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SENIORS' HEALTH AND THE ENVIRONMENT

Workshop Report

February 5–6, 2008

Ottawa Congress Centre



Canada 

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Prepared by:

Vulnerable Populations Office
Policy, Planning and Integration Directorate
Healthy Environments and Consumer Safety Branch
Health Canada

This report summarizes discussions and activities that took place at the Seniors' Health and the Environment Workshop Report, February 5–6, 2008, Ottawa Congress Centre. The outcomes and recommendations arising from this event reflect discussions and conclusions reached amongst participants. The views expressed are not necessarily endorsed by Health Canada.

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Executive Summary

On February 5–6, 2008, the Vulnerable Populations Office of the Safe Environments Programme of Health Canada organized a workshop in Ottawa on seniors' health and the environment. The purpose of the workshop was to improve understanding of the nature and extent of the relationship between the environment and the health of seniors, as distinct from other populations, and to identify major areas for action. Nearly 60 participants from various disciplines and sectors, including federal and provincial governments, health professional associations, academic institutions, Aboriginal organizations and non-governmental organizations (NGOs), met at the workshop to discuss the links between environmental risks and seniors' health as well as to identify strategies to protect the health of seniors from environmental hazards.

A series of panel presentations explored the interaction between environmental risks and seniors' health. Presentations informed participants about demographic trends pertaining to Canada's aging population, the factors that contribute to the specific vulnerabilities of older adults, and the linkages between the more predominant diseases among seniors and environmental contaminants. They also heard about current programs, policies and research initiatives on seniors and the environment in the United States and in Canada. These panel presentations were followed by a more in-depth discussion which identified the key priorities in addressing seniors' environmental health and proposed recommendations and actions. This report summarizes the presentations, discussions and recommendations.

Participants agreed that seniors' health and the environment is a complex issue due to the multiple factors which affect seniors' vulnerabilities to environmental hazards. These include the physical, lifestyle and other changes which occur during aging, as well as the body burden of environmental contaminants due to life long exposures. Moreover, Canada's seniors are a heterogeneous population. Issues related to their overall health and well-being and their vulnerability to environmental hazards may vary depending on their place of residence, their gender and their ethnocultural background. Productive discussions throughout the two days of the workshop identified five factors which contribute most to seniors' vulnerabilities to environmental risks:

1. Physiological changes during the process of aging.
2. Living arrangements, quality of the housing environment, especially indoor air quality and housing location.
3. Socio-economic status.
4. Body burden of environmental contaminants and historical environmental exposures.
5. Seniors' level of awareness on environmental health issues and environmental health literacy.

These factors could serve as a starting point to address priority issues to protect the health of seniors from environmental exposures.

Participants also made the following recommendations for protecting seniors' health from environmental risks:

1. Strengthen existing legislation and policies and build political awareness and interest on seniors' environmental health issues.
2. Enhance research capacity on seniors' health and the environment to inform policy. In particular, research should focus on pressing environmental risks on seniors' health.
3. Raise public awareness by engaging the public and key stakeholders in preventing exposures and protecting seniors from environmental risks. This includes building partnerships and collaborating on current initiatives to strengthen efforts and avoid duplication.
4. Increase education and training on environmental health issues throughout all population and in the community, including elementary and secondary schools, universities, health care professionals and health care providers.

Even though concerns about seniors and environmental health are not yet mainstream issues, participants recognized that raising public awareness and fostering collaboration and collective action across multiple sectors are required. They also emphasized that we should start communicating what we know instead of waiting for more scientific evidence. Participants also concluded that more work needs to be done to better understand the connection between environmental exposures and health outcomes of the aging population. The recommendations from the workshop will help inform future effort to protect the health of Canada's aging population from environmental hazards.

Seniors' Health and the Environment

Workshop Report

1 | Introduction

Health Canada's Vulnerable Populations Office (VPO) organized a workshop on Seniors' Health and the Environment in Ottawa on February 5–6, 2008. This workshop brought together key stakeholders to discuss the health effects of environmental risks on seniors. Participants at the workshop came from various disciplines and sectors, including federal and provincial governments, health professional associations, academic institutions, Aboriginal organizations and non-governmental organizations (Annex 1, Workshop Agenda). The purposes of the workshop were:

1. To enhance our understanding of the relationship between seniors' health and the environment.
2. To identify key areas of importance and ways to move forward, both individually and/or collectively, towards protecting the health of seniors from environmental risks.

This report provides a summary of the workshop and highlights the outcomes and recommendations from the discussions. These results will inform the development of programs and policies to protect the health of seniors from environmental hazards.

2 | Seniors' Health and the Environment Workshop

2.1 Scope of the workshop

Seniors: A senior is defined as a person 65 years of age or older. Sixty-five has come into widespread use because of its association with retirement and the commencement of eligibility for national income security programs. It is consistent with the age ranges used by other departments, such as Statistics Canada and the Public Health Agency of Canada (PHAC), thereby allowing for data comparisons. It is recognized, however, that there can be tremendous heterogeneity within any given age strata in the physical aging process and in age-related health conditions.

Environment: The term “environment” includes the natural physical environment as well as environments that are modified or built by humans. It includes the housing in which seniors live (e.g., residential or institutional homes), the air they breathe, the water and food they consume, the consumer products that they use, the workplaces where they are employed or volunteer, the institutional or public spaces where they spend time (e.g., hospitals, shopping malls, recreation centres, parks), and the communities in which they live.

Environmental hazards include:

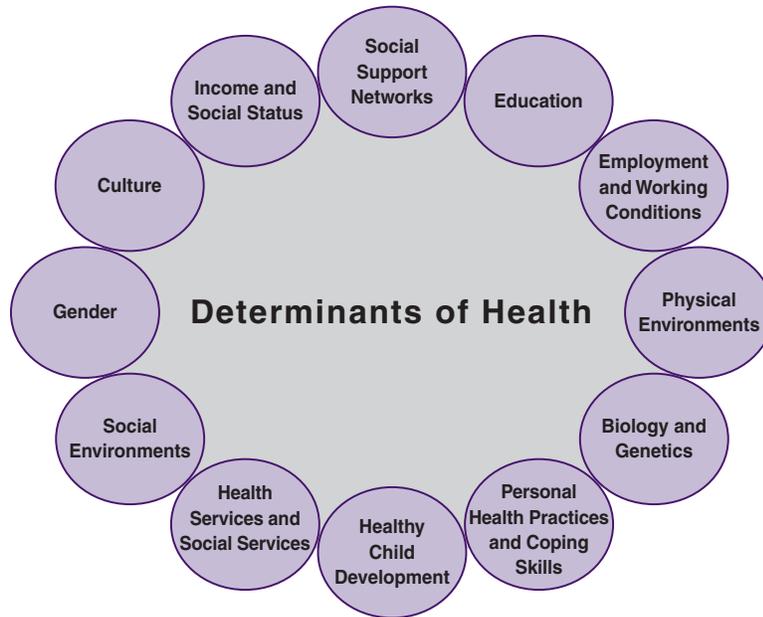
- **Physical hazards.** Physical factors/hazards can occur in the natural and built environments, whether urban, rural, agricultural, aquatic or marine. They can relate to land use and quality, water quality and availability, mechanical agents, and forces of climate, weather and earth processes. They also include hazards related to global environmental change such as threats to habitats, natural resources and the services provided by ecosystems.
- **Biological hazards.** Biological factors/hazards refer to pathogenic microorganisms in water, soil, air and products encountered in both the natural and built environments, including vector-borne microbes and pathogens, pollen, fungi and spores and invasive species.
- **Chemical hazards.** Chemical hazards are chemicals that are, or may be, dangerous to human health and that are present in indoor and outdoor air, water, soil, food, as well as consumer products. They may be of natural or anthropogenic origin.
- **Radiological hazards.** Radiological hazards refer to ionizing and non-ionizing radiation from both natural and anthropogenic sources, including ultraviolet radiation, radon, electromagnetic frequencies and noise.

Health: Health, as defined by the World Health Organization, is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.¹

Environment as a determinant of health: There are many determinants of health, of which environment is one, as illustrated in Figure 1. Other factors, such as genetics, income, level of physical fitness, access to health care and social supports, and personal health care practices, have important influences on all age groups, including seniors.

¹ Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. www.who.int/about/definition/en/print.html

Figure 1: Determinants of health. This figure illustrates the various determinants of health, including: social support networks, education, employment and working conditions, physical environments, biology and genetics, personal health practices and coping skills, healthy child development, health services and social services, social environments, gender, culture, and income and social status.



Source: World Health Organization

2.2 Workshop background

Prior to the workshop, a series of consultations were held with small groups of stakeholders including federal, provincial, territorial and municipal governments, health professional associations, non-governmental organizations (NGOs), Aboriginal organizations, as well as academics and researchers who are interested in the issue of seniors' health and the environment. The purposes of these consultations were:

1. To have a better understanding of the level of interest on the issue among various stakeholders.
2. To identify programs and initiatives on seniors' health and environment.
3. To discuss the scope of the workshop.

Following these consultations, it was decided that the workshop would focus on exploring the following issues:

- Profile of Canadian seniors and their vulnerabilities to environmental hazards;
- Relationship between environmental risks and the health of seniors;

- Current initiatives on seniors' health and the environment, as well as gaps and challenges in this area; and
- Potential next steps.

To better facilitate the workshop discussion, a discussion paper “Seniors’ Health and the Environment” was prepared by a consultant² to provide a snapshot of the key environmental health impacts on seniors, the current programs, research and policies on seniors and environmental health in Canada, as well as the challenges and opportunities in this emerging field.

2.3 Participants and speakers

Nearly 60 people attended the workshop and a panel of speakers was assembled. Less than half of the participants were from federal or provincial governments, with the remainder from health professional associations, academic institutions, NGOs, and Aboriginal organizations. Please see *Annex 2* for a list of attendees to the workshop and *Annex 3* for biographies of the speakers.

2.4 Summary of presentations

Profile of Canadian Seniors and Vulnerabilities to Environmental Risks

Dr. Linda Mealing, Associate Director of the Institute of Aging at the Canadian Institutes of Health Research, provided a profile of seniors in Canada, including projected trends. She stated that although seniors currently constitute 13% of the population, by 2036, this number is expected to rise to 25% with the number of elderly women exceeding the number of elderly men due to women’s longer lifespan. In 2005, women accounted for almost 75% of persons aged 90 or older, while they accounted for 52% of persons aged 65 to 69. Moreover, the fastest growth in the seniors’ population is occurring among the oldest Canadians: about one in ten Canadians will be 80 years and older by the year 2056, compared to one in thirty in 2005. Dr. Mealing also reviewed disease patterns for the aging population in Canada: the four most prevalent chronic diseases are arthritis, high blood pressure, heart disease and diabetes. The prevalence of dementia and cognitive impairment also increases with age.

Dr. Roy Fox, the Director of the Nova Scotia Environmental Clinic, provided an overview of the physical changes associated with aging and other factors which alter the degree of susceptibility of seniors to environmental hazards. As one ages, reserve capacity and the capacity for system repair decreases. Frailty due to the aging process, together with disease burden and body burden of environmental contaminants due to previous exposures starting at conception, make seniors more vulnerable to environmental stress than younger adults.

² Erica Phipps, Environmental Health Consultant.

Dr. Gloria Gutman, from the Gerontology Research Centre at Simon Fraser University, explored the lifestyle changes that occur among the aging population and how they may increase seniors' vulnerability to environmental hazards. Dr. Gutman also spoke of the heterogeneity of the aging population and the importance of taking that into consideration when designing interventions. For example, seniors live in different housing arrangements depending on their physical frailty, income and level of cognitive functioning. Seniors of lower income are more likely to live in homes that are poorly maintained increasing their risk of exposure to indoor air pollutants, such as moulds, and their vulnerability to heat or cold due to the lack of air conditioning or heating.

Dr. Laurie Chan, a Professor from the University of Northern British Columbia, provided an overview of key environmental health issues for Aboriginal seniors. Aboriginal seniors constitute 5% of the Aboriginal population and many of their communities are located in close proximity to pollutants from historical industrial sites. Since the older Aboriginal population is more likely than those who are younger to consume traditional foods, both in the past and currently, they are more likely to be exposed to a variety of contaminants, including heavy metals (e.g., mercury) and persistent organic pollutants, which may lead to adverse health outcomes such as cancer and neurological disorders.

Ms. Jill Skinner, Manager of the Office of Public Health at the Canadian Medical Association (CMA), presented on the perceptions of seniors of age 55+ on environmental health issues based on the findings from the CMA Report Card 2007. According to this survey, seniors are less likely than the general population to take action to protect their health from environmental factors and to change their lifestyle to lessen the impact on the environment. In addition, a higher proportion of seniors than other adults consider their family doctor a very credible source for information on the environment and its impact on health. Governments, on the other hand, were ranked quite low as the first source of information on environmental health issues. This information is important to help determine effective interventions to raise seniors' awareness on environmental impacts on their health.

Relationship between Environmental Risks and the Health of Seniors

Dr. Jack Siemiatycki, Canada Research Chair in Environmental Epidemiology and Population Health at l'Université de Montréal, discussed the relationship between exposures to carcinogens and cancer occurrence, and the research gaps and barriers in the area. He stated that cancer is the major cause of illness and death among the aged and in order to prevent cancer, we must modify lifestyle and environment at younger ages. As he quoted from the Canadian Association of Gerontology "...healthy aging does not start at 65: it starts the day that one is born. The chronic condition does not start when one turns 65. It has its roots in the 30s and 40s". With our current knowledge on cancer, it is predicted that 30–40% of cancers can be prevented. Dr. Siemiatycki concluded that more research is needed to identify the risk factors for cancer, as well as the need to overcome research barriers such as research capacity, funding and access to data.

Dr. Dave Stieb, a medical epidemiologist from Health Canada, presented on the factors mediating seniors' vulnerability to indoor and outdoor air pollutants and provided an overview of the effects of air pollution on respiratory and cardiovascular health. The three major factors in this area include: the degree of exposure which depends on where people spend their time as well as their level of activity; individual physiological characteristics; and recognized or unrecognized chronic diseases. Dr. Stieb highlighted knowledge gaps in the area, including the difficulty in measuring outcomes due to the lag time between exposure and response; uncertainty about the extent to which physiological changes affect the risk from air pollution; and the inadequacy of information on the chronic effects of indoor and outdoor air pollutants on seniors' health.

Dr. Ana Navas-Acien, an Associate Professor from the John Hopkins Bloomberg School of Public Health, focused on the importance of environmental risks, especially toxic metals, in cardiovascular disease development and control. Dr. Navas-Acien highlighted the growing evidence that supports a link between cardiovascular disease and chronic exposure to low-level environmental toxicants, especially toxic metals like lead, cadmium, mercury and arsenic. She emphasized the need for high quality data from prospective studies in populations exposed to wide range of levels of toxic metals, the need for mechanistic studies at relevant levels of exposure, and the need to design and implement regulatory and public health interventions to prevent and reduce exposure to these toxicants.

Dr David Hogan, Chair of Brenda Strafford in Geriatric Medicine from the University of Calgary, highlighted the links between environmental factors and the development of Parkinson's and Alzheimer's disease. Exposure to pesticides has been consistently associated with these diseases. Due to the complexity of individual variability, such as the genetic make up of the individual and gene-environment interactions, current and past exposures, physiological changes and the existence of other diseases and medications, Dr. Hogan recognized that it is challenging to link the effects of environmental contaminants with the development of Parkinson's or Alzheimer's disease. He stressed the need for more work in the area, which will require expertise from various fields including biology, neurosciences, chemistry, physics, toxicology, occupational medicine, environmental medicine and epidemiology.

Initiatives on Seniors' Health and the Environment

*Ms. Kathy Sykes, Senior Advisor from the Aging Initiative and Dr. Robert MacPhail from the National Health and Environmental Effects Research Laboratory at the United States Environmental Protection Agency (US EPA) presented on the *National Agenda for the Environment and Aging* and the *Research Framework on Aging and Environmental Health* respectively. Ms. Sykes and Dr. MacPhail shared some of their experiences, challenges and lessons learned. They indicated that the greatest challenges they have encountered were persuading others of the importance of environmental health*

impacts on seniors' health, competing for resources; and securing resources for and conducting longitudinal studies due to their high cost and length of time required. They provided the following recommendations:

1. Generate public support and involve seniors, stakeholders and public in developing partnerships.
2. Increase public awareness and public education on what we already know regarding environmental health.
3. Provide stakeholders and senior's communities with the opportunity to have true ownership of and investment in the agenda.
4. Survey current research gaps and attributes of community groups in promoting seniors' environmental health.
5. Add exposure measures to ongoing studies and critically appraise epidemiological, chemical and laboratory research findings.

Ms. Erica Phipps, Environmental Health Consultant, summarized some of the key programs, policies and research in Canada on seniors and environmental health. The area of aging and environmental health is still a relatively new and emerging area of focus and the number of initiatives and existing research, policies and programs are limited. However, there are some promising developments including:

- Health Canada has conducted a series of air pollution studies to examine the health effects of air pollution on seniors.
- The Canadian Health Measures Survey will gather physical data as well as information on lifestyle, nutrition and socioeconomic data from a representative sample of 5,000 people across Canada, including seniors up to age 79.
- The Canadian Age-Friendly Rural/Remote Communities Initiative is a joint effort between PHAC and the provinces and territories, to explore factors that make cities "age-friendly" in small, rural and remote Canadian communities.
- Under the *Canadian Environmental Protection Act 1999*, if data is available, exposure analyses for both screening and in-depth assessment will estimate the intake of a substance for six age categories: 0–6 months, 0.5–4 years, 5–11 years, 12–19 years, 20–59 years and 60+ years. For substances considered "CEPA-toxic", where identified in the assessments, risk management measures are developed to protect the most susceptible life stages, including seniors.
- The *Pest Control Products Act* includes specific consideration for seniors, and incorporates their unique vulnerabilities into the risk assessment framework, in the form of an additional safety factor that is applied when necessary.

3 | Summary of Workshop Discussions

Although the discussions were designed to focus on seniors' environmental health, they included actions and recommendations that go beyond protecting the health of seniors from environmental hazards. Since environmental health is a complex discipline which cuts across various fields and affects all populations, many of these actions could contribute in a meaningful way to moving towards creating a healthy environment for all Canadians.

3.1 Key areas of importance for seniors' health and the environment

The five factors which contribute most to seniors' vulnerabilities to environmental hazards identified by the participants were:

- 1. Physical changes during the process of aging**, such as the body's declining ability to deal with environmental insults, reduced ability to adopt appropriate measures to protect themselves from environmental exposures, the burden of chronic diseases, and poor nutritional status related to diet, may play a role in modifying seniors' susceptibility to chemical exposures. For example, iron deficiency is thought to contribute to increased lead absorption.³
- 2. Living arrangements, quality of housing environment and the location of housing.** Like other Canadians, seniors spend most of their time indoors; therefore, the type, quality and location of their housing is a crucial factor. Seniors living in close proximity to industrial sources of pollution may be at higher risk to environmental hazards, and seniors living in urban environments are at higher risk of exposure to air pollution resulting from vehicle traffic. Seniors living in rural environments are more isolated and may be more exposed to pesticides from nearby farmlands. In addition, seniors living in institutional care may be exposed to chemicals in cleaning agents, and seniors living in poorly maintained houses may be exposed to mould and other indoor air pollutants.
- 3. Socio-economic status.** According to a study conducted by Statistics Canada in 2003, the incidence of low-income among seniors in Canada is lower than other industrialized countries, including Sweden, the United States and the United Kingdom.⁴ In 2003, 6.8% of seniors were below the Low-Income Cut-Off (LICO) after taxes, in comparison to 21.3% in 1980. However, certain groups of seniors remain at risk for low income,

³ Katarzyna, K., Lonnerdal, B., and Stoltzfus, R.J. (2007). Interactions between nutrition and environmental exposures: effects on health outcomes in women and children. *Journal of Nutrition*, 137: 2794-2797.

⁴ Statistics Canada. (2006). *A Portrait of Seniors in Canada*. www.statcan.ca/english/freepub/89-519-XIE/89-519-XIE2006001.pdf

especially women living alone. Seniors with a lower socio-economic status may have a higher likelihood of living in a poor housing situation and lacking access to adequate diet, health care and other services.

4. Historical and life long exposures. Due to the relatively long life span of seniors, they have an increased body burden of environmental contaminants due to cumulative exposures, either in occupational or home settings. Other exposures across the lifespan may also affect seniors' vulnerability to environmental hazards, such as smoking and use of prescription and non-prescription medications.

5. Seniors' awareness of environmental health issues. Although most environmental health information is available via the internet, not all seniors have access to internet. In general, seniors are less aware of issues around environmental health than younger adults. Moreover, participants talked about the increased difficulty in changing one's behaviours as one ages. This is a challenge in creating environmental health messaging for seniors.

Participants at the workshop also identified some of the key environmental hazards which may impact on seniors' health:

Outdoor air quality – Some of the major risks include: particulate matter and heavy metals from industries and power plants, volatile organic compounds, sulphur oxides, nitrogen oxides and smog. There is abundant research that associates outdoor air pollution with adverse health effects, including premature mortality and aggravation of existing respiratory and cardiovascular conditions.

Indoor air quality – Environmental tobacco smoke in indoor environments, wood smoke, mould, formaldehyde, synthetic materials, and cleaning chemicals are some of the key risks identified in indoor environments. Indoor air pollutants can exacerbate asthma and chronic obstructive pulmonary disease.

Water quality – Microbiological contaminants in water were identified as one of the major environmental risks for Aboriginal seniors. The presence of manganese and arsenic in drinking water in some parts of Canada is also important since it may have potential neurological impacts. Seniors experience reduced immune function as a result of aging and are thereby more susceptible to infection. They are also more likely to experience a more severe and/or longer lasting illness.

Food – Participants considered exposure to high level of mercury and persistent organic pollutants (POPs), such as dioxin and polychlorinated biphenyls, particularly through the consumption of traditional foods among Aboriginal seniors, and possible exposure to pesticides residues in food, as the two major environmental risks for seniors in food. Moreover, seniors may be more sensitive to microbiological contaminants in food such as *Salmonella* and *E. coli* due to reduced immune function.

Consumer products – Participants identified the following as major environmental risks in consumer products: pesticide exposure when gardening or when used on pets; known respiratory irritant compounds in cleaning supplies, laundry and personal care products, such as ammonia, chlorine, formaldehyde and fragrances; and older toxic products kept in the house, such as pesticides, moth balls and other respiratory irritants.

Extreme temperature events – The impact of extreme temperature events on seniors with existing chronic conditions has been recognized as an important environmental risk. As seen in the 2003 European heat waves, mortality was significant among elderly populations across a number of European countries.

Conclusions: The majority of participants felt that there are knowledge gaps in understanding the health impacts of environmental hazards on seniors. These gaps are due to the lack of research on seniors and environmental health. For example, one group stated that there is an absence of data on the health effects of consumer products on seniors as the characteristics of the aging population are seldom taken into account in environmental health research studies. In animal studies, older animals are rarely used, and in epidemiological studies, there is a lack of data on environmental exposure for seniors above 65 years of age. For a more detailed list on the identified gaps and challenges, please refer to *Annex 5*.

3.2 Recommendations for action

The second day of the workshop focused on recommendations and actions designed to move forward in further protecting seniors' health from environmental hazards. Although a variety of recommendations were suggested, many groups concluded that:

“Vulnerable populations, including seniors, should have a safe place to live, work and recreate, and that the products they use are safe.”

Many of the recommendations proposed by the participants fall under three main themes:

- Ensure current practice, legislation and regulatory regimes adequately protect the health of seniors from environmental hazards.
- Expand the knowledge base on seniors' health and the environment.
- Increase public awareness of environmental health issues among children, parents, seniors, health care providers and others and develop partnerships and collaboration to achieve common goals.

This section summarizes and highlights some of the key recommendations raised during the plenary discussion.

Ensure current practice, legislation and regulatory regimes adequately protect the health of seniors from environmental hazards.

Participants suggested the need to:

- 1. Have adequate legislation in place** to meet policy goals and to minimize Canadian seniors' exposures through the development of performance indicators to monitor and evaluate programs.
- 2. Build political awareness** of seniors' environmental health issues.
- 3. Shift from traditional approach of chronic disease management to incorporate environmental health as part of the system.** For example, there should be a shift of perspectives from focusing on "disease based" models of health to focusing on a more "holistic" model.

Expand knowledge base on seniors' health and the environment.

As mentioned previously, it was noted that there are broad gaps in our knowledge on seniors and environmental health and there is a need to enhance our understanding of the relationship between seniors' health and the environment. This is true not only for researchers, but also for health care providers. Below are some steps to enhance our knowledge of the impact of environmental risks on seniors' health:

- 1. Develop an inventory or environmental scan** of what is currently in place in terms of research, programs and policies on seniors and environmental health. The purpose of this inventory would be able to help identify gaps, possible venues for discussion and key players for potential collaboration and partnerships on the issue. It will also recognize areas of duplication especially between different jurisdictions.
- 2. Identify priority populations.** A few groups noted that there is a huge gap in researching and addressing the specific vulnerabilities of the frail seniors, those who are socially isolated, and Aboriginal elders. The areas of importance as identified in section 3.1 can serve as a starting point. One group suggested that in the short term, the focus should be on pressing current issues, and on groups that are the most vulnerable among the aging population, for example, seniors living in institutional care and Aboriginal seniors. These programs or activities should link to public health interventions. Participants also raised the importance of involving seniors in identifying issues that are critical to them.

3. Increase and encourage education and training for more environmental health researchers and experts, including health care providers. This includes recognizing seniors' vulnerability to environmental risks and incorporating it into general education and training on environmental health. The following are some suggestions offered by participants:

- a) Identify mentors in environmental health within each of the health professional networks for undergraduate education.
- b) Offer courses and workshops for students and residents on environmental health.
- c) Bring deans of professional schools of medicine, nursing, dentists etc, together to generate a consensus on environmental health and to incorporate it into their curriculum.
- d) Educate and provide health care providers information on environmental health, for example through a variety of workshops, and allow them to take an environmental exposure history and conduct home assessments in seniors' homes.

4. Develop a research strategy for environmental health and secure long term funding for more environmental health research. This may be achievable through establishing an Institute on Environmental Health within the Canadian Institutes of Health Research to provide funding on environmental health research. It was suggested that the strategy should:

- a) Link to and build on existing research, such as in epidemiological, clinical and laboratory research studies, as well as risk assessment frameworks. The strategy should also link to other government priorities.
- b) Address and identify issues of priorities. A focus on the impacts on seniors' health of exposures earlier in life could be a long term goal.
- c) Address the need for training to promote expertise in environmental health, especially in the context of seniors' health, through fellowships, funding, partnerships and internships. This could also be supported through the establishment of a centre of excellence. Canada should examine creative models from the US or other countries for training more researchers in the area.

Increase public awareness of environmental health issues among children, parents, seniors, health care providers and others, and develop partnerships and collaboration to achieve common goals.

Raising public awareness and building partnerships were emphasized throughout the workshop. Many groups suggested that we should start communicating what we know instead of waiting for more scientific evidence. The following are some of the key recommended actions:

- 1. Enhance the capacity of health care providers and public health professionals around seniors' environmental health issues, and make resources and information readily available.** A few groups mentioned that the public should not just rely on family physicians as the primary source of information, as one of the biggest challenges for family physicians is the limited time available to spend with individual patients and educate them on all of the issues.
- 2. Conduct more comprehensive surveys and questionnaires to further understand seniors' perceptions on environmental health.** This includes understanding the most effective messaging mechanisms to reach this group, and the types of preventive interventions that are most likely to be adopted by seniors.
- 3. Host public consultations and listening sessions,** similar to what US EPA has done, and **mobilize and empower seniors to take action** in protecting their health from environmental risk.
- 4. Design appropriate and consistent environmental health information and messages for seniors.** Information should be solution oriented, affordable and accessible. Seniors are a very heterogeneous group, and educational materials or tools on environmental health need to be creative and target specific populations. Below are some suggested examples for these messages:
 - a) Environmental health fact sheets should be in various languages, so that seniors who speak neither English nor French can access the information.
 - b) Other modes of media for messaging should also be explored, such as via television programs, radio, and targeting seniors recreational centres and other audiences that are in closer contact with seniors, for example, family members and health care providers.
 - c) One group suggested that environmental health messaging could emphasize the benefits to the family (e.g., grandchildren) as a whole instead of at an individual level, to motivate seniors to take actions to protect themselves and their family from environmental risks.
 - d) Messaging strategies could also target middle-aged populations and capitalize on preventive measures.

- 5. Offer economic incentives on home renovation or home maintenance for seniors who are currently situated in poor housing.** As discussed above, seniors of lower socio-economic status are at a higher risk of being exposed to a variety of indoor air pollutants due to their poor housing situation. Economic incentives will encourage them, or their landlords, to take action to minimize their environmental exposures.
- 6. Build partnerships and collaborations** among seniors and environmental health interests groups, and other organizations: federal, provincial, territorial and municipal governments, health professionals, health care providers, Aboriginal organizations, NGOs, local public health units, industries and international organizations. Some examples suggested by participants include:
- a) Set up a Federal/Provincial/Territorial (F/P/T) working group, perhaps under the Committee on Health and Environment, on environmental health and vulnerable populations, including seniors.
 - b) Develop mechanisms to facilitate collaboration and connection among NGOs.
 - c) Follow up with the outcomes of the seniors' health and environment workshop and continue to have such dialogue and information sharing on the topic.

3.3 Recommendations on roles and responsibilities

Subsequent to the discussion on action plans to move forward on protecting seniors' health from environmental hazards, groups were asked to identify some of the roles and responsibilities of Health Canada, as well as other levels of government, health care providers, Aboriginal organizations, NGOs and the private sector to address the issues.

Health Canada's role could be –

- 1. To lead, coordinate and provide directions and facilitate the dialogue with all key stakeholders.**
 - a. Create and coordinate an F/P/T working group or interdepartmental committee on seniors (or vulnerable populations) and environmental health.
 - b. Collaborate and communicate with PHAC to avoid duplication and to maximize efforts.
 - c. Seek champions, engage and bring together different partners to develop innovative, interactive, creative health care services for seniors. This could be done through advocating with other F/P/T, municipal governments and First Nations to collaborate on service delivery for seniors.

- d. Develop strategies to coordinate efforts across Canada on seniors' environmental health.
- e. Synthesize evidence of environmental health hazards and their impacts on seniors' health by gathering research data from experts and identifying the gaps and priorities through convening panels. The US Task Force model could be a useful reference.
- f. Help direct intermural and extramural research on seniors' health and the environment.

2. To act as a central source of credible information on environmental health issues to ensure consistent messaging throughout. Information on seniors' environmental health could be organized on a website through provision of fact sheets in various languages and formats (e.g., bigger fonts), or via other modes of media such as TV and radios since seniors are less likely to use the internet.

3. To fund the establishment of an Environmental Health Think Tank and to provide funding for environmental health research, this could include setting up a centre of excellence and developing a nationwide call for proposals on seniors and environmental health. Funding should also be provided to support the incorporation of environmental health into the curricula of health care providers and be allocated to provinces for expenditures on environmental health clinics.

Roles of other organizations and departments

Participants agreed that many organizations and governments have a key role to play in protecting seniors from environmental hazards. Some of the roles and responsibilities which would be applicable to all of the key stakeholders are:

- Be transparent and responsible in providing information to the public on environmental health risks and ways of avoiding them.
- Continue to advocate for more action on environmental health issues.
- Maintain partnerships and develop mechanisms to share information with different groups and organizations, and identify a centralized leader in each group.
- Develop partnerships with international leaders that are more active and advanced in protecting the health of seniors from environmental risks, such as the US EPA.

Participants also suggested some specific roles that other organizations can play on the issue.

Roles of health care providers –

- Raise the profile of the health impact of environmental hazards on seniors.
- Health care providers and the Canadian Society for Environmental Medicine could sponsor workshops, conferences, or conventions on environmental health.
- Professional associations could bring credibility to environmental health and continue to advocate for more attention to environmental health issues.
- Health care providers could create innovative, interactive, creative services for seniors and provide advice on “healthy homes” for seniors, as well as be trained to conduct environmental health assessments in homes.

Roles of Provinces/Territories –

- Establish and participate actively in the F/P/T committee on seniors and environmental health. This committee could find a home under existing F/P/T arrangements.
- Support work on seniors’ health and the environment through public health departments and other parts of the health system.

Roles of Aboriginal organizations –

- Network among Aboriginal organizations and communities to raise awareness of seniors and environmental health issues.
- Lead activities to identify and address environmental health issues in their communities.

Role of NGOs –

- Network and come together with other organizations to conduct cross-cutting research on the topic.

4 | Next Steps

Health Canada is proposing a set of key activities to move forward in protecting the health of seniors' from environmental risks including:

1. Identifying key gaps and priorities in policies, programs and research on seniors' environmental health.
2. Promoting the inclusion of environmental health in seniors' health initiatives, and supporting the consideration of seniors' vulnerabilities in environmental health programs.
3. Identifying opportunities for knowledge generation of seniors' health and the environment.
4. Engaging health care professionals in seniors' environmental health.
5. Sharing information, providing support and building partnerships on seniors' environmental health issues within and outside of the federal government.

5 | Conclusion

Protecting the health of seniors from environmental risks is not the sole responsibility of one department, one level of government or one sector of society. It was recognized throughout the workshop that this multi-disciplinary field will require coordination, collaboration, partnerships and communication across various jurisdictions, disciplines, sectors and organizations. This workshop represents a first step in bringing interested parties together to build momentum on seniors' environmental health. It also identified actions and potential opportunities for collaboration and partnerships which will inform Health Canada, and others, in determining next steps to strengthen the protection of seniors' health from environmental hazards.

Annex 1 | Workshop agenda

Older Adults' Health and the Environment Workshop February 5–6, 2008

Location:

**Ottawa Congress Centre, Capital Hall 1B
55 Colonel By Drive**

AGENDA

Purpose

The purpose of the workshop is to enhance understanding on the relationship between older adults' health and the environment and to identify key areas of importance and ways to move forward, both individually and/or collectively, towards protecting the health of older adults from environmental risks.

Desired Outcomes

1. Development of a common understanding on the relationship between older adults' health and the environment
2. Determination of key environmental risks to the health of older adults and actions that can be prevent these risks
3. Identification of key gaps in knowledge and preventative action, and agreement on concrete next steps to advance the issue

Day 1 – Tuesday, February 5, 2008

8:30 ***Arrivals/Breakfast***

9:00 ***Introduction to the Workshop***

- › Welcome and Purpose – *Sue Milburn Hopwood, Health Canada*
- › Review of Agenda and Logistics – *Kathleen Connelly, Intersol Group*
- › Participant Expectations

9:45 ***First Panel Discussion: Profile of Canadian Older Adults and Why Vulnerable to Environmental Risk***

1. Profile of Canadian Older Adults – *Dr. Anne Martin-Matthews, Institute of Aging, Canadian Institute of Health Research*
2. Physiological and biological changes that underlie aging, and differences in the types of exposures for older adults – *Dr. Roy Fox, Nova Scotia Environmental Health Clinic*
3. Lifestyle and circumstantial changes – *Dr. Gloria Gutman, Department of Gerontology, Simon Fraser University*

4. Specific vulnerabilities of the aging subpopulation: Aboriginals – *Dr. Laurie Chan, University of Northern British Columbia*
5. Perceptions of older adults to environmental health risks – *Jill Skinner, Canadian Medical Association*

(Including Health Break at 10:30)

11:15 **Question and Answer Session**

11:45 **Table Discussion**

1. From your perspective, what are the factors that contribute to the specific vulnerability of older adults towards environmental exposures?
2. What do you see as the 3 most important factors which increase the vulnerabilities of older adults to environmental risks?
3. According to the Canadian Medical Association survey results, older adults are 1) most likely to approach their family doctors as a first choice for environmental health related information, and 2) less likely to make changes to their environment to protect their health. Taking into account these two facts, what would be the best approach to protecting older adults from environmental hazards?

(Table groups will be asked to record these on sheets and identify priorities)

12:30 **Lunch**

1:30 **Review of results of table discussion**

1:45 **Second Panel Discussion: Relationship Between Environmental Risks and the Health of Older Adults**

1. Cancer – *Dr. Jack Siemiatycki, University of Montreal*
2. Cardiovascular diseases – *Dr. Ana Navas-Acien, John Hopkins School of Public Health*
3. Respiratory diseases – *Dr. Dave Stieb, Health Canada*
4. Neurodegenerative diseases – *Dr. David Hogan, University of Calgary*

2:45 **Health Break**

3:00 **Question and Answer Session**

3:30 **Group Discussion**

Each group focusing on one of the following: outdoor air, indoor air, water, consumer products, food and extreme temperatures

1. What are the chemical, biological and radiological environmental risks in the topic assigned to your group that are specific to older adults? For each of these, what are the health outcomes?
2. From your perspective, which of the above risks are the 3 most important ones to focus on?
3. What are the most important knowledge gaps related to the topic assigned to your group?

4:15 **Report from Groups (1 or 2 groups depending on time available)**

4:30 **End of Meeting/Day One Evaluation**

- 8:30 **Arrivals/Breakfast**
- 9:00 **Review of agenda**
- 9:05 **Report from Groups (continued from previous day)**
- 9:30 **Third Panel Discussion: Initiatives on Older Adults' Health and the Environment**
- › United States
 1. Aging Initiative – *Kathy Sykes, U.S. Environmental Protection Agency*
 2. USEPA Research Framework for Aging – *Robert MacPhail, U.S. Environmental Protection Agency*
 - › Summary of Canadian activities
 3. *Erica Phipps, Environmental Health Consultant*
- 10:15 **Question and Answer Session**
- 10:45 **Health Break**
- 11:00 **Group Discussion**
1. What can we learn from the United States' experience? How, if at all, do we need to adapt these initiatives to Canada?
 2. What are the main gaps and challenges in moving forward in the area of older adults' health and the environment (in terms of research, education and training, programs and policies)? Based on the identified gaps, what are our main issues of priority that needs to be addressed?
- (Groups will record answers to question 1 in a table report book and will record answers to question 2 on individual sheets.)*
- 12:00 **Lunch**
- 1:00 **Introduction to Afternoon Discussion**
Review of Issues, Participants choose issues they wish to discuss
- 1:10 **For each issue, groups answer the following questions:**
1. What would achieving our goals with respect to the issue look like?
 2. What needs to be done/ what can we build on in order to address the issues? In both the short term and long term?
 3. a) What could be the roles and responsibilities of Health Canada to protect the health of older adults from environmental risks?
b) What could be the roles and responsibilities of other federal government departments, provincial and territorial governments, health professionals, aboriginal organizations, non-government organizations and private sector in better addressing the issues?
- (Including Health Break)

- 2:15 ***Plenary Debrief***
- 2:45 ***Next Steps and Closing Remarks – Sue Milburn Hopwood, Health Canada***
- 3:00 ***Meeting Close and Evaluation***

Annex 2 | List of participants

Organizers

Annie Bérubé, Senior Policy Analyst	Safe Environments Programme, Health Canada
Grant Hogg, Manager	Safe Environments Programme, Health Canada
Catherine Huang, Policy Analyst	Safe Environments Programme, Health Canada
Jessi Mahon, Policy Analyst	Safe Environments Programme, Health Canada
Sue Milburn-Hopwood, Director	Safe Environments Programme, Health Canada

Speakers

Laurie Chan, Professor	University of Northern British Columbia
Roy Fox, Medical Director	Nova Scotia Environmental Health Clinic
Gloria Gutman, Co-leader BC Network for Aging Research	Simon Fraser University
David Hogan, Professor	Geriatric Medicine, University of Calgary
Robert MacPhail, Research Scientist	U.S. Environmental Protection Agency
Linda Mealing, Associate Director	Institute of Aging, CIHR
Ana Navas-Acien, Associate Professor	John Hopkins School of Public Health
Erica Phipps, Environmental Health Consultant	
Jack Siemiatycki, Professor	University of Montreal
Jill Skinner, Senior Project Manager, Public Health	Canadian Medical Association
Dave Stieb, Medical Epidemiologist	Safe Environments Programme, Health Canada
Kathy Sykes, Senior Advisor, Aging Initiative	U.S. Environmental Protection Agency

Participants – Federal Government

Sherry Hamilton, Policy Analyst	Public Health Agency of Canada
Norm Healey, Health Risk Assessment Toxicology Specialist	Safe Environments Programme, Health Canada
Stan Hnatiuk, Regional Manager, MN/SK Region	Safe Environments Programme, Health Canada
Adele Iannantuono, A/ Regional Manager, ON Region	Safe Environments Programme, Health Canada
Mike Inskip, Biologist	Safe Environments Programme, Health Canada
Ariane Jaros-Denis, Economist	Health Policy Branch, Health Canada
Cheryl Khoury, Biologist	Safe Environments Programme, Health Canada
Erin Myers, Research Officer	FNHIB, Health Canada
Marianne O'Sullivan, Emergency Services Educator	Public Health Agency of Canada
Paul Partridge, Risk Management Specialist, MN/SK Region	Safe Environments Programme, Health Canada
Nathalie Perron, Manager, Home and Continuing Care Unit	Health Policy Branch, Health Canada
Shairoz Ramji, A/ Section Head	Pesticides Management Regulatory Assessment
Gail Salminen, Head, Information and Education	Consumer Product Safety, Health Canada
Jean-Emmanuel Simind, Project Officer	Consumer Product Safety, Health Canada
Spyridoula Tsoukalas, Policy Analyst	Public Health Agency of Canada
Marielou Verge, Regional Policy and Liaison Specialist, QC	Safe Environments Programme, Health Canada
Jennifer Walter, Policy Analyst	BRIA, Health Canada
Paul Walters, Section Head	Safe Environments Programme, Health Canada
Caroline Yung, Economist	Health Policy Branch, Health Canada

Participants – Provincial/Territorial Governments

Dianne Alexander, Manager, Environmental Health Policy	Ontario Ministry of Health and Long Term Care
Brian Gibson, Community Health Physician	Ontario Ministry of Health and Long Term Care
Douglas Howse, Environmental Health Promotion Specialist	Department of Health and Community Services, NL

Participants – Professional Associations/ Health Professionals

Jennifer Armstrong, Physician	Ottawa Environmental Health Clinic
Sylvia Fanjoy, Director, National Programs	Canadian Public Health Association
Kiran Ghai, Research and Policy Analyst	Region of Peel/Ontario Public Health Association
Sandi Hirst, President	Canadian Association of Gerontology
Andy Hurtubise, Family Physician	
Lynn Marshall, Co-chair, EH Committee	Ontario College of Family Physicians
John Molot, Family Physician	
Nicki Sims-Jones, Manager, Office of Environment	Canadian Nurses Association

Participants – University/ Academics/ Researchers

Melissa Andrew, Fellow	Geriatric Medicine, Dalhousie University
Parminder Raina, Professor	McMaster University

Participants – NGOs

Judy Cutler, Director, Government Relations	Canada Association for 50+
Denis Page, Health Policy Analyst	Canadian Cancer Society
Karl Saidla, Public Policy Analyst	Heart and Stroke Foundation
Barbara Snelgrove Director, Education and Service	Parkinson Society Canada
Brian Stocks, Air Quality Manager	Ontario Lung Association

Participants – Aboriginals

Lola Antonius, Research Policy Analyst	Assembly of First Nations
Sarah Carriere, Project Coordinator	Inuit Tapiriit Kanatami
Donna Naughton, Health Coordinator	Native Women's Association of Canada
Amy Nahwegahbow, Research and Policy Analyst	Assembly of First Nations

Annex 3 | Speakers' biographies

Anne Martin-Matthews, PhD
Scientific Director, Institute of Aging
Canadian Institutes of Health Research (CIHR)

Dr. Anne Martin-Matthews was appointed the Scientific Director of the national Institute of Aging of the Canadian Institutes of Health Research, as of March 2004. She is a Professor of Sociology at the University of British Columbia in Vancouver, B.C.

Her publications include a book *Widowhood in Later Life*, three edited volumes (one on the link between research and policy on aging) and over 125 papers on aging in a family context, social support, caregiving, health, and aging in rural environments. Dr. Martin-Matthews has been active in the field of gerontology, health and aging in Canada, through her professional associations and as an advisor to local, provincial and federal governments. These include on the Board of the Canadian Association on Gerontology, as Social Sciences editor for the *Canadian Journal on Aging* and as its Editor-in-Chief (1996–2000). She has served on review or advisory committees for Canada's National Health Research and Development Program; the Health Promotion Directorate of Health and Welfare Canada; the Division of Aging and Seniors; and on the Scientific Advisory Committee of the Seniors Independence Research Program of Health Canada. Currently, she is Vice-President of the Research Committee on Aging of the International Sociological Association and an Overseas Advisor to the UK journal, *Ageing and Society*. She is currently on the Gerontological Advisory Board for Veteran's Affairs Canada and the National Initiative for the Care of the Elderly.

Dr. Anne Martin-Matthews' contributions to research and scholarship in social gerontology have been recognized by a Distinguished Alumni Award from McMaster University; a Commemorative Medal for the Queen's Golden Jubilee, awarded by the Canadian Association on Gerontology; and a British Academy Visiting Professorship in 2004. She is a Fellow of the (U.S.) Gerontological Society of America and of the Canadian Academy of Health Sciences.

Roy A. Fox, BSc, MD, BS, MES, FRCPC, FRCP, FACP
Medical Director of Nova Scotia Environmental Health Centre

Born in Eccles, England, married and father of five children. Graduated in Medicine from the University of Newcastle-upon-Tyne, England, with Honours in 1965. Postgraduate training in the teaching hospitals in Newcastle and the Royal Free Hospital, London in Internal Medicine, Gastroenterology and Hepatology. Fellowship training in Immunology at Scripps Institute and Research Foundation, La Jolla, California and Environmental Medicine at Environmental Health Center, Dallas, Texas.

Dr. Fox is a Geriatrician by training and is currently the Medical Director of the Nova Scotia Environmental Health Centre. He received academic appointments in Departments of Medicine and Microbiology at Dalhousie University and he was also the Head of Geriatric Division and Director of the Centre of Health Care for the Elderly at the Dalhousie University.

The Nova Scotia Environmental Health Centre was established in 1994 and moved into a specially designed and constructed state-of-the-art building in Fall River in April 1997. The mandate of the Centre is to learn more of the link between the environment and illness in the human population and, specifically, to understand the nature of environmental sensitivities. Research is carried out in a clinical setting and is performed in all areas of clinical management, which includes diagnosis and treatment. Current research interests include the aetiology and nature of multiple chemical sensitivity. Dr. Fox has published 119 papers in peer reviewed publications and made many presentations before learned societies. As a trained healer he incorporates a holistic approach into the practice of medicine.

Gloria Gutman, PhD, OBC
Co-leader, British Columbia Network for Aging
Gerontology Research Centre, Simon Fraser University

Dr. Gutman developed and directed both the Simon Fraser University Gerontology Research Centre and the Gerontology Department (formerly called the Gerontology Program) from 1982 to 2005. Currently, she is Professor Emerita in the Gerontology Department, a Research Associate in the Gerontology Research Centre and a co-leader of the BC Network for Aging Research.

She is widely known in the field of gerontology as an educator, researcher, and consultant. She is the author/editor of twenty books, over one hundred and eighty scholarly articles, reports, and chapters, as well as over three hundred and sixty conference papers. In 2007, she was awarded the Order of British Columbia in recognition of her pioneering work in the field of Gerontology.

Dr. Gutman's research interests are wide-ranging; including seniors' housing, long term care, health promotion, dementia care, environmental design and seniors and emergency preparedness. She is currently conducting a series of studies in Canada and the United States as well as in the Dr. Tong Louie Living Laboratory designed to make acute care hospitals more elder-friendly.

Dr. Gutman has been very active in scholarly and community organizations. She was the Founding President of the Gerontology Association of British Columbia, served two terms as President of the Canadian Association on Gerontology (1987–1991), and was President

of the International Association of Gerontology and Geriatrics (IAGG), from 2001 to 2005. In her current position as Immediate Past President, she will serve on the IAGG Executive Committee until 2009. She is also a Fellow of the Gerontological Society of America, a member of the World Health Organization's Expert Advisory Panel on Health and Ageing, and a Director of the International Institute on Ageing-UN Malta.

Laurie Chan, PhD
Professor, Community Health Sciences
University of Northern British Columbia (UNBC)

Dr. Laurie Chan joined the Community Health Program at UNBC in January 2006. He obtained his B.Sc. and M.Phil from the University of Hong Kong and Ph.D. from the University of London. He holds a prestigious BC Leadership Chair in Aboriginal Environmental Health with a \$4.5 million endowment. He is also one of the six Natural Sciences and Engineering Research Council of Canada Northern Research Chairs in Canada.

Dr. Chan was a founding member of the Centre for Indigenous Peoples' Nutrition and Environment at McGill University (1993–2005). He has received over \$4 million in research funding from 45 research grants and contracts, published over 80 papers in peer-reviewed journals, written 18 book chapters and technical reports and owns two patents. He has presented over 200 abstracts and scientific papers, and has given over 60 invited talks. He has supervised 40 post-doctoral fellows and graduate students. Currently, he holds 12 research grants and supervises two post-doctoral fellows and seven graduate students.

Dr. Chan's work involves both basic and applied research in environmental toxicology and nutrition toxicology. He has conducted extensive studies on the risk and benefits of the consumption of traditional food and impacts of environmental changes on food security. Dr. Chan also serves as an advisor for numerous national and international governments and organizations and Aboriginal communities on environmental health issues.

Jill Skinner
Manager, Office for Public Health, Canadian Medical Association

Ms. Jill Skinner is a senior manager with the Office for Public Health at the Canadian Medical Association with over 25 years experience in the health care field including 15 years as registered nurse in a hospital setting followed by positions with government and national health care associations as a health communicator with particular experience in health promotion and risk communications.

Jack Siemiatycki, PhD
Professor, Department of Social and Preventive Medicine
University of Montreal

Dr. Jack Siemiatycki holds a Canada Research Chair in Environmental Epidemiology and Population Health at l'Université de Montréal, in the Department of Social and Preventive Medicine. A former National Health Research Scientist of Health Canada's National Health Research and Development Program (NHRDP), Dr. Siemiatycki has been a Canada Research Chair since 2001. He has served on numerous national and international expert advisory bodies such as, Health Effects Committee of International Joint Commission, Board of Directors of the National Cancer Institute of Canada, Scientific Council of the International Agency for Research on Cancer, Scientific Council of the Institut de recherche en santé publique (France), Institute Advisory Board of one of CIHR's Institutes, Fonds de la recherche en santé Quebec Advisory Committee on Ethics and Databanks, Board of Directors of the American College of Epidemiology, President of the Canadian Society for Epidemiology and Biostatistics, and several others. He has served on editorial boards of journals such as the American Journal of Epidemiology and has served on many grant review panels.

Dr. Siemiatycki has authored or co-authored five books, chapters and monographs, over 140 peer-reviewed articles, 40 scientific reports and has been an invited speaker at well over a hundred meetings. He has also co-authored children's books. He has received operating grant support from all the major health granting bodies in Canada and Québec. Most of his research has been in the area of environmental and occupational etiology of cancer, with involvement also in such issues as: social inequalities in health, health survey methodology, epidemiology of juvenile diabetes, water quality and health, and epidemiologic methodology.

Ana Navas-Acien, MD, MPH, PhD
Associate Professor, Department of Environmental Health Sciences
Johns Hopkins Bloomberg School of Public Health

Dr. Ana Navas-Acien is a physician-epidemiologist (MD University of Granada, Spain '96, PhD Johns Hopkins University '05) with a specialty in Preventive Medicine and Public Health and with a long-term interest in the health consequences of widespread environmental exposures. She is an Assistant Professor in the Departments of Environmental Health and Epidemiology at the Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. She is also a core faculty member of the Welch Center for Prevention, Epidemiology and Clinical Research, Johns Hopkins Medical Institutions.

Based on an epidemiologic approach, her research investigates the cardiovascular effects of arsenic, selenium, lead, cadmium and other trace metals. Given the paucity of epidemiologic data at low/moderate levels, the possible biological basis, and the controversy for current environmental standards, this challenging area of research is

potentially relevant for public health. For exposures with large epidemiologic evidence of the adverse health effects, such as second-hand smoke, her interest is to conduct relevant research in support of progressive policies to reduce involuntary exposure to environmental toxins.

Dave Stieb, MD, MSc, CCFP, FRCPC
Medical epidemiologist, and Biostatistics and Epidemiology Division
Health Canada

Dr. Dave Stieb is a public health physician and epidemiologist in the Biostatistics and Epidemiology Division of the Healthy Environments and Consumer Safety Branch at Health Canada. Since joining Health Canada in 1993, Dr. Stieb's primary focus has been epidemiologic research on the health effects of outdoor air pollution and the application of these findings to quantifying the public health impacts of air pollution. He is an adjunct professor in the Department of Epidemiology and Community Medicine at the University of Ottawa, and affiliate scientist at the McLaughlin Centre for Population Health Risk Assessment.

David Hogan, MD, FRCPC
Professor and the Brenda Stafford Foundation Chair in Geriatric Medicine
University of Calgary

Dr. Hogan is a specialist in internal medicine and a sub-specialist in geriatric medicine. He is Professor and the Brenda Stafford Foundation Chair in Geriatric Medicine at the University of Calgary and the acting Head of the Division of Geriatric Medicine/Medical Leader of Seniors Health, Calgary Health Region. His research interests include cognitive impairment/dementia/Alzheimer's disease, falls, frailty, geriatric clinical pharmacology, geriatric syndromes, health service research and population therapeutics.

He has over 300 publications. David is the Medical Director of both the Cognitive Assessment Clinic and the Calgary Fall Prevention Clinic. He works primarily out of the Foothills Medical Centre, Calgary Health Region. David is married. He and Janet have four children.

Kathy Sykes, MA
Senior Advisor, Aging Initiative
Office of Children's Health Protection & Environmental Education,
U.S. Environmental Protection Agency

In 1998, Kathy Sykes began working for the US Environmental Protection Agency (EPA) in the Office of Congressional and Intergovernmental Affairs as the lead on budget and appropriations. Since 2002, Kathy has been serving as the Senior Advisor for EPA's Aging Initiative. She has worked to raise awareness among older adults, caregivers, health care providers and the leaders in aging about environmental health hazards and encourage older adults to become environmental stewards to address environmental challenges

that face our society. She is also committed to improving the environment and health of persons of all ages through smart growth practices. She serves as the Chairperson for the Steering Committee for Building Healthy Communities for Active Aging.

During her 23 year career, Ms. Sykes has held various health and aging policy positions in both state and federal government. She served as the Associate Director for Planning & Legislation for the CDC's National Institute for Occupational Safety and Health, as professional staff for the U.S. Special Committee on Aging, and as Associate staff for United States Representative David R. Obey. She also worked as a special assistant for the Administrator of the Wisconsin State Division of Health.

In 1985, Kathy received a master's degree from the University of Wisconsin-Madison in Public Policy and Administration and Health Services Administration.

Robert C. MacPhail, PhD

Research Scientist, Neurotoxicology Division, National Health and Environmental Effects Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park

Dr. Robert MacPhail was previously Chief of the Division's Neurobehavioral Toxicology Branch for 20 years, and Division Science Advisor for four years. He has been a member of the Society of Toxicology since 1984 and was the President in 2006–2007. He is also a periodic advisor to the National Academy of Sciences, the International Programme on Chemical Safety (WHO), and the Organisation for Economic Co-operation and Development (OECD). His primary research interest is on the use of animal models of susceptibility to environmental contaminants throughout the life span, the mechanisms of susceptibility, and improving risk assessments for older adults and other susceptible subpopulations. Recent research also includes studies on the effects of anatoxin-a, which is a potent cyanotoxin and water contaminant, and studies on larval zebrafish as an alternative animal model for evaluating developmental neurotoxicity. Robert MacPhail research is part of a larger multidisciplinary effort to enhance our understanding of the public health risks of environmental pollutants.

Erica Phipps, MPH

Environmental health consultant

Erica Phipps is an environmental health consultant based in the Ottawa area. From 1999 to 2003, Erica served as a program coordinator for the North American Commission for Environmental Cooperation (CEC), where she developed and managed a program on children's health and the environment, and produced the CEC's annual "Taking Stock" report on industrial pollution. Prior to joining the CEC, Erica worked for the United Nations in Geneva, assisting developing countries in strengthening institutional capacities to manage toxic chemicals and pesticides, and for the US Environmental Protection Agency in the office of toxic substances and pollution prevention. Erica has a masters' degree in public health from the University of Michigan, where she specialized in environmental health and public policy.

Annex 4 | Evaluation of the workshop

A total of 33 evaluations were received at the end of the workshop. The overall response of the workshop was highly positive, with an average score of 4.6 out of 5. The majority of the respondents felt that the workshop was very well-organized, well-facilitated and focused. They appreciated the discussion paper prepared for the workshop and the distribution materials available for the participants. Respondents thought the presentations were very informative and interesting, and that the workshop fulfilled its objectives.

Of the 33 participants who provided evaluations, respondents indicated that the following were of most value to them:

- Information gathering and sharing, especially in learning about the relationship and linkages between seniors' and environmental health.
- Networking opportunities with people with common interest and/or with whom they had no prior contacts.
- Distribution materials and discussion paper for the workshop.
- Focusing with others from diverse backgrounds on the common goal of healthier environments for seniors.

The following were suggested as areas of improvements:

- Include perspectives and initiatives from other countries apart from the US and Canada in the panel presentations.
- Acknowledge First Nations Government and involve Aboriginals groups in the panel presentations.
- Provide hard copies of the power point presentations.
- More discussion on the federal/provincial/territorial jurisdictional responsibilities on environmental health issues.
- Establish clearer objectives and work plan extending from before to after the workshop.
- Include private sectors, seniors advocate groups and front line service providers at the table.
- Have a website which contains the workshop materials as well as the outcomes of the workshop.
- Provide more information on the impact of climate change on seniors' health.
- Address more on the economic burden of the environmental impacts on seniors' health, this could be the focus in another forum.
- Have more time for group discussions.

Other comments provided by the respondents:

- There was a heavy emphasis on increasing awareness of environmental health issues for health care professionals. One participant suggested that the most cost effective approach might be to focus on building capacity among front-line service providers, such as home care workers and public health nurses.
- A respondent recommended that the outcomes of the workshop should be broadcast across other divisions within the Safe Environments Programme of Health Canada and at the Programme’s management committee as well.
- Another respondent commented on the two workshops organized by Health Canada: the health professionals’ workshop on children and environmental health and senior’s health and the environment, have been extremely useful in addressing environmental health issues for the vulnerable populations. However, it was suggested that it is important to have a similar workshop to deal with the adult “canaries” – aged 19–65, who report sensitivity/ intolerances to environmental substances, and may become disabled at what should be the peak of their productive years.

Table 1. Ratings of the workshop

Rate of the workshop	Average score (out of 5)
The meeting achieved the stated objectives	4.3
The format of the meeting was appropriate to achieve the stated objectives	4.5
I got the opportunity to express my views	4.7
The facilitation of the workshop was effective	4.8
Workshop materials were relevant and appropriate	4.5
I was satisfied with the venue and food	4.4
Overall impression of the workshop	4.6
How relevant and effective were the following panels?	
Profile of Canadian older adults and why are they vulnerable to environmental health risks?	4.4
Relationship between environmental risks and the health of older adults	4.4
Initiatives on older adults’ health and the environment	4.4

Annex 5 | Results of working group discussions

Other gaps and challenges identified by participants

General

1. Environmental health literacy of the general population.

Outdoor Air

2. Lack of guidelines and standards for safety and exposures to outdoor air pollutants.
3. Inability to study exposure risks due to the multiple and fluctuating exposures over time.
4. Lack of communication in informing seniors on days in which the air quality is poor, or during occurrence of extreme heat events. Need for a “reverse 911” program in Canada.

Indoor Air

5. Inadequate public education on the health effects of indoor air chemicals.
6. Huge knowledge gaps on indoor air quality situation in First Nations communities and its impact on the health of First Nations seniors.

Water

7. Need to sort our jurisdictional responsibilities of drinking water.
8. Challenge in changing cultural practices and perspectives on water, i.e. Aboriginals believe that water has its own spirit and treating the water will “damage” the spirits.

Food

9. Lack of information on the extent on how contaminated the seafood and traditional food are in Aboriginal communities.
10. Unknown health impacts on the chemicals that leach into food from food containers, etc.
11. Unknown health impact of eating meat from cloned animals or vegetables that are genetically modified.
12. Lack of information on the association between various chemicals and their health impacts, such as synthetic fertilizers and Parkinson’s disease.
13. Lack of information on whether the loss of nutrients during the process of cooking is crucial to the aging population.

14. Lack of studies related to seniors particular vulnerabilities with respect to food consumption.
15. Great challenge in determining and promoting adaptation to changing environmental conditions for seniors who maintain traditional eating/storage patterns.
16. Lack of understanding on what role does vulnerabilities of seniors play in determining environmental risk factors in food.

Consumer products

17. Inadequate information on consumer purchasing patterns for age 65+.
18. Lack of information on “what’s in grandma’s closet”, i.e. what old and hazardous products those 65+ may be hoarding.

Extreme temperature events

19. Lack of knowledge on how to mitigate risk for the aging population, for example, how could this group we prepare and adapt in case of extreme temperature events.
20. There are great opportunities for home care providers to educate seniors on environmental health issues during their home visits. Creative roles for home care providers and other health care professionals.