2011

health in Peel

Determinants and Disparities

Region of Peel
Working for you
Public Health

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THE PURPOSE OF THIS REPORT

Health in Peel: Determinants and Disparities 2011 is intended to describe the state of health of the residents of Peel which varies according to demographic, social and economic factors.

This report shows where disparities in health exist and how we use both existing knowledge from the research literature and local data to inform decisions about actions to improve health and reduce disparities. It will also help readers to understand the relationships amongst determinants of health, risk factors and health outcomes.

HOW TO READ THIS REPORT

We have tried to illustrate our points throughout the report with local data. Sometimes, however, data for Peel were unavailable or the numbers were too small to be reliable. In these instances, we provide data for Ontario or Canada. In addition, for the purpose of comparison, we occasionally make use of provincial, national or international data.

Spatial data are presented in maps by census tract and data zones throughout the report and the map located in Appendix 1 will provide the reader with a reference to where these geographies lie within Peel. Much of the data used in this report was provided to us by external organizations, and we extend our thanks to the following:

- Statistics Canada,
- Canadian Institute for Health Information,
- Ontario Ministry of Health and Long-Term Care, and
- Ontario Ministry of Health Promotion.

The sources of data and methods of analysis are described in chapters seven and eight. Additional information may be found in other reports from Peel Public Health (peelregion.ca/health/reports) or by contacting HealthStatusData@peelregion.ca.

For more information about definitions for various terms used throughout this report and for analysis methods, see Chapter 8 – Data Methods.

Report Content

This report has been produced in two formats: print and web. Both contain the same content. The web version of the report can be found at peelregion.ca/health/reports.

Finally, there are two types of references used in this report – text references and data references:

- Text references refer to references from articles, books etc., and are defined by a superscript number. Example: "A higher risk of heart disease was observed".[1]
- Data references refer to the source of the data for the statistic being presented in the text and are defined by a superscript letter. Example: "Over 25% of the population reported having heart disease."[A] In this example, the "A" would refer to the source of the data.

THE DETERMINANTS OF HEALTH: A HISTORY

Our health-care system is usually thought of as a highly valued feature of Canadian life, which is ready for us when we get sick and which, if at all possible, restores us to health. Thus the progression is typically understood to be from sickness to wellness: we are sick and are made well. But what if we consider how and why we become sick in the first place?

Historically, becoming ill was often seen as a punishment for wrongdoing, or the result of a spell or curse. For many years ill health was regarded as something that happened by chance, rather than having a specific cause. More recently, medical science has identified certain physiological deviations which are associated with, and thought to cause or predict, certain diseases. These are termed biological risk factors: examples include hypertension and elevated serum cholesterol, both of which are associated with an increased risk of heart attack and stroke. As the science of epidemiology matured, diseases and their risk factors could be linked with certain behaviours of individuals which either increased the chances (health-risk behaviours), or decreased the chances (health-protective behaviours) of certain risk factors and diseases. For example, unhealthy eating and physical inactivity are related to overweight and obesity, diabetes and cardiovascular disease.

Similarly, driving while intoxicated and not wearing seatbelts are related to motor vehicle injuries; and tobacco smoking is related to many diseases, including lung cancer and chronic obstructive lung disease.

It would seem that changing these risk factors would prevent much of these diseases. Behaviours are a choice, so, if people would only eat less and exercise more for example, then surely the burden of obesity, diabetes and cardiovascular disease could be reduced. Unfortunately, this approach has generally not been successful. Decades of attempts to influence various health behaviours ('lifestyle change') have produced modest results at best. Educational programs – telling people how they can change their lives and thus reduce the risk of disease – have an instinctive appeal, but have failed to produce much change. Most people are more or less knowledgeable about risk factors, but changing them appears to be very difficult. There are evidently other factors at play, for example, how we organize our society economically and socially. These underlying factors – the 'causes of the causes' of disease – are termed the 'determinants of health'.

This is not to say that there is a simple chain of causation running from determinants, through risk factors to disease. These relationships are complex, and sometimes not well defined. For example, a person's job within the hierarchy at work is associated with health, even after accounting for differences in behavioural risk factors.[1] Differences in survival from established diseases according to socioeconomic status suggest that some determinants of health influence many different diseases through some common pathway.[2] It is thus apparent that determinants may affect outcomes directly,[3] but behavioural risk factors may also influence health outcomes independently of determinants.[4] Therefore determinants and risk factors may be linked to health outcomes by means of three pathways:

- Risk factors may influence health independently of determinants,
- Social determinants may influence outcomes by means of a pathway passing through risk factors, and
- Social determinants may be a direct influence upon outcomes.

Definition

**Social Determinants –
Why 'social determinants'?**

Although the term determinants of health is used in this report, the term 'social determinants' (of health) is often used. Risk factors are attributes of individuals, but determinants usually operate at a societal level, and reflect how, as a society, we organize ourselves politically, socially and economically.

What are the determinants of health?

Definition

Determinants of Health

Good or poor health is determined by a variety of factors and influences. To a great extent, people's behaviours and the conditions in which they are born, grow, work and age strongly influence their health.[5] At every stage of life, health is determined by complex interactions between genetic, social and economic factors; the physical and social environment; and individual behaviour. Factors such as access and use of health services, albeit important, often have less of an impact on health status. All of these factors are referred to as 'determinants of health'.

Much is known about the key factors which are associated with the health of the population but they may be conceptualized in many ways. There is therefore no definitive set of determinants. The Public Health Agency of Canada (PHAC), for example, lists the following: genetic endowment (age and sex), income and social status, culture, social support networks, education and literacy, employment and working conditions, physical and social environment, personal health behaviours and coping skills, healthy child development, and health services.

The commonalities between these determinants are that they have an association with health outcomes or behaviours and influence a wide range of diseases, both in occurrence and in outcome. Although each of these determinants is important in its own right, they are also inter-related. It is the combined influence of the determinants that drives the overall status of health, burden of illness and preventable loss of life of the population.

There is also empirical evidence about things which influence health and which do not fall easily into these fairly simple categories. One such example is the built environment. This

is a concept that incorporates features of the physical environment and urban form, but also encompasses social issues. These include social structure, policies related to transportation, economics and urban planning, social connectedness and social capital. Similarly, ethnocultural identity could be considered as another such higher-order concept, incorporating diverse issues such as behaviour, socioeconomic position, social support and others. Thus 'determinants of health' can refer to any characteristics of, or a relationship between, individual members or groups within a society, including formal and informal, legal, structural, voluntary and commercial relationships.

Income

Income has a relationship to health outcomes. People with higher incomes tend to have better health than those with lower incomes. If income is plotted in a graph against a measure of health status (such as life expectancy) a relationship known as the income gradient of health is evident. The shape of this gradient, and its slope, appear to vary according to circumstances. It is steeper for males than for females, although

there is also evidence that it is becoming less steep over time.[6] Its shape is also changing with differences between income groups becoming less marked, except for the lowest income group, which fares substantially worse than the others.

Questions exist about the relative importance of absolute and relative income, and the corresponding material definition and psychological explanations. At one point there was a consensus that, at least in developed countries, relative income was more important. In other words, one's health is influenced by how wealthy one is compared to others in society than by the absolute level of income. However, recent work finds no association between relative incomes and life expectancy of child health outcomes when comparing developed countries.[7] While this relationship has been observed using US states and census metropolitan areas (CMAs) as the unit of study, this has not been found when studying provinces and CMAs in Canada.[7,8] The reduction in disparities in life expectancy in Canada over a period during which income disparities increased, and the finding that regions in the US with the most inequality had the lowest declines in mortality are also pertinent.[6] It may be that Canada's levels of public investment in health, education and social services modify the relationship seen in the US.

Income is not a simple concept: the absolute income of an individual is the most basic, but not the only measure. Apart from relative income one must also take into account the income status of the local environment. Research on determinants and health within neighbourhoods shows that there is an independent effect of neighbourhood characteristics.[8,9,10] This may be attributed to the physical environments (e.g., poor infrastructure, facilities and amenities). However, certain influences remain even after accounting for the neighbourhood's material deprivation.[11] The way in which we interact with and are influenced by others (including individuals, families, groups and institutions) impacts our health and health choices. These

> **Definition**
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> **Relative and Absolute Income Hypotheses**
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> *Relative income hypothesis* – that an individual's health is affected by the distribution of income within a society. It is hypothesized that living in a place that has unequal income distribution leads to worse health experiences. Income in this instance is related to the individual's income compared to others.
>
> *Absolute income hypothesis* – that the higher an individual's income, the lower the risk of mortality because an individual is able to increase consumption as income increases. This hypothesis is based more on standards of living than on comparisons to the income of others.
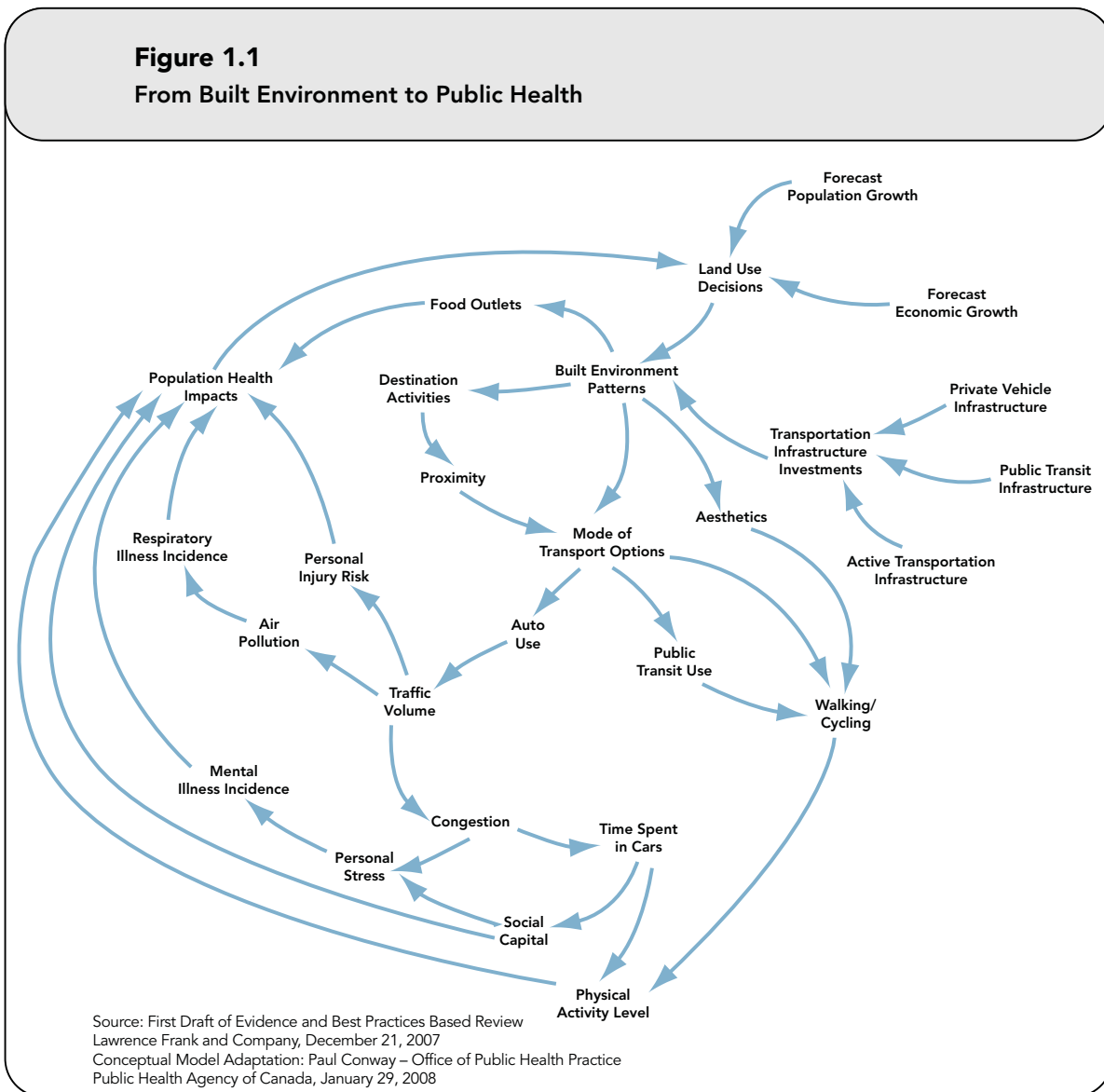
relationships may be informal (e.g., through neighbourhood groups), coercive (e.g., through legislation), or indirect (e.g., through societal, commercial or economic factors).

More on Pathways and Causality

It is important to recognize that in most settings, many factors may work together to affect a health behaviour or outcome. Multiple factors collectively can be thought to form a 'web of causation', where every cause is interconnected. Occurrence of a disease in a population might be due to physical similarities, micro-organisms, genetic abnormalities, social structure, behavioural patterns, environmental

issues, working places and other factors. Different individuals within the same population might acquire a disease due to different causal pathways depending on how individuals 'embody' aspects of the contexts in which they live and work.[12]

If we were to draw a picture of all of the determinants and how they related to each other, to risk factors, and to health outcomes, what would it look like? Something very complex, certainly. Figure 1.1 is a representation of one small part of this model that relates to just some aspects of the built environment.

Figure 1.1
From Built Environment to Public Health

Source: First Draft of Evidence and Best Practices Based Review
Lawrence Frank and Company, December 21, 2007
Conceptual Model Adaptation: Paul Conway – Office of Public Health Practice
Public Health Agency of Canada, January 29, 2008

There is much still to be explained about the pathways by which social determinants affect health. For example, by what mechanism is education linked to health status? A simple linear explanation going from education through literacy to health status has limitations: it fails to explain how the relationship continues well beyond the point at which literacy has been maximized. Likewise, a naïve linear model progressing from education through income to health status is inadequate. Educational achievement is the result of the accumulation of experiences within one's family, neighbourhood and society as well as the educational system. These influences persist and continue to influence health outcomes. Educational achievement can thus be a predictor of income, an effect of early experience or may indicate membership of a group. It is probable that much of the relationship between education and health is related to other factors which affect both (indirect causation).

Unidirectional linear models explain only a portion of the effects of social determinants

Causality

Research in epidemiology is often concerned with determining the direction of an association as well as separating non-causal relationships from truly causal ones. We often see in the results of our own data analysis and in many of the graphs within this report that there are relationships between things such as income and mortality or education and a specific health outcome. However, we are unable to determine the causal pathway for this relationship. This is because it is often difficult to design a research study that is able to determine the exact pathway from a determinant to a health outcome. The determinant may have occurred a long time before the outcome and many other potential causal factors may have occurred in the interim.

> **Definition**
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> *Causality*, defined simply, is the relationship between an event (the cause) and a second event (the effect), where the second event is a consequence of the first.

The relationship between causation and the determinants of health is complex

> **Definition**
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> *Confounder* is the apparent association between two variables when in fact no such association exists. It is caused by a third variable (the 'confounder'), which is correlated with the first two variables.[14]
>
> *Effect Modification* is a real effect that occurs in a study when a third factor influences the direction or magnitude of a causal association. It is also known as an interaction. For example, age modifies the effect for many conditions.[15]

In addition, the use of cross-sectional data restricts our ability to make causal inferences about the temporal sequence between a determinant and an outcome of interest. It could be that reverse causation occurs, which means that the outcome affects the determinant. We know that there is an association between smoking status and occupation, such that those with blue collar jobs are more likely to smoke compared to their white collar counterparts.[13] Or is it that being a smoker has an influence on type of occupation? What other factors may be acting as confounders or effect modifiers to this relationship? We cannot determine from cross-sectional data the cause and effect relationship between these two factors but simply that they are associated with one another. Many other personal, behavioural, social and environmental factors may influence this relationship.

There are three types of causal linkage:

- A causes B – direct causation;
- B causes A – reverse causation; and
- C causes both A and B – indirect causation.

All three types of causation are found, to a greater or lesser degree, in any causal model that accurately represents the empirical evidence.

A Life-Course Perspective

A static model cannot represent the complexity of the role of social determinants. Determinants exert their influence at various times over a whole life course, from the prenatal period to older adulthood. Determinants also have effects which persist, but which are subject to modification.

In addition to understanding causality, the timing and length of exposures are also important to understanding disease trends within an individual life course, across generations, and at the population level.[16] Current perspectives on life-course epidemiology do not deny the importance of conventional chronic disease risk factors, such

as smoking, diet, and hypertension, but bridge the perinatal and adult period by studying the contribution of early-life factors jointly with later-life factors to identify risk and protective processes throughout the life course.[16,17]

There are three main concepts in the life-course model – latency, cumulative and pathway.[18]

- *Latency* refers to relationships between an exposure at one point in the life course and the probability of health expressed years or decades later, irrespective of intervening experiences.

- *Cumulative* refers to multiple exposures over the life course that have a combined effect on health. In some cases this accumulation acts in a dose-response manner. This is commonly seen in occupational and environmental health, where the effects of an exposure to a toxic substance typically increase with the duration and intensity of exposure. There might also be multiple factor additive variant effects (i.e., different factors over the life course add to the effects of factors from early life) or interactive effects, in which the health outcome depends on the coexistence of risk factors from early and later on in life.

- *Pathways* represent dependent sequences of exposures in which exposure at one stage of the life course influences the probability of other exposures later on, as well as associated expressions. This differs from the interactive cumulative model in that early events influence the life-course trajectory leading to particular social destinations. It is these destinations that influence the health outcome (i.e., the early life influence may only play a role such that it affects where an individual ends up in the socioeconomic hierarchy). For example, early life social origins influence readiness for school, which in turn can influence success in school and educational attainment. Educational attainment, in turn, affects socioeconomic status in adult life, which then impacts health.

Health Inequity and Health Inequality

Health inequities and inequalities are terms often used when describing health outcome or behaviour differences between groups. Since health inequity involves normative judgement and is hard to measure, it will not be further described in this report. Instead, the term health inequality will be used and examples of this concept will be further explored.

Determinants of good health are not the same as inequalities of health

Definition

Health Inequity and Health Inequality

Health inequality or disparity is defined as the difference in health experienced by various groups in society. These can be the result of genetic and biological factors, or choices made by chance and circumstance, but often they are the result of differing income, education, employment and social supports.[19]

Health inequities refer to health disparities that are deemed to be unfair or stemming from some form of injustice. Because identifying health inequities involves normative judgement, science alone cannot determine which disparities are also inequitable, nor what proportion of an observed disparity is unjust or unfair.[20,21]

Three other terms related to health inequalities include the concepts of health disadvantage, health gaps and health gradients.[12]

Health disadvantage acknowledges that there are differences in health status between populations or societies.

Health gaps are assessed by focussing on the differences between the worst off and everybody else, assuming that everybody else enjoys uniformly good health. To narrow a health gap, the health of the poorest needs to be improved

at a rate that is faster than that of the broader population.

The *health gradient* on the other hand looks at health differences across the whole spectrum of the population and considers a systematic gradient in health inequalities.[12] To narrow the health gradient, it is important to raise the health of the population across all gradients, and to have a rate of improvement that increases as you move down the sociodemographic gradient. The bottom line is to ensure that, from a population health perspective, the entire population benefits from the intervention to improve health, but that more benefit can be gained with focussed energy on priority populations (a concept called 'proportionate universalism').

Some Examples of Health Inequality

The association between socioeconomic status and health inequality is clear. The Whitehall Studies conducted in England in 1967 were one of the first to demonstrate empirically the association between social class, as assessed by grade of employment, and mortality from a wide range of diseases.[22] The main findings were threefold:

- The age-standardized mortality was higher for those in manual occupations in comparison to those of more professional stature;
- There was a clear gradient in mortality from the top to the bottom of the hierarchy in almost all causes of death; and
- The differences in mortality from heart disease persisted even after statistical adjustments for smoking, blood pressure and cholesterol.[10,23,24]

The researchers recognized that the essential causal factor for death may be socioeconomic status, which expresses itself through a variety of diseases. Therefore focusing efforts on factors that can improve socioeconomic status should ultimately improve health status.[25]

Efforts to improve health through the adoption of health promotion behaviours, particularly

through education, have been shown to be initially more effective among populations with better education and higher incomes, due in part to the greater availability of resources and higher health literacy among well-off groups. Consequently, educational-based interventions may function, at least temporarily, to increase socioeconomic differences in health. Ischaemic heart disease is an example. Earlier in the 20th century, heart disease was more prevalent among higher socioeconomic groups, but since that time the rates in the upper classes have fallen, and the disparities between high- and low-income groups have increased. However, despite the worsening trend in disparities, disease incidence and mortality among all income groups have decreased over time, such that there has been an overall population benefit.[26,27]

Public health needs to have explicit goals of both increasing the health of the population overall, and of reducing disparities. But disparities may increase, even if the health of all groups increases – if those already healthier benefit more than the less healthy. Nevertheless, in this case the average health status, as well as that of all groups, does improve. Although there are several possible scenarios, the overall picture over the past decades is one of overall improvement in health for all groups, but no clear picture of a meaningful reduction in disparities of health in Canada. Two ways of looking at this phenomenon are, first, to observe that the differences are inequitable and our values would compel us to take action to reduce them. Second, note that the health status of the most privileged group represents a state which should be achievable by all, and thus that the observed differences represent a burden of disease that is potentially avoidable. There is no simple answer to achieving a balance between effectiveness and equity, or how to trade off aggregate improvement against reducing inequalities. Even the ways in which inequalities and changes in inequalities are measured (e.g., absolute versus relative changes) involve value judgments. At a minimum, these issues should be identified, measured and discussed.

Some History

The concept of 'determinants of health' is not a new one and determinants of health have always played an important role in understanding the variation we see in population risk factors as well as health outcomes. As early as the 1800s Dr. Rudolf Carl Virchow of Prussia, a revolutionary thinker in his day and proponent of social medicine, began to make the case for the social origins of illness, the multifactorial etiology of epidemics, and public health reform.[28] His investigation of the typhus epidemic in Upper Silesia in 1848 was a landmark event that established him as a pioneer of social medicine.

Local public health as we know it today could be said to have its origins in the sanitary movement of the nineteenth century. Its most influential figure was Edwin Chadwick who, in his "Report on the Sanitary Condition of the Labouring Population of Great Britain" in 1842, said that: "defective town cleansing fosters habits of the most abject degradation and tends to the demoralization of large numbers of human beings".[29] He believed that efforts to change behaviours were futile in the presence of extreme deprivation and that "the removal of noxious physical circumstances, and the promotion of civic, household and personal cleanliness, are necessary to the improvement of the moral condition of the population".[29]
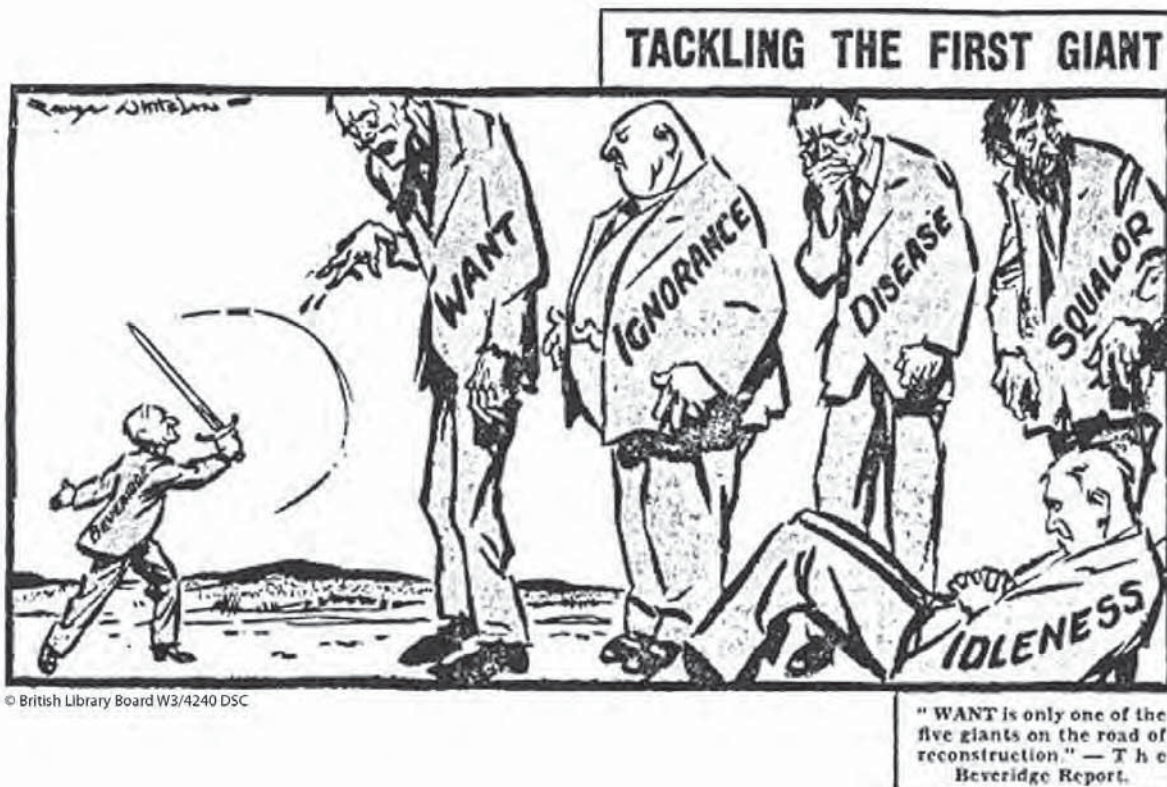
The changes that resulted from the sanitary movement, including clean water and safe disposal of solid and liquid waste, impacted all classes, even though the initial impetus was out of concern for the poor (or at least concern for the public costs of supporting the sick poor). Mortality data by social class before and after the sanitary changes are not available, but it is suspected that mortality decreased in all classes, and likely that differences between rich and poor were diminished.

The sanitary movement was an example of a pragmatic intervention, rather than one which addressed the most fundamental cause of mortality from infectious disease. Dr. William Pulteney Alison of Edinburgh, engaged in a vigorous debate with Chadwick about whether it was more important to tackle the sanitary arrangements or the extreme poverty which was then so prevalent. This was the debate between "destitution without filth and filth without destitution".[30] The debate about how far 'upstream' to go continues to this day. The chain of causation can be conceptualized as extending back into the most fundamental aspects of how

society is organized. This doesn't mean, however, that action at this level by public health is appropriate or feasible.

In the United Kingdom in 1942, Sir William Beveridge wrote his famous report intended to give direction for post-war reconstruction. This social policy document emphasized the need for the government to eradicate from life the five great evils:

- Want – the need for an adequate income for all;
- Disease – the need for access to health care;
- Ignorance – the need for access to educational opportunity;
- Squalor – the need for adequate housing; and
- Idleness – the need for gainful employment.

TACKLING THE FIRST GIANT

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" WANT is only one of the five giants on the road of reconstruction." — T h e Beveridge Report.

Beveridge's approach recognized the connection between social conditions and health status (although without using the term social determinants). Thus he proposed a complete package of social security from "cradle to grave", including unemployment, sickness, maternity and widows' benefits, old-age pensions and a national health service. The same benefits were also gradually introduced in Canada.

In the 1970s and 1980s the public discourse concerning the determinants of health was advanced through the publication of the Lalonde Report and the Ottawa Charter for Health Promotion.[31,32] Recently there have been new developments in how health behaviours are conceptualized. For example, past attempts to influence behaviours have either been based upon changing knowledge, attitudes and beliefs, or using coercive approaches. The assumption is that, without intervention, choices are free and rational, based upon the knowledge available to the individual. However, the choices, whether about taking public transit or driving, smoking, or using condoms, are not made rationally, dispassionately and with all of the necessary knowledge. They are guided to some degree by advertising, labelling, accessibility and convenience, as well as the availability of social

norms, alternatives, and default choices set by others. Understanding these mechanisms and directing them towards desired health outcomes is advocated by Sunstein and Thaler.[33] For example, the order in which foods are presented at the counter of a school cafeteria alters consumption; the number of cars in a household predicts the mileage driven, independent of other relevant factors; the removal of carbonated beverages from vending machines in schools reduces their consumption. This concept of 'choice architecture' has attracted the interest of governments in the US and UK.

Although public health has often used legislation to prevent some behaviours and conditions directly, it has also put in place policies which restrict choice, provide incentives or disincentives, or change the environment to 'make the healthy choice the easy choice'. Just as we recognize the importance of physical, social, or built environments for health, so we might conceptualize a 'choice environment' linking social determinants to health behaviours. One must bear in mind, however, that this is only a partial response to one aspect of the social determinants.

chapter 2

THE DETERMINANTS OF HEALTH IN PEEL

Introduction

The previous section highlighted the complexities in understanding the determinants of health with regards to causation and exposure during the life course. While some determinants can be modified to improve health outcomes (e.g., education and income); some cannot (e.g., sex and age). This section will describe the determinants of health in Peel region, using Peel data.

> **?** Did You Know
>
> **The region of Peel, located directly west of Toronto and York region, includes the cities of Mississauga and Brampton and the town of Caledon. Peel is primarily an urban area with many subdivisions and low-density housing. Many of the 400 series highways (403, 401, 407, 427 and 410) run through Peel and the Pearson International Airport is located along the eastern boundary of Peel.**
>
> **At the time of the 2006 census, 1,159,405 people lived in Peel, making it one of the largest municipalities in Canada; in Ontario it is second in size only to Toronto.**

Genetics – Age and Sex

The biology of the human body plays a fundamental role in determining health status. It sets the basis for the body's ability to respond to a wide range of circumstances such as experiencing stress, fighting off disease, and adapting to the physical and social environment. This inherited predisposition plays a part in determining lifespan, healthiness and the likelihood of developing certain illnesses. In some circumstances, genetics appears to predispose certain individuals to particular diseases or health problems.

One predisposition that has been studied extensively is the biological effect of aging. As individuals age, there is a normal decline in physiological functioning such as vision, nerve conduction velocity, muscular strength, bone mass and kidney function.[34] The rate of decline for these body functions is variable from person to person. It is unclear, however, how much of the decline associated with aging is attributable to biological aging and how much of it is due to other determinants, including personal health practices, social support and the physical environment. It has been shown, for example, that older individuals who engage in regular physical exercise have significantly improved balance than their counterparts in the same

age category who do not participate in regular physical exercise.[35]

In the context of determinants of health, sex may be viewed as both a biological and social construct. The biological construct, the differences in genetic makeup and hormone levels between males and females, seem to be constant across societies; the social construct varies with the roles, norms and values of a given society or era.[36] For example, the ability to bear a child is, fundamentally, a function of biology, whereas the nature of parenting, or the status associated with being a mother are more closely linked to social roles and expectations. Deciphering the differences between these two constructs and how they interact in relation to health outcomes is challenging.

Sex differences in life expectancy offer one of many examples of the interaction between the biological attributes and the social environment. In Canada, and in most of the developed world, women have a higher life expectancy than men. Men are also more likely to die prematurely and to be less educated than women.[36] While women live longer than men, they are more likely to suffer from chronic or disabling disease.

Peel has a high proportion of adults of reproductive age, and children

Figure 2.1 is a population pyramid showing the age and sex distribution of Peel's and Ontario's population in 2006. Compared to the province, Peel has a higher proportion of adults aged 30 to 49 years and children aged 0 to 19 years. This might be explained by Peel's high numbers of young families attracted to suburban living, and increased numbers of new immigrants.

By 2031, the population of Peel is expected to exceed 1.5 million. Although not shown, it is projected that there will be proportionally fewer young adults and more seniors compared to today.

Social Status and Income

The relationship between socioeconomic status and health has been observed for many decades.[6,37] Income and social status have a complex and inter-related association with other determinants of health throughout the life cycle. Income and social status determine the quality of childhood, education, employment, working conditions, housing, and food security.

Figure 2.1
Population by Age Group and Sex, Peel and Ontario, 2006
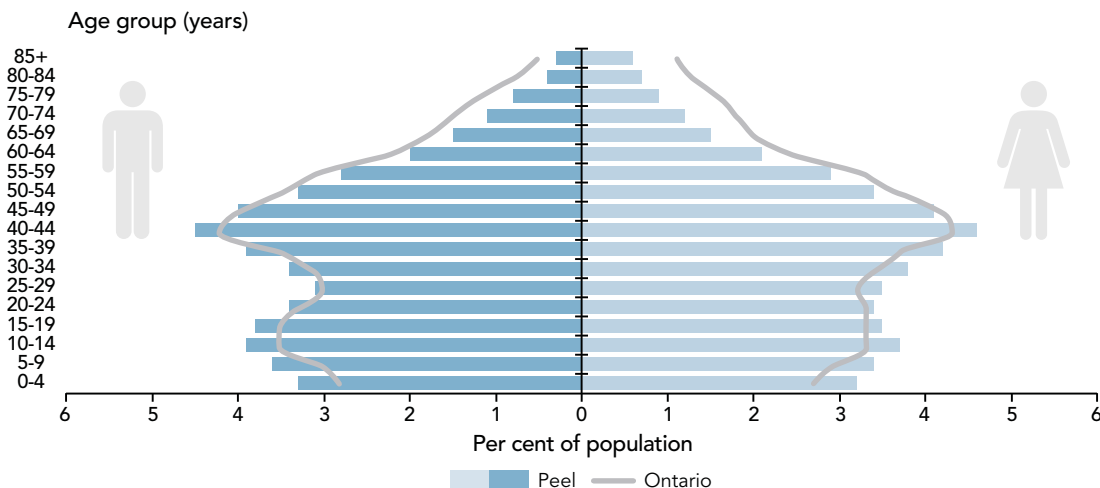
Source: 2006 Census, Statistics Canada

Social Status

Social status refers to the prestige attached to one's position in society (i.e., social position). It may also refer to a rank or position that one holds in a group or occupation. Occupation provides an example of status that may be either ascribed or achieved. It can be achieved by one gaining the right knowledge and skill to become socially positioned into a higher job position, which builds a person's social identity within the occupation.

Measuring Social Status

Occupation is often related to income and can reflect social standing and social networks as well as work-based stress, autonomy and work-related exposures.

There are many ways to measure the concept of occupation (e.g., current occupation, longest held occupation, parental occupation as an indicator of a person's childhood). Limitations to measuring occupation include the inability to assign an occupation to someone not recently employed and the exclusion of those in the population who are retired, working in the home, unemployed, a student, working in unpaid labour, or working in informal or illegal jobs. Occupation may also have different meanings for different birth cohorts in different geographical settings.[40]

Other proxies for socioeconomic position have included things such as: number of children in the home, infant and maternal mortality rates, marital status, single motherhood, orphan, illegitimacy, broken family, and death of mother or father at an early age.[40]

Social status is strongly associated with health. The likelihood of suffering from chronic diseases such as cancer and coronary heart disease is higher as you move down each level of the job status hierarchy. Those one step down from the top most level on the hierarchy, for example, have significantly higher rates of heart disease that those at the top.[38,39]

Given the complex nature of measuring social status through occupation, data are not presented in this manner for Peel.

Income

Measuring Income

Indicators of income capture data about individual or household income. Household income measures incorporate income information for the entire family which is useful if a family member is not engaged in the work force but benefits from the income of others in the family (e.g., a spouse who is not the main income earner).

Some disadvantages of this measure are that a person's income can change over a short period of time (e.g., loss of a job); and in surveys it can be a sensitive question, which is prone to high rates of non-response.[40]

In this section of the report the following income measures will be described: income distribution, mean and median income, and the prevalence of low income using the 'low-income cut-off' (LICO). Since Canada does not have an official poverty measure, these measures will be used to reflect the extent to which some Peel residents are less well-off than others. In addition, all income measures using Census data will be presented using after-tax income as this reflects a family's actual spending power after they pay their taxes and receive payment of social benefits. It should be noted that the number of

people falling below the LICO is lower using after-tax than before-tax income. Reasons for this include progressive tax rates where those with low income before taxes actually move out of the low-income bracket after taxes due to redistribution of income through taxes and social benefits.[41]

Understanding Income and Income Distribution in Peel

Data presented about income in Peel are collected through the Census from individuals but can be presented in a variety of different ways: as individual income; as private household income; as economic or non-economic family income; and as census family or non-census family income.

The way these categories relate is shown in Figure 2.2.

Figure 2.2
Economic and Census Family Membership and Family Status
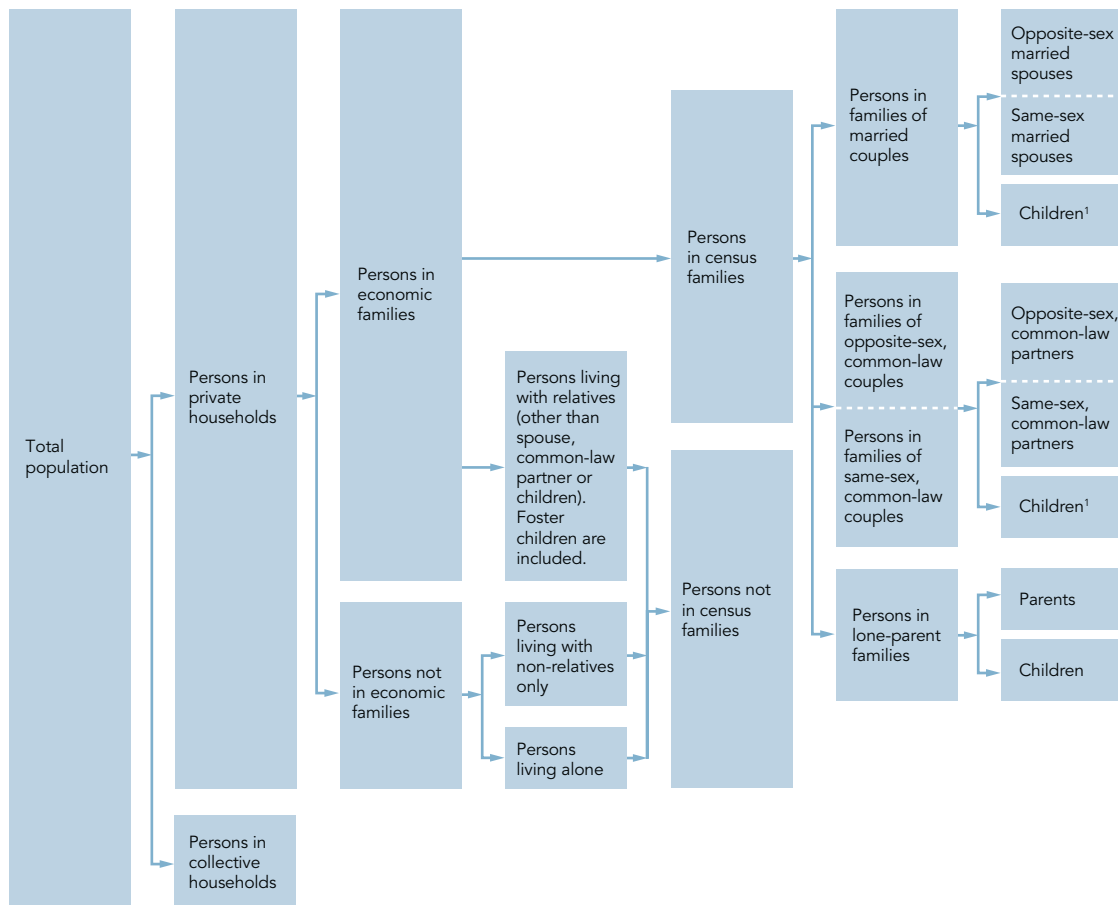
1. May or may not be present
Source: Statistics Canada, 2006 Census Dictionary. January 2010. Minister of Industry.

Definition

Private Household

A *private household* is defined as a place where a person lives (e.g., single detached house or apartment) and refers to a person or a group of persons (other than foreign residents) who occupy a private dwelling and do not have a usual place of residence elsewhere in Canada.

Private households are composed of all individuals except those who live in collective dwellings. Private households reflect the majority of the population.

Definition

Census Families

Census families are composed of those who are married or common-law (with or without children) or lone parents with children.

Definition

Economic Families

An *economic family* refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. A couple may be of opposite or same sex. This category also includes persons living with relatives other than children, a spouse or common-law partner.

Persons not in economic families are those household members who live alone or live with people who are not related to them by blood, marriage, common-law or adoption.

Income Distribution

Peel has a higher proportion of private households with after-tax income greater than $80,000 compared to Ontario and lower proportions of private households with after-tax income of less than $40,000 (Figure 2.3).

Figure 2.3

Distribution of After-Tax, Private Household Income, Peel and Ontario, 2005

Per cent of population in private households
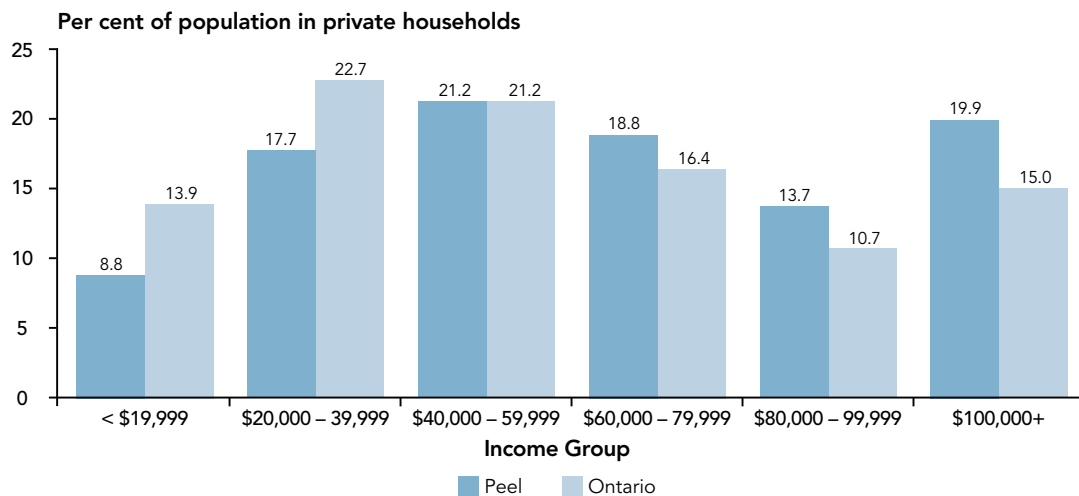
Source: 2006 Census, Statistics Canada

Median and Mean Income

Definition

Median and Mean Income

The *median income* of a population is the income level at which half of the population has a higher income and half the population has a lower income.

The *mean income,* also referred to as the 'average' is computed as the total or 'aggregate' income divided by the number of people in the population. It offers a convenient way of tracking aggregate income while adjusting for changes in the size of the population.

In 2005, individual mean and median income in Peel was very similar to Ontario. The median and mean after-tax income in private households in Peel, however, is about $10,000 higher than Ontario (Table 2.1). The median private household income is higher in Caledon than in Mississauga or Brampton. We use private households to reflect income as it represents those in families and those living alone. Excluded from this income summary are those living in collective households (e.g., hospitals, rooming houses, nursing homes, jails, group homes).

Table 2.1

Mean and Median, After-Tax Income and Average Number of People per Household, Peel Municipalities, Peel and Ontario, 2005

Area	Individuals[†]		Private Household		Average number of people per household
	Median Income	Mean Income	Median Income	Mean Income	
Caledon	$30,459	$38,373	$73,857	$88,921	3.1
Brampton	$24,629	$28,337	$62,470	$69,870	3.4
Mississauga	$25,075	$30,972	$61,083	$71,878	3.1
Peel	$25,157	$30,378	$62,181	$72,038	3.2
Ontario	$24,604	$31,011	$52,117	$63,441	2.6

† Individuals aged 15 years and older
Source: 2006 Census, Statistics Canada

Prevalence of Low Income

While private households in Peel appear to be wealthier, consideration of income alone does not tell the entire story about the factors that influence wealth in Peel. For example, Peel has higher rental costs and homeowner payments, and a higher proportion of Peel households (29%) spend more than 30% of their household income on household payments compared to Ontario (21%) (Table 2.2). Peel's higher household income is likely a reflection of a higher number of people per household (3.2) compared to Ontario (2.6) (Table 2.1) and a higher prevalence of multiple family households (6%) compared to Ontario (2.5%) (Appendix 2).

Additional details about economic family income are provided in Appendix 2.

Definition

Low-Income Prevalence

In the 2006 Census, the prevalence of low income was defined as the proportion of families or unattached individuals who spent 20% or more of their total income on food, shelter and clothing than did the average family or unattached individual.

This low-income cut-off (LICO) is based on a matrix that includes both family size and size of the community of residence. For example, a family of four living in an area with a population of 100,000 to 499,999 people would be classified as low income if its income level for 2005 was $33,251 or less.

Table 2.2
Household Value, and Household Owner or Rental Costs, Peel, Caledon, Brampton, Mississauga and Ontario, 2006

Household Costs	Peel	Caledon	Brampton	Mississauga	Ontario
Average monthly gross rent ($)	**$986**	$1,015	$997	$958	$834
Tenants spending > 30% of household income on gross rent	**42.6%**	38.3%	42.3%	42.9%	44.3%
Average value of owner-occupied, private, non-farm, non-reserve dwellings ($)	**$365,923**	$457,586	$333,591	$377,116	$297,479
Average monthly owner major payments ($)	**$1,462**	$1,430	$1,517	$1,430	$1,167
Owner households spending > 30% of household income on owner's major payments	**28.9%**	20.8%	32.4%	27.5%	20.8%

Source: 2006 Census, Statistics Canada

The prevalence of low income using the low-income cut-off (LICO) is often used as a proxy for measuring poverty. The LICO is considered to be a relative measure of poverty in the sense that as general living standards increase, the income level at which one would be considered poor also increases. The term relative poverty defines poverty in relation to standards that exist elsewhere in society. The LICO does not measure absolute poverty, which tends to be more subjective and is defined as the inability to meet basic human needs like food, shelter, and health care.

In 2005, 11% of private households in Peel were classified as low income. Map 2.1 displays the rate ratio of low income by data zone as compared to Peel. Data zone B3 in Brampton and M4, M6 and M8 in Mississauga are all areas where the prevalence of low income is 20% or more, higher than Peel overall. Table 2.3 provides the rate ratio and proportion of low income corresponding to Map 2.1.

Map 2.2 shows the prevalence of low income by census tract, identifying in more detail census tracts where the prevalence of low income is 20% or higher, the same as, or 20% or lower than Peel's overall rate. There are visual clusters of census tracts where the prevalence of low income is higher in downtown Brampton, around Pearson Airport, in central Mississauga, as well as in pockets around the eastern and southern boundary of Mississauga.

Definition

Rate Ratio

A *rate ratio* is the result of the comparison of one rate to another rate. For example, if the incidence of diabetes was 25 per 100 population in Peel and 50 per 100 in Ontario, the rate ratio would be calculated as 25 / 50 = 0.50. In this example, diabetes in Peel is 50% below that of the Ontario rate. A rate ratio of 1 indicates no difference between the rates.

Map 2.1

Rate Ratio† of After-Tax, Low-Income, Private Households by Data Zone, Peel, 2005
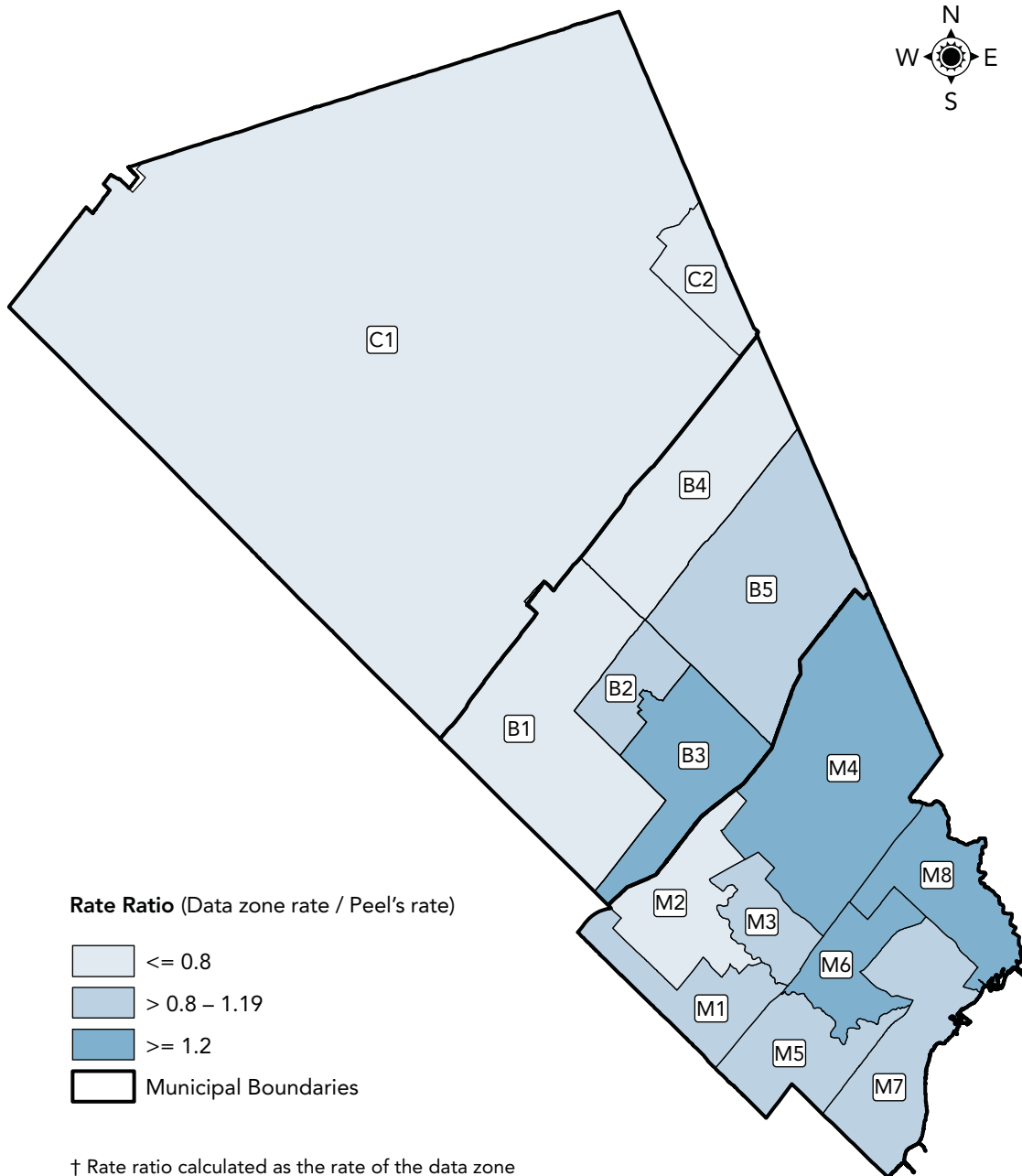
N
W · E
S

C2

C1

B4

B5

B2

B1

B3

M4

M8

M2

M3

M6

M1

M5

M7

Rate Ratio (Data zone rate / Peel's rate)

☐ <= 0.8

☐ > 0.8 – 1.19

☐ >= 1.2

☐ Municipal Boundaries

† Rate ratio calculated as the rate of the data zone divided by the Peel rate which is 11%

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).

Source: 2006 Census, Statistics Canada

0   2   4   8   12
                              Kilometers

When the rate ratio of low income is compared across the region, Caledon is lower than Brampton and Mississauga. Peel is similar to Ontario overall. For some areas, such as M6 in Mississauga, the rate of low income is 40% higher than Peel's rate of low income.

Table 2.3

After-Tax, Low-Income, Private Households and Low-Income Rate Ratio
Peel Municipalities, Peel Data Zones, Peel and Ontario, 2005

Area	Per Cent of Private Households with After-Tax Low Income	Rate Ratio[†]
Caledon	3.5	0.32
C1	3.2	0.29
C2	4.0	0.36
Brampton	10.3	0.94
B1	7.5	0.68
B2	9.6	0.87
B3	14.0	1.27
B4	8.8	0.80
B5	11.2	1.02
Mississauga	12.1	1.1
M1	9.7	0.88
M2	8.8	0.80
M3	10.4	0.95
M4	13.2	1.2
M5	11.3	1.03
M6	15.5	1.41
M7	13.0	1.18
M8	13.3	1.21
Peel[‡]	11.0	1.0
Ontario	11.1	1.01

† Data zone rate/Peel rate
‡ Referent area
Source: 2006 Census, Statistics Canada

Map 2.2

Rate Ratio† of After-Tax, Low-Income, Private Households by Census Tract, Peel, 2005

N
W   E
S
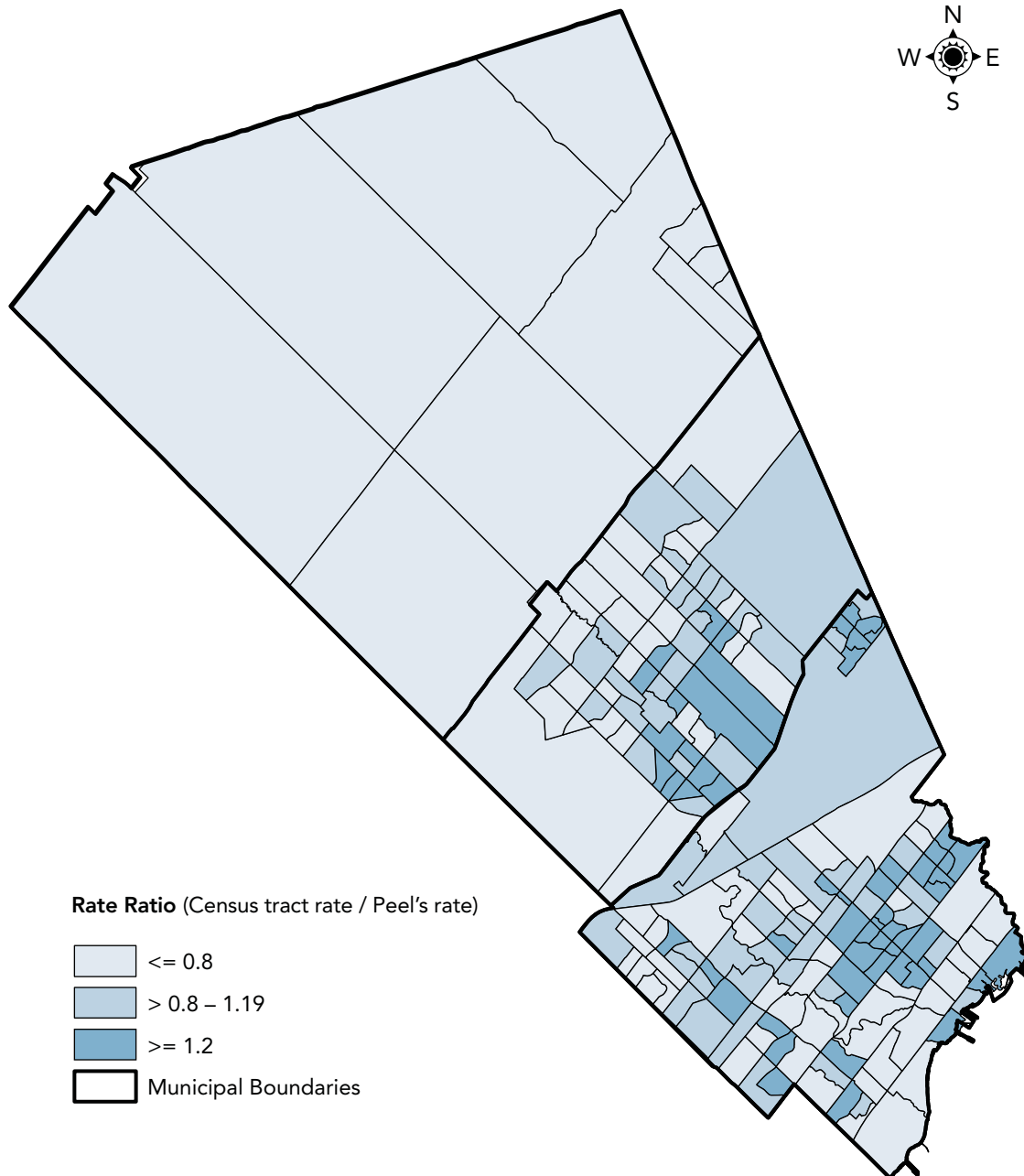
Rate Ratio (Census tract rate / Peel's rate)

- <= 0.8
- > 0.8 – 1.19
- >= 1.2
- Municipal Boundaries

† Rate ratio calculated as the rate of the census tract divided by the Peel rate which is 11%

0 2 4 8 12
Kilometers

Source: 2006 Census, Statistics Canada

Peel's low-income prevalence rates are similar to Ontario

Compared to Ontario, Peel has higher prevalence rates of low income for those in economic families and in couple families. Recent immigrants also have a higher rate of after-tax, low-income prevalence compared to the Peel total. Peel's population has a high proportion of immigrants who tend to have low incomes and to have families. This may explain Peel's high rates of low income in the economic-family and couple-family categories. (Table 2.4).

While the low-income rates of recent immigrants are considerably higher than the general population of Peel, the data portray a snapshot in time and do not describe the change in income once recent immigrants have found work. It should also be noted that short-term periods of low income do not necessarily mean that immigrants have poorer health outcomes.

In Peel, low income among lone parents is slightly less prevalent than in Ontario. However, the prevalence of seniors living in low income is higher than the provincial rate.

? Did You Know

Compared to other family types, lone-parent families, especially those led by women, tend to have lower levels of education and fewer job skills and therefore, have a lower income. These factors contribute to poorer health on average for both lone parents and their children.[42]

Income Inequality

Definition

Income Inequality

Income inequality describes the extent to which income is distributed unevenly among residents of an area.

While there are several measures (e.g., Hoover Index, Theil Index) that are used to describe the extent of income inequality within a given community or society, the most frequently used measure is the Gini coefficient. If incomes in a population are distributed completely equally, the

Table 2.4
After-Tax, Low-Income Prevalence by Family Type, Peel and Ontario, 2005

Family Type	Peel (%)	Peel Recent Immigrants† (%)	Ontario (%)
Private Households	**11.0**	**26.4**	**11.1**
• Total economic families	9.7	–	8.6
• Persons not in economic families (unattached individuals)	25.7	–	27.0
Census Families			
• Couple economic families	8.2	–	6.2
• Male lone parent	11.9	–	12.2
• Female lone parent	20.9	–	23.9
Special Populations of Interest			
• Persons less than 6 years of age	14.6	38.7	14.8
• Persons 65 years and older	7.4	15.9	5.9

– Data not available
† Arrived within the past five years
Source: 2006 Census, Statistics Canada

Gini value is zero. Complete income inequality (i.e., one person has all the money) is defined as a Gini value of 1.0.[43] Comparison of the Gini coefficient over time or between populations can be easily interpreted: the higher the coefficient, the higher the inequality in the distribution of individual income.[44] As of 2005, Canada's Gini coefficient was estimated by Statistics Canada to be 0.32 on an after-tax basis.

Table 2.5 shows the Gini coefficient in Canada compared to the countries with the highest and lowest Gini coefficients, as well as countries where the majority of Peel's immigrants were born.

Health Behaviours, Health Outcomes and Income

It is widely acknowledged that income is a powerful determinant of health.[43] Socioeconomic disadvantage has a negative impact on many measures of health status such as mortality, life expectancy, health-related quality of life, disability, cardiac disease, obesity, depression, and maternal and child health.[6,9,37,45-53]

To better understand the relationship between income and health, health outcomes are often plotted against categories of income (e.g., quartiles, deciles). This type of comparison is called the income gradient. The 'income gradient in health' is where health status typically improves at each step up the income and social hierarchy.[54,55] This means that those who have lower socioeconomic status usually experience poorer health outcomes than those who are more affluent. The socioeconomic gradient is not static; it varies over time, by age and sex, as well as by the health measure and population subgroup studied.

It has been suggested that the 'income gradient' has become less marked over time. However, the poorest fifth of the population still has poorer health outcomes, including a mean lifespan that is years shorter than the rest of society.[37] The income gradient is steepest for behaviour-related health outcomes, such as lung cancer, cirrhosis of the liver, and diseases of the digestive system. Conversely, for some outcomes, such as colorectal cancer (among both sexes), breast cancer (among women), and prostate cancer (among men), there is no significant gradient, and income appears to have no effect.[56]

Table 2.5
**Gini Coefficient,
Selected Countries and Canada, 2004-2009 Combined**

Country	Gini Coefficient
Sweden (2005)	0.23 (Lowest)
Ireland (2009)	0.29
Italy (2006)	0.32
Canada (2005)	**0.32**
United Kingdom (2005)	0.34
Poland (2005)	0.35
India (2004)	0.37
Portugal (2007)	0.38
China (2007)	0.41
United States (2007)	0.45
Jamaica (2004)	0.45
Namibia (2004)	0.71 (Highest)

Source: Central Intelligence Agency –
The World Factbook: https://www.cia.gov/library/publications/the-world-factbook/fields/2172.html, March 7, 2011

In Peel, there is an association between income and many health outcomes and health behaviours, some of which are shown in the following pages. For other health outcomes, such as life expectancy, the gradient is not so clear.

Life Expectancy and Income

Preliminary analyses regarding life expectancy, income and immigrant status for Toronto and Peel combined indicate that life expectancy at age 25 increases incrementally with stepwise movement up the income quintiles. This trend is seen for both immigrants and non-immigrants, and for men and women. The gradient in life expectancy is more marked for men than women (data not shown).

The income gradient for life expectancy in non-immigrants is greater than for immigrants. This is true for both males and females. The difference in life expectancy between immigrants and non-immigrants is sharpest at the lowest income quintile.

? Did You Know

Income Quintile

An *income quintile* is calculated by dividing income distribution (e.g., of a household or individual) into five quantiles or points based on the income distribution of the population of interest.

Definition

Life expectancy (LE) estimates the average age at death for a group or cohort at birth. Life expectancy is calculated based on the current mortality rates experienced by all age groups in the population.

Life expectancy at age 25 is a measure of the remaining years a person is expected to live by the time they are 25 years of age.

The very large difference in life expectancy within the poorest quintile between immigrants and non-immigrants points to the influence of other factors (probably including education, employment and social support). In addition, the 'healthy immigrant effect', in which immigrants represent a select population that is generally healthier than the average person in their source country, is also a factor. This helps us to understand why we cannot always see a clear relationship between income level and health outcomes in Peel and should prompt us to analyze data by immigrant status to understand these relationships further.

Health Behaviours and Income

Table 2.6 shows the prevalence of selected health behaviours at the lowest and highest income levels. The rate ratio is used to reflect the magnitude of the income disparity for each of the health behaviours.

Some of the health behaviours for Peel are contrary to what we would expect to see. The rate ratio for being a smoker for Peel residents is 0.87, meaning that there are fewer residents who smoke in the lowest income quartile compared to the highest income quartile. This observation is the opposite to what we see for Ontario with a rate ratio of 1.56. This is also true for being physically inactive and being overweight or obese. These results are likely affected by our high immigrant population who tend to have lower income but healthier behaviours. Chapter 3 will further explore these relationships between the determinants of health and various health behaviours.

In Ontario, the disparity rate ratio for binge drinking is 0.58 meaning that there is a lower proportion of binge drinkers in the lowest income level compared to the highest income level. Data are not releasable for Peel.

Table 2.6

Selected Health Behaviours by Income Level and Rate Ratio,
Peel and Ontario, 2007/2008

Health Behaviour	Low-Lower Middle Income Level		Highest Income Level		Rate Ratio[†]	
	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)
Physically inactive	44.1*	56.5	48.9	43.4	0.90	1.30
Eat fruit and vegetables <5 times per day	60.3	64.4	57.1	55.5	1.06	1.14
Overweight or obese	45.1*	50.6	51.6	53.2	0.87	0.95
Current smoker	14.9*	27.4	18.2*	17.5	0.82	1.56
Binge drinker	NR	11.5	16.8	19.7	Unable to calculate	0.58
No smoking restrictions in the home	16.8*	33.8	15.2	16.7	1.10	2.02

* Use estimate with caution.
† Low–Lower Middle Income Level/Highest Income Level
NR = Not releasable due to small numbers.
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Ethnocultural Diversity and Immigration

Culture refers to the learned values, beliefs, norms and ways of life of an individual that influences perceptions, decisions and actions in certain ways.[57] It is dynamic, evolves over time and is transmitted down generations.

The two concepts related to culture that will be described in this section are immigrant status and ethnicity.

Immigrant Status

Immigrants tend to enjoy better health than non-immigrants – a phenomenon that is typically referred to as the 'healthy immigrant effect'. This has been observed for mortality, a variety of chronic diseases, disability, dependency and life expectancy (with the exception of infectious and parasitic diseases).[58-63]

The healthy immigrant effect is the result of a number of factors:

- People who immigrate to another country tend to be healthier in general;

- Immigrants undergo medical screening to enter the country, and are selected by employability, education and language;[64] and

- Immigrants tend to have better health behaviours than non-immigrants (e.g., lower rates of smoking and alcohol use and better diets).[58,59]

While immigrants may be healthier upon arrival into a new country than non-immigrants, they tend to adopt the behaviours of those found in the new country. Eventually their health status converges toward that of the Canadian-born population.[65] In other words, recent immigrants (in Canada for less than 10 years) are generally healthier than long-term immigrants and non-immigrants, but after about 10 years, their rates of illness and disability approach those of the rest of the population.[66] This observation suggests that poverty among recent immigrants may have a different meaning than it has for the non-immigrant population.

Definition

The term *immigrant* refers to people who are, or have been, granted the right to live in Canada permanently by immigration authorities. Some immigrants have resided in Canada for a number of years, while others are have arrived recently.

Non-immigrant refers to the Canadian born population.

Non-permanent resident refers to a person from another country who had a work or study permit, or who was a refugee claimant at the time of the census. It also includes any family members living in Canada with them.

Unless stated otherwise, *recent immigrants* in this report refer to those who have been in Canada for 10 years or less. The term *long-term immigrant* refers to those who have been in Canada for 11 years or longer.

Almost half of Peel's population are immigrants

Forty nine per cent of Peel's population are immigrants. In comparison, immigrants represent 28% of the Ontario population and 20% of the Canadian population. Within Peel, Mississauga has the highest proportion of immigrants at 52%.[A] Ten per cent of Peel's immigrants arrived in Canada within the past five years (Figure 2.4), which is double the proportion for Ontario as a whole.

Caledon has the lowest proportion of recent immigrants (arrived within the past five years) compared to Peel, while Brampton and Mississauga are similar to Peel (Map 2.3). There are three areas within Peel where the proportion of recent immigrants is 20% or higher than that for the region as a whole. These areas are Brampton's data zone B3 and Mississauga's data zones M4 and M6. The proportion of recent immigrants and the rate ratio for each data zone is reflected in Table 2.7.

Figure 2.4
**Period of Immigration,
Peel and Ontario, 2006**

Category	Peel	Ontario
Non-Immigrants	50.4	70.8
Immigrant Before 1991	22.7	15.7
Immigrant 1991 – 2000	15.7	7.8
Immigrant 2001 – 2006	10.2	4.8
Non-Permanent Resident[†]	0.9	1.0

Per cent of population

■ Peel   ■ Ontario

† Non-permanent resident is defined as a person from another country who had a work or study permit, or who was a refugee claimant at the time of the census. It also includes any family members living in Canada with them.
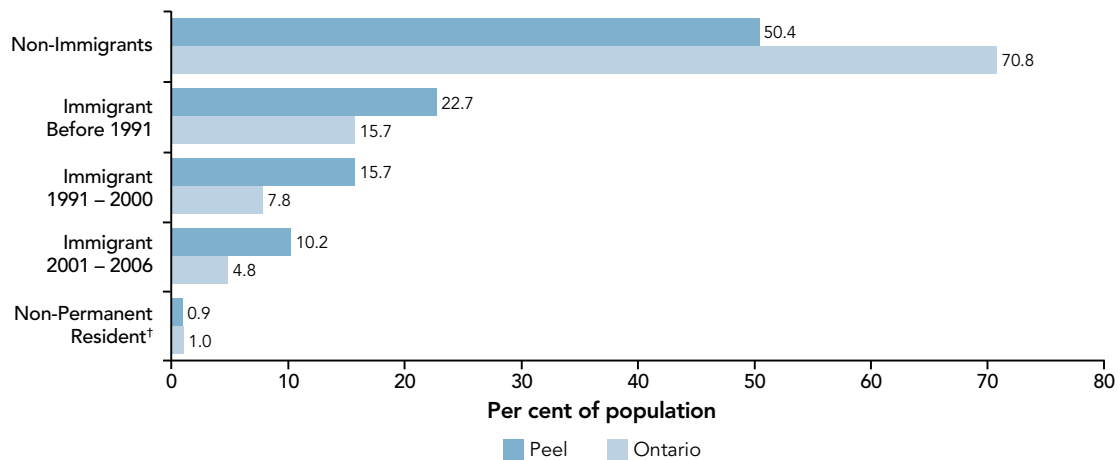Source: 2006 Census, Statistics Canada

Map 2.3
Rate Ratio† of Recent Immigrants†† by Data Zone, Peel, 2006
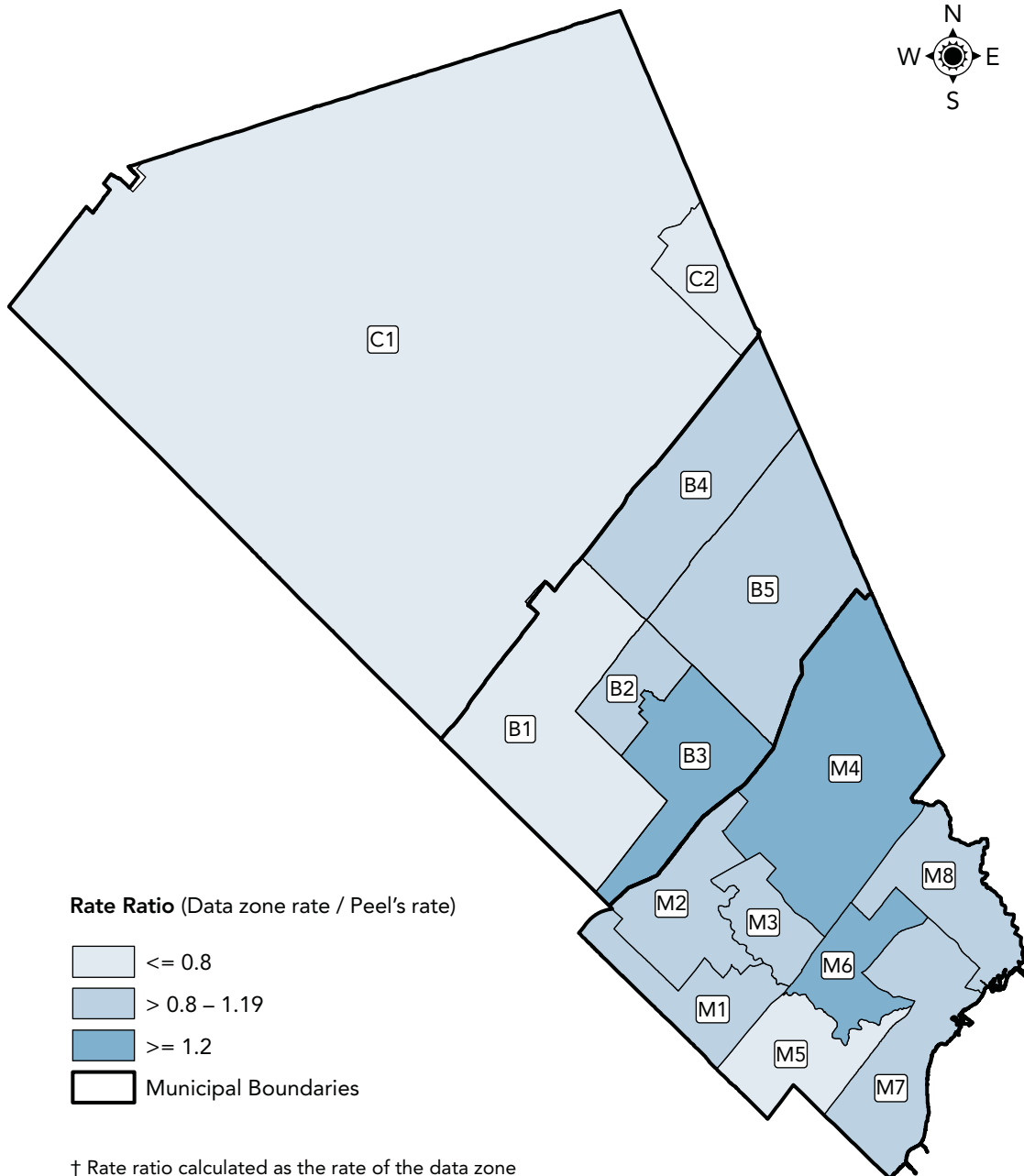
N
W • E
S

C2

C1

B4

B5

B2

B1

B3

M4

M8

Rate Ratio (Data zone rate / Peel's rate)

M2

M3

M6

<= 0.8

> 0.8 – 1.19

M1

>= 1.2

M5

Municipal Boundaries

M7

† Rate ratio calculated as the rate of the data zone divided by the Peel rate which is 10.2%
†† Immigrated within the last 5 years

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).

0   2   4   8   12
Kilometers

Source: 2006 Census, Statistics Canada
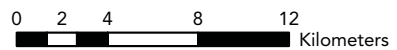
Table 2.7

Proportion of Immigrants, Recent Immigrants, and Long-Term Immigrants, Peel Municipalities, Peel Data Zones, Peel and Ontario, 2006

Area	Immigrants (%)	Recent Immigrants[†] (%)	Rate Ratio of Recent Immigrants*	Long-term Immigrants[‡]
Caledon	20.8	0.9	0.1	1.9
C1	21.3	0.9	0.1	2.0
C2	19.9	1.0	0.1	1.8
Brampton	47.8	9.9	1.0	17.9
B1	43.4	7.1	0.7	14.1
B2	43.3	8.3	0.8	15.2
B3	49.6	12.8	1.2	20.8
B4	56.2	10.7	1.0	21.1
B5	47.3	10.6	1.0	18.5
Mississauga	51.6	11.2	1.1	20.2
M1	52.9	11.1	1.1	22.6
M2	40.5	8.4	0.8	15.8
M3	60.3	11.0	1.1	23.5
M4	61.4	14.5	1.4	24.7
M5	42.6	7.5	0.7	14.3
M6	58.5	14.7	1.4	24.5
M7	43.7	10.1	1.0	16.8
M8	51.1	10.9	1.1	18.3
Peel	48.6	10.2	1.0	18.5
Ontario	28.3	4.8	0.5	8.7

† Immigrated within the past five years
‡ Immigrated within the past 10 years
* Data zone rate/Peel rate
Source: 2006 Census, Statistics Canada

As shown in Map 2.4, census tracts with the highest proportion of new immigrants in Peel (20% or more of new immigrants compared to the rest of Peel) tend to have lower median household income levels.

Map 2.4

After-Tax, Median Household Income and Rate Ratio[†] of Recent Immigrants[††] by Census Tract,
Peel, 2006

After-Tax, Median
Household Income

- • $35,500 to $48,500

- ● $48,501 to $61,100

- ● $61,101 to $68,100

- ● $68,101 to $74,500

- ● $74,501 to $133,500

Rate Ratio (Data zone rate / Peel's rate)

	<= 0.8
	> 0.8 – 1.19
	>= 1.2
	Municipal Boundaries

† Rate ratio calculated as the rate of the data zone
divided by the Peel rate which is 10.2%
†† Immigrated within the last 5 years

0   2   4   8   12
                              Kilometers
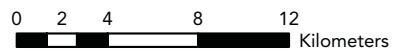
Source: 2006 Census, Statistics Canada

Ethnicity

With the high rates of immigration to Peel comes a mix of ethnic origins and languages that enhance the community's diversity. Ethnic origin can have an impact on health due to differences in diet, health behaviours and genetic make-up, among other factors (Figure 2.5).

Immigrant Status, Ethnicity and Health

Table 2.8 displays the prevalence of selected

health behaviours by immigrant status. This analysis shows that the rate ratio for most of the health behaviours is much lower for recent immigrants compared to non-immigrants for all health behaviours with the exception of physical inactivity. This means that more recent immigrants engage in healthier behaviours than do non-immigrants. This pattern is consistent for both Peel and Ontario.

Figure 2.5

**Top 10 Ethnic Origins[†],
Peel and Ontario, 2006**

Per cent of population

■ Peel   □ Ontario

† Based on total responses; ranking based on Peel
Note: Ethnicity is based on the question 'What were the ethnic or cultural origins of your ancestors?'. An ancestor is defined as someone who is usually more distant than a grandparent. The Canadian response may reflect those whose ancestors have been in Canada for several generations.
Source: 2006 Census, Statistics Canada

Table 2.8

**Selected Health Behaviours by Immigrant Status and Rate Ratio,
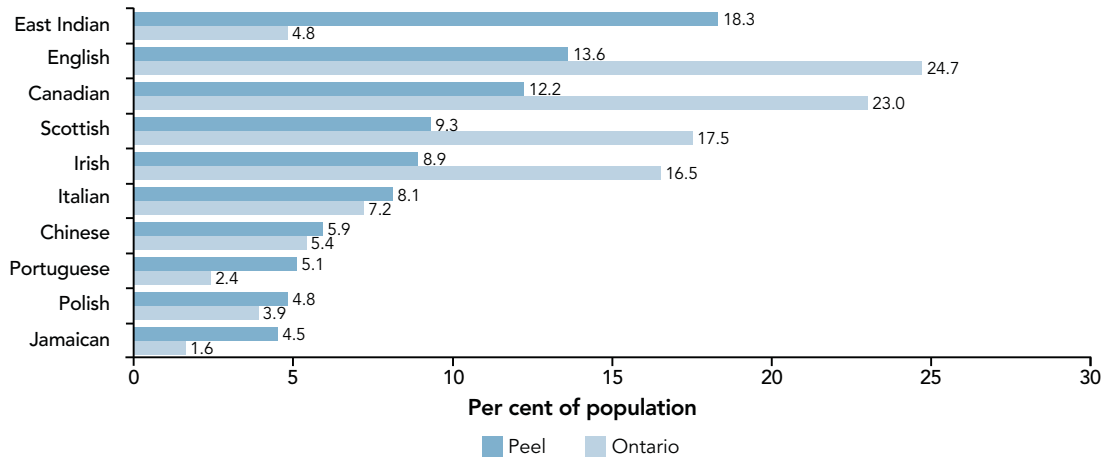Peel and Ontario, 2007/2008**

Health Behaviour	Recent Immigrant[†]		Non-Immigrant		Rate Ratio[‡]	
	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)
Physically inactive	58.0	61.9	49.7	45.6	1.17	1.36
Eat fruit and vegetables <5 times per day	51.3	56.2	57.9	56.2	0.89	1.0
Overweight or obese	43.9	34.6	52.1	54.1	0.84	0.64
Current smoker	10.9*	12.8	18.6	22.9	0.59	0.56
Binge drinker	24.6*	28.9	48.4	50.7	0.51	0.57

* Use estimate with caution
† Immigrated within the past 10 years
‡ Recent Immigrant / Non-immigrant
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 2.9
Current Smoking by Selected Ethnicities and Rate Ratio
Peel and Ontario, 2007/2008

Ethnicity	Peel (%)	Rate Ratio[†]	Ontario (%)	Rate Ratio[†]
White (referent group)	20.7	–	21.9	–
East/Southeast Asian	14.5*	0.70	13.2	0.60
South Asian	12.1	0.58	9.1	0.42

* Use estimate with caution.
† East/southeast Asian or South Asian ethnic group / White ethnic group
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Recent immigrants have healthier behaviours than those who are Canadian-born

Health behaviours also differ by ethnicity. The rate of smoking is much higher among those in the 'White' ethnicity for both Peel and Ontario than those who identify as being East/Southeast Asian or South Asian as can be seen by the prevalence rate and the rate ratio in Table 2.9.

Social Environment

Social environments can be viewed as the immediate physical environment, social relationships, and cultural milieus within which people function and interact.[67] There are multiple components and indicators that encompass social environments; however, for the purpose of this section we will focus primarily on social relationships and sense of belonging in relation to health status.

Positive social relationships with families, significant others and friends provide a needed emotional support in times of stress, and help provide the basic prerequisites of health. These relationships help provide basic support such as food and housing, as well as care during times of illness. Indeed, the link between low levels of social support and poor mental and physical health outcomes has been repeatedly demonstrated.[68-71] For example, it has been shown that the more social contacts people have, the lower their premature death rates.[72] Collectively, the evidence suggests caring and respect that manifest from supportive social networks act as a buffer against health problems.[73,74]

Marital status and sense of community belonging are the concepts presented here that proxy as a measure for the social environment. In addition, the living arrangements of seniors are also presented.

Marital Status

It has long been known that married people live longer than single people, and that widowhood is associated with increased illness and death.[75] Overall, both Ontario males and females who are married reported the highest level (good or very good) of self-rated health (Figure 2.6).

Community Belonging

A strong sense of belonging is positively associated with better physical and psychological well-being. A feeling of belonging to a country, region, and local community can influence a person's sense of identity and the extent to which they participate in society. These effects are fairly consistent despite the variation in definitions of community.

Almost two-thirds of Peel and Ontario residents report having strong (very or somewhat) community belonging (data not shown).[B] While we assessed the relationships between having a strong sense of community belonging and age or income, there were no interesting patterns; therefore additional

Figure 2.6
Self-Rated Health by Marital Status and Sex,
Ontario, 2007/2008

Per cent of population aged 25 – 64 years†

Marital Status	Male	Female
Single	88.7	89.1
Married	90.2	89.7
Common Law	89.2	89.2
Separated	87.8	85.0
Divorced	81.3	82.4
Widowed	82.7	77.5
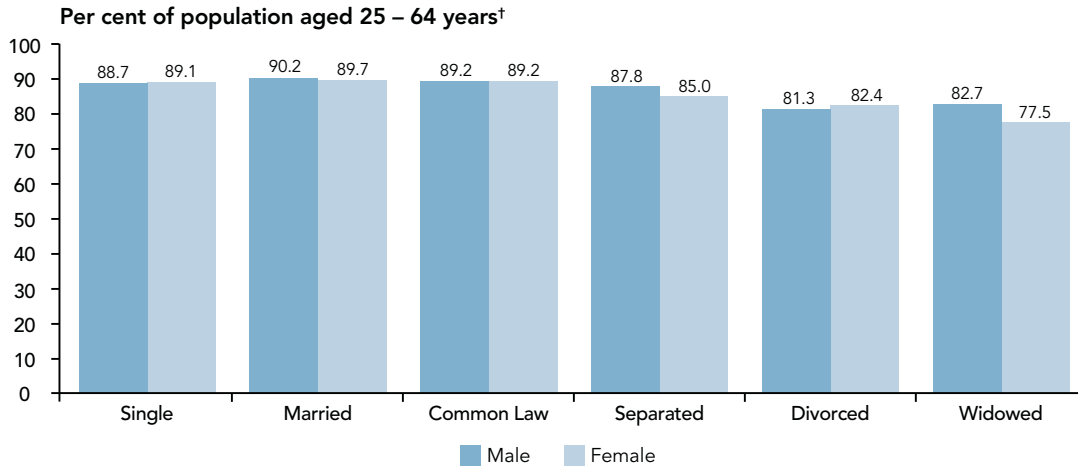
† See Data Methods chapter describing rationale for selected age grouping
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

data for these relationships are not presented here. However, Peel residents with less than secondary education report having a higher sense of community belonging compared to those with higher education (Figure 2.7).

Civic Engagement

For the purposes of this report, civic engagement is measured by a resident's membership in a volunteer organization at places such as a church or social group, a community centre, ethnic associations or social, civic or fraternal clubs.

Figure 2.7
Sense of Community Belonging† by Education Level,
Peel, 2007/2008

Per cent of population aged 12 years and older

Education Level	Per cent
< Secondary	73.7
Secondary Graduate	66.4
Other Post Secondary	61.0
Post Secondary Graduate	64.4
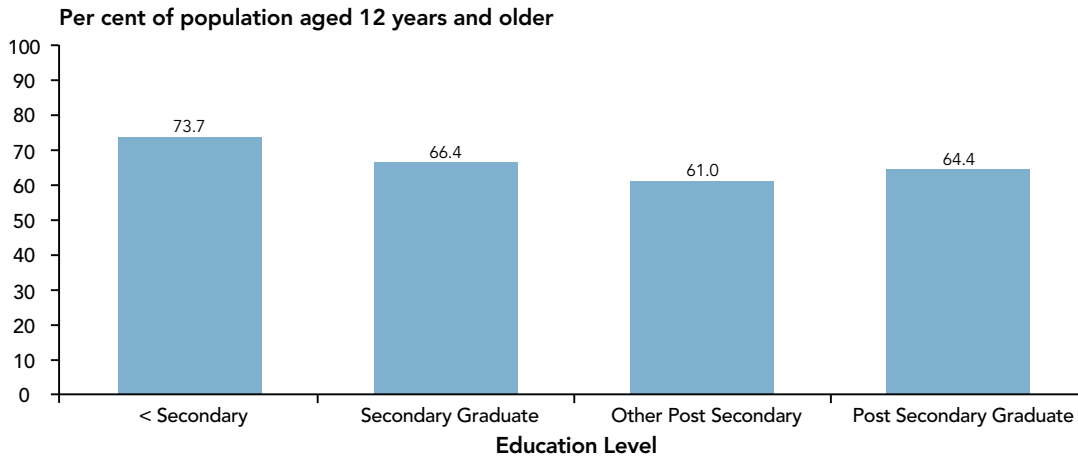
† Defined as 'very strong' or 'somewhat strong'
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Figure 2.8

Member of a Volunteer Organization by Age Group,
Peel and Ontario, 2003

Per cent of population aged 12 years and older

Age Group (Years)
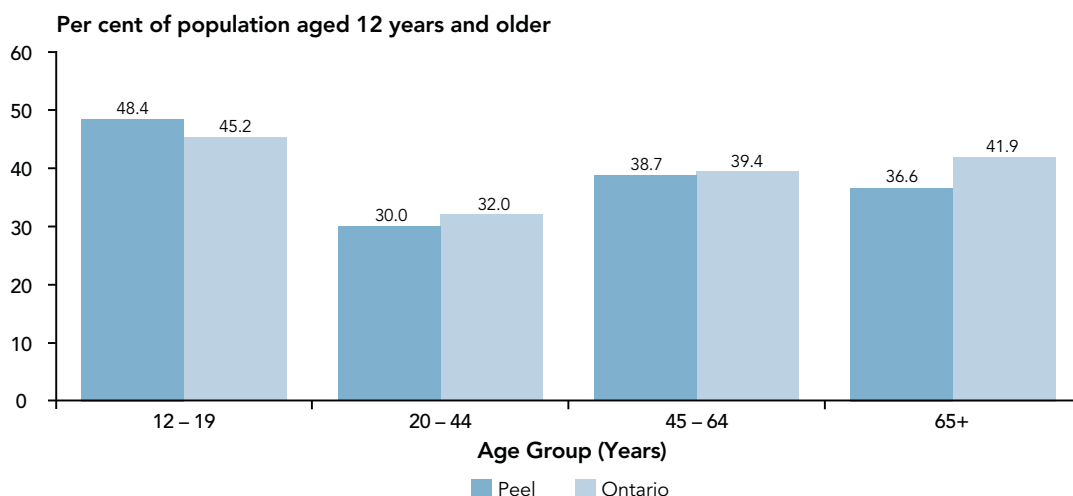
■ Peel □ Ontario

Source: Canadian Community Health Survey 2003, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Within Peel just over one-third (35%) of residents reported being a member of a volunteer organization, which is similar to Ontario (37%). Those who are younger (12 to 19 years) tend to be more engaged than those in older age groups (Figure 2.8). There were no relationships between civic engagement and income or education in Peel.

Seniors Living Alone

Peel, especially Brampton, has a high proportion of seniors living with relatives compared to Ontario (Table 2.10). Areas within Peel that have 20% or more seniors living with relatives than the rest of Peel are: data zones C2 within Caledon, B3 within Brampton, and M2, M7 and M8 within Mississauga. It is interesting to note that those data zones where the proportion of seniors living alone is low, the proportion of multiple family households is higher (Table 2.11).

Table 2.10

Living Arrangements of Seniors† Not in Census Families,
Peel, Caledon, Brampton, Mississauga, Peel and Ontario, 2006

Living Arrangements of Seniors	Peel (%)	Caledon (%)	Brampton (%)	Mississauga (%)	Ontario (%)
Not in census families	30.9	26.2	31.8	30.8	33.4
Living with relatives	13.8	9.2	16.9	12.6	6.2
Living with non-relatives only	1.5	2.2	1.4	1.4	1.5
Living alone	15.7	14.7	13.5	16.8	25.7

† Defined as the population aged 65 years and older
Source: 2006 Census, Statistics Canada

Map 2.5

Rate Ratio† of Seniors†† Living Alone by Data Zone, Peel, 2006
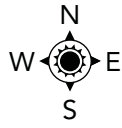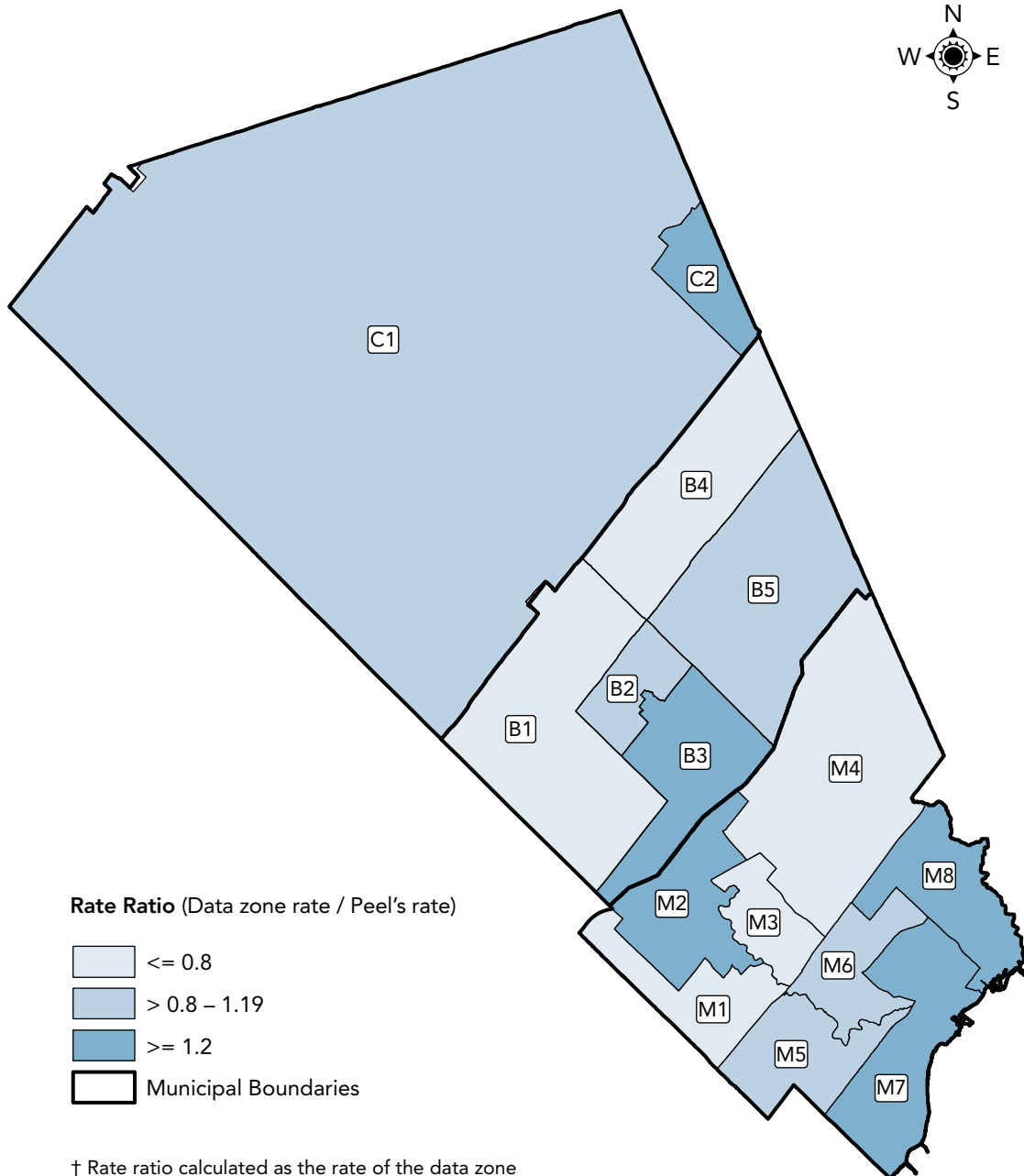
Rate Ratio (Data zone rate / Peel's rate)

<= 0.8

> 0.8 – 1.19

>= 1.2

Municipal Boundaries

† Rate ratio calculated as the rate of the data zone divided by the Peel rate which is 15.7%
†† Defined as the population aged 65 years and older

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).
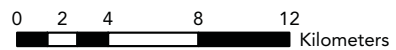
Source: 2006 Census, Statistics Canada

Table 2.11

Seniors[†] Living Alone and Multiple Family Households,
Peel Municipalities, Peel Data Zones, Peel and Ontario, 2006

Area	Seniors Living Alone (%)	Rate Ratio[‡] of Seniors Living Alone	Multiple Family Households (%)
Caledon	14.7	0.94	3.8
C1	12.8	0.82	4.5
C2	18.9	1.20	2.8
Brampton	13.5	0.86	9.1
B1	3.0	0.19	7.2
B2	15.4	0.98	7.2
B3	22.3	1.42	8.9
B4	3.5	0.22	17.2
B5	13.6	0.87	7.6
Mississauga	16.8	1.07	5.1
M1	10.5	0.67	5.7
M2	20.1	1.28	4.1
M3	3.8	0.24	9.4
M4	10.9	0.69	9.2
M5	15.6	0.99	3.9
M6	17.5	1.11	4.4
M7	23.5	1.50	2.6
M8	19.6	1.25	4.0
Peel	15.7	1.00*	6.4
Ontario	25.7	1.64	2.5

† Defined as the population aged 65 years and older
‡ Data zone rate/Peel rate
* Referent area
Source: 2006 Census, Statistics Canada

Education and Literacy

Educational attainment is strongly associated with higher physical and psychological well-being, as well as healthier patterns of behaviour.[76-82] The association is apparent across the full range of educational and economic circumstances and is not confined to the most disadvantaged.

Greater educational achievement increases opportunities for job and income security, and in turn job satisfaction. Given the strong association between educational attainment and family socioeconomic status, educational attainment of parents influences the economic environment in which a child is born, which is known to have a long-term influence on adult

disease outcomes.[83] Education may also affect sociocultural factors such as greater self-efficacy and control over life circumstances and social support.[83,84]

Causal inference between education and health remains challenging as it is confounded by unobserved personal characteristics, such as inherited ability, patience or early family circumstances.[85,86] For example, while the association between low-educational attainment and cigarette smoking is well established, the relationship is not necessarily causal. In an examination of the relationship between schooling and smoking within a community sample of adults who had all completed 12 to 18 years of education, educational inequalities

observed in young adults (mid-20s) who smoked were already evident at age 17 when all of the subjects were still in the same grade. In other words, educational inequalities between smokers and non-smokers were already apparent even before schooling was actually completed.[87] This suggests that a third variable such as intelligence, or the ability to postpone gratification – as opposed to schooling per se – might be responsible for the observed association between schooling and cigarette smoking.[86]

Measuring Education

Measurement of education can be used to assess what a person has learned and knows. It is a strong determinant of future employment and income.[40]

The concept of education is easy to measure in self-administered surveys and tends to yield high response rates as it is relevant to all people.

Since the meaning of education varies by age it is important to assess education by birth cohort. For example, those with less than high school education today may be different than those who had less than high school education 50 years ago. Another consideration for measuring education is whether a person obtained their education outside of their country of residence. Education differs by country depending on the educational regime. Also the number of years of education from another country does not necessarily indicate quality of education.

Figure 2.9
Examples of indicators measuring life-course socioeconomic position

Childhood	Young adulthood	Active professional life		Retirement
Parent's education	Education	First employment	Occupation first,…., last, longest	Household income
Parent's occupation		Income	Housewife	Wealth, deprivation
Household income		Household conditions	Unemployment: yes/no, number of episodes	Household conditions
Household conditions		Assets transfer occurring when starting a family	Income: changes over time	Assets transfer across generations occurring at death
			Wealth, deprivation: changes over time	
			Household conditions: changes over time	
			Partner's socio-economic position	

Reproduced from Indicators of Socioeconomic Position (part 1). Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. J Epidemiol Community Health. 2006;60(1):7-12. ©2005 with permission from BMJ Publishing Group Ltd

Peel residents are well educated

The educational attainment of Canadians is rising steadily. The percentage of Canadians with university degrees rose from 11% in 1990 to 19% in 2007.[88] In Peel, 35% of residents aged 25 to 64 years had a university degree compared to Ontario (31%) (Table 2.12).

Compared to Ontario, Peel has a slightly higher proportion of residents aged 25 to 64 years with a university degree (35% compared to 31%). Mississauga has a higher proportion of residents with a university degree than Brampton or Caledon (Table 2.12).

Forty per cent of seniors had less than a high school education, compared to 12% of those 25 to 64 years of age. These figures are similar to those seen in Ontario as a whole (Table 2.13).

In contrast to Table 2.12, which shows the highest education level obtained for Peel overall, the proportion of the population with a university degree (Figure 2.10) is much higher for recent immigrants (63%).

Table 2.12

Highest Level of Education among 25-to-64-Year-Olds, Peel, Caledon, Brampton, Mississauga, and Ontario, 2006

	Peel (%)	Caledon (%)	Brampton (%)	Mississauga (%)	Ontario (%)
Less than high school	12.3	10.7	15.7	10.3	13.6
High school certificate or equivalent	24.8	27.7	28.0	22.5	25.0
Apprenticeship or trades certificate or diploma	7.8	9.9	8.6	7.0	8.8
College, CEGEP or other non-university certificate or diploma	19.8	26.2	20.0	19.2	22.0
University certificate, diploma or degree	35.3	25.5	27.7	41.0	30.7

Source: 2006 Census, Statistics Canada

Table 2.13

Proportion of Residents by Highest Level of Education and Age Group, Peel and Ontario, 2006

	25 to 64 Years		65+ Years	
	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)
Less than high school	12.3	13.6	40.5	40.9
High school certificate or equivalent	24.8	25.0	22.9	21.9
Apprenticeship or trades certificate or diploma	7.8	8.8	9.4	10.7
College, CEGEP or other non-university certificate or diploma	19.8	22.0	11.7	11.8
University certificate, diploma or degree	35.3	30.7	15.5	14.8

Source: 2006 Census, Statistics Canada

Almost 40% of Peel residents received their education outside of Canada compared to only 21% of Ontario residents (Table 2.14).

Brampton has a higher proportion of residents with high school education or less compared to Caledon and Mississauga. Data zones B2 and B5 in Brampton have rates of education of high school or less that are 20% or more higher than the rest of Peel (Map 2.6 and Table 2.14).

Figure 2.10
Recent† Immigrants' Highest Level of Education Achieved by Age Group, Peel, 2006

Per cent of recent† immigrants aged 25 years and older

	Less than High School	High School or Equivalent	Apprenticeship or Trade Certificate of Diploma	College	University
25 – 64	10	15	4	8	63
65+	42	21	3	6	28

Age Group (Years)
■ 25 – 64   ■ 65+
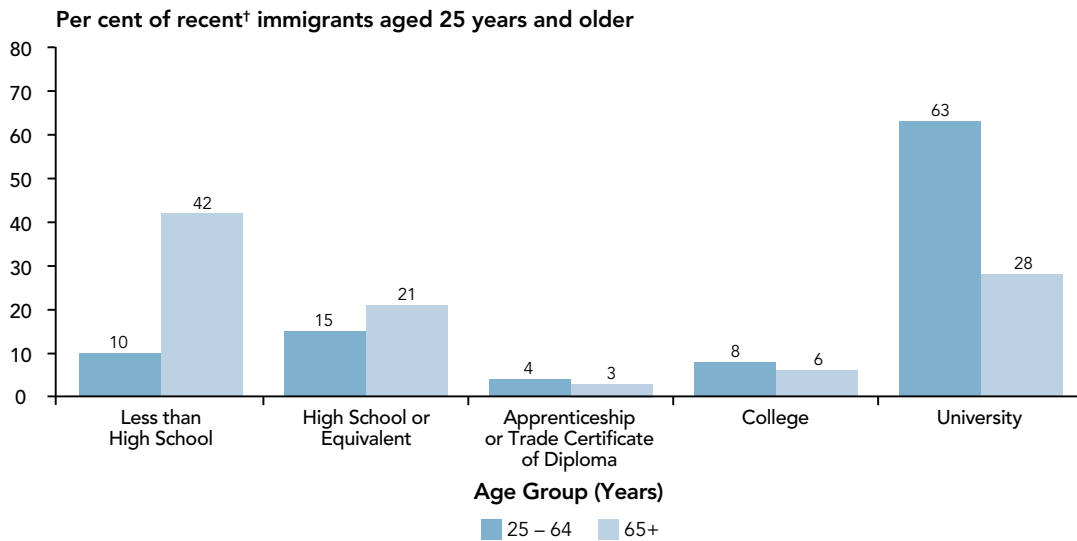
† Defined as arriving within the last five years
Source: 2006 Census, Statistics Canada

Map 2.6

Rate Ratio† of Less than High School Education†† by Data Zone, Peel, 2006
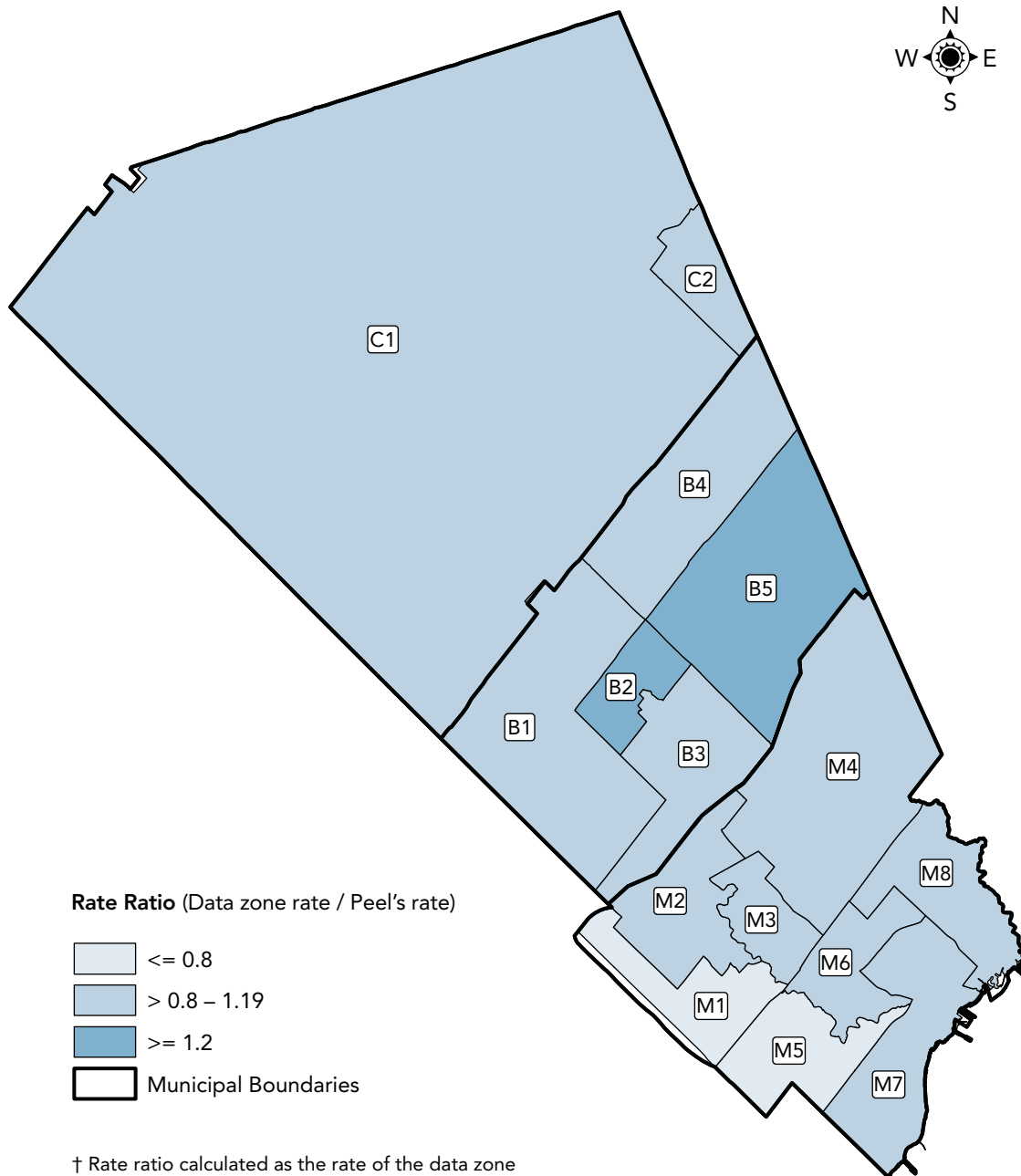
N
W E
S

C2

C1

B4

B5

B2

B1

B3

M4

M8

M2

M3

M6

M1

M5

M7

Rate Ratio (Data zone rate / Peel's rate)

<= 0.8

> 0.8 – 1.19

>= 1.2

Municipal Boundaries

† Rate ratio calculated as the rate of the data zone divided by the Peel rate which is 37.1%
†† Defined as the population aged 25–64 years

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).

Source: 2006 Census, Statistics Canada

0 2 4   8   12
Kilometers

Table 2.14
Population† with Less than High School Education and who Received Education Outside of Canada,
Peel Municipalities, Peel Data Zones, Peel and Ontario, 2006

Area	Population† with high school education or less (%)	Rate Ratio‡ of Population with high school education or less	Population who received education outside of Canada (%)
Caledon	14.7	1.03	3.8
C1	12.8	1.00	4.5
C2	18.9	1.08	2.8
Brampton	13.5	1.18	9.1
B1	3.0	1.08	7.2
B2	15.4	1.23	7.2
B3	22.3	1.18	8.9
B4	3.5	1.17	17.2
B5	13.6	1.22	7.6
Mississauga	16.8	0.88	5.1
M1	10.5	0.68	5.7
M2	20.1	0.88	4.1
M3	3.8	0.84	9.4
M4	10.9	1.04	9.2
M5	15.6	0.80	3.9
M6	17.5	0.84	4.4
M7	23.5	0.91	2.6
M8	19.6	1.01	4.0
Peel	15.7	1.00*	6.4
Ontario	25.7	1.04	2.5

† Defined as the population aged 25 – 64 years
‡ Data zone rate/Peel rate
* Referent area
Source: 2006 Census, Statistics Canada

Education and Health

Most of the results we see in Table 2.15 comparing selected health behaviours of those with less than high school education to those with post-secondary graduate education are as expected. For example, the proportion of smokers is 54% higher among those with less than high school education compared to those with post-secondary education. Chapter 3 will further explore these relationships between the determinants of health and various health behaviours.

Table 2.15

Selected Health Behaviours‡ by Education Level and Rate Ratio, Peel and Ontario, 2007/2008

Health Behaviour	Less than high school education		Post-secondary graduate		Rate Ratio†	
	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)	Peel (%)	Ontario (%)
Physically inactive	69.6	66.3	60.6	49.8	1.15	1.33
Eat fruit and vegetables <5 times per day	59.0	67.4	57.8	55.1	1.02	1.22
Overweight or obese	65.9	64.7	50.3	51.2	1.31	1.26
Current smoker	26.2*	38.6	17.0	19.3	1.54	2.00
Binge drinker	NR	15.9	11.1	16.2	NR	0.98
No smoking restrictions in the home	17.5*	30.9	17.6	17.8	0.99	1.74

* Use estimate with caution.
† Less than high school education / Post-secondary graduate
‡ Reflects population aged 25–64 years
NR = Not releasable due to small numbers
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Employment and Working Conditions

Given that more than half of Canadians spend a substantial amount of time at work each day, the physical and psychosocial conditions in which they work can have a profound impact on their overall health and well-being. People who have more control over their work conditions and have fewer stress-related job demands are healthier and often have a higher life expectancy than those in more stressful or poorer conditions.[89]

Unemployment, underemployment and stressful or unsafe working conditions are associated with poor physical, mental and social health. Employment not only provides an income, but also a sense of identity and purpose. It allows opportunities for personal and professional growth and access to social capital. Conversely, unemployment in some circumstances can have a devastating impact to both the health of the individual and his/her family. Unemployed people have a reduced life expectancy and suffer significantly more health problems than people

who are employed, however, the causal direction of this relationship is not known.[25]

Measurement

Measuring Indicators of Work Life

There are various ways to measure indicators of a person's work life – these include measures such as employment status (employed or unemployed), job security and employment type.[90]

Employment

While rates of employment are available from the 2006 Census, the measure can fluctuate over time. For this reason, data from the Labour Force Survey are used in this report instead. Since the recession in June 2008, unemployment rates have remained high and have not returned to the levels seen prior to June 2008 (Figure 2.11).

Type of Work

In Peel in 2009, just over two-thirds of the population 18 years and older reported that they work a regular daytime shift. Fourteen per cent

Figure 2.11
Unemployment Rates,
Peel, January 2008 – January 2011

Per cent unemployment among population aged 25 years and older

Source: Statistics Canada, Labour Force Survey
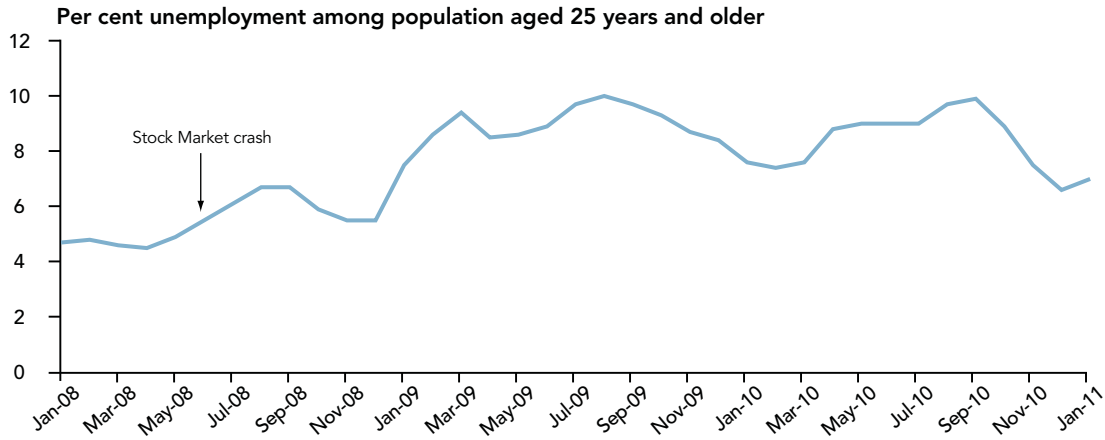
have a job involving shift work and 11% have an irregular schedule that is not defined as shift work.[D] Within Peel, Brampton has the highest proportion of employed adults in a shift work job (18%) compared to Mississauga (14%) or Caledon (10% - use estimate with caution) (data not shown).[D]

> **Definition**
>
> *Shift Work* is defined as employment that includes regular evening shifts, regular night shifts, rotating shifts and split shifts.

One in seven adults in Peel are employed in shift work

Shift Work

Shift work or non-standard hours of work (i.e., outside of regular daytime hours) is associated with adverse health outcomes including work-related injuries, poor mental health status, gastrointestinal disorders, family difficulties, and sleep deprivation.[91,92] Possible pathways for this association include disruption of circadian

rhythms and hormone regulation, adoption or worsening of unhealthy behaviour, and stress.[92,93]

Among Canadian men, shift work has been associated with having a chronic condition over time, higher work stress, low sense of mastery, relationship problems and psychological distress as well as daily smoking.[94] Among Canadian women, shift work has been associated with high personal stress, a low sense of mastery, reproductive disorders and breast cancer.[94]

Shift work is also socially patterned, being less common in graduates, and more common amongst manual workers and those working in the manufacturing or health-care sectors. In Canada, shift work tends to be performed by younger, single, less-educated and less-affluent individuals who do so not by personal choice but because of job requirements.[94]

Many people tend to get out of shift work within a few years. Those who stay in shift work may not have a choice, or are better able to tolerate the stressors associated with the nature of shift work. However, several recent systematic reviews determined that a change to the organization of shift work has the potential to improve health and work-life balance, particularly when the workers

are involved in the design and implementation of their revised work schedule.[95,96] More research is required in order to understand the effect of shift-work interventions on inequalities in health amongst working-age populations.[95]

The percentage of employed Peel residents working regular daytime hours is higher among those within the highest income level, while shift work is more common among those in the lowest income level (Figure 2.12).

Figure 2.12
Type of Work Hours by Income Level, Peel, 2009

Per cent of employed population aged 18 years and older

Income Level	Regular Daytime Work	Shift Work†
< $30,000	55.2*	NR
$30,000 – 49,999	61.3	28.1
$50,000 – 69,999	75.2	11.9*
$70,000+	77.1	10.4

Income Level

■ Regular Daytime Work ■ Shift Work†
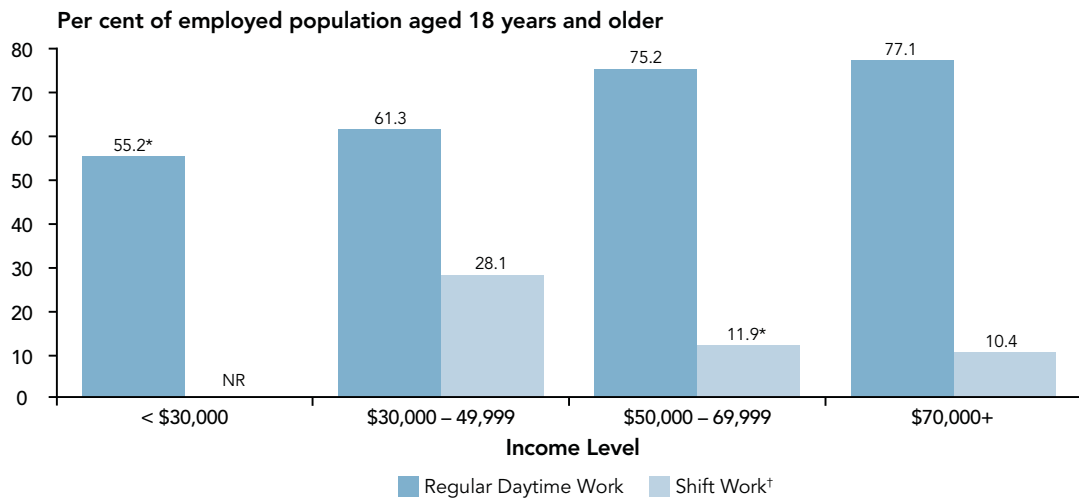
* Use estimate with caution
NR = not releasable due to small numbers
†Shift work includes: regular evening shift, regular night shift, rotating shift and split shift
Note: 65% of regular daytime workers and 16.8% of shift workers either Didn't Know or Refused to report their income
Source: Rapid Risk Factor Surveillance System, 2009, Peel Public Health

These data for Peel are similar to findings in Canadian literature that show high percentages of shift workers in lower-income households, with the exception of men in rotating shifts which could be attributed to the tendency for men in health professions and protection services to have high incomes and work rotating shifts.[94]

Commuting

A regular work day typically involves commuting to and from one's place of work. Long commutes and increased time driving have been linked to negative physical and mental health consequences including: increased stress, greater risk of motor vehicle accidents, and greater risk for obesity as well as decreased community involvement.[97–99] A higher proportion of Peel residents commute to their work compared to Ontario (Figure 2.13).

Working Conditions

Both the physical and psychosocial conditions of the workplace have the potential to place stress and strain on employees, leading to injury and poor health conditions. Physical working conditions have improved as a result of health and safety legislation and enforcement, yet some people are still exposed to health hazards in the workplace.
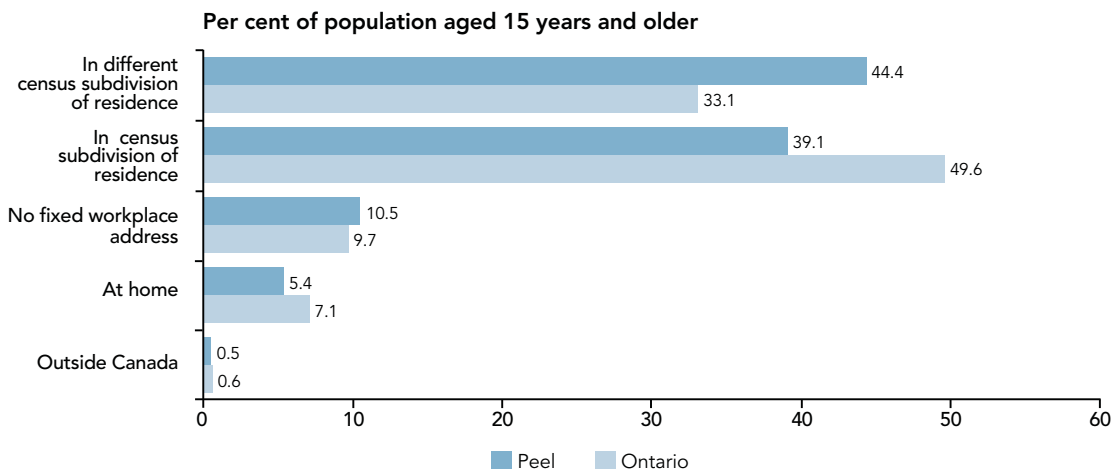
Psychosocial conditions can greatly impact stress and health among employees in all types of jobs. Susceptibility to illness and injury due to psychosocial work conditions can be the result of experiencing low control and rewards on the job, coupled with high demands and effort put forth by the employee.[100,101]

Employment and Health

The rate of work-related injuries and poor health is higher for workers with lower socioeconomic status, not only because they tend to be employed in jobs with more hazardous physical conditions but also because they are more likely to experience higher job demands, low-decision-making latitude and stress.[55,102] In Peel and Ontario, 9% and 6% of the population aged 20 to 64 years respectively reported having extreme levels of work stress (data not shown).[B]

Figure 2.13
**Usual Place of Work,
Peel and Ontario, 2006**

Per cent of population aged 15 years and older

Place of work	Peel	Ontario
In different census subdivision of residence	44.4	33.1
In census subdivision of residence	39.1	49.6
No fixed workplace address	10.5	9.7
At home	5.4	7.1
Outside Canada	0.5	0.6

Source: 2006 Census, Statistics Canada

The Environment

The impact of the physical environment on health is complex. For the purposes of delineating the impacts of the physical environment on health, we will differentiate between the 'physical environment' and the 'built environment', though the two are not mutually exclusive.
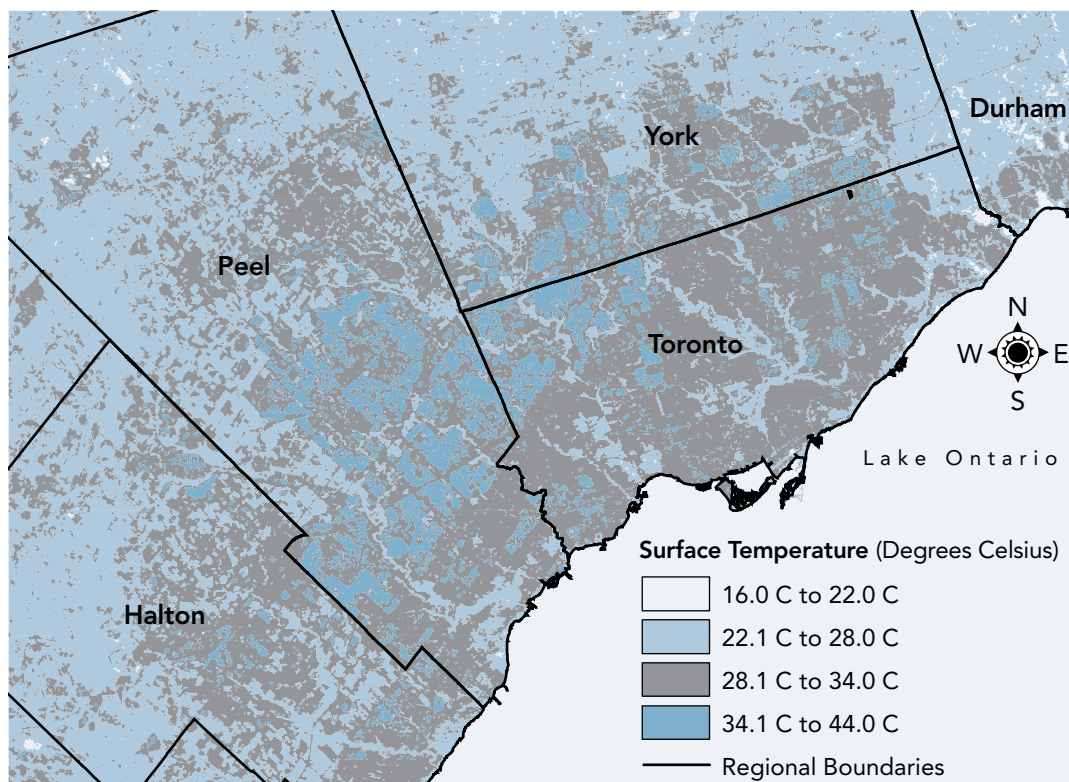
The Physical Environment

Many aspects of the physical environment (e.g., air, water, soil and climate) greatly impact human health. Environmental exposure - dependent on the degree and duration, and contaminants in the physical environment - can produce a variety of adverse health effects. Multiple exposures to things in the physical environment may act together, producing combined effects, or they may act alone.

Air pollution has adverse health effects ranging in severity from mild irritation of the eyes or nose to more serious effects such as premature death. Pollutants can be natural or man-made and the causes of poor air quality result from motorized transportation, industrial plants and processes, power generation, road dust, and forest fires. Children, seniors and individuals with allergies, asthma, conditions of the heart and/or lung, as well as those who work or exercise outside can be especially vulnerable to poor air quality.

Those who live in close proximity to major roads are also more vulnerable to transportation-related pollution such as particulate matter. Particulate matter ($PM_{2.5}$) consists of minute particles (smaller than 2.5 microns) of solid or liquid matter. These particles stay suspended in the air in the form of dust, mist, aerosols, smoke and soot. $PM_{2.5}$ is emitted from vehicle exhaust,

Map 2.7

Surface Temperature Variation in the Greater Tronto Area (GTA), August 10, 2002

Durham

York

Peel

Toronto

Halton

Lake Ontario

Surface Temperature (Degrees Celsius)

- 16.0 C to 22.0 C
- 22.1 C to 28.0 C
- 28.1 C to 34.0 C
- 34.1 C to 44.0 C
- Regional Boundaries

Source: Landsat 7, August 10, 2002
produced by Earth Science Sector of Natural Resources Canada
Projection: NAD 1983 UTM Zone 17N

0 5 10 20 Kilometers

industrial processes (combustion, incineration and construction), road dust and forest fires.

Documented health effects include higher rates of hospitalization for childhood asthma, premature death, higher rates of low-birth-weight babies, and poorer respiratory health or reduced lung function among children living by, or attending school, near high-traffic roadways.[103–107]

Across Peel in 2008, there were 71,200 residents living within 300 metres of 400-series highways, in addition to 10 schools and 48 recreational areas within 300 metres of these highways. Within this boundary, residents could be exposed to high levels of small air-borne pollutants such as $PM_{2.5}$.

Projected climate change also has health implications through environmental factors such as contaminated water, diminished outdoor air quality, ultra violet (UV) exposure, and vector- and rodent-borne exposure (e.g., Lyme disease and West Nile virus). Climate change over the long term will come with increases in severe and extreme weather conditions that will most likely impact Peel residents in the form of heat waves, which have the greatest impact in urban areas.[108] The urban heat island effect can elevate temperatures in urban areas as much as 3°C

? Did You Know

Urban Heat Island Effect (UHI)

The urban heat island effect is a phenomenon which produces temperatures from 1° to 6° C hotter in urban and suburban areas than in nearby rural areas. It occurs when the balance between vegetation and heat-absorbing surfaces (e.g., pavement, concrete, buildings, roads and other dark surfaces) is disturbed. Through shading and evapotranspiration (a process that absorbs solar radiation and cools the air around it), vegetation regulates ambient air temperature. The loss of trees and other plants due to development in urban areas reduces the natural cooling effects that vegetation provides.

higher than those in surrounding rural areas.[109] Vulnerable populations for heat-related premature deaths include older adults, young mothers and children living in shelters and people living in palliative care units. By the mid 2020s, the number of heat-related premature deaths among older population groups in southern Ontario is expected to rise.[110,111]

The Built Environment

Factors in the human-built environment such as housing, transportation systems and community infrastructure influence human physical and psychological well-being.

There is ever-increasing evidence linking the form of our cities to poor health outcomes. Urban sprawl (characterized by poor street connectivity and low-density housing, as well as wide separation of residential, retail, recreational and employment land uses) and dependence upon the automobile is associated with reduced physical activity, poor quality of air and water, increased pedestrian and motor vehicle injuries, and negative effects upon social capital (connections within a person's social network). Increased time spent commuting can lead to increased risk for injuries and stress as well as limited time for leisure activities, which can reduce social cohesion.

> *Suburban communities are built for cars, not people*

Neighbourhoods characterized as more walkable are associated with increased physical activity and social capital, and decreased overweight status, depression, and alcohol abuse.[99,112-114]

These community design factors impact how all residents live and go about their day; however, children, seniors, and the disabled may be at further disadvantage in sprawling neighbourhoods. There are fewer opportunities for children to incorporate physical activity into their day such as walking or biking to school because of long distances, hazardous streets, and insufficient sidewalks.[115] Urban sprawl also puts older and disabled people at increased risk of being isolated

and having less access to amenities and services if they are not able to drive to get to destinations safely and expediently.

'Supportive environments, healthy weights' is one of the program priorities in the 10-Year Peel Public Health Strategic Plan. Peel Health has been actively working with other Regional departments, including Planning, to implement policies that encourage healthier development patterns, such as:

Amending the Region of Peel Official Plan, which now clearly articulates the need to:

- **Implement Public Health Impact Studies where required as part of a complete development application; and**
- **Develop health indicators (e.g., Peel Healthy Development Index) to analyze the effectiveness of the Official Plan's Policies and to serve as a basis for policy adjustments.**

Propose amendments to Municipal Official Plans to align strategically with the direction set by the Region of Peel Official Plan and Peel's Healthy Development Index. For example, proposed engineering standards that will promote:

- **Creating active transportation by developing multiuse pathways located away from roads instead of on-road bike lanes; and**
- **Increasing walkability of a community by setting appropriate road and median widths.**

Suggested changes to the Provincial Policy Statement referencing the need for health assessment to be part of the municipal development application process has also been submitted to the Ministry of Municipal Affairs and Housing in September 2010.

Much of Peel's built form is characterized by sprawl. Therefore changes to make the environment more supportive and conducive to healthy living can play a role in the prevention of obesity and other chronic diseases such as diabetes, which has a high and rising prevalence in Peel. For example, if a 10% increase in walkability resulted in an average decrease in Body Mass Index (BMI) of 0.5 in adults aged 20 years and older then we would expect 2,460 fewer cases of diabetes caused by overweight and obesity in Peel.[116]

Another concept related to the built environment that has been proposed to affect health behaviours, such as diet and physical activity, is deprivation amplification. This suggests that individual or household deprivation (e.g., low income) is amplified by area level deprivation (e.g., lack of affordable amenities conducive to healthy living such as nutritious food, recreational space, or public transportation). With increased focus on environmental characteristics (as opposed to individual characteristics) in influencing health and health-related behaviours over the past few decades, it has been suggested that areas in which poorer people live may have poorer environments and less access to health promoting amenities, which has coincided with the higher levels of obesity in deprived neighbourhoods. However, a recent review of the deprivation amplification concept reveals that the empirical evidence may not fully support this theory.[117]

For example, 'food deserts' (a term coined in the mid-1990s), proposes that inner city areas do not have affordable, nutritious food available within a walkable distance and the only food resources are corner shops where prices are high and access to fresh fruit and vegetables is limited or non-existent. However, there is little empirical evidence to support this phenomenon except in the US. In the UK, large multiple supermarkets were actually more likely to be located in deprived neighbourhoods, and that any differences in the pricing of food actually

favoured the poorer neighbourhoods.[118] This 'food desert' pattern of fewer grocery stores in low-income areas is not seen in Peel either.

The geographical distribution of fast food outlets has also been examined due to their association with serving high-fat, processed foods. Another UK study showed that fast food outlets were not concentrated in poorer residential areas, but rather in the central business district and retail parks, and along arterial roads.[119]

In Peel, an examination of fast food outlets by neighbourhood income appears to show that lower income areas tend to have a higher proportion of fast-food outlets; however, it may be necessary to look at other aspects of those neighbourhoods (e.g., population density, land-use) to explain why fast-food outlets tend to congregate in certain areas.

In addition to where one lives, characteristics of one's dwelling such as the age of the home can influence indoor air and water quality which can also impact health. Exposures to things such as lead in piping in older homes, mold or exposure to tobacco smoke within the home can increase risks for a variety of health conditions. Pregnant women, fetuses and young children are especially sensitive to the effects of these kinds of exposures.

Most of the residents in Peel own their own home (78%) and the proportion of dwellings that need major repairs (4%) is lower than that in Ontario (7%). This is likely related to the number of new housing developments in Peel. Peel also has a higher proportion of households with six or more persons (8% for Peel compared to 3% for Ontario) (Appendix 3).

> **Definition**
>
> The *'early years'* typically refers to the period of time from the prenatal period up to age six.

Healthy Child Development

The health of children is influenced by many factors related to the determinants of health. A woman's health before and during pregnancy lays a biological foundation for an infant's health. Also, the relationships, experiences, and nutrition that a child receives greatly influence health outcomes in later adolescent and adult years. These concepts of nutrition and relationships will be described further.

The importance of early, positive life experiences on the developmental trajectories of children has prompted policy makers to make substantial and sustainable investments in these critical early years. Some examples of these investments concern preconception and prenatal health, early childhood care, education and school readiness.[120-124]

Our understanding of early child development is based on a convergence of neuroscience, molecular biology, genetics and the behavioural and social sciences which help to describe the various roles and interactions between genetics and the environment. New evidence is illustrating that early experiences, some of which are cumulative, are biologically embedded in the development of multiple organ systems, with long-term impacts on cardiovascular health, metabolic health, mental health and substance abuse, as well as the mastery of cognitive, linguistic, and social skills.[125] A safe and supportive environment, stable and responsive relationships, and appropriate nutrition are considered to be foundational for healthy development.[122]

Children who grow up in families or communities with low socioeconomic status appear to be particularly vulnerable to the biological contribution of disease risk (e.g., through excessive stress due to neighbourhood risk factors, poor parental responsiveness, or increased exposure to environmental toxins). However, new research is also attempting to explain individual differences in biological sensitivity to these types of exposures. This

will help us understand why some children do well in the face of adversity and why selected interventions appear to be effective for some children and not for others.[122,125]

Relationships

How parents interact with their children and the relationship that develops between a child and parent is critical for intellectual, social, emotional, and physical development.[124] It also impacts a child's readiness to learn as they enter school. Children with nurturing, involved parents tend to perform better in school and possess more social skills when it comes time to start kindergarten.[126]

Parents who are less responsive have more punitive and conflicted parenting styles. As a result, their children are more likely to experience adverse conditions that can lead to repeated physiological and emotional disruptions. This can impact the area of the brain tied closely to the regulation of emotional and social behaviour, reasoning capacity, language skills, and stress reactivity.[122]

One measure that is used to assess positive parenting capacity and interaction is the 'Parenting Consistency Scale'. Using a scale, respondents with children aged two to 11 years are asked a series of questions about their level of interaction between themselves and their child. Table 2.16 shows the per cent of Peel respondents by frequency of the different types of parent-child interactions in 2006. Most parents reported that they participated in positive parenting consistently and frequently.

Environments

Many factors of the child's environment are influenced by their care givers' health behaviour. Exposures to things such as tobacco smoke, domestic violence and safety hazards can be of concern to the child's social, emotional, and physical development. As children continue to grow, their own behaviours begin to have an impact on their health, but these are also influenced by their social and physical environment. For example, a child's eating and physical activity behaviour as it relates to healthy weight status is influenced by his/her parent's behaviour and the overall family environment.[127-129]

Table 2.16
Frequency of Parent/Child Interactions, Peel, 2006

Type of Interaction	Many times each day (%)	One or two times a day (%)	A few times a week or less (%)
Praising† the child	72.1	20.9	7.0*
Talking or playing with the child just for fun	64.1	28.5	7.3*
Laughing with the child	75.0	18.4	6.5*
Doing something special with the child that the child enjoys	31.7	24.2	44.1
Playing games with the child under two years old or playing games, sports or hobbies with the child aged two to eleven years	22.5	26.7	50.8

* Use estimate with caution
† According to High Scope Curriculum, a teaching philosophy used by Region of Peel Learn Play Care Centres, encouragement should be used instead of praise. Praise tends to impose a value judgement, whereas encouragement can be more constructive, offers specific feedback to the behaviour, and focuses on effort and improvement.
Source: Rapid Risk Factor Surveillance System, 2006, Peel Public Health

Early Learning

Another way to consider the degree to which children have had a positive start at a community level is to look at the number of children who are ready for Grade 1.

Definition

Early Development Instrument

The *Early Development Instrument (EDI)* is an assessment tool that measures the extent to which senior kindergarten children are ready for school. There are five domains that are assessed by senior kindergarten teachers: physical health and well-being; social competence; emotional maturity; language and cognitive development; and communication skills and general knowledge.[130]

Vulnerable score - Children scoring below the 10th percentile on one or more domains are considered to be 'vulnerable' (bottom 10th percentile) in terms of school readiness and are more likely to be limited in their ability to meet the task demands of school.

Very ready score - Children scoring above the 75th percentile on one or more domains are considered to be 'very ready' for school and are expected to have few difficulties in their readiness for school.

Table 2.17 presents the proportion of children who were considered 'vulnerable' or 'very ready' for school in 2007 and 2010 across Peel and the area municipalities. In Peel, there has been a slight increase in the proportion of children 'very ready' for school between 2007 and 2010. The proportion of 'vulnerable' children was lower in 2010 compared to 2007 with the exception of Mississauga where there was a slight but insignificant increase.

Maps 2.8 and 2.9 show the per cent of children who are 'vulnerable' or 'very ready' for school by data zone for 2010. There are two data zones where the proportion of children considered 'ready for school' is significantly lower in comparison to Peel overall – these are data zones B4 and B5 in Brampton (Map 2.8). In 2010, there were three data zones that had a significantly higher proportion of children who were classified as 'vulnerable' as compared to Peel – these were data zones B5 in Brampton, and M7, M8 in Mississauga (Map 2.9).

In addition to the Peel school boards, there are many agencies in Peel that offer preschool programming. These data are useful to identify potential areas where community engagement in preparing children for school can be enhanced so that more children are ready for school when they start Grade 1.

Table 2.17

Per cent of Children Vulnerable or Very Ready for School on One or More EDI Domains, Peel, Caledon, Brampton and Mississauga, 2007 and 2010

	Peel		Caledon		Brampton		Mississauga	
	2007	2010	2007	2010	2007	2010	2007	2010
Per cent Vulnerable	31.8	30.3	22.9	22.4	30.7	22.9	29.9	30.7
Per cent Very Ready	56.8	58.8	68.1	65.9	52.7	56.8	59.1	60.1

Source: Early Development Instrument, 2007, 2010, Region of Peel

Map 2.8

Per cent of Senior Kindergarten Children Very Ready on One or More Domains of the Early Development Instrument by Data Zone, Peel, 2010

Overall Peel Rate:
58.8% (95% CI: 58.0% – 59.7%)

- Significantly below Peel Rate
- Same as Peel Rate
- Significantly above Peel Rate
- Municipal Boundaries

Statistical significance based on 95% Confidence Intervals (CI)

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).
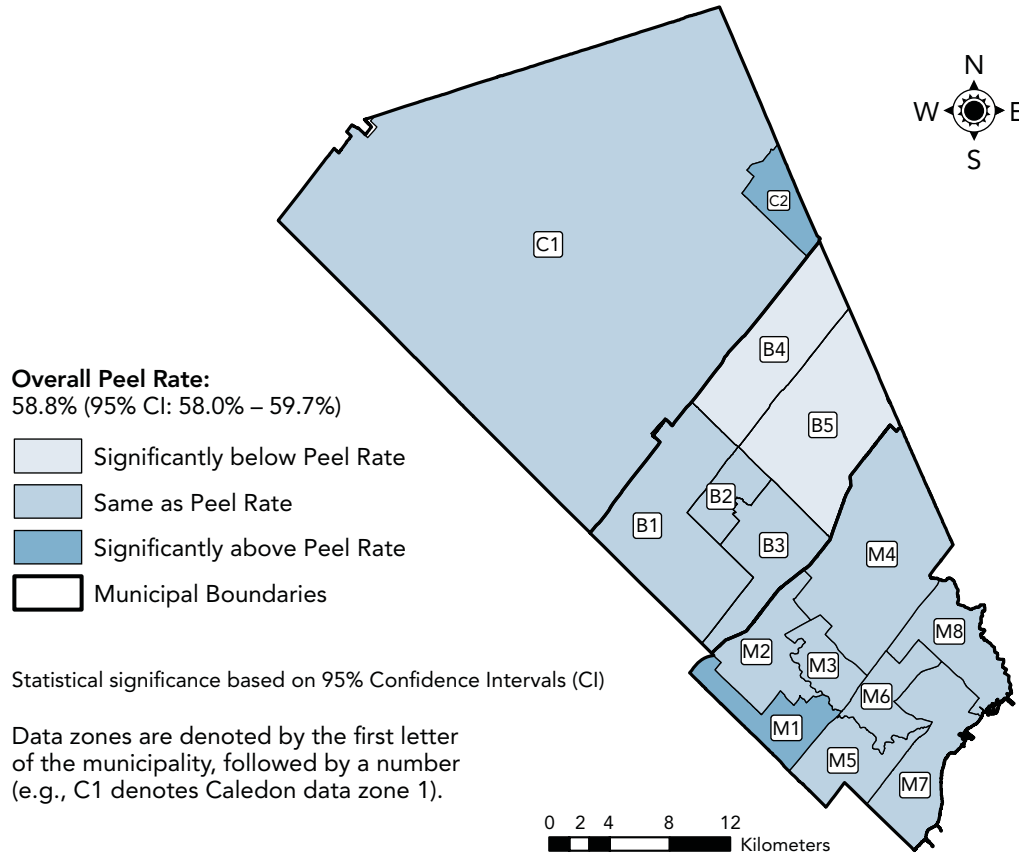
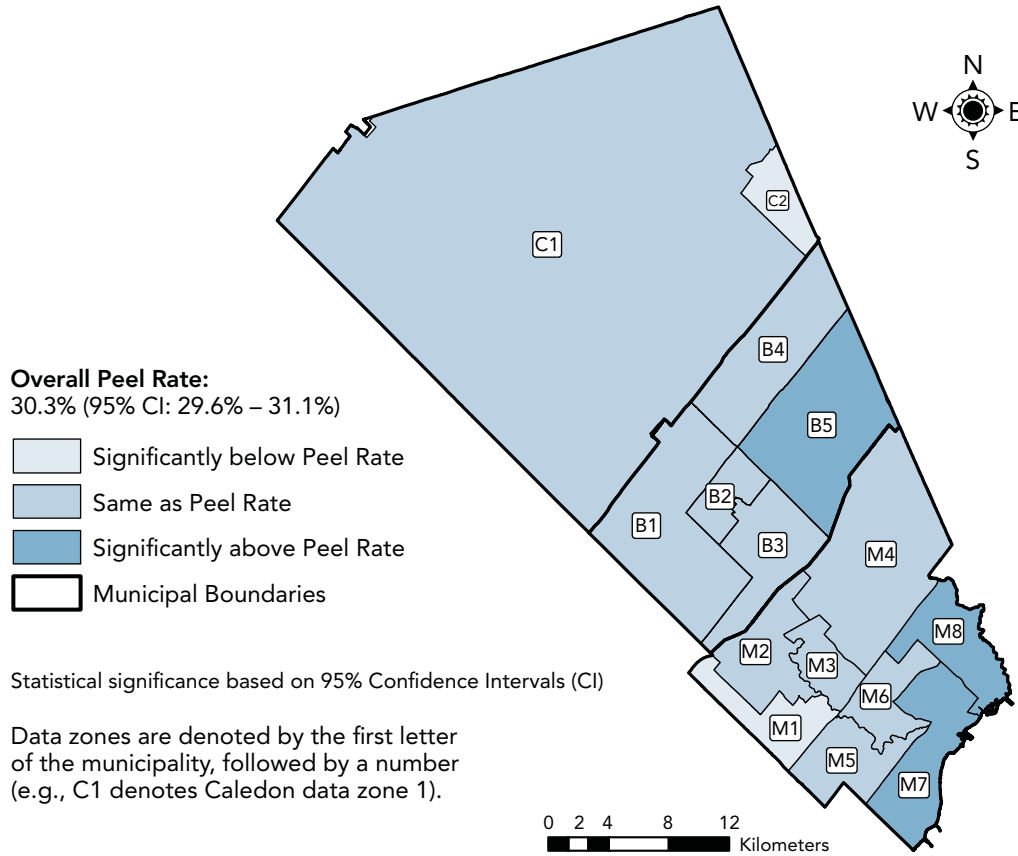| Data Zone	Valid EDI Cases	Very Ready		95% Confidence Intervals	
		Number	Per cent	Lower	Upper
Brampton Results					
B1	1,607	995	61.9	59.5	64.3
B2	965	536	55.5	52.4	58.7
B3	1,032	610	59.1	56.1	62.1
B4	1,355	743	54.8	52.2	57.5
B5	1,428	747	52.3	49.7	54.9
Caledon Results					
C1	357	219	61.3	56.2	66.3
C2	286	205	71.7	66.2	76.6
Mississauga Results					
M1	1,147	730	63.6	60.8	66.4
M2	794	483	60.8	57.4	64.2
M3	660	389	58.9	55.1	62.6
M4	1,143	654	57.2	54.3	60.1
M5	505	319	63.2	58.9	67.3
M6	728	448	61.5	58.0	65.0
M7	977	564	57.7	54.6	60.8
M8	683	399	58.4	54.7	62.1

Note: There were 13,667 Valid EDI cases in Peel region in 2010 excluding children with Special Needs
Source: Early Development Instrument, 2010, Region of Peel

Map 2.9

Per cent of Senior Kindergarten Children Vulnerable on One or More Domains of the Early Development Instrument by Data Zone, Peel, 2010

Overall Peel Rate:
30.3% (95% CI: 29.6% – 31.1%)

Significantly below Peel Rate

Same as Peel Rate

Significantly above Peel Rate

Municipal Boundaries

Statistical significance based on 95% Confidence Intervals (CI)

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).

Data Zone	Valid EDI Cases	Vulnerable		95% Confidence Intervals	
		Number	Per cent	Lower	Upper
Brampton Results					
B1	1,607	458	28.5	26.4	30.8
B2	965	292	30.3	27.4	33.2
B3	1,032	323	31.3	28.5	34.2
B4	1,355	394	29.1	26.7	31.6
B5	1,428	495	34.7	32.2	37.2
Caledon Results					
C1	357	90	25.2	21.0	30.0
C2	286	54	18.9	14.8	23.8
Mississauga Results					
M1	1,147	295	25.7	23.3	28.3
M2	794	247	31.1	28.0	34.4
M3	660	187	28.3	25.0	31.9
M4	1,143	350	30.6	28.0	33.4
M5	505	154	30.5	26.6	34.7
M6	728	221	30.4	27.1	33.8
M7	977	338	34.6	31.7	37.6
M8	683	245	35.9	32.4	39.5

Note: There were 13,667 Valid EDI cases in Peel region in 2010 excluding children with Special Needs
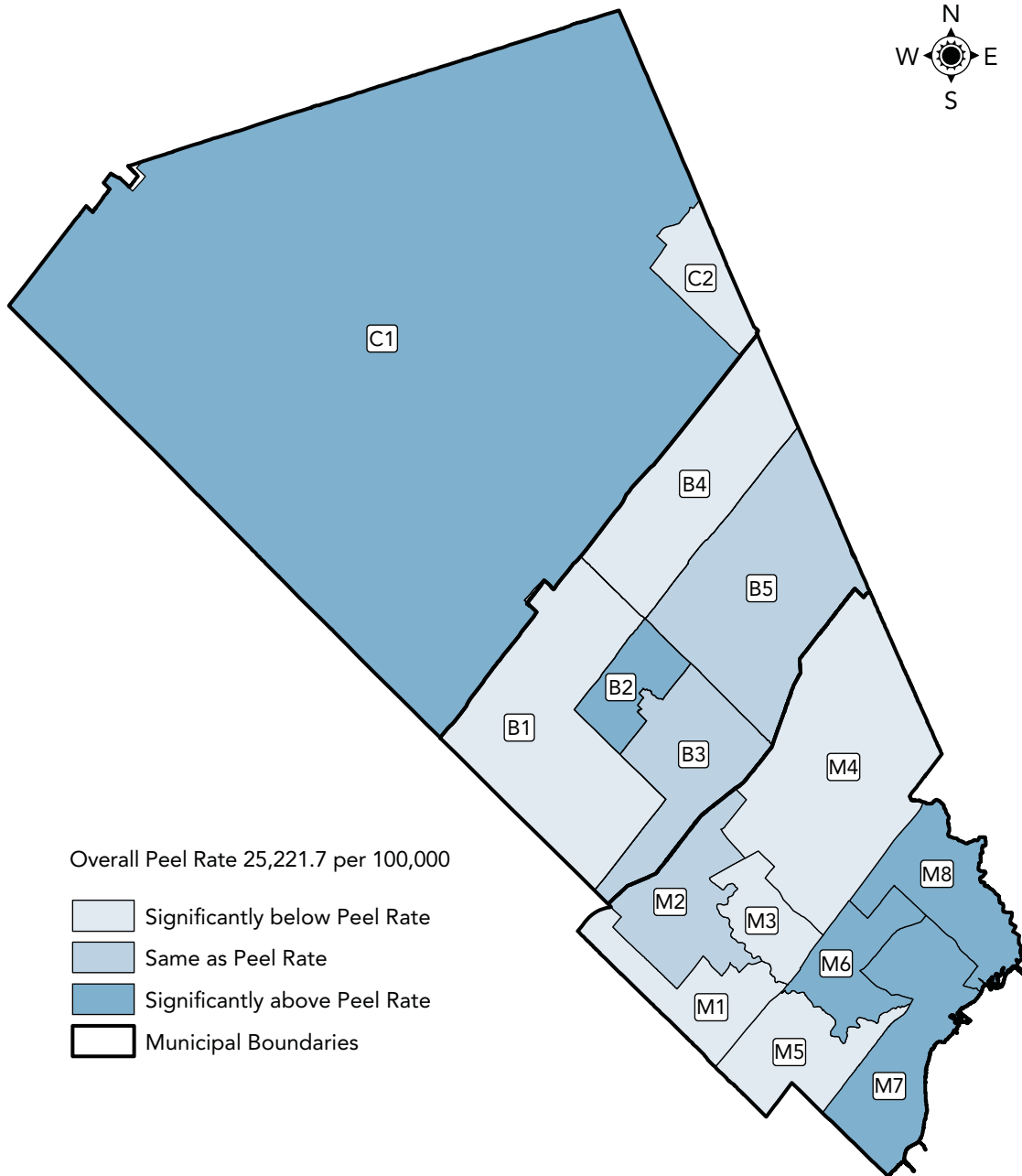Source: Early Development Instrument, 2010, Region of Peel

Health Services

In Canada, provincial health-care systems provide health services to all citizens on uniform terms and conditions. The main purpose of the universal health-care system is to protect the health of citizens and spread health costs across the entire population. This type of system is especially effective in protecting individuals who cannot afford private health-care insurance.

Preventive and primary health-care services such as prenatal care, routine immunization and disease screening are critical for maternal and child health.[131,132] For example, Canada's implementation of a two-dose measles immunization program in 1995 was followed by a seven-fold decrease in the incidence of reported measles in 1996.[114] Other prevention strategies such as screening for disease have also shown positive outcomes such as mammography screening to reduce breast cancer mortality among women aged 39 to 69 years.[133]

This complexity of seeking care and the factors that influence where people go for medical care is shown in Maps 2.10, 2.11 and 2.12. Up until October 2007, Peel Memorial Hospital operated in data zone B2. In 2007, there were high rates of Emergency Department (ED) visits for residents in data zone B2. All hospital services were transferred in October 2007 to the Brampton Civic Hospital, located in data zone B5. In 2008, the ED visit rate for B2 declined significantly, while increasing significantly for B5. By 2009, data zones bordering B5 also had significantly higher rates of ED visits. Does health status drive health-care utilization rates or is it likely in this case that access to care in this area resulted in changes in health-care utilization?
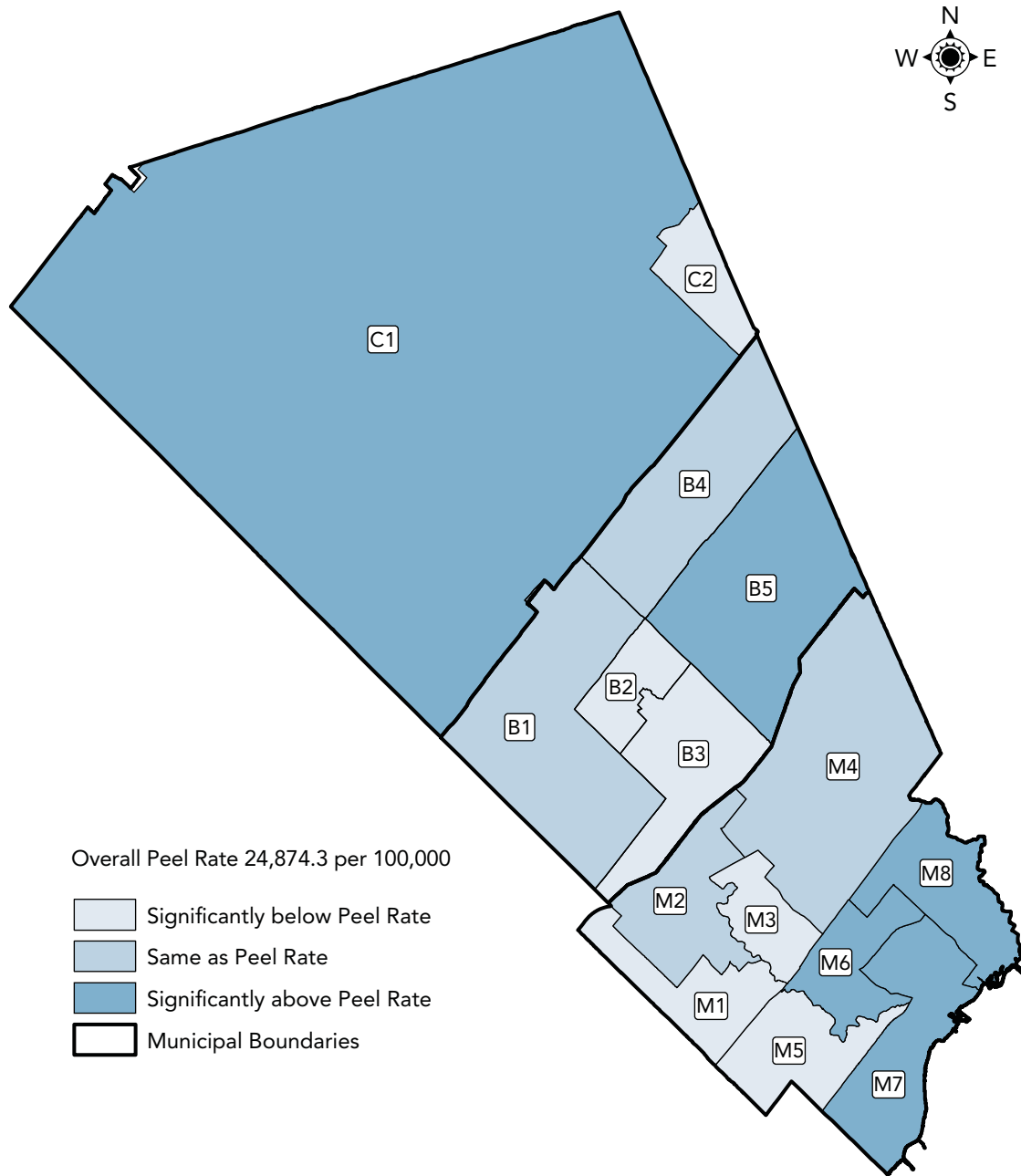
Map 2.10

**Emergency Department (ED) Visits by Data Zone,
Peel, 2007**

Overall Peel Rate 25,221.7 per 100,000

Significantly below Peel Rate

Same as Peel Rate

Significantly above Peel Rate

Municipal Boundaries

Data zones are denoted by the first letter
of the municipality, followed by a number
(e.g., C1 denotes Caledon data zone 1).

0   2   4   8   12
Kilometers

Notes: Rate is age-standardized to the 1991 Canadian population
Source: National Ambulatory Care Reporting System Data 2009, Intellihealth Ontario, Ministry of Health and Long-Term Care
2001 and 2006 Census, Statistics Canada. 2002-2005 and 2007+ population counts have been estimated from 2001 and
2006 Census counts using a straight line estimation method

Map 2.11

Emergency Department (ED) Visits by Data Zone, Peel, 2008

N
W E
S

C2

C1

B4

B5

B2

B1

B3

M4

M8

Overall Peel Rate 24,874.3 per 100,000

Significantly below Peel Rate

Same as Peel Rate

Significantly above Peel Rate

Municipal Boundaries

M2

M3

M6

M1

M5

M7

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).

0   2   4   8   12
Kilometers

Notes: Rate is age-standardized to the 1991 Canadian population
Source: National Ambulatory Care Reporting System Data 2009, Intellihealth Ontario, Ministry of Health and Long-Term Care 2001 and 2006 Census, Statistics Canada. 2002-2005 and 2007+ population counts have been estimated from 2001 and 2006 Census counts using a straight line estimation method

Map 2.12

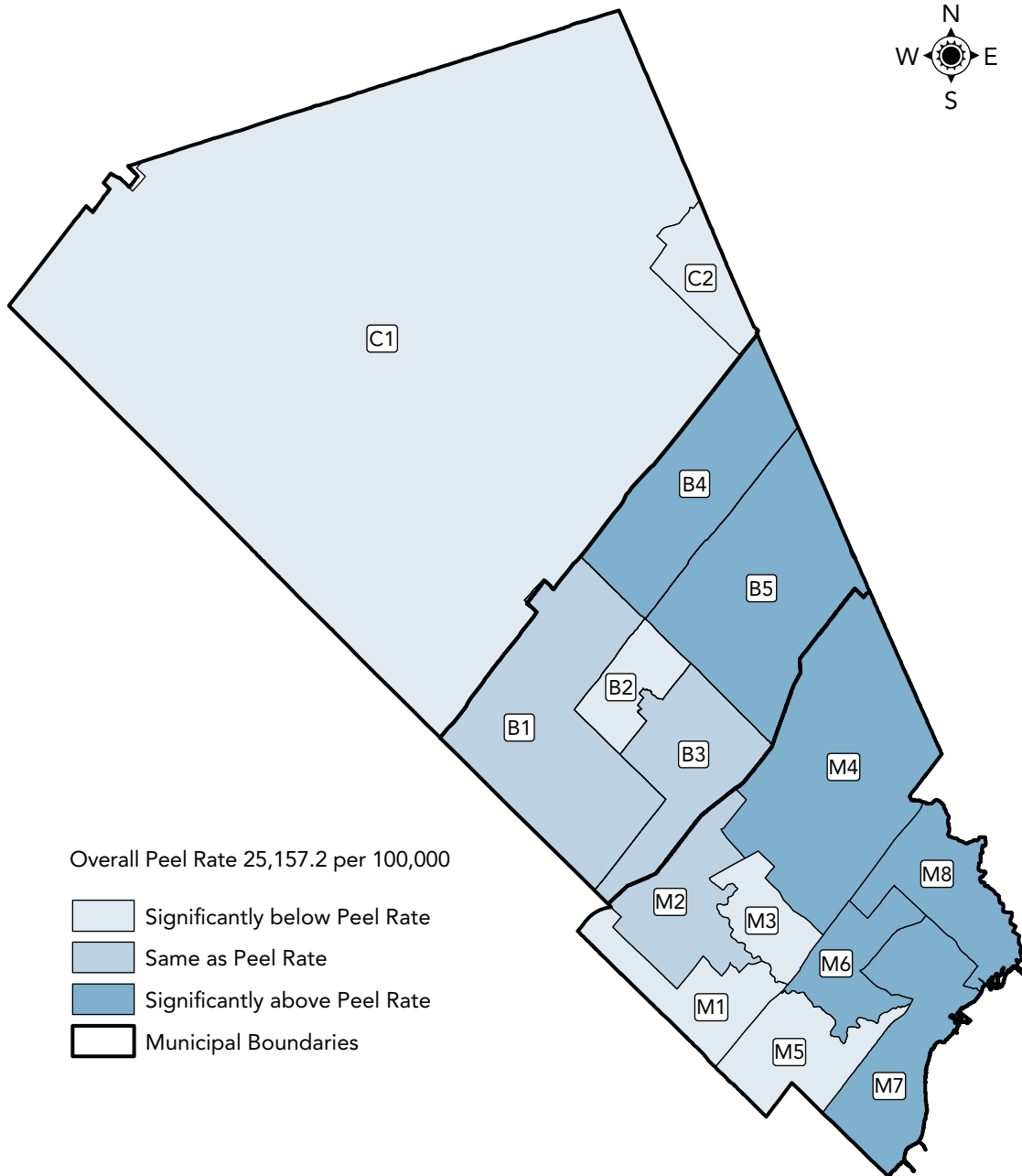**Emergency Department (ED) Visits by Data Zone, Peel, 2009**

N
W E
S

C2

C1

B4

B5

B2

B1

B3

M4

M2

M8

M3

M6

M1

M5

M7

Overall Peel Rate 25,157.2 per 100,000

Significantly below Peel Rate

Same as Peel Rate

Significantly above Peel Rate

Municipal Boundaries

Data zones are denoted by the first letter
of the municipality, followed by a number
(e.g., C1 denotes Caledon data zone 1).

0   2   4   8   12
Kilometers

Notes: Rate is age-standardized to the 1991 Canadian population
Source: National Ambulatory Care Reporting System Data 2009, Intellihealth Ontario, Ministry of Health and Long-Term Care
2001 and 2006 Census, Statistics Canada. 2002-2005 and 2007+ population counts have been estimated from 2001 and
2006 Census counts using a straight line estimation method

Access to Medical Services

Ninety-two per cent of Peel's population in 2007/2008 reported having a regular medical doctor which is a rate similar to that for Ontario (91%).[B] A contrasting picture (Figure 2.14) describes the ratio of physicians to the population for Peel. The two Local Health Integration Networks (LHINs) in Peel, Central West and Mississauga Halton, have a lower rate of physicians per population than other LHINs in the province.
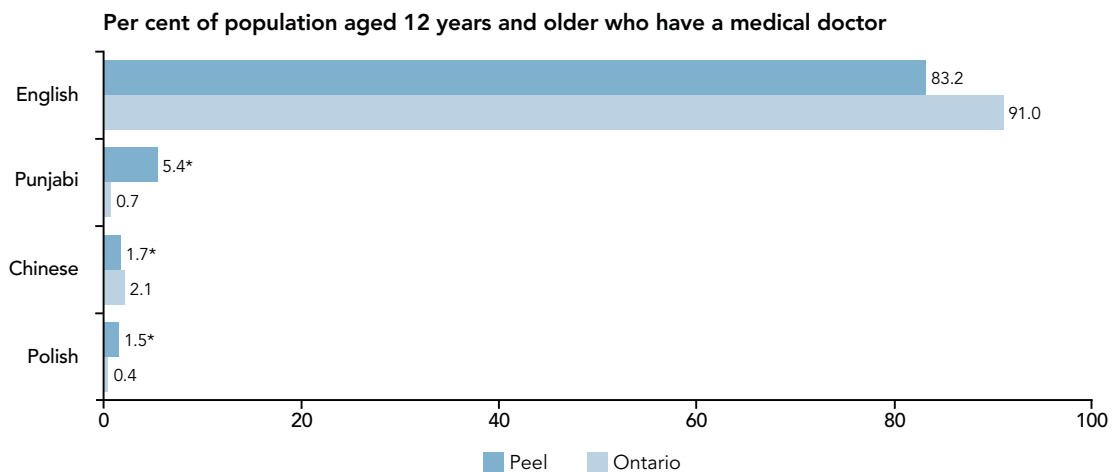
Figure 2.14

Active General Practitioner/Family Physicians (GP/FPs) by Local Health Integration Network (LHIN), 2003/2004
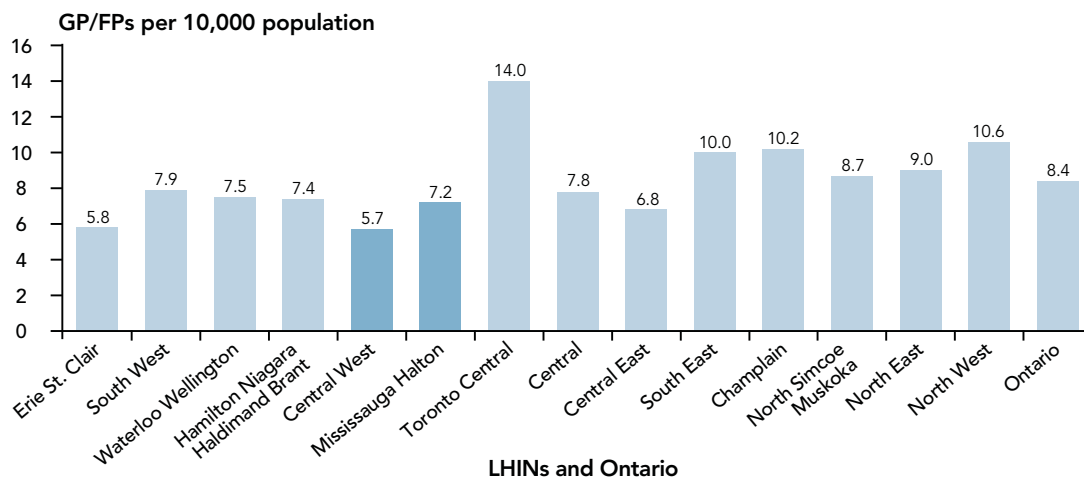
Source: Jaakkimainen L, Upshur REG, Klein-Geltink JE, Leong A, Maaten S, Schultz SE, Wang L, editors. Primary Care in Ontario: ICES Atlas Toronto: Institute for Clinical Evaluative Sciences; 2006
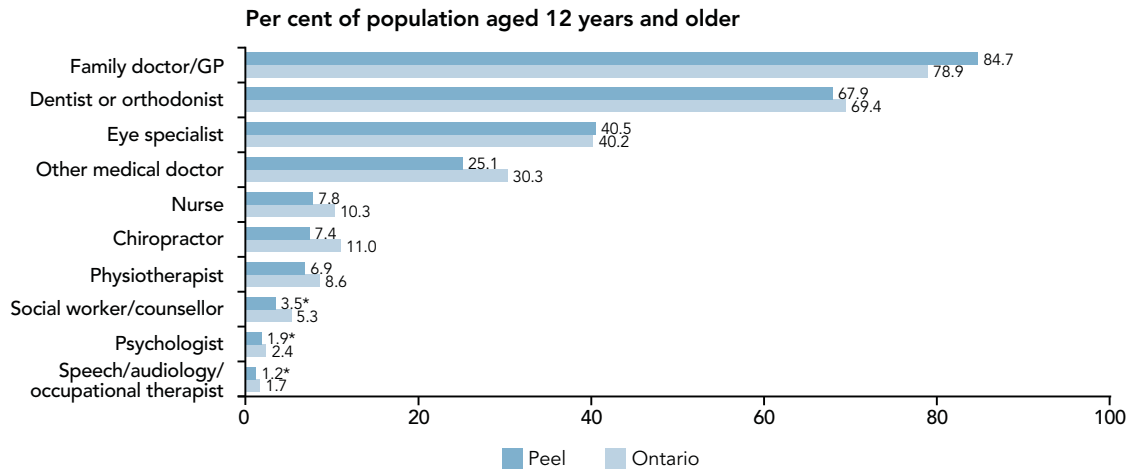
Figure 2.15

Top Four Languages Spoken to Doctors, Peel and Ontario, 2007/2008

* Use with caution
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Figure 2.16

**Type of Medical Care Sought,
Peel and Ontario, 2007/2008**

Per cent of population aged 12 years and older

Category	Peel	Ontario
Family doctor/GP	84.7	78.9
Dentist or orthodontist	67.9	69.4
Eye specialist	40.5	40.2
Other medical doctor	25.1	30.3
Nurse	7.8	10.3
Chiropractor	7.4	11.0
Physiotherapist	6.9	8.6
Social worker/counsellor	3.5*	5.3
Psychologist	1.9*	2.4
Speech/audiology/occupational therapist	1.2*	1.7

■ Peel   ■ Ontario

* Use with caution
Source: Canadian Community Health Survey 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Within Peel, 83% of the population speak English to their doctor compared to 91% in Ontario. An additional 9% speak to their doctor in Punjabi, Chinese or Polish (Figure 2.15).

As shown in Figure 2.16, the most common type of medical care sought by Peel residents is a visit to the family doctor, followed by dentist or orthodontist and then eye specialist.

In Peel, in 2007, fewer than 300,000 visits were made to the emergency department and there were approximately 72,000 admissions to hospital. Peel's rate of emergency department (ED) visits and hospitalization is much lower than that of the province (data not shown). Rates for both ED visits and hospitalization in Peel and Ontario have been declining since 1997.

This decline in ED visits and hospitalizations may be the result of several factors:

- Declining smoking rates may be resulting in lower cardiac (e.g., heart attack) and respiratory illness requiring hospital care;

- Early detection of illness is improving, thus people are under treatment sooner and avoid more serious events;

- Improved treatments and care are available from physicians in settings other than the ED or hospital;

- Better immunization rates for some vaccine preventable diseases (e.g., the Ontario Universal Flu Shot program was implemented in October 2000); and

- Increased availability of health-care services in the community, including access to Family Health Teams (initiated in April 2005), walk-in clinics and TeleHealth services (initiated February 2000).[134-137]

Beyond this, Peel's ED visit rates may be lower than Ontario's because of Peel's:

- Lower provision of emergency departments which means people seek care elsewhere;

- Younger population which may have fewer age-related heart disease cases or fall-related visits;

- Lower prevalence of obesity and overweight than Ontario, which may result in fewer obesity-related illnesses than the province;

- Slightly higher socioeconomic status (slightly more wealthy and better educated) than the province, which could result in healthier behaviours; and

- Higher proportions of recent immigrants to Peel create a 'healthy immigrant effect' that could result in fewer ED visits compared to other areas in the province.[136-138]

Discussion

Throughout this chapter, individual determinants of health have been portrayed with selected health outcomes or behaviours (e.g., income and smoking; education and physical activity). While this is helpful when describing the profile of the determinants of health for Peel and to identify disparities, it does not allow us to understand fully what the most important determinant or set of determinants are in relation to a health outcome or health behaviour of interest. In fact, this type of analysis could lead the user of the information to make erroneous conclusions.

RELATIONSHIPS AMONGST THE DETERMINANTS OF HEALTH

In chapter 2 of this report, we described the relationships between the individual determinants of health and selected health behaviours. In order to understand these relationships better, this chapter describes logistic regression modelling techniques to examine the independent effect of each of the determinants of health on the outcome of interest. Logistic regression methods incorporate multiple variables into the analysis. The results provide a more accurate assessment of an outcome of interest by considering how several dependent variables vary together. Four health outcomes and health behaviours were examined: self-rated general health status, binge drinking, overweight and obesity and current smoking status.

Details about the methods can be found in the Data Methods section of this report.

Self-Rated Health

Eighty-eight per cent of Peel residents report having positive self-rated health in 2007/2008 (Figure 3.1).

Table 3.1 presents the unadjusted, and adjusted odds ratios from the logistic regression model for poor self-perceived health. An odds ratio of less than 1 is protective, while an odds ratio of greater than 1 describes the magnitude of the risk.

What does this tell us?

Self-reported measures of health have been shown to be good predictors of morbidity and mortality. We explored a number of socioeconomic status and behavioural factors available from the Canadian Community Health Survey (CCHS) in order to identify both risk and protective factors related to poor self-rated health.

Consistent with other studies, increasing age was found to be significantly associated with poor self-rated health. Individuals are more likely to experience health-related problems later in life and are therefore more likely to report poorer health outcomes when compared to younger age groups. Consistent with the literature, the analysis found males to be less likely to report poor self-rated health when compared to females.

This may be attributed in part to the unique stresses that women may experience as a result of trying to accommodate role expectations both at home and at work. In addition, some authors note that depression and anxiety disorders are more common in women which may impact the way they evaluate their health status.[139]

Previous studies have demonstrated that poor self-rated health is associated with lower education level.[140] In our analysis, those with less than secondary education were 51% more likely to report poor self-rated health relative to those who were post-secondary graduates. Education may play a role in increasing self-efficacy, which in turn may help safeguard individuals against adopting unhealthy behaviours.

Social relations in the form of social capital, support and networks have been demonstrated to be an important determinant of self-rated health.[141-143] It is assumed that the quality of these social interactions results in psychological reactions that may in turn affect health.[144] Those who were single were 48% more likely to report self-rated health. In addition, those reporting a weak sense of belonging to local community were 59% more likely to report poor health.

Further, several studies have shown the effects of high job demands in combination with low job control to be detrimental to health.[145] Although variables to assess job demand and control were not used in the present analysis, results did show that being without a job was significantly associated with poor self-rated health, a finding consistently reported in the literature.[146,147] In addition, respondents who reported a high degree of life stress were almost three times more likely to report poor health when compared to respondents reporting no stress.

Lifestyle factors such as smoking, physical inactivity, alcohol intake and obesity have been found to be strongly related to impaired self-rated health.[34,148] We found similar results in our present analysis. Poor self-rated health was more common among those physically inactive, those underweight or obese and those who reported being current smokers. However, contrary to the literature, our analyses found that those who reported weekly alcohol consumption were less likely to report poor health. Dichotomizing alcohol use as 'yes' or 'no' may fail to capture the frequency and amount consumed and mask the effect of alcohol use on self-reported health.

Figure 3.1

Prevalence of Positive[†] Self-Rated Health, Peel, 2000/2001, 2003, 2005, 2007/2008

Per cent of population aged 18 years and older
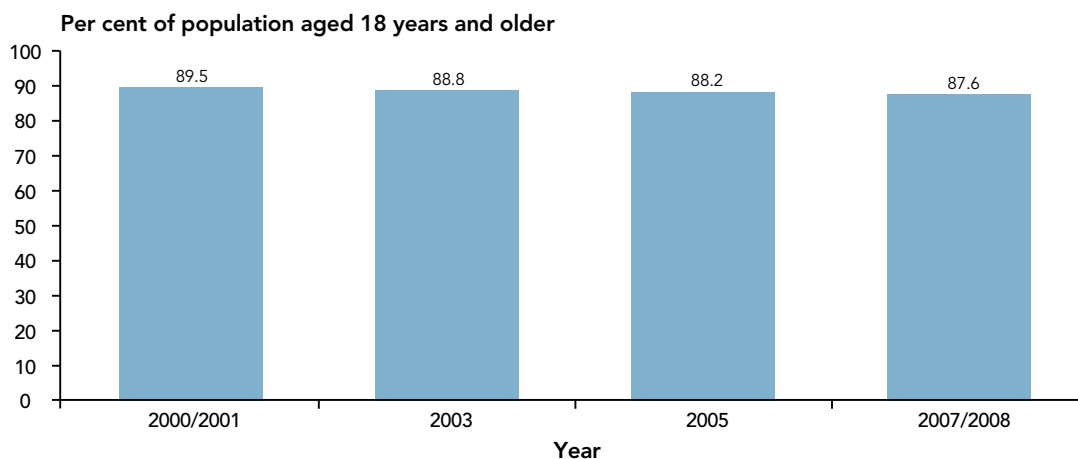
† Defined as excellent, very good or good self-rated health
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.1

Binomial Logistic Regression Analysis for the Association between Self-Reported Poor Health, the Determinants of Health and Behavioural Risk Factors, Peel, 2000/2001, 2003, 2005, 2007/2008 Combined, N=7,347

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Age	* 1.04 (1.03, 1.04)	* 1.05 (1.04, 1.05)
Sex		
Male	* 0.68 (0.56, 0.82)	* 0.78 (0.62, 0.98)
Female	1.0	1.0
Household income level		
Lowest to middle	1.42 (0.98, 2.06)	1.32 (0.85, 2.05)
Upper-middle	1.0	1.0
Highest	* 0.46 (0.38, 0.57)	* 0.61 (0.49, 0.77)
Educational level of respondent		
Less than secondary	* 2.63 (2.06, 3.36)	* 1.51 (1.16, 1.96)
Secondary graduate	* 1.30 (1.03, 1.64)	1.18 (0.93, 1.51)
Other post-secondary	0.73 (0.52, 1.04)	0.99 (0.67, 1.47)
Post-secondary graduate	1.0	1.0
Ethnicity		
White	1.0	1.0
Black	0.98 (0.67, 1.43)	0.94 (0.61, 1.48)
East/Southeast Asian	0.98 (0.67, 1.42)	1.27 (0.79, 2.04)
West Asian/Arab	0.68 (0.30, 1.50)	0.78 (0.31, 1.99)
South Asian	1.05 (0.76, 1.44)	0.95 (0.66, 1.37)
Latin and Other	1.24 (0.82, 1.87)	1.04 (0.67-1.61)
Immigrant status		
Recent immigrant	0.96 (0.69, 1.33)	1.01 (0.64, 1.60)
Long-term immigrant	* 1.71 (1.42, 2.06)	1.16 (0.93, 1.45)
Non-immigrant	1.0	1.0
Marital status		
Now married/common law	1.0	1.0
Divorced/separated/widowed	* 1.98 (1.59, 2.48)	1.00 (0.76, 1.30)
Single	* 0.66 (0.51, 0.84)	* 1.48 (1.08, 2.03)
Sense of belonging to local community		
Very strong/somewhat strong	1.0	1.0
Somewhat weak/very weak	* 1.59 (1.31, 1.93)	* 1.59 (1.27, 1.99)
Self-perceived life stress		
Quite a bit/extremely	* 2.32 (1.92, 2.79)	* 2.81 (2.26, 3.50)
Not at all/not very/a bit	1.0	1.0
Employment status in past week		
At work last week/absent last week	1.0	1.0
No job last week	* 1.78 (1.46, 2.17)	* 1.28 (1.01, 1.63)

* Indicates statistically significant findings (p<0.05)
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.1 Continued

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Behavioural Risk Factors		
Weekly alcohol consumption		
Yes	* 0.60 (0.49, 0.73)	* 0.73 (0.59, 0.92)
No	1.0	1.0
Smoking status		
Current smoker	1.24 (0.98, 1.57)	* 1.61 (1.22, 2.11)
Non-smoker	1.0	1.0
Physical activity level		
Active	1.0	1.0
Moderate	1.18 (0.86, 1.61)	1.00 (0.71, 1.41)
Inactive	* 2.06 (1.59, 2.66)	* 1.46 (1.12, 1.90)
BMI		
Underweight	* 2.45 (1.49, 4.03)	* 2.46 (1.39, 4.35)
Overweight	* 1.33 (1.08, 1.64)	1.23 (0.98, 1.57)
Obese	* 3.05 (2.41, 3.87)	* 2.68 (2.07, 3.46)
Normal	1.0	1.0

* Indicates statistically significant findings ($p < 0.05$)
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Binge Drinking

Peel has a significantly lower proportion of self-reported binge drinkers in 2007/2008 compared to Ontario (data not shown). The proportion of Peel's population that binge drinks has not changed over time (Figure 3.2).

The final regression analysis found several determinants of health to be significantly associated with binge drinking, including sex, age, income, education and ethnicity as well as immigrant status, marital status and work status. Among the other risk factors assessed, smoking and physical activity level were also found to be significant (Table 3.2).

What does this tell us?

The results of this regression analysis identify several important predictors of binge drinking in adults. The effect of age on binge drinking has been explored extensively, with individuals between the ages of 18 to 44 being more likely to binge drink. Our results suggest a similar association, with the odds of binge drinking decreasing as age increases. The youth and adolescent population has specifically been identified as a higher risk group in which onset of substance use usually occurs.[150]

We found a large effect by sex, with males being almost four times more likely to binge drink than females. This finding is consistent with the results of previous studies that have found a significant difference in binge drinking between males and females.[151,152] Running separate regressions based on sex (i.e., stratifying) may further highlight the differences in binge drinking between males and females, but could not be carried out in the present analysis due to the small number of respondents.

The effect of education has been shown to vary between sexes and age groups. Individuals who are more highly educated have been found to drink more frequently, but are less likely to binge drink. However, a significant positive association has been previously found between females and educational attainment, with more highly educated women being more likely to report drinking problems.[152] The results of our analysis showed that respondents who reported having some post-secondary education were significantly more likely to binge drink compared to those who were post-secondary graduates. Once again it might be important to further investigate the effect of sex by stratifying the analysis.

Figure 3.2
Prevalence of Binge Drinking[†],
Peel, 2000/2001, 2003, 2005, 2007/2008

Per cent of population aged 18 years and older
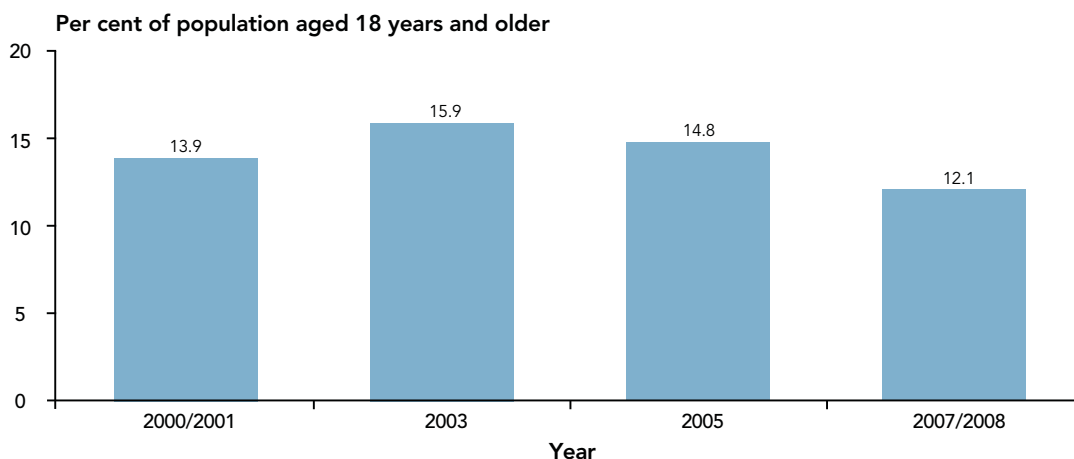
† Defined as consuming five or more drinks on one occasion at least once per month within the past 12 months
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

The effect of income on binge drinking remains unclear. Our analysis shows that respondents in the highest income group are more likely to binge drink compared to those in the upper-middle income bracket. While lower income has been associated with binge drinking, a similar relationship has also been found between higher income and binge drinking.[153,154] These mixed results could be due to differences between the populations being studied, or differences in the way income and socioeconomic status are defined and measured. Employment status was also explored as a determinant of health in the current analysis. In our results, respondents who reported not having a job in the past week were significantly less likely to binge drink.

Binge drinking has been shown to vary based on ethnicity, with differences being noted between visible minorities and individuals who identify as White.[155] We found a significant protective effect for respondents who identified as Black, East Asian, West Asian/Arab, or South Asian when compared to their White counterparts. Our analysis also showed that recent immigrants in Peel were 46% less likely to binge drink compared to non-immigrants. A similar pattern has been previously reported, with foreign born individuals being significantly less likely to binge drink than the native-born population.[156]

Marital status has been found to affect the likelihood of binge drinking. Married men and women have been shown to be significantly less likely to binge drink compared to those who are not married.[153] Our results also show

that those who are single are significantly more likely to binge drink in comparison to those who are married or in common-law relationships. No significant difference was found between individuals who were divorced, separated or widowed and those who were married or in a common-law relationship.

Several other risk factors and predictors were also included in the analysis. The significant association between binge drinking and smoking has been well documented.[153,156,157] The findings of our analysis also show this association; where current smokers were almost three times more likely to binge drink compared to those who have never smoked or no longer smoke.

Interestingly, those who reported being physically inactive were less likely to binge drink compared to highly active respondents. However, no significant difference in binge drinking was found between respondents who reported a moderate level of physical activity compared to those who were highly active. Several studies carried out in youth populations have shown a positive association between binge drinking and individuals who are involved in sport, especially in male adolescents.[158,159] While it may seem counter-intuitive that individuals who otherwise exhibit positive health behaviours and are physically active partake in problematic drinking behaviours, it is often the case that binge drinking and heavy alcohol consumption are a part of the subculture around sport and athletics.[159]

Alcohol use has also been previously identified as a risk factor for unintentional and intentional injury. This association may be especially relevant in adolescent and young adult populations that show a high prevalence of alcohol use.[160] However, our analysis did not show a significant association between binge drinking and injury for adults. It should be noted that our analysis was not restricted to youth populations, which might have contributed to a decreased magnitude of effect.

Table 3.2

Binomial Logistic Regression Analysis for the Association between Self-Reported Binge Drinking and the Determinants of Health and Behavioural Risk Factors, Peel, 2000/2001, 2003, 2005, 2007/2008 Combined, N=7347

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Age		
18 – 24	* 3.03 (2.23, 4.11)	* 2.19 (1.47, 3.26)
25 – 34	* 2.16 (1.64, 2.85)	* 1.89 (1.40, 2.56)
35 – 44	* 1.34 (1.03, 1.76)	* 1.42 (1.06, 1.92)
45 – 54	1.0	1.0
55 – 64	* 0.56 (0.38, 0.85)	* 0.61 (0.38, 0.94)
65 and older	* 0.32 (0.19, 0.55)	* 0.42 (0.23, 0.76)
Sex		
Male	* 4.20 (3.49, 5.06)	* 3.96 (3.24, 4.85)
Female	1.0	1.0
Household income level		
Lowest to middle	1.29 (0.77, 2.16)	1.51 (0.90, 2.51)
Upper-middle	1.0	1.0
Highest	* 2.21 (1.86, 2.62)	* 1.61 (1.31, 1.98)
Educational level of respondent		
Less than secondary	1.12 (0.89, 1.40)	1.12 (0.83, 1.52)
Secondary graduate	* 1.26 (1.01, 1.58)	1.07 (0.82, 1.40)
Other post-secondary	* 1.90 (1.44, 2.51)	* 1.40 (1.03, 1.91)
Post-secondary graduate	1.0	1.0
Ethnicity		
White	1.0	1.0
Black	* 0.36 (0.21, 0.60)	* 0.41 (0.23, 0.72)
East/Southeast Asian	* 0.30 (0.20, 0.47)	* 0.38 (0.23, 0.62)
West Asian/Arab	* 0.27 (0.10, 0.73)	* 0.29 (0.10, 0.83)
South Asian	* 0.26 (0.18, 0.37)	* 0.35 (0.23, 0.54)
Latin American and Other	0.69 (0.47, 1.01)	0.83 (0.53, 1.29)
Immigrant status		
Recent immigrant	* 0.26 (0.19, 0.35)	* 0.54 (0.37, 0.81)
Long-term immigrant	* 0.37 (0.30, 0.47)	0.85 (0.66, 1.11)
Non-immigrant	1.0	1.0
Marital status		
Now married/common law	1.0	1.0
Divorced/separated/widowed	0.81 (0.58, 1.12)	1.08 (0.74, 1.59)
Single	* 3.05 (2.53, 3.69)	* 1.74 (1.35, 2.23)
Sense of belonging to local community		
Very strong/somewhat strong	1.0	1.0
Somewhat weak/very weak	* 1.35 (1.13, 1.61)	1.07 (0.88, 1.30)

* Indicates statistically significant findings (p<0.05)
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.2 Continued

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Self-perceived life stress		
Quite a bit/extremely	0.98 (0.82, 1.20)	0.92 (0.74, 1.16)
Not at all/not very/a bit	1.0	1.0
Employment status in past week		
At work last week/ absent last week	1.0	1.0
No job last week	* 0.47 (0.36, 0.62)	* 0.78 (0.59, 1.03)
Behavioural Risk Factors		
Self-perceived health		
Excellent/very good/good	1.0	1.0
Fair/poor	* 0.69 (0.50, 0.94)	1.23 (0.87, 1.76)
Smoking status		
Current smoker	* 3.86 (3.21, 4.65)	* 2.84 (2.30, 3.51)
Non-smoker	1.0	1.0
Physical activity level		
Active	1.0	1.0
Moderate	0.81 (0.64, 1.01)	1.04 (0.80, 1.34)
Inactive	* 0.45 (0.38, 0.55)	* 0.59 (0.47, 0.73)
Someone smokes in home		
Yes	* 2.05 (1.53, 2.74)	1.25 (0.92, 1.71)
No	1.0	1.0
Injured in past 12 months		
Yes	* 2.09 (1.63–2.68)	1.28 (0.95, 1.72)
No	1.0	1.0

* Indicates statistically significant findings ($p < 0.05$)
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Current Smoking Status

The proportion of smokers aged 18 years and older has declined in Peel from 21% to 17% between 2000/2001 and 2007/2008 (Figure 3.3). The rate of smoking in Peel is lower than in Ontario (data not shown).

The results of the regression analysis stratified by sex, for the association between current smoking status, health determinants and other risk factors are presented in Tables 3.3 and 3.4. Differences between males and females were found for several determinants of health and risk factors.
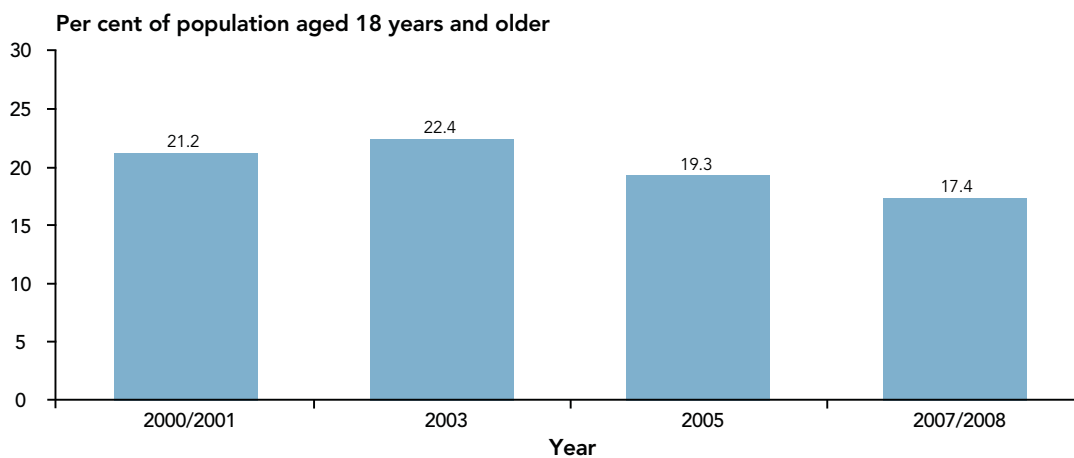

What does this tell us?

The model results show that as age increases the risk of smoking decreases for both males and females. This is consistent with Canadian findings that young adults aged 20 to 24 years had the highest prevalence of smoking (23%) in 2009, compared to youth aged 15 to 19 years (13%) and adults aged 25 years and older (17%).[161] Among young Canadian adults, the prevalence of smoking has declined significantly since 2008 among males (33% in 2008 to 27% in 2009) but not among females (22% in 2008 to 20% in 2009).[161]

In Peel, secondary graduates were more likely to report being a current smoker compared to post-secondary school graduates. This finding is also reflected at the national level, where those who completed college or university were less likely to be current smokers than those who had a completed secondary education or less.[162] Nine per cent of those with a completed university education reported being a current smoker, compared to 16% of those with a completed college education, 22% of those with a completed secondary school education and 23% of those without a completed secondary school education.[162]

Figure 3.3

**Prevalence of Current Smoking†,
Peel, 2000/2001, 2003, 2005, 2007/2008**

Per cent of population aged 18 years and older

Year	Per cent
2000/2001	21.2
2003	22.4
2005	19.3
2007/2008	17.4

† Defined as a person who smokes daily or occasionally and has smoked at least 100 cigarettes in their lifetime and smoked on some days in the past 30 days
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Interestingly, male respondents who reported not having a job in the previous week were less likely to report being a current smoker compared to those reporting employment in the previous week.

Immigrants to Canada tend to be healthier than non-immigrants. As the length of time in Canada increases, the health advantage of immigrants diminishes and the health status of long-term immigrants becomes more similar to non-immigrants.[163] This pattern was observed in the Peel model for females but not for males suggesting that males may adopt the risk behaviours of non-immigrants sooner than females.

Those who are married have better health than those who are not married. Marital separation and divorce has been associated with new episodes of depression. Men who experienced a marital breakup were at higher risk for depression than women.[164,165] The model shows that, for both males and females in Peel, those who were divorced, separated or widowed had higher odds of being a current smoker compared to those who were married or in a common-law relationship.

Model results also found that both males and females who reported weekly alcohol consumption were more likely to smoke currently relative to those who did not consume alcohol. This is consistent with epidemiologic studies that have documented a positive association between smoking and alcohol use.[166-168]

Males who reported that someone smoked in the home were four times more likely to be a current smoker while females who reported that someone smoked in the home were six times more likely to be a current smoker. Other studies have reported a similar association between home smoking restrictions and smoking behaviours.[169] In one study, home smoking restrictions were found to be strongly related to an individual's level of cigarette consumption. Having a smoke-free home also appeared to prolong the duration of cessation following a quit attempt.[169] This suggests that public health efforts aimed to promote a smoke-free home will not only protect non-smokers from exposure to second-hand smoke but would also give household members trying to stop smoking a tool to reinforce their desire not to smoke.

Lower prevalence of smoking among ethnic groups has been documented in many studies and is reflected to some degree in our results.[170,171] In particular, our analysis found Black, East/Southeast Asian, and Latin American or Other females were less likely to report being a current smoker. South Asian males were the only ethnic group found to be significantly less likely to smoke in the male model. Underlying differences in smoking prevalence among different ethnic groups may not have been detected in our analysis due to the small sample size of these groups.

Previous studies report that lower levels of social capital (measured as social participation or trust) are related to higher rates of daily smoking.[172,173] This association was consistent in our analysis for females but not males. Females reporting a weak sense of belonging to their local community were 40% more likely to report being a current smoker relative to those reporting a strong sense of community belonging. This suggests that efforts to strengthen social participation/social networks may play an important role for smoking cessation among women.

Table 3.3

Binomial Logistic Regression Analysis for the Association between Current Smoking Status, the Determinants of Health and Behavioural Risk Factors in Females, Peel, 2000/2001, 2003, 2005, 2007/2008 Combined, N=3,851

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Age	* 0.98 (0.98, 0.99)	* 0.96 (0.95, 0.97)
Household income level		
Lowest to middle	1.19 (0.68, 2.05)	1.21 (0.69, 2.13)
Upper-middle	1.0	1.0
Highest	1.18 (0.93, 1.48)	0.89 (0.69, 1.17)
Educational level of respondent		
Less than secondary	1.29 (0.93, 1.80)	1.43 (0.96, 2.14)
Secondary graduate	* 2.08 (1.60, 2.70)	* 1.95 (1.46, 2.63)
Other post-secondary	* 1.72 (1.11, 2.66)	1.54 (0.90, 2.64)
Post-secondary graduate	1.0	1.0
Ethnicity		
White	1.0	1.0
Black	* 0.26 (0.12, 0.55)	* 0.26 (0.12, 0.59)
East/Southeast Asian	* 0.21 (0.11, 0.40)	* 0.27 (0.13, 0.53)
West Asian/Arab	0.63 (0.29, 1.35)	0.59 (0.25, 1.40)
South Asian	0.13 (0.01, 1.17)	0.15 (0.02, 1.31)
Latin American and Other	*0.56 (0.33, 0.95)	*0.49 (0.25, 0.95)
Immigrant status		
Recent immigrant	* 0.18 (0.11, 0.28)	* 0.42 (0.24, 0.72)
Long-term immigrant	* 0.53 (0.41, 0.67)	1.01 (0.74, 1.39)
Non-immigrant	1.0	1.0
Marital status		
Now married/common law	1.0	1.0
Divorced/separated/widowed	*1.78 (1.35, 2.37)	* 2.41 (1.71, 3.42)
Single	*1.70 (1.28-2.27)	1.02 (0.71, 1.47)
Sense of belonging to local community		
Very strong/somewhat strong	1.0	1.0
Somewhat weak/very weak	* 1.64 (1.30, 2.08)	* 1.40 (1.09, 1.80)
Self-perceived life stress		
Quite a bit/extremely	*1.35 (1.05, 1.73)	1.06 (0.79, 1.42)
Not at all/not very/a bit	1.0	1.0
Employment status in past week		
At work last week/absent last week	1.0	1.0
No job last week	0.82 (0.61, 1.09)	1.17 (0.85, 1.62)

* Indicates statistically significant findings (p<0.05).
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.3 Continued

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Behavioural Risk Factors		
Self-perceived health		
Excellent/very good/good	1.0	1.0
Fair/poor	* 1.48 (1.08, 2.01)	* 1.70 (1.19, 2.42)
Weekly alcohol consumption		
Yes	* 1.90 (1.51, 2.40)	* 1.56 (1.18, 2.07)
No	1.0	1.0
Physical activity level		
Active	1.0	1.0
Moderate	1.04 (0.74, 1.47)	1.02 (0.72, 1.45)
Inactive	1.32 (0.98, 1.77)	*1.38 (1.02, 1.90)
Someone smokes in home		
Yes	* 7.13 (5.02, 10.12)	* 6.30 (4.19, 9.49)
No	1.0	1.0

* Indicates statistically significant findings ($p < 0.05$).
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.4

Binomial Logistic Regression Analysis for the Association between Current Smoking Status and the Determinants of Health and Behavioural Risk Factors in Males, Peel, 2000/2001, 2003, 2005, 2007/2008 Combined, N=3,496

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Age	* 0.98 (0.97, 0.98)	* 0.97 (0.96, 0.98)
Household income level		
Lowest to middle	1.07 (0.62, 1.85)	1.15 (0.62, 2.10)
Upper-middle	1.0	1.0
Highest	1.08 (0.88, 1.33)	0.93 (0.73, 1.19)
Educational level of respondent		
Less than secondary	* 1.88 (1.46, 2.43)	* 1.93 (1.44, 2.58)
Secondary graduate	* 1.62 (1.26, 2.09)	* 1.40 (1.05, 1.86)
Other post-secondary	0.93 (0.66, 1.33)	0.70 (0.46, 1.06)
Post-secondary graduate	1.0	1.0
Ethnicity		
White	1.0	1.0
Black	0.71 (0.43, 1.16)	0.65 (0.37, 1.17)
East/Southeast Asian	0.67 (0.44, 1.01)	0.78 (0.49, 1.25)
West Asian/Arab	0.99 (0.51, 1.90)	1.21 (0.63, 2.31)
South Asian	* 0.50 (0.35, 0.72)	* 0.54 (0.36, 0.82)
Latin American and Other	0.69 (0.42, 1.13)	0.72 (0.44, 1.16)
Immigrant status		
Recent immigrant	* 0.65 (0.47, 0.91)	0.93 (0.61, 1.42)
Long-term immigrant	* 0.76 (0.61, 0.95)	1.11 (0.84, 1.47)
Non-immigrant	1.0	1.0
Marital status		
Now married/common law	1.0	1.0
Divorced/separated/widowed	* 2.24 (1.62, 3.08)	* 2.73 (1.88, 3.96)
Single	* 1.46 (1.16, 1.83)	0.79 (0.58, 1.07)
Sense of belonging to local community		
Very strong/somewhat strong	1.0	1.0
Somewhat weak/very weak	* 1.49 (1.20, 1.85)	1.14 (0.91, 1.43)
Self-perceived life stress		
Quite a bit/extremely	*1.32 (1.05, 1.65)	1.16 (0.91, 1.50)
Not at all/not very/a bit	1.0	1.0
Employment status in past week		
At work last week/absent last week	1.0	1.0
No job last week	* 0.52 (0.39, 0.69)	* 0.58 (0.41, 0.83)

* Indicates statistically significant findings ($p < 0.05$).
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.4 Continued

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Behavioural Risk Factors		
Self-perceived health		
Excellent/very good/good	1.0	1.0
Fair/poor	1.20 (0.83, 1.73)	1.14 (0.76, 1.70)
Weekly alcohol consumption		
Yes	* 1.53 (1.25, 1.89)	* 1.37 (1.07, 1.75)
No	1.0	1.0
Physical activity level		
Active	1.0	1.0
Moderate	0.93 (0.70, 1.24)	1.00 (0.73, 1.37)
Inactive	* 1.42 (1.12, 1.80)	* 1.46 (1.11, 1.91)
Someone smokes in home		
Yes	* 4.22 (2.99, 5.96)	* 4.10 (2.76, 6.11)
No	1.0	1.0

* Indicates statistically significant findings ($p < 0.05$).
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File,
Ontario Ministry of Health and Long-Term Care

Overweight and Obesity

The prevalence of overweight and obesity in Peel is lower than in Ontario (data not shown). While the prevalence of overweight and obesity in Peel has increased between 2000/2001 and 2007/2008, this increase is not statistically significant (Figure 3.4).

Respondents of the Canadian Community Health Survey were asked to self-report their height and weight in order to calculate their Body Mass Index (BMI). Self-reported height and weight have been shown to underestimate weight among females and overestimate height among males. Those with a BMI greater than 25.0 were categorized as overweight or obese.

The results of the regression analysis specific to overweight or obesity and stratified by sex are shown in Tables 3.5 and 3.6.

What does this tell us?

The present analysis for Peel replicates and builds on many findings in previous literature on predictors of overweight or obesity. Several

determinants of health and risk factors previously found to be related to overweight or obesity were incorporated in the analysis. Stratification by sex was performed based on previous findings that have indicated differences in the association between socioeconomic status and BMI by sex.[51]

Age was found to be a significant predictor of overweight or obesity in females, with the odds of overweight or obesity increasing by 2% with every year increase in age (OR: 1.02; 95% CI: 1.02, 1.03). The effect of age was not found to be significant in males.

Controlling for socioeconomic factors such as education level and household income was an important aspect of this analysis. High-income males were more likely to be overweight or obese than those in the upper-middle income bracket - a finding that is consistent with previous literature. This differs from typical findings in which a social gradient applies to risk factors for chronic diseases, and higher-income people tend to have better health compared to lower-income people. This social gradient does not seem to apply to men when it comes to weight status.[51,174,175]

Males who received other post-secondary education were 33% less likely to be overweight or obese compared to those who were post-secondary graduates. There were no significant differences for males who did not complete secondary school or were secondary school graduates.

Nationally, women in middle and upper-middle income households were more likely to be overweight or obese than those in the highest income bracket.[175] Other literature has found a strong inverse association between socioeconomic status and body mass index in women.[51,176] Our analyses found no significant associations in females for education level and household income.

Our findings showed no significant differences between marital status and overweight or obesity in females. However, a protective effect was seen in single males. Previous literature has found variations in both males and females by change in marital status. Specifically, men and women entering marriage tend to gain weight, and those who leave a marriage (not including widowed individuals) have been found to lose weight.[177] It should be noted, however, that

Figure 3.4
Prevalence of Overweight and Obesity[†],
Peel, 2000/2001, 2003, 2005, 2007-2008

Per cent of population aged 18 years and older

Year	Per cent
2000/2001	47.6
2003	45.5
2005	47.1
2007/2008	50.2
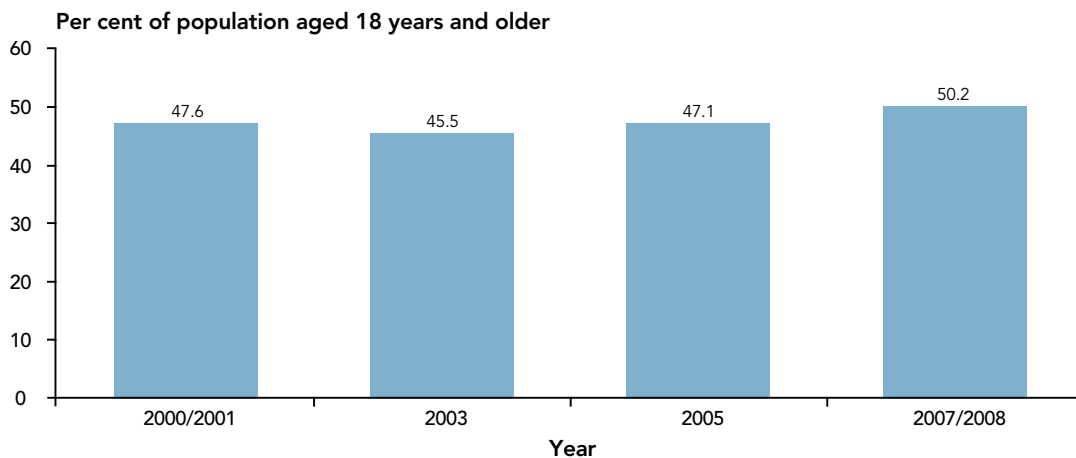
† Excludes pregnant women and those <3ft in height or >=7ft in height
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

these previous findings pertain to weight gain/loss and may not necessarily be indicative of overweight or obesity.

The protective effect for overweight and obesity observed among East and Southeast Asians is consistent with previous studies[178] and is reflected to some degree in our results. In our analysis South Asian males and females were less likely to report being overweight or obese when compared to White males and females. Unlike their male counterparts, Black females had increased odds of being overweight or obese when compared to White females. Tremblay et al. (2005) note that ethnic groups experience different social pressures and norms surrounding 'acceptable' body ranges which may explain the variations of overweight and obesity observed in our analysis in Peel.

Studies suggest that increased intake of fruit and vegetables is associated with a significantly lower risk of overweight and obesity.[179,180] However, fruit and vegetable consumption was not found to be a significant predictor of overweight or obesity in both unadjusted and adjusted regression models. CCHS data capture the number of times fruit and vegetables were consumed (frequency) rather than the actual number of servings consumed per day. Our analysis may therefore have underestimated the protective effect of fruit and vegetable consumption in reducing risk for overweight and obesity.

Males who were current smokers were less likely to be overweight or obese when compared to non-smokers and former smokers. However, smoking did not emerge as a significant risk factor for overweight or obesity among females. Similar findings have been reported by others. In one study, regression analysis found that being a smoker was associated with a lower body mass index but did not remain significant when separate regression models were conducted for males and females.[181]

Living a sedentary lifestyle has been shown in the literature to be strong predictor of increased BMI and waist circumference.[181] Results of

our analysis in Peel found that women who were inactive and moderately active were approximately twice as likely to be overweight or obese when compared to women who were physically active. However, lack of physical activity level did not emerge as a significant risk among males.

It is unclear why a stronger association is not observed between physical activity and overweight or obesity as the level of physical activity decreases. These results could likely be an artifact of reporting bias which is often a limitation in self-report surveys, where a greater number of respondents may incorrectly classify themselves as moderately active as opposed to inactive.

Table 3.5

Binomial Logistic Regression Analysis for the Association between Overweight and Obesity, the Determinants of Health and Behavioural Risk Factors in Females, Peel, 2000/2001, 2003, 2005, 2007/2008 Combined, N=3,851

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Age	* 1.03 (1.02, 1.03)	* 1.02 (1.02, 1.03)
Household income level		
Lowest to middle	0.92 (0.62, 1.37)	0.90 (0.57, 1.40)
Upper-middle	1.0	1.0
Highest	0.84 (0.70, 1.00)	0.93 (0.77, 1.15)
Educational level of respondent		
Less than secondary	* 1.82 (1.40, 2.35)	1.25 (0.92, 1.71)
Secondary graduate	1.17 (0.94, 1.45)	1.03 (0.82, 1.30)
Other post-secondary	0.78 (0.54, 1.13)	1.07 (0.72, 1.57)
Post-secondary graduate	1.0	1.0
Ethnicity		
White	1.0	1.0
Black	* 1.58 (1.14, 2.19)	* 1.73 (1.19, 2.52)
East/Southeast Asian	* 0.40 (0.27, 0.60)	* 0.40 (0.26, 0.62)
West Asian/Arab	0.69 (0.35, 1.35)	0.88 (0.43, 1.82)
South Asian	0.78 (0.60, 1.01)	0.83 (0.62, 1.13)
Latin American and Other	0.94 (0.66, 1.35)	1.21 (0.81, 1.81)
Immigrant status		
Recent immigrant	* 0.70 (0.54, 0.90)	0.81 (0.59, 1.11)
Long-term immigrant	* 1.23 (1.03, 1.47)	1.00 (0.80, 1.24)
Non-immigrant	1.0	1.0
Marital status		
Now married/common law	1.0	1.0
Divorced/separated/widowed	* 1.39 (1.12, 1.73)	0.93 (0.73, 1.18)
Single	* 0.55 (0.45, 0.69)	0.80 (0.62, 1.03)
Sense of belonging to local community		
Very strong/somewhat strong	1.0	1.0
Somewhat weak/very weak	1.00 (0.84, 1.19)	1.03 (0.85, 1.24)
Self-perceived life stress		
Quite a bit/extremely	1.08 (0.90–1.30)	1.09 (0.89, 1.34)
Not at all/not very/a bit	1.0	1.0
Employment status in past week		
At work last week/absent last week	1.0	1.0
No job last week	1.20 (0.98, 1.45)	1.03 (0.84, 1.26)

* Indicates statistically significant results (p<0.05)
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008 Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.5 Continued

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Behavioural Risk Factors		
Self-perceived health		
Excellent/very good/good	1.0	1.0
Fair/poor	* 1.87 (1.47, 2.38)	* 1.44 (1.10, 1.89)
Weekly alcohol consumption		
Yes	0.91 (0.74, 1.11)	0.83 (0.66, 1.04)
No	1.0	1.0
Physical activity level		
Active	1.0	1.0
Moderate	* 1.94 (1.50, 2.53)	* 2.07 (1.57, 2.74)
Inactive	* 1.94 (1.56, 2.41)	* 1.87 (1.46, 2.41)
Fruit and vegetable consumption		
Five or more times per day	1.0	1.0
Less than five times per day	1.06 (0.90, 1.25)	1.07 (0.89, 1.28)

* Indicates statistically significant results (p<0.05)
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008 Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.6

Binomial Logistic Regression Analysis for the Association between Overweight and Obesity, the Determinants of Health and Behavioural Risk Factors in Males, Peel, 2000/2001, 2003, 2005, 2007/2008 Combined, N=3,496

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Determinants of Health		
Age	* 1.02 (1.01, 1.02)	1.00 (0.99, 1.01)
Household income level		
Lowest to middle	0.78 (0.47, 1.30)	0.90 (0.51, 1.56)
Upper-middle	1.0	1.0
Highest	* 1.28 (1.06, 1.54)	* 1.27 (1.02, 1.58)
Educational level of respondent		
Less than secondary	1.22 (0.93, 1.60)	1.23 (0.93, 1.65)
Secondary graduate	1.06 (0.85, 1.32)	1.18 (0.94, 1.49)
Other post-secondary	* 0.54 (0.38, 0.77)	* 0.67 (0.45, 0.99)
Post-secondary graduate	1.0	1.0
Ethnicity		
White	1.0	1.0
Black	0.82 (0.53, 1.25)	0.93 (0.58, 1.49)
East/Southeast Asian	* 0.39 (0.28, 0.55)	* 0.39 (0.27, 0.58)
West Asian/Arab	0.77 (0.41, 1.44)	0.91 (0.49, 1.71)
South Asian	* 0.55 (0.42, 0.70)	* 0.55 (0.40, 0.75)
Latin American and Other	1.27 (0.84, 1.90)	1.35 (0.86, 2.11)
Immigrant status		
Recent immigrant	* 0.67 (0.51, 0.88)	0.94 (0.65, 1.36)
Long-term immigrant	0.97 (0.80, 1.17)	0.97 (0.76, 1.23)
Non-immigrant	1.0	1.0
Marital status		
Now married/common law	1.0	1.0
Divorced/separated/widowed	1.24 (0.91, 1.70)	1.15 (0.81, 1.62)
Single	* 0.49 (0.40, 0.60)	* 0.52 (0.40, 0.68)
Sense of belonging to local community		
Very strong/somewhat strong	1.0	1.0
Somewhat weak/ very weak	1.04 (0.87, 1.25)	0.97 (0.81, 1.20)
Self-perceived life stress		
Quite a bit/extremely	1.15 (0.94, 1.39)	1.07 (0.87, 1.32)
Not at all/not very/a bit	1.0	1.0
Employment status in past week		
At work last week/absent last week	1.0	1.0
No job last week	0.83 (0.65, 1.05)	0.85 (0.66, 1.11)

* Indicates statistically significant findings (p<0.05).
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Table 3.6 Continued

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Behavioural Risk Factors		
Self-perceived health		
Excellent/very good/good	1.0	1.0
Fair/poor	* 1.65 (1.18, 2.30)	* 1.51 (1.06, 2.15)
Weekly alcohol consumption		
Yes	* 1.19 (1.02, 1.40)	1.00 (0.84, 1.20)
No	1.0	1.0
Physical activity level		
Active	1.0	1.0
Moderate	1.28 (1.01–1.62)	1.13 (0.87, 1.47)
Inactive	* 1.32 (1.08, 1.62)	1.21 (0.97, 1.51)
Fruit and vegetable consumption		
Five or more times per day	1.0	1.0
Less than five times per day	1.15 (0.95, 1.39)	1.16 (0.94, 1.43)

* Indicates statistically significant findings ($p<0.05$).
Source: Canadian Community Health Survey 2000/2001, 2003, 2005, 2007/2008, Statistics Canada, Share File, Ontario Ministry of Health and Long-Term Care

Discussion

The findings of this analysis indicate the complexity of the determinants of health and the relationships between the selected health outcomes and the determinants of health. The ability to control for other potential risk factors that may influence health outcomes or behaviours provides the reader with the ability to identify priority populations with more accuracy.

THE MARGINALIZATION INDEX – A PEEL PERSPECTIVE

The term deprivation is defined as "a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which the individual, family or group belongs."[182] This disadvantage may relate to such things as access to food, shelter, education and work.[11] There are many forms of deprivation that are closely linked to public health and welfare. Peter Townsend identified two forms of deprivation – material and social. The first relates to the concept of poverty and refers to the deprivation of goods and conveniences that are part of modern life such as a car, a television and neighbourhoods with recreational areas.[182] The second refers to the quality of an individual's social interactions and closely relates to the concept of social capital (the connections within and between social networks) and social integration.[183]

There are several versions of deprivation or marginalization indices used in Canada. These include the INSPQ Deprivation Index and the Canadian and Ontario Marginalization Index.

INSPQ Deprivation Index

The INSPQ Deprivation Index was developed in Quebec[119,184] and was influenced by the work of Townsend and other research examining links between socioeconomic conditions and health.[182] The INSPQ (Institut National de Santé Publique du Québec) index chose six indicators (Table 4.1) known to be linked to a large number of health and social concerns and associated with the two forms of deprivation (material and social). The indicators (with the exception of the proportion of single-parent families) were adjusted according to the age-sex structure of the Canadian population.[11]

Table 4.1
INSPQ Indicators of Material and Social Deprivation

Material Component	Social Component
Proportion of people without high school diplomas	Proportion of people separated, divorced or widowed
Average personal income	Proportion of single-parent families
Ratio of employment to population	Proportion of people living alone

The application of the INSPQ index to selected health outcomes in Peel was not as illuminating in assessing material and social deprivation. Associations seen at a national level between deprivation and selected health outcomes were in some instances non-existent for Peel. We suspect that a number of potentially relevant variables for Peel such as ethnicity, language and immigration status, which were not considered in the index, are very important for Peel given that almost half of the population are immigrants. While the INSPQ index has been used extensively in Quebec, the validity of the index when applied to Ontario populations remains unknown.

Ontario Marginalization Index

The Ontario Marginalization Index was developed using a theoretical framework based on previous work on deprivation and marginalization.[50] The index, referred to as OnMarg, is a census-based, geographically derived index for use in research that seeks to understand inequalities in various measures of health and social well-being, either between population groups or between geographical areas. In total, 18 census tract (CT) measures were extracted from the census data, describing the socio-economic and demographic character of the CT.[50]

OnMarg is an Ontario-specific version of the Canadian Marginalization Index (CanMarg), which has been in use since 2006. OnMarg is multifaceted, allowing users to explore multiple dimensions of marginalization in urban and rural Ontario – residential instability, deprivation, ethnic concentration and dependency. Table 4.2 describes the variables included in the marginalization index.

The OnMarg index has been demonstrated to be stable across time periods and across different geographic areas (e.g., cities and rural areas). Previous analyses have found the index to be associated with a variety of health outcomes including hypertension, depression, body mass index and infant birth weight.[50,185,186]

Table 4.2
Variables Included in the Ontario Marginalization Index

Dimension	Census Variables
1. Residential Instability	• Per cent living alone • Per cent of youth 5 – 15 years • Persons per dwelling • Per cent living in apartment buildings • Per cent married • Per cent home ownership • Per cent moved within the last 5 years
2. Material Deprivation:	• Per cent 20+ without high school graduation • Per cent lone parent families • Per cent of families receiving government transfer payments • Per cent 15+ unemployed • Per cent living below income cut off (measure adjusted for community size, family size and inflation) • Per cent of homes needing major repair
3. Dependency	• Per cent of seniors (age 65+) • The ratio of the pop aged 0 – 14 and 65+ divided by the population aged 15 – 64 • Labour force participation
4. Ethnic diversity	• Per cent recent immigrants • Per cent visible minorities

Maps 4.1 to 4.4 show the geographic distribution of the four dimensions of deprivation (residential instability, material deprivation, dependency and ethnic diversity) in Peel. Areas of high deprivation were observed to vary greatly depending on the dimension examined.

The Ontario Marginalization Index was used to explore health-care utilization patterns in Peel using emergency department visits and hospitalization data. Dissemination areas (DA) in Peel were categorized into five groups ranging from quintile 1 (least marginalization) to quintile 5 (greatest marginalization).

Table 4.3 reports the age-standardized ED visit rate for all causes in Peel. As residential instability increased, the ED visit rate increased significantly when compared to the overall Peel estimate. A similar trend was observed when the material deprivation and dependency dimensions were examined. Conversely, ED visit rates were observed to be significantly lower in areas found to have a high ethnic concentration when compared to the overall Peel estimate.

Table 4.3

Age-Standardized Emergency Department (ED) Visit Rate for all Causes, Peel, 2006

Dimension: Residential Instability	ED Visit Rate (per 100,000)	Comparison to Peel's ED Visit Rate*
1 (least unstable)	23,514	Lower than Peel
2	26,174	Higher than Peel
3	28,512	Higher than Peel
4	27,097	Higher than Peel
5 (most unstable)	27,672	Higher than Peel
Dimension: Material Deprivation	**ED Visit Rate (per 100,000)**	**Comparison to Peel's ED Visit Rate***
1 (least deprived)	23,852	Lower than Peel
2	24,399	Lower than Peel
3	24,901	Lower than Peel
4	27,008	Higher than Peel
5 (most deprived)	30,160	Higher than Peel
Dimension: Dependency	**ED Visit Rate (per 100,000)**	**Comparison to Peel's ED Visit Rate***
1 (least dependent)	24,387	Lower than Peel
2	24,938	Lower than Peel
3	26,580	Higher than Peel
4	27,374	Higher than Peel
5 (most dependent)	29,421	Higher than Peel
Dimension: Ethnic Concentration	**ED Visit Rate (per 100,000)**	**Comparison to Peel's ED Visit Rate***
1 (low ethnic concentration)	28,564	Higher than Peel
2	28,281	Higher than Peel
3	26,858	Higher than Peel
4	27,132	Higher than Peel
5 (high ethnic concentration)	24,447	Lower than Peel

*Overall ED Visit Rate in Peel: 25,519 (CI: 25,424 – 25,614)
Statistical significance based on non-overlapping 95% confidence intervals.
Sources: Ontario Marginalization Index, Centre for Research on Inner City Health and 2006 Census, Statistics Canada; National Ambulatory Care Reporting System 2006, Provincial Health Planning Database (PHPDB), Ontario Ministry of Health and Long-Term Care

Table 4.4 reports the age-standardized hospitalization rate for all causes in Peel. Areas with lower material deprivation (quintiles 1 and 2) were found to have significantly lower hospitalization rates while significantly higher hospitalization rates were found in areas with greater deprivation (quintiles 4 and 5) when compared to Peel's rate overall. Although areas having high ethnic concentration (quintiles 4 and 5) did not vary from the overall Peel average, lower hospitalization rates were found in areas with low ethnic concentration (quintiles 1, 2 and 3) when compared to Peel's rate overall.

Table 4.4

Age-Standardized Hospitalization Rate for All Causes, Peel, 2006

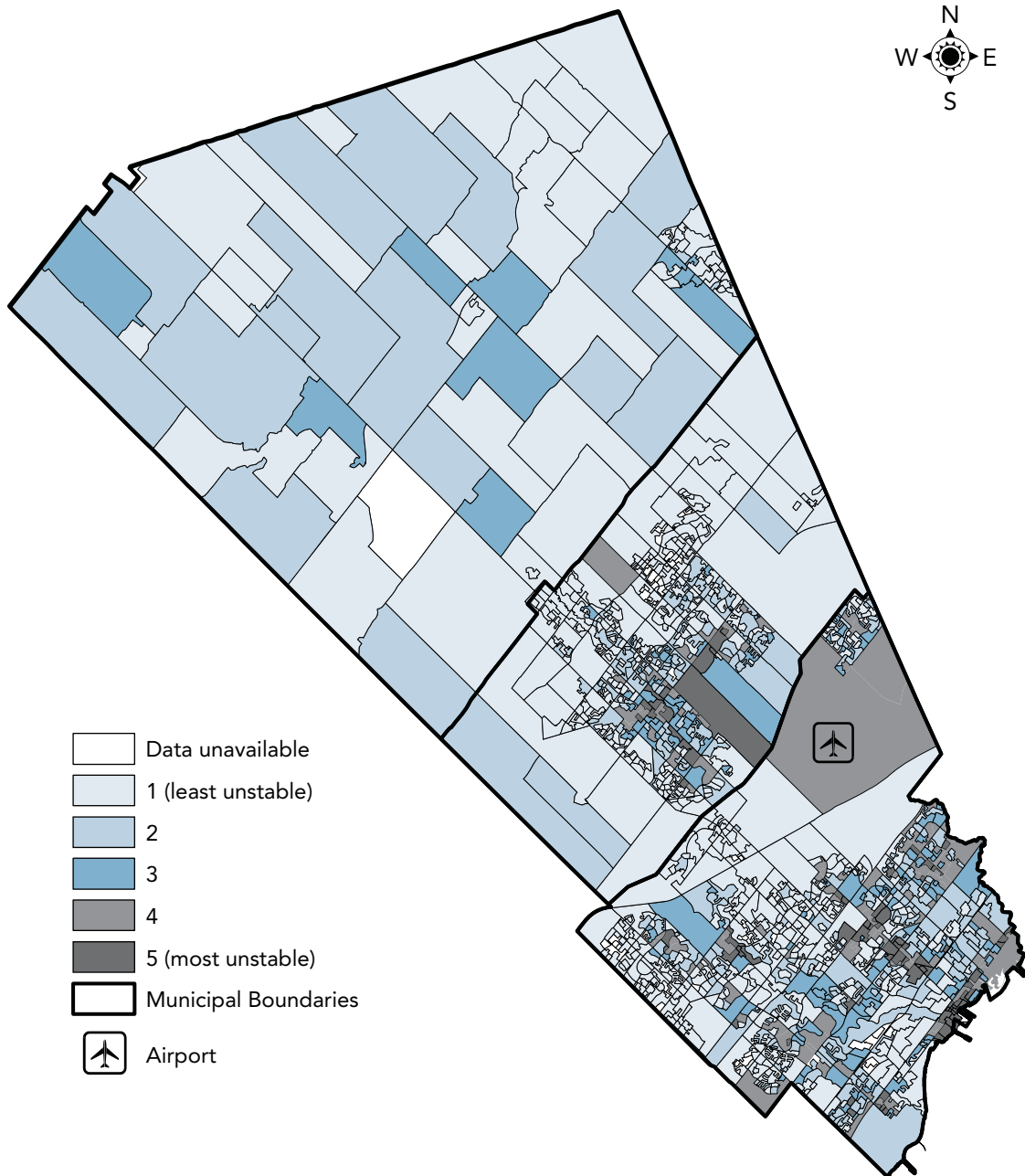| Dimension: Residential Instability	Hospitalization Rate (per 100,000)	Comparison to Peel Hospitalization Rate* Estimate
1 (least unstable)	6,689	No Difference
2	6,612	Lower than Peel
3	6,901	No Difference
4	6,903	No Difference
5 (most unstable)	6,938	No Difference
Dimension: Material Deprivation	Hospitalization Rate (per 100,000)	Comparison to Peel Hospitalization Rate* Estimate
1 (least deprived)	6,414	Lower than Peel
2	6,594	Lower than Peel
3	6,725	No Difference
4	7,104	Higher than Peel
5 (most deprived)	7,701	Higher than Peel
Dimension: Dependencey	Hospitalization Rate (per 100,000)	Comparison to Peel Hospitalization Rate* Estimate
1 (least dependent)	6,808	No Difference
2	6,652	No Difference
3	6,697	No Difference
4	6,778	No Difference
5 (most dependent)	6,476	Lower than Peel
Dimension: Ethnic Concentration	Hospitalization Rate (per 100,000)	Comparison to Peel Hospitalization Rate* Estimate
1 (low ethnic concentration)	5,999	Lower than Peel
2	6,422	Lower than Peel
3	6,358	Lower than Peell
4	6,753	No Difference
5 (high ethnic concentration)	6,747	No Difference

Overall Hospitalization Rate in Peel: 6,785 (CI: 6,735 – 6,836)
*Statistical significance based on non-overlapping 95% confidence intervals
Sources: Ontario Marginalization Index, Centre for Research on Inner City Health and 2006 Census, Statistics Canada;
Hospital In-Patient Discharge Data, 2006, Provincial Health Planning Database (PHPDB),
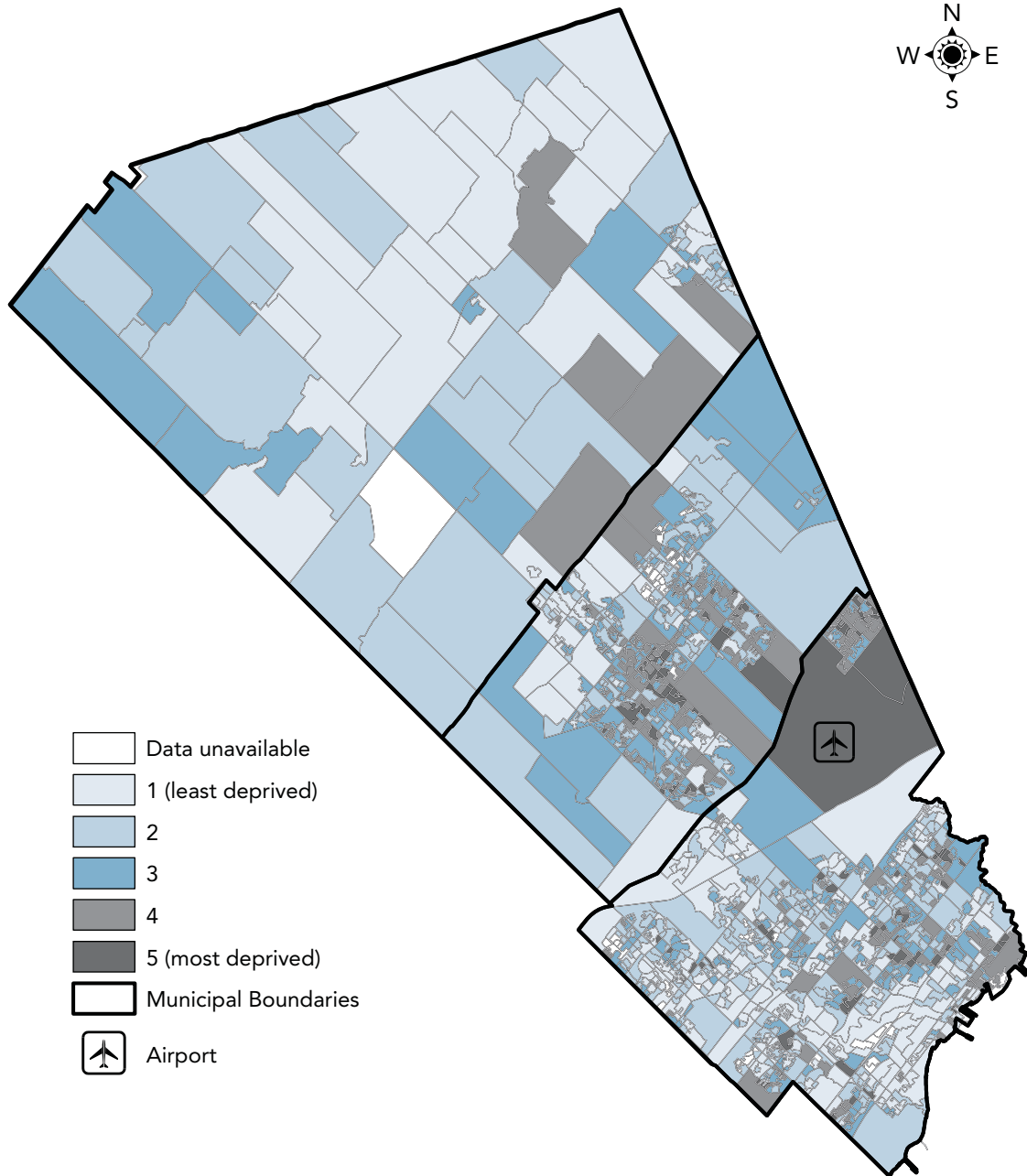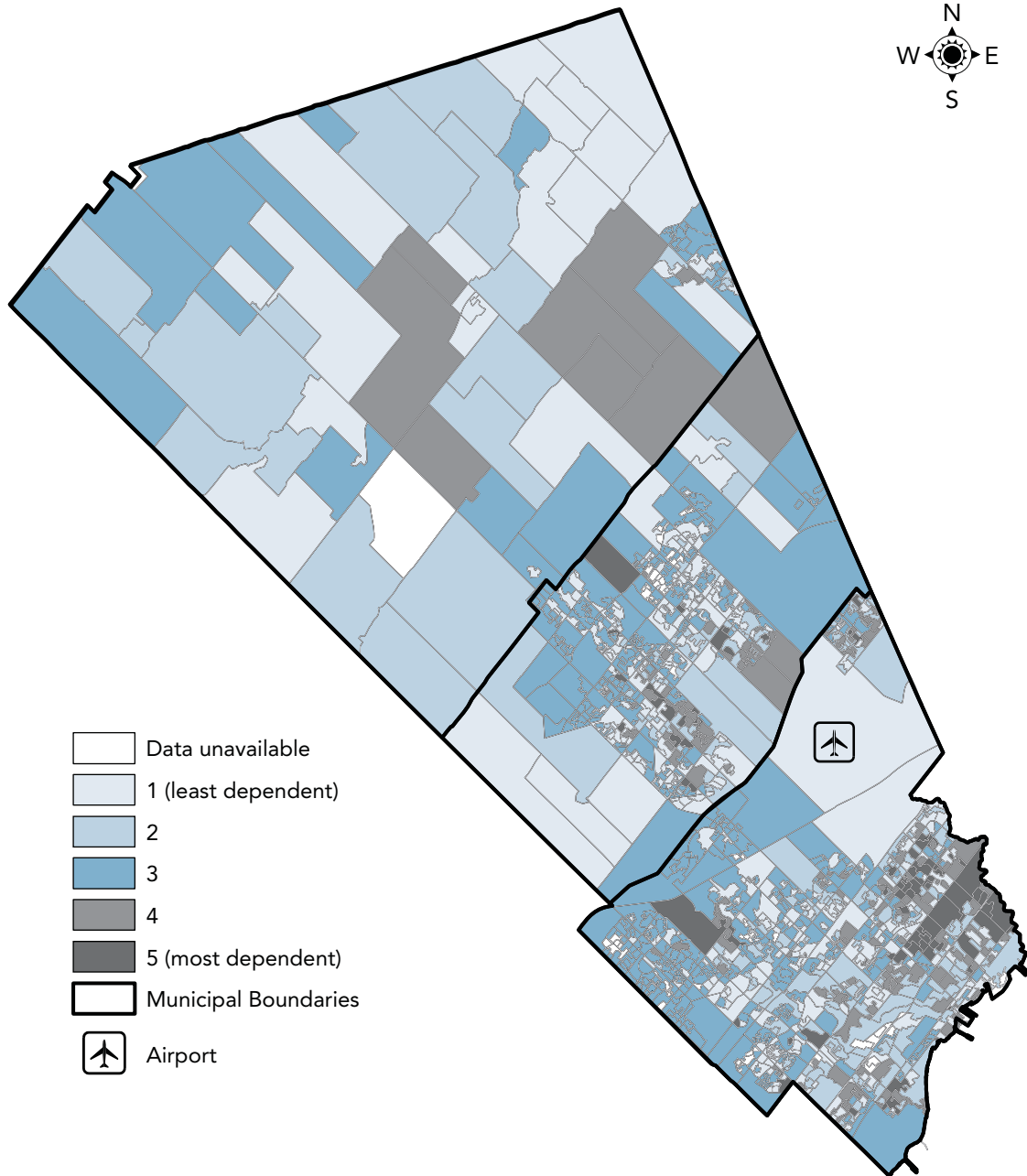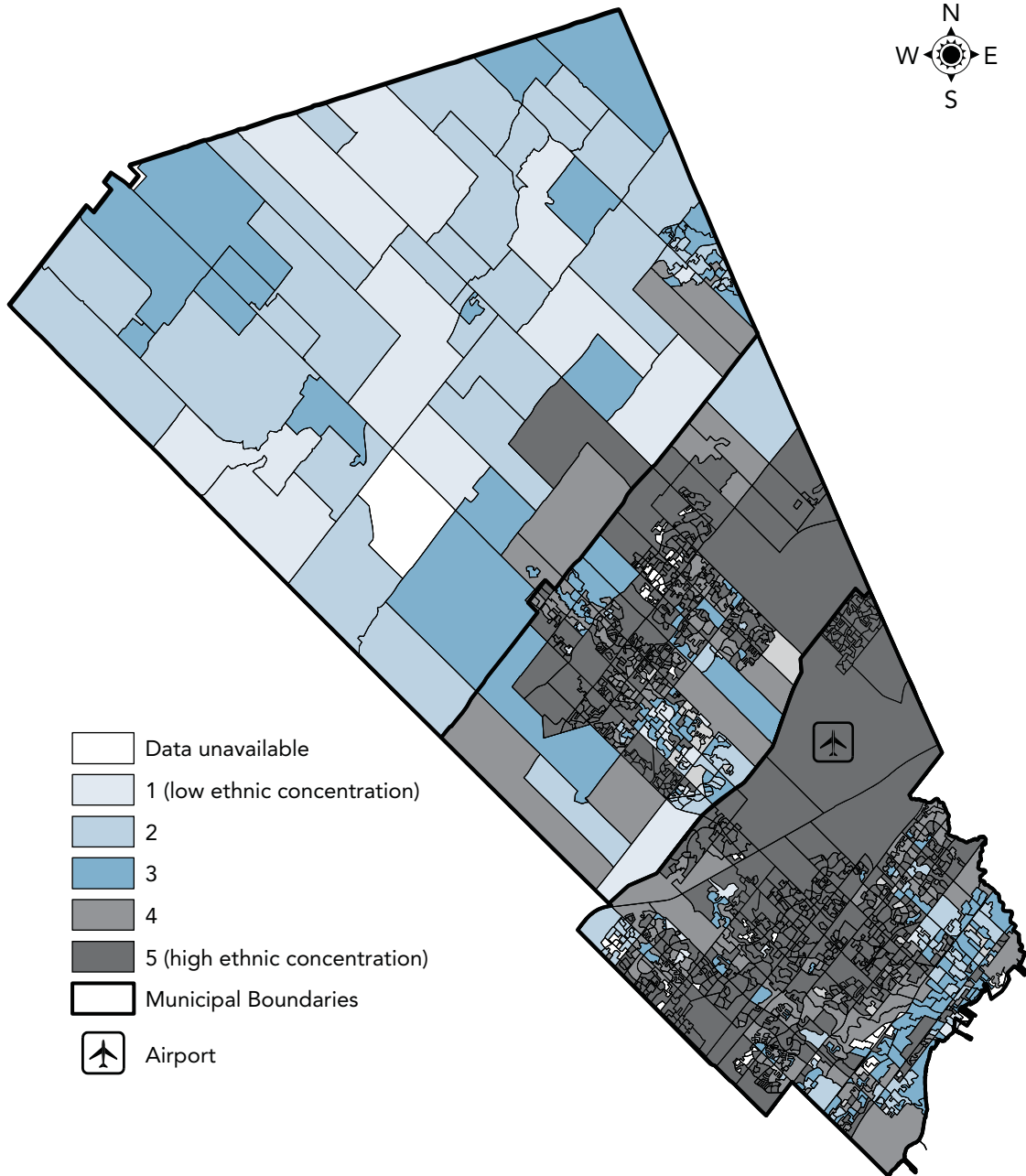Ontario Ministry of Health and Long-Term Care

Map 4.1

**Ontario Marginalization Index by Dissemination Area,
Residential Instability Component, Peel, 2006**

N
W E
S

Data unavailable

1 (least unstable)

2

3

4

5 (most unstable)

Municipal Boundaries

Airport

0   2   4   8   12
Kilometers

Source: Ontario Marginalization Index, Centre for Research on Inner City Health and 2006 Census, Statistics Canada

Map 4.2

Ontario Marginalization Index by Dissemination Area,
Material Deprivation Component, Peel, 2006

Data unavailable

1 (least deprived)

2

3

4

5 (most deprived)

Municipal Boundaries

Airport

0   2   4   8   12
Kilometers

Source: Ontario Marginalization Index, Centre for Research on Inner City Health and 2006 Census, Statistics Canada

Map 4.3

Ontario Marginalization Index by Dissemination Area,
Dependency Component, Peel, 2006

Legend:
- Data unavailable
- 1 (least dependent)
- 2
- 3
- 4
- 5 (most dependent)
- Municipal Boundaries
- Airport

N W E S

0 2 4 8 12 Kilometers

Source: Ontario Marginalization Index, Centre for Research on Inner City Health and 2006 Census, Statistics Canada

Map 4.4

**Ontario Marginalization Index by Dissemination Area,
Ethnic Concentration Component, Peel, 2006**

Data unavailable

1 (low ethnic concentration)

2

3

4

5 (high ethnic concentration)

Municipal Boundaries

Airport

N
W · E
S

0 2 4   8   12
Kilometers

Source: Ontario Marginalization Index, Centre for Research on Inner City Health and 2006 Census, Statistics Canada

Discussion

Several Canadian studies have explored the relationship between sociodemographic variables and health-care utilization patterns.[189-192] Results of these studies have shown that lower income groups are more likely to be hospitalized and have longer lengths of stay compared to those in higher income groups.[193,194] In addition, higher use of emergency departments among low-income, young adults and children of single parents have also been found.[195]

Recently, the importance of investigating social and community influences which may impact health has also been recognized.[9,50] Deprivation indices such as the INSPQ index and the Ontario Marginalization index can be used to explore the effect of neighbourhood-level factors on health. Our exploratory analysis using the Ontario Marginalization Index found higher ED visit rates for all causes among areas with high residential instability, high dependency and high material deprivation when compared to Peel's rate overall. Although no studies to date have used the Ontario Marginalization Index to assess health-care utilization patterns, the relationship between increased rates of emergency admission and higher levels of deprivation have been reported when other deprivation indices were examined.[9,196]

Analyses using the INSPQ index and the Ontario marginalization index highlight the importance of examining multiple factors to better understand the link between neighbourhood deprivation and poor health. Further investigation is needed to help build on this exploratory work. Specifically, exploring the effect of marginalization across different age groups and as it relates to important disease outcomes will likely inform public health planning. In addition, the use of multilevel modelling can help understand how neighbourhood deprivation affects health outcomes after adjusting for known individual-level risk factors. Such analyses will be instrumental in guiding future public health prevention strategies and in identifying high-risk and priority populations.

DISCUSSION AND NEXT STEPS

Understanding what causes poor health is a complicated business. Many of our analyses show relationships between determinants and outcomes, but the pathway linking cause and effect is not always obvious. Furthermore, although most determinants influence multiple outcomes, this is not always the case. In Peel for example, income is associated with binge drinking (more people in the high-income level drink compared to those in the lowest-income level). Income is not significantly associated with being a smoker, however, having attained a lower level of education and smoking are associated.

This report has provided a progression from descriptive associations between determinants of health and selected health outcomes in chapter 2, to regression modelling in chapter 3 and an analysis using the Ontario Marginalization Index in chapter 4.

In chapter 2 we saw the single relationship between a determinant of health and a health outcome. With this approach we can assess changes over time and can assess disparities between risk behaviours such as smoking and those in the highest and lowest education groups.

In chapter 3, we present the results of regression modelling for selected health outcomes, health behaviours and the determinants of health. These analyses identified predictors of self-rated health, binge drinking, smoking and overweight or obesity in Peel, while controlling for the effect of the determinants of health and other related risk factors. This provides us with a deeper understanding of the determinants of health and their impact on health outcomes taking into consideration the effect of sociodemographic and cultural factors. This final step helps to guide us in identifying priority populations and engaging in the development of prevention and health promotion activities.

Chapter 4 assesses the four dimensions of marginalization (dependency, deprivation, ethnic concentration and residential instability) and allows us to assess relationships between grouped determinants of health dimensions and health. What we cannot assess from the methods employed in chapters 2 and 4 are the effects of the relationships between the individual determinants of health and selected health outcomes.

No single method in assessing the determinants of health can tell the entire picture and this report has considered this through each of the chapters.

What do we know about the determinants of health in Peel?

The income level of individuals in Peel is similar to Ontario, but private household income is higher. Spending power within private households is influenced by the number of people living in the home, the proportion of multiple family households, and rental or owner costs. While income is an important determinant for some health outcomes such as the prevalence of overweight and obesity, it is not associated with being a smoker in Peel.

Peel has a high proportion of immigrants (49%) and 10% have arrived within the past five years. Recent immigrants tend to have better health behaviours (e.g., are less likely to smoke or to be overweight or obese) than those who are Canadian born, and they live longer than the Canadian born population.

The proportion of seniors living alone in Peel is about half that of Ontario (16% compared to 26%) suggesting strong support networks for Peel seniors.

Peel residents are well educated (55% have college education or greater). Peel residents who are well educated (have post-secondary education) tend to have healthier behaviours (e.g., do not smoke, are more physically active, have a healthy weight) than those with less than high school education.

The built environment in Peel is one of many roads and urban sprawl which has an impact on health and the physical environment.

What comes next?

Anyone who wants to improve the health of the population needs to take a more systematic analytical approach to fully understand the relationships between the determinants of health and other health behaviours and outcomes, and combine this with findings from the research literature.

Peel Public Health will continue to incorporate a determinants of health perspective to the analysis of health behaviours and health outcomes. We will also make available and communicate this information to those in Peel delivering prevention and health promotion activities. Peel Public Health will continue to monitor disparities in health and health behaviours over time to guide us in the implementation of effective prevention strategies in the future.

ACKNOWLEDGEMENTS

chapter 7

DATA SOURCES AND LIMITATIONS

Numerous data sources were used in this report including but not limited to:

- Statistics Canada for Census and Labour Force Survey data;
- IntelliHEALTH of the Ontario Ministry of Health and Long-Term Care (MOHLTC) for population estimates, mortality, hospitalizations and emergency department visits data;
- The Canadian Community Health Survey (2000/2001, 2003, 2005, 2007/2008) and the Rapid Risk Factor Surveillance System (2001-2009) for health behaviour data.

For additional details about the methods of analysis used in each of the chapters of this report, please refer to the Data Methods chapter.

Census Data

The Census is conducted every five years and data are provided by Statistics Canada. The 2006 Census was conducted on May 16, 2006.

Limitations:

- The Census undercounts some groups, such as the homeless, young adults and Aboriginal people on reserves.
- Comparison between censuses is affected by changes in question wording and in the definition of the population concerned.

Labour Force Survey Data

The Labour Force Survey (LFS) is a monthly survey involving around 50,000 Canadian households. The goal of the survey is to provide a detailed, current picture of the labour market across the country. The LFS is the only Statistics Canada source of current, monthly estimates of total employment (including self-employment) and unemployment.

Mortality Data

The Office of the Registrar General obtains information about mortality from death certificates which are completed by physicians. All deaths within Ontario are registered in the office of the division registrar within which the death occurs. A Statement of Death must be filed with a division registrar before a Burial Permit can be issued.

Limitations:

- Co-morbidity contributes to uncertainty in classifying the underlying cause of death.
- Determining the true cause of death may be influenced by the social or legal conditions surrounding the death and by the level of medical investigation (e.g., AIDS, suicide).

Emergency Department Visit Data

Hospital emergency departments report patient visit information into the National Ambulatory Care Reporting System (NACRS), which began in July 2000. Data are not considered to be reliable until the fiscal year 2002/2003. Ambulatory visit data provide only a crude measure of the condition being quantified since a person may not seek care at an emergency department, or may visit several times for the same disease or injury event, or may visit more than one hospital for the same disease or injury event.

Limitations:

- Data are influenced by factors that are unrelated to health status such as availability and accessibility of care, and administrative policies and procedures. This may influence comparisons between areas and over time.

Canadian Community Health Survey

The Canadian Community Health Survey (CCHS) is a Statistics Canada survey aimed at providing health information at the provincial, regional and health unit levels. The target population of the CCHS includes household residents aged 12 years and older in all provinces and territories, with the principal exclusion of populations on Indian Reserves, Canadian Forces Bases, and those living in institutions or more remote areas. There is one randomly selected respondent per household, with an oversampling of youths resulting in a second member of certain households being interviewed. The CCHS sample is primarily a selection of dwellings drawn from the Labour Force Survey area sampling frame. For the regional level survey, the sample is supplemented with a random digit-dialling sample in some health regions.

The interview for the regional-level health survey includes common content to be asked of all sample units, optional content determined by each health region from a predefined list of questionnaire modules, and socioeconomic and demographic content. A focused provincial-level survey consists of some general health content and one focus content topic per cycle. Focus content is intended to be an in-depth treatment of topical issues.

Prior to 2007, data were collected every two years on an annual period. Data presented for 2000/2001, 2003 and 2005 reflect this data collection method. Starting in 2007, major changes were made to the survey design in order to improve its effectiveness and flexibility through data collection on an ongoing basis. As a result, data collection now occurs every year, but for Peel a 'cycle' is still considered to be a two-year period (e.g., 2007/2008, 2009/2010).

Data collection for the CCHS is done by either computer-assisted, personal or telephone interviewing for the area sample, or telephone interviewing for the random digit-dialling sample.

Limitations:

- Depending upon the question, data may be subject to recall bias, social desirability bias and errors from proxy reporting.
- Individuals and/or households without a telephone would be excluded from the sampling frame.
- Some analyses are limited by sample size.

Rapid Risk Factor Surveillance System

The Rapid Risk Factor Surveillance System (RRFSS) is an ongoing telephone survey occurring in various public health units across Ontario. Each month, a random sample of 100 adults aged 18 years and older is interviewed regarding awareness, knowledge, attitudes and risk behaviours of importance to public health, for example smoking, sun safety, bike helmet use, and water testing in private wells. The Institute for Social Research (ISR) at York University conducts the survey on behalf of all RRFSS-participating health units.

Limitations:

- Depending upon the question, data may be subject to recall bias, social desirability bias and errors from proxy reporting.

- Individuals and/or households without a telephone (household or cell) would be excluded from the sampling frame.

- In Peel, the survey is administered in English only.

- Some analyses are limited by sample size.

Early Development Instrument (EDI)

The Early Development Instrument (EDI) is a tool that helps communities to understand how well they are preparing children for grade 1. Results can show community strengths and weaknesses in supporting their children and, therefore, can be a useful tool in assessing community gaps and assets.

The EDI, developed by the Offord Centre for Child Studies at McMaster University, is a teacher-completed, community-based population measure. The EDI is completed in Peel on a three-year cycle in the second half of the kindergarten year to allow for teachers to get to know the children and for children to adjust to their new school environment.

The EDI is comprised of five developmental domains that represent the critical components of child development: communication and general knowledge, emotional maturity, language and cognitive development, physical health and well-being, and social competence. Each domain is scored on a scale of one to 10, with a higher score indicating greater developmental readiness. EDI scores are presented in this report as percentiles, with those scoring below the 10th percentile on one or more domains being considered 'vulnerable' and those scoring above the 75th percentile on one or more domains being considered 'ready'.

Limitations:

- The EDI can be used for service planning purposes but should be used in conjunction with other data such as Census, family, health and community indicators.

- The EDI is meant to be used at the population, not individual, level.

- As students who do not live in Peel but attend Peel schools are excluded from the analysis, the results presented are not reflective of all students attending Peel schools.

- Children identified as having special needs by the teacher are not included in the EDI results.

DATA METHODS

General Methods

Within the majority of tables and figures of this report, values are presented to one decimal of precision while values in the text of the report are rounded to the nearest whole number. Due to rounding, some values may sum to more or less than 100%.

To ensure confidentiality, data were suppressed under the following conditions:

- Canadian Community Health Survey (CCHS): Unweighted numerators or counts less than 10 individuals and denominator counts of less than 30. Suppressed data are noted within the report as "NR – not releasable due to small numbers".
- Rapid Risk Factor Surveillance System (RRFSS): Unweighted numerators or counts with less than five individuals. Suppressed data are noted within the report as "NR – not releasable due to small numbers".
- Mortality or emergency department data counts with less than five individuals were suppressed.
- Early Development Instrument (EDI) data with denominators less than 15 were suppressed.

When comparing mortality or emergency department data for two populations, differences in the respective age distributions were controlled for by using age-standardized rates. This minimizes the effect of differences in age distributions between populations so that observed differences can then be attributed to factors other than age. The direct age-standardization method was used for the calculation of rates with the 1991 Canadian population being used as the 'standard' population.

For figures and tables related to marital status or highest level of education, only those residents aged 25 to 64 years were included, to avoid confounding the relationship observed with age (i.e., that younger persons are not as likely to be married or to have completed their education and older people are more likely to be widowed or to have lower attained levels of education).

For Census Data:

Immigrant status is defined as follows:

- Recent Immigrant: arrived in Canada within the past five years.
- Long-term Immigrant: resident of Canada for more than five years.
- Non-Immigrant: Canadian-born population.

For Canadian Community Health Survey Data:

Immigrant status is defined as follows:

- Recent Immigrant: arrived in Canada within the past 10 years;
- Long-term Immigrant: resident of Canada for 11 or more years; and
- Non-Immigrant: Canadian-born population.

For analyses using the Canadian Community Health Survey (CCHS) or the Rapid Risk Factor Surveillance Survey (RRFSS), outcomes of interest where a missing, do not know or refused response was greater than five per cent are included in the denominator. This is a different approach to previous reports and may result in numerical differences between reports.

Unless otherwise stated, all data presented from the CCHS and RRFSS have been weighted to account for the sampling method used.

Within the CCHS, income, education, ethnicity and immigrant status were categorized as follows:

CCHS Income:

Based on the self-reported total household income and the number of individuals in the household; four ranked income categories were developed as shown in Table 8.1.

Using the Canadian Community Health Survey (CCHS), education is categorized into the following:

- Less than high school,
- High School,
- Other post-secondary and
- Post-secondary.

CCHS ethnicity is categorized into the following based on the population aged 12 years and older who responded to the question about their cultural and racial background at the time of the interview. The pre-defined categories in the survey were:

- White;
- East/Southeast Asian - includes Chinese, Filipino, Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese), Japanese, Korean;
- West Asian/Arab - includes Arab and West Asian (e.g., Afghan, Iranian);
- South Asian (e.g., East Indian, Pakistani, Sri Lankan);
- Latin American (e.g., Mexican, Caribbean, South American); and
- Black.

Table 8.1

**Household Income Categories,
Canadian Community Health Survey**

Income Level	Income-Level Name	Number of people in the household	Total household income
I1	Low-Lower Middle	1 – 2 people 3 – 4 people 5+ people	<$14,999 <$19,999 <$29,999
I2	Middle	1 – 2 people 3 – 4 people 5+ people	$15,0000 to $29,999 $20,000 to $39,999 $30,000 to $59,999
I3	Upper Middle	1 – 2 people 3 – 4 people 5+ people	$30,000 to $59,999 $40,000 to $79,999 $60,000 to $79,999
I4	Highest	1 – 2 people 3 or more	More than $60,000 More than $80,000

Source: Canadian Community Health Survey, Statistics Canada

- Aboriginal people of North America (e.g., North American Indian, Métis, Inui/Eskimo)

- Other (multiple responses across categories defined here, and non-response/don't know/ refusal).

When making international comparisons, countries selected for inclusion were those at the top and bottom of the ranking (e.g., the countries with the highest and lowest Gini coefficient) as well as countries where the majority of Peel's immigrants were born. This included: India, United Kingdom, Italy, China, Portugal, Poland, Jamaica and the United States.

Chapter Specific Methods

Chapter 2 – The Determinants of Health in Peel

Map 2.4 shows the after-tax median household income and the proportion of recent immigrants (those who immigrated between 2001 and 2006). For each census tract, the percentage of recent immigrants was calculated and the census tracts were ranked and classified into quintiles with an equal number of census tracts in each group. After-tax median household income was classified into five, roughly equal groups, with each grouping encompassing the nearest five hundred or thousand.

Chapter 3: Relationships amongst the Determinants of Health

For this report, four separate health outcome models were developed specific to self-rated health, binge drinking, smoking status and overweight or obesity. Data from cycles 1.1, 2.1, 3.1 and 4.1 of the Canadian Community Health Surveys were used for the analyses.

Self-rated poor health was defined as the proportion of respondents who reported fair or poor health.

Binge drinking was defined as the proportion of respondents who reported drinking five or more alcoholic drinks on one occasion at least once a month over the preceding twelve months.

Current smokers were defined as a person who smokes daily or occasionally and has smoked at least 100 cigarettes in their lifetime and smoked on some days in the past 30 days. Respondents who were former smokers (daily and occasional) were grouped with those who never smoked and were categorized as non-smokers.

Overweight or obesity was defined as the proportion of respondents who had a Body Mass Index of 25 or greater (i.e., with overweight defined as 25-29.9, and obese classified as greater than 30).

Independent Variables

The determinants of health analyzed in all four models were age, sex, household income level, educational level of respondent, racial group, immigrant status, marital status, sense of belonging to the local community, self-perceived life stress and work status in the past week. Other risk factors found in the literature that were relevant to each health outcome were also included in the appropriate models.

Household income level

Household income level was derived using the total household income and the number of people living in the household. The variable was categorized as lowest to middle, upper-middle and highest, with the referent group being respondents in the upper-middle category.

Educational level of respondent

The educational level was defined as the highest level of education reported by the respondent. The variable was categorized as less than secondary school education, secondary graduate, other post-secondary education, and post-secondary graduate. Respondents who were post-secondary graduates were defined as the referent group.

Ethnicity

The variable for ethnicity was categorized into respondents who identified as the following: White, Black, East or Southeast Asian, West Asian or Arab, South Asian, Latin American or Other racial origins (including multiple

origins). Due to small sample size, respondents identifying as Latin American and Other racial origins were grouped together for all models. Respondents who self-reported as being 'White' were defined as the referent group.

Immigrant status

A variable for immigrant status was derived using reported time since immigration to Canada. Respondents were categorized as recent immigrants if they immigrated 10 or less years ago, and long-term immigrants were defined as those who immigrated to Canada 11 years ago or longer. Respondents who were non-immigrants (i.e., Canadian-born repondents) were defined as the referent group.

Marital status

The variable describing marital status consists of three categories. Respondents were grouped as currently married or in a common-law relationship (referent group); divorced, separated or widowed; or single.

Sense of belonging to the local community

A self-reported variable was used to measure respondents' sense of belonging to the local community. The variable was grouped into two categories—very strong or somewhat strong (referent group), and somewhat weak or very weak.

Self-perceived life stress

The variable for self-perceived life stress was similarly dichotomized into respondents who reported being extremely stressed or quite a bit stressed, and those reporting not at all being stressed, not very stressed or being a bit stressed. The latter was used as the referent group.

Employment status in past week

The employment status of respondents was categorized as those who reported being at work in the last week or were absent from work last week (referent group), and those who reported having no job last week. Respondents who reported being permanently unable to work were excluded from the analysis due to the small sample size in Peel.

Self-perceived health

The variable for self-perceived health was included in all four models, and consisted of two categories: excellent, very good or good health, and fair or poor health. Respondents reporting excellent, very good or good health were used as the referent group.

Weekly alcohol consumption

Weekly alcohol consumption was defined as the proportion of current drinkers who consumed alcohol at least once per week in the past 12 months. The variable was included in the models for smoking and overweight or obesity, and was dichotomized into those respondents who consumed alcohol on a weekly basis, and those who did not (referent group).

Smoking status

Smoking status was included as an independent predictor in the analysis for binge drinking and overweight or obesity. The variable consisted of two categories: current smoker and non-smokers or former smoker (referent group).

Physical Activity Level

Physical activity levels were defined using calculated energy expenditure values, and were categorized as active (referent group), moderate and inactive. The variable was included in the analyses for all four models.

Fruit and vegetable consumption

A dichotomous variable for fruit and vegetable consumption was created and included in the model for overweight or obesity. The variable categorized respondents into those who reported consuming fruit and vegetables five or more times per day (referent group), and those who reported consuming fruit and vegetables less than five times per day.

Someone smokes in the home

A dichotomous variable was created to assess whether household members or regular visitors smoke inside the home every day or almost every day (yes/no). The variable was included in analyses for the smoking and binge drinking models. Those who reported no smoking in the home were used as the referent group.

Injured in past twelve months

Survey respondents were asked if they had sustained an injury in the preceding 12 months that was serious enough to limit their normal activities (yes/no). The variable excluded repetitive strain injuries. Those who reported no injury were established as the referent group.

Inclusion and Exclusion Criteria

The present analyses were restricted to residents of the region of Peel who were 18 years of age and older. In order to accurately measure Body Mass Index (BMI) in the overweight and obesity model, persons less than 3 feet tall or greater than 6 feet 11 inches were excluded from the analyses as well as lactating or pregnant women.

Statistical Analysis

Analysis was performed using SPSS statistical software 19.0. Common variables were identified across each individual cycle and were combined to create a merged data set. Changes in questionnaire content across each cycle were considered prior to merging to ensure the appropriateness of combining cycles. For the final logistic regression analyses, a bootstrap procedure developed by Statistics Canada to account for the complex sampling design of the survey was used to generate robust estimates and confidence intervals.

Exploratory modelling was conducted using a block approach. All determinants of health variables were selected for inclusion in the model. Additional explanatory variables identified in the literature were also considered for inclusion. Missing data were excluded from the analyses.

Collinearity Diagnostics were conducted using the variance inflation factor (VIF) and Tolerance (TOL). In all models, the variable of inflation was less than five for each variable indicating no problems with collinearity among the covariates.[187] Odds ratios and 95% confidence intervals were generated.

Effect modification was not assessed in the present models, as the bootstrap program did not allow for the inclusion of interaction terms. However, based on the previous literature, the models for current smoking status and overweight or obesity were stratified by sex, and analyses were run to assess the presence of effect modification.[50,188] Due to insufficient cell counts, stratification by sex could not be carried out for binge drinking.

There are several limitations which may have important impacts on the results of this analysis. First, due to their availability in the Canadian Community Health Survey, there were important determinants of health that could not be included – for example social support or the social and physical environment indicators. Alternatively, some variables of importance were not included because they were not consistently collected or were not measured in a useful way (e.g., language spoken at home changed between cycles). Also, determinants may not have been measured in a manner which would reflect distinctions in fair or poor health status. The process of combining years of CCHS data will also dilute any changes that might have occurred over the years from 2000/2001 to 2007/2008. Finally, even with four cycles of the Canadian Community Health Survey, the unweighted Peel sample was small and may not have been able to detect true differences where they may exist (e.g., education and self-rated general health).

Chapter 4: The Marginalization Index – A Peel Perspective

The OnMarg index was empirically derived using factor analysis and is available as a continuous measure or in quintiles. The loadings for each factor were used to compute four separate indices for residential instability, material deprivation, dependency and ethnic diversity from the factor scores generated for each subject. Previous literature has found that the dimensions of residential instability and material deprivation capture the concept of chronic stress to a much larger degree than ethnic diversity and dependency. The latter two measures reflect demographic characteristics related to ethnicity and population age-structure and were therefore used as neighbourhood-level control variables in the analysis.[50]

Emergency department visits and hospital discharge data for 2006 were used with the OnMarg Index data to conduct the analyses found in this chapter.

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chapter 10

## DATA REFERENCES AND APPENDICES

A - 2006 Census, Statistics Canada

B - Canadian Community Health Survey
    2007/2008, Statistics Canada, Share File,
    Ontario Ministry of Health and
    Long-Term Care

C - Canadian Community Health Survey 2005,
    Statistics Canada, Share File, Ontario
    Ministry of Health and Long-Term Care

D - Rapid Risk Factor Surveillance System,
    Peel Public Health

Appendix 1
Peel Data Zones
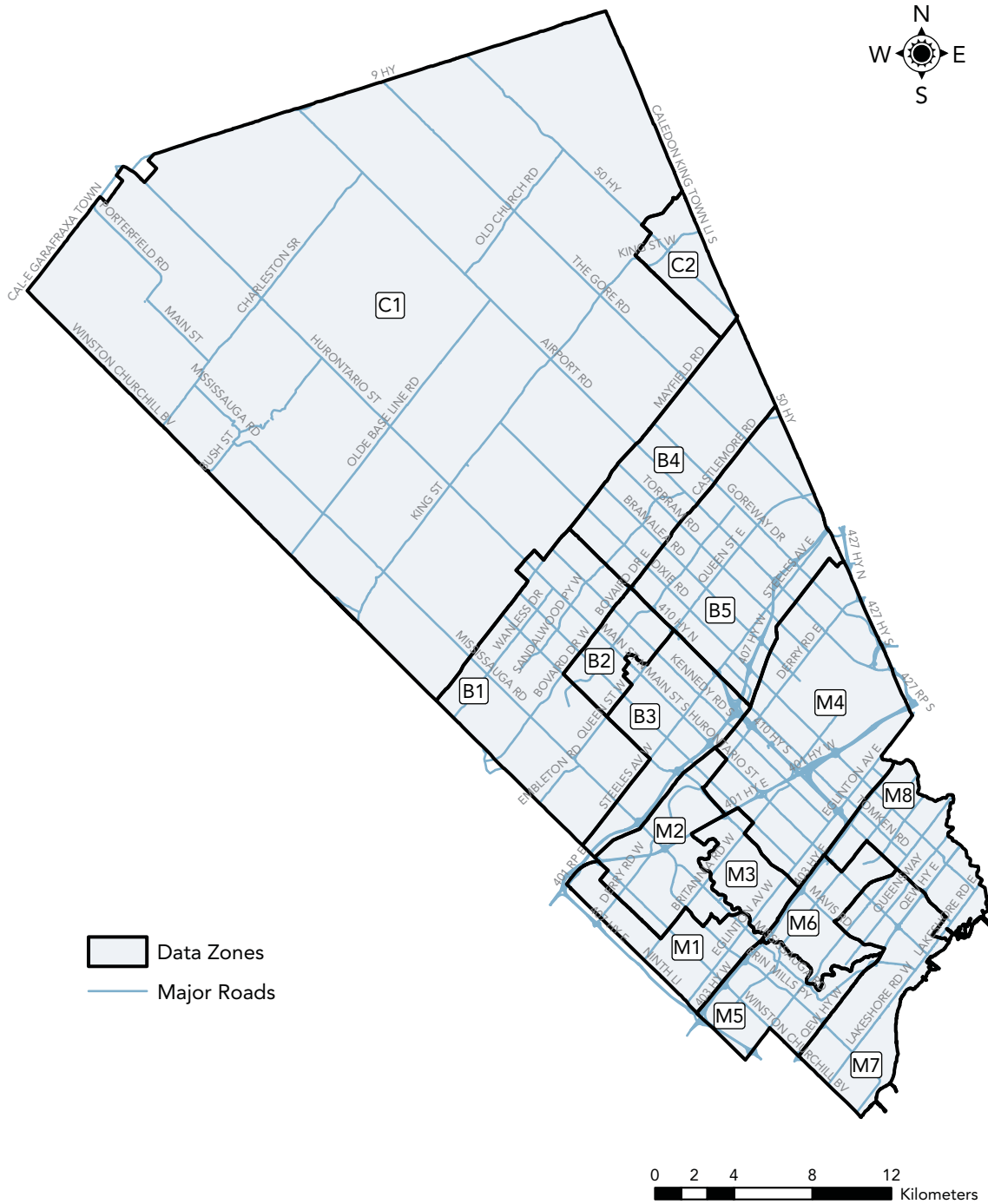
Data Zones

Major Roads

Data zones are denoted by the first letter of the municipality, followed by a number (e.g., C1 denotes Caledon data zone 1).

Source: Developed for Peel Public Health by McMaster University, School of Geography and Earth Sciences

Appendix 2

After-Tax, Income Measures for Economic Families, and
Prevalence of Multiple Family Homes
Peel Municipalities, Peel Data Zones, Peel and Ontario, 2005

Area	Median After-Tax Income for Economic Families	Prevalence of Low Income for Economic Families (%)	Prevalence of Low Income for Couples (%)	Prevalence of Low Income for Male Lone Parents (%)	Prevalence of Low Income for Female Lone Parents (%)	Multiple family households (%)
Caledon	$79,159	3.0	2.6	2.8	8.5	3.8
C1	$82,720	2.6	2.2	5.0	7.9	4.5
C2	$74,116	3.8	3.3	0.0	9.2	2.8
Brampton	$66,386	9.2	7.6	11.5	20.2	9.1
B1	$72,860	6.6	5.5	9.6	15.5	7.2
B2	$64,377	8.7	7.0	8.8	19.0	7.2
B3	$62,173	12.2	9.9	13.6	26.9	8.9
B4	$71,278	8.5	7.6	8.1	16.5	17.2
B5	$62,397	9.7	7.9	15.1	20.7	7.6
Mississauga	$67,728	10.7	9.1	12.9	22.1	5.1
M1	$78,839	8.7	7.9	20.0	14.6	5.7
M2	$71,452	7.6	6.6	7.1	15.8	4.1
M3	$75,231	9.8	8.4	0.0	24.6	9.4
M4	$61,605	12.6	10.6	18.1	24.7	9.2
M5	$75,788	9.8	7.4	7.8	26.4	3.9
M6	$60,745	13.2	12.1	11.4	22.3	4.4
M7	$64,234	11.2	9.4	8.7	24.0	2.6
M8	$60,570	11.2	9.3	21.2	21.9	4.0
Peel	$67,841	9.7	8.2	11.9	20.9	6.4
Ontario	$62,288	8.6	6.2	12.2	23.9	2.5

Source: 2006 Census, Statistics Canada

Appendix 3

Home Ownership, Home Characteristics and Household Size,
Peel Municipalities, Peel Data Zones, Peel and Ontario, 2006

Area	Own a home (%)	Dwellings in need of major repairs (%)	Dwellings built prior to 1991 (%)	Live in single or detached dwellings (%)	Households with six or more persons (%)
Caledon	91.4	4.6	57.8	85.7	4.4
C1	91.3	5.8	66.7	90.0	5.0
C2	91.6	2.5	44.2	78.6	3.7
Brampton	81.5	3.6	56.3	51.8	10.4
B1	94.1	2.2	32.3	70.2	9.4
B2	79.3	4.7	68.7	41.2	8.0
B3	67.6	4.9	71.2	45.7	9.7
B4	95.0	0.7	5.0	66.5	19.3
B5	77.8	4.3	80.7	43.4	8.7
Mississauga	75.0	4.3	67.5	40.9	6.3
M1	92.5	1.2	16.6	55.5	8.0
M2	78.9	3.6	65.8	42.2	5.4
M3	89.5	2.1	24.1	60.8	11.8
M4	76.1	3.6	61.7	34.0	9.8
M5	77.9	4.3	89.2	49.3	5.6
M6	69.8	4.8	79.5	26.8	5.4
M7	62.8	6.1	85.2	36.4	3.5
M8	67.0	6.3	91.5	37.6	4.0
Peel	78.1	4.0	63.1	47.0	7.7
Ontario	71.0	6.6	77.6	56.0	3.5

Source: 2006 Census, Statistics Canada