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November 2007, Issue 14

Health Policy Research Bulletin

People, Place and Health

Health Policy Research Bulletin

People, Place and Health

Research from several disciplines is currently shedding new light on the complexities of the relationships between a place, its people and their health. As national and population-level data can mask underlying inequalities, this newer research is showing how patterns of health and health inequalities can vary depending on where people live.

Building on recent work on the health of urban and rural Canadians, this issue of the *Health Policy Research Bulletin* explores how research on "place and health" has evolved and offers a lens for viewing this research from a determinants of health perspective. Following a snapshot of health variations across Canada's urban and rural places, the issue presents research on the relationships underlying these variations—"drilling down" to the city and neighbourhood levels where the interaction of health determinants can be more readily observed and health inequalities more easily understood.

Throughout the issue, the articles explore the implications for policy and suggest that a focus on "places of concern," as well as "populations of concern," may facilitate a more strategic approach for addressing issues of health and health inequalities.

In this Issue

Canada

Glossary

The following terms are census **geographic units** that are often used to describe the delineation of urban and rural areas in Canada:

Census Metropolitan Area (CMA)—is an area consisting of one or more adjacent municipalities situated around a major urban core. A CMA must have a total population of at least 100,000 people of which 50,000 live in the urban core.

Census Agglomeration (CA)—is an area consisting of one or more adjacent municipalities situated around a major urban core. A CA must have an urban core population of at least 10,000 people.

Metropolitan Influence Zone(s) (MIZ)—categorize(s) non-urban areas, based on population density and distance to an urban core. There are four categories of MIZ ranging from Strong MIZ to No MIZ.

The following are some commonly used **measures of health**, which are used in this issue of the Bulletin:

Health Status—refers to the state of health of a person, group or population. Indicators of health status include traditional measures of mortality and morbidity, but they can also include individuals' subjective assessments of their own health (*see self-rated health*).

Health Utility Index (HUI)—is a generic health status index that synthesizes both qualitative and quantitative aspects of health. It incorporates measures of overall functional health (vision, hearing, speech, mobility, dexterity, feelings, cognition and pain).

Life Expectancy (LE)—is the average length of years that an individual is expected to live, starting from a given age, on the basis of mortality statistics for a specific observation period. LE is a widely used indicator for measuring the health of a population, measuring the quantity rather than the quality of life.

Potential Years of Life Lost (PYLL)—is the number of years of life "lost" when a person dies "prematurely" from any cause—before age 75 (e.g., a person dying at age 25 has lost 50 years of life).

Self-Rated Health—is an indicator of self-perceived health status. It can reflect a combination of health problems (acute and chronic conditions, physical functioning, etc.), health behaviours or mental health problems.

About the Health Policy Research Bulletin

Health Canada's *Health Policy Research Bulletin* is published twice yearly with the aim of strengthening the evidence base for health policy decision making. The Bulletin features research from across Health Canada, the Public Health Agency of Canada (PHAC), other federal departments and academia. A Steering Committee composed of representatives from Health Canada and PHAC recommends policy research themes to be featured and reviews the text for each issue. The Committee is supported by the Bulletin Secretariat within the Data Development and Research Dissemination Division of the Applied Research and Analysis Directorate, Health Policy Branch, Health Canada, which coordinates all aspects of the Bulletin's development, production, release and dissemination.

The opinions expressed in these articles, including interpretation of the data, are those of the authors and are not to be taken as official statements of Health Canada.

Special thanks for this issue go to the Guest Editor, Mark Wheeler, Assistant Director of the former Policy Coordination Division, Policy Coordination and Planning Directorate, Health Policy Branch. Appreciation is also extended to Allium Consulting Group Inc., for editing, design and layout.

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Published by authority of the Minister of Health.

The *Health Policy Research Bulletin* is available on Internet at the following address:
http://www.healthcanada.gc.ca/hpr-bulletin

Également disponible en français sous le titre : *Bulletin de recherche sur les politiques de santé.*

This publication can be made available on request on diskette, large print, audiocassette and braille.

For further information or to obtain additional copies, please contact:
Publications, Health Canada, Ottawa, Ontario K1A 0K9
Tel.: (613) 954-5995, Fax: (613) 941-5366
E-mail: info@hc-sc.gc.ca

Publications Mail Agreement Number 4006 9608

HC Pub.: 1460 Cat. No.: H12-36/14-2007 ISSN 1496-466 X
Cat. No.: H12-36/14-2007E-PDF (Online) ISSN 1499-3503 (Online)

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Our New Look

You may notice that we're making some changes to the design of the Bulletin in keeping with Health Canada's new Visual Identity Guidelines. We hope that you will enjoy reading our articles and regular columns in their new format.

Being Strategic with Our Interventions

In this issue, Nancy Hamilton, Managing Editor of the Health Policy Research Bulletin, *speaks with* Mark Wheeler, *Assistant Director of the former Policy Coordination Division, Policy Coordination and Planning Directorate, Health Policy Branch, Health Canada.*

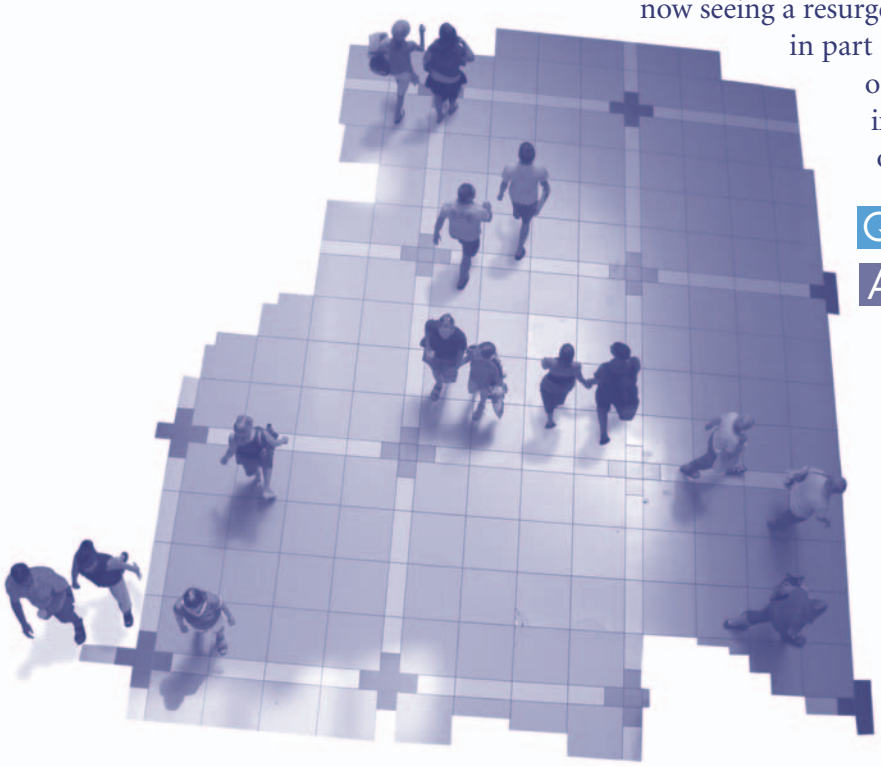
Q ***Why develop an issue of the* Health Policy Research Bulletin *on "People, Place and Health" at this point in time?***

A We've recently seen a number of reports, including those published by the Canadian Population Health Initiative, which have looked at how health status varies across Canadian places—both urban and rural. Now it's time to "drill down" so that we can understand the dynamics underlying these differences.

For example, some of the healthiest, longest living Canadians live in Vancouver. But, if one were predicting health status on the basis of individual characteristics, then Vancouver's population should be even healthier than it is. So, is something "pushing back"? Is it something in the social environment? The physical environment? On the other hand, the health of Montréalers is better than one would predict on the basis of individual characteristics. So what is "pushing forward"? There are no simple answers to questions like these; nevertheless, finding the answers will enable us to be strategic with our interventions and investments.

Q ***Are these questions really new to health policy?***

A The concept of "place" is not new to health policy, but how we've framed and studied it has evolved, as the authors point out in the article on page 6. We're now seeing a resurgence of interest in the role of place in health policy, in part due to a convergence of research from a number of disciplines. This is shedding new light on the importance of place in relation to health, as well as on the complexity of the underlying relationships.



Q ***What is the thrust of this new research?***

A While the entry point may vary, much of the recent and current work focuses on the health status gradient and how it plays out in different places. From a policy standpoint, we've been trying to understand what drives the gradient and what we can do about it. For example, through Health Canada's former *Health Policy Research Program*, researchers like Nancy Ross of McGill University have looked at how the gradient varies between and within Canada's census metropolitan areas (CMAs).

Q ***What do you mean by the "health status gradient" and what does it tell us about health?***

A The "gradient" refers to the socio-economic gradient in health. Although it is now fairly well known among those concerned with the social determinants of health, it goes back to the landmark work of Sir Michael Marmot in the U.K. (*The Whitehall Studies*). In looking at the British Civil Service, he found that the rates of heart disease were higher among the lower than the upper ranks. In trying to explain this gradient, he found that the usual risk factors (smoking, diet, physical activity) accounted for just over one third of the difference. What was so powerful as to have over *twice* the impact of all other risk factors? Marmot has come to attribute the difference to "status." Although you'll see different terms for this—socioeconomic status, social standing, socioeconomic position—they all relate to one's position within a society or a hierarchy that serves to improve or dampen one's health outcomes.

Since Marmot's initial work, the "gradient" has been well established in the literature. Gradients have been observed between socioeconomic status and various health outcomes, giving us important information about health disparities.

Q ***What is the new research telling us about health disparities in Canada?***

A I'll refer first to an earlier study by Nancy Ross and Michael Wolfson of Statistics Canada, together with colleagues in the U.S., which looked at the relationship between income (as a proxy for socioeconomic status) and health across cities, first in the U.S. and then in Canada. In the U.S., they found a gradient running from the "snow belt" where health was better, to the deep south where health was worse, with the "heartland" falling in between. By comparison, the same type of gradient was not found across Canadian cities. On a population-weighted basis, the Canadian gradient came out pretty flat. So, they determined we must be doing something right in Canada and seemed to point to our systems of equalization payments and universal health care.

Socioeconomic status, social standing, socioeconomic position—they all relate to one's position within a society or a hierarchy that serves to improve or dampen one's health outcomes.

The absence of a clear gradient *across* Canadian cities prompted questions about what was happening *within* Canadian cities and led to Ross's "neighbourhood-level" research. This work did show the presence of a gradient within most cities studied, indicating that socioeconomic-related health disparities do indeed exist. But, as the article on page 23 describes, the shape and slope of the gradient varies from city to city, indicating that intra-city disparities are greater in some places than others.

Q ***Do we know why the gradient is playing out differently in different places?***

A The pathways are complex and research is trying to disentangle the relationships in play. Let me give you a couple of examples of what we need to look at more closely. It's important to look at the "people" element of the people, place and health relationship—the element that often gets overlooked. At the national level, we know that Canada is an immigrant-seeking society and that most immigrants settle in urban places. Less obvious is the extent to which Canadians move or migrate from place to place at different points in the life cycle. For example, people might make a rural-urban transfer or a region-to-region move to go to school, to seek a job, or to retire.

We also need to look at the sub-national level if we don't want to miss an important story. For instance, recent data from Statistics Canada (see article on page 13) show that the growth of two of our largest cities—Toronto and Montréal—can be explained in terms of births and international immigration, but not by internal migration. On the other hand, cities like Ottawa and Calgary are picking up people from internal migration. Not only is the flow of people moving in and out not the same in all places, but there are also "net losers and "net gainers." Consequently, knowing where people are living—and why—is important in trying to understand what is driving the gradient in different places.

Q ***What other factors and pathways need to be considered in the "people, place and health" relationship?***

A In addition to the economic environment, we also need to look at a community's physical, social and public policy environments. For example, we know that

air pollution still poses a risk to people's health. However, new Health Canada research is showing that some of these risks are not distributed evenly across the population, but are being disproportionately faced by those living in low socioeconomic circumstances (see article on page 33). Thus, in addition to affecting health directly, we're seeing that the physical environment can compound the effect of income, placing an added health burden on those who may be socially or economically disadvantaged.

There is also some interesting work on the built environment, which is showing a correlation between "mixed-use" neighbourhoods, walkability and increased physical activity. For example, research shows that physical activity rates among people in some lower socioeconomic status (SES), mixed-use urban cores (such as in Montréal) are higher than those living in higher SES, residential suburbs. Could this be part of what is "pushing forward" in Montréal? Or, could it be the level of social networks and social capital? As Issue 12 of this Bulletin discussed, the social environment is an important consideration, especially at the neighbourhood level. A person's social networks may affect the health resources that one may choose to access, for example.

It's so important to appreciate how these influences intersect. For instance, if we consider a place where the principal economic activity is resource processing (e.g., steel mill, pulp mill), then this says something about the work people will be doing, the quality of the physical environment, and the value of neighbouring real estate. It's not hard to imagine how, over time, a divide can grow at the level of the social stratum—with higher SES neighbourhoods developing on the more prime real estate "upwind" of the plant, and lower SES neighbourhoods forming on the less desirable land "downwind" of the plant.

Q *You mentioned that policy can be an important lever of change—I'd like to return to that for a moment.*

A The policy environment is an important part of the story. Research is showing that place plays a role through both neighbourhood- and metropolitan-level influences. Many of these influences, in turn, can be altered by the types of policies that are established. Take land use, for example. How are different parcels of real estate being used? What constitutes an ideal mix between residential and commercial uses? How are issues of "urban sprawl" addressed? While policies like these are set outside the health sector, the health sector has a role to play in working across sectors to create "healthy public policy."

Q *What are the policy implications for the health sector?*

A Regardless of how intersectoral the contributing factors are, it is the health departments and agencies —be they at the federal, provincial or municipal level—that have the mandate to sort out what makes a difference to people's health. I've always believed that the most important thing we can do in policy and policy research is to define the issue correctly. Here, the new research on "place" is helping out because, with aggregated data alone, it's difficult to frame the context for evaluating options and, therefore, be strategic in our investments.

Place plays a role through both neighbourhood- and metropolitan-level influences. Many of these influences, in turn, can be altered by the types of policies that are established.

Take the Greater Sudbury area for example which, with one of the highest percentages of smokers in the country, has to be a place of concern. But, do we target young people to persuade them not to start smoking, or veteran smokers who might be motivated to quit? At the same time, we know that Sudbury has been suffering net population losses over the years. So, are the people who are leaving representative of those who stay behind? If those who leave are younger, better educated and less likely to smoke, then it could be that smoking uptake is no different in Sudbury than in other places. In policy terms, this would mean that smoking cessation challenges may or may not be different than elsewhere in the country.

Getting the story straight is hugely important if we are to be strategic in how and where we focus our interventions and investments. ■

Setting the Stage:

The Influence of Place on Health

Richard Duranceau, Policy Coordination and Planning Directorate, Health Policy Branch, Health Canada, and **Derek McCall**, formerly of the Policy Coordination Division, Policy Coordination and Planning Directorate, Health Policy Branch, Health Canada

The authors would like to acknowledge the assistance of co-op student **Samara Hammoud**.

While the concept of place is not new to health research, the ways in which it has been studied have evolved over time. This article takes a closer look at that evolution and at how place can be conceptualized. The authors outline a lens through which the complex relationship between place and health can be viewed.

Early Links

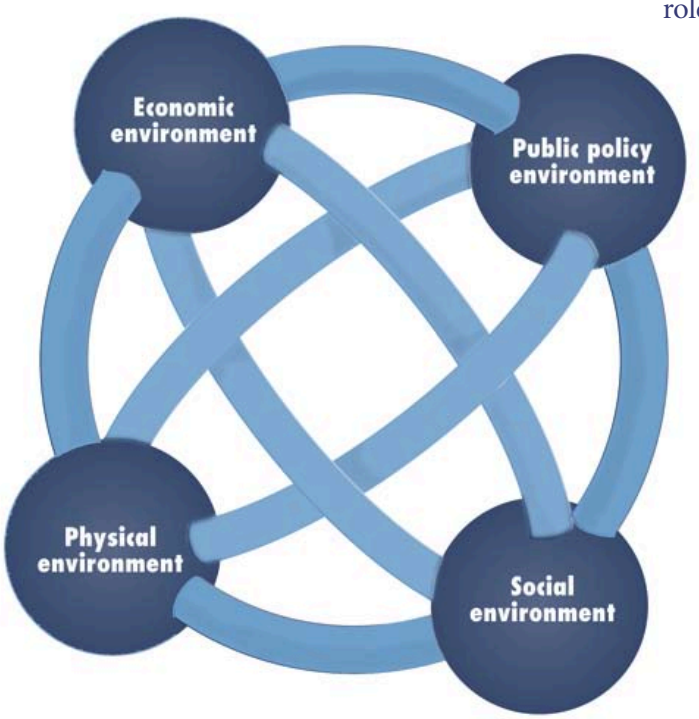
Friedrich Engels' *The Condition of the Working Class* has been cited as one of the earliest studies on the "social determinants of health," which includes such factors as income equality, education and housing.[1] In studying poverty in 19th century England, Engels highlighted the role of "place" in the residential segregation between rich and poor citizens. Engels noted that poorer people tended to be geographically concentrated in areas that were more likely to contribute to diseases such as typhus and tuberculosis, and to other negative health outcomes. His analysis of 19th century social conditions suggested a correlation between population, geography and health.

In response to such findings, early public health efforts focused on reducing the risk of infectious diseases through improved sanitation and public infrastructure.

A Focus on Lifestyle

Development of the health care system in Canada through the post-war period was followed by an increasing attention to chronic disease and the role that lifestyle and personal behaviours play in health. This was reinforced by the *Lalonde Report* in 1974.[2] While "environment" was identified in the four fields of influence (human biology, environment, lifestyle and health care organization) presented in the *Lalonde Report*, lifestyle emerged as a key area of research and an important aspect of health promotion. In light of research showing that health outcomes are negatively influenced by such health behaviours as smoking, drinking and lack of exercise, program activity concentrated on modifying the impact of lifestyle factors through education and public awareness tools.

Subsequent developments in the United Kingdom, however, indicated that health behaviours are not easily modifiable. The *Black Report* (1980) showed that health inequalities persisted, despite the efforts of the public health system, and that individual health behaviours did not fully explain these unequal outcomes.[3]



The Determinants of Health

With the release in 1986 of *Achieving Health for All*[4] and the *Ottawa Charter for Health Promotion*,[5] greater emphasis was put on the influence of contextual factors on health. This both broadened the research and led to more comprehensive program responses, including the use of public policy interventions aimed at community- as well as individual-level change. Lifestyle programs were reoriented as research showed that health behaviours, once thought to be the product of individual choice alone, are also influenced by external conditions. At the same time, initiatives such as *Healthy Communities*[6] fostered citizen participation in intersectoral policy action to create more "health supportive" communities.

In the early 1990s, the book *Why Are Some People Healthy and Others Are Not?*[7] presented a compelling synthesis of the available research on the factors and conditions that determine health. This, and other research, provided the basis for the document *Strategies for Population Health: Investing in the Health of Canadians*,[8] approved by the Federal/Provincial/Territorial Ministers of Health in 1994. In its framework for population health, this document identified a number of determinants of health, many of which play out in the context of local communities—for example, employment and working conditions, the physical environment and social support networks.

In the mid-1990s, the National Forum on Health cited the social, physical and economic contexts in which people live and work as possible pathways or mechanisms that may lead to differences in the health behaviours and health status of Canadians.[9] More recently, the Public Health Agency of Canada, in partnership with Health Canada, has been involved in the WHO Commission on the Social Determinants of Health, which is compiling evidence on the science and action related to these determinants (see article on page 41).

A Covergence of New Research on Place

Current research from a number of disciplines, including geography, gender studies, health and social sciences, is bringing to light the complex pathways by which factors in the environment influence patterns of health and health disparities. Many of these pathways operate at the community level and are masked by aggregate-level data at the national or regional level. As a result, studies are now "drilling down" to the city and neighbourhood levels in order to better understand the ways in which these patterns are playing out across Canada's urban and rural places.

Depending on the field of study, one can consider "place" from various perspectives—climatic zones, regions with similar topography, areas under the same political control, to name a few. As a starting point for studying "people, place and health," place can be thought of as a geographic area where men, women, boys and girls live in all their diversity. Typically, it is the distinguishing physical characteristics of Canada's places that have received the most attention from researchers.[10] This is not surprising, given the importance of physical qualities of place in shaping Canada's initial settlement patterns—as well as their continuing influence on the internal migration patterns of Canadians.

Canada has become an increasingly urbanized society with over 80% of the population living in urban areas. Over two thirds (68%) of this urban population live in one of Canada's 33 largest city areas (of over 100,000 people) called census metropolitan areas (CMAs).

Canada has become an increasingly urbanized society with over 80% of the population living in urban areas. Over two thirds (68%) of this urban population live in one of Canada's 33 largest city areas (of over 100,000 people) called census metropolitan areas (CMAs).[11] Because of their population density as well as the fact that many of the factors determining health play out in the context of local economies, the CMA has become a major focus for research on the effects of place on health. Researchers are also studying rural places and are moving away from their earlier focus on the concept of a rural/urban dichotomy as they recognize that rural places exhibit varying degrees of rurality, depending upon factors such as the influence of nearby metropolitan areas.[12]

Through the Lens. . .

When examining the relationships between people, place and health, it is helpful to consider places as more than geographic entities. For example, Fitzpatrick and Lagory conceptualize place as "environments consisting of physical, cultural, political, economic and social components, with each component contributing in complex ways to the differential health risks experienced by a population."[13] A heuristic framework or lens can be helpful when viewing the complex relationships between people and the places in which they live, work, socialize and build their lives. Drawing on the work of these and other researchers, the authors suggest that these relationships be considered through the lens of the physical environment, the social environment, the economic environment and the public policy environment.[13] The rest of this article defines and illustrates, through the *example of housing and neighbourhood safety*, how the framework can be used to identify the various pathways by which a component of the environment can influence health.

Physical environment

Encompassing both the natural and built environment, the physical environment includes aspects of housing, access to services and environmental quality.[14]

Often, as is the case with the research on housing and health, the evidence is stronger when looking at the health effects of specific environmental factors. For example, lead has been demonstrated to cause neurological deficits and, while governments have taken measures to minimize exposure, older housing stock may retain significant amounts of lead and continue to pose a threat to vulnerable populations, including children. Recent multidisciplinary research suggests that some areas are more likely to expose their inhabitants to a wider range of hazards than others —including the quality of housing.[15,16,17,18,19,20,21,22,23] Understanding how the quality of housing affects vulnerable populations may provide important insights into how an area's physical features may promote or inhibit health.

Fitzpatrick and Lagory conceptualize place as "environments consisting of physical, cultural, political, economic and social components, with each component contributing in complex ways to the differential health risks experienced by a population."

Social environment

The social environment refers to the external conditions under which people engage in social activity within their community.[14] It includes aspects of social opportunity, leisure and recreation, education, access to health services, health status and participation in democratic processes.

Neighbourhood safety provides an example of how the social environment may influence community health. Canadian research shows that high crime neighbourhoods are characterized by access to fewer socioeconomic resources, lower residential stability, higher population density and land use patterns that increase opportunities for violent and property crime.[24,25,26] It is important to note that crime appears to be experienced differently by men and women. There may also be differences in the incidence and type of crime experienced by men and women in particular neighbourhoods. For example, some studies have found that women report higher levels of fear of crime when walking alone or using public transit after dark.[27]

Research from the United States suggests that the social and organizational characteristics of neighbourhoods can explain variations in crime rates over and beyond individual characteristics, with high levels of crime corresponding with low levels of social capital (i.e., few social networks and lack of social trust) and greater inequalities in health.[28,29,30]

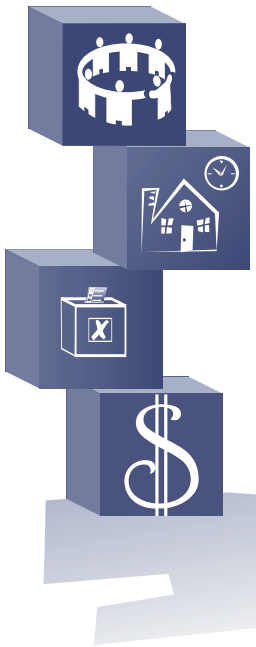
Economic environment

The economic environment represents the external conditions under which people are engaged in, and benefit from, a range of economic activity including paid employment, finances and economic status.[14] As the interview on page 3 has pointed out, one's socioeconomic status (SES) and

socioeconomic context have a powerful influence on health, both directly and indirectly. Understanding how these influences affect the patterns of health and health inequalities within Canada's places is the subject of many of the subsequent articles in this issue.

One of the pathways by which SES is theorized to affect health is through the access it affords to the basic necessities of life. Housing and shelter are essential components in the lives of Canadians—as such, they provide a striking example of how changing economic conditions can affect peoples' health and well-being. Canadian research shows a relationship between the level of housing need and the level of inequality between neighbourhoods[31] —a relationship that is often exacerbated by a series of converging trends such as an aging rental stock and the conversion of apartments into condominiums.[32] Perhaps even more important is the emerging trend showing a growing divide between the household incomes of homeowners and renters. International research suggests that housing tenure (homeowner, social renter, private renter) can influence health outcomes, with owner-occupiers having lower mortality risks, lower infant mortality rates, and higher scores on physical, global and mental health measures.[33]

A case can be made that "health and place" continues to be an underutilized concept in health policy making. Gaining a better understanding of the relationships involved might strengthen our capacity to address population health challenges.



Public policy environment

The public policy environment is important in understanding the role of place and health, and includes issues related to the choice of policy instrument (e.g., legislation, community programming) and the level of citizen participation in the policy-making process. The use of minimum wages, zoning laws and health and safety regulations are just a few examples of government policies that may have health impacts. The Ross et al. study in 2000 suggests that public policy may have a role in reducing the impact of income inequality upon health.[34] Social expenditures aimed at reducing unemployment, improving housing stock and enhancing neighbourhood social supports may also serve to promote the health and well-being of a given population.[35,36]

In Conclusion

There is a growing recognition in the literature that place exerts an important influence on health.[16] However, a case can be made that "health and place" continues to be an underutilized concept in health policy making. Gaining a better understanding of the relationships involved might strengthen our capacity to address population health challenges.

The Bulletin responds to this challenge in subsequent articles by exploring how and why patterns of health and health inequalities vary across Canadian places. The conceptual lens or framework presented in this article was used to help organize the research for this issue. For example, after examining Canada's population patterns and providing a snapshot of health variations across Canada's urban and rural places, later articles explore the relationships underlying these variations. Although the articles focus on each of the environments in turn—socioeconomic, physical, public policy, etc.—readers are encouraged to reflect on the potential points of intersection between the pathways discussed. Finally, the issue closes with an example of how local control over policy-making structures within First Nations communities is having a beneficial influence on health. ■

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Defining, Measuring and Analyzing Health and Place

Shamali Gupta, Applied Research and Analysis Directorate, Health Policy Branch, Health Canada, and **Linda Senzilet**, former Policy Coordination Division, Policy Coordination and Planning Directorate, Health Policy Branch, Health Canada

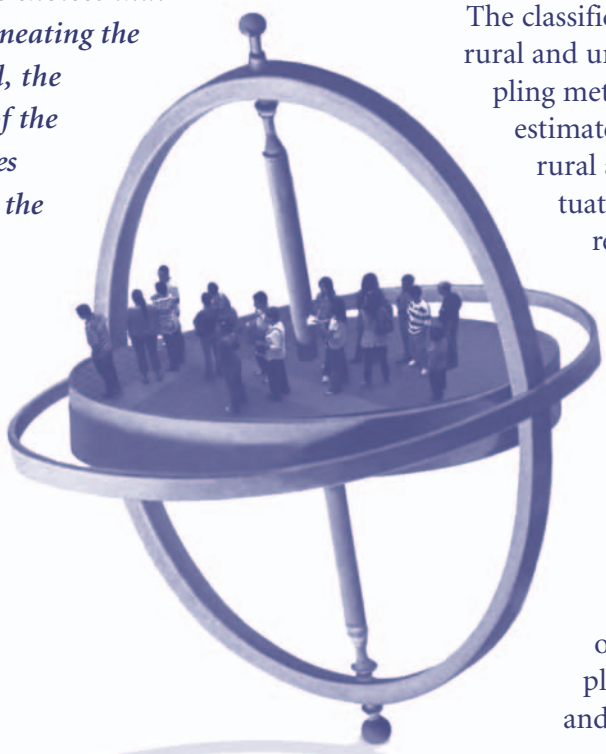
As the research on "people, place and health" demonstrates, this is an exciting time to be a population health researcher. The multidisciplinary nature of the field, the analysis of individual- and area-level factors as well as the increasing availability of sophisticated statistical methods present both challenges and opportunities. To help sort through these issues, the authors highlight a few methodological considerations to keep in mind while reading the articles that follow. After identifying some of the choices that researchers face in delineating the "places" being studied, the authors discuss some of the methodological challenges confronted in studying the complex relationships between place and health.

Setting the Boundaries

Places are usually identified by drawing geographic boundaries to create spatial or geographic units. Such units, however, may vary depending on the health issue being evaluated. For example, the spatial unit needed to study the effects of air pollution may differ from that required to study the effects of resource allocation for health services. The units may also vary depending upon the classification system used to delineate the areas being studied (see Table 1).

Census building blocks

In Canada, the "building blocks" for classifying an area as "rural" or "urban" are often based on the census geography classification.[1,2] Using these building blocks, one can delineate "rural" or "urban" areas in a number of different ways, depending upon the criteria being emphasized (e.g., population size, density, labour market or settlement context). The classification definition one uses for delineating rural and urban places has implications for the sampling methodology—and the resulting population estimates. For example, as Figure 1 shows, Canada's rural and urban population estimates could fluctuate between 22% and 38%, and 62% and 78%, respectively, depending upon the system used.[1,3] The reported demographics and characteristics of the population are also affected by such changes in methodology.



Interpret with caution

The classification system one uses to delineate place may also affect the extent to which we can discern underlying relationships between place and health. For example, one U.S. study evaluated the impacts of different classifications of urban/rural places on risk estimates for youth smoking and drinking.[4] The researchers found substantial

Table 1 Classification Systems for Rural and Urban Population Sampling

Definition	Criteria	Census Building Block
Rural Small Town/Large Urban Centre	Population size or density	Enumeration Area
Census Rural/Urban	Labour market context (e.g., commuting flows)	Census Subdivisions (e.g., Census Metropolitan Areas/Census Agglomerations, Metropolitan Influence Zones)
Rural/Urban Postal Codes	Mail route delivery	N/A (e.g., Canada Post geography)
Beale Non-Metropolitan/Metropolitan	Settlement context, population size	Census Division
OECD Regions	Settlement context	Census Division
OECD Rural/Urban Communities	Population density	Census Consolidated Subdivision

Source: Statistics Canada. (2001). Rural and Small Town Canada Analysis Bulletin.

differences in risk estimates according to the classification used.[4] Across the various categories of "urban" environments, smoking and drinking risk estimates ranged from 23% to 32% and from 35% to 43%, respectively. Similarly, across the "rural/other" categories, smoking and drinking risk estimates ranged from 39% to 59% and from 48% to 59%, respectively. Such findings show that research results may differ simply due to differences in how the boundaries of place are drawn.

Demonstrating these differences may also be beneficial. Although interpretations of place may vary, results may actually be complementary when looking at a specific issue. For example, studies of rural regions across Canada, regardless of how "rural" has been categorized, have all supported similar conclusions (e.g., rural Canadians have lower employment rates and lower income levels than the Canadian average), indicating that rural communities face worse socioeconomic circumstances when compared to the national average.

Unravelling the Complexities

After delineating the places to be studied, researchers face challenges associated with studying the complex relationships between health and place. Analysis at both the individual and area level is required. Such analysis is benefiting from multilevel modelling techniques which are helping researchers sort out the relative contributions of both individual- and area-level factors.[5,6,7,8]

Although some area-level factors, such as air pollution, can directly affect the health of individuals, others can exert an indirect (or mediating) effect by influencing individual-level factors, such as health behaviours. Many individual health behaviours may actually be shaped by the social, cultural, physical and economic context in which the individual lives. For example:

- Certain features of the built environment may either encourage or discourage regular physical activity.
- Area-level social cohesion has been associated with a lower likelihood of smoking.[9]
- High smoking prevalence within a neighbourhood may exert a "contagion effect" on smoking initiation among adolescents.[10]
- An individual may desire to eat healthy foods, but be unable to do so, due to the unavailability of such foods in his or her neighbourhood.[10]

A Closer Look . . .

Individual-level factors consist of measures of sociodemographic status, health behaviours and psychosocial factors.

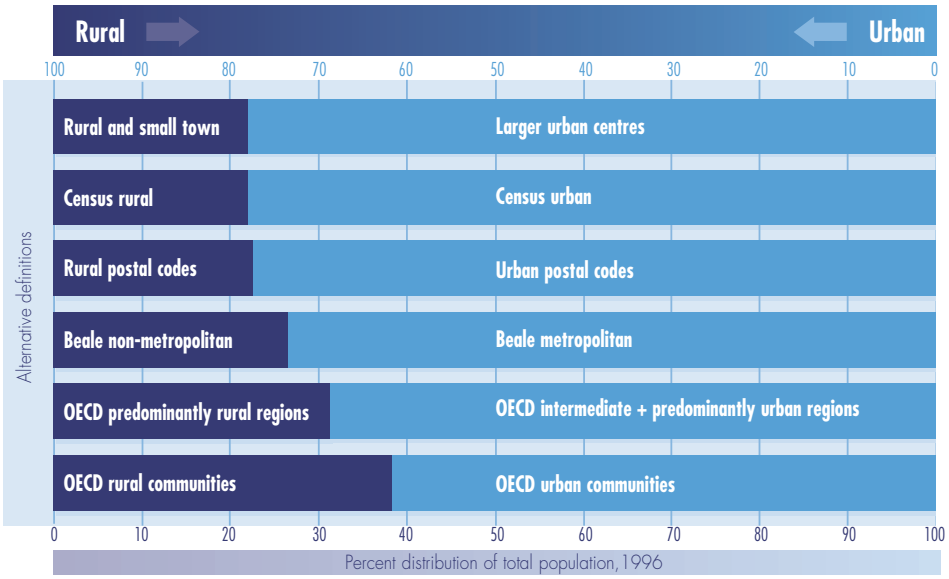
Area-level factors include descriptions of the aggregate properties of individuals (e.g., percent of residents who are immigrants, average income, unemployment rate),[5] or the properties of the area itself (e.g., income distribution, public spaces for physical activity, housing quality, pollution levels).[6,7,8]

Studying health at the area level

Ecological studies analyze populations or groups of people, rather than individuals.[11] Early ecological studies that examined the associations between population-level exposures and health outcomes were often subject to the *ecological fallacy*. This type of bias occurred when inferences about individual risk were made based on observed group risk, even though individual risk factor data had not been collected.[12] As a result, for several decades ecological studies were regarded as inferior.

Currently, in addition to studying the impact of individual factors, ecological studies examine the influence

Figure 1 Options for Delineating Canadian Rural and Urban Populations



Adapted from: Statistics Canada. (2001). Rural and Small Town Canada Analysis Bulletin. Data source: Census of Population, 1996.

of social and physical environments on health outcomes, both within and across places.[13] It is now well recognized that analyzing area-level variables for their own unique characteristics (and not simply as proxies for individual-level variables) may yield useful results for health policy and planning.[14]

Multilevel modelling

Multilevel modelling techniques simultaneously analyze outcomes in relation to determinants measured at different levels (e.g., individual, neighbourhood and region),[7] in order to assess whether the health of individuals is shaped by their environments (see sidebar). Although the methodological limitations associated with such analyses are beyond the scope of this article, two deserve mention here. First, in the absence of longitudinal data, most multilevel analyses rely on cross-sectional data, which do not account for either the time lag between an individual's exposure to an area-level factor and its health consequences, or residential mobility (e.g., people may have lived in other neighbourhoods prior to living in the one under study).[10,16]

Additionally, the data used to characterize neighbourhood environments are often limited to census-derived data, which were not originally designed for use in studies assessing multiple levels of causality.[10,17] However, census data from Montréal showed that census tracts closely mimic natural neighbourhoods and can be used as a proxy for neighbourhoods.[18]

Multilevel studies present a number of other challenges. Researchers must first develop variables that reflect the aggregate characteristics of the area and the population being studied, and then decide upon the combination of variables that will be analyzed in relationship to health. The results of this type of analysis will be a measure of the "neighbourhood or area-level effect" on health (see article on page 23). Hence, in interpreting the results and drawing comparisons across studies, it is essential that the reader be aware of the number and type of variables (e.g., social cohesion, air quality, economic, etc.) included in such analyses.

Multilevel Modelling: A Case Study

A recent study[15] considered the degree to which the social environment of health regions influences the self-rated health of Canadians. Four synthetic factors were derived from 21 area-level socioeconomic and demographic factors. Although the majority of the variation among health regions was found to be accounted for by individual factors, a modest association was found between self-rated health and regional socioeconomic and demographic factors.

Conclusion

Despite the methodological issues confronting "place and health" researchers, the growing body of knowledge afforded by the use of multilevel modelling and other techniques is an important resource for policy makers and planners. The results of "place and health" research provide valuable evidence about the type of interventions that are required to improve health status and at what level they should be targeted.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Population Patterns in Canada

Julie Creasey, Applied Research and Analysis Directorate, Health Policy Branch, Health Canada

The author acknowledges the assistance of **Laurent Martel** and **Éric Caron Malenfant**, both of the Demography Division, Statistics Canada, and **Grant Schellenberg**, Social and Aboriginal Statistics Division, Statistics Canada.

Knowing where people live in Canada, and why, sheds light on some of the complex links between "people, place and health." This article draws on two recent Statistics Canada analytical releases*—Portrait of the Canadian Population in 2006[1] *and* Portrait of the Canadian Population in 2006, by Age and Sex[2] *(both by Laurent Martel and Éric Caron Malenfant)—to provide a snapshot of Canada's population and to highlight changing patterns in distribution and composition.

Population Growth

The 2006 Census enumerated 31,612,897 people in Canada. At 5.4%, Canada's population growth rate from 2001 to 2006 was the highest among the G8 countries. The main source of this gain was international immigration, accounting for about two thirds of Canada's increase—or 1.2 million immigrants from 2001 to 2006—with natural increase making up the remaining one third.

Highs and lows across Canada

Over the past two intercensal periods (1996–2001 and 2001–2006), population growth in Atlantic Canada, Québec, Manitoba and Saskatchewan was well below the national average, while rates were higher than the national average in Alberta and Ontario (see Figure 1). Looking at the most recent period, there were increased growth rates in all three territories (Yukon, Northwest Territories, Nunavut) which, for the first time, have a combined population of over 100,000 people.

The reasons behind these growth patterns vary across the regions. For example, from 2001 to 2006, an increase in growth for some provinces (including Ontario and British Columbia) was due mainly to **international immigration**, while for others (Alberta, Northwest Territories, Yukon) **interprovincial migration**, driven by economic opportunities, had the greatest impact. Over the same period, population aging led to a decline in natural increase for almost every province and territory—with Alberta and Nunavut being the two exceptions.

Changing regional distribution

Historically, Canada's population has been concentrated along the U.S. border and in southern Ontario and southern Québec.[3] While this pattern still holds, uneven growth patterns across Canada's regions are contributing to changing population distributions. For example, between 1966 and 2006, the share of the Canadian population residing in British Columbia and the Prairie provinces increased from 26.3% to 30.1%, while the proportion living in Ontario, Québec and Atlantic Canada decreased from 73.6% to 69.6%.[1,4]

Increasing urbanization

Urbanization continues to be on the rise in Canada. Prior to the period 1921 to 1931, the majority of Canadians lived in rural areas. Since then, the urban population has been growing to the point that 80% of Canadians now live in an urban area, with 21.5 million people living in one of Canada's census metropolitan areas (CMAs).

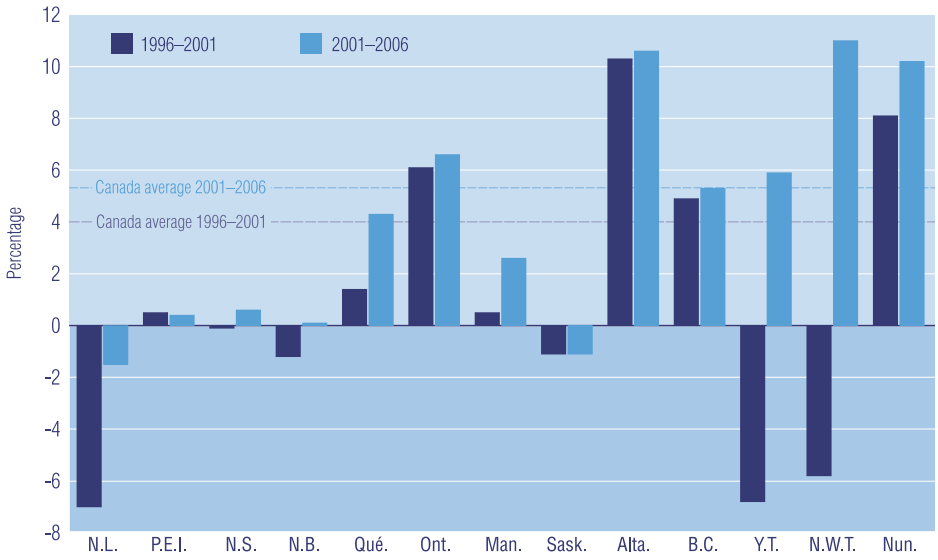
Higher growth in urban areas

From 2001 to 2006, the population of the CMAs increased by 1.4 million people, accounting for nearly 90% of the growth in the country's population. Canada now has 33 CMAs, of which six have over 1 million people: Toronto, Montréal, Vancouver, Ottawa-Gatineau, and the recent additions of Calgary and Edmonton. Together, these CMAs made up 45% of Canada's population in 2006.

Immigration, which has increasingly become an urban, "large city phenomenon," is fuelling growth in the major CMAs.[5] In 2001, Toronto, Montréal and Vancouver were home to 73% of new immigrants (compared with 58% in 1981).[6] Interestingly, while Toronto and Montréal both have population losses from **net internal migration**, their levels of **international immigration** and **natural increase** have kept their growth rates high.[5]

There is substantial variation in the growth of Canada's CMAs. For example, the populations of Barrie, Calgary, Oshawa and Edmonton grew by more than 10% between 2001 and 2006 (see Figure 2). Saint John and Saguenay were the only CMAs to experience a loss in population over this period. St. John's, Trois-Rivières, Sudbury, Regina and Thunder Bay all experienced an increase in population since 2001, following declines in the previous period.

Figure 1 Population Growth of Provinces and Territories, Canada, 1996-2001 and 2001-2006



Note: Because of improved coverage for the census in the Northwest Territories in 2006, the population growth for 2001–2006 is likely overstated.
Source: Martel, L., & Caron Malenfant, É. (2006).[1]

Sprawl within CMAs

Within CMAs there has been an increase in urban sprawl and an expansion of peripheral communities. From 2001 to 2006, "the growth rate of peripheral municipalities that surround the central municipality of Canada's CMAs was double the national average (11.1% versus 5.4%), while the central municipalities grew more slowly (4.2%) than the Canadian population."[1]

Changing Composition

While the scope of this article does not enable a comprehensive review of Canada's population in terms of age, sex and ethnicity, it does provide some recent statistics on the age structure of Canada's population along with some examples of how internal migration patterns are influencing the composition of Canadian places.

Data from the 2006 Census show a continuing trend in the aging of Canada's population. There was a record number of seniors (13.7% of the total population was aged 65 years and over) while, on the other hand, the proportion of people under age 15 in Canada was at

Canada's Aboriginal Population*[7]

- 976,305 people self-reported being Aboriginal (3.3% of the total national population).
- The highest concentration of Aboriginal people was in the North and the Prairies; Nunavut had the highest proportion at 85%.
- Canada's Aboriginal population is younger than the non-Aboriginal population (median age of 24.7 years versus 37.7 years), but is still aging.

**Based on data from the 2001 Census. Data on the topic of Aboriginal peoples from the 2006 Census will be released in January 2008.*

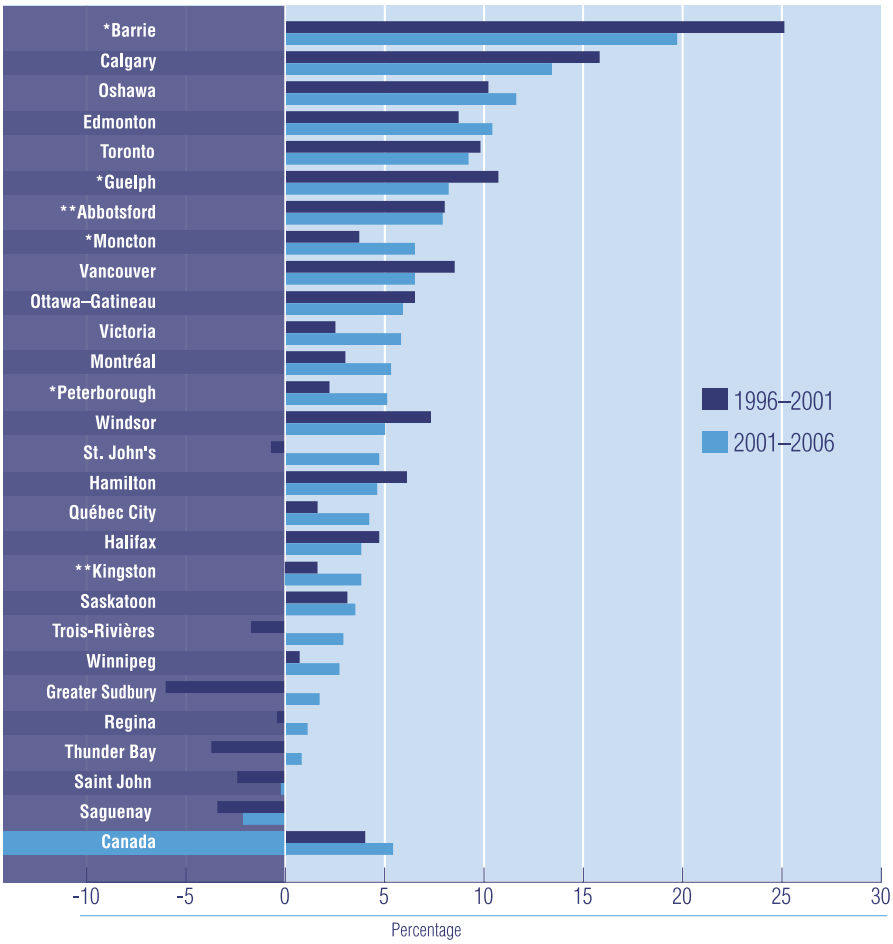
an all-time low (17.7%). Overall, the largest increase was in the 65 and over age category (11.5%). The number of seniors aged 80 and over in 2006 (25%) is also growing and has reached a record of close to 1.2 million people; the majority are women. Even with these signs of aging, Canada is one of the "youngest countries in the G8."[2]

Internal migration

Internal migration in Canada, which is often tied to economic factors, influences the composition of populations. The "push-pull factors" behind a decision to move are different according to age, gender and life course stage.[8,9,10] For example, some rural areas in Canada with resource-dependent economies and fewer job opportunities have lost large numbers of young people.[3,8] However, while some rural areas lose population, others may gain —thus, some research shows that the differences in annual out-migration rates may not be that large between rural areas and large cities.[8] Research also indicates that periods of "boom and bust" can affect people's decisions to have children, with areas of economic growth often seeing population growth.[11]

While, in general, fewer older people move, many return to the place they grew up. This is especially the case in Atlantic Canada and the eastern Prairies, which have seen a corresponding acceleration in the aging of their populations.[12] At the same time, British Columbia, Ontario and Prince Edward Island have also seen increased aging partially due to older people moving to communities that are attractive for retirees.[12]

Figure 2 Population Growth of Selected CMAs, Canada, 1996–2001 and 2001–2006



*Gained CMA status in 2006. **Gained CMA status in 2001.
Adapted from: Martel, L., & Caron Malenfant, É. (2006).[1]

Impacts of Demographic Changes

The ever-changing nature of Canada's population patterns poses challenges for policy makers across sectors and levels of government. Different rates and sources of growth (internal migration, immigration, natural increase) and an aging population have led to varying demographic profiles from region to region, city to city and neighbourhood to neighbourhood. Evidence from "people, place and health" research is showing that these differences are linked to variations in the determinants of health (including income and social status, gender, social environments and physical environments) across Canada. As such, taking into account demographic changes as part of a place-based approach to policy making may lead to policies that are better tailored to the uniqueness of Canadian communities.

Beyond the Numbers— A Sense of Place

Researchers have proposed varying conceptualizations of "sense of place," which may include social ties and attachments to the community, natural environment and built environment. While few studies are available, research has shown that people's connection to place is affected by their life course stage.[13,14]

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Health Variations across Canada: A Snapshot

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The author would like to acknowledge the assistance of co-op student **Samara Hammoud**.

Given Canada's size, diversity and population patterns, one might expect that levels and patterns of health would vary across the country. On the other hand, given Canada's universal, publicly-funded health care system, one might expect that such variations would be relatively small. This article examines how patterns of health vary across the provinces and territories as well as across the country's census metropolitan areas (CMAs). Subsequent articles will explore the pathways and mechanisms underlying these variations.

Among the 30 members of the Organisation for Economic Co-operation and Development (OECD), there was an 11-year range in life expectancy at birth in 2003. Japan had the highest life expectancy at 81.8 years, while Turkey had the lowest, at 71 years. Canada ranked sixth among the member nations, with its average life expectancy of 79.9 years being approximately two years behind that of the front runner.[1] Overall, 60% of Canadians rated their own health as either excellent or very good in 2003.[2]

Such national averages, however, can hide health variations within a country. Even though Canada has a universal, publicly-funded health care system, not all Canadians have the same probability of living a long and disability-free life. Patterns of health outcomes and health behaviours vary considerably across provinces and territories and across CMAs.

Across Provinces and Territories

Although one might expect self-rated health to be higher in jurisdictions with higher life expectancy at birth (and vice versa), this relationship is not consistent throughout the country. In 2003, life expectancies ranged from a high of 80.8 years in British Columbia to a low of 68.5 years in Nunavut[2] (see Figure 1). Not surprisingly, Nunavut had the lowest percentage (51%) of the population who rated their own health as either excellent or very good.[2] In the province with the highest life expectancy, however, only 62% of British Columbians rated their health as either excellent or very good, compared with 68% of the population of Newfoundland and Labrador, whose life expectancy was the second lowest in the country (78.2 years), after Nunavut.

While life expectancy was higher among females than males in all provinces and territories, a higher percentage of males than females reported excellent or very good health in five provinces and all three territories[2] (see Figure 1). This difference may be because Canadian women have higher prevalences of multiple chronic conditions as well as moderate and severe disability than do Canadian men.[3]

Across CMAs

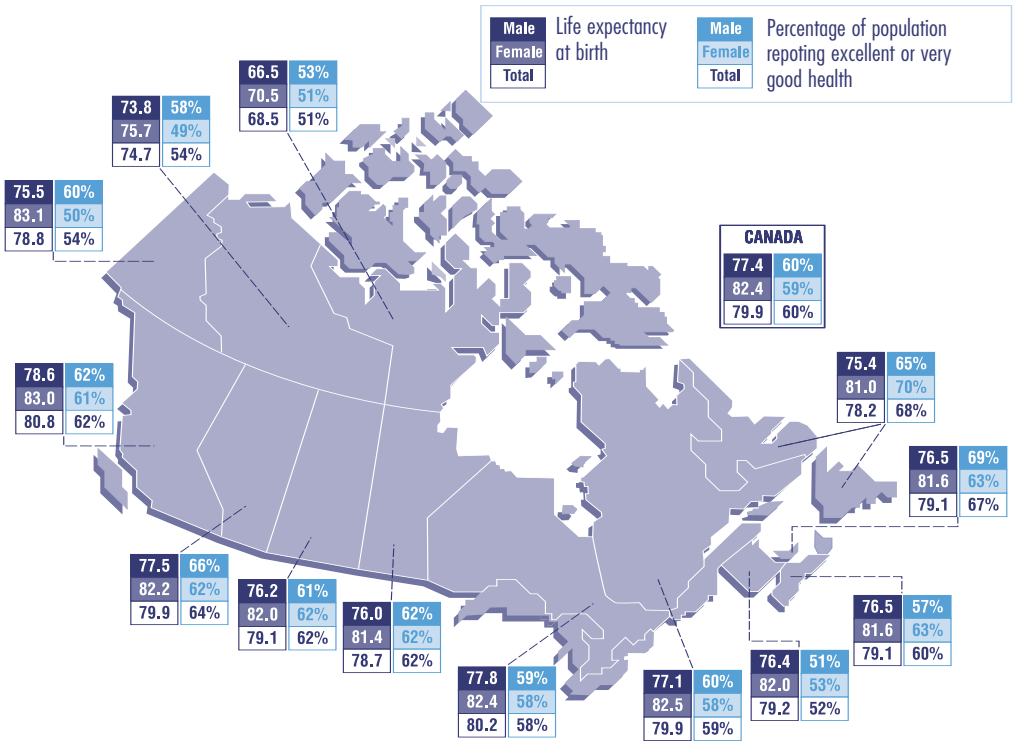
Metropolitan areas may be more appropriate than provinces and territories for examining the effects of place-based factors on health, as many of these health effects play out at the metropolitan level.[2]

Life expectancy and self-rated health

Variations in health outcomes across Canada's CMAs equal, or even exceed, the variability across provinces and territories.[2] In 2000, the average life expectancy at birth for Canada was 79.4 years, but it ranged from a high of 81.1 years in Vancouver to a low of 76.7 years in Greater Sudbury.[4] Not surprisingly, in 2003, Greater Sudbury was one of five cities (including Thunder Bay, Windsor, Kingston and Saguenay) in which the percentage of the age-adjusted population reporting excellent or very good health was significantly lower (53%) than the Canadian CMA average.[2]

As we saw at the provincial/territorial level, however, there was not a consistent relationship between life expectancy and self-rated health at the CMA level. For example, while residents of St. John's had the third lowest life expectancy of all CMAs,[4] they reported the highest percentage of self-rated excellent or very good health (67%).[2] In addition, residents of Vancouver, who led the country in life expectancy at birth, reported the same percentage of excellent or very good health as the CMA average.[2]

Figure 1 Life Expectancy at Birth and Percentage of Population, Age 12+, Reporting Excellent or Very Good Health, by Sex and Province/Territory, Canada, 2003



Source: Canadian Population Health Initiative, Canadian Institute for Health Information (2006), Improving the Health of Canadians: An Introduction to Health in Urban Places.[2]

Across First Nations Communities

First Nations as a population do not enjoy the same level of health as other Canadians. Among other health disparities, national statistics show that they have disproportionately high rates of injury, suicide and diabetes, as well as a lower life expectancy at birth than other Canadians.[5] New research is showing that having community control over civic services (such as educational services and health delivery services) is important for the well-being of First Nations. This, along with the characteristics that foster successful First Nations communities, will be discussed in a later article, beginning on page 38.

Health behaviours

Higher life expectancy is positively correlated with lower prevalences of smoking, heavy drinking, obesity and high blood pressure.[4] Overall, residents living in the Western CMAs were significantly more likely than the CMA average to report engaging in a combination of healthy lifestyle behaviours (defined as active or moderate daily physical activity, not smoking and not binge drinking), while those living in Atlantic Canada and in three of the five Québec CMAs were significantly less likely to adopt such behaviours.[2]

It is particularly notable that residents of St. John's, who reported the highest level of self-rated excellent or very good health in the country (tied with Calgary), also reported the lowest percentage of people engaging in healthy behaviours (tied with Saguenay).[2]

Physical activity higher in the West and Ontario

As shown in Figure 2, the percentage of residents in 2003 who reported being physically active on a daily basis was higher in all eight Western/Prairie CMAs than the

Canadian CMA average (this percentage was significantly higher in Victoria, Vancouver, Calgary and Winnipeg). Similarly, the proportion of residents who reported daily physical activity exceeded the CMA average in eight of the eleven Ontario CMAs (this percentage was significantly higher in Thunder Bay, St. Catharines-Niagara and Oshawa). Significantly fewer Torontonians reported being either active or even moderately active on a daily basis, compared with the CMA average.[2]

In Atlantic Canada and the province of Québec, however, a very different picture emerged. The proportion of residents who reported being active on a daily basis was lower than the Canadian CMA average in four of the five Québec CMAs; the percentage was significantly lower in Montréal and Québec City. However, on the measure of being moderately active, the proportion of Québec City residents was significantly higher than the CMA average (not shown). Atlantic CMAs, on the other hand, had a lower-than-average proportion of residents who were active daily. St. John's reported a significantly lower percentage of physically active residents than the CMA average[2] (see Figure 2).

Smoking rates higher in Ontario and Québec CMAs

Regional variations in smoking behaviour were also evident in 2003. Four of the eight Western/Prairie CMAs had lower-than-average proportions of smokers, especially Vancouver and Abbotsford. Similarly, Atlantic CMAs, especially Halifax, reported lower proportions of smokers than the CMA average. All CMAs in Ontario and Québec, however, reported smoking prevalence rates that exceeded the CMA average, with the exception of Windsor, London, Toronto and Ottawa-Gatineau[2] (see Figure 2).

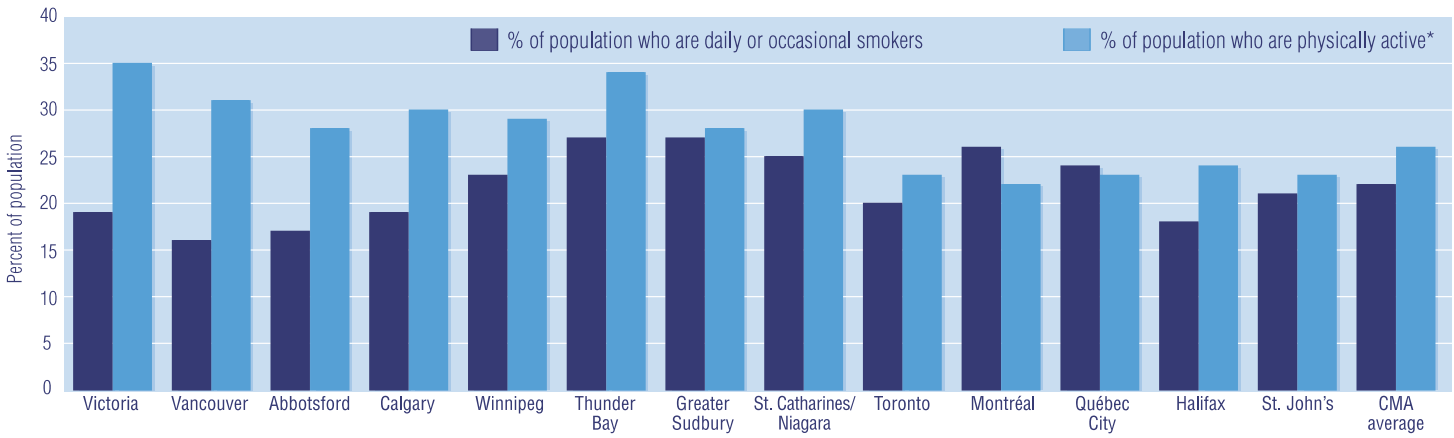
Summing Up

Perhaps surprisingly, there is more variation in life expectancy within Canada than among all 30 OECD members. There may be several reasons for this. For example, while a shorter life expectancy can reflect poorer health status in the population, it can also reflect a relatively aged population in which many of the younger, healthier people have migrated to other parts of the country in search of employment (as seen in the previous article). Conversely, life expectancy is highest in those CMAs with the highest proportion of post-secondary graduates, the highest average household income and the largest share of the population comprising immigrants.[4] In 2001, Vancouver and Toronto, which led the CMAs in life expectancy, had the highest proportions of immigrants (37.5% and 43.7%, respectively).[4]

The next article will examine variations in health patterns in rural Canada. Subsequent articles will examine some of the underlying dynamics of variations, indeed disparities in some cases, in health status and outcomes across the country.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Figure 2 Percentage of Population, Age 12+, Who Are Daily or Occasional Smokers, and Who Are Physically Active,* by Selected CMA, Canada, 2003



*Derived variable using categories that group participants based on the total daily energy expenditure values (kcal/kg/day). Data presented represents the highest category of physical activity reported.
Adapted from: Canadian Population Health Initiative, Canadian Institute for Health Information (2006), Improving the Health of Canadians: An Introduction to Health in Urban Places.[2]

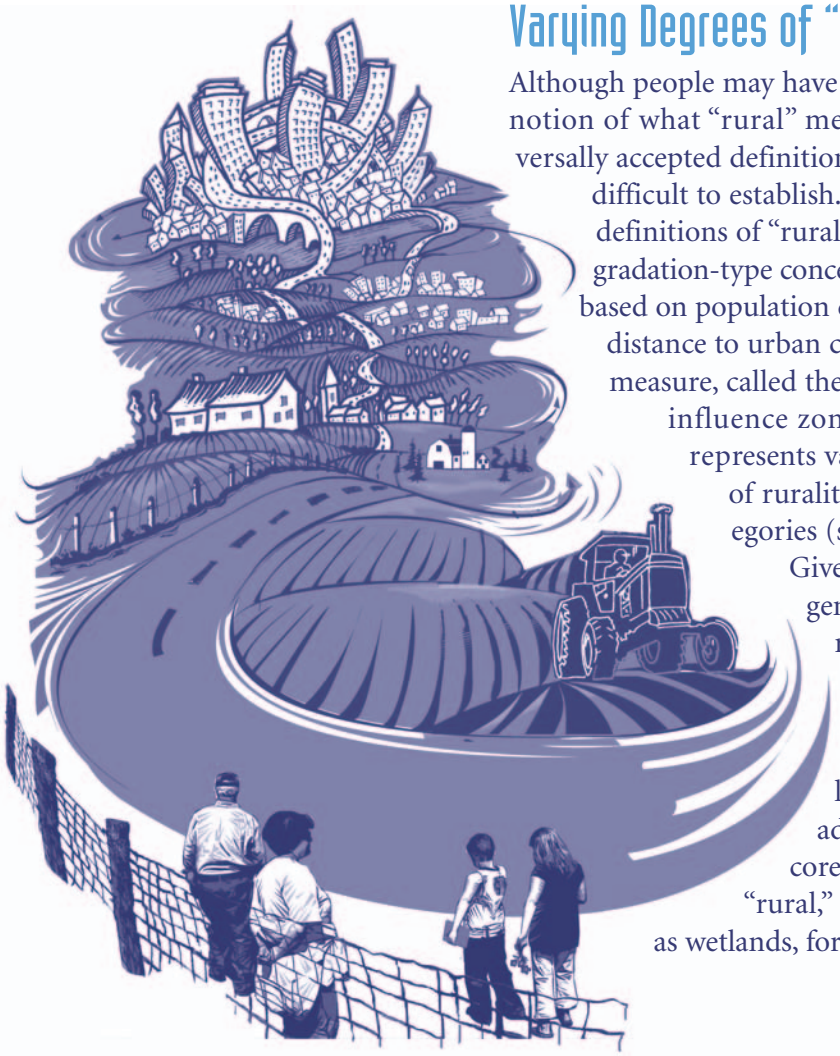
Rural Places: Variations in Health

Marie DesMeules, **Wei Luo** and **Feng Wang**, all from the Centre for Chronic Disease Prevention, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada, and **Raymond Pong**, Centre for Rural and Northern Health Research, Laurentian University

The authors would like to acknowledge the assistance of **Marion Pogson** and **Justin Francis**.

Increasing attention has been given to the role of place in shaping people's health; however, most of the work has been based on studies of the urban environment and less attention has been directed to characterizing the health of rural populations in Canada. This article, based on the first-ever pan-Canadian rural health report, provides a basis for considering rural health issues.

Differences exist in the health of individuals living in rural and urban areas.[1] Using data from several national sources, including the *Canadian Community Health Survey* (CCHS), the report entitled *How Healthy are Rural Canadians? An Assessment of Their Health Status and Social Determinants* explores differences in health between rural and urban Canadians. This article, based on the findings of that report, begins with a description of rural people and places, and then provides an overview of the health status of rural Canadians. (For further information or for a complete copy of the rural report, please visit the Canadian Institute for Health Information website at: <http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=GR_1529_E&CW_TOPIC=1529>.)



Varying Degrees of "Rurality"

Although people may have a general notion of what "rural" means, a universally accepted definition has been difficult to establish.[1] In general, definitions of "rural" introduce a gradation-type concept of rurality, based on population density and/or distance to urban core. One such measure, called the metropolitan influence zone (MIZ), represents varying degrees of rurality by four categories (see sidebar). Given this heterogeneity among rural areas in Canada, it is not surprising that the boundary between "rural" and "urban" environments is often not that clear. For example, a CMA can be a relatively large geographic area that may include a number of adjacent municipalities surrounding a major urban core. Within a CMA, there may be areas that appear to be "rural," in that they have very low population density—such as wetlands, forests or agricultural areas. Nevertheless, such areas are

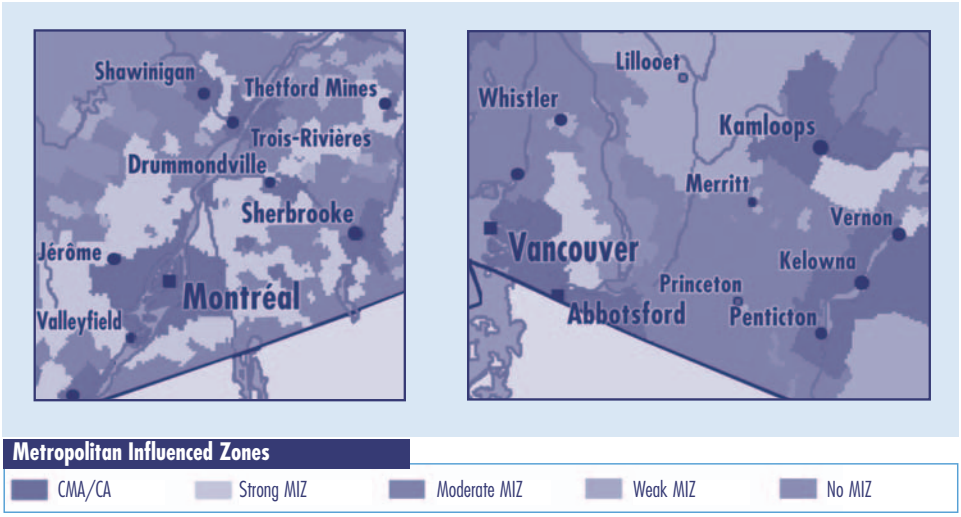
What is a Metropolitan Influence Zone?[1]

The metropolitan influence zone (MIZ) is a way of categorizing non-urban areas according to the proportion of their labour force that works in an urban area and how much this influences access to financial, educational, cultural and health-related services. Census subdivisions (CSDs) that lie outside a census metropolitan area (CMA) or census agglomeration (CA) are classified into one of four zones, based on the percentage of its residents who commute to work in any CMA/CA urban core:

1. **Strong MIZ**—30% or more work in an urban core.
2. **Moderate MIZ**—at least 5%, but less than 30% work in an urban core.
3. **Weak MIZ**—more than 0%, but less than 5% work in an urban core.
4. **No MIZ**—either a small employed labour force (less than 40 people) or none of the employed labour force works in *any* CMA/CA urban core.

not classified as a MIZ, as they are located within the boundaries of the CMA. Moreover, MIZs do not always follow an even pattern of gradation from CMA/CA to Strong MIZ, Moderate MIZ, Weak MIZ and No MIZ. Rather, their shape, size and relative location can reflect the physical geography (such as mountains and rivers) and patterns of development unique to the area (see Figure 1).[2]

Figure 1 CMA/CA and MIZ Locations near Montréal and Vancouver, 1996[2]



Adapted from: Natural Resources Canada, based on 1996 Census data.

A Demographic Snapshot

According to the results of the 2000–2001 CCHS, rural and urban residents reported differences on a number of fronts. Compared to residents living in urban areas, rural residents:

- have a higher proportion of young people and a lower proportion of work force adults (i.e., those 30 to 59 years of age), likely due to working age adults moving out of rural areas in search of job opportunities
- have a higher proportion of older adults (age 60 and older)
- have a lower proportion of immigrants and a higher proportion of Aboriginal people
- are financially less well off and are less highly educated than their urban counterparts

While differences exist between rural and urban areas, there is also considerable variation across MIZs. For example, residents of the No MIZ are less educated, report being financially less well off and report greater levels of unemployment, when compared to residents in the other MIZ categories (see Table 1).

How Health Varies

Overall, the rural report found that the health of rural residents varied on a number of factors. While, in general, life expectancy was lower in the rural population, when using measures of self-reported health, rural residents reported higher levels of health, lower levels of stress and a stronger sense of community when compared to their urban counterparts. There were also important differences in health status among people living in rural Canada, as highlighted below.

Table 1 Age-Standardized Proportion of Population with Selected Sociodemographic Characteristics, by CMA/CA and MIZ, Canada, 2000–2001

Indicator	CMA/CA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Less than secondary school graduation	27.8 (27.4–28.2)	35.1 (33.9–36.3)*	39.4 (38.4–40.3)*	37.3 (36.4–38.1)*	43.0 (40.5–45.5)*
Low/low-middle income	32.4 (31.9–32.8)	34.6 (33.2–35.9)*	45.0 (43.9–46.2)*	43.1 (42.1–44.1)*	49.9 (47.1–52.7)*
Unemployed	33.4 (32.9–33.8)	32.3 (31.2–33.5)	36.6 (35.6–37.5)*	34.7 (33.8–35.5)	37.1 (34.6–39.6)*

*Note: Reference group is CMA/CA; *statistically significant at p <0.05. Data source: CCHS 2000–2001.*

Differences in life expectancy between women and men

Between 1986 and 1996, life expectancy (LE) was higher for women than for men across Canada.[3] However, while LE for women (81.43 years) remained fairly consistent across both rural and urban areas, LE for men was significantly lower with greater degrees of rurality. LE for men ranged from 76.77 years in CMA/CAs to 73.98 years in the No MIZ area—surprisingly, LE was higher in the Strong MIZ area (77.36 years) than in CMA/CAs. Factors that have been seen to have a positive impact on LE include higher levels of income and education.[4] The lower levels of income and education reported by rural populations may contribute to the (lower) LE seen in these areas.

Interestingly, the Strong MIZs came out ahead in several measures (such as all-cause mortality and mortality rates due to injury); however reasons for these findings have not been clearly identified (see sidebar).

Health behaviours differ

Generally speaking, compared to urban residents, rural dwellers are less likely to exhibit positive health-related behaviours—among the health behaviours examined, three showed strong rural-urban differences:

- Rural areas reported higher smoking rates (32.4% in No MIZs compared to 24.9% in CMA/CAs), particularly among men.
- Rural residents were more likely to be exposed to second-hand smoke (34.2% in No MIZs compared to 27% in CMA/CAs).
- Rural dwellers, particularly men, were less likely than their urban counterparts to eat the recommended five servings or more of fruit and vegetables daily (31.1% in No MIZs compared to 38.2% in CMA/CAs).

On the other hand, leisure time physical activity rates were similar in rural and urban areas.

In the report, socioeconomic status was proposed as a possible mediator between place of residence and the adoption of certain lifestyle behaviours. However, other potential explanations could also be considered, such as reduced access to recreational facilities, lower awareness of healthy lifestyle choices and lack of access to a variety of reasonably priced healthy food in rural areas.

Risk of chronic disease higher in rural places

In general, the risk of many chronic diseases was higher in rural regions. Key study findings include:

- Prevalence of arthritis and rheumatism was higher in rural areas for both sexes and, among all chronic conditions, arthritis and rheumatism showed the strongest differences between rural and urban areas.
- Mortality risk due to circulatory disease was higher in rural regions than urban ones, particularly for men. In addition, rural areas had a higher rate of circulatory disease risk factors, such as smoking, hypertension and overweight/obesity.
- In contrast, both overall cancer mortality and morbidity rates for both sexes were lower in rural than urban areas. One explanation could be because many people move to urban areas to receive specialized cancer treatments and care.[5] Less exposure to environmental pollution could be another possible reason.

Mortality increases with degree of rurality

Changing patterns of population distribution across rural-urban areas affect regional analysis of mortality rates across Canada. Statistics Canada data from 1986 to 1996 show that the all-cause age-standardized mortality rates were lower in the Strong MIZs than in the CMA/CAs and became higher with remoteness of the area of residence (see Figure 2). Other interesting study findings include:

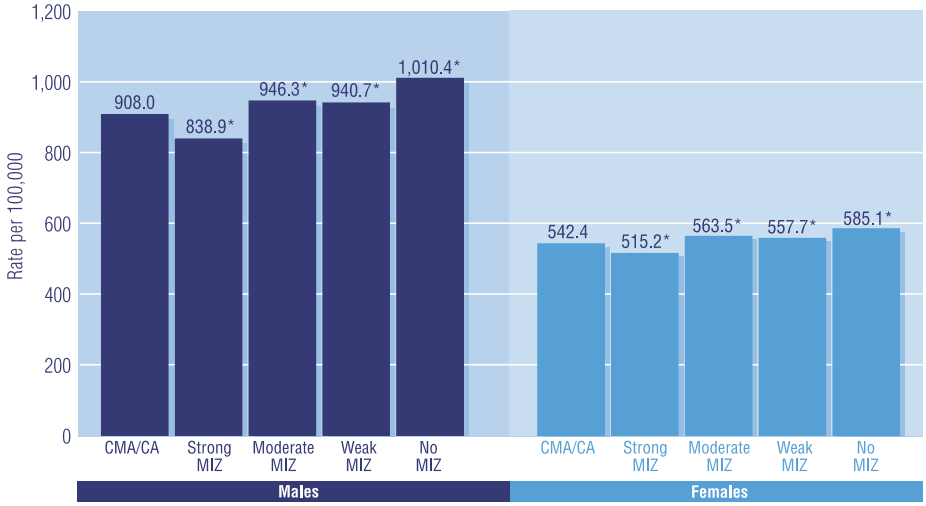
- Overall higher mortality rates were seen among men than women (see Figure 2). This could be because men also had higher mortality rates for major chronic diseases (such as circulatory disease, cancer and respiratory diseases), as well as for injuries, poisonings and motor vehicle accidents.

Strong MIZ—A "Healthy" Place to Live?

Overall, living in a Strong MIZ appears to confer a number of health benefits; however, reasons for this are not well understood. A possible reason may be that rural residents with close links to metropolitan areas have the advantages of access to the services and opportunities associated with urban living, but also experience the social connections and relatively lower levels of stress associated with living in a more rural location. However, CCHS data reporting levels of stress and social cohesion do not support this hypothesis. Further research is required to learn more about why the health benefits appear to be greater in the Strong MIZs.

- Regional age-specific mortality analyses found that the adult all-cause mortality rates were highest in the territories and the Atlantic region; however, mortality rates among children and youth under age 19 were higher than the national average in the western provinces and the territories.
- Overall, age-specific analyses found that the all-cause mortality rates for children and youth under age 19 were generally higher in rural areas. This could be because the risk of motor vehicle accidents among children and youth is particularly high in rural areas. In contrast, mortality rates for those aged 65 and older were significantly lower in rural regions than in urban areas—this supports evidence which suggests that older people and those with chronic illnesses move out of a rural area to be closer to health services and (possibly) family members in urban regions.[5]
- Suicide mortality rates were over four times higher among men than women. Although girls and young women (ages 5 to 19) living in rural areas were at an increased risk of committing suicide compared to their urban counterparts, the highest suicide mortality rates for rural residents were among men and women aged 20 to 44 living in the No MIZs. Risk factors associated with suicide include mental illness, substance abuse, terminal illness and a family history of suicide.
- Mortality due to injury and poisoning, including motor vehicle accidents and farm-related injuries, increased with rurality and were the most important cause of death in rural areas.

Figure 2 Age-Standardized All-Cause Mortality Rates, by Sex and Place of Residence, Canada, 1986-1996



*Note: Reference group is CMA/CA; *statistically significant at p <0.05.*
Source: Statistics Canada, Canadian Annual Mortality Data, 1986–1996.

Addressing the Rural-Urban Health Imbalance

This pan-Canadian research shows variations in health across rural communities, along with disparities in health determinants and health outcomes between rural and urban populations (see sidebar). Addressing this health imbalance will require action on many fronts: better medical services, economic development programs in remote areas, and targeted preventive approaches that meet the needs of women and men (e.g., injury prevention programs for high-risk activities such as farming and forestry).[6,7]

As rural health and place research is a relatively new discipline, there are many observations but little in the way of an approach or framework to guide the research or explain the study findings. However, with improved data and advances in this area of work, this will undoubtedly change with time. ■

Key Areas of Rural-Urban Health Imbalance[1]

Generally, when compared to their urban counterparts, rural residents in Canada are more likely to:

- be in poorer socioeconomic conditions
- have lower educational attainment
- exhibit fewer healthy behaviours
- have a higher risk of certain chronic diseases
- have lower life expectancy and higher overall mortality rates

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Under the Microscope: Health Disparities within Canadian Cities

Shamali Gupta, Applied Research and Analysis Directorate, Health Policy Branch, Health Canada, and **Nancy A. Ross**, PhD, Geography Department, McGill University

Key factors in the socioeconomic environment are known to have an impact on health. Many studies have documented patterns of health by socioeconomic status across Canada; however, little is known about this patterning within Canadian cities. This article sheds light on the issue by identifying and comparing the intra-metropolitan health gradients and place-based factors affecting the health status of Canadians.

The preceding articles have examined patterns of health across Canada's urban and rural places. This and subsequent articles will explore the pathways by which factors in one's contextual environments influence health. Given the magnitude of the influence of socioeconomic phenomena, we begin by examining the relationship between factors in the socioeconomic environment and health.

Socioeconomic Determinants of Health

Income and social position have long been known to influence an individual's health status.[1,2] The evidence shows that higher social standing, economic status and income are all associated with better health, and are considered key determinants of health.[3,4] On the basis of these determinants, a socioeconomic gradient in health can be observed in which those with poorer socioeconomic circumstances may not be as healthy as those in higher socioeconomic groups. Previous research has documented patterns of health status by socioeconomic conditions at a national level and *across* Canadian cities;[5] however, much less has focused on looking for such patterns *within* Canadian cities.

In response to this research gap, Health Canada's former *Health Policy Research Program* funded research to examine linkages observed between economic factors and health gradients. Findings from one of these projects entitled *Unpacking the Socioeconomic Health Gradient: A Canadian Intra-Metropolitan Research Program*, led by Dr. Nancy A. Ross (one of the authors of this article), details and uncovers the socioeconomic health gradient within Canadian cities and neighbourhoods. This article focuses on the project's findings that are most relevant to the "people, place and health" theme of this issue of the Bulletin, while highlighting other evidence that has emerged in this area. (To order a full copy of the Ross et al. report (2005), visit Health Canada's website at: <http://hc-sc.gc.ca/sr-sr/finance/hprp-prpms/results-resultats/2005-ross_e.html>.)

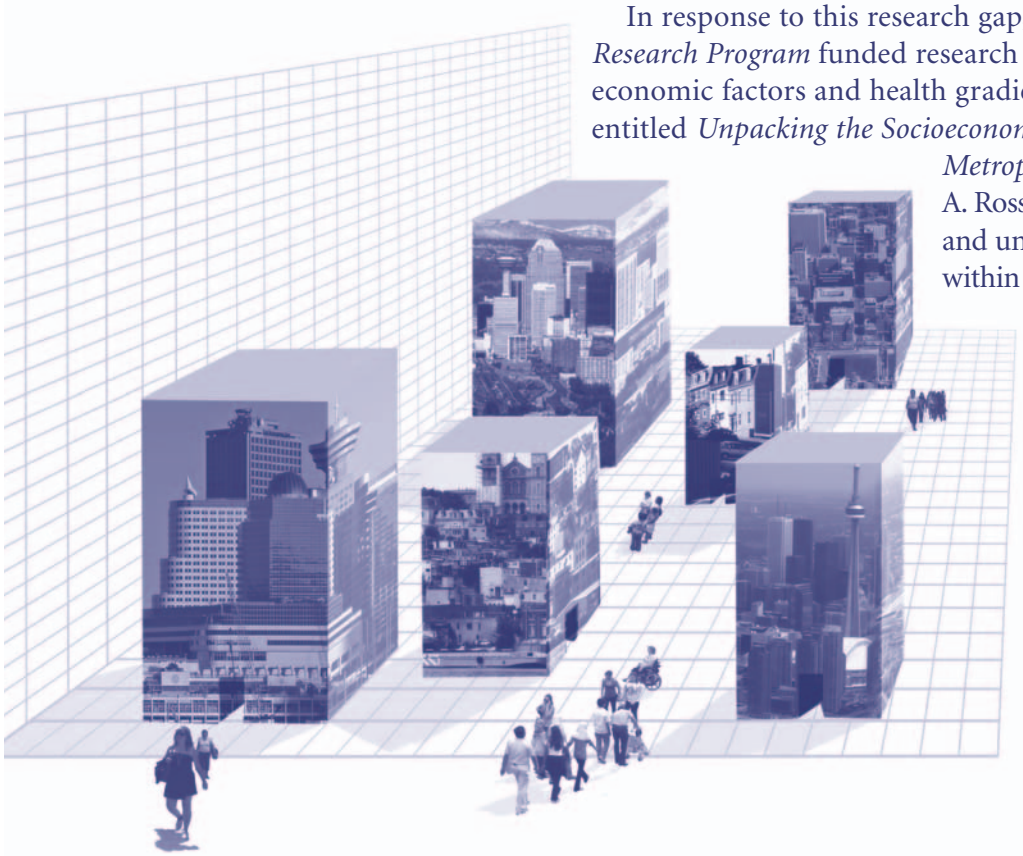
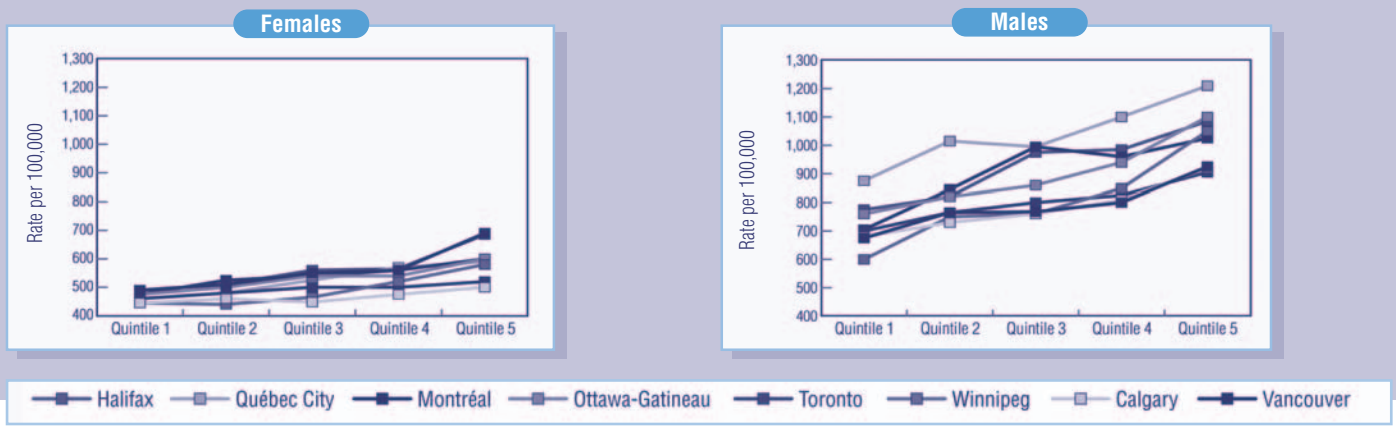


Figure 1: Mortality Rates (all Causes), by Income Quintile and Sex, Canada, 1986-1996



Adapted from: Ross et al. report (2005).

Why Focus on Cities?

Cities are arguably the most relevant scale at which to examine the impact of socioeconomic phenomena on health, for a number of reasons:

- With their high population densities, cities have the greatest social and population-based variability.
- Processes of social and economic differentiation caused by inequalities inherent in labour and housing markets are generally experienced at the metropolitan level.
- Cities influence virtually every aspect of the health and well-being of their residents through factors related to the quality of air, water, safety, housing options and opportunities for social support.

Looking across cities

Earlier research that looked at the relationship between income and health across cities in the U.S. and Canada found a difference between the two countries. In the U.S., a socioeconomic gradient in health was observed across regions and cities, with greater discrepancies in wealth translating into greater discrepancies in health.[6,7] In other words, cities with higher levels of income disparity also had significantly higher levels of mortality, when compared to cities with lower levels of income inequity.[7]

By comparison, this relationship between income inequity and health was not observed across Canadian cities.[8]

When looking across all causes of mortality and income levels, differences in gradients for men and women were apparent.

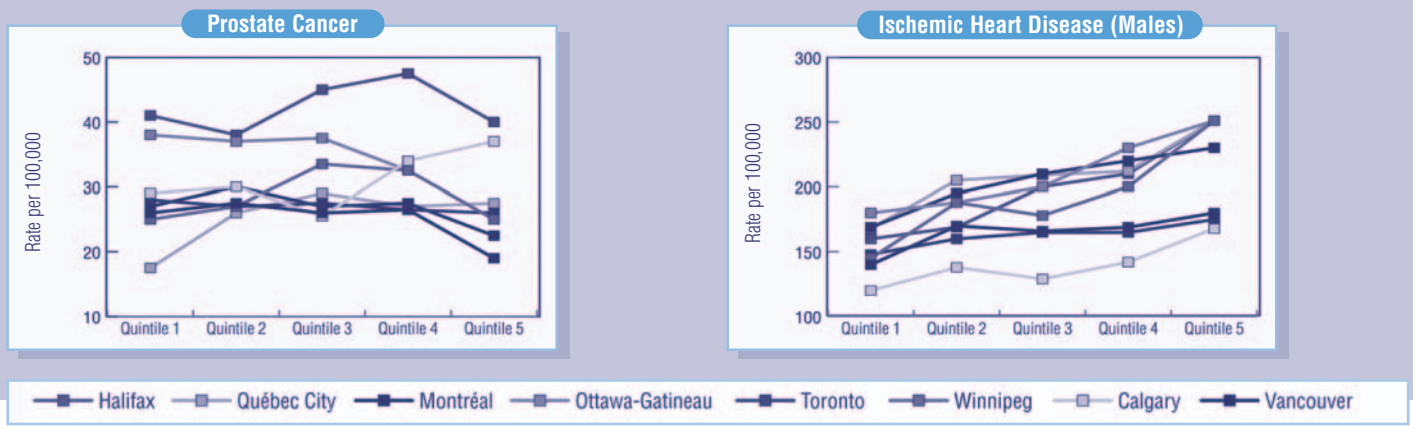
However, some recent studies examining economic segregation and social polarization in Canada are showing that this gap has widened over the last few decades.[9,10] So, although the association between income inequality and mortality may be less apparent in Canada, it is still known to exist and may vary according to the social and political characteristics specific to where people live.[8]

Dissecting the Intra-Metropolitan Health Gradient

This earlier work looking at income and health across North American cities served as a springboard to the current study, which sought to uncover the patterns of health, disability and mortality—by income *within* Canada's urban areas.

Population and income data were drawn from the 1996 Census, while mortality statistics for 23 different causes of death were obtained from the 1996–1998 Canadian Mortality Database and supplementary files. Income levels were calculated for enumeration areas within each census metropolitan area (CMA) and divided into five income quintiles, from Quintile 1 (Q1) to Quintile 5 (Q5), with Q5 being the poorest income quintile. For various causes of death (e.g., cancers, heart disease), income was assessed against three health outcome measures—mortality, life

Figure 2: Mortality Rates (Prostate Cancer and Ischemic Heart Disease) for Males, by Income Quintile, Canada, 1986-1996



Adapted from: Ross et al. report (2005).

expectancy indicators and potential years of life lost. Since the analyses for all three health outcome measures supported similar conclusions, this article will concentrate on the results of the income and mortality analyses.

In contrast with research looking across cities, this study found evidence of socioeconomic health gradients within Canadian cities. However, the gradient pattern varied in steepness by gender, by cause of death and by city. Such variation is important, as the steepness of the gradient is a key indicator of the overall health of the population,[11] with less healthy societies exhibiting a steeper gradient pattern (pronounced income inequality) than healthier societies.

For behaviour-related conditions, such as heart disease, a clear gradient pattern was evident; however, for conditions where there is less of a behavioural component (e.g., prostate cancer), a gradient pattern was not observed.

Gradient stronger for men than women

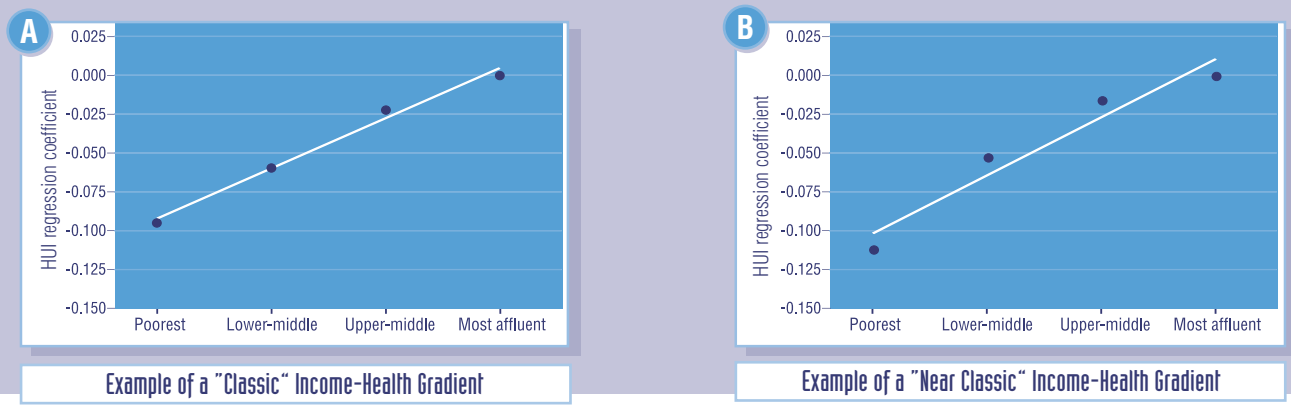
When looking across all causes of mortality and income levels, differences in gradients for men and women were apparent (see Figure 1). First, the slope of the gradient was steeper for men than for women, indicating that men experience greater income-related health inequalities than women. Second, women had lower mortality rates than men, with women in the poorest income quintile (Q5) having lower mortality rates than men in the highest income quintile (Q1). These findings are consistent with other studies that have shown the impact of income and sex on specific diseases.[12,13,14]

Reasons for such differences in mortality rates across socioeconomic measures for men and women are not well understood. Some research has suggested that labour market experiences (e.g., greater male exposure to risk of work accidents and chemical or physical occupation hazards) or gender differences in health behaviours (such as cigarette use and alcohol consumption) may account for some of the observed discrepancy in mortality rates.[15] Male/female differences may also be related to differences in how inequality is measured among men and women.[15] Further research evaluating the impact of methodological differences may help to clarify the reporting of male/female differences in measures of socioeconomic health inequalities.

Gradient varies by cause of death

When looking at the relationship between income and mortality across different causes of death, the most striking gradients were seen for mortality due to conditions with an associated behavioural etiology (e.g., heart disease, lung cancer and cirrhosis of the liver). For example, as Figure 2 illustrates, for behaviour-related conditions, such as heart disease, a clear gradient pattern was evident; however, for conditions where there is less of a behavioural component (e.g., prostate cancer), a gradient pattern was not observed. This finding suggests that the prevalence of risky health behaviours may also vary across income groups, with risky behaviours being more prevalent among low-income groups.

Figure 3: Income-Health Gradients in Canadian Cities



Source: Ross et al. report (2005).

Income-health gradient patterns

To determine how the gradient varied across Canadian cities, we turn our attention to another part of the Ross et al. study. Using different data sets and methodologies, the study also investigated the relationship between *income* and *self-reported health status*.

Data were derived from the 2000–2001 *Canadian Community Health Survey* and the 2001 Census of the Population, while measures of individual health status were ascertained through the Health Utility Index (HUI). From an analysis of these data, various income-health gradients were identified across Canadian cities and were grouped into four main categories.

The "classic" gradient (see Figure 3A) depicts better health with each increase in income category. Many large Canadian cities with high population and dwelling densities (e.g., Montréal, Calgary, Toronto, Ottawa-Gatineau, Vancouver), and many smaller cities such as Saint John, Hamilton, London, Kitchener and Thunder Bay, displayed this gradient pattern. Variations include the "near classic" income-health gradient (see Figure 3B) where there is no significant difference in health between those in the upper-middle and most affluent income categories. Cities such as Victoria, Regina, Sudbury and St. John's displayed this gradient.

Conversely, an "effect of poverty" gradient (see Figure 3C) occurred when substantial gaps in health status between those in the lowest income groups and those in the middle and affluent groups were seen; however, the difference between middle and affluent groups was indistinguishable. Cities with lower median family incomes, and higher crime and unemployment rates (e.g., Oshawa, Québec City, Saskatoon and St. Catharines-Niagara) displayed an "effect of poverty" gradient between income and health status.

The "no visible" income-health gradient (see Figure 3D) suggests that there are no differences in the health of individuals across income categories. Edmonton, Halifax and Kingston displayed this gradient.

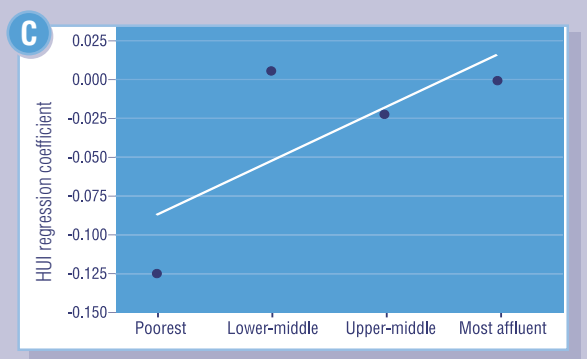
Both mean and median family incomes were highest among the cities with the "classic" gradient and lowest in the cities displaying the "effect of poverty" gradient. These varying income-health relationships bring to light the diverse socioeconomic conditions that may exist in urban areas. For example, lower income groups may experience different circumstances such as stress, safety, food and/or housing, etc., which relate directly to their health.[16,17] This suggests that programs or interventions targeted towards the needs of specific communities may be the most effective way to narrow the gap within disadvantaged areas.

Neighbourhood Characteristics and Health

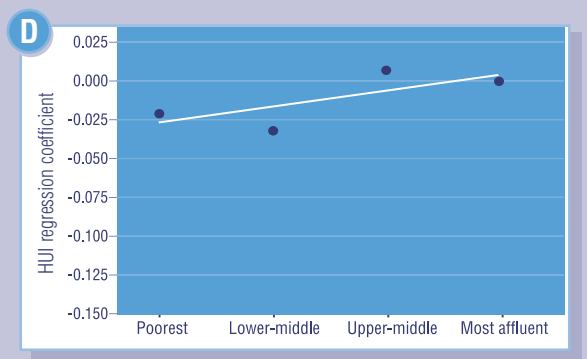
In addition to looking at health at the level of the city, it is also important to capture and analyze variations at the neighbourhood level as analysis at the city level may actually mask inequalities found within and between neighbourhoods.[18]

Several theories have been put forward for looking at the importance of neighbourhoods in terms of their health effects on the population.[19,20] The Ross et al. project also sought to study the relationship between a person's socioeconomic status (SES), neighbourhood environment, and health status and behaviours.

In assessing *neighbourhood* effects a number of area-level variables were measured, including the proportion



Example of an "Effect of Poverty" Income-Health Gradient



Example of "No Visible" Income-Health Gradient

of lone-parent families, the proportion of recent immigrants, as well as the education level and median income of the population. While these measures describe the socioeconomic conditions of the neighbourhood, they do not measure the quality or level of neighbourhood social cohesion, which was not addressed by the study.

Neighbourhood effects greater on health behaviours

After controlling for individual variables (e.g., age, sex, household income, smoking), neighbourhood effects on health status were observed, but only in the three largest cities—Vancouver, Montréal and Toronto. However, research suggests that associations may exist between social relations and health,[21,22] so the exclusion of these variables from the analysis may have had an influence on the study findings.

Despite the relatively modest effect on health status, neighbourhood-level contexts were found to be more strongly linked to health behaviours, with lower SES neighbourhoods being associated with an increased risk of engaging in unhealthy behaviours. For example, when examining body mass index (BMI) levels and smoking, this study found that health behaviours were related to neighbourhood characteristics as well as a person's economic status and social position.

In addition, certain place-based factors (e.g., the built environment and walkability of a neighbourhood) were found to modify the effect of income on health behaviours (see page 29). For instance, an "appropriately designed" low-income neighbourhood, with recreation facilities and supermarkets in close proximity, may provide residents otherwise at risk for obesity with the necessary exercise and local resources to offset the impact of low income on their health.[23]

While much remains to be learned about the complexities of the relationship between income and health, the results of the current study lend support to theoretical discussions regarding the importance of multiple pathways. Additional research looking at income and health in the context of place will add to our understanding of health inequities and what can be done to address them.

Explaining the Complexity

Given the strength of the relationship between income and health, understanding the underlying dynamics of the relationship is important. Several theoretical pathways have been put forward to explain the link between income inequalities and health disparities at the individual level.[24] These pathways are by no means mutually exclusive, and may indeed be intimately related.

Material/Structural—Income inequities may translate into inequities in material or structural conditions (e.g., proper nutrition, housing) which, in turn, may lead to health disparities.[24]

Behavioural/Cultural—Health disparities may come about due to differences in health-related behaviours among socioeconomic groups (e.g., general lifestyle or likelihood of being involved in risky health behaviours such as smoking and drinking).[25]

Psychosocial—Experiences of belonging to a particular social class or the stress associated with living at the bottom of a social hierarchy may lead to disease or related health outcomes.[24]

While much remains to be learned about the complexities of the relationship between income and health, the results of the current study lend support to theoretical discussions regarding the importance of multiple pathways. Additional research looking at income and health in the context of place will add to our understanding of health inequities and what can be done to address them (see CPHI sidebar, for example).

Where to Next?

In many European nations, the issue of income inequity is a basic component of national and regional health policy.[26] Countries such as the U.K. have recognized the importance of this work, have commissioned research to learn what lies behind health inequalities within cities and neighbourhoods, and are in the process of developing targets for their reduction.[27] International and Canadian research will help build the evidence to inform and develop policies aimed at improving the health of Canadians living in our cities and urban neighbourhoods. ■

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Highlights of Health Status in Urban Canada

Elizabeth Votta, PhD, Canadian Population Health Initiative, Canadian Institute for Health Information

Work conducted by the Canadian Population Health Initiative (CPHI) is guided by various strategic themes, one of which is "Place and Health." (For additional information on CPHI, please see* Who's Doing What?*)

CPHI's report, *Improving* the *Health of Canadians: An Introduction to Health in Urban Places*, considers the role of various determinants of health—including social, cultural, physical and socioeconomic determinants—in its exploration of why some people who live in urban areas are healthier than others.[1]

Patterns of health in Canadian neighbourhoods

Analyses of health-related behaviours and outcomes for neighbourhoods in five cities (Vancouver, Calgary, Toronto, Montréal, Halifax), have shown that patterns of health behaviours and outcomes vary, depending on where people live. In both Vancouver and Montréal, neighbourhoods differed (by as much as 15%) in the proportion of people who reported rating their health as very good or excellent. Why these differences? Individual choices and socioeconomic characteristics may play a role. People who reported their health as very good or excellent were more likely to report being active or moderately active in their leisure time and were less apt to say they smoke. They also lived in neighbourhoods with a higher-than-average median income and percentage of post-secondary graduates.

Analyses also showed that rates of self-reported overweight/obesity tended to be lower in neighbourhoods situated close to downtown. This may be due to the physical activity that people obtain walking in the downtown area or taking public transit.[2,3]

Housing in urban Canada

The study also looked at literature specific to housing-related and environmental issues. Research indicates that housing-specific issues, such as exposure to lead, environmental tobacco smoke, dampness/mould, poor quality housing and stair hazards were related to various negative health outcomes, including anemia, respiratory problems, fire-related deaths and falls-related injuries.[4,5,6] The research also showed that a number of traffic-related sources in the urban environment could affect noise levels[7] and the quality of air[8,9] and water[10,11] which, in turn, could adversely affect health.

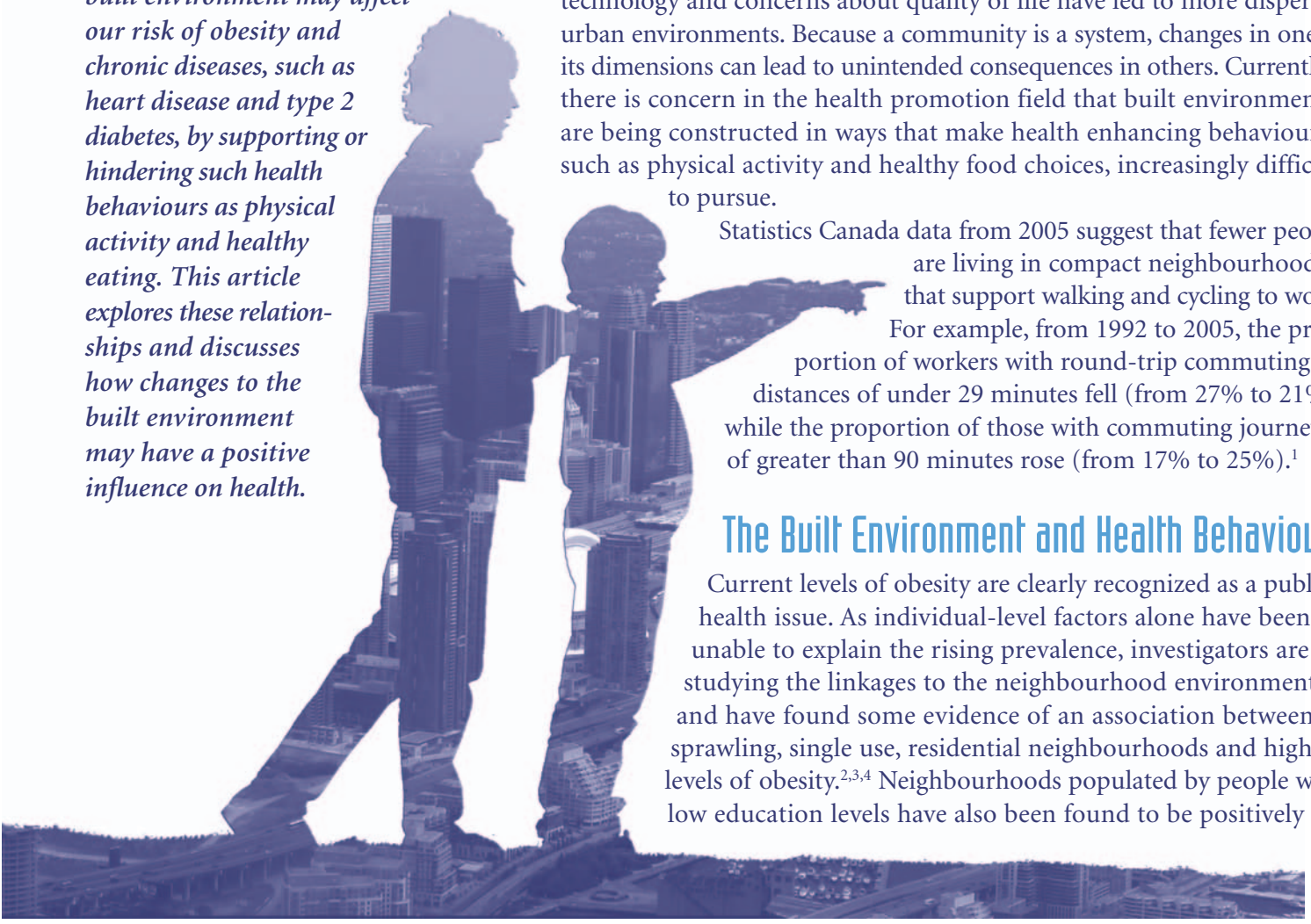
Summary

Health can be influenced by various neighbourhood and housing characteristics which, in turn, can be influenced by policies and interventions at many levels. Urban areas are built by people, for people—so urban health is a matter of interest to individuals, home builders, urban planners, health service providers, transportation developers, environmentalists, employers, policy makers and many others.

Exploring the Intersection between the Built Environment and Health Behaviours

Joanna Grenon, **Greg Butler** and **Randy Adams**, all from the Centre for Health Promotion, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada

New research is taking a more multidisciplinary look at the built environment to understand the complex interactions between area-level physical characteristics, social determinants of health, and health behaviours and outcomes. For example, results are showing that characteristics of the built environment may affect our risk of obesity and chronic diseases, such as heart disease and type 2 diabetes, by supporting or hindering such health behaviours as physical activity and healthy eating. This article explores these relationships and discusses how changes to the built environment may have a positive influence on health.



The Built Environment, Then and Now

Every place has a natural environment, characterized by climate and terrain. The built environment reflects how we shape these places for human habitation. The design of buildings, the location of stores, factories, offices and schools are all part of the built environment, as are the location and design of roads, sidewalks, bike lanes and footpaths.

Early communities tended to be very compact, because walking was the primary mode of transportation. Over time, new transportation technology and concerns about quality of life have led to more dispersed urban environments. Because a community is a system, changes in one of its dimensions can lead to unintended consequences in others. Currently, there is concern in the health promotion field that built environments are being constructed in ways that make health enhancing behaviours, such as physical activity and healthy food choices, increasingly difficult to pursue.

Statistics Canada data from 2005 suggest that fewer people are living in compact neighbourhoods that support walking and cycling to work. For example, from 1992 to 2005, the proportion of workers with round-trip commuting distances of under 29 minutes fell (from 27% to 21%), while the proportion of those with commuting journeys of greater than 90 minutes rose (from 17% to 25%).[1]

The Built Environment and Health Behaviours

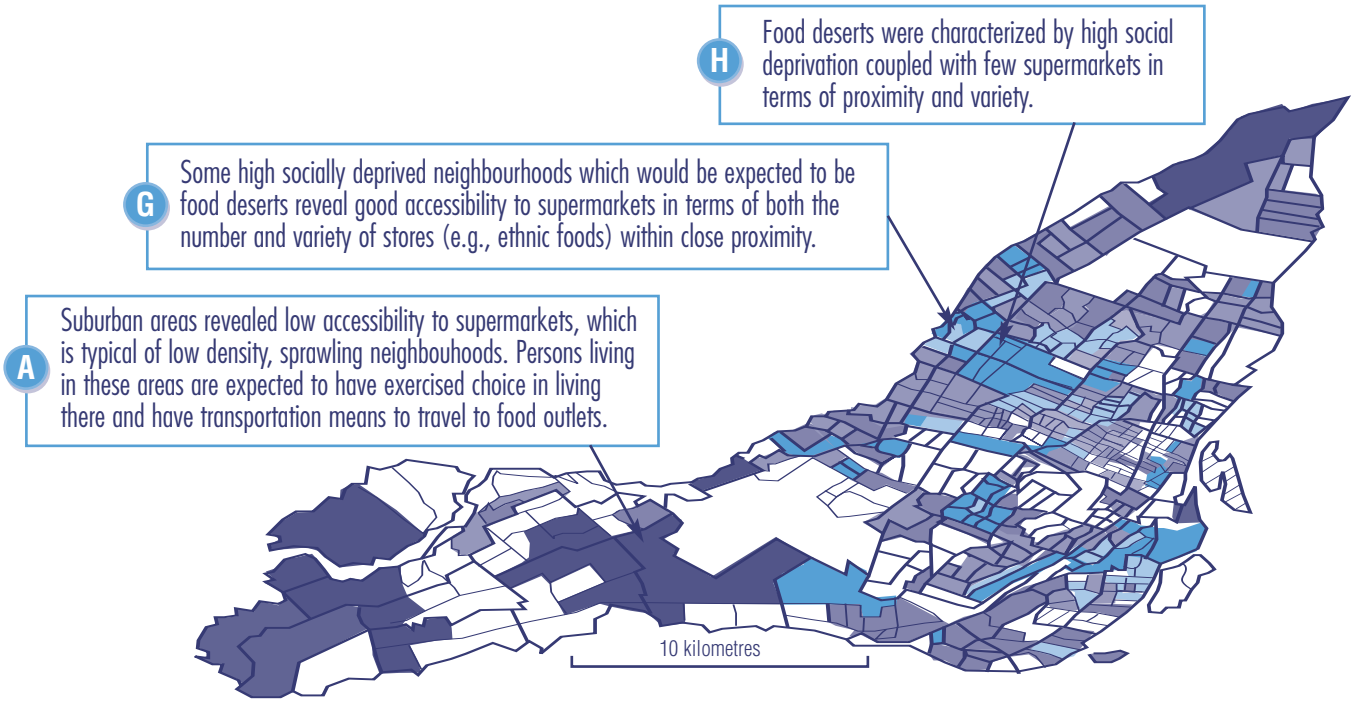
Current levels of obesity are clearly recognized as a public health issue. As individual-level factors alone have been unable to explain the rising prevalence, investigators are studying the linkages to the neighbourhood environment and have found some evidence of an association between sprawling, single use, residential neighbourhoods and higher levels of obesity.[2,3,4] Neighbourhoods populated by people with low education levels have also been found to be positively

associated with higher body mass index (BMI) values for both women and men,[4] while inverse relationships between area-level socioeconomic status and obesity/overweight have been documented for both adults[5] and children.[6,7]

Access to healthy food

The **built nutrition environment** includes restaurants, grocery and convenience stores, as well as the sidewalks, roads and bus routes that provide access to them. The location, number and type of such structures can vary considerably from place to place—depending on economics, zoning policies and the demographic composition of the area. Zoning policies, for example, can affect the proximity of food outlets to residential areas and whether space constrained stores are permitted to increase fruit and vegetable offerings through sidewalk displays. The physical shape of neighbourhood lots can also influence the type of buildings that are erected. For instance, smaller, oddly shaped urban lots may lend themselves to convenience stores and fast food restaurants rather than the larger supermarkets that are more typically seen in suburban areas.

Figure 1 Access to Supermarkets in Montréal Census Tracts Relative to Social Deprivation Index, 2001



Typology of Census Tracts — Centres of Gravity of Classes

Level of social deprivation	Level of accessibility to supermarkets	Class	Census tracts (N)	Index of social deprivation	Nearest supermarkets (in metres)	Number of supermarkets within 1,000 metres	Average distance to three closest different chain-name supermarkets
Very low	Very low	A	18	0.612	**2,882**	0.003	**3,637**
		B	3	0.800	**5,499**	0.000	**8,064**
		C	93	0.921	**1,375**	0.279	**2,113**
Low	High	D	115	1.351	613	**1.412**	1,166
	Very high	E	36	1.509	422	**3.448**	751
	Low	F	73	1.559	**949**	0.629	**1,613**
High	Very high	G	86	**1.983**	491	**2.163**	915
	Low (food deserts)	H	82	**2.398**	816	0.887	1,340
		All	506	1.561	910	1.220	1,490

Note: Values in bold are higher than the average for all census tracts. Classes are sorted by mean value of social deprivation index.
Adapted with permission from: Apparicio, P., et al. (2007).[8]

Research shows that most of the food eaten in Canadian households is prepared in the home,[9] suggesting that access to retail food resources is an important prerequisite to healthy eating. Hence, urban areas where residents have limited access to healthy food because of physical and economic barriers have become known as "food deserts."[8] Indeed, international studies have shown that living in such resource-deprived areas is associated with poor diet.[10]

Crossing the Road . . . or Not?

A recent article in *The Toronto Globe and Mail* reported that residents of a Toronto seniors' complex were paying $4 to take a bus to the shopping mall across the street, because they couldn't cross the six-lane road in the time the traffic light took to change.[22]

Food deserts are characterized by the presence of few or no supermarkets, with small/convenience stores instead. Access to public transportation is generally limited and residents who live in such areas often do so out of necessity, rather than choice. Mapping of supermarkets by neighbourhood in Edmonton and Montréal has suggested that food deserts exist in these cities.[8,11] Figure 1, for example, shows how access to supermarkets in Montréal varies with a social deprivation index measured by five neighbourhood variables: percent of the population with low income, percent of lone-parent families, unemployment rate, education level, and the percent of the population who are recent immigrants.

Active transportation

Physical activity encompasses more than exercise and leisure-time physical activity. It also includes what is referred to as "active transportation"—activities such as walking and cycling to school, to work and/or for errands that are incorporated into the normal activities of daily living.

Research has shown that the extent to which both forms of physical activity are practised is linked to the built environment. For example, there is evidence that the density of physical activity resources in the community is associated with physical activity prevalence.[12] Research also shows that integrated communities, with a variety of destinations accessible by safe and supportive walking environments, are associated with a higher prevalence of walking to work.[13]

Lost opportunities—The loss of physical activity from active transportation is often noted in studies about the built environment. This is concerning, because walking and cycling as a means of active transportation can provide a significant portion of a person's daily dose of physical activity (30–60 minutes for adults and 90 minutes for children, as recommended by *Canada's Physical Activity Guide to Healthy Active Living*). A study of children in the United Kingdom found that walking to and from destinations was one of the most important sources of their daily activity. Results also showed that, among older children, the walk to and from school was responsible for more calorie expenditure than recreational games or physical education at school.[14]

Physical activity from walking and cycling has been shown to reduce disparities in adult physical activity levels.[15] This may be due to the greater importance of walking and cycling for transport in the lives of people with lower incomes—activities that are not captured when only leisure physical activity is considered.[16]

Modifying the Built Environment . . .

. . . to support healthy eating

While grocery stores and restaurants are walkable destinations in many communities,[17] a U.S. study found that, in some neighbourhoods, there are both real and perceived barriers to local shopping, such as the need to cross busy streets and the lack of pedestrian routes (see sidebar). Moreover, people's preferences and habits may be geared toward driving instead of walking so that they can shop at more than one location or at stores with a better selection that may be further from home.[18] Locating retail food outlets close to residents may be more important in high walkability neighbourhoods, where residents can or must walk for such errands.[19]

Research in the U.K. studying the effects of introducing supermarkets to resource-deprived areas found some positive impacts on fruit and vegetable consumption.[20,21] The greatest effects were found among:

- people with poor diets (who increased fruit and vegetable consumption by 60%)
- those who had previously shopped at limited/discount stores
- and those living within 750 metres of the new store[21]

Studies point to the importance of understanding the attributes of place and tailoring the built environment to take into account its norms, composition and needs. Starting a community garden is one such application (see sidebar).

. . . to promote physical activity

In a built environment that is increasingly dominated by the automobile, opportunities for active transportation are becoming squeezed out. At the same time, lower income Canadians (particularly seniors, adolescents and families headed by single mothers) are less likely to have access to an automobile and, hence, are more likely to be adversely affected by built environments that impede safe, active transportation.

A number of solutions need to be considered to ensure that women, men, boys and girls have better prospects for being physically active through built environments that support both active transportation and leisure-time physical activities:

- funding infrastructure that supports active transportation and its perceived safety—including bicycle parking at transit stations, shopping and work places; and well-lit and well-constructed sidewalks and bike lanes in the city, in suburbs and in rural areas
- providing recreation facilities in the workplace and/or community to permit men and women with limited opportunities for activity to exercise at lunch, or before or after work
- encouraging residential, commercial and recreational development near transit stations (often called Transit Oriented Development, or TOD), to reduce travel time and create further opportunities for integrating physical activity into daily life

Found opportunities—Changes in the built environment also offer the potential for improved safety and reduced risk of injury during active transportation. For example, making pedestrian and bike routes more visible, continuous and dominant can increase actual and perceived safety.

Produce from Gardens

Community gardens have shown promising results in a study of Toronto neighbourhoods. Residents reported improved nutrition for themselves and their families, more opportunities for physical activity and increased social cohesion. Produce was described as fresher, more culturally appropriate and more cost effective than that in local grocery stores. However, some residents expressed concern about the quality of soil in reclaimed land and the impact of urban air pollution on the safety of the produce.[23]

Summing It Up

Creating built environments that support healthy behaviours has a number of benefits for men, women, boys and girls, including improvements in population health as a result of regular physical activity and healthy eating. Both reduce the risk of chronic disease (e.g., heart disease, type 2 diabetes and some cancers), premature death and disability. Across sectors, additional benefits may be seen—such as those from an environmental perspective (e.g., reduced energy consumption, air pollution and greenhouse gas emissions) and those from a transportation perspective (e.g., reduced per capita vehicle use).

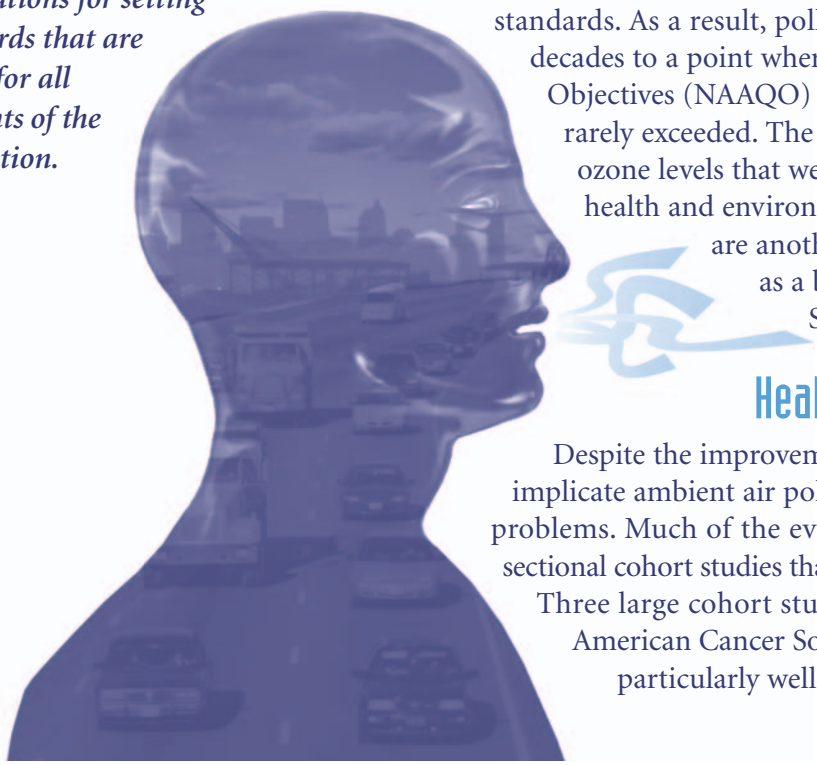
Modern zoning applications regarding the use of residential, employment and retail property have important implications for health. Consequently, there is an opportunity for various players—urban planners, transportation engineers, environmentalists, public health specialists and researchers—to work together on this area of intersecting interests to shape built environments that support healthier, happier populations living in more sustainable communities.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Air Pollution: Uneven Distribution of Health Risks

Sabit Cakmak, PhD, Research Scientist, Environmental Health Research Bureau, Healthy Environments and Consumer Safety Branch, Health Canada

Air pollution is often viewed as an important indicator of the quality of the physical environment. Despite our progress in reducing pollutant levels, air pollution still poses a serious public health risk. To study whether this risk is distributed evenly across the population, Health Canada scientists examined whether education and income influence the link between air pollution and cardiorespiratory hospitalizations in 10 large Canadian cities. The author highlights the results of this research and discusses the implications for setting standards that are "safe" for all segments of the population.



Early Reports and Initial Progress

Although the health risks of air pollution are generally well recognized today, the first indication of these effects can be traced to the London fog incident of 1952, where high levels of particulate matter and sulphur dioxide ($S0_2$) became trapped by stagnant weather conditions. At the same time, increases in cardiorespiratory mortality were reported, particularly among the elderly.[1,2] Based on this early evidence, it was assumed that reductions in air pollution would lead to lower acute mortality rates. This, in turn, led to new legislation governing emissions (the *British Clean Air Act* of 1956). However, reductions in ambient levels were not seen for five to six years due to the time needed to convert to less-polluting fuels and to improve combustion technologies.

Similar legislation in other industrialized countries, coupled with continued implementation of low sulphur fuels and improved combustion technologies, has led to significantly reduced pollutant levels in North America and Europe. In recent years, some less-industrialized countries (e.g., Chile, Mexico) have also begun to adopt clean air policies and technologies.

Several countries, including Canada, have set increasingly stringent emission standards. As a result, pollution levels have declined over the past decades to a point where Canada's National Ambient Air Quality Objectives (NAAQO) and Canada-Wide Standards (CWS) are rarely exceeded. The CWS are targets for particulate matter and ozone levels that were set by the federal government to reduce health and environmental risk by 2010. Similarly, the NAAQO are another set of air quality regulations that serve as a benchmark for other pollutants (e.g., O_3, SO_2 and NO_2).

Health Risks at Today's Levels

Despite the improvements, epidemiological studies continue to implicate ambient air pollution as a risk factor for cardiorespiratory problems. Much of the evidence comes from time series and cross-sectional cohort studies that have been conducted over the past decade. Three large cohort studies (the Harvard Six-Cities Study,[3] the American Cancer Society Study[4] and the California Study[5]) are particularly well known and have provided considerable

What is air pollution?

Air pollution is the contamination of air by the discharge of harmful substances. Major pollutants include, but are not limited to:

Gaseous Elements

- **Carbon monoxide (CO)**–motor vehicle exhaust contributes more than 50% of overall CO emissions, and in cities as much as 95%. Other sources include industrial processes (e.g., non-transportation fuel combustion) and natural sources such as wildfires.
- **Sulphur dioxide (SO_2)**–forms when fuel containing sulphur (mainly coal and oil) is burned, and during metal smelting and other industrial processes.
- **Nitrogen dioxide (NO_2)**–is a highly reactive gas that forms when fuel is burned at high temperatures (e.g., principally from motor vehicle exhaust and sources such as electric utilities and industrial boilers). It also plays a major role in the atmospheric reactions that produce ground-level ozone.
- **Ozone (O_3)**–ground-level O_3 (the primary constituent of smog) is the most complex, pervasive and difficult to control. It is not emitted directly into the air but is created by sunlight acting on reactive gases and chemicals in the air (e.g., gasoline vapours, chemical solvents, consumer products). Such gases can be carried hundreds of miles and can result in high O_3 concentrations over very large regions.

Solid Elements

- **Particulate matter** (e.g., smoke, dust, vapours)—can be directly emitted from power plants, diesel trucks, woodstoves, etc., or can be formed in the atmosphere when gaseous pollutants react to form fine particles.

evidence on the associations between adverse health outcomes and various types of air pollutants.

With health risks persisting at today's ambient levels, researchers are now questioning whether these risks are distributed evenly across the population. As pointed out by Ito and Thurston, "It is unlikely that exposures to elevated air pollution would increase the risk of dying uniformly across the population."[6] Population characteristics vary from one geographic region to another depending upon the distribution of sociodemographic factors. Moreover, airborne particles vary in size and composition depending upon time and location.

The question of whether certain subgroups or communities are particularly susceptible to air pollution is important for a couple of reasons—our ability to generalize the health risks from one geographic region to another with different sociodemographic characteristics, and our capacity to make decisions about setting "safe levels." To address this question, a number of countries, including Canada, have been investigating whether air pollution-related mortality and morbidity vary across communities with different levels of income and education.

A Canadian Time Series Study

Scientists from Health Canada, together with colleagues at the University of Ottawa and the Ottawa Hospital Research Institute, recently completed an investigation to determine the influence of air pollution on hospital admissions for respiratory disease and cardiac disease, and to find out if these associations are stronger in communities with lower education and income levels.[7,8]

The study population included all emergency hospital admissions between April 1, 1993, and March 31, 2000, where the principal diagnosis was for a respiratory (e.g., asthma, bronchitis, pneumonia) or cardiac (e.g., congestive heart failure, ischemic heart disease) condition. Data were collected across 10 large Canadian cities (Calgary, Edmonton, Halifax, London, Ottawa, Saint John, Toronto, Vancouver, Windsor and Winnipeg) and resulted in 316,234 cardiac and 215,544 respiratory-related hospital discharges.

Population data were provided by the Canadian Institute for Health Information; sociodemographic information was obtained from the 1996 Canadian Census. Each subject was assigned the sociodemographics of the enumeration area in which he/she

Table 1 Descriptive Statistics for Mean 24-Hour Air Pollution Levels for 10 Large Canadian Cities, April 1, 1993–March 31, 2000

City	Ozone (O_3) (parts per billion)	Nitrogen Dioxide (NO_2) (parts per billion)	Sulphur Dioxide (SO_2) (parts per billion)	Carbon Monoxide (CO) (parts per million)
Calgary	17.2 [8.2]*	24.7 [9]	3.5 [1.8]	0.8 [0.5]
Edmonton	17.0 [9]	24.3 [10]	2.8 [2]	0.8 [0.5]
Halifax	20.7 [7.8]	17.3 [6.4]	**10.2 [6.1]**	0.6 [0.2]
London	**23.7 [12.6]**	19.4 [8.8]	3.3 [3.8]	0.5 [3.7]
Ottawa	18.2 [8.7]	18.8 [9.1]	3.5 [2.9]	0.7 [0.4]
Saint John	22.9 [8]	8.8 [5.5]	7.4 [6.4]	0.8 [0.55]
Toronto	19.2 [10]	**25.4 [7.8]**	4.5 [3.2]	**1.0 [0.3]**
Vancouver	13.5 [6.8]	18.5 [5.3]	3.9 [2.3]	0.8 [0.37]
Windsor	19.5 [12.2]	24.4 [9.7]	7.7 [4.4]	0.8 [0.44]
Winnipeg	17.8 [8]	15.0 [7]	8.0 [4.3]	0.5 [0.2]
Average	17.4	21.4	4.6	0.8

**Standard deviation.* *Note: Values in bold denote highest concentration.*

resided. Individuals were classified into quartiles of family education and family income.

Daily concentrations of gaseous air pollutants (SO_2, NO_2, CO and O_3) were measured in the 10 cities and assessed against cardiac and respiratory hospitalizations using time-series analyses. Air pollutant data readings were provided by Environment Canada and the National Air Pollution Monitoring System. Analyses were adjusted for day of the week, temperature, barometric pressure and relative humidity.

Pollutant concentrations vary across the country

Air pollution concentrations varied across the cities studied, with the greatest variation being for NO_2 (see Table 1). Such variations were not surprising, given the different industrial profiles across the country.

When looking at Table 1, one should not assume that the pollution-related health effects will be greatest in cities with the highest pollutant concentrations. Although the health risk depends on the ambient pollutant concentrations—as well as on the length and degree of exposure—other factors are involved, such as the person's health status and genetic makeup. Interactions between air pollutants and aeroallergens may also be involved in suppressing a person's normal defence mechanisms. Place-based factors in the natural environment, such as topography and wind direction, and in the built environment—including proximity of residential dwellings to industrial emitters or congested highways—can also play a role in determining the health impacts.

Although the health risk depends on the ambient pollutant concentrations—as well as on the length and degree of exposure—other factors are involved, such as the person's health status and genetic makeup. Interactions between air pollutants and aeroallergens may also be involved in suppressing a person's normal defence mechanisms.

Evidence of health risks

In assessing the health risks across the cities studied, the study confirmed a relationship between the effects of short-term changes in air pollution on cardiac and respiratory *hospitalizations*. Results were higher in some cities and lower in

Table 2 Percentage Increase in Daily Hospitalizations, by Sex, for a Change in ALL Air Pollutants Equivalent in Magnitude to Their Population Weighted Mean Values, April 1, 1993–March 31, 2000

Air Pollutant	% Increase in Daily Hospitalizations—Cardiac Related		% Increase in Daily Hospitalizations—Respiratory Related	
	Males	Females	Males	Females
Ozone (O_3)	1.4 (0.9, 1.9)	2.7 (0.2, 5.2)	**4.5 (2.6, 6.3)**	**3.6 (1.6, 5.7)**
Nitrogen dioxide (NO_2)	**4.4 (2.0, 6.8)**	**7.4 (4.4, 10.4)**	2.8 (-0.1, 5.7)	0.7 (-2.2, 3.5)
Sulphur dioxide (SO_2)	1.1 (0.3, 1.9)	0.8 (-0.1, 1.7)	0.4 (-0.2, 1.1)	0.9 (-0.4, 2.1)
Carbon monoxide (CO)	0.4 (0.03, 0.8)	0.3 (-0.2, 0.8)	N/A	N/A
All pollutants	7.0 (0.5, 13.4)	12.3 (1.7, 22.9)	7.7* (4.2, 11.2)	5.2* (1.7, 8.7)

** "All pollutants" for respiratory-related hospital admissions exclude CO levels.*

Note: Values in bold denote highest percent increase.

others, but significant differences between cities were not found. Although differences between results for men and women were detected, they were not significant. As Table 2 shows, increased cardiac hospitalizations were associated with increased levels of all individual pollutants, with NO_2 having the strongest effect. Similarly, this trend was seen for respiratory hospitalizations, with O_3 levels having the strongest effect (see Table 2). An association was also found between short-term changes of air pollutant levels and cardiorespiratory *admissions*. Once again, the burden of illness did not appear to be disproportionately experienced by either males or females.

Respiratory effects vary with socioeconomic status (SES) and education . . .

When looking at how these pollution-related health risks were distributed across the population, higher levels of all pollutants—O_3, NO_2 and multi-pollutant combinations—resulted in differences in risk of **respiratory hospitalization** for individuals in the lowest income and education categories, when compared to

Pooled Estimate Percent Change in Daily Respiratory Hospitalizations Associated with an Increase in ALL Air Pollutant Levels, by Income Quartile or Education Category, April 1, 1993–March 31, 2000

Figure 1A: Risk of Respiratory Hospitalization, by Income Quartile

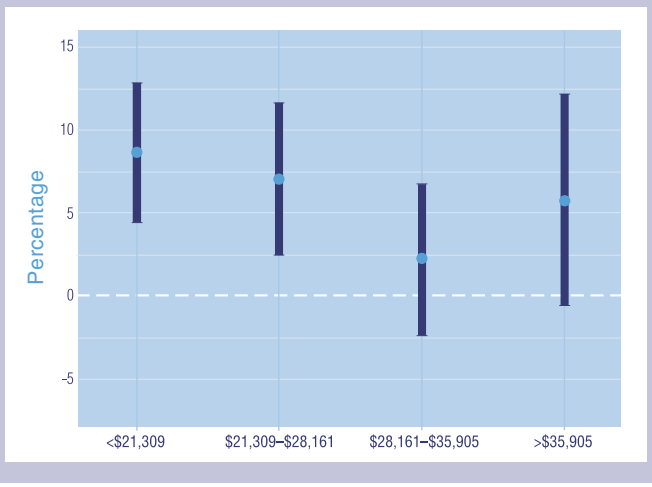
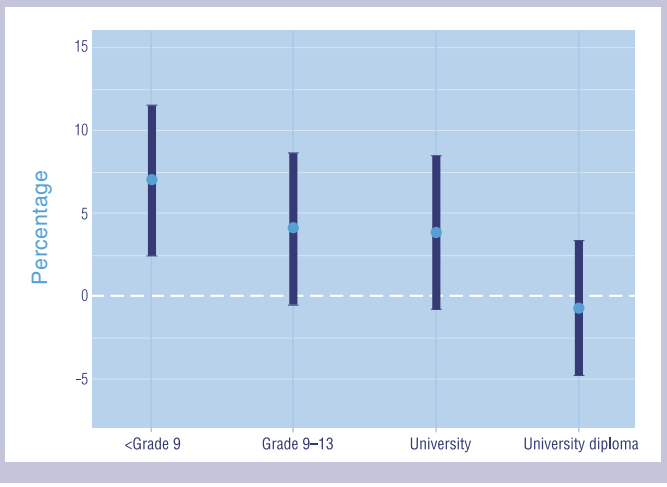


Figure 1B: Risk of Respiratory Hospitalization, by Education Category



Note: If confidence intervals cross zero, the risk estimate is not considered statistically significant.

those in the highest income and education categories (see Figures 1A and 1B). These findings suggest that those living in low SES circumstances may have an increased vulnerability to air pollution-related respiratory conditions.

. . . but cardiac effects do not

Unlike the risk for respiratory hospitalizations, no clear association was observed between the various income and education levels and the risk for **cardiac hospitalization** (see Figures 2A and 2B). Further studies of SES and cardiac disease, looking at both acute and chronic effects alongside measures of education and income (at personal, family and community levels), are recommended by the researchers.

The respiratory-related health risks associated with air pollution are not distributed evenly across the population but are disproportionately experienced by those living in poorer socioeconomic circumstances.

Implications for Moving Forward

As these findings show, the respiratory-related health risks associated with air pollution are not distributed evenly across the population but are disproportionately experienced by those living in poorer socioeconomic circumstances. While the reasons are not fully understood, this increased *susceptibility* among lower SES groups may be related to increased cigarette smoking and other unhealthy behaviours. Additionally, it may be related to increased *exposure* to pollutants as a result of living in lower SES neighbourhoods that are often located "downwind" of major sources of pollution.

The current findings have important public health and regulatory implications. Most air pollution standards aim to reduce the average exposure to pollutants over large areas. However, as the above findings show, the health effects cannot be generalized between regions with different sociodemographic characteristics. Hence, air quality standards that are based on effects averaged over the general population may provide insufficient protection for lower SES populations and communities. Including both air pollution and socioeconomic variables in epidemiologic studies can help to inform public policies that aim to protect those most susceptible to air pollution exposure, and to ensure equitable protection from health risks.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Pooled Estimate Percent Change in Daily Cardiac Hospitalizations Associated with an Increase in ALL Air Pollutant Levels, by Income Quartile or Education Category, April 1, 1993–March 31, 2000

Figure 2A: **Risk of Cardiac Hospitalization, by Income Quartile**

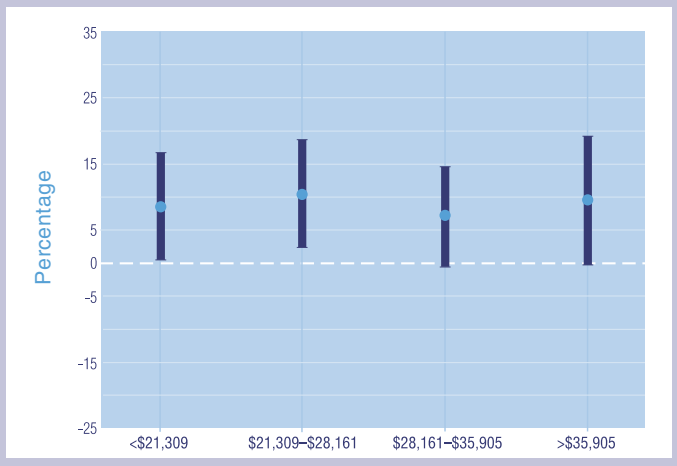
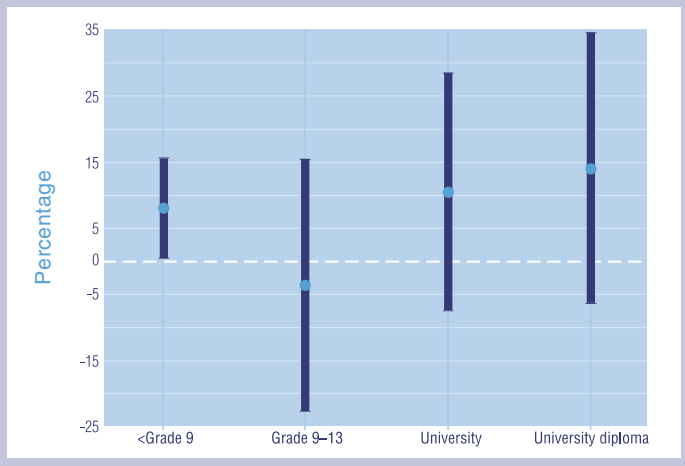


Figure 2B: **Risk of Cardiac Hospitalization, by Education Category**



Note: If confidence intervals cross zero, the risk estimate is not considered statistically significant.

What Makes First Nations Communities Successful?

Libbie Driscoll and **Clare Jackson**, Strategic Policy and Planning Division, Strategic Policy, Planning and Analysis Directorate, First Nations and Inuit Health Branch, Health Canada

The authors would like to acknowledge the research of **Kim Scott**, Kishk Anaquot Health Research.

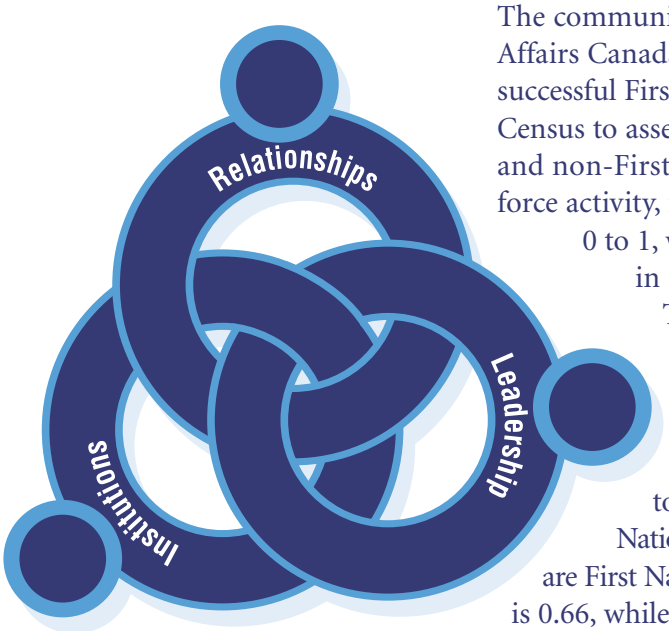
Recent research provides insight into the importance of place-based, community-level work that takes a positive approach to studying success in First Nations communities. This article provides background on the community well-being index, and highlights new Health Canada research on indicators of success that are both meaningful and relevant to First Nations communities.

Noted Cree academic and lecturer Willie Ermine has said of the state of the discussion on First Nations health in Canada, "We should be talking about health as the optimum well-being of our people. Not the ailments . . . What are the good ideas, what are the things that give us success?"[1] Yet in statistics and in media coverage, First Nations communities are usually identified by negative characteristics (see sidebar). The health and social disparities between First Nations and non-First Nations Canadians are well documented. High rates of suicide, chronic and communicable disease—and low rates of employment and educational attainment plague many of these communities. At the same time, there are many examples of successful and healthy First Nations communities that are often overlooked.

The First Nations and Inuit Health Branch (FNIHB) of Health Canada is working with First Nations leaders to explore the factors that create and sustain successful First Nations communities, and how this success might be made possible in other First Nations communities by federal programs and policies. Such a focus brings a positive perspective and encourages an approach to creating healthy First Nations communities that builds on their strengths.

Community Well-Being Index . . . and Beyond

The community well-being (CWB) index developed by Indian and Northern Affairs Canada provides a starting point for examining what contributes to successful First Nations communities. The CWB index uses data from the 2001 Census to assess and compare socioeconomic well-being among First Nations and non-First Nations communities on four indicators—education, labour force activity, income and housing.[2] The CWB index, measured on a scale from 0 to 1, was used to assess 541 First Nations communities (of the 603 total in Canada) and 4,144 non-First Nations Canadian communities. Thirty Indian reserves and settlements that were incompletely enumerated by the 2001 Census as well as communities with fewer than 65 inhabitants were excluded from the assessment.



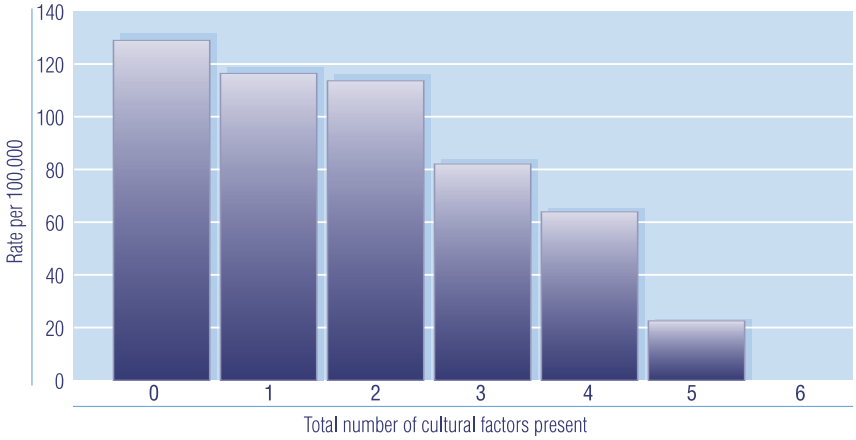
The CWB index clearly demonstrates the disparities between First Nations and non-First Nations communities. Only one of the top 100 scoring communities (i.e., with scores closer to 1) is a First Nations community; conversely, 92 of the bottom 100 scoring communities are First Nations. The average CWB index score of First Nations communities is 0.66, while the average score of other Canadian communities is 0.81.

The CWB index offers a method of measuring and comparing the socioeconomic well-being of communities. However, while the index provides compelling evidence of the disparities that exist between First Nations and non-First Nations communities, it does so primarily in terms of economic well-being. The CWB index therefore cannot be a proxy for the "health" (either physically or holistically defined) of a First Nations community.

Importance of Community Control

Community control of civic services is often cited as an important factor in ensuring the well-being of First Nations communities. Researchers Chandler and Lalonde have found that community control of civic services can act as a protective factor against suicide in First Nations communities.[3] When examining the presence of six particular cultural factors in First Nations communities (self-government, land claims, educational services, health delivery services, cultural facilities and police/fire services), they concluded that the greater the total number of these cultural factors over which a given First Nations community exercised some degree of control, the lower the number of suicides in that community (see Figure 1).

Figure 1 First Nations Youth (Ages 15-24) Suicide Rates, by Number of Cultural Continuity Factors Present, Canada, 1998



Source: Chandler, M.J., & Lalonde, C.E. (1998). Cultural continuity as a hedge against suicide in Canada's First Nations.[3]

FNIHB is facilitating greater community control over health services through a continuum of health services transfer arrangements (see sidebar). At present, over 80% of communities are in some form of management control process for their health programs and services, of which 46% are in health services transfer. However, First Nations communities that are under some type of health transfer agreement showed no correlation with their CWB index score.

A Participatory Approach

While much work has been done to measure community well-being and social capital in Indigenous communities, little has been published that reflects the perspective of community leaders about how successful communities are generated and sustained.

In order to address this gap, FNIHB undertook a research project to identify possible indicators of success in First Nations communities that are meaningful for and relevant to those communities.[6] The perspectives of First Nations leaders and health authorities were sought, to find out the answers to such questions as: "Which First Nations communities would you identify as 'successful' and why? Are successful communities random or predictable? Can successful communities be created? If so, how? If not, why not?" These perspectives are key to a partnership approach to developing policies and programs with First Nations.

A full report of this research, which included a literature search and interviews with selected Indigenous health authorities, will be published in 2008.[7]

First Nations Health Status

- The projected average annual population growth rate between 2001 and 2017 is 2% for the First Nations population (approximately 780,000), compared to 0.7% for Canada.
- The gap in life expectancy between First Nations and Canadians, in general, is five years for females and seven years for males.
- In 2005, 16.4% of all AIDS cases in Canada were found within the Aboriginal population (compared with 1.6% of cases in 1995).[5]
- The First Nations diabetes rate is 2.7 times higher than the general Canadian population.
- The rate of suicide of First Nations youth (aged 10 to 19 years) is 4.3 times greater than for Canada.

Source: Health Canada. (2005). A Statistical Profile on the Health of First Nations in Canada for the Year 2000.[4]

Types of Health Services Transfer

General Consolidated Contribution Agreement (CA): Communities administer FNIHB-designed health programs.

Integrated CA: The community sets up its own health management structure but shares responsibility for delivering services with FNIHB.

Transfer CA: Transfer offers more authority and control of health resources than the two strategies mentioned above. The community establishes a health management structure, looks at training requirements, assesses its health needs and develops a community health plan. Communities may design new programs and redirect resources to areas of high priority, as long as mandatory programs are provided.

Self-Government Agreement: Offers the highest level of control of resources, including jurisdictional or law-making authority.

What We're Finding

Respondents identified characteristics that they associated with a "successful community." Characteristics fell into three broad categories—relationships, institutions and leadership. A few examples from each of these categories are provided in the sidebar below.

These characteristics are not unique to First Nations communities in Canada—similar views would be found among non-First Nations communities. In community development, the idea of success based on a strategic planning process that responds to an internal agenda, and that aims to achieve sustained community well-being, is well known. Measuring success by indicators related to social, cultural, political and economic impacts in a community is common across the globe.

There was a high degree of certitude among First Nations leaders that successful communities can be created, and such places were identified by all the respondents. Other examples of community achievements related to: economic development; environmental stewardship; investment in youth; employment in community managed businesses; early childhood development; youth suicide initiatives that engage young people and integrate culture and traditions in healing; a relationship with the provincial government that results in linkages with broader partnerships with Canadian institutions; and addressing a community environment of widespread addiction and changing that to one of nearly complete sobriety.

In parallel, the questions posed to First Nations were used in an internal departmental survey that included FNIHB Regional Directors. While some common themes were found, there was a greater emphasis on good governance and the importance of health systems among FNIHB managers.[8]

Moving Forward

This research will provide the basis for further investigation and will guide FNIHB's policy and programs as the Branch works with its partners to further identify what makes communities successful and to find ways to respond to community initiatives in sharing and building on what is being learned. ■

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.healthcanada.gc.ca/hpr-bulletin>.

Some Characteristics of "Successful Communities" Identified by First Nations Community Leaders and Health Authorities

Characteristics of Relationships

- mobilize and maximize the strengths of individuals
- strong community identity and pride
- strong family functioning

Characteristics of Institutions

- stable and strong economic base (or movement towards developing such a base)
- cultural integrity is obvious and supported
- members respect and participate in local institutions

Characteristics of Leadership

- good governance
- proactive planning towards a long-term vision
- internal accountability

Who's Doing What?

Who's Doing What? is a regular column of the *Health Policy Research Bulletin* that looks at the key players involved in policy research related to the current theme area. This article profiles national-level initiatives and various stakeholders who are working in the area of "People, Place and Health."

Derek McCall *and* **Samara Hammoud**, *formerly of the Policy Coordination Division, Policy Coordination and Planning Directorate, Health Policy Branch, Health Canada*

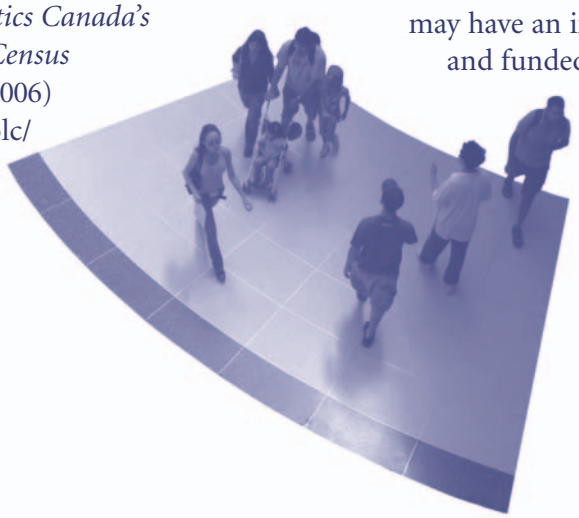
Health Canada and the Public Health Agency of Canada (PHAC)

Work on the topic of "people, place and health" is conducted in many branches and directorates across Health Canada and PHAC. The authors and contributors to this issue of the Bulletin represent some of these areas, including: the Health Policy Branch, Healthy Environments and Consumer Safety Branch, First Nations and Inuit Health Branch at Health Canada, and the Health Promotion and Chronic Disease Prevention Branch at PHAC.

Statistics Canada

Data from many Statistics Canada surveys are used in research on people, place and health. Key surveys include the Census of Canada <http://www12.statcan.ca/english/census/index.cfm> and the *Canadian Community Health Survey* <http://www.statcan.ca/english/concepts/health/>. In addition, Statistics Canada has produced analytical papers related to the theme area, such as a recent report on trends in Canada's metropolitan areas:

- *Ten Things to Know About Canadian Metropolitan Areas: A Synthesis of Statistics Canada's Trends and Conditions in Census Metropolitan Areas Series* (2006) <http://www.statcan.ca/bsolc/english/bsolc?catno=89-613-M2005009>



Work on the Social Determinants of Health

The WHO Commission on Social Determinants of Health, chaired by Sir Michael Marmot of University College (London), is working to address the problem of growing inequities in health status both within and between countries. With a three-year mandate (2005–2008), the Commission is working to effect policy change by compiling evidence on the science and action on the social determinants of health, encouraging and widening debate on the issues and proposing national and global policies for action.

Canada is participating on a number of fronts. The Honourable Monique Bégin serves as Canada's Commissioner. The Canadian Reference Group (CRG) is supported by PHAC's Strategic Initiatives and Innovations Directorate (Health Promotion and Chronic Disease Prevention Branch). Along with researchers and other organizations, the CRG is actively engaged in a number of initiatives—including examining Canadian experiences with intersectoral collaboration, supporting three knowledge networks (one of which focuses on *urban settings*) and engaging civil society in continued efforts to address health inequities.

Visit <http://www.phac-aspc.gc.ca/sdh-dss/index.html> for information and updates.

Canadian Population Health Initiative (CPHI)

CPHI, as part of the Canadian Institute for Health Information, is undertaking research on the theme of "place and health" with a focus on modifiable attributes of both the natural and built environments that may have an impact on health. Several CPHI reports and funded research are available on this theme. While some were referred to in this issue of the Bulletin, others include:

Recent reports

- *Metropolitan Socio-Economic Inequality and Population Health* (February 2001–September 2006) <http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=cphi_communities_jdunn_e>

- *Health Inequalities and Living Conditions: Social Determinants and Their Interactions* (June 2002–March 2007) <http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=cphi_communities_mdekoninck_e>
- *Perception of Place and Health: Differences Between Neighbourhoods in the Quebec City Region* (April 2007) <http://www.sciencedirect.com/science/article/B6VBF-4NDVHDN-3/2/f9ef5f96d48bb98bdaf9ce94331c210d>

Upcoming research

- Series of 19 reports—CPHI is currently working with the *Urban Public Health Network*, a collaboration of Medical Officers of Health from Canada's largest cities, on a series of 19 reports that examine the association between socioeconomic status and the health of Canadians living in Canada's major cities. The reports are scheduled for release in the winter of 2007.
- *Cohort Mortality by Individual, Family, Household and Neighbourhood Socioeconomic Characteristics, Based on a 15% Sample of the 1991 Population for All of Canada* (May 2004–March 2008)—an ongoing program that investigates how the health of individuals differs by income, education, occupation, language and ethnicity, disability status and Aboriginal heritage.

Canadian Institutes of Health Research (CIHR)

As the Government of Canada's health research funding agency, CIHR supports research that improves Canadians' health, the health care system and quality of life. Two funded research projects of note are:

- *Neighbourhood health effects: A systematic review of research evidence and place-based policy prescriptions* (2006–2007) <http://webapps.cihr-irsc.gc.ca/funding/Search?p_language=E&p_version=CIHR>
- *Mining and community health: The impact of mining activities on health of residents in British Columbia mining communities* (2005–2006 to 2006–2007) <http://webapps.cihr-irsc.gc.ca/funding/Search?p_language=E&p_version=CIHR>

Health and Place

This interdisciplinary journal is dedicated to the study of all aspects of health and health care in which place or location matters. By bringing together international contributors from geography, sociology, social policy and public health, it offers comparative perspectives on the difference that place makes to the incidence of ill health, the structuring of health-related behaviour, the provision and use of health services, and the development of health policy. Visit: <http://www.elsevier.com/wps/find/journaldescription.cws_home/30519/description#description>.

CIHR's **Institute of Population and Public Health** has also been involved in the following initiative:

- *Population Health Intervention Research Initiative for Canada*—examines in part how neighbourhoods impact health and well-being. Researchers in this area are preparing a systematic review on the "Moving to Opportunity" research demonstration, which focuses on the health impact that a change in neighbourhood would have. Visit: <http://www.irsc.gc.ca/e/33503.html>.

Centres of Excellence for Women's Health

The Centres of Excellence for Women's Health work hand in hand with community partners to define research issues and questions that matter to women. In cooperation with the Canadian Women's Health Network, with funding from Health Canada, research was undertaken to expand the knowledge about rural and remote women's health issues and create a new agenda for policy and research in rural, northern and remote women's health. Visit <http://www.cewh-cesf.ca/en/resources/rural_remote/index.shtml> to access the summary report.

Heart and Stroke Foundation of Canada (HSFC)

HSFC focuses part of its research on the social, environmental and population health factors and their influence on health. *Built environment, obesity, and health* is an initiative put forward by HSFC to enhance existing knowledge on how the built environment influences physical activity, obesity and individual behaviour. Visit: <http://www.hsf.ca/research/>.

Using Canada's Health Data

Using Canada's Health Data is a regular column of the *Health Policy Research Bulletin* highlighting some of the methods used in analyzing health data. In this issue we feature a surveillance research tool—the Chronic Disease Infobase.

Hongbo Liang, *PhD, Centre for Chronic Disease Prevention, Health Promotion and Chronic Disease Prevention Branch, Public Health Agency of Canada*

CHRONIC DISEASE INFOBASE MALADIES CHRONIQUES

Surveillance Information is Just a Click Away . . .

Surveillance allows us to better understand diseases and therefore improve the targeting of programs and research. Accessing the most current cardiovascular disease and cancer statistics, risk factor prevalence and data on other major non-communicable diseases in Canada is made easier through the Chronic Disease Infobase. As one of several public health surveillance activities underway at the Public Health Agency of Canada (PHAC), the Infobase (available in English and French) strives to:

- collate high quality and up-to-date data from various sources
- apply appropriate analyses
- translate data into information
- present information in an easy-to-understand format

Timely, High Quality Data Collection

Surveillance requires timely, high quality data. The Infobase currently contains over 1.5 million data points and over 200 sub-data groups in the five major categories of demographics, morbidity, mortality, risk factors and health-related services, spanning the past few decades. The major data sources are national databases and surveys such as the Canadian Census, Canadian Cancer Registry, Hospital Morbidity Database, Canadian Vital Statistics (including annual mortality data), *National Population Health Survey* and *Canadian Community Health Survey*. The Infobase is updated frequently as new data become available to PHAC.

Data Interpretation

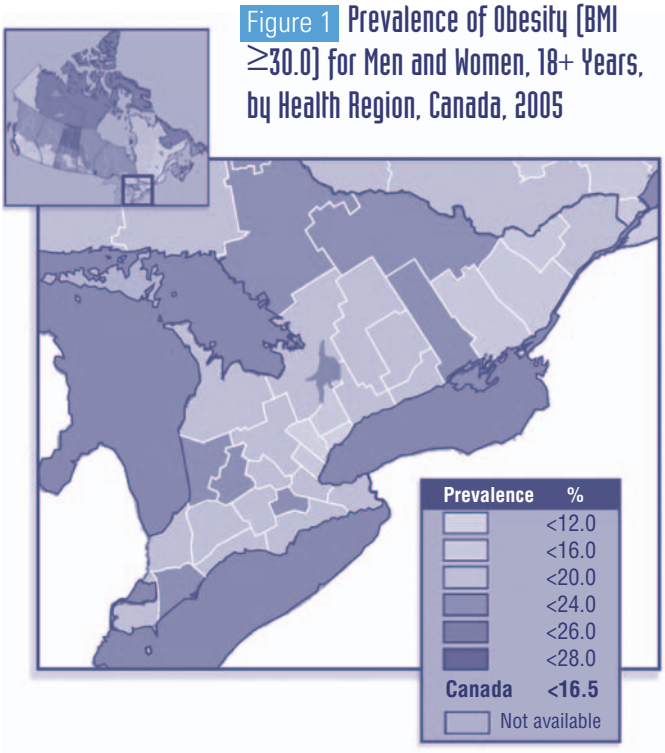
Applying appropriate statistical methods is the key to transforming data into information. Infobase results that can be selected include:

- age-standardized cancer incidence rates, hospital discharge rates and mortality rates
- age-standardized morbidity and mortality trends, age-specific and birth cohort mortality trends
- age-standardized proportional mortality trends
- risk factor prevalence rates

Data Dissemination Tools

The Infobase provides users with a quick and easy way to generate complex maps, graphs and tables, and to summarize national, provincial/territorial and health region profiles (see Figure 1). Policy makers and health professionals can use maps and graphs in their reports or download data for further analyses. The general public can also easily obtain and understand health information from these maps and graphs. Figure 1 is an example of a map created using the Infobase to display the prevalence rate of obesity (body mass index (BMI) 30 and higher) for men and women 18 years of age and over in Canada in 2005.

Figure 1 Prevalence of Obesity (BMI ≥30.0) for Men and Women, 18+ Years, by Health Region, Canada, 2005



Contact the Chronic Disease Infobase

Please visit the Infobase website at: <http://www.infobase.phac-aspc.gc.ca> and send your comments or questions to: infobase@phac-aspc.gc.ca

The *Health Policy Research Bulletin* is published two times a year with the aim of strengthening the evidence base on policy issues of importance to Health Canada and the Public Health Agency of Canada (PHAC). Each issue is produced on a specific theme and, through a collaborative approach, draws together research from across Health Canada, PHAC and other partners in the Federal Health Portfolio. The research is presented through a series of interrelated articles that examine the scope of the issue, provide an analysis of the impacts and potential interventions, and discuss how the findings can be applied in the policy development process.

Following is a list of all of our past issues, available in electronic HTML and PDF versions at: <www.healthcanada.gc.ca/hpr-bulletin>, or by contacting us at: <bulletininfo@hc-sc.gc.ca>.

- **Financial Implications of Aging for the Health Care System** (March 2001)
- **The Next Frontier: Health Policy and the Human Genome** (September 2001)
- **Health Promotion–Does it Work?** (March 2002)
- **Health and the Environment: Critical Pathways** (October 2002)
- **Closing the Gaps in Aboriginal Health** (March 2003)
- **Antimicrobial Resistance: Keeping it in the Box** (June 2003)
- **Complementary and Alternative Health Care: The Other Mainstream?** (November 2003)
- **Health Human Resources: Balancing Supply and Demand** (May 2004)
- **Child Maltreatment: A Public Health Issue** (September 2004)
- **Changing Fertility Patterns: Trends and Implications** (May 2005)
- **Climate Change: Preparing for the Health Impacts** (November 2005)
- **Social Capital and Health** (September 2006)
- **The Working Conditions of Nurses: Confronting the Challenges** (February 2007)

Mark Your Calendar

7th International Conference on Health Policy Statistics–"Striving for Consensus on Methods"
January 17-18, 2008
Philadelphia, Pennsylvania
Addressing a broad range of topics, including developing new methods to address problems specific to multidisciplinary research
http://www.amstat.org/meetings/ichps/2008/

Seventh International Conference on Occupational Stress and Health
March 6-8, 2008
Washington, DC
Exploring healthy and safe work through research, practice and partnerships
http://www.apa.org/pi/work/wsh.html

World Congress of Health Professions–"The Future Now: Challenges and Opportunities in Health"
March 26-29, 2008
Perth, Australia
Addressing five themes related to the challenges and opportunities of shaping and providing health care in a rapidly changing world
http://www.worldhealthcongress.org/

E-Health Conference 2008–"Extending the Reach"
May 4-7, 2008
Vancouver, BC
Addressing several themes including privacy, security and risk management
http://www.e-healthconference.com/

Geneva Health Forum: Towards Global Access to Health
May 25-28, 2008
Geneva, Switzerland
Providing an interactive and dynamic platform for critical reflection on the complexity of global access to health
http://genevahealthforum.hug-ge.ch/

Canadian Association for Health Services and Policy Research (CAHSPR) Conference–"Bridging Silos"
May 26-28, 2008
Gatineau, QC
Bridging across silos for the common purpose of preparing for change in priority areas of the health care system
http://www.cahspr.ca/

5th World Conference on Breast Cancer
June 4-8, 2008
Winnipeg, MB
Providing leading information on all aspects of breast cancer: research, diagnosis, treatment, support, prevention, outreach and education
http://www.wcbcf.ca/winnipeg08.php

46th International Making Cities Liveable Conference
June 1-5, 2008
Santa Fe, New Mexico
Interdisciplinary, international network of individuals and cities dedicated to making cities and communities more liveable
http://www.livablecities.org/index.htm

XVII International AIDS Conference
August 3-8, 2008
Mexico City, Mexico
Presenting new scientific research and opportunities for dialogue on challenges facing the global response to AIDS
http://www.aids2008.org/