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National Strategic Framework on Children's Environmental Health

May 2010

Canada

PREFACE

In 2003, the **Canadian Council of Ministers of the Environment** (CCME) called for the development of a set of principles of federal, provincial, and territorial collaboration on children's environment and health, as the basis for a collaborative agenda for children's environmental health.[1] The principles, jointly developed by the health and environment sectors, recognize that children require special protection and state that:

- Prevention of exposures is fundamental to protecting children's health;
- Best available science will play an integral role in the process of making decisions about children's environmental health;
- Children's vulnerabilities will be considered in developing environmental and health regulations, policies and standards; and
- Targeted environmental and health regulations, policies and standards may be required to protect children's health.

In response, the **Children's Task Group** (CTG) of the **Federal/Provincial/Territorial Committee on Health and the Environment** (F/P/T-CHE) has drafted this national Strategic Framework to provide guidance for action plans on children's environmental health. The elements of the Strategic Framework have been informed by discussions during the Canadian Partnership for Children's Health and the Environment (CPCHE) policy consultations in 2007–08. These consultations culminated in the *First Steps in Lifelong Health, a Vision and Strategy for Children's Health and Environment in Canada*.[2] The National Strategic Framework has also been informed by a large number of recent reports and papers on children's health and well-being (see Appendix 1).

The ***National Strategic Framework on Children's Environmental Health*** provides overall principles and goals. In general, the Strategic Framework can be applied by all sectors of society in Canada to protect children's health from environmental hazards according to identified needs and priorities. More specifically, it is intended that this Strategic Framework be used by jurisdictions in Canada to stimulate discussion and to facilitate focused action on current and future children's environmental health concerns. A glossary of terms used can be found in Appendix 2.

[1] www.ccme.ca/assets/pdf/children_principles_e.pdf
[2] 2008, see Appendix 1.

TABLE OF CONTENTS

Acknowledgements 4
Executive Summary 5

National Strategic Framework on Children's Environmental Health 6

Introduction 6

The Strategic Framework 9
Intent 9
Scope 9
Vision 9
Principles 9
Goals 12

Appendix 1.
Recent Policy Documents, Assessments, Action Plans and Strategies Related to Children's Health and the Environment 15

Appendix 2.
Glossary of Terms 17

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EXECUTIVE SUMMARY

Protecting the health and well being of children is a national and international priority. Governments and international agencies have all agreed that promoting healthy growth and development in children is the most sustainable approach by far for optimizing adult health and well being and for lowering health care costs.

In 2003, the Canadian Council of Ministers of the Environment (CCME) called for the establishment of a collaborative agenda for children's environmental health. In response, the Children's Task Group (CTG) of the Federal/Provincial/Territorial Committee on Health and the Environment (F/P/T-CHE) has drafted this national Strategic Framework to provide guidance for action plans on children's environmental health.

The development of the *National Strategic Framework on Children's Environmental Health* has been informed by a number of recent reports and papers on children's health and well-being. It can be applied by all sectors of Canadian society to protect children's health from environmental hazards according to identified needs and priorities. The Strategic Framework is intended to be of use by jurisdictions in Canada to stimulate discussion and to facilitate focused action on current and future children's environmental health concerns.

The Strategic Framework:

- The overall *intent* of this Strategic Framework is to provide the vision, principles and goals to guide the development of action plans for the protection of children living in Canada from exposure to environmental hazards.
- The *scope* of the Strategic Framework addresses the environmental health determinant as it applies to children but recognizes that other determinants of health such as genetics, socioeconomic status, and culture can have significant influence on the susceptibility of children to environmental exposures.
- The *vision* of this Strategic Framework is that all children in Canada live, learn, work and play in healthy environments.
- The Strategic Framework is built on nine *principles*: overall population health improvement; prevention and protection; evidence-based public policy; fostering collaboration; enhancing existing capacity; integration and utilization of information; public education and communication; sustainable development; and measuring success.
- The three major *goals* in this draft Strategic Framework are linked together to address risk assessment, risk management, and communication and capacity building issues and each goal identifies areas where focus could be placed.

National Strategic Framework on Children's Environmental Health

1. INTRODUCTION

Children, and the adults they become, are the most significant asset of any country. It is clear that protecting their health and well being is a national and international priority. Promoting healthy growth and development in children is the most sustainable approach by far for optimizing adult health and well being and for lowering health care costs. Protecting children from exposures to environmental hazards is one way to keep children healthy. Everyone has a role to play in reducing exposures to environmental hazards. For example:

- Parents and families provide a safe environment for their children at home and are the decision makers of what is best for their children;
- Care-givers in daycares, schools and other settings provide an environment free of hazards to the children in their care;
- Health-care professionals and scientists provide advice on how chemicals and other contaminants can affect children's health and how to avoid and treat significant exposures; and
- Governments, non-governmental organizations and the private sector all work together to support the development of legislation and policies which protect children from known and potential environmental hazards.

Protecting children from exposures to environmental hazards which may result in adverse child-health outcomes is a growing concern globally. In 1997, the G-8 Environment Ministers issued the *Miami Declaration on Children's Environmental Health.*[3] Its key components included:

- Children face significant threats to health from environmental hazards.
- Protection of human health is a fundamental objective of environmental policies to achieve sustainable development.
- Health and well-being of families depends on a clean and healthy environment.
- Children are particularly vulnerable to pollution.
- Environmental threats to children are aggravated by poverty.

The Environment Ministers reaffirmed their commitment and concern through the *Busan Pledge* in 2009.[4]

Within a global context, Canadians enjoy a good quality environment, but identified risks to health remain. The World Health Organization has calculated that environmental

[3] Environment Leaders Summit of the Eight, Miami, Florida, May 5–6, 1997 Declaration, 1997. www.g8.utoronto.ca/environment/1997miami/children.html

[4] www.who.int/phe/busan_pledge.pdf

factors are responsible for 13% of Canada's overall disease burden.[5] Recent and preliminary Canadian research estimates that pollution may contribute up to 25,000 premature deaths in Canada each year and could burden the health care system with several billion dollars in extra costs annually.[6] The environmental burden of disease, with its associated socioeconomic costs, can be reduced both by ensuring healthier environments and providing people with the information they need to protect themselves from harmful exposures.

While environmental hazards may potentially affect the health of all Canadians, children can be disproportionately affected. In 2000, the WHO estimated that the environmental burden of diseases (measured in disability adjusted life years or DALYs, see Appendix 2) for children 14 years old and under can be up to 13 times higher than for all other age groups combined.[7] In the European Region, the WHO has reported that one third of the total burden of disease for children 0–19 years old comes from air pollution, unsafe water, lead exposure and injuries.[8]

Children and youth make up almost one-quarter (23%) of the Canadian population (7.9 million Canadians age 19 or under) based on Statistics Canada projections for 2009,[9] and thus represent a large vulnerable sub-population. There is fairly universal agreement that children are more susceptible to environmental hazards for several reasons (see publications in Appendix 1), including:

- Developing physiology which opens windows of vulnerability at critical developmental stages, and may also affect their absorption, metabolism and elimination of toxic substances;
- Immune system development (suppressed by some persistent chemicals, improved by breast feeding, microbiological challenges specific to some diets and living conditions, etc.);
- Unique early life exposure pathways (e.g., trans-placental transfer, consumption of breast milk or formula, close-to-ground exposures, etc.);
- Greater exposures compared with adults because they eat, drink and breathe more in proportion to their body weight;
- Specific childhood behaviours (e.g., crawling hazards, hand-to-mouth actions, risk taking behaviours especially in male adolescents, etc.);
- Lack of awareness of and control over their own environmental risks to health (exposure to second hand smoke, parental occupational exposures, noise, heat, cold, radiation, microbiological hazards, etc.); and
- Lack of knowledge among parents, care-givers and health professionals about how to reduce specific environmental risks for children.

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[5] WHO, 2009. Country profiles of environmental burden of disease. www.who.int/quantifying_ehimpacts/national/countryprofile/canada.pdf

[6] Boyd and Genuis, 2008. The environmental burden of disease in Canada: Respiratory disease, cardiovascular disease, cancer, and congenital affliction. Environmental Research 106(2) 240–249.

[7] WHO, 2000. www.who.int/whr/2000/en/

[8] WHO, 2004. www.who.int/quanitfying_ehimpacts/publications/en/ebd8web.pdf

[9] Statistics Canada, 2009. www40.statcan.ca/l01/cst01/demo10a-eng.htm

Other determinants of health, as outlined in Appendix 2 can make children even more vulnerable to environmental hazards. For example, living in poverty is strongly related to the burden of environmentally attributable disease for all Canadians, and even more so for children. Poverty is often associated with poor nutrition, poor or crowded housing, less education, less access to health care, poorer quality local environments, less than adequate nurture, more substance abuse, etc. Children in some Aboriginal communities, others who are newcomers to Canada and still others living in dense urban centres are potentially more vulnerable to exposure to environmental hazards.

As in other countries, Canadian groups and agencies have been working diligently to address children's environmental health issues by undertaking research, bringing about policy and regulatory changes and improving education. While there has been a tremendous effort to protect children's health from environmental hazards, there is still a need for all stakeholders to work together to strengthen protection of children's health from environmental hazards in Canada.

The development of this Strategic Framework was informed by the work of national and international groups such as the Canadian Partnership for Children's Health and the Environment (CPCHE). This Strategic Framework provides an overall vision, principles and goals which can be applied by all sectors of Canadian society to protect children's health from environmental hazards according to identified needs and priorities. The Strategic Framework is intended to be of use by jurisdictions in Canada to stimulate discussion and to facilitate focused action on current and future children's environmental health concerns. Although the Strategic Framework was developed by governments it may be useful for other sectors.

In developing this Strategic Framework the CTG took into account the progress already made, the work being currently done and the challenges still to be faced. In addition, an extensive but not exhaustive literature review was carried out (see Appendix 1). Terms used in this Strategic Framework are described in more detail in Appendix 2.

2. THE STRATEGIC FRAMEWORK

2.1 INTENT

The overall **Intent** of this Strategic Framework is to provide the vision, principles and goals to guide:

- *The development of action plans for the protection of children living in Canada from exposure to environmental hazards.*

2.2 SCOPE

The **Scope** of this Strategic Framework includes:

- *Chemical, biological and physical hazards in the environment;*
- *Preconception, prenatal and childhood exposures;*
- *Exposures through air, water, soil/dust, food, consumer products, and other aspects of the physical environment in which the child lives;*
- *Health outcomes during childhood and during adulthood that result from (or may result from) known or suspected childhood exposures.*

This **Scope** recognizes that other determinants of health (see Appendix 2) such as genetics, socioeconomic status, and culture may have significant influence on the susceptibility of children to environmental exposures. This Strategic Framework focuses on the 'environmental health' determinant and will not identify strategies to address the root causes of these other determinants or to reduce their sources of risk. Inclusion of overall social determinants must be part of a larger effort on the protecting the health of children living in Canada.

2.3 VISION

The V**ision** of this Strategic Framework is that:

All children in Canada live, learn, work and play in healthy environments.

2.4 PRINCIPLES

This Strategic Framework is built on the following **Principles**:

2.4.1 Overall Population Health Improvement

Actions taken to reduce harmful environmental exposures will improve the health of children and the general population.

- The special vulnerability of children increases their risk of harm from environmental exposures. As child health is a determinant of adult health, efforts to protect the health of children contribute to the maintenance and improvement of adult health in Canada, as well as the health of future generations. In short, healthy children become healthy adults.

2.4.2 Promotion, Prevention and Protection

It is easier and less expensive to prevent or minimize harmful environmental exposures which may lead to adverse outcomes, rather than to identify treatment strategies after children have been exposed or adversely affected.

- This principle follows from the old adage that "an ounce of prevention is worth a pound of cure". By improving health outcomes in children across Canada, collaborative efforts will also reduce the economic and social costs of common chronic diseases and conditions associated with the environment such as respiratory diseases, cancer as well as developmental and neurobehavioral disorders.

2.4.3 Evidence-based Public Policy

Policy and communication must be built on good science, and to be effective, they must grasp the significance of the latest science and address emerging children's health issues.

- Good science is foundational to good policy development and communication activities. Policy needs to recognize that new or emerging exposures can occur rapidly as our world changes. Some of these changing exposures may affect the most vulnerable sub-groups of children first or with greater impacts (e.g., contaminant levels in the traditional food of Inuit). In addition, population dynamics and geography may result in new vulnerable populations of children not previously considered at risk from these new environmental exposures. Strengthening public policy, assessment and regulations in the area of children's environmental health and 'grounding' it to the science we have, is essential to success.

2.4.4 Fostering Collaboration

Collaboration and communication among all stakeholders is essential because maintaining and improving the status of children's environmental health in Canada is a responsibility shared by all.

- Collaboration does not just happen; it is developed and shaped by many players working together for a common interest. Collaboration increases capacity through knowledge sharing and pooling of resources, reduces duplication, supports consistency and standards, and enhances cost-effectiveness of interventions. A broad-based and collaborative Strategic Framework better positions Canada to link with related initiatives both within the country and on the international stage.

2.4.5 Enhancing Existing Capacity

The most successful approaches to children's environmental health issues in Canada will be based on adding value to the existing foundation of work completed and underway.

- A significant number of programs, initiatives, and activities related to children's health and the environment are already underway in Canada. Building on the knowledge base, the current activities and successes in Canada and internationally will be cost effective and strategic; it will increase Canadian expertise and capacity for action on children's environmental health.

2.4.6 Integration and Utilization of Information

Integration of a broad spectrum of information related to environmental exposures, hazards and health outcomes is essential for a better understanding of the relationships between the health of children and environmental hazards.

- Children's environmental health issues are complex and interconnected with a range of other determinants of health. Children will be affected as the world is influenced by known and emerging environmental hazards. Addressing these issues will require collaborative efforts of multiple disciplines, communities and cultures working locally, nationally and globally. Children's environmental health issues will also require that we work collectively for a common goal and share a large amount of up-to-date information from many sources including those which can establish linkages between human, animal and ecosystem health.

2.4.7. Public Education and Communication

Focused and continuous education and communication are necessary to raise awareness about environmental hazards and to foster actions that may be taken to prevent harm and promote children's health.

- Education and awareness-raising needs to be based on the transfer of knowledge from the latest science findings into comprehensible public information. Communication involves multiple individuals and groups sharing information and ideas and listening to each other. Communicating information and providing ongoing education on the risks to children's health posed by exposures to environmental hazards is critical if parents/care givers and youth are to be involved in reducing children's and youth's exposure to environmental hazards.

2.4.8 Consideration of Other Determinants of Health

Approaches to addressing children's environmental health issues must take into account social, cultural, and economic considerations to reduce health inequities.

- Actions taken to resolve children's environmental health issues must be based on the principles of sustainable development. They must consider all factors including social economic and environmental aspects and be respectful of culture.

2.4.9 Measuring Success

The success of Canada's initiatives to prevent/reduce harm to children's health from environmental exposures needs to be measurable whenever possible.

- Public policy and public health initiatives can have varying degrees of success and may need to be re-considered from time-to-time based on evaluation of outcomes. The collection of health statistics and regular publication of information will enable an evaluation of the effectiveness of policies and initiatives related to children's environmental health.

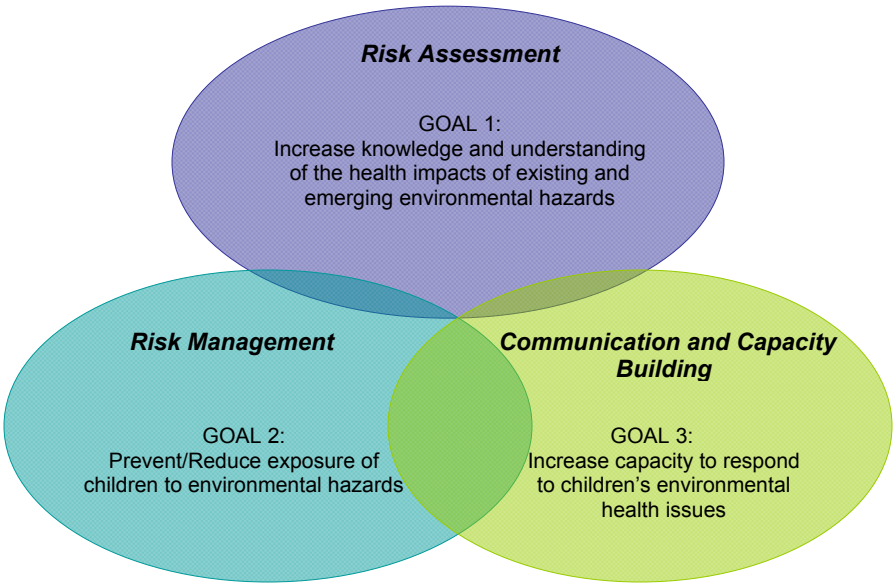
2.5 GOALS

The three major **Goals** in this draft Strategic Framework are linked together to address risk assessment, risk management, and risk communication and capacity building issues (see Figure 1). The three major goals have a number of areas of focus as shown below. All Strategic Framework goals and their focus areas are designed to contribute to the **Vision** of the Strategic Framework, address the **Intent** and to satisfy the **Principles** outlined above.

Figure 1: National Child Health and Environment Strategic Framework

Vision: **All children in Canada live, learn, work and play in healthy environments.**

Intent: **The development of action plans for the protection of children living in Canada from exposure to environmental hazards.**



Principles:

Overall population health Improvement	Promotion, Prevention and protection	Evidence-based public policy
Fostering collaboration	Enhancing existing capacity	Integration and utilization of information
Public education and Communication	Consideration of Others Determinants of Health	Measuring success

GOAL 1. Risk Assessment: Increase knowledge and understanding of the health impacts of existing and emerging environmental hazards for children

Some areas of focus include:

- Identifying vulnerable sub-populations of children in Canada most likely to be affected by environmental hazards (e.g., children living on First Nations reserves; Aboriginal children including Inuit; children living in low income households; children living in dense urban centres; new Canadians; etc.).
- Identifying priority emerging or new environmental hazards (e.g., agents or substances which may affect children disproportionately; heightened exposures resulting from climate change; previously undetected or poorly characterized substances or agents; etc.).
- Establishing and supporting a research agenda on children's environmental health (research gaps/needs; monitoring priorities/frequency; key environmental health indicators for children; causal relationships between environmental exposures and children's health; support for collaborative and interdisciplinary studies; specimen banking; data banking; data reporting; etc.).
- Reporting on indicators of children's environmental health for both the general population of children and vulnerable sub-populations of children (quantitative trend information related to levels/amount of exposure; exposure estimates for children indoors, outdoors, prenatal, postnatal, different ages; regular and frequent reporting timelines; prompt publication of data; communication of key findings to policy makers; etc.).
- Increasing understanding of the environmental burden of illness in children living in Canada including the economic and social costs.
- Understanding the relationship between environmental exposures and other determinants of health.

GOAL 2. Risk Management: Prevent/Reduce exposure of children to environmental hazards

Some areas of focus include:

- Identifying priority risks to child health related to exposure to environmental hazards (e.g., metals such as mercury and lead; persistent chemical pollutants; endocrine disrupting substances; indoor and outdoor air pollutants such as particulates, dust and moulds; microbiological agents; etc.).
- Identifying priority sources of risks to child health in the physical environments where children live, learn, work and play (e.g., exposures in the home and at school; overcrowded homes; contaminated play spaces; lack of safe local parks or recreation paths for exercise; etc.).
- Including children's environmental health considerations in all risk evaluations and policy development (e.g., incorporating children's vulnerabilities in all risk assessment; risk management and health impact assessment methodologies; children's exposure guidelines; exposure monitoring activities directed at children's health; etc.).

GOAL 3. Communication and Capacity Building: Increase capacity to respond to children's environmental health issues

Some areas of focus include:

- Enhancing communication and coordination between/among stakeholders in Canada to facilitate more expertise and capacity on children's environmental health issues (e.g., websites; inter-disciplinary conferences; internships; staff exchanges; etc.).
- Understanding the decisions made by caregivers that affect children's health.
- Increasing stakeholders' capacity to address environmental risks to child health (e.g., health professionals; educational institutions; communities; etc.).
- Reaching-out and providing advice to Canadians on how they can reduce children's exposure to environmental hazards (information dissemination to caregivers at home, in daycares, and at school; community outreach; addressing risk taking behaviours in adolescents; etc.).
- Establishing effective systems and networks of surveillance to monitor the short- and long-term impacts of environmental exposures (including occupational exposures which are transferred into the home or may affect reproductive health) on the health of pregnant women and children.
- Providing support for communities which takes account of environmental and socioeconomic determinants of health (e.g., understanding social determinants and how they interact with environmental exposures; policy advocacy which addresses both social and environmental exposures; how the workplace affects environmental determinants; community development and action; etc.).

APPENDIX 1. RECENT POLICY DOCUMENTS, ASSESSMENTS, ACTION PLANS AND STRATEGIES RELATED TO CHILDREN'S HEALTH AND THE ENVIRONMENT

NOTE: This list is not an all inclusive list; however, it is indicative of recent and informative coverage of children's environmental health issues.

North America

2009. Through the Eyes of a Child: First Nation Children's Environmental Health. Union of Ontario Indians, Anishinabek Health Secretariat.
2009. Background Paper on Children's Environmental Health Research in Canada. Contract Report, E. Phipps, Health Canada.
2008. Lead, Mercury and Cadmium Levels in Canadians. Statistics Canada, Ottawa.
2008. CPCHE Vision and Strategy for CHE in Canada. Canadian Partnership for Children's Health and the Environment.
2008. Final Report of the CPCHE/ Pollution Probe National Policy Consultation on Children's Health and Environment. Canadian Partnership for Children's Health and the Environment and Pollution Probe.
2007. (draft) A National Child Health and Environment Strategy for Canada. Children's Task Group, Committee on Environment and Health, Canadian Council of Environment Ministers.
2007. Reaching for the Top: a report by the Advisor on Healthy Children and Youth. K.K Leitch.
2007. Prescription for a Healthy Canada: Towards a National Environmental Health Strategy. David Boyd, Suzuki Foundation, Canada.
2007. A Father's Day Report – Men, Boys and Environmental Health Threats. Canadian Partnership for Children's Health and the Environment and Pollution Probe.
2006. Toxic Chemicals and Children's Health in North America. North American Commission for Environmental Cooperation, Montreal.
2006. The Air We Breathe: An International Comparison of Air Quality Standards and Guidelines. Suzuki Foundation, Canada.
2006. Protecting Our Future: How Selected OECD Countries Govern Environmental Health Threats to Children. Contract Report, V. Armstrong, Health Canada, Ottawa.
2006. Children's Health and the Environment in North America: A First Report on Available Indicators and Measures. Environment Canada and Health Canada, Ottawa.
2006. First Report on Available Indicators and Measures. North American Commission for Environmental Cooperation, Montreal.
2006. Health Policy Approaches to Children's Environmental Health. Contract Report, D. Krewski, Health Canada, Ottawa.
2006. Governance Instruments and Child Health: Informing Canadian Policy. Spady, Health Canada, Ottawa
2005. Environmental Threats to Children: Understanding the risks, enabling prevention. City of Toronto Public Health
2005. Child Health and the Environment: A Primer. Canadian Partnership for Children's Health and the Environment.
2003. Child Health and Environment. D. Wigle, Oxford University Press, New York.
2002. Status Report on the Implementation of the Declaration of the Environment Leaders of the Eight on Children's Environmental Health (1997). Environment Canada, Ottawa.

2002. Cooperative Agenda for Children's Health and Environment in North America. North American Commission for Environmental Cooperation, Montreal.
2000. Children's Health Project: Environmental Standard Setting and Children's Health. Canadian Environmental Law Association and OCFP.
2000. Health of Canada's Children (Third Edition). Canadian Institute for Child Health, Ottawa
2000. Our Children, Our Health: Towards a Federal Agenda on Children's Environmental Health – Workshop Report. 5NR Working Group, Government of Canada, Ottawa.
1999. Airborne Pollutants and Human Health.
Date Unknown. Environmental Contaminants: Evaluating the Impacts on Aboriginal Children and Elders.

Other International

2009. Children's Environment and Health Strategy for the UK. Health Protection Agency, United Kingdom.
2005. Children's health and the environment: A global perspective. World Health Organization, Geneva.
2004. Healthy Environments for Children Alliance: Framework for Action. World Health Organization, Geneva.
2004. Children's Environmental Health Action Plan for Europe (CEHAPE). World Health Organization Regional Office for Europe, Copenhagen, DK.
1997. Miami Declaration of the Environment Leaders of the Eight on Children's Environmental Health.

APPENDIX 2. GLOSSARY OF TERMS

The following terms appear in the National Strategic Framework on Children's Environmental Health.

Children

The term "children" includes the period from **conception up to 19 years of age**.[10] It also includes the **preconception period** in that parental exposure to environmental hazards can significantly affect pregnancy and child health outcomes. This definition recognizes the specific exposures and susceptibility of each of the following developmental stages:

- Preconception: Parental exposure prior to conception can have a major impact on paternal and maternal reproductive health (i.e., ionising radiation) as well as pregnancy outcome. Several persistent contaminants can be stored in the mother's body and later mobilized during pregnancy to affect the fetus (i.e., through placental transfer) and the newborn (i.e., during breastfeeding). Paternal exposures can also affect the offspring.
- Embryonic and fetal period: A period of rapid cell growth during which environmental exposures can cause permanent cell damage, congenital anomalies, and influence the development of cancer later in life. Many organic chemical and metallic environmental contaminants cross the placenta and reach the fetus (i.e., PCBs, DDT, lead, mercury).
- Neonatal period (0–1 year old): Organs and tissues undergo rapid growth during the first year of life. The gastrointestinal tract and skin are highly permeable (exposures occur through ingestion of breast milk and formula and dermal contact with substances).
- Preschool age (1–4 years old): Lung growth and development are very rapid and in comparison to adults there is still a markedly greater rate of respiration and caloric intake per kilogram of body weight, as well as, more hand-to-mouth behaviour and often more limited diets.
- School-age (4–11 years of age): Lung growth and development remain rapid and rates of respiration and caloric intake per kilogram of body weight continue to be greater than adult rates. Exposures may occur in daycares and schools (e.g., chemical use in schools, diesel fuelled school buses).
- Adolescence (11–19 years of age): Lung growth and development, rapid growth in the viscera, skeleton and muscles, and development and differentiation of reproductive system continue. Maturation of a number of systems and organs, including the brain, takes place. Risk taking behaviour rises as do some occupational exposures.[11]

Children's Environmental Health

Children's environmental health is defined by those aspects of child health that are determined by the **physical environment**. Children's environmental health recognizes that children are at greater risk from some **environmental hazards** than adults because of their physical size, immature organs, physiology, behaviour and lack of knowledge. It also refers to the theory and practice of assessing, correcting, controlling and preventing exposures to those hazards in the physical environment that can potentially affect adversely the health of present and future generations. Addressing children's environmental health also includes the recognition that child health is a determinant of adult health, and that environmental exposures early in life (childhood years) may result in adverse health outcomes later in life (adult years). Lifetime health

[10] "up to 19 years of age" is the most commonly used definition of a child for health statistics in Canada.

[11] Adapted from Tamburlini et al. (2002) "Children's health and environment: A Review of Evidence", World Health Organization Regional Office for Europe, European Environment Agency, ISBN 92-9167-412-5, EEA, Copenhagen. Pp. 19–21.

implications of exposures to environmental hazards in early years are only just beginning to be recognized. Some children are exposed to higher levels of contaminants than others because of where they live, their diet or their parent's occupations. Prevention of excess environmental exposures in children may help to alleviate future health care costs for aging populations.[12] [13]

Health

Health can be defined as, "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity".[14]

Determinants of Health

Health is influenced by a variety of factors, the main ones being genetic inheritance and the economic, social, psychological and physical environment in which individuals, families and communities live. These factors interact in complex ways, which may be specific for each disease and for specific individuals and population groups. Environmental exposures are a risk factor for many important chronic diseases, such as asthma and for infectious diseases, caused by organisms such as *E. coli*. Addressing the physical environment as a determinant of disease and ill-health in children does not imply a clear-cut separation between what is "environmental" and what is not, and between what is "social" and what is not, etc. On the contrary, a focus on health effects that are at least partially attributable to the physical environment, contributes to a more comprehensive view of the complex and multiple determinants of health. The determinants of health as defined by the World Health Organizations[15] are illustrated below:

[12] Organization for Economic Co-operation and Development, *Environmental Outlook* (Paris: OECD, 2001), 253.

[13] Wigle, D. T., Arbuckle, T. E., Walker, M., Wade, M., Liu, S., and Krewski, D. 2007. Child health and environmental contaminants. *J. Toxicol. Environ. Health B.*

[14] Preamble to WHO constitution. 1948.

[15] Health Canada, 2004. Canadian Handbook On Health Impact Assessment – Volume 1: The Basics. www.hc-sc.gc.ca (go to Environmental and Workplace Health and then Environmental Health Assessment on the web page).

Physical Environment

The physical environment — both natural and modified or built by humans — plays a crucial role in the development of a healthy child. It includes the housing in which children live, the air they breathe, the water they drink, the food they eat, the consumer products they use, and the parks and communities in which they play. Within both natural and built environments, children are exposed to various hazards, at different levels and, in some cases, through different exposure pathways than adults.

- ***Physical hazards:*** Ionizing radiation including radionuclides and radon gas, non-ionizing radiation including uV light, noise, heat, cold, etc.
- ***Biological hazards****:* Pathogenic micro-organisms spread through direct contact with contaminated food, consumer products, air, soil, water and other vectors.
- ***Chemical hazards:*** Chemicals and metals released into the environment and present in food, consumer products, air, soil or water.
- ***Global and local environmental degradation:*** The effects of climate change and the thinning of the ozone layer pose a threat to children's health.[16] The release and transport of contaminants in the environment and the deterioration of our natural waters, lands and air threaten children's access to safe water, food, air, shelter, learning, recreation and spiritual development.

Environmental Burden of Disease

An estimate of the mortality and loss of health due to disease and injury caused by environmental hazards. The environmental burden of disease is often measured in disability adjusted life years (DALYs) among other measures. A DALY is the sum of the years of potential life lost due to premature mortality and the years of productive life lost to disability.

[16] Adapted from: "Natural and Built Environments", Public Health Agency of Canada, Division of Childhood and Adolescence. www.phac-aspc.gc.ca/dca-dea/publications/healthy_dev_partb_5_e.html