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Leslie T. Foster and C. Peter Keller,
University of Victoria, August 2007

Preface

In 2005, we completed the BC Mortality Atlas, a web-based update (*www.geog.uvic.ca/mortality*) to an earlier publication titled *The Geography of Death: Mortality Atlas of British Columbia, 1985-1989* (Foster and Edgell, 1992). We were beginning work on a youth atlas and a seniors atlas for BC when Andrew Hazlewood, Assistant Deputy Minister of Population, Health and Wellness in the Ministry of Health, organized a brief meeting to discuss the concept of a wellness approach to mapping health in BC. Mapping health-related data in the province has a tradition over the past two decades, but mapping has tended to look at mortality, morbidity, or system use, not the actual "health" or wellness of British Columbians. To our knowledge, the concept of taking a wellness approach had not been tried before. Hence, the genesis of this Atlas.

The interministry ActNow BC Assistant Deputy Ministers' Committee, co-chaired by Andrew Hazlewood and John Mills, was tasked with providing advice and implementing projects that would support the provincial government's ActNow BC initiative announced in early 2005. The overall goal of ActNow BC was to help make BC the healthiest jurisdiction to host a modern day Olympic and Paralympic games. The Atlas could assist in focusing the attention of diverse ministries on ways to contribute to ActNow BC, and also ensure that actions to support the initiative would recognize the geographical diversity of the province. It was well known that achieving the provincial goals of ActNow BC would require attention to the fact that health, wellness, illness, and health system infrastructure varied substantially throughout the province. As such, it was important to get a geographical base line of these variations so that differences, and anticipated improvements, could be measured over time. This first edition of the *BC Atlas of Wellness* contributes to this process.

Unlike mortality, which is readily defined, measuring and mapping wellness is much more challenging. Like health, wellness is a term that is used in everyday discourse without much thought to what it entails. There is an assumption that everyone knows what it is. Achieving some definition of wellness, and agreement around what influences it, has been one of the major challenges in developing and organizing this Atlas. A second major challenge has been defining an appropriate geographical unit for mapping purposes. Within the province, there are myriad geographical administrative units for which data are collected: municipalities, local health areas, federal and provincial electoral ridings, school districts, regional districts, health service delivery areas, economic development regions, and health authorities, to name but a few. Given the tight timelines for producing this Atlas, our approach has been to use existing data, albeit from a variety of sources. In addition, we use data that are collected periodically so that trends and changes can be mapped over time. Consequently, to the extent possible, we have mapped data at the Health Service Delivery Area (HSDA) level. While a finer scale would have been preferred, the reasons for choosing the HSDA level are of a practical nature. The HSDA is the most detailed level for which key survey data (particularly the 14,000 sample Canadian Community Health Survey) are available. Furthermore, this survey is repeated on a regular basis and also provides an opportunity for comparisons with other parts of the country. As such, changes over time can be measured and mapped. A selected number of indicators are also mapped by other administrative units, most notably School Districts, BC Games Zones, and Economic Development Regions. In addition, there are a limited number of what we refer to as "custom maps," which have a different basis altogether. These are based on the ready availability of unique indicator data.

The Atlas is organized into several chapters that provide background and context, but primarily follow the main "pillars" of the ActNow BC initiative. The first chapter gives an introduction to the Atlas and a brief background of the ActNow BC initiative. In addition, a brief introduction to health-related mapping, particularly for BC, is provided. Chapter two presents a synopsis of the concept of wellness, and an introduction to the determinants of health and wellness. Chapter three provides an overview of the key data sources, and instructions on "how to use and read" the maps provided in the Atlas. Chapter four offers a geographical context for the Atlas, particularly with respect to the demographic and physical aspects of the province. Chapter five is the main chapter and, after a series of maps showing the socio-economic and demographic determinants of, or assets for, health and wellness, follows closely the key pillars of the ActNow BC initiative, providing maps and commentary on indicators related to tobacco smoke-free environments, nutrition and food security, physical activity, healthy weights, healthy pregnancy, and wellness outcomes. Chapter six provides a series of maps and commentary based on a combination of selected indicators contained within the Atlas.

Throughout the Atlas, a "half-full" or asset approach to mapping indicators is taken, rather than a "half-empty" or deficit approach. Put simply, this involves using indicators such as healthy weight rather than overweight status or obesity,

non-smoking behaviour rather than smoking behaviour, activity-related indicators rather than those related to inactivity, and good health indicators rather than illness measures. This is our way of using the wellness concept in the Atlas. This approach will not be without its critics. Some will argue that focusing on wellness or positive aspects of health will provide an unfair picture of health and wellness in the province by ignoring or minimizing problem issues and areas that need addressing, and may leave an impression that all is "well" in the province. That is not our intent. Each colour map shows those areas that are doing best as measured by key indicators, and those that are not. As such, the regions requiring improvement in wellness issues are readily apparent. Further, we are aware that problem areas and issues will continue to be pursued by others, as is currently the case.

It is not our intent to explain the variations in the many indicators that we map. The aim of the *BC Atlas of Wellness* is to present data in a useful form that is readily understandable. The maps "speak for themselves," and our job is to describe the key points that emerge from the maps and accompanying tables as a basis for discussion by interested groups and individuals. It is our hope that they will ask questions of themselves, and others in their community, about the "whys and wherefores" of the patterns that emerge.

We anticipate that this novel approach—to mapping the positive, rather than the negative, mapping the assets, rather than the deficits—will result in useful discourse on why variations exist and what can be done about them. This can only help improve the overall health and wellness of the province and its residents.

Leslie T. Foster and C. Peter Keller
University of Victoria, August 2007

Foreword

Geographical mapping has been, and continues to be, an important technique used by a variety of public health-related disciplines to show health and wellness patterns within populations. John Snow, viewed by many as the first modern-day epidemiologist, mapped cholera victims in London in 1854 and was able to identify how the disease was transmitted and thus make recommendations to prevent future outbreaks. The *BC Atlas of Wellness* follows a distinguished tradition in health-related mapping to show variations and inequities in various wellness-related indicators. While many previous health-related atlases have focused on system use and problem areas, this Atlas is unique in that its focus is on assets rather than deficits. In public health, we are accustomed to focusing on problems and finding ways to minimize their impacts or prevent them entirely. By focusing on the concept of wellness, which, like health, is multi-faceted in nature, this Atlas provides a wealth of different types of indicators that reflect many key dimensions of wellness. In all, over 270 separate maps are included, along with supporting tables that provide data related to approximately 120 indicators of the various dimensions of wellness.

While the topics included in the Atlas cover traditional indicators related to the determinants of health and wellness and healthy public policies, there are also many unique indicators. The material is grounded in the physical and demographic diversity of BC, and an important feature of the Atlas is that it uses the ActNow BC health promotion initiative as a framework to present the mapped indicators. This initiative is based on several key areas of public health: smoking; nutrition; physical exercise; weight; and pregnancies. While these areas are all covered in the Atlas, it takes a positive approach to the indicators being mapped: rather than mapping smoking, it looks at non-smoking behaviour and environments, at healthy nutrition and policy adoption rather than poor nutrition, at physical activities rather than sedentary activities, at healthy weights rather than obesity, and at conditions that promote healthy pregnancy rather than potentially damaging behaviour during pregnancy. Furthermore, it provides information on outcomes in terms of how the population views certain components of their health and wellness, and also provides an interesting yet simple approach to determining potential benchmarks for specific wellness features.

The Atlas has contributions from a variety of partners, including scholars from several institutions, graduate students, consultants, health advocacy groups, and public servants. Its aims are to measure and show the level of regional inequities in wellness, and to generate questions and discussions among community groups, public health policy and decision makers, school boards, and local governments on why one region does better than other regions on one or more indicators. Are regional inequalities in wellness indicators important enough to warrant local action? If so, what can be done to improve wellness? What can be learned from the regions that are the best or excel on certain dimensions of wellness?

The material presented here shows regional variations, as well as variations based on gender and age groupings. In some instances, statistical testing shows whether or not differences are significant. As such, the information can be used to help target health promotion initiatives both geographically and demographically. The maps and tables have also been created from a variety of scattered data sources, some of which may not be that well known to policy makers and others interested in wellness. The Atlas, by adding value to raw data so that rates can be compared among regions, and providing them publicly, essentially makes them available to any one who wishes to use the data for their own purposes. Further, the Atlas is available to all who have access to the internet through the website *www.geog.uvic.ca/wellness*, and additional and updated data will be made available through this website in the future.

By focusing on assets and taking a wellness approach, the *BC Atlas of Wellness* provides a unique and most interesting look at health and wellness in the province. It will assist communities and regions to learn more about their health and wellness relative to other parts of the province, and it complements reports that have been produced through my office.

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1

Introduction to the Atlas

The background to the development of the *BC Atlas of Wellness* is described in the following pages. It springs from the ActNow BC initiative, which was introduced by the BC government in early 2005 to encourage British Columbians to make healthy lifestyle choices to improve their quality of life, reduce the incidence of preventable chronic disease, and reduce the burden on the health care system. ActNow BC is an integrated, government-wide approach that engages the contributions of partners in other levels of government (e.g., municipalities), non-government organizations, schools, communities, and the private sector to develop and deliver programs and services to assist individuals to quit or never start smoking, to be more physically active, eat healthier foods, achieve and maintain a healthy weight, and make healthy choices in pregnancy. The key thrusts of ActNow BC are described, as these provide the framework for the maps that follow later in the Atlas. A second part to this chapter provides a discussion on why we have taken the approach of mapping wellness through a variety of indicators, and reviews some of the key literature related to the mapping approach to health and wellness. The final section considers the goals of this Atlas and the reasons behind them.

The Emergence of ActNow BC

In April 2004, the Select Standing Committee on Health was asked, among other things, to investigate successful health promotion campaigns in other jurisdictions with a view to assessing their usefulness for BC. The Committee was also asked to look at how to promote "healthy lifestyles" and to consider savings that might result from the improved fitness of the general population, and children and youth in particular (BC Select Standing Committee on Health, 2004).

The report was delivered 8 months later and indicated that 40% of the most common chronic diseases were a result of one or more of the following preventable factors: smoking, poor diet, physical inactivity, the resulting overweight status or obesity, and irresponsible use of alcohol.

The Committee noted that failure to reduce the occurrence of those diseases that were actually preventable resulted in great human, social, and economic costs. In total, the Committee made no fewer than 29 recommendations and stated that there were no "quick or easy fixes" to achieve savings or improvements in health and wellness. As the Committee noted, "The path to health and wellness for British Columbians will not be an easy road to travel" (Ibid., p. 4), and the greatest concerns were related to the rates of obesity, poor nutrition, and physical inactivity, which had reached epidemic proportions in society.

Touting the 2010 Winter Olympics, which BC had won the opportunity to host, the Committee felt that the entire BC population could respond to the excitement of the games and join the athletes in achieving personal bests and improving their own health. The members noted that "The need to *act now* [emphasis added] is urgent" (Ibid., p. 2) if the health care system is not to be overwhelmed, and suggested that funding for public health should be gradually doubled as a proportion of the total health care budget from 3% to 6%. Community and municipal organizations were seen as crucial to making a difference.

In releasing its strategic plan in 2005, the Province responded to the concerns of the Committee, setting as one of "Five Great Goals" for the next few years to "lead the way in North America in healthy living and physical fitness" (*www.bcbudget.gov.bc.ca/2006/stplan/*).

Key actions to accomplish this goal included:

- making BC the healthiest jurisdiction to ever host a modern Olympic and Paralympic games;
- encouraging British Columbians to reduce tobacco use, increase physical activity and improve nutrition, and make healthier choices during pregnancy (set out by the specific targets of ActNow BC);
- encouraging British Columbians to make healthier living choices that support a sustainable health care system by reducing the burden of chronic disease; and
- closing the gap in health status between Aboriginal and non-Aboriginal British Columbians.

In the discussion of the goal, it was noted that being overweight or obese contributed to many preventable diseases, and resulted in premature death, and that increased levels of physical exercise could combat some of these conditions. It further stated that tobacco was still a major cause of preventable morbidity and premature mortality.

The ActNow BC Framework

ActNow BC was created in 2005, following the release of the province's strategic plan, and assigned the leadership role to the Ministry of Health to make it a comprehensive health promotion initiative. The key was to help ensure that citizens could make positive lifestyle choices and also be active in order to stay well and in good health.

While the goals for improvement were set for 2015/16, the 2010 Olympics were clearly seen as an event that could help to rally the population around the need to achieve the goals suggested by the BC Select Standing Committee on Health. ActNow BC adopted the actions identified by the strategic plan to improve the health and wellness of the province, and added the need to build community capacity to create healthier and sustainable, economically viable communities.

Although the provincial strategic plan had set goals to be achieved by 2015/16, ActNow BC set more ambitious goals to be achieved by 2010, the year the Olympics are to be hosted. The targets included:

- reduce tobacco use by 10%;
- increase the number of people who eat at least five servings of fruits and vegetables every day by 20%;
- increase the number of people who are physically active by 20%;
- reduce the number of BC adults who are overweight by 20%;
- increase the number of women counselled about alcohol use during pregnancy by 50%.

It was recognized that success in achieving these goals needed long term changes in beliefs, values, and behaviours, and while government could be the leader, it could not do it alone. There was a need for influential community partners, and four key partners were singled out: 2010 Legacies Now, BC Recreation and Parks Association (BCRPA), BC Healthy Living Alliance (BCHLA), and the Union of BC Municipalities (UBCM).

2010 Legacies Now was first created in 2000 to assist with the Olympic bid and to help ensure that the benefits of the 2010 Olympics were shared throughout the province. It became an independent society in 2002 with a mandate to ensure "a strong and lasting sport system for the province that increased participation from Playground to Podium and supported safe, healthy, and vibrant communities." Its mandate was expanded in early 2004 to include the arts, volunteerism, and literacy, and to develop a network of community committees throughout the province to support these areas. These are all important initiatives that develop assets for wellness. The organization also administers Action Schools! BC, a program that will be described later in the Atlas (*www.2010legaciesnow.com*).

The BCRPA, like 2010 Legacies Now, is a non-profit society and, as its name suggests, is "dedicated to building and sustaining active healthy lifestyles and communities in BC." It also has a role in helping to increase sports and recreation activity in the province and has responsibility for administering the Active Community program, which will be discussed in greater detail later (*www.bcrpa.bc.ca*).

The BCHLA was formed in response to the ActNow BC initiative. It works to promote physical activity, healthy eating, and smoke-free living, and consists of a variety of key organizations with interests in chronic disease issues (e.g., BC Lung Association, Canadian Diabetes Association, Heart and Stroke Foundation of BC and Yukon, Arthritis Society of BC/Yukon, Canadian Cancer Society–BC/Yukon Chapter, and BC Pediatric Society), and other key organizations such as the Centre on Aging at the University of Victoria, Directorate of Agencies for School Health BC, Public Health Association of BC, BCRPA, Dieticians of Canada, and UBCM. BCHLA produced several important documents in early 2005 that have been significant in terms of giving publicity to ActNow BC goals (BCHLA, 2005a), as well as providing

an analysis of the risk factors associated with chronic disease and an effectiveness analysis of interventions (BCHLA, 2005b). This Alliance received approximately $25 million in 2006 to help government achieve its ActNow BC goals (*www.bchealthyliving.ca*).

The fourth key organization is the UBCM, which has represented the interests of municipalities in the province for more than a century. The UBCM has been provided government funding to establish a Community Health Promotion Fund that provides grants, on a competitive basis, to local government to support health promotion focusing on healthy living and chronic disease prevention in support of the ActNow BC goals. The UBCM also supports the BC Healthy Communities initiative, which aims to help improve collective health and wellness at the community level.

At the same time the provincial government recognized it could not achieve its goal to "lead the way in North America in healthy living and physical fitness" without help from many partners, the Ministry of Health also realized that it needed a broad-based alliance within government to marshal a cross-government or horizontal focus on this ambitious health promotion initiative. All ministries within government have the ability to influence the achievement of ActNow BC. To help focus on the ActNow BC initiative, a cross-ministry group of assistant deputy ministers from each ministry in government was created, and $15 million over 3 years was made available from the Ministry of Health for projects brought forward that supported the ActNow BC goal. Ministries, or their funded agencies, needed to match these funds in order to qualify for funding. The development of the *BC Atlas of Wellness* is part of this cross-government initiative and has been supported by the Assistant Deputy Ministers' Committee. In August 2006, government created a Minister of State position, filled by the Honourable Gordon Hogg, who was assigned to lead ActNow BC. The minister is responsible for the government-wide approach of the initiative. Under his direction, all provincial ministries are identifying strategies and actions that support the goals of ActNow BC. The *BC Atlas of Wellness* was developed, in part, to assist ministries to understand how, through the development of indicators, both obvious and novel, they might contribute to the achievement of ActNow BC goals.

This background is important as a context for understanding how the *BC Atlas of Wellness* is put together in terms of its framework and in terms of the indicators included. The next section reviews some of the factors related to health and wellness mapping.

Why Maps and Atlases?

Communication via maps pre-dates written communication and can be traced back to as early as 30,000 BC (Robinson et al., 1995). Today, rarely a day goes by without maps being featured in the media to help locate an issue, to understand geographical relationships, or to explain geographical variation. The common expression that "a picture is worth (or can save) a thousand words" certainly also holds true for a map. But a map also can generate a hundred questions! Why are there geographical patterns? What is causing them? Is it a good thing? If not, what can be done to improve matters?...and so on.

Research has shown that the public wants maps packaged in the form of atlases to allow them to browse their neighbourhood and territory, to understand regional variation, and to allow for relative comparison (i.e., "how am I doing in my neighbourhood compared to other neighbourhoods or regions?") (Keller, 1995). The public also has clear ideas about what it wants such atlases to look like (Hocking and Keller, 1992, 1993; Keller, Hocking, and Wood, 1995), and what purpose and role communication technologies like the Internet should play in facilitating access to such atlases (Harrower, Keller and Hocking, 1997).

The purpose of this Atlas is to communicate data about key wellness indicators for BC, and to highlight patterns that emerge from these data in an interesting and informative way. The objective is not only to help people recognize and understand why certain geographical patterns may occur, but also to encourage questions provincially, regionally, and locally as to why the patterns are the way they are, why wellness varies over space, and what can or should be done about it.

In this chapter, we offer some background by briefly tracing the relationship between mapping and wellness with a focus on Canada and BC.

Maps and Health and Wellness

The use of maps and atlases to understand health and illness patterns has a long and distinguished history. The seminal work in health geography, and the origin of modern epidemiology, was the 1854 mapping of cholera victims in London (Snow, 1855). Snow used descriptive statistics and maps to identify how cholera was transmitted, making recommendations for prevention of future outbreaks. His maps and research continue to attract considerable attention (Koch, 2004; Monmonier,

2005). Barrett (1980) attributes the origins of disease mapping and atlases to Heinrick Berghaus (1845), who produced one of the first physical atlases in which global distributions of cholera, smallpox, and tuberculosis, among others, were shown and correlated with risk factors. The importance of maps to modern health geography is attributed to Jacques May (Pyle, 1979), who advocated a 'disease ecology' approach, in which he placed particular emphasis on the use of maps, since:

> *the map of disease represents the sum of the places where requirements of each factor in a complex coincide. By reading a map of disease one can get a clue to all the factors needed for its occurrence, since they must be present in all places where the disease occurs* (May, 1958: p. xxiii).

The end of the 1970s also marked the publication of one of the first formal texts on health geography, *Applied Medical Geography* (Pyle, 1979), which focused on "the unity of a small but expanding systematic discipline."

Today, health and wellness researchers use geographic information systems (GIS) and web-based mapping to expand beyond disease mapping to examine a number of scientific hypotheses, such as disease etiology, equitable access to health services, or the social determinants of health (Khan, 2003). For example, mapping of cancer mortality rates in the US between 1950 and 1969 revealed exceptionally high rates of lung cancer along the eastern seaboard (Blot et al., 1978; Devesa et al., 1999). These patterns led to further investigation where several studies found that exposure to asbestos among employees at shipyards accounted for a significant portion of the excessive mortality from lung cancer (Blot et al., 1978, 1980, 1982).

The contemporary GIS is recognized as a powerful information technology to facilitate convergence of disease-specific information and its analysis in relation to population settlements, surrounding social and health services, and the natural environment (WHO, 2007). GIS can help researchers and planners perform analyses of access to services using proximity measures and network functions (Rushton, 2002), or use spatial interaction models for health planning (Bullen, Moon, and Jones, 1996). For example, GIS can be used to examine residential density, the socio-economic characteristics of neighbourhoods, or the access of different neighbourhoods to health services or wellness-related assets such as recreational facilities. Moreover, GIS allow policy makers to easily visualize problems in relation to existing health and social services and the natural environment, and therefore effectively target resources (WHO, 2007).

The results of GIS analyses can provide valuable information for assessing population wellness measures. Abstract concepts that may affect wellness but that typically are not recorded by administrative data, such as neighbourhood structure, access to recreational facilities, access to grocery stores to obtain nutritious fruits and vegetables, access to public transit which encourages walking, or environmental health determinants, can be calculated using GIS and incorporated with existing data sources to determine wellness indicators. With the development of powerful yet affordable geo-technologies, digital maps and visual displays can be produced (Khan, 2003). GIS are producing important wellness indicators at finer spatial resolutions, which will allow further exploration of the subjective and objective measures of wellness (Sun, 2005). Mapping the spatial distribution of wellness will also help identify concerns of social justice and provide information on the spatial variation of wellness and the extent, intensity, and distribution of wellness variations (Randall, 2003).

Geographical approaches specific to wellness have been very limited to date, however, a significant amount of geographic research has examined quality of life and happiness (Smith, 1973; Townshend, 2001; Cutter, 1985; Rogerson, Findlay, Morris, and Paddison, 1989a, 1989b; Johnston, 1982). These types of studies typically have focused on situations characterized by low quality of life. In the UK, for example, the continuing decline of inner city areas has been revealed by analyses that showed high concentrations of the unemployed, the low-skilled, the aged, and ethnic minorities accompanied by high levels of overcrowding, amenity deficient housing, and out-migration (Pacione, 1999). Similarly, research in the US has focused on the deteriorating physical structure of the city and quality of life implications (Midgley and Livermore, 1998; Waste, 1998). Whether it is low or high levels of quality of life, geographers view the concepts as a measurement of the conditions of place (Randall and Williams, 2002).

A geographical approach by Pacione (2003) examined the usefulness of measuring quality of life or human well-being in terms of outputs of value to social scientists and policy makers. He used a five-dimensional model in two exemplar case studies: 1) the geography of the quality of life in Glasgow with particular attention to the conditions of the disadvantaged end of the population;

2) the landscapes of fear in the city of Glasgow, again especially in locations identified as disadvantaged. This quality of life study proved useful in a number of ways. It provided:

- some baseline measures to examine trends over time;
- knowledge of how satisfaction and dissatisfaction are distributed through society and across space;
- an understanding of the structure and dependence or interrelationship of various life concerns;
- an understanding of how people combine their feelings of individual life concerns into an overall evaluation of quality of life;
- a better understanding of the causes and conditions which lead to individuals' feelings of well-being, and of the effects of such feelings on behaviour;
- identification of problems meriting special attention and possible societal action;
- identification of normative standards against which actual conditions may be judged in order to inform effective policy formulation;
- monitoring of the effect of policies on the ground; and
- promotion of public participation in the policy-making process.

Canadian Health-Related Mapping

Quality of life is a topic of increasing interest in Canada. The Speech from the Throne of the 36th Parliament was titled "Building a Higher Quality of Life for All Canadians" (Governor General of Canada, 1999). Considering the large geographic extent of Canada, and its diverse communities, a geographic approach to addressing the quality of life of Canadians is important. Recognizing this, a number of organizations in Canada have commenced collecting data on quality of life. For example, the Federation of Canadian Municipalities (FCM) has developed the "FCM Quality of Life Reporting System," which generates annual reports providing evaluations for 18 of the largest municipalities in the country (Federation of Canadian Municipalities, 2001). The Canada Mortgage and Housing Corporation (CMHC) also has promoted several pilot case studies from which a set of quality of life indicators are determined (Canada Mortgage and Housing Corporation, 1996). The objective of such data collection mechanisms is to establish standardized reporting systems to analyse the geographic distribution of quality of life across Canada.

Mapping of quality of life indicators and the use of GIS have played an important role in the development and implementation of initiatives to examine quality of life in Canada and elsewhere. According to Helburn (1982), geographers study quality of life because its "utility value as a policy tool is so tied to place and as such it is a goal of which geographers must be cognizant and to which geographers can make important contributions." Geographically localized communities, such as provinces, cities, neighbourhoods, or census divisions, can serve as the basis for examining physical, social, environmental, and political action with respect to issues that affect quality of life or wellness.

The *Atlas of Canada* (2004) recently produced quality of life maps for Canada. To assess quality of life across Canada, indicators were used to represent what are judged to be the most important aspects of a person's life, which include, for example, education, employment, and household finances. The individual indicators were then categorized into three broad groups: the social environment, economic environment, and physical environment. The indicator data were used to generate three quality of life maps for each environment, and then combined to produce an overall quality of life map for Canada. Census subdivisions were used to georeference the data, since they are the geographic areas that best represent different communities or urban areas across Canada (*Atlas of Canada*, 2004). The goal of the *Atlas of Canada* quality of life initiative was to apply a consistent set of indicators and a common methodology to map broad general patterns in quality of life among communities across Canada. Quality of life was not intended to reflect happiness or overall satisfaction with life; rather, the maps show that some locations in Canada present a higher quality of life than other locations, based solely on these indicators (*Atlas of Canada*, 2004)

The *Atlas of Canada* model was developed from the methodology put forth by Randall (2003), who examined the spatial and temporal variations of quality of life within Saskatoon, Saskatchewan from 1991 to 1996. The model incorporated objective and subjective indicators to measure the social and physical environments that contribute to quality of life, and combined Cutter's (1985) geographical model of quality of life and Myers' (1987) concept of community quality of life. Sun (2005) expanded on Randall's research by examining a methodology to produce geographic quality of life measures at a neighbourhood scale. The results of this study suggest that neighbourhood quality of life indicators may be used to measure specific attributes

and the overall status of liveability of neighbourhoods; however, some issues, such as how best to characterize the indicators and how to incorporate subjective measures, were recognized to require further attention.

One of the most impressive arrays of health-related atlases comes from the Institute for Clinical Evaluative Sciences (ICES) in Toronto, which has produced approximately 20 separate atlases on different health-related topics between 1994 and 2006 (ICES, 2007). Mapping techniques provide the first step, or the road map, on the path to understanding health variations in populations. These atlases, as with the *BC Atlas of Wellness*, do not try to explain differences in spatial patterns of disease processes and the resulting health effects. They simply function as a starting point to raise awareness and to frame questions. Answers to these questions, among other explanations, lie in the many risk factors associated with health patterns, including the psychological/social environment, the physical environment, the biological endowment, the economic environment, individual responses, health status and function, and the health care system. The Canadian Institute for Advanced Research (1991), Hayes, Foster, and Foster (1994), and the Canadian Population Health Initiative (Canadian Institute for Health Information, 2004, 2005, 2006a) describe some of these factors, the social gradients in health status, and the resulting impacts on population health. Statistics Canada also has developed a series of reports comparing various quality of life and wellness and health indicators among the key Census Metropolitan Areas based on the 2001 census and other data. More recently, the Canadian Population Health Initiative (CPHI) also has published a major report on place and health (Canadian Institute for Health Information, 2006b). The analysis and understanding of the effects of these factors on population health have been enhanced through the use of mapping techniques and the production of atlases.

Health Mapping in BC

In BC, health mapping has been used in the Provincial Health Officer's Annual Report of 1992 (Millar, 1993) and at the Division of Vital Statistics since 1988 through Annual Reports, Quarterly Digests, and Feature Reports (Danderfer and Foster, 1993; Danderfer and Cronin, 1994, 1995; Foster, Burr, and Mohamed, 1994). Over the past 15 years, health-related atlases and publications have become important in representing data geographically within the province. For example, the first mortality atlas was published in 1992 (Foster and Edgell, 1992), and a health map supplement showing a variety of health-related indicators, including demographics, standardized morbidity rates by gender, maternal and child health rates, immunization, and health care system utilization rates at the Local Health Area level, was published by the Ministry of Health (Nicholls, Ho, and Foster, 1993). Later, this was supplemented by comprehensive health atlases presented by the Centre for Health Services and Policy Research (CHSPR) at the University of British Columbia (McGrail, Schaub, and Black, 2004; McGrail and Schaub, 2002; Watson, Kreuger, Mooney, and Black, 2005; CHSPR, nd). In addition, maps and atlases related to early child development and health have been produced through the Human Early Learning Partnership (HELP) at the University of British Columbia (Hertzman, McLean, Kohen, Dunn, and Evans, 2002; Kershaw et al., 2005; HELP, 2005), and maps have been developed for selected youth health and development indicators (Foster, 2005). An online updated mortality atlas was published in 2006 (*www.geog.uvic.ca/mortality*), and this has been followed by the *BC Atlas of Youth Health and Behaviour* (Foster and McKee, 2007). British Columbia Statistics today has an impressive array of indicators that have been mapped and are readily available for downloading. Of particular note is the set of maps that show a series of hardship indicators at several geographical administrative levels (BC Stats, 2007).

Goals of the Atlas: Why Wellness?

The vast majority of the mapping initiatives noted above focus on mapping what is "bad" rather than what is "good," "deficits" rather than "assets," "mortality" rather than "life," and "illness" rather than "wellness." In other words, mapping exercises to date have tended to focus on the negative rather than to accentuate the positive. This is not meant as criticism. Obviously, focusing on problem areas and issues helps get public, political, and management attention so that improvements can be achieved. However, sometimes it may be beneficial to report conditions by placing a focus on the positive.

What we provide in this *BC Atlas of Wellness*, and to our knowledge this is the first comprehensive atlas of its kind, is a unique focus on the positive rather than the negative. Over 120 indicators are used to build a picture of wellness within BC. We take the optimist's half-full approach rather than the pessimist's half-empty approach, which, as noted above, has been the usual strategy taken in health mapping to date. Instead of mapping illness, we map wellness, or assets that can

help determine, maintain, and improve wellness at the population level within the province. Instead of mapping obesity, we map healthy weights; instead of mapping smoking rates, we map smoke-free rates; instead of mapping low birth weight we map healthy birth weight; instead of mapping infant mortality we map infant survival, and many more such indicators.

We noted earlier that researchers have discovered that maps and atlases often are used by readers to compare their own neighbourhood to others (Keller, 1995). In health mapping, the tradition is to compare oneself using maps that communicate degrees of something wrong. This atlas instead facilitates comparison by focusing on what is right, and hopefully what can be learned by others from this.

The conditions we have selected to show are all assets for wellness, just as obesity or smoking or low birth weight are risk factors for illness, poor development, and premature mortality. Focusing on wellness indicators and those areas that achieve high values on particular wellness assets can help provide some understanding of what is achievable for those areas and communities that feel they need to make improvements. The best values can become benchmarks for others to achieve as these values have been attained by a relatively large segment of the population in the province. And the ones who are doing best can strive to do even better, thus raising the wellness bar. One area can learn from another area in terms of what works, and adopt some of the strategies used by the communities who demonstrate high levels of “wellness” (Foster, Burr, and Mohamed, 1992, 1994). Communities can also evaluate which of the indicators that we provide in the Atlas are important ones to them and decide whether to focus on improving them over time.

Some may question the wisdom of this wellness approach as it could lead to the conclusion that all is “well” in the province, thus potentially undermining the need to focus attention on problem issues. This is clearly not our intent. A quick glance at many of the maps and tables will show that there are major “gradients” or differences in wellness between various areas in the province and between different groups within the province. There are certainly areas that need improvement, and can be improved. Studying the areas that appear to be the “best” on a particular wellness indicator may assist others to try to emulate their results by finding out what they are doing “right” to achieve these results. These areas will become clear when using the Atlas.

The following chapter presents a review of the key academic literature that has been written over the past few years on the topic of wellness. How is it defined? What are its dimensions? How can it be measured? This, in turn, is followed by a summary of the key determinants of health and wellness and these two sections provide the basis for the indicators that are mapped and discussed later in this Atlas.