this association.

Renal and Bladder Stones

Urinary tract stone disease is usually caused by the super-saturation of the urine with stone-forming constituents such as calcium oxalate or phosphate. Kidney stones consist of four main chemical types. The vast majority of stones are composed of calcium oxalate (70-80%), calcium phosphate, or a combination of the two. Struvite stones are the second most common stones (15-20%) followed by uric acid stones. Cystine stones are relatively rare.

Research on the prevention of urinary stones suggests that lifestyle factors such as an appropriate diet - including a high intake of water and certain minerals such as magnesium - and a normalization of BMI are associated with a significant reduction in the risk of stone formation.

Chronic Kidney Disease

Chronic kidney disease is linked to diabetes mellitus, hypertension, ischemia, infection, obstruction, toxins, and autoimmune and infiltrative diseases. Primary prevention of chronic kidney disease is mainly about the prevention or effective management of the underlying and contributing condition.

- Several trials have demonstrated the benefit of strict blood pressure control in slowing the progression of kidney disease.
- Diabetes mellitus is the most common cause of chronic kidney disease. Studies have shown that the A1C level correlates with loss of renal function and that glycemic control reduces the progression of kidney disease.

Bladder Cancer

Bladder cancer is one of the most common cancers of the urinary tract and is the ninth most common cancer among men. Modifiable risk factors potentially associated with the risk of bladder cancer are physical activity, artificial sweeteners, alcohol consumption, and smoking.

The strong conclusion from several reviews of the evidence is that cigarette smoking increases the risk of bladder cancer. The role of other lifestyle factors, including an increased risk in men associated with alcohol consumption and a possible decreased risk associated with physical activity, is considerably less certain.

Cancer of the Cervix

Cervical cancer is the most prevalent and the most studied form of HPV-related cancer. Apart from persistent infection with high-risk HPV types - and the consequent connection to sexual activity - proposed risk factors for progression of lesions towards cancer have included viral load, smoking, parity, and long-term use of oral contraceptives.

One reviewer noted that “the understanding of cervical cancer as a preventable disease process hinges on the concept that it is fundamentally a sexually transmitted disease with a known causative agent: the human papillomavirus (HPV). There is essentially a one-to-one connection between cervical cancer cases and the detection of HPV DNA, suggesting that “the prevention of HPV infection would virtually eliminate cervical cancer.”

While HPV has been identified as a necessary cause of cervical cancer, the fact that a large percentage of women infected with high-risk HPV types do not progress to cancerous states demonstrates that the presence of the virus is not a *sufficient* cause of disease. Several potential co-agents have been noted above, including smoking and other infections. Genetic susceptibility in the host and genetic variants of the high-risk virus types have also been an area of intense interest in terms of explaining why only a subset of infected women develop cancer.

It appears that a vaccine for HPV is both highly efficacious and very well-tolerated; efficacy ranges from 90 to 100%.

Prostate Cancer

While many different risk factors have been studied, the etiology of prostate cancer remains relatively unknown. The main known risk factors are age, race, and family history. Other potential risk factors have been studied, including diet (especially the role of animal fat and vitamin supplements), tobacco consumption, exercise, occupational exposures to cadmium, zinc, and pesticides, hormone status, history of sexually transmitted disease, and vasectomy. The results of studies assessing these variables, however, remain inconclusive. The relative risk of prostate cancer is approximately two to three times higher in men with one first degree relative with prostate cancer than those who do not have a family history. How much of this additional risk is associated with environmental, dietary, or genetic factors has been difficult to assess.

A growing body of evidence suggests that some micronutrients, supplements, or dietary components may reduce the risk of prostate cancer. Of the vitamins, Vitamin E is the most promising at this time. Selenium has been studied extensively, and in almost all studies has been found to have a protective effect against prostate cancer.

Coronary Artery Disease

Diseases of the circulatory system are the number one cause of death in North America, and, because of this, the associated risk factors have been extensively studied. The most intense behavioural focus has been on physical activity, not smoking, and a healthy diet, which have been shown as potentially effective in reducing CAD.

Beyond lifestyle factors, several more direct biological markers are associated with CAD, including cholesterol levels, hypertension, and obesity. This raises another category of primary prevention involving drugs aimed at lowering risks of coronary artery disease events through medical control of cholesterol or some other biological factor.

A very common drug used to protect against CAD is aspirin, though both mixed and adverse outcomes have been recorded. In particular, aspirin increases the risk of gastrointestinal bleeding. Although the U.S Preventive Services Task Force (USPSTF) does recommend aspirin for those considered at risk for CAD, cautions pertain to more indiscriminate usage.

Whatever the impact of risk factors, reduction targets, and the interventions aimed at them, the reality is that a large percentage of Canadians at risk of CAD are being inadequately addressed. From physical inactivity to dyslipidemia, there is a large gap between need, treatment, and adherence that must be addressed for further progress on heart disease.

Heart Failure

Heart failure can have a number of causes, including a lack of blood supply to heart muscle due to CAD, scar tissue from a heart attack, high blood pressure, diseases or infections of the heart muscle or valves, and congenital heart defects. Treatment is generally aimed at the cause of the failure, and therefore may vary from patient to patient. In extreme cases, a heart transplant becomes the appropriate intervention.

The risk factors directly implicated in HF include excessive alcohol consumption, smoking, low physical activity, low socioeconomic status or education, coffee consumption, dietary sodium intake, and depression. Most of these are amenable to lifestyle/behavioural modification, and some to medical approaches. At this time, the use of either anticoagulation (e.g., warfarin) or antiplatelet agents (e.g., aspirin, clopidogrel) is not well supported in the literature.

Hypertension

Essential hypertension is responsible for approximately 95% of all cases. It has no single clear cause, but is the result of the interaction of multiple genetic and environmental variables. The genetic components of hypertension are not well understood. Secondary hypertension, on the other hand, is high blood pressure due to another condition, often of the kidneys, adrenal gland, or aorta. Perhaps the greatest risk factor for hypertension is age, although as is true for other forms of cardiovascular disease, hypertension is the result of various risk factors, and the combined effects of these build up over time.

A comparison of hypertension prevalence in Canada compared to the United States found a similar prevalence in each country (21.1% vs. 20.1%), but that only 13% of hypertensives in Canada had their blood pressure under control compared to 25% in the United States.

Many of the risk factors for high blood pressure are dietary. The association between sodium intake and incidence of hypertension, for example, is well known. Caffeine intake has also been shown to increase blood pressure, while soybeans and fish-oil have beneficial effects. Other factors that have been shown to lower blood pressure are weight reduction and physical activity. Finally, it is important to mention that risk factors for hypertension overlap significantly with those for related conditions, such as heart disease and diabetes.

Early Detection and Treatment of Hypertension as Primary Prevention

It is important to recognise that while treatment is not usually considered to be primary prevention, it is with respect to heart disease (CAD and heart failure), stroke, and renal disease; it is, for example, the single most important modifiable risk factor for stroke. Thus early detection (summarised later) and treatment here can be considered primary prevention of some of the most important causes of death in Canada and BC. The British Columbia Guidelines and Protocols Advisory Committee (GPAC) has noted that “a baseline blood pressure (BP) should be established in all adults and reassessed periodically, commensurate with age and the presence of other risk factors....Blood pressure monitoring should be rigorous in those patients who:

- Have known or newly detected elevated BP
- Have cardiovascular target organ damage (*Target organ damage includes: cerebrovascular disease, coronary heart disease (CHD), left ventricular hypertrophy (LVH), chronic kidney disease (CKD), peripheral vascular disease, and hypertensive retinopathy*).
- Have other risk factors
- Are receiving antihypertensive therapy”

Stroke

Stroke is the third leading cause of death in British Columbia, and it is the primary cause of acquired long-term disability in adults. Hypertension is the single most important modifiable risk factor for stroke; other risk factors for ischemic stroke are similar to those for the related conditions of hypertension and heart failure previously discussed, including obesity, smoking, physical inactivity, and alcohol consumption.

Research suggests that other risk factors for stroke may include fried fish consumption, depressive symptoms, hormone replacement therapy, elevated homocysteine levels, and high magnesium intake, though these are not as well-studied.

- *Hypertension*: Of the modifiable risk factors, hypertension carries the highest relative risk for stroke. According to one study approximately one-quarter of hemorrhagic strokes in hypertensive subjects would have been prevented if they had been receiving hypertension treatment.
- *Aspirin*: There is no evidence that aspirin reduces the risk of stroke in the general population of people at low risk, and it may actually increase risk of hemorrhagic stroke. However, the results of a large primary prevention trial support the use of aspirin for preventing a first stroke among women over age 65 who are at increased risk of cardiovascular events.

Asthma

Correlations have been found between asthma and a number of variables, including presence of pet and dust mite allergens and environmental cigarette smoke. The most promising results are found when a number of these variables can be controlled at the same time.

While support for reduction of environmental cigarette smoke is consistent, the effects of other factors are less clear. Results for dust mite and pet allergen avoidance and Omega-3 consumption are inconclusive, although multiple simultaneous interventions were more consistently positive. The hygiene hypothesis suggests that some degree of exposure to viruses and allergens may actually be beneficial. Other factors commonly studied include breastfeeding and viral infections. Exposure to chlorine has also been suggested as having a potential role.

Asthma is clearly a multi-faceted disease with numerous risk factors. The role of these risk factors has been hotly debated in the medical literature. The view of some is that “the environmental factors causally driving the temporal changes remain largely unknown. Therefore, there are few truly justified recommendations for the prevention of asthma.” Van Schayck and co-authors have wrestled with the fact that “preventive measures thus far studied with the aim of preventing (or delaying) the development of asthma have shown such disappointing results.” They suggest that “the most likely explanation is that the development of a multi-factorial disease, such as asthma, is extremely difficult, if not impossible, to prevent by eliminating only one risk factor.” To add further complexity to the issue of asthma prevention, what we sometimes think of as one disease - asthma - may in fact be a constellation of diseases.

Chronic Obstructive Pulmonary Disease (COPD)

COPD is an umbrella term for a number of diseases which include chronic bronchitis and emphysema. Cigarette smoking is the principal underlying cause in 80% to 90% of COPD cases. The contribution of primary smoking is very clearly established, and exposure to second-hand smoke likely also plays an important, although not as well-defined, role.

About 15% of all cases of COPD are work-related. Specific settings and agents have been indicated or confirmed as linked to COPD. Coal miners, hard-rock miners, tunnel workers, concrete-manufacturing workers, and non-mining industrial workers have been shown to be at the highest occupational risk for developing COPD. Outdoor air pollution is associated with increased symptoms among those with COPD. Also, repeated childhood respiratory tract infections and childhood exposure to second-hand smoke lead to reduced levels of respiratory function, which may predispose a person to COPD. A genetic deficiency of alpha-1-antitrypsin, an anti-protease which protects the lung tissues from damage, is also associated with an increased risk of COPD.

As cigarette smoking is undoubtedly the main cause of COPD in the population, reduction or cessation of personal exposure to tobacco is of primary importance as the key preventive measure. For primary prevention to be effective, other sectors within a community must also be actively engaged along with the public health system, to address environmental air pollutants and occupational risk factors.

Breast Cancer

The concept that breast cancer may be preventable is supported by wide international variation in the incidence of breast cancer. Potential strategies to reduce the risk of breast cancer include an increase in exercise, weight loss, reduction of alcohol intake, reduction of fat intake, and chemoprevention and prophylactic surgery.

- *Physical activity*: There is evidence of a protective effect with a dose-response association for both pre- and post-menopausal breast cancer. At least a moderate level (> 4.5 MET per week) of physical activity is required.
- *Obesity*: associated with increased breast cancer risk, particularly in postmenopausal women.
- *Alcohol*: The consumption of alcohol (in excess of 30g per day) is also associated with an increased risk of breast cancer; one review notes that “if alcohol is consumed on a regular basis, a sufficient supply of fresh vegetables and fruit is essential”.
- *Fat intake*: The association between breast cancer and fat intake is more controversial although a low-fat diet may contribute to a reduction in breast cancer risk through helping to maintain a healthy weight.
- *Chemoprevention*: Selective Estrogen Receptor Modulators (SERMs) such as tamoxifen and raloxifene have been shown to be protective against breast cancer, reducing breast cancer risk by 48% and 66% respectively. However, there are also significant increased risks associated with the use of SERMs, including an increased relative risk of

endometrial cancers and venous thromboembolic events. Thus the USPSTF recommends against the use of tamoxifen and raloxifene for the primary prevention of breast cancer in women with low or average risk for breast cancer. In women with a high risk for breast cancer (defined as a five-year risk of at least 1.6%) and a low risk for the side effects, the USPSTF recommends that clinicians discuss the possibility of chemoprevention with these women. Similar recommendations have been made by other organizations, including the Canadian Task force on Preventative Health Care.

- *Prophylactic surgery*: Prophylactic mastectomy is sometimes considered for women with a high risk of breast cancer. A recent Cochrane review concluded that “while published observational studies demonstrated that BPM was effective in reducing both the incidence, and death from, breast cancer, more rigorous prospective studies (ideally randomized trials) are needed. BPM should be considered only among those at very high risk of disease”.

Diabetes

Type 2 diabetes, also known as non-insulin-dependent diabetes mellitus (NIDDM), is the most common form of diabetes, occurring in approximately 90% of patients with diabetes.

The most consistent risk factors associated with type 2 diabetes are obesity, sedentary behaviour, and smoking. The most common preventative effect reported was related to an increase in physical activity. Certain dietary changes, including replacing saturated and trans-fats with unsaturated fats, and refined grain products with those made from whole grain, were also consistently found to be beneficial. The British Columbia Guidelines and Protocols Advisory Committee (GPAC) has noted that “a large proportion of type 2 diabetes can be prevented using lifestyle modification and/or pharmacologic intervention. All individuals should be encouraged to pursue a program of lifestyle modification that includes regular physical activity (at least 150 minutes of moderate intensity aerobic exercise each week spread over 3 non-consecutive days and resistance exercise 3 times a week) and moderate weight loss (5-10% of initial body weight). Lifestyle modification is particularly important for persons considered at high risk for diabetes. Pharmacologic therapy with metformin or acarbose should also be considered for those at high risk.

Type 1 diabetes, also known as insulin-dependent diabetes mellitus (IDDM), is an autoimmune disease that occurs when the insulin-producing beta cells in the pancreas are damaged or destroyed, causing a reduction in, or the cessation of, insulin production. The etiology of type 1 diabetes is not well understood, but the disease is believed to be the result of an individual’s genetic vulnerability together with a possible viral or other infectious trigger; the infection induces an autoimmune response that damages the already vulnerable insulin-producing beta cells in the pancreas.

A number of studies have looked at possible interventions for preventing type 1 diabetes. Over 125 therapies have been shown to prevent, or at least slow, the disease in animal models, but human trials have experienced only limited success to date.

Screening and Early Detection

The issue of early detection is substantially more important for some of the diseases reviewed in this report than for others.

Alzheimer's Disease

A significant amount of research effort, for example, has been expended in the area of the early detection of Alzheimer's disease (AD), particularly with respect to neuropsychologic testing, neuroimaging, and biomarkers.

Multiple longitudinal prospective studies have found that neuropsychological testing with a focus on memory and executive function can accurately predict conversion to AD. Such results have raised the question of whether or not large-scale community memory screening is feasible and practical.

Neuroimaging studies have identified hippocampal atrophy as a predictor of the decline from mild cognitive impairment to AD. The potential role of cerebrospinal fluid protein biomarkers in the early detection of AD has also been studied with some positive results.

Nevertheless the best possible approach for the early diagnosis of AD at this point in time is still a multidisciplinary approach comprising informant history, neurophysiological data, neuroimaging, and perhaps genetic testing.

Parkinson's Disease

Research in the early detection of Parkinson's disease (PD) indicates a promising potential role for functional neuroimaging. The role of biomarkers is being studied but, at this time, seems to be less useful in the early detection of PD. Overall no single method of PD detection is reliable on its own and neuroimaging must still be conducted within the scope of the classical PD clinical examination.

Multiple Sclerosis

The early diagnosis of Multiple Sclerosis (MS) is important for favourable outcomes and slowed disease progression. Several studies have shown that MRI imaging, especially of the spinal cord, can be useful in assisting with an early diagnosis of MS. Other studies discuss the success of using IgG in the cerebrospinal fluid as a reliable biomarker of MS disease. As with AD and PD, however, neither imaging nor biomarkers are currently sufficient for the early detection of MS.

Ocular Diseases

The early detection of ocular diseases is important as approximately 40% of blindness is either preventable or treatable if discovered early enough. The most important aspect of early detection in this area is regular and periodic vision examinations.

Rheumatoid Arthritis

Current research indicates that there is a “window of opportunity” in early rheumatoid arthritis (RA), within the first 3-6 months, when immune-modifying therapies have their greatest impact and potential to alter disease course. Despite the importance of early detection, there is no easy way to differentiate between RA and other forms of arthritis.

The following combination of methods for detecting RA is usually employed

- *History*—symptoms lasting more than 6 weeks; morning stiffness
- *Examination* (from most to least accurate)—arthritis in 3 joints; arthritis of hand joints; compression pain in hand or foot joints; symmetrical arthritis; subcutaneous nodules.
- *Laboratory*—erythrocyte sedimentation rate and C-reactive protein do not distinguish well between RA and non-RA; measuring rheumatoid factor (RF) is a valuable tool in RA diagnosis; various antibody tests are showing promise, especially anti-cyclic citrullinated peptide (CCP); genetic typing enables discrimination between self-limiting and persistent disease in early RA, with an accuracy of 50-60%.
- *Imaging*—conventional X-rays; ultrasound; magnetic resonance imaging (MRI).

The use of RF has been problematic as it is not restricted to patients with RA. The use of anti-citrullinated protein/peptide antibodies (ACPA) has been recommended but even this system of early detection is flawed as ACPA has been found in other rheumatic autoimmune diseases besides RA.

Gastric Disease

Both endoscopic biopsies and non-invasive tests are used to establish whether a gastric disease process has begun, but neither of these approaches is considered cost-effective at a population level. Rather, it has been suggested that highly susceptible individuals infected with high virulence bacterial genotypes should be targeted for endoscopic monitoring to detect advanced precancerous lesions.

Colorectal Cancer

Screening for colorectal cancer is strongly recommended for men and women 50 years of age or older. An earlier onset of initial screening (e.g., age 40 rather than 50) and more frequent screening (e.g., colonoscopy every 5 years rather than every 10 years) is usually associated with screening individuals in higher risk categories. Most organizations do not emphasize one strategy over another but rather stress the importance of screening by any method for all eligible adults.

Cervical Cancer

Screening with the Pap test has had a significant impact on the morbidity and mortality associated with cervical cancer. The U.S. Preventive Services Task Force currently has the following five recommendations with respect to screening for cervical cancer

1. Strongly recommends screening for cervical cancer in women who have been sexually active and have a cervix.
2. Recommends against routinely screening women older than 65 for cervical cancer if they have had adequate recent screening with normal Pap smears and are not otherwise at high risk for cervical cancer.
3. Recommends against routine Pap smear screening in women who have had a total hysterectomy for benign disease.
4. Concludes that the evidence is insufficient to recommend for or against the routine use of new technologies to screen for cervical cancer.
5. Concludes that the evidence is insufficient to recommend for or against the routine use of HPV testing as a primary screening test for cervical cancer.

Despite the current excitement associated with vaccine development for HPV infection, routine screening will likely be required for the foreseeable future as even the best vaccines currently in development will likely only address 75% of oncogenic HPV subtypes.

Prostate Cancer

There has been considerable debate regarding the potential role of the prostate specific antigen (PSA) tests replacing the digital rectal exam for the early detection of prostate cancer. There is good evidence that PSA screening can detect early-stage prostate cancer but mixed and inconclusive evidence that early detection improves health outcomes. Screening with PSA was also found to be associated with potential harmful effects including false positives, anxiety and so on. The current research indicates that there remains no conclusive evidence that PSA screening is beneficial.

Breast Cancer

Mammography screening for breast cancer is controversial. The BC Cancer Agency encourages women from the ages of 50-69 (and otherwise healthy women aged 70-79) to have a mammogram every 24 months. The authors of the Cochrane Review in this area, however, conclude that “the currently available evidence does not show a survival benefit of mass screening for breast cancer (and the evidence is inconclusive for breast cancer mortality). Women, clinicians and policy makers should consider these findings carefully when they decide whether or not to attend or support screening programs.”

Type 2 Diabetes

According to the U.S. Preventive Services Task Force, there is good evidence that using available screening methods can detect type 2 diabetes before symptoms are evident. The benefits of screening are still in question, however, since it has not been shown that glycemic control starting immediately after early detection is any more effective than interventions at the point of clinical diagnosis.

Heart Disease

Screening for heart diseases is an evolving issue. Many of the current methods are invasive and expensive (e.g., coronary angiogram). The ultimate goal is a completely non-invasive, relatively inexpensive method that still accurately determines the risk of heart disease. In the meantime, the recommendation is against formal screening in low-risk patients.

High Blood Pressure

Screening for high blood pressure, a key risk factor for heart disease, on the other hand, is generally recommended in all adults age 18 and over.

Stroke

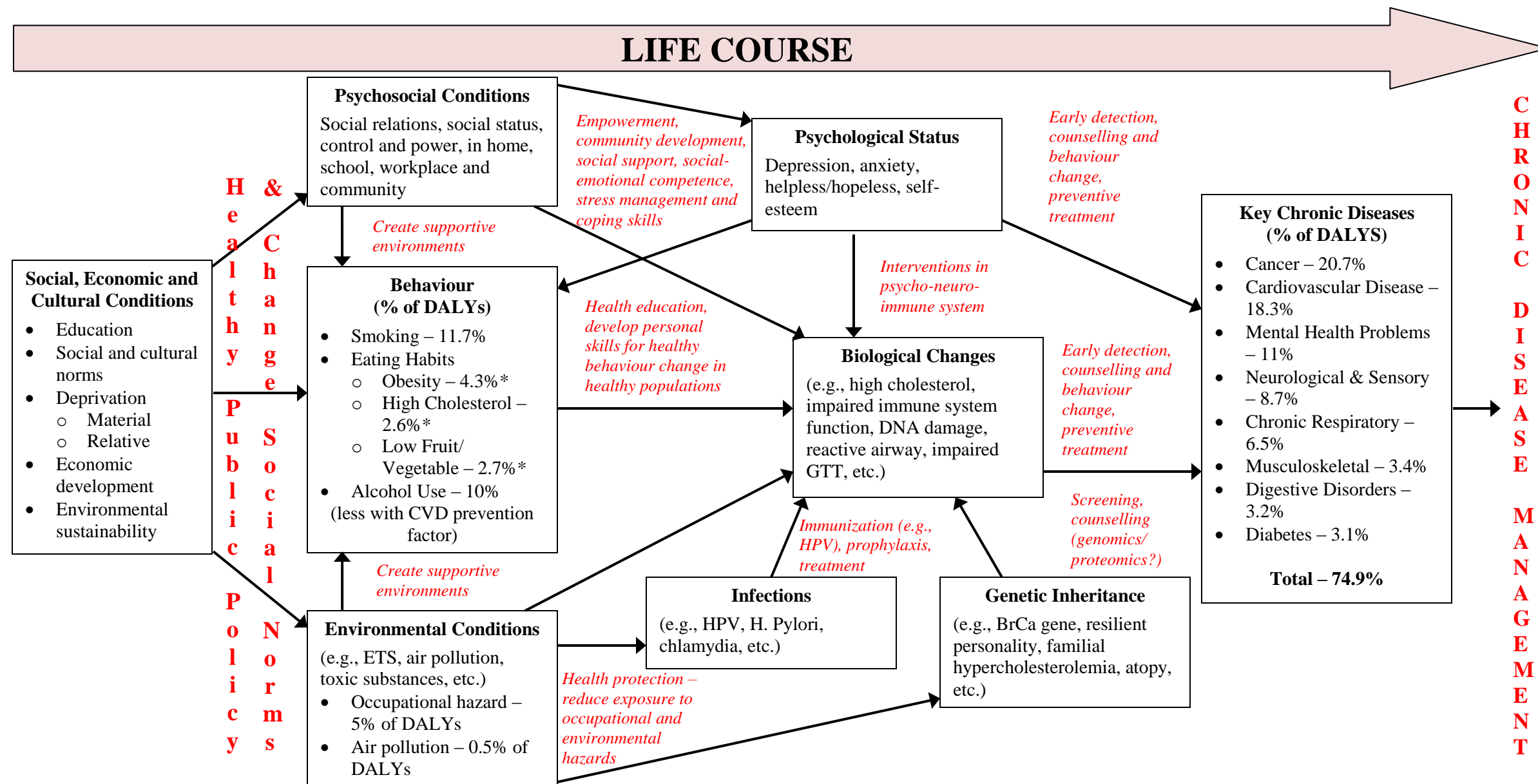
Recognition and immediate response to the warning signs of stroke can significantly impact long-term prognosis. If patients with acute ischemic stroke are given intravenous thrombolytic treatment within 3 hours of the initial onset of symptoms, the patient will have improved clinical outcome at 3 months. Public awareness of stroke symptoms is imperative for early detection and treatment of stroke; only one-quarter of stroke patients receive treatment within the 3-hour critical time frame.

This summary, and the more detailed review that follows, makes it clear that in many cases the same risk factors that are addressed in the core programs in healthy living and some other core programs (e.g., injury prevention) will also contribute to prevention in a number of conditions reviewed here. In particular, not smoking, being physically active, having a healthy diet, and maintaining a healthy weight, all targets of ActNow BC and the BC Healthy Living Alliance, are important preventive factors for a number of conditions. The challenge will be to identify interventions beyond those already contemplated that will be a worthwhile addition to a core program in chronic disease prevention.

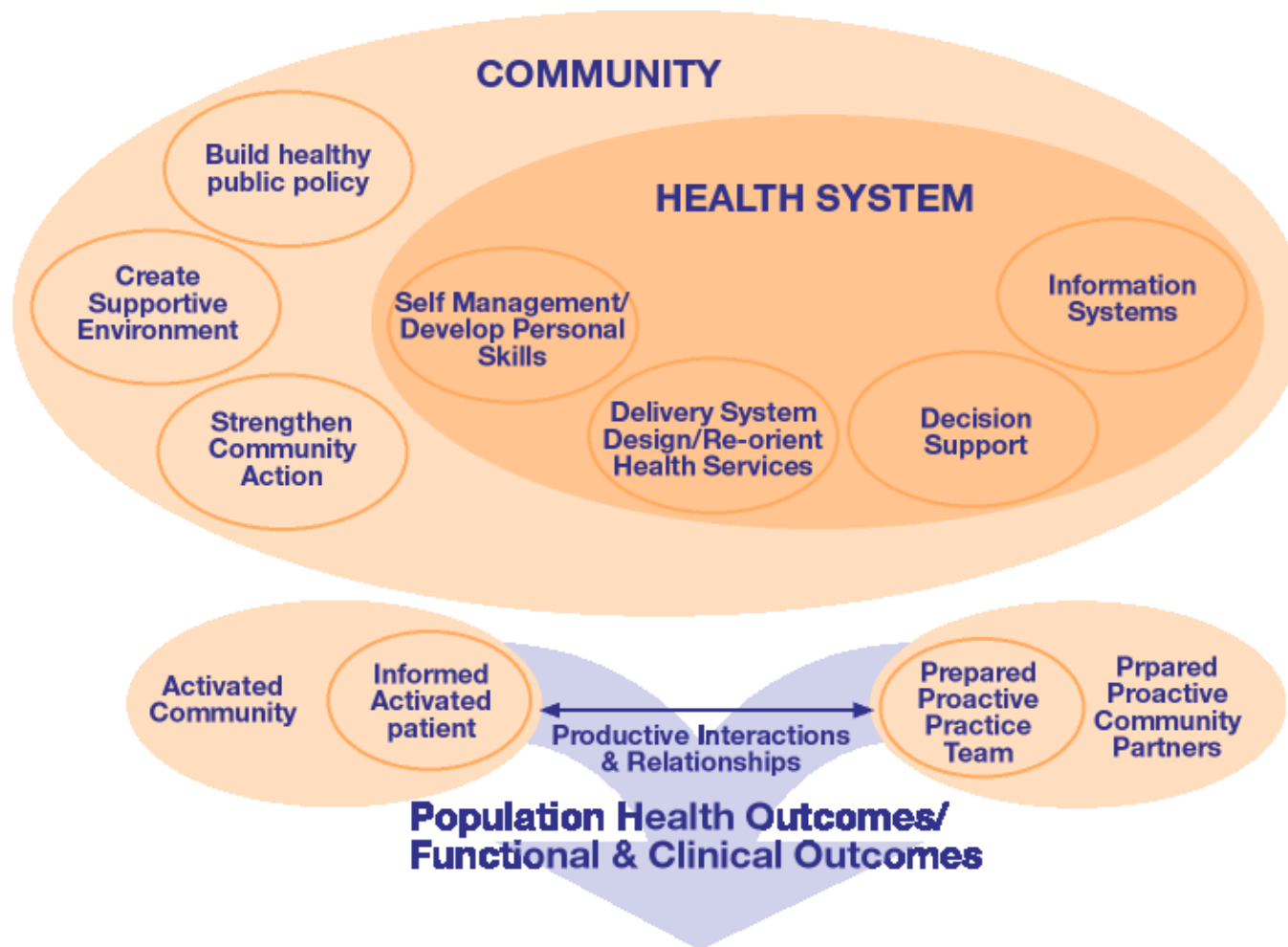
^c www.phabc.org/pdf/core/core_functions.pdf

^{ci} www.health.gov.bc.ca/prevent/pdf/cdp/cdpframework.pdf

APPENDIX 2: CHRONIC DISEASE PREVENTION MODEL



APPENDIX 3: BC'S EXPANDED CHRONIC CARE MODEL



Source: V. Barr, S. Robinson, B. Marin-Link, L. Underhill, A. Dotts, D., & D. Ravensdale. (2002). Adapted from Glasgow, R., Oreleans, C., Wagner, E., Curry, S., & Solberg, L. (2001). Does the chronic care model also serve as a template for improving prevention? *The Milbank Quarterly*, 79(4), and World Health Organization, Health and Welfare Canada and Canadian Public Health Association. (1986). *Ottawa Charter of Health Promotion*.

APPENDIX 4: INDICATORS

Part 1 – Process (Output) Indicators

Population Health Promotion

Select	Indicator	Comments
	Health promotion strategic plan status update	Descriptive summary produced by Health Authority
	Analyses of vulnerable groups Vulnerable groups identified by vulnerability, population size, location, age-groups, gender	
	Summary of initiatives undertaken to enhance protective factors and reduce risk factors	Descriptive summary produced by Health Authority
	List of targeted health promotion initiatives by at-risk group	Descriptive list compiled by Health Authority

Clinical Prevention

Select	Indicator	Comments
	Immunization rates HPV vaccine Adults (Flu, pneumococcal)	Identified as an indicator for the Communicable Disease Core Function
	Screening and early detection activities for cardiovascular disease, cancer and other chronic conditions	Number and type of activities undertaken, screening rates achieved
	Percentage of primary care providers that have implemented IM/IT that supports the provision of clinical prevention services	
	Number of “practice teams” developed during year	Could take the form of a count or status update

Prevention as part of chronic disease management and self-care

Select	Indicator	Comments
	Updates on provision of Healthy Living Core Program services to those with chronic diseases	Progress report in qualitative form
	List of educational materials available to partners	
	Activities undertaken to facilitate access to information which assists clients to build expertise in managing their health	Descriptive summary produced by Health Authority
	Activities undertaken with community organizations, schools, professional associations, employers and unions to enhance understanding and support for positive self-care	Descriptive summary produced by Health Authority

Part II – Outcome Indicators

Risk Factors (a short- and longer-term outcome for Clinical Prevention)

(Source: Canadian Community Health Survey conducted by Statistics Canada; Adolescent Health Survey conducted by the McCreary Society for adolescent age-group)

Many of these indicators are monitored by the core functions most directly responsible for them, but would be useful for surveillance of chronic diseases.

Select	Indicator	Comments
	Smoking Current daily or occasional smoker	
	Exposed to second-hand smoke	
	Exposed to second-hand smoke at home	
	Exposed to second-hand smoke in vehicles	
	Exposed to second-hand smoke in public places	
	Smoked first cigarette at 5-11 years old Smoked first cigarette at 12-14 years old Smoked first cigarette at 15-19 years old Smoked first cigarette at 20+ years old	
	Quit smoking less than 1 year ago Quit smoking 1 to 2 years ago Quit smoking 3 to 5 years ago Quit smoking more than 5 years ago Use of alternative tobacco products	
	Alcohol Use 5 or more drinks on one occasion, 12 or more times a year 5 or more drinks on one occasion, less than 12 times a year	
	Obesity rates by age group	
	Overweight rates by age group	
	Consume fruits and vegetables < 5 times per day	
	Have been diagnosed as high blood pressure	
	Leisure-time physical inactivity rates by age group	
	Depression	
	Life Stress	

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Morbidity

(Source: Discharge Abstract Database, Ministry of Health Services)

Select	Indicator	Comments
	Cancer incidence (ASIR)	
	All invasive primary cancer sites	
	Colon, rectum and rectosigmoid junction cancer	
	Bronchus and lung cancer	
	Female breast cancer	
	Prostate cancer	
	Cervical cancer	

Select	Indicator	Comments
	CVD Discharges (ASDR)	
	Ischaemic heart disease	
	Acute myocardial infarction	
	Other ischaemic heart disease	
	Cerebrovascular disease	
	Hemorrhagic stroke	
	Occlusive stroke	
	Other circulatory disease	
	Hypertensive disease	
	Heart failure	
	Congestive heart failure	
	Diabetes rates by age and gender	

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Mortality

(Source: Vital Statistics)

Select	Indicator	Comments
	Cancer Mortality	
	All invasive primary cancer sites	
	Colon, rectum and rectosigmoid junction cancer	
	Bronchus and lung cancer	
	Female breast cancer	
	Prostate cancer	
	Cervical cancer	

Select	Indicator	Comments
	CVD Mortality	
	Circulatory diseases	
	Ischaemic heart diseases	
	Cerebrovascular diseases	

Health Services

(Source: Discharge Abstract Database, Ministry of Health Services)

Average length of inpatient hospital stay for:

Select	Indicator	Comments
	Circulatory diseases	
	Ischemic heart disease	
	Acute myocardial infarction	
	Other ischaemic heart disease	
	Cerebrovascular disease	
	Hemorrhagic stroke	
	Occlusive stroke	
	Other circulatory disease	

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Select	Indicator	Comments
	Hypertensive disease	
	Heart failure	
	Respiratory diseases Chronic obstructive lung disease except asthma	
	Asthma	
	Diabetes	
	Alzheimer's disease	

Improved Patient Health Outcomes

(Source: Vital Statistics)

Select	Indicator	Comments
	Age standardized mortality rate	
	Years of Potential Life Lost (PYLL)	

Additional Indicators

The following indicators are from The WHO 2008-2013 *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases: Prevent and Control*. They may be useful to a health authority as an indication of the type of organizational arrangements the province or perhaps a health authority might need to have in place.

- Number of countries that have an established unit for the prevention and control of noncommunicable diseases (with dedicated staffing and budget) in the Ministry of Health or equivalent national health authority.
- Number of countries that have adopted a multisectoral national policy for noncommunicable diseases in conformity with the global strategy for the prevention and control of noncommunicable diseases.
- Number of countries with reliable, nationally representative mortality statistics by cause
- Number of countries with reliable standardized data on the major noncommunicable disease risk factors (based on WHO tools).
- Number of countries with reliable population-based cancer registries.
- Number of countries that have excise tax rates of at least 50% of the retail price of a pack of the most commonly-used cigarettes.

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- Number of countries with complete smoke-free legislation covering all types of places and institutions, as defined in the WHO Report on the Global Tobacco Epidemic, 2008.
- Number of countries with bans on tobacco advertising, promotion and sponsorship, as defined in the WHO Report on the Global Tobacco Epidemic, 2008.
- Number of countries that have incorporated smoking cessation support (including counselling and/or behavioural therapies) into primary health care, as defined in the WHO Report on the Global Tobacco Epidemic, 2008.
- Number of countries that have adopted multisectoral strategies and plans on healthy diet, based on the WHO Global Strategy on Diet, Physical Activity and Health.
- Number of countries that have adopted multisectoral strategies and plans on physical activity based on the WHO Global Strategy on Diet, Physical Activity and Health.
- Number of countries that have developed national food-based dietary guidelines.
- Number of countries that have developed national recommendations on physical activity for health.
- Number of countries that have developed policies, plans and programmes for preventing public-health problems caused by harmful use of alcohol.
- Number of countries with a national research agenda and a prioritized research plan for noncommunicable diseases and their risk factors in line with WHO's global research strategy.
- Number of countries with comprehensive national cancer-control programmes, covering priorities in prevention, early detection, treatment and palliative care.
- Number of countries providing early detection and screening programmes for cervical cancer and/or breast cancer.
- Number of countries in which patients have access to affordable essential medicines for pain relief and palliative care, including oral morphine.
- Number of radiotherapy devices per 100 000 population.
- Number of countries in which essential medicines for management of chronic respiratory diseases, hypertension, and diabetes are affordable and accessible in primary health care.
- Prevalence of raised fasting blood glucose concentration among adults aged 25–64 years

APPENDIX 5: LOGIC MODEL - MODEL CORE PROGRAM FOR PREVENTION OF CHRONIC DISEASE

Goal: To enhance the health and well-being of British Columbians by preventing and/or reducing the incidence and prevalence of chronic disease among the population.

Main Components	Activities	Outputs	Short and Intermediate Outcomes	Longer Term Outcomes	Ultimate Outcomes
Population Health Promotion Strategy	<ul style="list-style-type: none"> Establish a comprehensive multi-sectoral health promotion strategic plan Advocate for policies, by-laws, and social / cultural / environmental conditions that decrease the risk of chronic diseases Strengthen education, awareness and community development to enhance protective factors and reduce risk factors Target health promotion initiatives to at-risk groups including Aboriginal communities, and other vulnerable population groups 	<ul style="list-style-type: none"> Health promotion strategic plan Planning meetings Analysis of vulnerable groups Policy proposals Educational materials and resources Capacity building sessions with local councils and groups 	<ul style="list-style-type: none"> Strategic approach to integration and coordination of prevention policies, programs and services Enhanced community knowledge and strengthened programs to decrease local chronic disease risks Increased public awareness and support for enhancing chronic disease protective factors 	Enhance coordinated systemic support for positive lifestyle behaviours and other protective factors that reduce chronic diseases across the population, at all stages of the lifecourse	Improved health and wellness for British Columbians
Clinical Prevention	<ul style="list-style-type: none"> Promote, support and encourage HA primary care providers to integrate the following into their practice: primary prevention (immunization, counselling, preventive medication, screening) Promote and support collaborative strategies by developing “practice teams” and other integrated and/or shared initiatives between primary health care providers, public health and other community health care professionals Facilitate / promote among primary care providers, the implementation of IM/IT that supports the provision of clinical prevention services Facilitate expanded coverage and access to priority clinical prevention services especially for those who are disadvantaged 	<ul style="list-style-type: none"> Immunization of children/adults Screening and early detection for cardiovascular disease, cancer and other chronic conditions Counselling Preventive medications IM/IT tools implemented Collaborative needs assessment Joint planning meetings Collaborative strategies Coordinated program delivery Practice teams 	<ul style="list-style-type: none"> Increased screening and counselling for at-risk clients Reduced risk factors for chronic diseases among clients including vulnerable clients Increased intervention at the early development stages of chronic disease Improved coordination, communication and collaboration among primary care, public health and other health care professionals Increased information / administrative support for clinical prevention services 	Prevent and/or reduce (modifiable) risk factors that influence the occurrence and severity of chronic diseases Reduce health disparities among different segments of the population with regard to chronic diseases Increase the early detection of the chronic conditions which can be prevented / controlled through early intervention	Reduced premature mortality and morbidity

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Main Components	Activities	Outputs	Short and Intermediate Outcomes	Longer Term Outcomes	Ultimate Outcomes
Promotion of Self-Care/Self-Management Strategies	<ul style="list-style-type: none"> • Support integration of ‘healthy living’ activities and prevention of co-morbid conditions for people with chronic disease in chronic disease management activities by HA primary care providers and as feasible with community primary care providers • Facilitate access to information which assists clients to build expertise in managing their health • Work with community organizations, schools, professional associations, employers and unions to enhance understanding and support for positive self-care 	<ul style="list-style-type: none"> • Advice to individuals and groups • Educational materials • Referrals • Coordination meetings with support groups • Presentations 	<ul style="list-style-type: none"> • Increased expertise among at-risk individuals for self-care • Reduced pain, fatigue and stress among those with chronic diseases • Increased support among schools, associations, employers and unions to reduce hazards / barriers / cultures that impact chronic conditions and self-care 	Enhance the health-related quality of life of people with chronic illnesses.	Reduced burden on the health care system
Surveillance, Monitoring and Evaluation	<ul style="list-style-type: none"> • Gather and assess statistics on chronic disease incidence/prevalence, trends, issues, risk factors, and vulnerable groups and populations • Establish program evaluation frameworks and conduct evaluation of new initiatives • Encourage continuous improvement through application of findings from new research • Disseminate knowledge to primary care partners and other health professional community partners 	<ul style="list-style-type: none"> • Statistical reports and trends analysis • Community risk analysis • Evaluation frameworks • Program evaluation reports 	<ul style="list-style-type: none"> • Improved data collection, decision-making and priority setting to enhance effectiveness of programs 	As above	As above