



CORE

Public Health Functions for BC

**Model Core Program Paper:
Healthy Community
Environments**

BC Health Authorities

BC Ministry of Healthy Living and Sport

February 2009

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 (February 2009)

BC Ministry of Healthy Living and Sport (February 2009)

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EXECUTIVE SUMMARY

This paper identifies the core elements that are provided by British Columbia health authorities in the delivery of programs for healthy community environments. It is intended, as part of the BC Core Functions in Public Health, to reflect evidence-based practice and to support continuous performance improvement.

A Working Group of representatives from the Ministry of Healthy Living and Sport, BC Centre for Disease Control and the health authorities worked together in the development of this paper. They recognize that healthy community environments is a comparatively new focus for health authorities and that this model core program is one that they can aspire to, understanding that its development will take time.

The Working Group agreed the program goal is to improve the health of the public by helping to create healthier built environments,¹ and by preventing, reducing, or eliminating community environmental health hazards. The specific objectives are:

- To collaborate in creating healthy built environments that support everyone in leading healthy lives.
- To prevent, reduce or eliminate actual or potential public exposure to chemicals, metals, industrial contaminants, radiation, and environmental noise, which represent a threat to human health.
- To ensure that solid and liquid (sewage) waste is properly managed and does not present a threat to human health.
- To promote community planning and design that prevents potential environmental and social threats to health and contributes to the creation of healthy community environments.

The Working Group determined that the main program components for delivery of an effective health authority program on healthy community environments consist of:

- Environmental surveillance and monitoring.
- Environmental health risk assessment/risk management.
- Community responsiveness.
- Collaboration for healthy community environments.
- Investigation and enforcement.
- Research and program evaluation.

¹ The “built environment” encompasses all the buildings, spaces and products that are created or at least significantly modified by people and include: homes, schools and workplaces, parks, business areas and roads. It extends overhead in the form of electric transmission lines and underground in the form of waster disposal sites and subway trains and across the country in the form of highways (Health Canada, 1997).

The Working Group also recognized that the application of the precautionary principle is of fundamental importance in protecting the public from harm resulting from environmental hazards.

“Better” or “promising” practices are identified, based on the literature and exemplary practices widely recommended by experts in the field. Recommended practices include:

- Public health leadership to build strategic partnerships with multiple sectors and levels of government for a unified focus on managing and developing healthy community environments.
- Environmental surveillance, monitoring, and health impact assessments² to identify unhealthy built environments and environmental risks and to develop health promotion, risk management and risk reduction strategies to protect public health.
- Collaboration and capacity building with local government, community stakeholders and other groups to support and enhance healthy community environments through the development of land-use plans, local bylaws, urban development, industrial projects, neighbourhood plans and housing developments, traffic/transit designs, and the development of parks, recreation and community services.
- Implementation of health protection interventions, including public education and awareness, protective action, investigation and enforcement of standards and legislative requirements.
- Conducting research and evaluation on programs and processes to ensure continuous quality improvement.

Key success factors highlight a range of strategies that ensure a health authority’s successful implementation of an effective program on healthy community environments. These include strong support from the Board and management; allocation of sufficient resources; well-trained and competent staff; a well-developed information system; and clear mechanisms for reporting and accountability.

² Health impact assessments may be conducted alone, with partners, or consist of independent reviews of assessments completed by others.

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 then-Ministry of Health and the health authorities.

In addition, the new *Public Health Act* (and the current *Health Act* in force until the new Act is proclaimed) specifies powers, duties, and functions with respect to preventing or stopping environmental health hazards or health impediments. The legislation can require mandatory reporting of health hazards, and defines the responsibilities of persons to comply with requirements and duties associated with health impediments and with orders from a health officer to stop or mitigate a health hazard. The Act also defines the responsibilities of medical health officers to monitor, advise, take action, consult with the Provincial Health Officer, and make public reports on the health of the population and the extent to which population health targets have been achieved.

Implementation of core functions will establish a performance improvement process for public health, developed in collaboration between the Ministry of Healthy Living and Sport, 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? These 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 for healthy community environments 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 is one element in an overall public health performance improvement strategy developed by the Ministry of Healthy Living and Sport in collaboration with provincial health authorities and experts in the field of communicable diseases. It builds on previous work from a number of sources.

In March 2005, the then-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, 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 reviews that have informed this paper are:

- *Evidence Review: Healthy Community Environments* (2008), by the Ministry of Healthy Living and Sport, Population and Public Health.
- *Evidence Paper: Public Health Agencies' Influence on Planning and Policymaking for the Built Environment* (2007), by J. Deby and L. Frank, School of Community and Regional Planning, University of British Columbia.

A Working Group on Healthy Community Environments was formed in November 2007, of experts from the Ministry of Healthy Living and Sport, the Provincial Health Services Authority (BC Centre for Disease Control) and the health authorities. The group provided guidance and direction in the development of the model core program paper during meetings in 2007 and 2008, as well as through telephone and e-mail discussions.

1.2 Introduction to Healthy Community Environments

1.2.1 Environmental Hazards and Concerns

Key environmental threats and hazards across the province include:

- **The “built” environment**

The built environment is part of the overall ecosystem of our earth. It encompasses all of the buildings, spaces and products that are created, or at least significantly modified, by people. It includes our homes, schools and workplaces, parks, business areas and roads. It extends underground in the form of waste disposal sites and subway trains and across the country in the form of highways (Health Canada, 1997).

As Canadians spend about 90 per cent of their time inside homes, offices, factories, commercial establishments and other buildings (National Research Council Canada, 2007), and are 80 per cent urbanized (Statistics Canada, 2007), the design, construction, operation and maintenance of the built environment, particularly housing and urban developments, have a major influence on health and well-being. In addition to a focus on environmental risks and hazards, it is important to acknowledge the opportunities to enhance the health of the population through healthy built environments, including the promotion of active transportation, pedestrian safety, green spaces, accessible community services and recreation, healthy workplaces, child-friendly and age-friendly environments, and accessibility for those who are disabled. These initiatives can protect physical health, encourage healthy social networks and enhance social capital.

- **Rural and remote environments** – Environmental concerns are also an important factor in rural and remote areas, not only through the construction of built environments, but also due to human-created and natural hazards such as widespread use and higher exposure to pesticides in agricultural communities, air pollutants from industrial and domestic sources such as the burning of gas, oil, coal and wood for generating heat or other forms of energy, smoke from forest fires, and toxins produced in mining and smelting operations.
- **Vulnerability of children** – Children are at greater risk from environmental hazards and experience increased sensitivity due to their physical size, immature organs, rapid development, physiology, behaviour, and lack of knowledge. For example, in the womb, the fetus can be exposed to a number of contaminants through the placenta that may cause developmental abnormalities. Young children also have increased and unique pathways of exposure such as continual exploration of their environment through touch and taste (e.g., crawling on the ground where levels of heavier contaminants such as lead, particulates, pesticides and radon may be higher, or ingesting harmful substances accidentally, etc.). The long-term, cumulative exposures in childhood can be an important factor in determining adult health status (Health Canada, n.d., Vulnerable Populations).
- **Waste management** – Harmful health impacts from waste materials have been documented in populations living close to landfills, among workers in composting sites and sewage plants, and in locations where there is swimming in sewage contaminated

waters. For the most part, however, evidence on the improper treatment, handling and disposal of waste is “insufficient, [with] some probable, but not conclusive evidence of potential health impacts” (South West Public Health Observatory, 2002). The particular areas of concern include untreated sewage discharge, application of Class B sludge (human and animal waste) to agricultural land, and improperly designed landfill sites.

- **Ultraviolet radiation** – Excessive exposure to ultraviolet radiation (UVR) is widely recognized as a major risk factor for skin cancer (Fears, Scotto, & Schneidermann, 1977). Chronic cumulative sun exposure over an extended period of time is a risk factor, as well as an intermittent intense exposure prior to adulthood (Crane, Schneider, Yohn, Morelli, & Plomer, 1999). While skin cancer may be among the most common cancers, it is also one of the most preventable; risk can be reduced by limiting exposure to sunlight, the primary source of UVR. Total avoidance is not recommended as it is an excellent source of Vitamin D, necessary for muscle and bone health and disease prevention (Holick, 2004). In addition, it is important to note that risk from radiation exposure is also associated with naturally occurring radioactive materials, cell phone use, lasers and radio waves.
- **Pesticides** – Exposure to pesticides is widespread and may occur through multiple routes. Inhalation, dermal absorption and unintentional ingestion are considered important routes for domestically used pesticides (Bradman & Whyatt, 2005). Dietary ingestion is a significant pathway of exposure as pesticide residues can remain on the surface of fruit and vegetables, or within the food itself (e.g., in meat and milk of animals that received pesticide-treated feed) (Campt, 1990). Those living in agricultural communities generally have higher than average exposure, with children at risk of higher exposure than adults, particularly children of farm workers, due to their activity patterns and behaviour (Lambert et al., 2005). Children are more susceptible to the health effects of pesticides due to their rapid physical development (Wilson et al., 2004).
- **Lead contamination** – In spite of successful efforts to lower the amount of lead in the environment, lead poisoning still exists among Canadians. Children remain at the greatest risk for lead exposure and associated adverse health effects. Since even low levels of lead exposure may produce adverse health effects, there is a need for continued intervention to reduce exposure.
- **Environmental noise** – Prolonged or excessive exposure to noise, whether in the community or at work, can cause permanent hearing loss and may cause hypertension and ischemic heart disease. Children are particularly vulnerable to environmental noise, as studies have documented raised blood pressure, heart rates, and levels of stress hormones in children living in neighbourhoods with higher traffic noise. The main sources of environmental noise are road traffic and aircraft noise, although other sources, depending on their noise levels and the type of exposure can also be hazardous (e.g., loud music, loud toys, arcades, machinery and tools, construction and agricultural equipment, industrial sources, ATVs and off-road motorcycles) (Lazarus, 1998; World Health Organization [WHO], 1999).
- **Climate change** – Climate change is anticipated to present new environmental threats that could affect human health. These include increased exposure to UVR; soil erosion,

surface water contamination, floods, increased landslides and/or infrastructure vulnerability due to extreme rainfall (Canadian Climate Impacts and Adaptation Research Network, 2002); increased smog episodes, dust emissions, droughts, and glacier retreat as a result of heat waves and/or extreme weather events (Health Canada, n.d., Understanding). Each region of Canada has specific climate change risks and vulnerabilities that have the potential to cause death, injury, illness, infectious disease, stress-related disorders, as well as social and economic disruption. The most vulnerable members of society (i.e., children, elderly people, the poor, people with disabilities, immigrant populations and Aboriginal people) are particularly susceptible to these impacts.

- **Other contaminants** – Environmental contamination may occur from a wide range of sources such as chemical spills from industrial sites, petroleum spills from ruptured tanks, soil contamination from other toxins or waste products, and deposition of dust from coal burning, waste incineration, etc. Some consumer products may also be sources of environmental risk (e.g., lead paint on children’s toys, etc.).

1.2.2 Knowledge-Based/Evidence-Based Decision-making

An important consideration in this field is that research tends to focus on biological risk factors, with limited attention given to effective interventions to reduce harm from hazardous substances and hazardous environments. It is also recognized that research required for population health intervention studies is different from the “gold standard” randomized controlled trial of clinical medicine. Long-term studies in public health are expensive and comparatively rare, resulting in evidence often based on inadequate control, compliance and follow-up (Ministry of Health [MOH], 2005). In fact, a United Kingdom inquiry into inequities in health noted that “the more a potential intervention relates to the wider determinants of inequalities in health...the less the possibility of using the methodology of a control trial to evaluate it” (Acheson, 1998, as cited in MOH 2005).

The precautionary approach is a tool to assist in environmental management and risk decision-making in situations that have the potential for adverse health risks. The most broadly accepted definition is Principle #15 of the 1992 United Nations Declaration of the Rio Conference on Environment and Development (UNCED).

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environment degradation.”³

The World Health Organization (WHO), in addressing increasingly complex environmental health threats, has determined the need for timely preventive action in some circumstances, despite lack of proof, and the relevance of precaution under scientific uncertainty (WHO, 2003).

³ This definition is supported by Canada, and is enshrined in the *Canadian Environmental Protection Act, 1999*.

The application of the precautionary approach is an important tool to assist in risk assessment and management decisions in response to potential environmental hazards.

Considering the current weakness of the evidence and the precautionary approach, a combination of knowledge-based and evidence-based initiatives may thus be required to address environmental hazards that threaten community health. A knowledge-based approach refers to the process of understanding and quantifying the risk of potential environmental and human impacts in light of few “convincing” empirical studies. It reflects a United Kingdom government Cabinet office document, which addresses the reality of public health decision-making; it defines evidence as “expert knowledge, published research, existing statistics, stakeholder consultations, previous policy evaluations, the internet, outcomes from consultations, costing of policy options, output from economic and statistical modeling” (Nutley, Davies, & Walter, 2003).

1.2.3 Partners and Linkages

The range of agencies that have an important role in this field include environmental protection, health, transportation, housing, urban development, land-use planning, energy, agriculture, waste management, food and drug administration, emergency management, consumer product safety, injury control, vector control and occupational safety, as well as multiple levels of government.

On the provincial level, key linkages are the Ministry of Healthy Living and Sport, the Ministry of Health Services, the British Columbia Centre for Disease Control, the Ministry of the Environment and the Ministry of Community Development. Other important linkages are Ministries of Transportation and Infrastructure, Agriculture and Lands, and Energy, Mines and Petroleum Resources. At the regional and local level, it is essential to partner with local government, local networks and agencies involved in community planning and sustainable development.

Linkages with other core public health programs within the health authority will also be important. A key partner is the health assessment and disease surveillance program, as well as the core programs for drinking water and recreational water quality, air quality, food safety, food security, emergency preparedness, healthy communities, and healthy living.

2.0 SCOPE AND AUTHORITY FOR A HEALTHY COMMUNITY ENVIRONMENT PROGRAM

In order to implement the program for healthy community environments, there must be clarity on the respective roles and responsibilities of the Ministry of Healthy Living and Sport, the Ministry of Health Services, the Provincial Health Services Authority (BC Centre for Disease Control), the health authorities, and other ministries and levels of government involved in this field.

2.1 International Roles and Responsibilities

The World Health Organization (WHO) addresses public health and the environment through the development and distribution of guidelines, fact sheets and technical information on a range of physical, chemical and biological environmental substances that can affect human health.

2.2 National Roles and Responsibilities

Under the *Canadian Environmental Protection Act*, 1999 (CEPA), Health Canada is responsible for the assessment of potential risks to human health posed by substances. Health Canada works jointly with Environment Canada, the department responsible for assessing risk to the environment. The CEPA provides the framework for the identification, prioritization and assessment of existing substances and the control or management of those considered to pose a risk. Screening and full assessment determines whether a substance is toxic, as defined by CEPA, and the related need to develop measures for controlling risk to human health and/or the environment. Health Canada engages in consultation and public education to ensure that Canadians are informed about toxic substance risk management.

In addition, Health Canada is responsible for establishing and ensuring compliance with standards for noise emission labelling and maximum noise emission for consumer products, equipment and vehicles. It has control over inter-provincial transportation systems, including aircraft, trains and navigable waterways and has issued National Guidelines for Environmental Noise Control (1989) to guide legislators and planners in provincial and local governments.

The Public Health Agency of Canada has recently established a National Collaborating Centre (NCC) for Environment and Health, based at the BC Centre for Disease Control. The Centre examines how changes in the environment, climate, shelter, water, food and air quality affect the health of Canadians. This NCC also looks at the role that toxins, chemical agents and workplace injuries play in human health.

2.3 Provincial Roles and Responsibilities

2.3.1 Ministry of Healthy Living and Sport Roles and Responsibilities

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

- Promote health and prevent disease, disability and injury.
- Protect people from harm.

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- 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 healthy community environments, the Ministry of Healthy Living and Sport is responsible for strategic policies and legislation, as follows:

- Advising the Minister on environmental health policies and legislation.
- Consulting with, and advising, health authorities on specific environmental health legislative and policy issues.
- Coordinating the development of plans and strategies with health authorities to protect and enhance community environmental health and support local government initiatives.
- Conducting research and evaluation on the effectiveness of healthy community environment programs in the province.
- Providing advice and guidance to the Ministry of Health Services, the Ministry of Environment, other ministries, and to health authorities, on measures to address health risks from environmental contaminants and hazards and specific industries.
- Consulting with other ministries and agencies regarding the development of protocols, agreements and guidelines on environmental health issues.
- Setting standards and accountability frameworks on air and water quality and associated monitoring and reporting.
- Managing data on environmental health issues across the province.
- Developing public education resources on environmental health.
- Collaborating with the federal government and federal/provincial forums on community environmental health issues.

2.3.2 Provincial Health Officer's Roles and Responsibilities

The Provincial Health Officer (PHO), located in the Ministry of Healthy Living and Sport, has an oversight role and is responsible for ensuring accountability in fulfilling the legal requirements for environmental health. The PHO monitors the government and health authorities for compliance with legislation regional Medical Health Officers to ensure compliance with legal requirements.

2.3.3 Other Provincial Ministries Roles and Responsibilities

The Ministry of Healthy Living and Sport has a unique relationship with the Ministry of Health Services as they are the primary linkage to the regional health authorities and are responsible for service delivery of public health programs. The role and functions of the Ministry of Health Services are predominantly focused on: leadership for the delivery of health services and programs; funding and accountability for regional health authorities; ensuring long-term sustainability of the health care system; improved patient care; leadership, direction and support to health care service delivery partners; setting province-wide goals, standards and expectations for health care service delivery by health authorities; and management of the Medical Services Plan, Pharmacare, Ambulance Services, and BC HealthGuide self care program.

The BC Ministry of Environment is responsible for the design, development, implementation and evaluation of a wide range of pollution prevention and remediation activities throughout BC to fulfill its goal of preventing pollution at the source and remediating where necessary. It provides leadership through the use of tools such as legislation, regulation, guidelines and standards, education, planning processes and a contaminated site remediation system. The Ministry of Transportation and Infrastructure focuses on expanding and strengthening roads, rails, ferries, bridges, ports and airports. The Ministry of Community Development promotes effective local government and sustainable and liveable communities, which support improved waste water treatment, cycling and pedestrian infrastructure, "green" initiatives and energy conservation.

2.3.4 Provincial Health Services Authority Roles and Responsibilities

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 Ministry of Healthy Living and Sport and the Ministry of Health Services. 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.

In relation to healthy community environments, PHSA's activities include knowledge synthesis and transfer related to health impacts of the built environment. With respect to environmental contaminants, its role encompasses a wide range of centralized services and supports delivered through the BC Centre for Disease Control (BCCDC), including:

- Conducting surveillance, risk assessment, research and analysis on community environmental health issues.
- Providing technical guidance and advice to the Provincial Health Officer, the Ministry of Healthy Living and Sport, and the Ministry of Health Services.
- Advising health authorities on risk assessment, health protection and harm prevention related to environmental health hazards.
- Conducting epidemiological and other surveys related to health risks from environmental contaminants.
- Developing public awareness materials on environmental health issues for use by health authorities, other organizations and the public.

2.3.5 Other Provincial Groups Roles and Responsibilities

There are also a number of non-government provincial groups focused on healthy community environments, including the UBC Centre for Health and Environmental Research, the BC Environmental and Occupational Health Research Network, and BC Healthy Communities.

2.4 Health Authorities Roles and Responsibilities

The role of health authorities is to identify and assess the health needs in the region, to deliver health services (excluding physician services and BC Pharmacare) to British Columbians in an efficient, appropriate, equitable and effective manner, and to monitor and evaluate the services that it provides. In the area of community environmental health, the health authorities are responsible for:

- Conducting environmental surveillance, monitoring, and health impact assessment to identify unhealthy built environments and environmental risks and to develop health promotion, risk management and risk reduction strategies to protect public health.
- Supporting the development of healthy built environments.
- Leading strategic public health partnerships with multiple sectors, including collaboration and capacity building with local government, community stakeholders and other groups

to assess risks and enhance the positive health impacts of land-use plans, local bylaws, built environments and a wide range of community and industrial projects.

- Implementing health protection interventions, including public education and awareness, protective actions and enforcement of standards and legislative requirements.
- Conducting research and evaluation on programs and processes to ensure continuous quality improvement.

2.5 Local Roles and Responsibilities

Local governments and regional districts have legislated authority under the Community Charter to establish local health bylaws to protect their communities from environmental health contaminants. Bylaws that govern land-use planning, zoning, traffic management, and building developments have the potential to reduce environmental threats and enhance the health of community residents.

2.6 Legislation and Policy Direction

The overall legislative and policy direction for healthy community environments is derived from:

- The following provincial acts and regulations:
 - *Health Act* (and the new *Public Health Act* once it is proclaimed and comes into force), the related Sewerage System Regulation and the *Sewerage System Standard Practice Manual*.
 - *Environmental Management Act*, *Hazardous Waste Act* and related regulations including Hazardous Waste Regulation, Contaminated Sites Regulation, Municipal Sewage Regulation, Organic Matter Recycling Regulation, Open Burning Smoke Control Regulation, Return of Used Lubricating Oil Regulation, Agriculture Waste Control Regulation, as well as various environmental codes of practices for specific industries.
- Federal legislation, including the *Canadian Environmental Protection Act*, *Hazardous Products Act*, the Canadian Food and Drug Regulations, the *Radiation Emitting Devices Act*, and the *Federal Contaminated Sites Action Plan*.
- *A Framework for Core Functions in Public Health* (March 2005).
- Specific policies/priorities that may be established by the health authority, the Ministry of Healthy Living and Sport or the provincial government.

3.0 PRINCIPLES

Principles for a model health authority program for healthy community environments:

- Collaboration among public health programs—health protection, disease prevention and health promotion—within the health authority.
- Coordination and partnerships with other health authorities, local governments, schools, non-government organizations, the private sector, and provincial ministries and agencies.
- Promotion of positive initiatives that create healthy built environments, including healthy work environments, recreational spaces, and environments that are child-friendly, age-friendly and enhance accessibility for people with disabilities.
- Advocacy for effective environmental health initiatives that reflect environmental justice; i.e., risk, hazards, investments and benefits are equally distributed and access to information and participation into decision-making is enjoyed by all.
- A population health approach, considering determinants of health, risk factors, and vulnerable populations, including the use of an equity lens, to avoid disproportionate impacts of environmental risks on any segment of the population.
- Application of a precautionary approach in risk management.
- Responsiveness to local needs, issues and concerns.
- Community capacity building to enhance local knowledge and empower local action.
- A culture of knowledge/evidence-based practice, and continuous quality improvement.
- Research and evaluation to strengthen evidence and decision-making.

4.0 GOALS AND OBJECTIVES

The overall goal of the program is to improve the health of the public by helping to create healthier built environments, and by preventing, reducing, or eliminating community environmental health hazards. The specific objectives are

- To collaborate in creating healthy built environments that support everyone in leading healthy lives.
- To prevent, reduce or eliminate actual or potential public exposure to chemicals, metals, industrial contaminants, radiation, and environmental noise, which represent a threat to human health.
- To ensure that solid and liquid (sewage) waste is properly managed and does not present a threat to human health.
- To promote community planning and design that prevents potential environmental and social threats to health and contributes to the creation of healthy community environments.

5.0 MAIN COMPONENTS AND SUPPORTING EVIDENCE

The major program components for enhancing healthy community environments by health authorities, in collaboration with other lead regulatory authorities, are:

- Environmental surveillance and monitoring.
- Environmental health risk assessment/risk management.
- Community responsiveness.
- Collaboration for healthy community environments.
- Investigation and enforcement.
- Research and program evaluation.

The program components are described in detail in the following sections, along with a summary of supporting evidence, where this exists, or professional opinions from experts in the field. It is recognized that this area is a relatively new public health focus for health authorities and that development of these components may take some time.

As well, a Decision-Making Framework: Healthy Community Environments has been developed by the Working Group to guide decision-making for public health interventions, particularly in situations that are considered to pose a risk to human health but where there is limited research available on specific health impacts and effective remedial measures. The use of a combination of risk management tools for decision-making in these cases is proposed including health impact assessment; the use of knowledge-based and evidence-based information; and application of a precautionary approach. These tools will lead to identification and analysis of a range of interventions; and risk management recommendations and strategies. The Decision-Making Framework is attached in Appendix 1.

5.1 Environmental Surveillance and Monitoring

Health authorities need to engage with provincial and federal governments in accessing and collecting up-to-date information on the health of community environments, including:

- Collecting and/or monitoring, through collaboration with applicable regulatory agencies, qualitative and quantitative data on regional and community environmental hazards and related health factors (e.g., levels of chemicals and other toxic substances, unhealthy housing/buildings, unhealthy urban developments, disease surveillance and burden of illness data, exposure levels, types of complaints, etc.) based on provincial, regional and local sources, to assist in monitoring and surveillance of environmental health issues that pose a potential threat to communities throughout the region (NOTE: the new *Public Health Act* stipulates that a medical health officer must monitor the health of the population in their designated area).
- Integrating environmental surveillance data with health surveillance data to support enhanced analysis of issues and trends.

- Reporting and disseminating statistical information to reflect long-term community environmental trends and patterns and related health considerations.

NOTE: Collaboration with the model core program on health assessment and disease surveillance will be an important element in this process, as will involvement in activities that may be required for the province to identify and address province-wide gaps in this field).

5.1.1 Summary of Supporting Evidence

The evidence suggests that quality data analysis and interpretation is dependent upon having educated and qualified personnel; appropriate tools; and standardized approaches and methodologies (MOH, Population Health and Wellness, 2006). As well, “the first line of detection of new or emerging threats to health is often the health care provider which includes public health staff, primary care providers, emergency rooms and other key nodes. Health care providers need to pay attention to new or emerging diseases... as well as to other potential threats to public health, including environmental health problems” (MOH, 2005).

5.2 **Environmental Health Risk Assessment/Risk Management**

Risk assessment and risk management of community environmental health challenges include methodologies such as risk modeling and health impact assessment (especially during the pre-development stage to identify, assess and manage potential environmental hazards before a planned development or facility is built). This may involve some or all of the following: Risk assessment and risk management of community environmental health challenges include methodologies such as risk modeling and health impact assessment (especially during the pre-development stage to identify, assess and manage potential environmental hazards before a planned development or facility is built). This may involve some or all of the following:

- Partnering with local governments and community groups to conduct evidence-based modeling processes during the development stages of projects to enhance planning for healthy built environments, including neighbourhood designs, housing developments, parks, business and industrial developments, school and workplace designs, transportation systems, etc.
- Adopting a decision-making framework as required to integrate a number of risk reduction and risk management tools such as:
 - Health impact assessments (HIA) to determine the risk to human health and to identify measures required to reduce unacceptable levels of risk.
 - Utilization of knowledge-based and evidence-based information.
 - Integration of a precautionary approach (as recommended by the federal government and the WHO).
 - Endorsement of guidelines recommended by other governments and professional organizations to provide direction, enhance sustainability and

- promote healthy environments (e.g., walkable neighbourhoods, maximum levels of specific contaminants, waste management processes, etc.).
- Evaluation of options based on the degree of risk (i.e., seriousness of harm, the number of people exposed, and chronic versus acute exposure) in comparison to anticipated benefits (i.e., the rate of risk reduction, and costs in relation to the impact on harm).
 - Conducting health impact assessments (i.e., conducting these alone, in partnership with others, or independently reviewing assessments conducted by others) on existing or potential environmental health issues, based on:
 - Strategic partnerships for assessing health impacts, highlighting the need for environmental health leadership and a collaborative approach with the provincial/regional Ministries of Environment, Transportation and Infrastructure, and Community Development, as well as the BC Centre of Disease Control and other provincial, regional and community partners.
 - Regional priorities, considering the seriousness of impact on human health, and the scope and level of analysis required for potential and existing health issues.
 - Standard HIA processes including screening; scoping; identifying and assessing impacts; developing recommendations; and evaluating, monitoring and follow-up.

5.2.1 Summary of Supporting Evidence

The need for a collaborative approach is highlighted in a number of reports, which discuss the fragmentation of the environmental public health response and the complexity of managing and developing community environmental health, considering the wide range of agencies and government ministries involved (National Center for Environmental Health, n.d.). For example, the US Environmental Health Commission report (Pew Environmental Health Commission, 2000) highlighted fragmentation at all levels as a barrier to effective protection against environmental health threats and noted that today's complex environmental public health problems require coordinated responses by multiple agencies and organizations and various professional disciplines. It further noted the importance of focused environmental health leadership to create and promote a unified identity for environmental public health, and to develop performance standards and best practices (Pew Environmental Health Commission, 2000).

Health impact assessment acknowledges the complex interrelationships between social, economic, political and cultural health determinants with the natural environment.

Given the environmental risks and uncertainties... and intimate relationship between human health and ecosystem health, the ability to predict, assess, understand and monitor the impacts of development projects on quality of life, human health and well-being is becoming ever more imperative (Health Canada, 2004).

Experts note that the increasing focus on health impact assessment recognizes that in the past, little attention was placed on social and health impacts during project development and related environment impact assessments (Sadler, 1996).

The WHO's rationale for the precautionary principle notes that the principle does not replace, but instead enhances, science-based risk management and attempts to incorporate whatever is known while evaluating what is not known or incompletely understood. The precautionary framework recognizes perspectives based both on scientific evidence and on social factors, values, and experience or observation, and provides a platform for each to be addressed. Adding perspectives based on experience or observation, and recognizing the validity of people's values, helps to identify knowledge gaps that may elude scientific assessments (Martuzzi & Tickner, 2004).

5.3 Community Responsiveness

Monitoring community concerns and complaints with respect to the community's environment can augment other more formal forms of environmental surveillance and monitoring, and may lead to early detection of emerging issues. Responding to those concerns in partnership with community organizations and local citizens can build on existing community capacity to address environmental issues and create healthier communities. Thus, community responsiveness includes:

- Monitoring community complaints, concerns and questions, and responding in a timely manner with open communication and consultation with affected persons where appropriate.
- Facilitating, or encouraging others to facilitate, a community development or a community capacity building process to address significant community environmental health concerns and complaints, ranging from environmental contaminants and hazards, waste management, substandard housing and negative impacts of the built environment.
- Assessing, or supporting municipalities or other organizations to assess, complaints and concerns (through health impact assessment or other evidence-based/knowledge-based analysis) to determine health risks and interventions/actions deemed necessary to protect public health (including enforcement of legislative standards discussed in Section 5.4).
- Providing education and advice as well as referrals to other agencies when interventions are not within the mandate of the health authority.

5.3.1 Summary of Supporting Evidence/Best Practice

Overall, best practices on effective management of complaints suggest that complaint processes should be highly visible, transparent, accessible, easy to use, and affordable. Successful initiatives typically have the explicit commitment of employees at all levels of the organization and utilize procedures that operate quickly, provide a regular flow of information to the people involved, ensure privacy and security, and include employee incentives for compliance and disincentives for non-compliance. Effective implementation depends on adequate financing, a good communications plan, regular review, consistency, fair treatment, and open and transparent processes (Government of Canada, n.d.).

5.4 Collaboration for Healthy Community Environments

A proactive role is necessary to promote and encourage strong community-based awareness and action in order to support healthy community environments. Based on the principles of health promotion, this encompasses

- Building healthy public policy through:
 - Collaboration (with local governments, regional offices of provincial ministries, stakeholders, First Nations groups and community organizations) in assessing, developing and enhancing new housing developments, transportation systems, recreational plans and other developments in the built environment, as well as land-use plans, waste management systems, initiatives to reduce environmental contaminants and impacts of climate change.
 - Advocacy⁴ to support bylaws, policies and/or processes to eliminate or minimize potential environmental health threats.
 - Analysis of social and economic determinants of health with respect to the disproportionate impact of community environmental health hazards on population sub-groups, including low-income people, single-parent families, elderly people, those with disabilities, First Nations people, immigrant populations, etc.
- Strengthening community action:
 - Building on existing community capacity to facilitate, encourage and support positive local planning processes and action plans to address key community environmental health opportunities and concerns.
 - Integration with other public health initiatives such as healthy communities, food policy committees, injury prevention, chronic disease prevention programs, etc.

⁴ Advocacy, as defined in *A Framework for Core Functions in Public Health* (MOH, 2005), involves public health leaders at the local level providing advice on behalf of the public to their communities in matters of public health, reporting on the health of their communities, and playing a leadership role in initiatives that address the determinants of health in their communities.

- Creating supportive environments through:
 - Workshops and/or educational materials on healthy community environments, particularly related to specific local issues, for health professionals, including community public health professionals.
 - Provision of a range of education and information resources on key issues and opportunities for local government officials and community stakeholders.
- Developing personal skills through public education and awareness initiatives on key environmental health hazards and issues of major concern.

5.4.1 Summary of Supporting Evidence

The World Health Organization's Ottawa Charter for Health Promotion (1986) highlights the importance of promoting healthy public policy, creating supportive environments, developing personal skills, strengthening community action and re-orienting health services.

Experts have identified the following factors as helpful in influencing decisions related to healthy built environments: prior relationship-building with planners, elected officials and policymakers; prior education of stakeholders, especially planners and elected officials; early involvement of stakeholders in public health considerations; the ability to provide clear evidence to back up proposed changes in the interest of public health; connecting health with other goals; political will or at least support from elected officials; persistence in the face of resistance; and the facilitation of dialogue among other stakeholders (Deby & Frank, 2007).

A best practices review that studied nine communities in Canada, the United States, and Europe found that only those communities that passed a bylaw and supported it with education, or made a community agreement, were successful in reducing the use of pesticides by a high degree (51 to 90 per cent). Education and outreach programs alone, while more popular, were less effective; researchers could find none that achieved more than a low reduction (10 to 24 per cent) in pesticide use (Canadian Centre for Pollution Prevention & Cullbridge Marketing and Communications, 2004).

5.5 Investigation and Enforcement

Health authorities have an important role in determining and enforcing an acceptable level of environmental health safety in their region, as well as ensuring compliance with provincially legislated standards. This is mandated by the *Health Act* and the new *Public Health Act*.⁵ Initiatives include:

- Conducting inspections and investigations as follows:
 - Inspections in response to emerging issues, events or complaints, (e.g., findings from lab reports, requests from other agencies, etc.).

⁵ The text of the *Public Health Act* can be found at <http://www.bclaws.ca/>. Of particular interest are sections 11, 15, 22, 30, 31(1), 73, and 83, and some of the definitions (health hazard, health impediment, health officer, and preventive measures).

- Investigation of public health risks, partnering as appropriate with BCCDC, Ministry of Healthy Living and Sport, Ministry of Environment and other partners, and utilizing health impact assessment processes as necessary (based on Section 5.2).
- Follow-up remedial recommendations to achieve an acceptable level of health protection (based on national, provincial and/or health authority standards and guidelines) and/or compliance with provincial legislation.
- Enforcing compliance with provisions of the *Public Health Act*:
 - Progressive enforcement including obtaining voluntary compliance, ticketing, issuing orders for public notice, closure, and/or obtaining a court order (injunction).
 - In situations that pose an imminent risk, a court order may be sought as an early remedy in the event that the health inspector deems voluntary action to be unlikely.

5.5.1 Summary of Supporting Evidence

Some of the above activities are articulated and dictated by legislative requirements; as well, public health inspections, investigations and enforcement activities are widely recognized as a fundamental element in health authorities' public health protection role.

5.6 **Research and Program Evaluation**

Considering the limited evidence in this field, research and program evaluation can contribute essential information for performance improvement decision-making. This should include:

- Actively participating in new research with other health authorities, the Ministry of Healthy Living and Sport, BCCDC, universities and/or other researchers to assess risk levels and interventions.
- Contributing to the development of provincial standards and guidelines on
 - Optimal practices for healthy built environments, as well as risk levels and intervention criteria for unsafe housing/buildings and other built environments.
 - Risk/exposure limits and associated intervention criteria for key environmental contaminants.
- Conducting formal program evaluation to determine the effectiveness of health authority program processes and outcomes.
- Encouraging continuous improvement through application of findings from new research studies and program evaluations.
- Disseminating knowledge to community groups and regional partners.

5.6.1 Summary of Supporting Evidence

A 2003 report by the Canadian Institutes of Health Research recommends accountability mechanisms as one of the key elements of a public health system. “It is recognized that although the performance of public health, and prevention programs in particular, is 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” (Ministry of Health, 2005). A prevention information system capable of telling us how well we are doing is necessary for this purpose (Ministry of Health, 2005).

6.0 BEST PRACTICES

The evidence reviews on community environmental health reflect an absence of substantial evidence on effective interventions, although there are a number of “best” practices based on case studies, guidelines and emerging initiatives that appear to be effective in managing the quality of community environments. Often, there is no one “best practice” that is agreed upon, but rather, 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.

Overall the key “best” practices that have been identified in this field include the following (Ministry of Healthy Living and Sport, Population and Public Health, 2008).

- Use of environmental surveillance, monitoring, and health impact assessments to determine levels of risk and recommended action to enhance environmental planning decisions.
- Collaboration and partnership with local government, community stakeholders and other groups in assessing the health impact of developmental projects, land-use plans, and local bylaws to influence decisions and support healthy community environments. These activities will address, among other things:
 - Natural and man-made hazards.
 - Solid and liquid waste management.
 - Contaminated sites.
 - Environmental noise.
 - Community plans, neighbourhood plans and housing developments.
 - Traffic/transit designs.
 - Development of parks, and recreational and community services.
- Multi-component collaborative approaches, combined with public education and awareness, to support interventions including:
 - Local bylaws combined with public education to limit the use of pesticides.
 - Use of nutritional supplements for children with high blood-lead levels along with public education.
 - Educational and policy interventions in primary schools to reduce exposure to UV, as well as public awareness targeted to teens on appearance-based impacts of UV.
 - Land-use planning, local bylaws and public education to reduce environmental noise and to promote healthy communities.

- Risk assessment, mitigation and adaptation planning to respond to the impact of climate change, utilizing public education and encouraging public action.
- Application of the precautionary principle and prevention principle to take action to protect the public where there is reasonable possibility that public health will be seriously damaged, without awaiting full scientific proof.
- Establishment of a formal complaint process that is visible, transparent, easy to use and affordable.

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 measurement (usually numerical) of a factor which constitutes an important reflection of some aspect of a given program or service. Indicators need to be standard 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.

This section presents a number of key indicators or performance measures for a program on healthy community environments. Suggested benchmarks can apply across the province, while other benchmarks may need to be modified to account for key issues and concerns in different areas, geographic size, or population density of the health authority.

One can develop indicators related to the inputs, activities, outputs and outcomes (immediate, intermediate or final) of each of the respective components of a healthy community environment. 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 programs to protect community environment are complex, and that it may be difficult to link interventions with direct human 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, and then, based on consideration of local factors, determine a realistic performance target. This performance target would be consistent with the goal of performance improvement but would be achievable 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 development of provincial benchmarks.

7.2 Indicators for a Healthy Community Environment Program

Indicators that may be used by the health authorities are included in Appendix 4, following the Logic Model for the program (Appendix 3). The indicators were selected by members of the Working Group, who ranked them as the most important measures for assessing performance related to healthy community environments; as such, there may not be indicators for each component of the logic model in each category of indicators (output/process, short-term and long-term outcomes). The list represents a catalogue of possible indicators from which each health authority can select those that are most relevant to their circumstances.

Data related to the risk levels of many contaminants and the direct causation of specific diseases is relatively limited. As well, it is recognized that many of the indicators are beyond the control of the health authorities; however, the indicators are intended to provide a basis for reviewing trends and issues over time and for planning program priorities.

It is understood that some of the indicators may not be under the control or influence of health authorities; nevertheless, they provide important information for health authority needs assessment and planning processes. Those indicators and benchmarks that 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 basis for comparative analysis in future years. Benchmarks are currently not available but will be determined over time between the Ministry of Healthy Living and Sport and the health authorities. In some instances, it may also be appropriate to establish local or regional 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 their programs for healthy community environments. However, it must be emphasized that successful implementation of an effective program for healthy community environments will also depend on having in place key success factors/system strategies.

Important success factors include:

- Strong support from the Board and management of the health authorities regarding the importance of healthy community environments in their regions and the role these play in protecting the health of the population.
- 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 decisions.
- Access to the data required for surveillance, monitoring and health impact assessment.
- High quality and competent management of the program for healthy community environments, including monitoring of performance measures.
- Clear mechanisms of reporting and accountability to the health authority and external bodies.

8.2 Intersectoral Collaboration and Coordination

A program for healthy community environments does not exist in isolation and will not achieve optimum efficiency or effectiveness unless it works collaboratively with other key partners involved with environmental health. Intersectoral collaboration and coordination on the local and regional levels is essential to ensuring the active participation of those organizations that can contribute to a healthy environment.

On the provincial level, the key linkages are the Ministry of Healthy Living and Sport, the Ministry of Health Services, the British Columbia Centre for Disease Control and the Ministry of Environment. Other important linkages are with the Ministry of Community Development, Ministry of Transportation and Infrastructure, Ministry of Agriculture and Lands and Ministry of Energy, Mines and Petroleum Resources.

At the regional and local level, it is essential to link with local government, local networks and agencies involved in community planning and healthy environments to ensure strong linkages between community planning, environmental issues and health concerns.

Linkages with other core public health programs within the health authority will also be important. These include drinking water and recreational water quality, air quality, food safety, food security, emergency preparedness, health assessment and disease prevention, healthy communities, and healthy living.

8.3 Assessment and Evaluation of the Program on Healthy Community Environments

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. It will be necessary to

- Establish new policies and procedures for some activities to ensure that the necessary records are kept.
- Acquire additional software to facilitate the process of recording and monitoring data (consistency and compatibility among the health authorities with respect to reporting systems is desirable).
- Plan regular survey or sampling projects, either individually or in partnership with other health authorities, or with the Ministry of Healthy Living and Sport to assess performance on certain indicators. For example, the level of knowledge about healthy environments among the public will likely only be available by conducting a survey to gather baseline data, and repeating the survey at a later date to determine any differences over time. Such surveys may be conducted by each region or developed as joint projects.

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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APPENDIX 1: DECISION-MAKING FRAMEWORK—HEALTHY COMMUNITY ENVIRONMENTS

Introduction

This paper provides a summary of a decision-making framework for public health interventions, particularly in situations that are considered to pose a risk to human health but where there is limited research available on specific health impacts and effective remedial measures. The use of at least one and perhaps a combination of the following risk management tools for decision-making is proposed:

- Health impact assessment.
- Use of knowledge-based and evidence-based information.
- Application of the precautionary principle.

These processes will lead to:

- Identification and analysis of a range of interventions.
 - Development of risk management recommendations and strategies.
-
- *Health Impact Assessment*
Health impact assessment (HIA) acknowledges the complex interrelationship between social, economic, political and cultural health determinants and the natural environment. “Given the environmental risks and uncertainties..., and intimate relationship between human health and ecosystem health, the ability to predict, assess, understand and monitor the impacts of projects on quality of life, human health and well-being is becoming ever more imperative” (Sadler, 1996).
 - *Knowledge-Based and Evidence-Based Analysis*
The evidence on prevention interventions to support healthy community environments tends to be limited, particularly in relation to emerging threats and long-term health outcomes. The long time frames and large sample sizes needed to pursue randomized controlled studies present a challenge: they are expensive and comparatively rare in public health (MOH, 2005). Also, the type of research required for population health interventions is different from the “gold standard” randomized controlled trials of clinical medicine. A United Kingdom Cabinet office document addresses the reality of public health decision-making by supporting a combination of ‘knowledge-based’ and ‘evidence-based’ approaches utilizing “expert knowledge, published research, existing statistics, stakeholder consultations, previous policy evaluations, the internet, outcomes from consultations, costing of policy options, and outputs of economic and statistical modeling” (Nutley et al., 2003).

- *A Precautionary Approach*

The World Health Organization (WHO), in addressing increasingly complex environmental health threats, has determined the need for timely preventive action despite lack of proof, and the relevance of precaution under scientific uncertainty (and its potential misuse). WHO developed an approach to applying precaution, consistent with public health values and its mission to promote and protect health and strive for “a state of complete physical, mental and social well being and not merely the absence of disease or infirmity.” The WHO’s rationale is that the precautionary principle does not replace but instead enhances science-based risk management and attempts to incorporate whatever is known while evaluating what is not known or incompletely understood. The precautionary framework recognizes perspectives based both on scientific evidence and on social factors, values, and experience or observation, and provides a platform for each to be addressed. Adding perspectives based on experience or observation, and recognizing the validity of people’s values, helps to identify knowledge gaps that may elude scientific assessments (Martuzzi & Tickner, 2004).

A Decision-Making Framework

The Decision-Making Framework for analyzing and developing initiatives that support healthy community environments is based on the general steps used in conducting health impact assessments.⁶ These steps and processes are as follows:

1. *Screening* – Determine if an HIA is warranted/required.
2. *Scoping* – Determine which impacts will be considered, the scope and depth of the analysis, and develop a plan for the assessment.
3. *Identifying and assessing health impacts and options* – Conduct an analysis of the hazard levels, exposure levels, magnitude, likelihood of existing or potential health impacts and the level of certainty/uncertainty, using a variety of different methods and types of information (e.g., policy analysis, profiling, qualitative and quantitative data collection, impact analysis), and prioritize impacts. As well, identify and assess intervention options.

Key considerations:

- Who is being harmed?
- How many people are being harmed?
- What types of exposure – is this acute or chronic?
- What is the degree of risk? For example, Is there a large number of people at risk of serious harm, or a small number of people at risk of minimal health impact.
- Assess the options for intervention by comparing the level of benefit to the level and extent of harm, and the cost effectiveness in terms of the impact on level of harm.

⁶ For example, *European Policy Health Impact Assessment: A Guide* (2004), by the European Policy Health Impact Assessment Project Group.

4. *Decision-making and recommendations* – Assess options for intervention and formulate recommendations and strategies based on assessed risks and benefits, taking into account the range of knowledge-based and evidence-based information to reach a balanced decision. The following tools and considerations may be utilized:

Key considerations:

- Apply, as appropriate and where deemed necessary, the precautionary approach; i.e., “Where there is reasonable possibility that public health will be damaged, action should be taken to protect public health without awaiting full scientific proof” (Martuzzi & Tickner, 2004).
 - Utilize guidelines and standards developed by governments and professional bodies and/or best practices developed by leading experts in the field.⁷
 - Take a leadership role in planning, managing and regulating health impacts of the environmental among the many organizations that have a role in this field National Center for Environmental Health, n.d.).
 - Establish processes to communicate assessment results and decisions to the public in a credible manner. “Factors that influence the credibility of those communicating with the public include the perception of empathy, competence and expertise, honesty, openness, and dedication... and keeping a steady dialogue with the community and organized groups” (Health Canada, 2004).
5. *Evaluating, monitoring and following-up* – Develop and implement plans and processes for monitoring and evaluation of health impacts.

Glossary: Decision-Making Framework

- *Health Impact Assessment*
Health impact assessments (HIAs) are defined as “a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, including the distribution of those effects within the population. Recommendations are produced for decision makers and stakeholders, with the aim of maximizing positive health effects and minimizing negative health effects” (European Centre for Health Policy, 1999).

HIAs can vary considerably in scope, ranging from large-scale regional impact studies, to assessing health risks related to specific projects or events. The level of detail and analysis depends upon priority, scope and the nature of the project (e.g., they can range from a small 2-week assessment providing a broad overview to a 6 month in-depth analysis) (European Policy Health Impact Assessment Project Group, 2004).

⁷ The *Canadian Environment Protection Act* (1999) provides a framework for the identification, prioritization and assessment of existing substances and for the control or management of those considered to pose a risk. This framework is intended to be broad, open, transparent and evidence-based, taking into account, aspects such as exposure and effects of a substance related to the potential risk it may pose.

The Canadian Handbook on Health Impact Assessment (Health Canada, 2004), prepared through consultation among federal, provincial and territorial officials, provides extensive discussion of the environmental and human health impacts associated with the implementation of development projects and activities in major sectors of the Canadian economy. The aim is to provide an integrated approach to the public health aspects within the framework of environmental impact assessment (Health Canada, 2004). The Canadian Handbook includes four volumes intended to support and assist public health officials in conducting HIAs: Volume 1, The Basics; Volume 2, Decision Making in Environmental Health Impact Assessment; Volume 3, Roles for the Health Practitioner, and Volume 4, Health Impacts by Industry Sector.

- *The Precautionary Approach*

The precautionary approach is a tool to assist in environmental management and risk decision-making in situations that have the potential for adverse health risks. The most broadly accepted definition is Principle #15 of the 1992 UN Declaration of the Rio Conference on Environment and Development (UNCED)

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.⁸

The World Health Organization recommends the precautionary principle from a public health perspective, as follows: “In all cases, contaminants should be reduced to the lowest level achievable in a particular situation. Where there is reasonable possibility that public health will be damaged, action should be taken to protect public health without awaiting full scientific proof” (WHO, 2003).

⁸ This definition is supported by Canada, and is enshrined in the *Canadian Environmental Protection Act, 1999*.

APPENDIX 2: THE EVIDENCE BASE FOR HEALTHY COMMUNITY ENVIRONMENTS

Taken from: *Evidence Review: Healthy Community Environments (2008)*, by the Ministry of Healthy Living and Sport, Population and Public Health.

Part I

This evidence review addresses a wide range of environmental contaminants that impact, or have the potential to impact, the health of the BC population. The focus is on evidence that demonstrates the effectiveness of interventions to reduce, mitigate and/or prevent health hazards, particularly those interventions that are appropriate on a regional and community level. Where there is a lack of scientific evidence, information on “best practices”⁹ has been added.

This review has been prepared to support representatives of the BC Ministry of Healthy Living and Sport and the health authorities to develop a model core program on health community environments that is based on evidence and continuous quality improvement processes.

Overall, a major factor in implementing effective programs is not only the complexity of the issues but also the multiple sectors and levels of governments involved in managing and developing healthy community environments. A number of reports suggest that environmental public health is one of the most poorly defined areas of public health, and that “fragmentation among agencies at all levels is a barrier to effective protection against environmental health threats” (National Center for Environmental Health [NCEH], n.d.). As a result, “it is clear that today’s complex environmental public health problems require coordinated responses of multiple agencies and organizations and various professional disciplines” (NCEH, n.d.). Experts have identified the need for focused environmental health leadership on all levels to develop strategic partnerships, to create and promote a unified identity for environmental public health, and to develop performance standards and best practices (Pew Environmental Health Commission, 2000). The range of agencies that have an important role in this field include: environmental protection, health, transportation, housing, urban development, land-use planning, energy, agriculture, food and drug administration, emergency management, consumer product safety, injury control, vector control and occupational safety, as well as multiple levels of government (Pew Environmental Health Commission, 2000).

⁹ The term “best practices” is used to encompass initiatives considered to be “good practices”, “generally accepted practices”, or “better practices” that have yielded positive results in some settings. The term is used to reflect the range of practices that are supported and/or recommended by leading jurisdictions, by experts in the field and/or by research studies. For simplicity, they are referred to as “best practices” in this document.

Pesticides

Exposure to pesticides is widespread and may occur through multiple routes and pathways. Although the domestic use of pesticides is common, few studies have examined intervention effectiveness or characterized non-occupational exposure levels in the general population. In summary, the findings are:

- A public education intervention involving changing the patterns of domestic pesticide use did result in a more responsible use of pesticides, according to participant feedback.
- Human exposure to pesticides through foods depends on many factors including the processing method. However, the effects of processing on pesticide residue levels needs to be clarified before accurate estimates of dietary intakes can be made. Organic products generally have lower levels of pesticide residues, but it is also recognized that natural toxicants need to be better identified within organic production.
- Children of farmworkers are exposed to pesticides through the presence of pesticides on parents' clothing and shoes; and they may also be exposed to spray drift from nearby farms.

The exposure studies do indicate that domestic use and diet are both significant contributors to pesticide exposure. Children living in agricultural communities may be exposed through additional pathways. Effective methods for reducing pesticide exposure from any of these sources may lead to beneficial health effects.

A best practices review that studied nine communities in Canada, the United States, and Europe found that only those communities that passed a bylaw and supported it with education, or made a community agreement, were successful in reducing the use of pesticides by a high degree (51–90 per cent). Education and outreach programs alone, while more popular, were far less effective; researchers could find none that achieved more than a low reduction (10–24 per cent) in pesticide use (Canadian Centre for Pollution Prevention & Cullbridge Marketing and Communications, 2004).

Based on the evidence and best practice reviews, it is suggested that interventions include: promotion of local bylaws to limit the use of pesticides for beautifying lawns and gardens; educational campaigns on responsible domestic pesticide use and storage; encouragement to choose organic fruits and vegetables; and educational initiatives targeting agricultural communities to reduce the take-home exposure to pesticides.

Lead Contamination

In spite of successful efforts to lower the amount of lead in the environment, lead poisoning still exists among Canadians. Children remain at the greatest risk for lead exposure and associated adverse health effects. Since even low levels of lead exposure may produce adverse health effects, there is a need for effective interventions to reduce lead exposure.

The findings from studies on intervention type (i.e., soil remediation; lead paint abatement; dust control; nutrition; and public education) are, in summary:

- Soil remediation has limited utility in treating mildly elevated blood-lead levels.
- The effectiveness of lead paint abatement is often dependent on baseline blood-lead levels. For children with higher blood-lead levels, abatement is recommended.
- Dust control results are inconsistent with regard to the efficacy of dust control on reducing blood-lead levels, due to the wide-ranging scope of dust control measures used in the various studies.
- There is sufficient evidence to indicate that public health should include nutrition as part of a lead intervention plan. Although there is insufficient evidence to indicate that nutrient supplementation above recommended intake levels is associated with decreased blood-lead levels, the benefits of a balanced diet are considered to be substantial.
- Interventions using public education as a cost-effective alternative to other methods of secondary prevention showed a decline in blood-lead levels following at-home visits; however, there have not been enough large-scale studies to state that education is an effective intervention strategy on its own.

Based on the available evidence, the only intervention shown to be effective in reducing blood-lead levels is nutritional supplementation in children with marginal nutritional status. There is not sufficient evidence to recommend any other sole intervention strategy for low-level lead exposure. Education has been shown to result in declining blood lead, in combination with other interventions, and as it is a relatively cost-efficient measure, it should also be used in all cases of elevated blood-lead levels.

Ultraviolet Radiation

Ultraviolet radiation is the main risk factor for the development of skin cancer. This risk factor can be greatly reduced by following responsible sun protection measures and avoiding artificial ultraviolet radiation. This review was conducted to assess the evidence behind interventions aimed at reducing ultraviolet radiation.

The results of this study strongly suggest that educational interventions directed at primary school age children are effective at increasing covering-up behaviour in children. Too few studies with consistent evidence were available to evaluate the effectiveness of interventions aimed at caregivers, outdoor workers, secondary school students, health care providers and recreational settings. Although there are many intervention studies targeting these population groups and settings, the lack of standardization in intervention content and implementation, as well as variation in outcome measurements, made it difficult to reach conclusions on the effectiveness of the interventions.

Studies that evaluated appearance-based interventions targeting sun protection behaviours of college-aged students indicate that appearance-based interventions may be more effective than health-based interventions in this age group. However, this is a new area of research with insufficient evidence on which to base recommendations.

Based on the available evidence, educational interventions directly targeting primary school children are effective strategies for decreasing ultraviolet radiation exposure in children. Educational interventions in other settings may also be effective but do not have a large body of evidence to support them.

Environmental Noise

Prolonged or excessive exposure to noise, whether in the community or at work, has been found to cause permanent medical conditions such as hearing loss, and may cause hypertension and ischemic heart disease. Children are particularly vulnerable to environmental noise as studies have documented raised blood pressure, heart rates and levels of stress hormones in children living in neighbourhoods with higher traffic noise. Noise can also disturb sleep, cause psycho-physiological effects, reduce performance and provoke annoyance responses.

The main sources of environmental noise are road traffic and aircraft noise, although other sources, depending on their noise levels and the type of exposure, can also be hazardous. These include loud music and concerts, loud toys, arcades, machinery and tools, construction and agricultural equipment, industrial sources, and certain recreational vehicles (e.g., all-terrain vehicles and off-road motorcycles).

The literature highlights the value of noise management strategies that focus on controlling and mitigating the level of environmental noise. These include:

- *Legal Measures* – Land-use planning; control of noise emission/transmission; noise mapping and zoning around roads, airports and industries; enforcement of regulations; traffic speed limits; and minimum requirements for acoustical properties of buildings (i.e., sound insulation).
- *Engineering Measures* – Noise emission reduction; traffic management; quiet road surfaces; noise barriers; passive protection (earplugs, insulation, façade design).
- *Education and Information* – Raising public awareness of the health impacts of noise; monitoring/modeling/reporting on soundscapes; increasing the number of noise experts; conducting research and development; and initiating behavioural change.

Land-use planning and local bylaws are important tools for regulating community noise levels as they present a range of options for controlling traffic noise, aircraft noise, noise from machines and equipment, as well as other noise sources. Evidence suggests that local planning measures include initiatives targeted to:

- Specific environments such as schools, playgrounds, homes and hospitals.
- Sensitive time periods such as evenings, nights and holidays.
- High-risk groups such as children and the hearing impaired.

Other Contaminants and Environmental Challenges

Climate Change

It is widely recognized that both mitigation and adaptation strategies are required to reduce the impact of greenhouse gas emissions and to cope with the current and projected impacts of climate change on the health and well-being of the population. Best practices highlight the collaborative involvement of all levels of government to address these issues, particularly the regional and local levels that deliver many of the public health programs.

Each region of Canada has specific climate-change risks and vulnerabilities. In general these may include: smog and heat waves, air pollution, extreme weather events (e.g., increased winds, storms, floods, rising sea levels, etc.), infectious diseases, water contamination, lack of food sources, as well as social and economic disruption. The most vulnerable members of society (i.e., children, elderly people, the poor, people with disabilities, immigrant populations and Aboriginal people) are particularly susceptible to these impacts.

In Canada, a number of regions and municipalities have been proactive in this field with initiatives such as comprehensive risk assessments, upgrading of monitoring systems, adaptation planning processes, and climate-change public education tools.

Internationally, many governments and organizations, including the World Health Organization, the European Union and the United Kingdom are urging action on all levels. In the United States, the National Association of County and City Health Officials encourage a full range of local public health activities including:

- Instituting strong and continuous programs to educate communities and their constituents on the health impact of climate change.
- Initiating and promoting scientifically based health programs, developing practice standards and recognizing best practices in the local public health response to climate change.
- Building partnerships with stakeholders to ensure inclusion of public health concerns on policies and programs related to climate-change mitigation and adaptation;
- Developing capable public health leadership and personnel to assure the capacity of public health departments, agencies and programs to respond to the health effects of climate change” (National Association of County and City Health Officials [NACCHO], 2007).

Illegal Methamphetamine Laboratories

Clandestine laboratories for the manufacture of methamphetamine (meth) and other illegal substances, are emerging as a public health hazard in many communities. Meth manufacturing leaves 5 to 7 pounds of chemical waste for each pound of meth produced. These by-products are considered hazardous waste as they produce corrosive, explosive, flammable and toxic chemicals

that are health and safety hazards to all individuals involved in the process, and those who enter the site. Children who live at, or visit, these sites face acute health risks, as they are particularly vulnerable to the effects of these chemicals because of age-related behaviour as well as physiological characteristics such as higher metabolic and respiratory rates and a developing nervous system.

A number of American States have enacted regulations, and established policies and procedures for decontamination of methamphetamine drug laboratories. As well, many local health departments are actively involved in oversight of the decontamination process. Examples include:

- Forming multi-agency clandestine drug response teams.
- Educating first responders about the health hazards of meth labs (including use of protective clothing).
- Developing guidelines on how to respond to meth lab complaints.
- Passing state laws limiting the sale and distribution of meth precursor chemicals.
- Adopting local regulations that focus on the health and safety hazards associated with meth labs.
- Altering properties of anhydrous ammonia to render it useless for meth production.
- Increasing security around commercial facilities that contain meth ingredients (Horton, Haugh, & Berkowitz, 2006).

Other Contaminants

Other community environmental health hazards may also be an issue in some circumstances. These can include challenges such as: chemical spills from industrial sites; soil contamination from other toxins or waste products; petroleum contamination from rupture of underground storage tanks; and deposition of dust from smelting operations, coal burning and other sources.

In Canada, the Canadian Council of Ministers of the Environment produced the *Canadian Soil Quality Guidelines* (CSQG), which recommend criteria-based limits for contaminant levels in soil. In BC, land remediation legislation and related policies are managed by the Ministry of the Environment, in collaboration with related ministries, regional and community authorities. The involvement of health protection officials on a provincial and regional level is an important element in ensuring that the health risks from contaminated sites are fully analyzed and addressed. A coordinated approach with a team of provincial experts is used for risk assessment and risk management to protect public safety and ecological integrity. Long-term management and monitoring strategies are developed with partners on a site-specific basis.

Management and Regulatory Measures

Regulatory Measures and Coordination

Adoption of regulatory measures and guidelines are standard practice at the federal, provincial and local level when there is clear evidence of the critical levels of contaminants that are hazardous to human health.

Where evidence is not well established, particularly for emerging threats and long-term outcomes, the United Nations recommends that “the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation” (based on UNCED 1992). This definition is currently enshrined in the Canadian Environmental Protection Act (1999). Similarly, the World Health Organization recommends the precautionary principle from a public health perspective :

- *The Precautionary Principle* – In all cases, contaminants should be reduced to the lowest level achievable in a particular situation. Where there is reasonable possibility that public health will be damaged, action should be taken to protect public health without awaiting full scientific proof.
- *The Prevention Principle* – Action should be taken where possible to reduce contamination at the source. Land-use planning should be guided by an environmental health impact assessment that considers pollutants (World Health Organization [WHO], 1999).

Both the Pew Environmental Health Commission and the National Center for Environmental Health have pointed out the complexity of managing and developing healthy community environment initiatives, considering the wide range of agencies and government departments involved. They note that fragmentation at all levels can be a barrier to effective protection against environmental health threats. To overcome this challenge, they highlight the importance of coordinated responses of multiple agencies, organizations and professional disciplines.

Land-Use Planning

Land-use planning and local bylaws are major tools that local governments can use to control and prevent environmental pollution and protect the health of communities. The input of public health officials into community decision-making on local environmental health hazards is important to ensure that potential threats can be minimized, mitigated and/or prevented. Analysis of health impacts is necessary for a wide range of initiatives ranging from natural and man-made hazards, transportation and injury prevention, environmental noise, solid and liquid waste management, water quality, water quantity, air quality, contaminated sites, as well as the built environment.

With respect to the built environment (i.e., community and neighbourhood plans, housing developments, traffic/transit designs, and development of recreational and other community

services) a parallel evidence review has been prepared and is summarized in Section 1.3 of the Executive Summary.

Health Impact Assessment

Health impact assessments (HIAs) are often a key component in planning new projects, both community-based and private sector. They are defined as a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, including the distribution of those effects within the population. Recommendations are produced for decision-makers and stakeholders, with the aim of maximizing the proposal's positive health effects and minimizing the negative effects. HIA acknowledges the complex interrelationship between social, economic, political and cultural health determinants with the natural environment. They may be initiated by public health authorities in a proactive manner, or in response to public complaints.

HIAs can vary considerably in scope, detail and level of analysis, depending upon the priority and the nature of the project. General steps for conducting an HIA are: screening, scoping, identification and assessment of impacts, decision-making and recommendations, and evaluation and monitoring.

Best practices suggest that these measures be based on scientific data, consultations with affected persons and the careful study of proposed solutions to determine their feasibility and their social acceptability. It is further suggested that setting specific limits on risk levels and criteria for interventions can facilitate decision-making on the acceptability of risk levels (e.g., individual risk, collective risk, chemical substance thresholds and ecological risk), and assist in communicating clear public health notices and guidelines.

Complaint Processes

In addition to regulatory measures, coordination, land-use planning, and health impact assessment, an effective complaint-handling process is a key element in managing healthy community environments. Although no specific evidence was found related to effective complaint-handling processes in the environmental health field, a number of best practices were identified.

In general, effective complaint-based processes are a key component to effective community relations. The literature suggests that successful management of complaints involves initiatives that are highly visible, transparent, accessible, easy-to-use and affordable. They typically have the explicit commitment of employees at all levels of the organization; they operate quickly, provide a regular flow of information to the people involved and ensure privacy and security. Effective implementation depends on adequate financing, a good communications plan, regular review, consistency, fair treatment and open and transparent processes.

Part II

This section presents the findings of a literature search to determine the state of evidence on the relationship of current waste management practices to human health and wellness. It then identifies practices and strategies that can inform the development of core programs to be delivered by regional health authorities. Proposed practices are identified that can build upon current efforts to further advance health and wellness and limit the risks that may be associated with waste management.

The evidence suggests that scientific studies to date have been unable, for the most part, to provide any definitive proof of a negative impact of solid and liquid waste management on human health. The literature identifies the historical limitations of the scientific method in understanding the extent of waste management's impact on human health.

The literature also provides different views of what is considered evidence, ranging from the "gold standard" used in clinical trials to one which includes many forms of anecdotal information and knowledge sources. The literature on sludge spreading on land is reviewed in some detail as an important case study that highlights the various interpretations of the same evidence.

The precautionary principle, and a knowledge-based rather than scientific evidence-based approach, is introduced as a more reasonable fundamental starting point for determining Public Health core program and practice responses to potential environmental health impacts of waste management. Practices are described that reflect current thinking on leadership strategies that should be considered in developing core components of a community sanitation program in health authorities.

This paper provides and draws upon interpretations of the literature and issues related to current practices and better practices in waste management, and by implication, the role of health authorities in championing and supporting the development of those better practices.

Public Health and the Built Environment

While this subject is not discussed in detail in this evidence review, a summary of several evidence reviews on public health and the built environment are provided below to highlight this important component of healthy community environments.

1. *Evidence Paper: Public Health Agencies' Influence on Planning and Policymaking for the Built Environment* (2007), by J. Deby and L. Frank.

The review examines cases where public health officials have successfully influenced land use and transportation investment decisions, noting that this influence typically occurs in one of two ways: either by influencing a policy that in turn affected transportation investments or land development actions, or through direct engagement in the development review process. Both types of cases are represented in this report. Cases were identified through a review of literature, and experiences and interviews with public health and planning-related professionals in Canada and abroad. It was not within the scope of this evidence review to assess the actual public health

impacts of these interventions; moreover, recent literature suggests that this kind of evidence is not yet prevalent (Petticrew, Macintyre, & Thomson, 2004).

Health impact assessments are the most frequent format for interventions in the cases reviewed. Transportation and housing are both well-represented, with citywide, regional, and long-range planning making up most of the remainder. Universal access was addressed in one case.

Literature and interviewees supplied several useful insights about the contextual factors and specific actions that helped them achieve their goals. The following were identified as important:

- Prior relationship-building with planners, elected officials and policy-makers.
- Prior education of stakeholders, especially planners, elected officials and policy-makers about the relationship between public health and built form.
- Early involvement of stakeholders, including developers, in public health considerations.
- Ability to provide clear evidence to back up proposed changes in the interest of public health, for example results of health impact assessments.
- Connecting health with other goals; for example, the creation of tourist-friendly streets and transit systems, or environmental protection.
- Political will or at least support from elected officials.
- Persistence in the face of resistance.
- Facilitating dialogue among other stakeholders.

Other factors identified were: focusing on the good as well as the need for improvement when doing HIAs; phrasing suggested changes constructively; allocating tasks based on the strengths of different groups in the partnership; exploring creative funding paths; and being proactive in widening the scope of existing regulations to include public health considerations.

Although the cases are few, the literature is growing. Several interviewees mentioned that they looked to Canada and British Columbia as models for designing healthy urban environments. It is clear that if British Columbia continues to explore collaborative approaches to urban planning and public health, that good documentation planned in advance would both add to the small body of literature, and would continue to draw international attention to our achievements.

2. *Creating a Healthier Built Environment in British Columbia* (2007), by L. Frank and K. Raine, prepared for the Provincial Health Services Authority.

An overview of the findings are:

- *The research supports making changes to our built environment* – The majority of the research review for the report finds a clear relationship between the built environment, physical activity and body weight. Based on existing evidence, the conclusion of this review is that there is strong support for making changes to the built environment to help promote healthy body weight and improve population health.

- *Walkable neighbourhoods are associated with changes in travel behaviour* – Walkable neighbourhoods—neighbourhoods that are compact (high density), with an interconnected network of streets and a mix of land uses—are associated with statistically significant changes in travel behaviour (i.e., less driving and more walking, cycling and use of public transit).
- *Walkable neighbourhoods are associated with lower body weights* – Personal travel patterns influence a person’s physical activity levels. The current evidence shows that people located in more walkable areas are less likely to be obese and more likely to meet recommended levels of daily physical activity.
- *Increased density is associated with less pollution* – People in compact, well-serviced neighbourhoods are less likely to drive, produce less greenhouse gases and consume less energy per capita. Such neighbourhoods are also accessible to a wider range of family types and household incomes. For low-income households, increased density offers an important economic benefit by making it possible to forego car ownership.
- *Pedestrian-friendly streetscapes encourage physical activity* – Areas that are safe and attractive for pedestrians encourage higher rates of physical activity. Furthermore, the visible presence of pedestrians and cyclists has been linked to promoting higher rates of physical activity, presumably because people notice the prevalence of such behaviour in the area and feel encouraged to participate.
- *Pedestrian-friendly streetscapes are associated with fewer traffic accidents and less crime* – Narrower streets and streets with marked pedestrian crossings help to slow traffic. Features such as landscaping, sidewalks and parallel parking can further enhance pedestrian safety by increasing driver awareness. Such streets are also associated with lower rates of crime.
- *Public transit encourages physical activity* – As most public transit trips involve walking links, the existence of a good public transit service helps promote physical activity. Furthermore, improved public transit service may achieve the greatest health benefits for low-income individuals.
- *The built environment influences nutrition* – The built environment can contribute to poor diet through the absence, in some communities, of local (within walking distance) food retailers and restaurants offering a good selection of nutritious food.
- *Improving the food environment can improve nutrition* – The local food environment can be improved through zoning to increase the number and quality of food retailers and restaurants in underserved areas.

Specific opportunities for changing the environment can include such measures as:

- Increasing density in existing mixed-use centres, bringing other land uses into neighbourhoods that are currently residential-only, increasing the connectivity of street and trail networks, and improving the appearance and safety of streetscapes.

- On the transportation side, research suggests that improved population health may be achieved through increased investments in bicycle, pedestrian and transit facilities and services.
- To increase access to healthy food choices, vacant parcels of land, particularly in neighbourhoods that lack healthy food choices, could be purchased or temporarily used for community food gardens. In neighbourhoods lacking grocery stores, it may be expedient to have developers secure grocery stores or food markets as tenants as a condition for approval of new developments.

Because land-use development takes place parcel-by-parcel, it can take time to see new regulations implemented, especially in areas where compact, mixed-use neighbourhoods are a departure from the norm. Furthermore, there is an indirect relationship between land use and physical activity. Once land-use patterns change it may take time for the corresponding changes in people's behaviour and the desired outcomes—increased physical activity and reduced obesity—to occur.

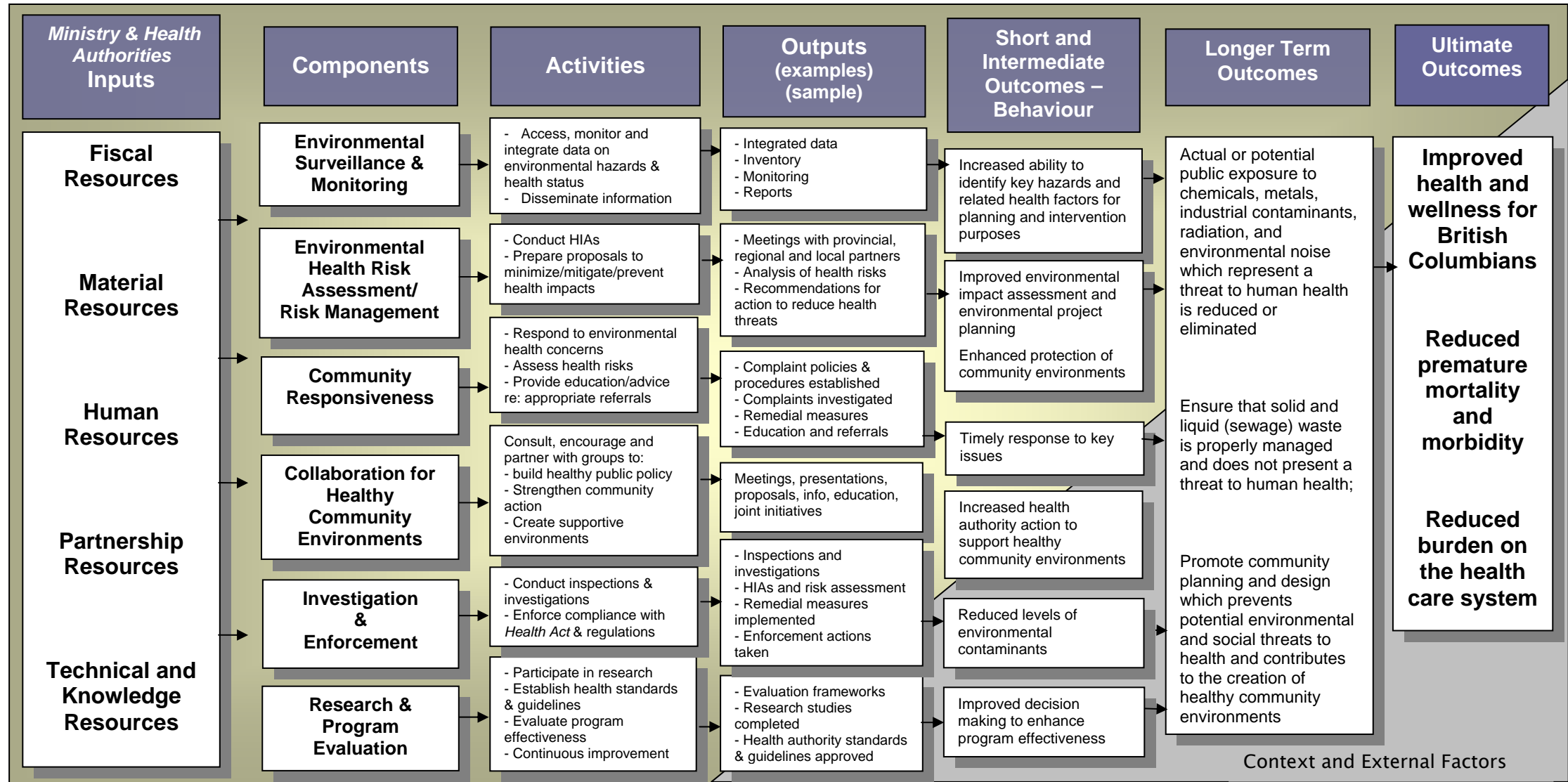
A collaborative focus on population health is crucial. Translating research into policy and action requires the commitment and cooperation of many players from a variety of areas to understand the issues, brainstorm policy solutions and oversee the implementation of recommended changes. As new policies are implemented, it is also essential to monitor their effects to assess whether the desired outcomes are achieved and, if not, what further changes are needed.

3. *Understanding the Relationship Between Public Health and the Built Environment* (2006), by R. Ewing and R. Kreutzer, prepared for the U.S. Green Building Council, the Congress of the New Urbanism, and the Natural Resources Defense Council (Summary Conclusions, pages 115–129).

This landmark document is a comprehensive 2006 report that summarizes the relationship between public health and the built environment. It is intended to help prepare for a rating system for neighbourhoods called LEED_ND (Leadership in Energy and Environmental Design for Neighborhood Development).

APPENDIX 3: HEALTHY COMMUNITY ENVIRONMENTS – LOGIC MODEL

Goal: To improve the health of the public by helping to create healthier built environments, and by preventing, reducing, or eliminating community environmental health hazards.



Note: Logic model is dated December 2008.

APPENDIX 4: SUGGESTED INDICATORS FOR HEALTHY COMMUNITY ENVIRONMENTS

Output/Process Indicators

Logic Model Component	Logic Model Activity	Indicator	Definition/ Description (source of definition, where there is one)	Data Source	Benchmark/Comments
Community Responsiveness	<i>Establish complaint process</i>	Existence of formal process for complaint response and mechanisms for resolution.	Description of complaint process and mechanisms for resolution—similar to complaints with drinking water quality http://www.hls.gov.bc.ca/protect/dwcomplaints.html . Public health bylaws under the Community Charter may provide information on how to develop complaint process.	<ul style="list-style-type: none"> Local health authorities Ministry of Healthy Living and Sport (Health Protection Branch) 	
	<i>Respond to environmental health concerns</i>	Existence of a community environment concerns register with descriptions of concerns, response and outcomes.	The health concerns register would collect information about the concern, what actions were taken to remedy the situation and the outcome of the response. This should also include a register of those involved in any remediation process (health authority, Ministry staff, etc.).	<ul style="list-style-type: none"> Local health authorities Ministry of Healthy Living and Sport (Health Protection Branch) 	Note: This may incorporate complaints, as above, but is broader, including all community environment concerns whether or not they have been identified by a complaint.
Investigation & Enforcement	<i>Enforce compliance with Health Act and regulations</i>	Proportion of enforcement actions satisfactorily resolved.	Identification of enforcement actions, details of actions taken and resolution achieved.	Local health authorities maintain register with associated enforcement actions and responses to actions.	

Core Public Health Functions for BC: Model Core Program Paper
Healthy Community Environments

Short-Term Outcome Indicators

Program Component	Logic Model Short-Term Outcome	Indicator	Definition/ Description (source of definition, where there is one)	Data Source	Benchmark/Comments
Collaboration for Healthy Community Environments	<i>Increased health authority action to support healthy community environments</i>	Involvement of health authority staff in promotion of healthy planning and design: Measures of public participation	Presence of health authority staff in decision-making process for healthy community planning and design, especially at the municipal level. For example: <ul style="list-style-type: none"> • Process to review official community plans (OCPs) • Joint health impact assessments (HIAs) of development plans. • Participation in local ‘healthy built environment’ alliances. 	Health authority log of health planning and design activities by staff.	Possible indicators of collaboration: <ul style="list-style-type: none"> • Informing public processes with health data. <ul style="list-style-type: none"> ○ <i>indicator:</i> public-friendly reports on healthy built environment, health inequities. • Advocating on behalf of health promoting policies and developments. <ul style="list-style-type: none"> ○ <i>indicators:</i> presentations, partnerships, participation in local government policy discussions, OCPs and other planning activities. • Community capacity building (this is a major theme in the healthy communities core program; need to link to indicators there).
Environmental health risk assessment/risk management	<i>Improved environmental impact assessment and environmental project planning</i>	<ul style="list-style-type: none"> • Analyses of local health risks • Recommendations for action to reduce health threats <ul style="list-style-type: none"> • Water quality impact analyses 	Local health impacts assessments and risk analyses that include the following elements <ul style="list-style-type: none"> • Significance of ecosystem role. • Social or economic gain/value. • Increased risk in environmental damage/health risks. • Participation from specialist groups (First Nations, non-governmental organizations). • Historical “base” conditions. • Development options – scale, magnitude, duration, cumulative effect, projected future effects. http://www.env.gov.bc.ca/wld/documents/era.pdf	<ul style="list-style-type: none"> • Health authorities • Ministry of Healthy Living and Sport (Health Protection Branch) • Ministry of Environment • BC Centre for Disease Control (BCCDC) 	See national and international HIA websites for further details Water quality is addressed in the water quality core program.

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Program Component	Logic Model Short-Term Outcome	Indicator	Definition/ Description (source of definition, where there is one)	Data Source	Benchmark/Comments
Community Responsiveness	<i>Timely response to key issues</i>	Measure of public/community satisfaction with response to issues (response time and final resolution)	<p>The Department for Victorian Communities in the State of Victoria, Australia, coordinates an Annual Community Satisfaction Survey on behalf of 76 communities in the State. The survey is constructed around the following categories:</p> <ul style="list-style-type: none"> • Community satisfaction rating for overall performance generally of the council; • Community satisfaction rating for overall performance in 66 key service areas and responsibilities; • Community satisfaction rating for council's interaction and responsiveness in dealing with the public; • Community satisfaction rating for council's advocacy and community representation on key local issues; and • Community satisfaction rating for council's engagement in decision making on key local issues. <p>These categories form part of the Victorian Local Government Indicators www.melbourne.vic.gov.au/opm/bc/CTEE/meetings/COUNCIL_516_20040826.pdf</p>	<ul style="list-style-type: none"> • Local health authorities • Ministry of Healthy Living and Sport (Health Protection Branch) 	One person suggested “data tracking of complaints—receipt to close—with an indication of notification of action taken to agency/person involved in issue and a measure of their satisfaction with response”

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Long-Term Outcome Indicators

Logic Model Longer-Term Outcome	Indicators	Definition/ Description (source of definition, where there is one)	Data Source	Benchmark/Comments
<p><i>Actual or potential public exposure to chemicals, metals, industrial contaminants, radiation, and environmental noise, which represent a threat to human health, is reduced or eliminated</i></p>	<p>Indicators of prevalence of community environmental health hazards. Should include baseline measures and targets. May include:</p> <ul style="list-style-type: none"> • Water quality index • Prevalence of mould • Radon levels • Persistent Organic Pollutants – Heavy metals in food (dirty dozen) e.g.: PCB, DDT, PBDE, dioxins, furans, etc. • Heavy metal in food • Environmental and traffic hazards. 	<p>Please refer to the following links for definitions/descriptions.</p> <ul style="list-style-type: none"> • The Water Quality Index (WQI) is a tool that allows a large number of water quality characteristics to be expressed as a simple rating for each body of fresh water. • Statistics Canada for Canadian environmental sustainability indicators. • Canadian Centre for Occupational Health and Safety (CCOHS) for radon in buildings. <p>Examples of indicators: http://www.env.gov.bc.ca/soe/et07/05_contaminants/technical_paper/contaminants.pdf (environmental trends in BC: 2007, MOE)</p> <p>http://www.bcbudget.gov.bc.ca/2008/sp/trans/default.html#4 (Ministry of Transportation BC)</p> <p>http://www.env.gov.bc.ca/wat/wq/BCguidelines/microbiology/microbiology.html (water quality prescribed acceptable levels of contamination by biological agents)</p> <p>SOE Infobase Indicators Profile: passenger transport. http://www.ec.gc.ca/soer-ree/English/indicator_series/techs.cfm?tech_id=49&issue_id=12&supp=1</p> <p>http://www.statcan.gc.ca/pub/16-251-x/16-251-x2005000-eng.pdf</p> <p>http://www.ccohs.ca/oshanswers/phys_agents/radon.html</p>	<ul style="list-style-type: none"> • Ministry of Environment Statistics Canada • CCOHS • Health authorities • BCCDC (labs, public service announcements) • Transport Canada • Ministry of Transportation (traffic volume data) • Ministry of Agriculture and Lands (shellfish and presence of contaminants) 	<p>Selection of relevant measures to be determined by health authorities based on local issues.</p>
<p><i>Solid and liquid (sewage) waste is properly managed and does not present a threat to human health</i></p>	<ul style="list-style-type: none"> • Indicators of episodes of improper management of solid and liquid wastes. • Number of incidents of sewage contacting drinking supply. 	<ul style="list-style-type: none"> • BC Ministry of Environment, Contaminated Sites Registry http://www.env.gov.bc.ca/wat/wq/bmps/npsaction.html http://www.env.gov.bc.ca/epd/remediation/cs101.htm#2 <p>Incidence of gastrointestinal illness linked to sewage contamination.</p>	<ul style="list-style-type: none"> • Health Canada • Ministry of Environment • BCCDC 	<p>Selection of relevant measures to be determined by health authorities based on local issues</p>

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Logic Model Longer-Term Outcome	Indicators	Definition/ Description (source of definition, where there is one)	Data Source	Benchmark/Comments
<i>Community planning and design, which prevents potential environmental and social threats to health and contributes to the creation of healthy community environments.</i>	<ul style="list-style-type: none"> • Measures of social capital/ connectivity: (mixed-use, walkable urban areas increase social capital) • Location and number of designated cycling routes (and change thereof) • Use of public community activity centres per 1,000 population 	<p>Social capital – capital – sense of community, attachment to social community Physical activity – time spent walking Activity limitation Walkability index (where available locally) – See Prof. Larry Frank, UBC</p> <p>Length and location of bike paths, bike lanes etc</p> <p>Total public community activity centres, utilization data Hectares of parks and playgrounds per 1,000 people, utilization data</p>	<ul style="list-style-type: none"> • Canadian Community Health Survey (2003) • Statistics Canada (NPHS) • Local government • BC Recreation and Parks Association (estimates from Statistics Canada) • Transport Canada • Local government 	

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Possible Surveillance and Monitoring Indicators for Healthy Community Environments

Measures of morbidity or mortality attributable to environmental exposure, which are part of the ultimate outcome.

It is expected that health authorities will select indicators relevant to their local environmental concerns and/or will identify other indicators more relevant to their situation.

Indicator	Definition/Description (source of definition, where there is one)	Data Source
Pesticide contamination in health authority	Incidence of pesticide-related poisonings and illness: <ul style="list-style-type: none"> in pesticide workers. in children. 	<ul style="list-style-type: none"> Poison Control Centres Health authorities/MSP data WCB (for those who work with pesticides)
Lead contamination in health authority (for areas that have lead smelters or other sources prompting high exposure to lead)	<ul style="list-style-type: none"> Blood-lead levels in children. Number of hospitalizations from lead poisoning in children. 	<ul style="list-style-type: none"> Health Canada Health authorities/MSP data Environment Canada CCOHS (for those who work with lead) Poison Control Centres http://www.hc-sc.gc.ca/ewh-semt/contaminants/lead-plomb/exposure-exposition-eng.php (general info site for lead poisoning).
Liquid and solid waste disposal	<ul style="list-style-type: none"> Wastewater treatment – population served, treatment levels, number of on-site malfunctions). Inventory of waste facilities. 	<ul style="list-style-type: none"> http://www.env.gov.bc.ca/soe/et07/01_population_economic/technical_paper/population_economic_activity.pdf (environmental trends in BC: 2007 –Ministry of Environment) http://www.bcossa.com/images/BC_Sewerage_Regulation.pdf (BC sewerage system regulations) http://www.env.gov.bc.ca/epd/main/pdf/WDR_implement_guide.pdf (waste discharge regulation implementation guide: Ministry of Environment)
Environmental noise	Proportion of adults with hearing loss from noise exposure.	<ul style="list-style-type: none"> CCHS Canadian Hearing Society WCB CCOHS Health authorities Health Canada Canadian Hard of Hearing Association Statistics Canada (Hearing problems among seniors, assistive devices) http://www2.worksafebc.com/pdfs/hearing/ConstructionNoise.pdf (WCB construction noise claim information) http://www.ccohs.ca/oshanswers/phys_agents/noise_auditory.html (Canadian Centre for Occupational Health and Safety) http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/life-vie/community-urbain-eng.php (Health Canada; Community noise annoyance)

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Indicator	Definition/Description (source of definition, where there is one)	Data Source
Health authority illness or conditions with suspected or confirmed environmental exposure	a) Rates of acute asthma events. b) Cases of Methemoglobinemia. c) Environmentally-related cancer incidence and mortality rates, including soft tissue sarcoma, mesothelioma and melanoma. d) Incidence rates for environmentally-related adverse reproductive outcomes (low birth weight, developmental disabilities, birth defects, etc.). e) Number of non-occupational poisonings. f) Number of injuries resulting from chemical spills. g) Incidence of illness and mortality rates resulting from extreme weather events, by type of event (e.g., heat waves, floods, drought, natural disasters, etc.). http://www.toronto.ca/health/hphe/pdf/boh_environmental_threats_summary_part2.pdf (Toronto PH)	<ul style="list-style-type: none"> • CCOHS • Health Canada (reporting from adverse reactions to medication re: methemoglobinemia) • Health authorities • BC Cancer Agency • BC Perinatal Health Program • BC Vital Statistics Agency • WCB • Ministry of Environment • BC Injury Research and Prevention Unit • BC Drug and Poison Information Centre • Statistics Canada (re: vital stats ex. developmental disabilities) • HELP (UBC)/BC Early Hearing Program/Community Living BC/MCFD • http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/research-agenda-recherche/temperature-eng.php (Health Canada extreme weather and health mortality/morbidity)