Health Canada Santé Canada

Canadian Handbook on Health Impact Assessment:

The Basics

This document has been divided into a series of files for easier downloading from our web site.

Part 1 of 2

Canada

About the cover illustration:

THE HAUDENOSAUNEE CREATION

Watercolour by Richard W. Hill, Sr.
Tuscarora, Six Nations

The Haudenosaunee Creation Story established the relationship of humans to the universe. We see the universe as a complex web of life, with each being connected in a spiritual way with each other being. The Universe is like a giant sphere, with the top half called the Sky World. Above us is the sky dome, seen in the painting as a beaded curve. Up in that sky world is a great magical tree of life. That tree, seen as the double curve above the woman's head, gives off bright light and has medicinal powers. The Sun, who we call our Elder Brother, and the Moon, who we call Our Grandmother, are connected to that Sky World light. The eagle connects us to that world above.

Once, a woman who lived in the sky world, heavy with child, fell from above and was saved by the water bird who put their wings together to break her fall. The birds placed her on the back of the turtle. She had small plants and seeds from the sky world that she planted in the mud that was placed on the back of the turtle. As she walked in an ever-increasing circle, she planted those seeds. New life was created on the Turtle Island. We live on the back of that giant turtle. We call North America the Great Turtle Island. We call that turtle island, Etinohah – Our Mother, the earth. Below the Turtle Island is a deep ocean with dark and mysterious creatures.

She gave birth to a girl, who herself was impregnated by a Turtle Spirit Man. He placed two arrows over her bed. One had a flint arrow head. She was to have twins, but one seemed to cause her trouble even before he was born. She could feel the boys wrestling inside her. That twisted-minded boy decided to be born in an unusual way and in doing so killed his own mother. His brother, who was First Born, had a kinder personality and went about creating nice things on the Turtle Island. When the body of the mother was buried, the four sacred plants grew from her body – corn, beans, squash and native tobacco.

Soon those boys held many contests to see who would have authority over the newly created earth. They wrestled with each other. They played lacrosse. They held many contests, but each to a draw. Finally, with help from the deer spirit, the Good-Minded Son defeated his brother and, in doing so, made the earth ready for humans. He took fresh mud from the Mother Earth and shaped two human figures from the clay – a man and a woman. He breathed into them and they came alive. They were the Original People and he taught them the Original Instructions about how to live in harmony with the earth, plants, animals and spirit forces.

The animals represent the family clans of the Haudenosaunee – hawk, heron, deer, bear, wolf, beaver, eel, snipe and turtle. We inherit the clan of our mother. Each clan is headed by the Clan Mother in honour of the Sky Woman and the Mother Earth. The plants represent those that we celebrate and give thanks to through our ceremonies – tobacco, maple tree, corn, beans, squash and strawberries. People are meant to live happy and healthy lives, but we must give thanks for all that the creation provides us and use it sensibly. It is a great gift of life.

CANADIAN HANDBOOK ON HEALTH IMPACT ASSESSMENT

VOLUME 1: THE BASICS

JUNE 1999

A Report of the Federal/Provincial/Territorial Committee on Environmental and Occupational Health

Our mission is to help the people of Canada maintain and improve their health.
Health Canada

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The CEOH has membership from all provinces, territories and the federal government. Membership on the CEOH and Task Force represent environment, health and labour sectors. The Task Force members included:

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Volume 1: The Basics originated as a discussion paper written under contract by Dr. Kate Davies entitled: *The National Health Guide for Environmental Assessment: A Discussion Paper*. The discussion paper underwent extensive consultation at six regional multi-sectoral workshops as well as review via a questionnaire.

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Finally, the Discussion paper underwent extensive rewriting by Roy E. Kwiatkowski.

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PREFACE

> Human beings are at the centre of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature.
>
> U.N. Conference on Environment and Development
> Rio de Janeiro, 1992

The environmental impact assessment (EIA) process is a comprehensive planning process to predict and assess the effects of a proposed project, program or policy. The recently released International Study on the Effectiveness of Environmental Assessment[1] identified social and health impact assessment as areas that are not considered or are inadequately treated in project environmental impact assessment. There has been a tendency in health impact studies to set up curative services to deal with the health problems created by a project instead of setting in place appropriate preventive strategies as an integral part of the original development.[2]

Human activities are intimately embedded in, and dependent on the natural environment, which is in turn impacted by human activities. Human activities and all our social constructs are a subsystem of the natural environment and are intrinsically dependent on the health of ecosystems. Human health is therefore embedded in and intimately dependent on the natural environment as well. However, environmental quality is only one variable affecting human health. A comprehensive definition of health, such as that provided by the World Health Organization, *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"*, acknowledges the influence of the multitude of human social constructs and their complex inter-relationships. The influence of political, social, cultural and economic elements are all crucial determinants of human health. The interplay amongst these and the feedbacks

1. Sadler, B. 1995. *Environmental Assessment: Towards Improved Effectiveness.* International Study of the Effectiveness of Environmental Assessment. Interim Report and Discussion Paper. Unpublished report.
2. Slooff, R. 1995. Consultant's Report. *Commonwealth Secretariat Expert Group Meeting on Health Assessment as Part of Environmental Assessment.* Aberdeen, Scotland, 1-3 February 1995. Commonwealth Secretariat Publications, Marlborough House, London, SW1Y 5HX, ISBN 0-85092-499-9.

developed between them and the natural environment weaves a complex web of factors determining our quality of life, health and well-being. We need to manage human activities to recognize this complexity and evolve societies which can monitor, learn, respond and adapt rather than try to manage and control nature.

The World Health Organization's definition suggests a holistic interpretation of health linking the complex interrelationships between social, economic, political and cultural health determinants with the natural environment. Based on such a comprehensive definition, it is evident a proposed development project has the potential to create significant human health impacts. They may arise from direct and indirect influences of development, and result in cumulative and synergistic impacts, often characterized by complex cause-effect relationships. Given the environmental risks and uncertainties associated with increasing material and energy consumption from human activities, and the 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.

Development projects are expected to have beneficial effects on health and well-being because they create jobs and provide other economic benefits that contribute to a better standard of living. Although there are exceptions, economic well-being has been repeatedly linked with longevity and other indicators of health because people with adequate incomes can afford to eat balanced diets and live healthier lifestyles. However, development projects also have the capacity to cause adverse effects on health and well-being at the individual and community level. Sometimes these effects are experienced by people who do not share in the project's benefits. One of the negative effects that can be associated with projects is related to physical health, such as mortality and morbidity from disease and injury. Social and community health may also be affected negatively where individuals face a loss of cultural identity and quality of life, social disruption and violence, and a breakdown of community and family support networks. Furthermore, socio-cultural well-being can be affected by increasing stress, anxiety, and feelings of alienation.

Creating changes in a community without learning from, or knowing what the impacts of those changes were, can generate uncertainties within the community leading to a loss of control over and deterioration of the quality of life and health of the community. Whether beneficial or negative, it is important to understand, assess and respond to changes and if possible, prevent or enhance them as determined. Communities might notice a marked decrease in their quality of life and health, yet be incapable of determining when or from what processes these changes emerged. On the other hand, their quality of life may have improved, yet without the knowledge of just where and when these

improvements began, enhancing such changes or duplicating them in the future or in other communities may prove difficult, and attempts to do so may be counterproductive.

Health need not be thought of as the end product of all the endeavours of society. Rather, it works the other way as well. The healthier the population, the more productive the economy will be, and the more sustainable our natural environment and resource base will be.

Roy E. Kwiatkowski
Chief, Office of Environmental Health Assessment
Health Canada

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Purpose

This Handbook examines the need and the procedure necessary to incorporate the assessment of human health effects in the EA process. The Handbook will make reference to the federal and provincial governments' legislated environmental assessment processes; however, the Handbook is not designed to address specific issues associated with the various legislative regimes. Instead, the Handbook is of a general nature, designed to provide guidance, irrespective of which EA process is used.

Scope

The Handbook seeks to assist individuals with health knowledge in the medical fields, social sciences and government/industry health experts to participate in the environmental assessment process.

Contents

The Handbook provides the answers to some commonly asked questions concerning health in EA. The following presents those questions and directs you to the appropriate section in the Handbook.

Q: What is meant by the term "health" and what are the principle determinants of health?

A: If you are aware that health encompasses not only the absence of disease or infirmity but also our physical, mental and social well-being, then you are on the right track. But if the nine determinants of health elude you, we encourage you to read Chapter 1.

Q: Why do we need environmental assessment (EA)?

A. EA is a decision-making tool designed to identify, predict, evaluate and mitigate the ecological and related health, social, economic and cultural implications of proposed human activities. EA legislation exists in each province as well as at the federal level. Please see Chapter 2 for more information about EA and Chapter 4 for information on EA legislation in Canada.

Q: Why should health be incorporated in the EA process?

A: Health needs to be integrated into EA to:

a) address public concern;
b) minimize the need for separate health and EA;
c) ensure cost effectiveness;
d) minimize the adverse and maximize the beneficial effects on health;
e) support the concept of sustainable development.

Please see Chapter 2 (page 2-16) for more information.

Q: How do you carry out an EA?

A: Steps to carry out an EA:

1. Describe project and determine whether or not an EA is required.
2. Scope or identify the key issues to be considered in an EA.
3. Assess the potential effects and determine their significance.
4. Identify mitigative measures to prevent, minimize or compensate for the impacts and monitor the project once it is in operation.
5. Make recommendations on the fate of the project and conditions attached to its approval.
6. Provide process for public participation throughout the EA.

For more information concerning the EA process, please see Chapter 2 (page 2-2) and consult the Glossary in the Appendix for definitions.

Q: What types of indicators should be used to assess potential health effects?

A: Baseline and/or predictive (modelling) information needs to be compared to the potential effects likely to be caused by the project. To obtain this information, the types of indicators required are direct measures of health (e.g., cancer incidence, injuries, changes in stress levels, etc.) and indirect measures of health (e.g., levels of toxic chemicals in human tissues, discharges of hazardous substances to the environment, etc.). To get a better understanding of the health indicators for use in EA, please see Chapter 3.

Q: Who takes part in the EA process?

A: The main players in an EA are the proponent, government departments/ ministries or agencies, the public, the EA practitioner, including the health professional and decision-makers (please see Glossary). An important segment of the public that can aid in the EA process are Aboriginal peoples since they can contribute traditional knowledge.

Q: Are EAs being carried out only in Canada?

A: Although Canada is a world leader in the field of EA, EAs have evolved into an integral element of environmental policy not only in all of Canada, including Aboriginal lands, but also at an international level. Chapter 4 addresses EA in Canada, Chapter 5 discusses EA on Aboriginal lands and Chapter 6 deals with EA on an international level.

Q: What is the future outlook for health in EA?

A: The ability to sufficiently incorporate health considerations in EA is very encouraging although to date, this has not been achieved. Some of the issues that would assist in achieving this goal include: (a) increasing awareness and education; (b) strengthening cooperation between EA practitioners and health professionals; (c) assessing cumulative health effects; (d) dealing with risk perception; (e) greater public consideration and community action; and (f) improving the follow-up monitoring process. More information surrounding these issues can be found in Chapter 7.

Q: Where can I get more information?

A: At the end of each chapter, further information can be obtained for the topics of the corresponding chapter. Please see “Suggested Readings” at the end of each chapter.

INTRODUCTION

Canada needs economic development to ensure a secure future. In the last 150 years, the production and consumption of Canada's natural resources and the resulting industrialization and urbanization have led to obvious improvements in the standard of living. Yet at the same time, these activities have been linked to new health problems; some related to environmental degradation. Chemicals and wastes contaminate water supplies. Airborne pollutants from industry, cars and other sources are changing the composition of the planet's atmosphere. Overcrowding, inadequate housing and poverty lead to poor sanitation and other health problems. Unsafe working conditions result in accidents, injuries, occupational diseases and lost productivity. It is clear that these activities cannot continue without further impacting human life or human and environmental health.

Canada's Goal

"Ensure that citizens today and tomorrow have the clean air, water and land essential to sustaining human health and the environment."

Life's Three Essentials
Environment Canada

As efforts to enhance health impact assessment with the EA process evolves, concerns grow about the data/information which must be gathered to meet scientific, political, public or legislative requirements. The resources required to obtain this data/information is also of concern. Development of a consistent scientific approach to environmental/human health impact assessment will focus efforts and diminish resource requirements, providing better information for decision-makers and the public.

To promote the concepts of health impact assessment within Canada, the Federal/Provincial/Territorial Committee on Environmental and Occupational Health (which has membership from health, labour and environment) established a Task Force (four federal and four provincial representatives) in September of 1992. The Task Force was asked to produce guidance material to help proponents of projects, intervenors, government agencies, and EA practitioners identify valued components within environmental/human health assessment.

Mandate of Task Force:

- To provide advice, share information and foster communication among federal, provincial and territorial agencies, industry, universities and consultants on health impact assessment (HIA).
- To encourage coordination and harmonization of approaches to HIA.
- To improve awareness of the linkages among environmental, socio-economic, cultural and human health effects.
- To carry out workshops to address specific information exchange needs on HIA.
- To assess the need for a registry of databases on HIA.

Principles to be followed by the Task Force:

- The World Health Organization's definition of health is accepted by the Task Force.
- Environmental and human health are inextricably interlinked and therefore, HIA is an integral part of Environmental Impact Assessment (EIA).
- A cornerstone of HIA is the recognition of the need for public participation in the definition and scoping of human health concerns, and in decision-making.
- HIA is required throughout the life cycle of the project (planning, construction, operation, decommissioning and follow-up monitoring) and takes into consideration occupational health and safety.
- Development of a scientific approach to HIA will focus efforts and diminish resource requirements, providing a fair, effective and efficient process of information gathering for decision-makers and the public.
- Educational tools are required to promote or increase awareness of environmental/human health assessment, risk assessment and communication, and the linkages among environmental, social, economic, cultural and human health effects.

Six regional, multi-sectoral workshops, sponsored by the Task Force, were held in 1995 and 1996.[1] There was a consensus at all of the workshops that guidance material on health impact assessment within EA is needed in Canada and that it should include advice on assessing effects on socio-cultural health

1. Health Impact Assessment Task Force: Federal/Provincial/Territorial Committee on Environmental and Occupational Health. *The Role of Health Professionals in Environmental Assessment – Consolidated Workshop Proceedings.* June, 1996.

and occupational health, as well as physical health. This would be consistent with the World Health Organization's definition of health and the known determinants of health.[2]

It was suggested that because different people have different levels of familiarity with the issues associated with including health in EA, there may be a need to prepare more than one guidance document. Participants stressed that the guidance material should be flexible and adaptable to circumstances in different provinces and that it should not be prescriptive.

The Task Force decided that three volumes were needed to meet the requirements stakeholders identified. This volume, entitled: *Canadian Handbook on Health Impact Assessment Volume 1: The Basics*, focuses on the need for and components of HIA within EA. It does not address the need for or components of EA directly, other than where necessary to understand the role of HIA. Reference documents on EA should be obtained from the Canadian Environmental Assessment Agency for the federal EA process and the EA Administrators for provincial EA processes.

Volume 1, The Basics presents the nature and necessity of incorporating health into environmental assessment within several chapters. Chapters 1 and 2 introduce the basic concepts inherent to health and environmental assessment and lay the groundwork for the remainder of the Handbook. Chapter 3 discusses environmental health indicators as valuable tools to assess and predict the impacts of projects. Chapter 4 examines EA within a Canadian context by providing an overview of Canadian federal and provincial legislation and regulation. Chapter 5 deals with Aboriginal health and examines the concept of traditional knowledge. Chapter 6 takes a peek at EA on an international level and finally, Chapter 7 looks at the future challenges that lie ahead and the necessity to effectively incorporate health considerations into EA. The underlying theme of all of the chapters is that full health considerations need to be incorporated into the EA of projects.

Details on Volumes 2 and 3 of this Handbook are provided in Chapter 7. Volume 1, as well as revisions and updates, are available by Internet at:

http://www.hc-sc.gc.ca/oeha (english);

http://www.hc-sc.gc.ca/behm (french).

2. Federal, Provincial and Territorial Advisory Committee on Population Health, 1994. *Strategies for Population Health: Investing in the Health of Canadians*. Minister of Supply and Services Canada, 1994.

Notes:

Notes:

1 LEARNING THE BASICS ABOUT HEALTH

To effectively incorporate health considerations into an environmental assessment, it is necessary to understand some basic concepts. As such, this Chapter will:

- Define health
- Outline and examine the determinants of health
- Discuss beneficial and adverse effects of projects on health
- Suggested readings

Defining Health

Our health is primarily our own responsibility. Government's job is to provide citizens with accurate and appropriate information so that they can protect themselves. People have their own idea about what is meant by the term "health". Acknowledging a specified definition of health, however, is the first step to promoting consistent procedures. Federal and provincial governments and health officials have accepted the World Health Organization's (WHO) definition of health:

Health

"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"

World Health Organization, 1967

and,

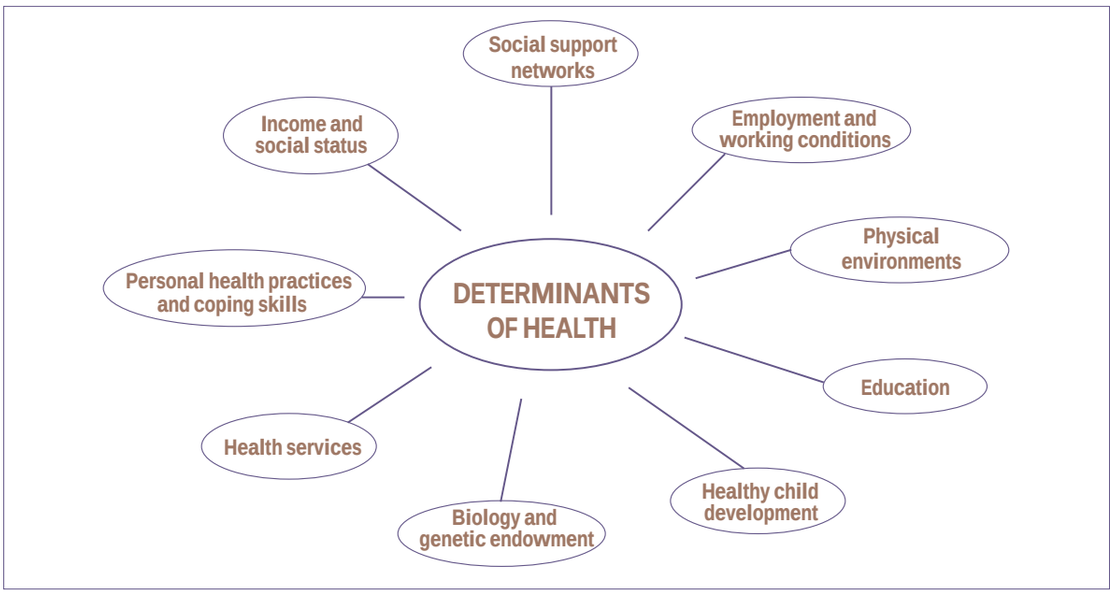
"the extent to which an individual or a group is able, on the one hand, to realize aspirations and to satisfy needs, and on the other, to change or cope with the environment"

World Health Organization, 1984

Outlining and Examining the Determinants of Health

This definition of health clearly indicates that health is more than the absence of sickness and disease. Health encompasses social, economic, cultural and psychological well-being, and the ability to adapt to the stresses of daily life. A recent Canadian report by the Federal, Provincial and Territorial Advisory Committee on Population Health (1994), examined the issue of what makes people healthy and identified the "determinants of health" shown in Figure 1.1:

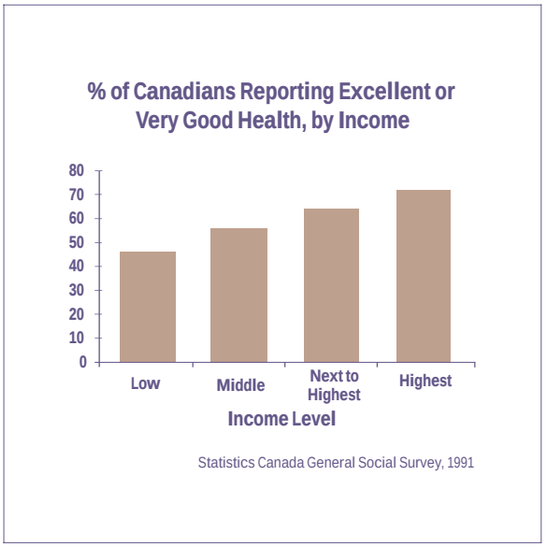
Figure 1.1
Outlining the Determinants of Health

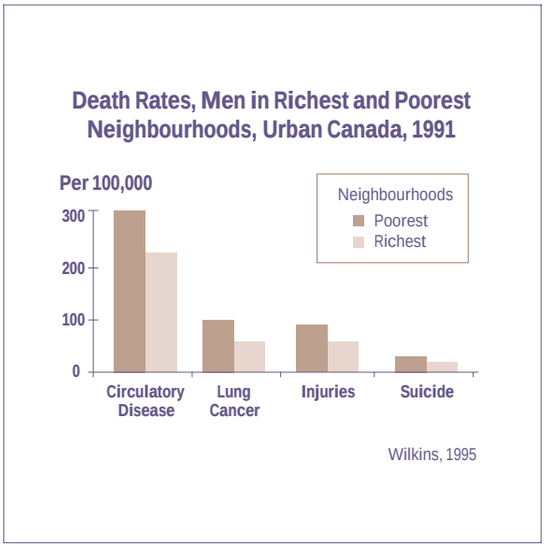


A closer examination of the determinants of health as identified by the Federal, Provincial and Territorial Advisory Committee on Population Health might clarify why they are so important to our health and happiness. Four of these categories – income and social status, education, biology and genetic endowment, and personal health practices and coping skills – relate to the individual whereas the other five categories relate to the collective conditions that provide the basis for the individual categories. Although these factors are important in their own right, they are interrelated.

Income and Social Status

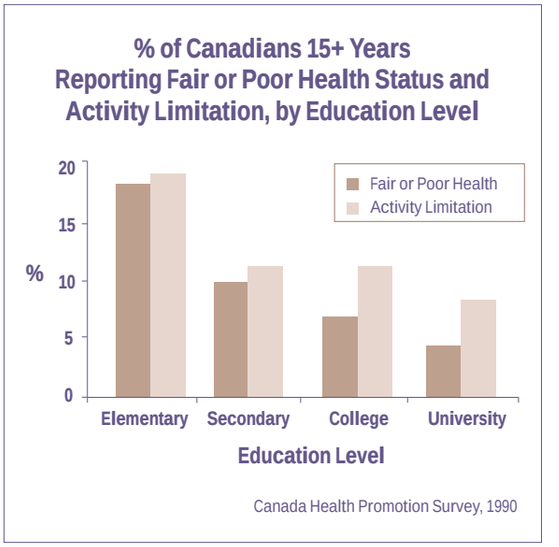
Growing evidence from the Federal, Provincial and Territorial Committee on Population Health indicates that income and social status is the most important determinant of health. People perceive themselves as being healthier the higher their socio-economic status and the higher their income level. This may be surprising considering we have a health system that provides virtually equal access for all Canadians, regardless of their income. Yet studies in provinces and cities throughout Canada consistently indicate that there is not only a difference between people in the highest and lowest income scale, but that people at *each* step on the income scale are healthier than those on the step below. Furthermore, many studies demonstrate that the more equitable the distribution of wealth, the healthier the population, regardless of the amount spent on health care.





Education

For a variety of reasons, health status improves with an increasing level of education. Education improves opportunities for employment, income, job security and job satisfaction and equips people with knowledge and skills necessary for problem solving. People also have more control over their work environment and are better able to access and understand information to help them stay healthy.



Employment and Working Conditions

Unemployment is linked to poorer health: the unemployed experience significantly more psychological distress, anxiety, health problems, hospitalization, etc., than the employed. Within the employed population, however, other factors that negatively affect health include stress-related demands of the job and the frequency of deadlines. Workplace support is measured by the number and quality of interactions with co-workers. The more connections people have, the better their health. Finally, workplaces that are not conducive to preventing workplace injuries and occupational illnesses also decrease health status.

Physical Environments

Health is critically dependent on the elements in the natural environment such as the air we breathe, the water we drink, and the food we eat. Factors in our human-built environment such as housing, workplace and community safety have equally important influences on health.

Biology and Genetic Endowment

The organic make-up of the body, the functioning of various body systems and the processes of development and aging serve as fundamental determinants of health. Biological differences between the sexes and the traits and roles that society ascribes to females and males form a complex relationship between individual experience and the development and functioning of key body systems. At the same time, genetic endowment predisposes certain individuals to particular diseases or health problems.

Social Support Networks

The support which families, friends, and communities provide contributes to improved health. Social support networks can help people cope with daily stresses and solve their problems. "The caring and respect that occurs in social relationships, and the resulting sense of satisfaction and well-being, seems to act as a buffer against health problems" (Strategies for Population Health, 1994).

> "Studies show that the more social contacts people have, the lower their premature death rates."
>
> Berkman, 1979

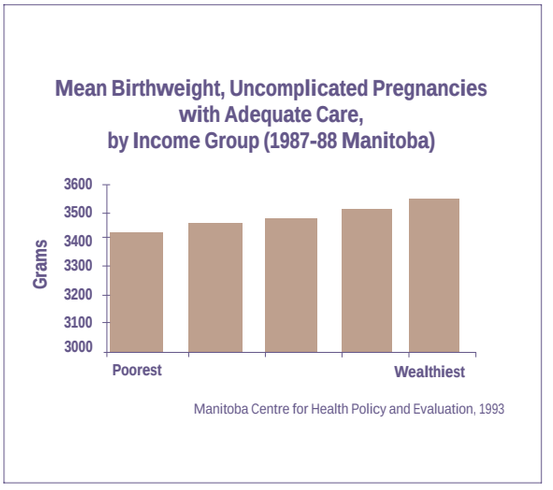
Overall, most Canadians report access to a substantial level of support. Females reported a higher level of support (86%) than males (80%). High support was found to be most prevalent in adolescents with a gradual decline of support with age.

Personal Health Practices and Coping Skills

Social environments that promote healthy choices and lifestyles are linked to improved health. A balanced diet and regular exercise have been shown to provide substantial health benefits while tobacco and excessive consumption of alcohol are linked to many of the most common health problems. The way people react to stresses and events which they encounter in their day-to-day lives demonstrates their coping skills and how self-reliant or able they are in solving problems to make informed choices that enhance health.

Healthy Child Development

The significant decreases in maternal and infant death rate over the last 60 years have had a profound impact on Canadians' life expectancy. Mounting evidence indicates that prenatal and early childhood experiences have a powerful influence on subsequent health, well-being, coping skills and competence. Not only are infants with low weights at birth more susceptible to infancy deaths, neurological defects, congenital abnormalities and retarded development, they also experience negative effects later in life which can include premature deaths. Of further interest, a strong correlation exists between a mother's level of income and the baby's birth weight; mothers at each step up the income scale have babies with higher birth weights, on



average, than those on the step below. Finally, the degree of prenatal care at an early age also influences a child's coping skills and health for the rest of their lives.

Health Services

Health care services contribute to health status, particularly when they are designed to maintain and promote health and prevent disease. Services such as prenatal care, immunization and those that serve to educate children and adults about health risks and choices all serve to improve health. On the flip side, environmentally sustainable practices can improve population health and help reduce costs to the health care system.

In 1994, Canada spent an estimated $72.5 billion on health, or $2,478 per person.

Health Canada, 1996

The determinants of health, specifically the living and working environments, community cohesiveness and health services are important factors in shaping the health and well-being of an individual or a community. At the same time, economic development provides jobs, income and social status which can promote health by allowing the community to afford and promote well-being. As such, individuals accept a huge responsibility in shaping their health.

Health Promotion

"Health promotion" through community support is an important method enabling people to gain greater control over the determinants of their own health. This concept is also tied to the social learning theory which supports the notion that people self-regulate their environments and actions; and despite being acted upon by the environment and their surroundings, people also create their surroundings (Green & Kreuter, 1991).

"Health promotion is the process of enabling people to increase control over and improve their health."

CPHA, 1995

Improving community health also requires collaboration among a variety of sectors – not only for the general population, but particularly for vulnerable groups which experience lower health status than others. Gender is gaining recognition as another determinant of health because of the lower health status experienced by women. Lower income and social status, longer lifespans implying more disability and illness than men, and increasing stresses between work and tending to the family negatively affect women and lower their health status. Of greater severity, Aboriginal

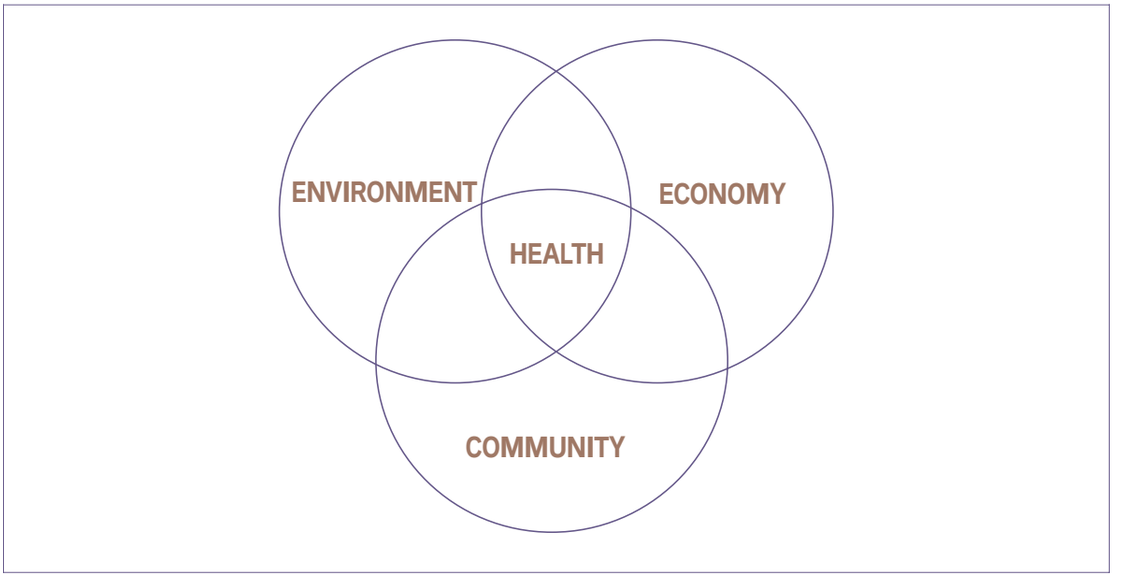
peoples have the poorest health status among Canadians. Aboriginal people experience significantly higher infant death rates and much higher disease rates than the rest of Canada. As such, government and non-government organizations need to work together to implement strategies targeting vulnerable groups. Community initiatives, particularly at the local level have proven to be an effective means of improving health.

Investing in a population health approach offers benefits in three main areas:

- increased prosperity because a healthy population is a major contributor to a vibrant economy;
- reduced expenditures on health and social problems; and
- overall social stability and well-being for Canadians.

With this in mind, one is able to understand how the environment, economy and community are interrelated with health. Figure 1.2 provides a holistic or EA approach which recognizes that economic health, environmental health, and the health of the community are inextricably linked.

Figure 1.2
Holistic Approach of EA (modified from Hancock, 1990)



Human health depends in a fundamental way on the environment as both a source of resources and a sink for wastes. It is also true that environmental quality is more likely to be properly respected if the economy is healthy. In the past, most decision-making for health, the environment and economic development has been conducted separately. The challenge now is to better understand the links between health, the environment and economic development, and to develop ecosystem-based decision-making processes that integrate these considerations. Environmental assessment (EA) is recognized within Canada, as well as internationally, as a primary decision-making tool for maintaining and enhancing environmental quality while carrying out economic development.

Beneficial and Adverse Effects of Projects

Most projects requiring EA are expected to have beneficial effects on health and well-being because they create jobs and provide other economic benefits that contribute to a better standard of living. Although there are exceptions, economic well-being has been repeatedly linked with longevity and other indicators of health because people with adequate incomes can afford to eat balanced diets and live healthier lifestyles. As well, a health economy is necessary to pay for health care services.

Projects also have the capacity to cause adverse effects on health and well-being at the individual and community level. Sometimes these effects are experienced by people who do not share in the project's benefits. One of the negative effects that can be associated with projects is related to physical health, such as mortality and morbidity from disease and injury. Social and community health may also be affected negatively where individuals face a loss of cultural identity and quality of life, social disruption and violence, and a breakdown of community and family support networks. Furthermore, socio-cultural well-being can be affected by increasing stress, anxiety, and feelings of alienation.

Now that health and the determinants of health have been identified, we will look at environmental assessment (EA) and discuss the health component within the stages of EA.

Suggested Readings

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Notes:

Notes:

2 LEARNING THE BASICS ABOUT EA

- Defining environmental assessment (EA)
- Identifying the players in EA
- Providing an EA schematic
- Description of the steps in the EA schematic and examining health within the specified stages of EA
- Health as an integral component of EA
- Suggested readings

Getting Started: Defining Environmental Assessment (EA)

Since its inception in the early 1970s, EA has become an effective decision-making tool to assist decision-makers in ensuring the integration of economic development and important environmental issues. EA is designed to anticipate and prevent adverse effects of projects. Simply put, EA involves determining any changes or impacts that a project or action will have on our surroundings – be it positive or negative effects – before that project is carried out in order to prevent irrevocable damage from occurring. Thus, environmental assessment[1] can be defined as:

1. For the sake of convenience, this Handbook will use the term "environmental assessment" (EA) synonymously with the term "environmental impact assessment" (EIA), environmental assessment review and impact assessment.

Environmental Assessment (EA)
a comprehensive and systematic process, designed to identify, analyze and evaluate the environmental effects of a project in a public and participatory manner; environmental assessment involves the use of technical experts, research and analysis, issue identification, specification of information requirements, data gathering and interpretation, impact prediction, development of mitigative proposals, design of any required follow-up monitoring, external consultations, and report preparation and review

Identifying the Players in an EA

The question now turns to those involved in an EA. A number of areas of expertise are required in an EA. There are essentially five main players in an EA, namely: (1) the proponent (the individual, company or organization that proposes a development project); (2) government departments/ministries or agencies, including local and regional authorities; (3) the public; (4) the EA practitioner, including the health professional; and (5) decision-makers. Further details of these main characters involved in an EA can be found in the Glossary.

Providing an EA Schematic

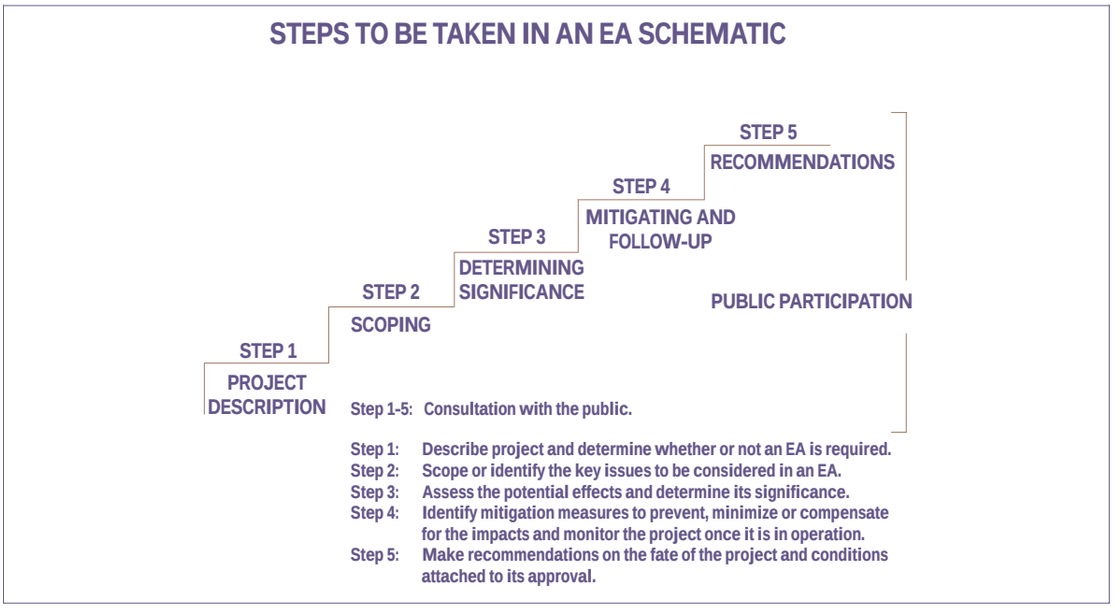
EA requirements and processes vary, not only internationally, but provincially as well. However, many common procedural elements exist within Canadian EA processes. These are schematically outlined in Figure 2.1. Depending on the jurisdiction, these steps can be combined or be complementary.

Description of the Steps in the EA Schematic and Examining Health within the Specified Stages of EA

Step 1: Project Description

The project description will provide the basic information – the who, what, when and where – regarding the project. This information presented by the proponent should offer sufficient information to anyone not familiar with the project. Data which can be included at this stage are:

Figure 2.1



- the rationale, objectives and goals of the project;
- a description of the project including the processes, chemicals and types of equipment to be used and the building layout;
- sufficient detail of the planning, designing, construction, operating, maintenance and decommissioning phases;
- types and quantities of inputs (energy, water and chemicals used in the industrial process) and outputs (products and waste materials) and a brief discussion of their treatment and disposal;
- expected infrastructure, local facilities and services (e.g., electricity, water, sewage, roads);
- advantages and drawbacks associated with the project.

At this stage, a determination as to whether or not the project is subjected to an EA is made. Who makes that decision varies with jurisdiction. EA administrators (part of the Ministry of Environment within the provincial regime) make that decision within the provincial EA processes, while within the federal EA process, the manager responsible for the project (irrespective of which department) makes the decision. It is important that the project description also focus on the features that will likely generate public concern. Projects that are prone to trigger health concerns are those associated with mining, agriculture, energy production, natural resource management, waste management, chemical

production and manufacturing processes. Public sector projects such as infrastructure and urban development (airports, highways, railways and utilities) are further examples of areas that usually raise concerns about the health effect implications.

The scope of possible effects on occupational and public health are shown in Table 2.1.

Table 2.1
Health Factors to Be Considered in the Project Description

	Factors to Consider
Project	Location, environmental setting.
	Different stages of the project's life cycle (e.g., construction, operation, maintenance and decommissioning).
	Different project activities (e.g., transportation of raw materials and products, processing of materials and waste management).
	The manufacture, use or disposal of chemicals or microbiological organisms, including products of biotechnology.
	Physical hazards associated with the projects, such as noise, dust or radiation.
Human Exposure	The potentially affected populations, including workers and the public.
	Any especially vulnerable groups that could be exposed such as Aboriginal peoples, children, pregnant women and hypersensitive individuals.
	Expected changes in human exposures and the effects of the project on total human exposures.
	Any changes in human contact with communicable diseases or their vectors (e.g., mosquitoes, rodents).
Possible Effects	Possible effects on the physical health of potentially exposed populations.
	Possible effects on socio-cultural well-being.
	Possible effects on health care facilities and occupational health services.

Ideally, the project description should be prepared by the proponent and an EA practitioner who has a thorough understanding of environmental and health issues.

Step 2: Scope

The scope of an EA is analogous to an EA workplan. It lays the foundation for an effective EA by identifying significant issues and the potential environmental effects that the project might have on the biophysical and social environment, including any health issues that need to be assessed. A properly defined, scoped project improves the efficiency and effectiveness of the EA and focuses efforts on issues deemed important by the public and the experts.

Unfortunately, the process used to scope a project is not an exact science and is not always carried out in a disciplined or consistent fashion. As a result, important health issues are sometimes not identified, or identified too late for a thorough health assessment to take place. Furthermore, if health issues are overlooked, individuals can be hostile to the proponent for neglecting an issue during public consultation, thus jeopardizing the proponent's credibility.

There are essentially four major objectives of scoping. These are:

- determining the factors to be considered, alternatives to the project, and the potential effects of the project to be considered;
- prioritizing the issues to be addressed in the EA;
- setting appropriate boundaries for the EA study; and
- determining the appropriate level of effort for the EA.

The first objective of scoping is to determine the significant environmental and health effects, and factors and alternatives to be considered. This objective is paramount as it helps the proponent focus time and resources on the essential environmental and health concerns raised by the project.

Boundaries:
Spatial boundaries are set on the basis of the geographical limits of the impacts.

Temporal boundaries deal with the timing and the life span of the impacts arising from the project.

Jurisdictional boundaries refer to the legal requirements that the project must adhere to.

Canter, 1986

A second objective of scoping is the prioritization of issues identified in the first objective. It would be impractical for an EA to address every single potential effect or to discuss all of the alternative means of carrying out the project to the same level of detail. Prioritizing the issues from a list of potential problems should be achieved in consultation with the public and experts. Clearly, it is unfair to claim that a proponent has not adequately addressed an issue if the issue was not clearly raised, and the importance of addressing it was not established during scoping sessions. Another difficulty associated with the prioritization of

issues is that opinions of the project proponent and the public may differ with respect to the impacts; (i.e., where the project proponent might view a health issue as being inconsequential, the public may place a higher priority to that risk).

A third objective of scoping involves setting realistic and appropriate spatial, temporal and jurisdictional boundaries on what is to be included or excluded in the EA. A problem commonly faced with large boundaries is that if the project is scoped too broadly, it will be very difficult to assess. The proponent can also feel that it is unattainable with the limited time and resources. If the project is scoped too narrowly, it can miss some potential effects. This can upset the public who may feel that important environmental and social issues are being neglected. For this reason, boundaries should be reasonable. Criteria used to determine appropriate spatial and temporal boundaries can include:

- the size and nature of the project;
- the environmental effects of relevant past, existing and future projects in the area which, in combination with the proposed project, would suggest that cumulative effects occur;
- the availability and feasibility of existing data; and
- the characteristics of the environment in which the project will occur (e.g., aquatic boundaries such as watershed, habitat, land use).

The fourth objective of scoping involves determining the appropriate level of effort for the EA. This can be largely determined by the same criteria as those used to determine appropriate spatial and temporal boundaries and should be consistent with the magnitude and severity of the potential effects caused by the project.

Many factors will determine the types of health effects identified during the scoping stage. Table 2.2 outlines several factors of health that have been considered during the scoping stage of an EA.

Table 2.2
Factors of Health Considered in EA

Factor	Characteristics
Hazardous agents	Microbiological virus, bacteria
	Chemical – heavy metals and toxic organic chemicals
	Physical – noise, dust, radiation, vibration
Environmental	Changes in the quality or availability of water, food, air, land and soil
	Waste management practices
	Physical safety and security
	Disease vectors
Exposure conditions	Human exposure pathways – food, air, water, etc.
	Public exposure
	Occupational exposure
	Identification of high-risk groups
Effects on physical health	Mortality
	Morbidity – communicable and non-communicable diseases, acute and chronic effects
	Injuries and accidents
	Effects on future generations
	Effects on high-risk groups (i.e., due to exposure or sensitivity)
	Exacerbation of existing health conditions (e.g., asthma)
	Cumulative effects
Effects on health care services	Incremental health care needs
	Displacement of traditional health care services
Effects on social well-being	Effects on income, socio-economic status and employment
	Effects on municipal revenues and local industries
	Migration and re-settlement
	Effects on social and community health including effects on culture and way of life
	Effects on services (e.g., education, social support networks, etc.)
	Effects on psychological well-being (e.g., stress, anxiety, nuisance, discomfort)
	Beneficial effects on health

Step 3: Determining Significance

Predicting the potential impacts and determining their significance is a key step to project approval and condition setting, and in choosing among alternatives. This step involves assessment of the potential health, environmental and social effects of the project, interpreting information and providing advice on the significance of effects to the decision-makers.

Baseline Health Status:

"Baseline status" refers to the conditions prior to the construction and/or operation of the project.

Once issues of concern have been identified through scoping, baseline health status of the population that will be affected must be obtained. The baseline health status of the potentially affected population, particularly sensitive sub-groups such as workers, Indigenous people, children, pregnant women and the elderly, is needed to assess the potential impacts of the project on health and well-being. The baseline health status is also essential to monitor the changes to environmental health once the project is in place.

The types of quantitative and qualitative information that should be used to describe baseline environmental, health and social conditions are shown in Table 2.3.

Table 2.3
Types of Information Used to Describe Baseline Environmental, Health and Social Conditions Related to the Determination of Human Health Impacts

	Types of Information
Environmental conditions	Levels of environmental contaminants in air, water, soil and biota
	Resources or species that are important for commercial or other reasons
	Community infrastructure, such as drinking water, sewage treatment, solid waste management, transportation and housing
	Local amenities, recreational facilities and sites of historical, cultural or religious significance

Table 2.3 (Cont'd)

	Types of Information
Health and social conditions	The demographic characteristics of the potentially affected population(s) including their size, cultural origins, education, age structure, socio-economic status, patterns of employment and work experience
	Current health status of the potentially affected population(s) including information on their physical health and psycho-social well-being
	The local health care and occupational health services
	The characteristics of any incoming groups of people, such as construction workers
	The history of the potentially affected population(s) in relation to development
^	Any distinguishing, unique or traditional behaviours, lifestyles or ways of life in the local community or the potentially affected populations

Baseline data usually rely on existing available health information. Relying on this type of information can raise certain problems:

- Health information is collected for specific purposes and is not usually adaptable for use in EA. For example, medical data rarely distinguish between new health problems and repeat visits for the same condition – useful for consideration in EA.
- There is often a lack of information on health statistics at the community level.
- Precisely how the environment affects health is still in its infancy, therefore, existing health information is rarely related to environmental quality.
- Confidentiality of data especially where one is dealing with a small population where individuals might be identified from the data set.

Although there are difficulties in locating appropriate health information, there are health indicators presently of use in EA. The following chapter will discuss this issue in greater detail.

Assessing the Impacts:

Once the baseline health status has been determined, assessing the impact and determining significance is the next step. Criteria for assessing and determining the significance of adverse health effects can be found in Table 2.4.

Table 2.4
Criteria for Assessing Impact Significance (Canter, 1986)

Nature of the Impact	Definition
Magnitude	The probable severity of each potential adverse impact, in the sense of degree, extensiveness or scale. How serious is the impact? Does it cause a large change over baseline conditions (e.g., will crime rates double?) Does it cause a rapid rate of change – large changes over a short time period? Will these changes exceed local capacity to address or incorporate change? Does it create a change which is unacceptable? Does it exceed a recognized threshold value?
Geographical limits	This is the extent to which the potential impact may eventually extend (e.g., local, regional, national, global), as well as, to geographical location (e.g., far North, reserve, etc.)
Duration and frequency	The length of time (day, year, decade) for which an impact may be discernible, and the nature of that impact over time (is it intermittent and/or repetitive?) If repetitive, then how often?
Cumulative impact	The potential impact that is achieved when the particular project's impact(s) are added to impacts of other projects or activities that have been or will be carried out. The purpose being to predict whether or not a threshold level is surpassed.
Risk	The probability/predictability of an impact occurring. For many socio-economic impacts, qualitative assessments would be appropriate (high, medium, low).
Socio-economic importance	The degree to which the potential effects may (or be perceived to) impact on local economies or social structure.
People affected	How pervasive will the impact be across the population? This criterion should be used to assess both the percentage of the population affected and the extent to which it will affect different demographic groups, particularly the vulnerable groups (e.g., Aboriginal groups, children, elderly, pregnant women, etc.).
Local sensitivity	To what extent is the local population aware of the impact? Is it perceived to be significant? Has it been a source of previous concern in the community? Are there any organized interest groups likely to be mobilized by the impact?
Reversibility	How long will it take to mitigate the impact by natural or man-induced means? Is it reversible, and, if so, can it be reversed in the short or long-term?
Economic costs	How much will it cost to mitigate this impact? Who will pay? How soon will finances be needed to address this impact?
Institutional capacity	What is the current institutional capacity for addressing the impact? Is there an existing legal, regulatory, or service structure? Is there excess capacity, or is the capacity already overloaded? Can the primary level of government (e.g., local government) deal with the impact or does it require other levels or the private sector?

Health-based guidelines and objectives can be used to provide advice on the significance of potential adverse health effects. Guidelines and objectives have been developed for environmental and occupational hazards, including noise level, contaminants, radiation and microbiological agents. Useful guidelines include Health Canada's *Guidelines for Canadian Drinking Water Quality* and the *Guidelines for the Management of Wastes Containing PCBs* under the Canadian Council of Ministers of the Environment (CCME). Predicted levels are insignificant or have little effect if they fall below the level as specified by the guidelines or objectives.

Health-based guidelines and objectives provide a straightforward means of predicting impacts, but they do not exist for every possible environmental health hazard. Reasons why guidelines and objectives should be used with caution include:

- they are set to protect against specific types of health effects (e.g., common acute effects and cancer) but do not guarantee protection from all types of adverse health effects;
- they are usually set for individual hazardous agents; however, people are often exposed to mixtures;
- they have not been developed for all environmental hazards and they do not address the social, community or psychological dimensions of health and well-being effectively; and
- finally, health-based guidelines and objectives do not necessarily account for the age and sex of a person. For instance, children, the elderly and pregnant women can be more vulnerable to environmental hazards.

If no regulatory standards or objective criteria are available, other modes of evaluation should be used. Other approaches that can be used to assess a project's potential effects on health can be a balance between expert judgment and experience, risk-based analyses, public input, literature reviews, and case studies of effects associated with other similar projects.

Often, the evaluation of impact significance is seen as an ambiguous area of practice. Scientists and health professionals can evaluate significance of impacts differently or judgments can be subjective and contingent upon social values.

Social Impact Assessments:

Assessing the effects on socio-cultural well-being has often been referred to as social impact assessments (SIA). SIAs are conducted to examine the effects of projects on social and related economic conditions, such as employment, demographics, behaviour and lifestyle. Although SIAs are normally part of most EAs

for medium-sized and large projects, the approaches and methods used have evolved separately from those used for health. If the World Health Organization's definition of health is to be reflected in EAs, SIAs should be seen as part of the health component of EAs.

Occupational Health:

EAs should also address the potential effects on occupational health. In most Canadian jurisdictions, occupational health is usually assessed in EA. However, occupational health concerns are sometimes dealt with only later in project approval processes, such as facility licensing or permitting. It is important to include occupational health in EA because mitigative measures (design changes) to protect worker health are often more easily incorporated at the EA stage than at the facility licensing or permitting stage.

As well, in some cases, measures to protect occupational health may have a spill-over effect and result in improved protection for public health. Although occupational and public health concerns should be assessed in the same EA, the actual assessments need to be done separately. This is because occupational exposures are likely to be different from public exposures, and because occupational populations are different from the general public, since they are largely comprised of healthy adults. However, this information must come together within environmental assessment for decision-makers.

Health promotion (focusing on behavioral change strategies) versus health protection (efforts for making worksites safer) is an issue that has proven challenging when dealing with the occupational health and safety of workers. Increasing health promotion in the workplace is ineffective if efforts to make worksites safer (i.e., addressing the hazards of work) are minimal. Similarly, a health protection program that does not consider personal risk factors or wellness programs is equally ineffective. Consequently, an integrated approach to health promotion and health protection which includes joint worker and management participation in program planning and implementation, consultation with workers about worksite changes, and coordinated educational programs targeting health behaviour change is essential to promote worker health and safety.

Step 4: Determining Mitigation and Follow-Up

This stage focuses on two aspects. Mitigation, which is necessary to eliminate or to reduce to acceptable levels the predicted impacts, and follow-up monitoring, to verify the accuracy of the predicted impacts and modify the mitigation measures if need be.

Mitigation:

Mitigation measures are usually required to address significant adverse effects. If adverse impacts cannot be avoided or prevented, then minimizing these effects through mitigation is sought. If this is not attainable, compensation which usually takes the form of monetary payments, for damages caused by the project can be utilized. Monetary payment, or compensation does not reduce the environmental impacts but serves to financially compensate the individual(s) for tolerating the negative impact.

> Mitigation is "the elimination, reduction, or control of a project's adverse environmental effects, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation, or any other means".
>
> CEAA, 1992

The severity of the effects as well as environmental, social, cultural, political and economic conditions will all play a role in choosing appropriate mitigation measures as well as local circumstances and acceptability by the potentially affected populations. When responsibility for designing and implementing mitigation measures lies outside the health sector, health professionals should provide advice on the likely effectiveness of the measures for managing health risks to those responsible for the mitigation measures.

Follow-up:

The purpose of follow-up is to verify the accuracy of the environmental assessment that has been conducted – to determine if the proposed mitigative measures were implemented, and to determine the effectiveness of those mitigative measures. It should be noted that the requirements for identifying follow-up differ between jurisdictions.

Follow-up requirements however, may include:

- inspection and surveillance to ensure terms and conditions are implemented;
- compliance or effects monitoring to respectively ensure standards are met and impacts are within the predicted levels;
- impact management to address unanticipated changes and adjust mitigation measures and environmental management plans accordingly; and
- audit and process evaluation measures to examine the accuracy of predictions, the success of mitigation measures, and overall levels of environmental and EA performance.

Presently within EA, health monitoring and follow-up are poorly developed and represents a major area of weakness, particularly in comparison to the attention

and effort that is given to the previous steps. Monitoring and follow-up are perhaps the most crucial steps to advance our understanding of the effects of development projects on our physical and social well-being. If we are to understand the health implications for future development projects, we must rely on an accurate depiction of health effects from similar previous development projects. This can only be obtained through follow-up monitoring.

Step 5: Recommendations Regarding the Project

The final step in an EA is to decide whether or not the project should be allowed to proceed, and if so, what conditions should be attached to the approval. Conditions can include mitigative measures, requirements for follow-up activities, modifications to operating procedures, etc. Requirements for health mitigation or follow-up activities are sector specific (e.g., mining, nuclear, etc.) or project specific (urban/rural setting, or impacting on Aboriginal lands, etc.).

Decisions about whether or not a major project can proceed are made by the Minister of the Environment (provincial), the minister responsible for the project (federal) or Cabinet, and are based on recommendations received from government officials, a board or a panel. At this final stage, the decision-maker(s) look at both the potential adverse environmental and health effects of the project and its anticipated beneficial effects.

Public Participation

An integral part of the EA process is the public consultation process. This crucial stage is not seen as one of the steps of an EA schematic, since it is a parallel or ongoing activity to all of the aforementioned steps.

Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available.

Rio Declaration on Environment and Development, 1992

Public consultation is an important process *throughout* an EA since it allows the public to voice its concerns about issues which it feels are relevant to the proposed project or themselves. In fact, concerns about a project's adverse effects on health, well-being and the quality of life are most often raised within the public consultation process. Allowing different perspectives and views to come forward will hopefully ensure that important aspects are not overlooked. Furthermore, including the public from the onset is important since the public may have valuable knowledge and insights (traditional knowledge) into the ecosystems that will be potentially affected by a project.

Public participation and consultation is a vital component of any EA throughout the entire process. Invariably, the public will be concerned about how the project will impact on its physical and social well-being. As such, it is paramount that consultation between the proponent and the public begin at the scoping stage in order that the public does not feel excluded from the decision-making process. Follow-up activities on health and well-being should also consider the role that the public can play in matters such as follow-up monitoring, advisory committees and notification mechanisms.

Public participation is important in EA for four main reasons:

- it provides an open dialogue among the stakeholders;
- it allows the public to bring forward relevant information about the environmental, health and social conditions in the area;
- it provides a means of gauging public concerns about a project; and
- it can prevent and/or resolve disagreements about the project and its potential effects.

While the proponent or the government might not agree with all public opinions or concerns, it is essential to carefully consider the public's concerns about a project. Without dismissing or criticizing public concerns, proponents and government officials should be prepared to explain carefully and comprehensively the perspectives based on scientific evidence or accepted health practice. For this reason, the role of the health professional can be particularly useful in contributing to the long-term education of the public about the project and about public health matters in general. Health professionals can generally be quite effective at explaining and convincing the public because of their long-standing favourable relationship with the public.

> "The fundamental point is that participation without redistribution of power is an empty and frustrating process for the powerless."
>
> Arnstein, 1969

Successful participation will require trust between the proponent and stakeholders and a "level playing field" where all the stakeholders have access to adequate resources and all relevant information and reasonable notice for the public to prepare comments, statements and written responses. Methods and approaches that are used to provide and obtain information from the public can include advertisements on TV or radio, distributing brochures, direct mail, newspapers, and exhibitions or displays in public areas, etc.

Another reason to include the public from the onset is to ensure that they feel that their voices are being heard and considered. This contributes to the "health promotion" concept (discussed in Chapter 1) which contributes to better health for individuals and communities who feel better and can be more receptive or adapt more easily to a project if they are a part of the decision-making process.

Costs of assessing the environmental impacts of projects are on average less than 2% of capital costs and in most instances, represent a fraction of the costs of retrofitting or modifying poorly designed projects.

Health Canada, 1995

Tying Things Together: Health as an Integral Component of EA

Health assessment needs to be integrated into EA for reasons such as: (1) addressing public concerns; (2) minimizing the need for separate health and environmental impact assessments; (3) demonstrating cost effectiveness; (4) minimizing the adverse and maximizing the beneficial effects on health; and (5) supporting the concept of sustainable development. The bottom line is that it makes sense to include health considerations within EA for economic and social reasons and ultimately, to ensure that the health and well-being of individuals and society is not compromised.

Addressing Public Concerns

The public's main concern about projects is frequently related to health, well-being and the quality of life. These issues can go unnoticed by developers and be easily ignored unless individuals or communities raise them. EA has the capacity to address public concerns (and therefore health-related concerns), particularly during the public consultation process. Furthermore, EA has a follow-up and monitoring stage that is designed to ensure that the negative environment and health effects are minimized.

Minimizing the Need for Separate Health Impact Assessments

Health assessment needs to be integrated in EA and not done as a separate entity because decision-makers require information on economic issues, health and environmental effects concurrently. As such, the obvious decision should be to perform all tasks simultaneously. It would be time-consuming and often a duplication of information if one were to assess health separately from EA since information is often common for both. Equally important, the public expects health assessments to be part of the EA process.

Demonstrating Cost Effectiveness

The level of effort for assessing health in EA should be consistent with the magnitude and severity of the potential effects. Assessing health in the EA process is much more cost-effective for the proponent than assessing it separately since there is no duplication of data sets which requires time and additional monetary resources. One might argue that neglecting to assess health in EA would be even more cost-efficient, however, these costs are likely to be very small for the proponent in comparison with the eventual costs on society for curative and treatment services that could be required in the event that health effects were not foreseen or not assessed properly. Adverse effects on health can be minimized or prevented from occurring so as not to be an additional burden on health care services associated with the project. One of the difficulties with this argument is that quantifying the health effects prevented by EA or any positive health outcomes in economic terms is a new and somewhat unknown endeavour.

Minimizing the Adverse and Maximizing the Beneficial Effects on Health

Including health as a component of EA permits the reduction of adverse health effects through mitigative measures. If certain detrimental effects on health have been identified (and cannot be prevented), at the onset of the project, at least these impacts can be mitigated as much as possible and the effects can be monitored closely.

EAs need not only be used to mitigate adverse effects. They also have the potential to maximize beneficial effects of development on health. For example, EAs could identify strategies and measures that will actively promote health such as workplace programs on health. It has already been suggested that EAs should consider how projects can promote health by conducting "health opportunity assessments" (Slooff, 1995).

Contributing to Sustainable Development

In 1987, the World Commission on Environment and Development popularized the term "sustainable development". Since then, many countries have endorsed this concept. The report of the WHO Commission and UNCED's (United Nations Committee on Environment and Development) Agenda 21 recognized that even though health concerns are essentially related to those of environment and development, "health considerations are often taken for granted

Sustainable development: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

WCED, 1987

when the latter are considered and either ignored or dealt with inadequately". Adamant that this notion must change, the first principle enunciated in the Preamble to the Rio Declaration on Environment and Development thus focuses on human health:

> "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature."
>
> WHO, 1993

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3 HEALTH INDICATORS FOR USE IN EA

It has already been stated that the assessment phase and the phase determining the significance of potential effects lies at the heart of EA. This Chapter will delve into the requirements for baseline information on health and well-being that will be useful to decision-makers by:

- Discussing the type of health information and indicators for use in EA
- Providing possible sources to contact for information on public and occupational health
- Suggested readings

Health Information and Indicators for Use in EA

As mentioned in the previous Chapter, baseline information on health and well-being is necessary to assess and determine the significance of potential effects on health. Several types of health information are useful:

- scientific information, such as data on the incidence of disease;
- public information and concerns;
- traditional knowledge held by people who live or work on the land, including farmers, hunters, trappers, guides and Indigenous people.

Information on health and well-being is usually represented by indicators. There are many different indicators of health and well-being. In most EAs, existing information and indicators are used for assessment purposes. Occasionally, for large projects, and when there is a shortage of information and indicators, it may be necessary to collect new information and to select new indicators. New information can be collected in health surveys and epidemiological studies, but these are often expensive, time consuming and resource-intensive. It is rarely possible to collect new health information within the timeframe of most EAs.

Information and indicators used for health and well-being should be:

- relevant to the possible effects of the project on health and well-being;
- understandable by all stakeholders;
- interpretable and permit the distinguishing of acceptable from unacceptable conditions; and
- quantitative whenever possible.

The types of information and indicators used in an EA will depend on the type of project and its possible effects. Some types of information and indicators on health and well-being can be found in Table 3.1.

Table 3.1
Types of Health Information and Indicators for Use in EA

	Physical Health	Socio-cultural Well-Being
Public	■ Respiratory effects ■ Noise ■ Effects of accidents and malfunctions ■ Rates of communicable and sexually transmitted diseases ■ Cancer incidence ■ Effects on fertility and development, including congenital anomalies	■ Changes in the quality or way of life ■ Changes in cultural and social patterns ■ Rates of crime ■ Rates of drug and substance abuse ■ Changes in stress levels
Worker	■ Injuries, effects of accidents and malfunctions ■ Days off work or disability days ■ Long term activity limitations ■ Respiratory effects ■ Effects on skin (e.g., irritation, chloracne) ■ Effects on fertility ■ Cancer incidence	■ Changes in the quality or way of life ■ Necessity for relocation ■ Stress-related conditions

The types of information and indicators shown in Table 3.1 are mostly direct measures of health. Monitoring using direct indicators of health will usually only provide information after people have been affected. In contrast, indirect measures can provide an important means of preventive monitoring because they can provide information before health is affected. Indirect indicators of occupational or public health include:

- levels of toxic chemicals in human tissues, including blood, hair and urine;
- biological markers of exposure to toxic chemicals, such as enzyme induction, cellular abnormalities and the formation of DNA adducts;
- the proportion of workers and/or the public following safety procedures (e.g., workers wearing personal protective equipment);
- levels of hazardous substances in the environment;
- effects on the health and well-being of wildlife; and
- discharges of hazardous substances to the environment.

Often, the greatest difficulty lies in measuring and consequently, assessing effects associated with some aspects of physical well-being and socio-cultural well-being. Cumulative effects which contribute to physical well-being are often difficult to assess since effects can, and most likely, will occur over a long period of time. Furthermore, it is difficult to determine whether the impacts are attributed solely to the project on hand or whether other factors in the environment are contributing to the effect. Socio-cultural well-being, however, is much more difficult to assess since changes in the way of life or quality of life are often subtle, occur sporadically over different time spans and affect individuals differently. Consequently, indicators reflecting social well-being as it relates to health in EA are still in the developmental stage.

Contacts for Information on Public and Occupational Health

Fortunately, there is some information and indicators of health and well-being available for workers and the public throughout Canada. Some possible sources of information on public and occupational health are shown in Table 3.2.

Table 3.2
Sources of Information on Public and Occupational Health in Canada

Level	Description of Source
National/ Federal	Canadian census (Statistics Canada)
	Canadian Centre for Health Information (Statistics Canada)
	State of the Environment Report (Environment Canada)
	Federal EAs (Canadian Environmental Assessment Agency)
	Canadian Congenital Anomalies Surveillance System (Health Canada)
	Environmental health assessment staff of Health Canada
	Department of Human Resources
	Environment Canada staff
Provincial	Provincial health surveys (provincial health departments)
	Cancer registries
	Workers' Compensation Boards
	Provincial state of the environment reports (provincial environmental departments)
	Provincial EAs (provincial environmental departments)
	Staff of provincial health, environment and labour departments)
Local	Local health surveys (local health departments)
	Local state of the environment reports (municipalities)
	Health care professionals including physicians, nurses, community workers and industrial hygienists
	Local environmental, public health and occupational health consultants
	The public including local residents, local business people, labour organizations, environmental groups, hunters, fishers, and Aboriginal people
	Local academic and research consultants
	Municipal staff and local health department staff
Others	Epidemiological studies
	Toxicological studies
	Environmental studies

Suggested Readings

McColl, Stephen (ed.) Development of Environmental Health Status Indicators. Institute for Risk Research. University of Waterloo, Waterloo, Ont., Canada, 1992.

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