PART TWO

A Profile of Women and Healthy Living

Table of Contents

Measures of Women and Healthy Living

Margaret Haworth-Brockman

A question we asked as we embarked on this research was what does healthy living currently look like among women in Canada? As demonstrated in Part 1, discussions of healthy living have largely been restricted to eating well, preventing obesity and staying physically active. Refraining from smoking and moderate alcohol use have also been recommendations for healthier living. However, as also demonstrated earlier and through our own research, we know that achieving and maintaining good health and well-being are not so simplistic. Thus in this chapter we expand the discussion to other healthy living topics as well as illustrate how complex determinants influence women's experiences and thus their healthy living.

We begin this chapter with a framework of health indicators for situating our subsequent presentation of specific healthy living topic areas within other health-determining aspects of women's lives. Because we begin from the position that health is determined by the overall context of women's lives in Canada, we have already examined a few national socio-political factors within the framework, as well as women's diversity in terms of employment, education, income, place of residence, ancestry and age in Part 1. All of these factors (among others) have been found to influence women's health. These same factors are then used as stratifiers in our profile of the healthy living topics wherever possible. We present the indicators in this profile using national survey and administrative data, providing a gendered analysis of our findings.

A Framework and Indicators for the Healthy Living Profile

Health indicator frameworks provide a purposeful and systematic means to conceptualize health determinants and their relationships to health status or outcomes. Frameworks are shaped by current health policy priorities and the availability of useable data, but also should reflect factors that have meaning in people's lives, and point to actions that can be taken to improve health (1,2). As the concepts and methods for sex- and gender-based analysis have matured, it has become clear that not only do analyses of women's and men's health require specific data about each sex, but data must also be presented in the context of political, social, economic and other systemic factors that influence health. These factors, related to women's (and men's) gendered norms, responsibilities, roles, and opportunities to get and use resources and partake in decision-making, provide significant context for understanding health data (2).

Health indicator frameworks provide purposeful and systematic means to conceptualize health-influencing factors and their relationships to health status or outcomes.

In a review of health indicator frameworks,[1] Haworth-Brockman and Isfeld found that many frameworks can be used to characterize population health in a gendered profile such as this one (2). No matter which format is adopted however, there are two key challenges. One is to assess the ability of indicators to meaningfully reflect aspects of peoples' lives and their health. The second challenge is to ensure that each set of measures is analyzed in terms of both sex and gender.

The framework we adopted for this report was refined in recent work on gender and health statistics with the World Health Organization (2), and builds on earlier work, particularly that of Vivian Lin and La Trobe Consortium (1). As illustrated in Figure 1, the framework we used is similar to the one used by the Canadian Institute for Health Information (3). There are four "tiers"[2] – (1) health status, (2) determinants of health, (3) health system performance, and (4) community and structural factors – which reflect individual, family and household level as well as community and societal factors for a population. Tier 1 (Health Status) indicators, for example, are measured at the individual level (such as treatment for a disease, or hospitalization for an injury), and are usually reported as rates for a population (such as incidence or prevalence). The Tier 2

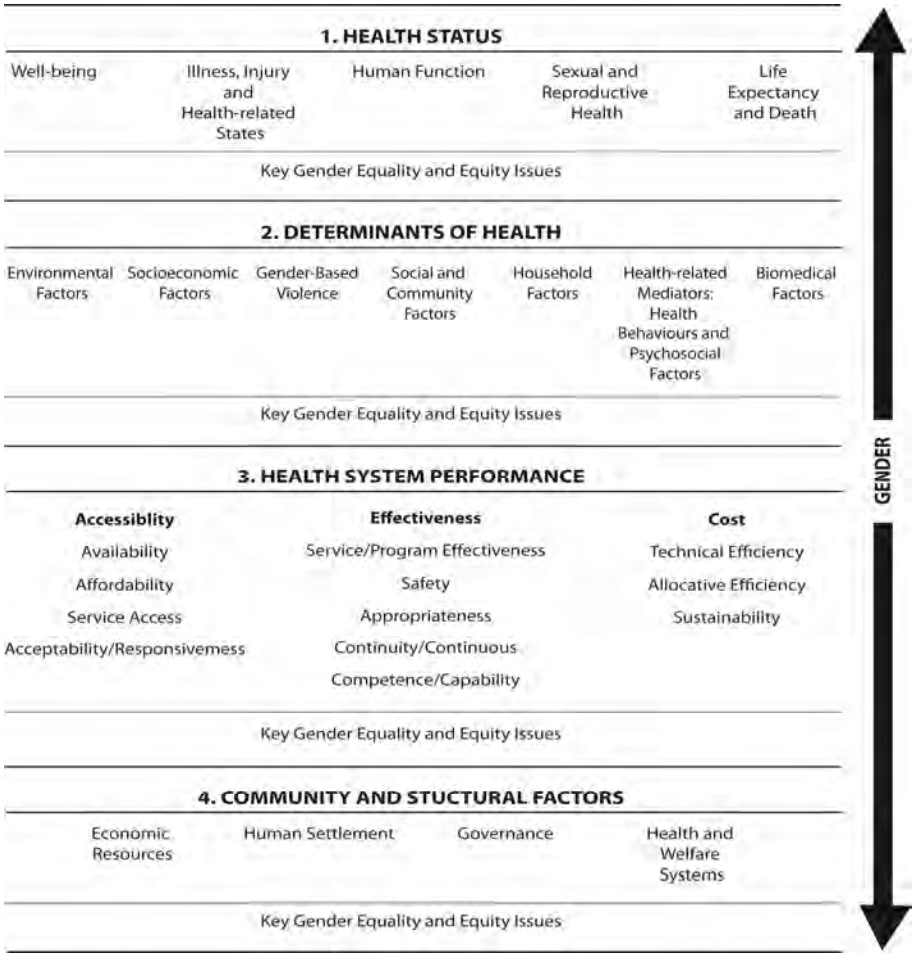


Figure 1. Gender and Health Information Framework (2).

[1] See for example: http://secure.cihi.ca/cihiweb/products/health_indicators_2011_en.pdf http://www.paho.org/english/ad/ge/basicindicators.pdf , http://www.searo.who.int/EN/Section13/Section390/Section1376_5513.htm http://www.who.int/healthinfo/statistics/whostat2005en1.pdf http://www.uregina.ca/fnh/ http://www.framtidsstudier.se/wp-content/uploads/2011/01/20080109110739filmZ8UVQv2wQFShMRF6cuT.pdf http://www.phn-rsp.ca/pubs/ihi-idps/pdf/Indicators-of-Health-Inequalities-Report-PHPEG-Feb-2010-EN.pdf

[2] The "tiers" do not necessarily connote a hierarchy except that it is typical for health profiles to present mortality and life expectancy data first, followed by data on other aspects of health status.

indicators include personal habits (servings of vegetables eaten per day, for example) and may be collected at the individual level or for all the members of a household. Tier 2 also can include aspects of the local community such as proximity to hazardous sites. The indicators in Tiers 3 and 4 are measured for a society or an institution, such as when an immunization program is rolled out (Tier 3) or political systems of taxation (Tier 4). The factors in every tier are conceptualized as influencing the health of individuals and the health of populations.

In contrast to the CIHI framework, however, this version of the framework incorporates "key gender equality and equity issues" as a component of all four levels. For example gender-based violence in a community (Tier 2, *Determinants of Health*) affects the *Health Status* (injury, well-being, mental health – Tier 1) of women who are abused. Acts of gender-based violence and the consequences are likewise affected by *Community and Structural Factors* (Tier 4) which can define how and if gender-based violence is dealt with in a society, the laws in place to protect women and to prosecute perpetrators, for example. At the same time, how well women are treated with respect to preventing abuse or following abusive incidents can be measured as aspects of the *Health System Performance* (Tier 3). The inclusion of gender-specific topic areas in every "tier" reminds both producers and users of health data that analyses of gender equality and equity are needed to situate health information and outcomes. The arrow along the right-hand side of the diagram serves to emphasize the point that gender is both influenced by and influences health (2).

The framework in Figure 1 is a static illustration of processes that are dynamic since social and behavioural practices at all levels can influence others. In an effort to capture this dynamism, as well as to emphasize the contribution of gender within each aspect of the framework, Moussavi et al. provide a new version of the same framework (adapted in Figure 2 for this report) which provides a clearer representation of the links between and among the four tiers of indicators and the importance of considering gender within and across health statistics (4). For any topic area, be it a broad population health profile or a more disease-particular health report (on HIV/AIDS, for example), there are gender-specific areas that require exploration, no matter whether the population of interest is everyone, or just women, or just men, or some other sub-population such as the men and women of a particular ethnic or economic group (2,5).

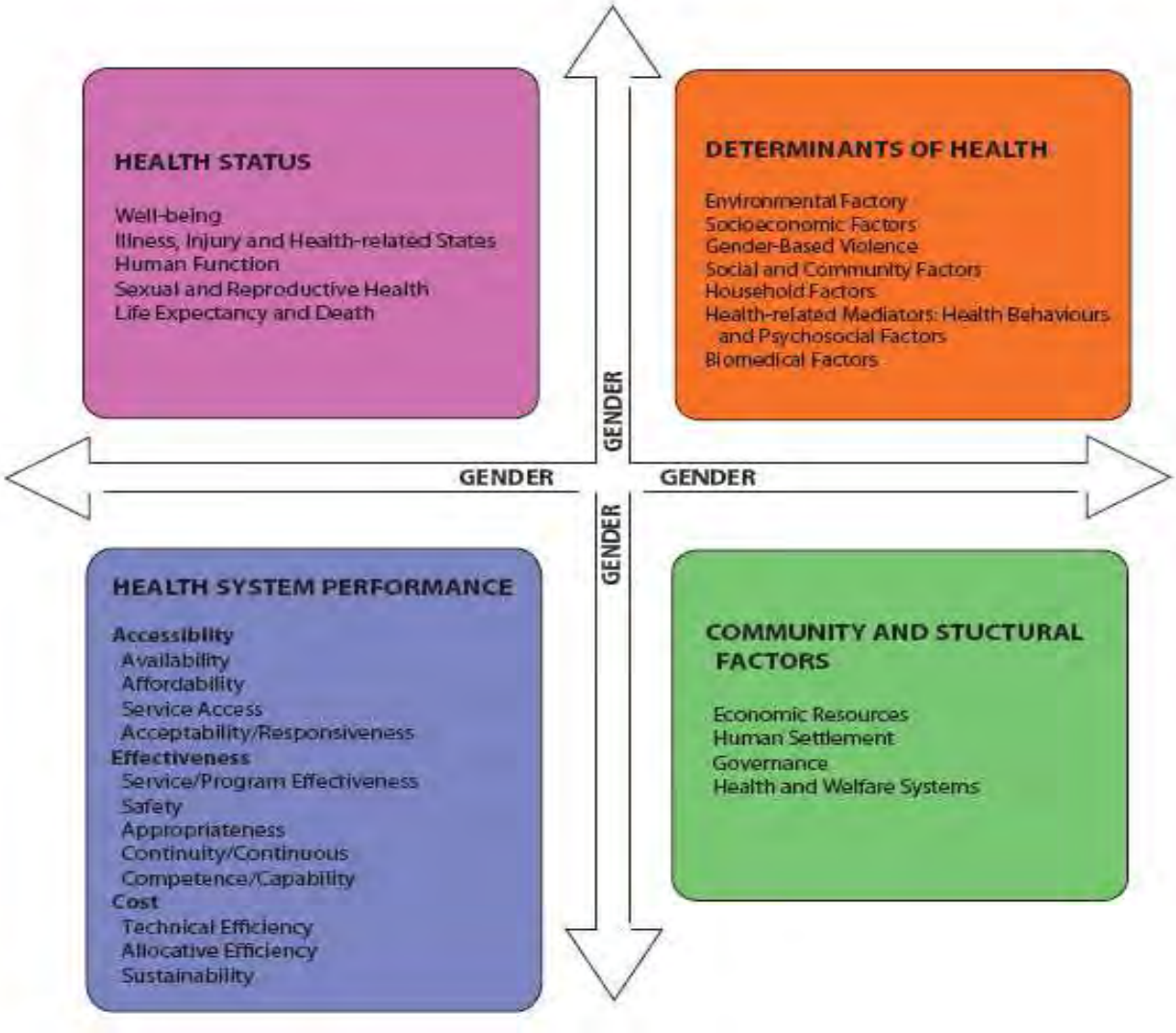


Figure 2. Organizing framework for gender-sensitive indicators. Adapted, with permission from the authors, from Moussavi et al. (4).

Both depictions of this framework facilitate the identification and inclusion of gender-sensitive indicators in health research and planning. Tony Beck developed criteria for ensuring gender-sensitivity in indicators, which he defined as measures that enable us to "identify, examine and monitor gender-related changes in society over time" (6). He emphasized the need to have comparators across populations (comparing women to men, or creating ratios) and across time (e.g.,, how a particular measure compares with the last time it was assessed, and any goals for future improvement) (6,7). As he pointed out, health (or other) indicators are valuable only if they can be used to make change, if they are meaningful, and if they have a comparator to illustrate where disparities lie. Drawing on Beck's initial work, Lilia Jara provided this definition of gender-sensitive indicators:

> ***"Gender-sensitive indicators** provide direct evidence about the situation of women compared to another specific population group, which may be men, but may also be women of another age group, ethnicity, socioeconomic level or place of residence."(8)*

We are using Jara's definition of gender-sensitive indicators in this report, in our presentation and analysis of the healthy living topics. The health indicator data are presented for women across Canada, but not in comparison to men or to a total of women and men. Since our focus is on women, we examine the gender-sensitivity of the indicator data to reveal differences and inequities where they exist among women in this country.

Sex- and Gender-based Analysis and Indicators

Indicators alone are not sufficient for monitoring and measuring gender-based health inequities. Consistent sex- and gender-based analysis (SGBA) is essential to understanding how and why inequities contribute to health disparities. That is, systematic attention to differences between and among women (and men) in a population is required. This is because it is important to recognize that indicators, even gender-sensitive ones, often point to key questions rather than provide answers and it is the interpretation of the data, drawing on information about broader social, economic, political and cultural contexts including gender norms, relations and roles, that can provide some of the answers to those questions (2).

The analysis of health indicators in this report includes stratifiers that illustrate how differences among women may be hidden within national-level data about "all women in Canada". Our analyses also incorporate findings from current research literature and a working knowledge of local policies and politics, as well as community expertise in the form of local reports and other information.

As Jackson noted, "The analysis is strengthened by understanding that social locations (like gender, race or class) are not simply attributes of individuals, they are the product of social relations and should be situated within social structures (e.g., diagnostic practices, gendered relations of care). The analysis should move between different levels of analysis and diverse sources and types of evidence, moving both horizontally (from situation to situation) and vertically (from particular to general, micro to macro-structural). The analysis remains open to both generalized knowledge (e.g., prevalence of osteoarthritis in women and men) and personal experience (e.g., an individual's reports of pain and disability)" (quoted in (2)).

…social locations (like gender, race or class) are not simply attributes of individuals, they are the product of social relations and should be situated within social structures….

Summary

A gender-sensitive health indicator framework and SGBA form the basis of our exploration of healthy living among women in Canada. We began this report by examining the framework's tier for social and political structures (Tier 4), before describing the female population in Canada and then looking at some determinants of health in Tier 2. The determinants were selected because they are available in the health survey data we analyzed for our healthy living topics. As will be demonstrated, in this section, healthy living for women is influenced by many factors, some of which are within women's control and others of which have more to do with the households, community and societal structures in which we live.

References

(1) Lin V, Gruszin S, Ellickson C, Glover J, Silburn K, Wilson G, et al. Comparative evaluation of indicators for gender equity and health. 2003;WHO/WKC/TECH.SER/03.2.

(2) Haworth-Brockman MJ, Isfeld H. Better evidence to improve women's health with gender and health statistics: Health indicator frameworks. 2012. Winnipeg: Prairie Women's Health Centre of Excellence

(3) Canadian Institute for Health Information. Health Indicators 2010. 2010. Ottawa.

(4) Moussavi S, Amin A, Alfven T, Papy J, Schutt-Aine J, Rotzinger S, et al. Know your epidemic, know your response to gender inequality: a framework for gender-sensitive HIV monitoring and evaluation. WHO Bulletin in press.

(5) Better evidence to improve women's health through gender and health statistics. World Health Organization; 2010. http://www.who.int/gender/events/2010/gender_policy_dialogue/en/index.html

(6) Beck T. Using gender-sensitive indicators: a reference manual for government and other stakeholders. 1999. Commonwealth Secretariat

(7) Beck T, Stelcner M. Guide to gender sensitive indicators. 1997. Ottawa: Women's Health Bureau, Health Canada.

(8) Jara L. Integrating a gender perspective into health statistics: an ongoing process in Central America. Int. J Public Health 2007;52(0):S35-S40.

Data Sources and Methods

Harpa Isfeld

Study Design

This profile presents recent evidence on a wide range of factors that are understood to predict Canadian women's ability to preserve health and diminish risk of disease, disability and death. Numerous indicators, many routinely measured and widely used, were included in the analysis of ten healthy living topics: body weight, eating well, food insecurity, physical activity, sedentary living, tobacco use, alcohol use, sexual behaviour, injury and gender-based violence and self-injury.

Several key national sources were used for cross-sectional or period estimated data, with some examination of trends. Sex-stratification was integral to the analysis, with our focus being on data concerning females. Although some comparisons were drawn between women and men and girls and boys, as points of reference useful in describing gender inequities in some topics areas, such comparisons between the sexes were not systematically pursued in our data analysis. Our analysis supported a more in-depth view of Canadian women, recognizing that gender is neither dichotomous (female versus male) nor constant, but rather a socially ascribed and individually interpreted dimension that is best understood as a continuous variable, and one that is context dependent (i.e., shaped by time, place, and social group membership). Particular focus was placed on evidence of disparities among women in Canada, accomplished through simple bivariate analysis of healthy living indicators (dependent variables) cross-tabulated against social and socioeconomic variables (independent or stratifying variables) known to represent some important dimensions of diversity, and for which data are readily available in Canada. These stratifying variables (e.g.,, income, education level) represent some of the factors which hinder or benefit women's health, as described in the indicator framework in the previous chapter.

The quantitative evidence we present was rounded out by using data from other published quantitative and qualitative research, both from grey and peer-reviewed academic literature, to further explore gendered and diverse experiences of women. In keeping with the indicator framework, a sex- and gender-based analysis was applied to each topic area, allowing a deeper level of analysis that considered multiple determinants of health (e.g., at the individual, community or structural levels) and the meaning, implications and relevance of the evidence for Canadian women, including vulnerable groups within this population.

Data Sources

The information about women's healthy living we used was derived from seven sources, including national health surveys, surveillance programs, and administrative data sets. The main source of information was the Canadian Community Health Survey (CCHS), which was selected for this profile because it is the most comprehensive data source for healthy living indicators, it is based upon a large national sample which may support stable estimates for Canadian women as well as regional and other sub-populations of women, and it contains enough social and economic measures to allow for diversity analysis. CCHS Master File data were secured through the remote access program of Statistics Canada-Health Division. The particular annuals/cycles used (2009-2010; 2007-2008; and 2005) were chosen based on whether they included modules and indicators of interest to us and whether they drew upon a full national sample of Canadian women (and men).[1] Choice of these CCHS annuals conserved the size of the data set to support more stable estimates of proportions based upon cross-tabulations of female-only data and permitted regional comparisons.

In addition to the CCHS, data from the following sources were also analyzed: Canadian Health Measures Survey (CHMS, 2007-2009), Canadian Tobacco Use Monitoring Survey (CTUMS, 2010), Canadian Drug Use Monitoring Survey (CADUMS, 2010), administrative data from the National Work Injury Statistics Program of the Association of Workers Compensation Boards of Canada (AWCBC - NWISP), Sexually Transmitted Infections (STI) Surveillance Data produced by Public Health Agency of Canada, and the Census of Agriculture 2001. CTUMS, CADUMS, Census of Agriculture, and STI data were derived from publically available data sets (i.e., Public Use Microdata Files and summary tables available online), whereas CHMS and NWISP data were purchased as custom requests from Statistics Canada and the AWCBC, respectively. Public data sources created some constraints for our analyses, compared to the CCHS Master File data, as some variables were inaccessible (e.g., pregnancy, Aboriginal identity) or not comparable with those in the CCHS (e.g., see the notes on income below).

These sources are admittedly not exhaustive of data available on healthy living indicators for the Canadian population. Other important sources were not pursued for primary analysis due to limitations of time and resources. Notably, our project constraints did not permit analysis of data from the 2nd First Nations Regional Health Survey (2008-2010), which measured many healthy living indicators, although the potential for future collaboration was explored with staff of the First Nations Information Governance Centre. Such omissions were ameliorated by relying on secondary analysis of data in published reports, although some publications do not consistently include sex-disaggregated data. Efforts were made to include the most recent data,

[1] Respondents in all health regions participate in CCHS questionnaire modules designated by Statistics Canada as 'core content' or 'theme content' for particular cycles. Other modules are 'optional', meaning that health regions are given a choice of whether to ask them of respondents in their region. We chose indicators from modules included as core content, and obtained the most recent data for those indicators.

however due to the large number of data sets and our time constraints, data released after analyses were underway were not updated. Where a particular data source did not permit cross-tabulation of variables by sex, older data sources which did permit sex-disaggregated analysis were employed (e.g., Census of Agriculture 2001 was preferred over 2006).

Further details regarding each data source are provided in the Technical Appendix to this report.

Variables

More than 85 variables, nearly all of them categorical, were submitted for analysis. Our choice of variables for the profile was necessarily pragmatic, given project constraints. For example, given the complex file structure of nutrient data, and limited availability of technical files through the remote access program for other vitamin and mineral data, healthy eating variables were limited to only fruit and vegetable consumption. The Technical Appendix provides a full listing, by topic area, of all variables submitted for analysis, including their definitions and any exclusion criteria.

Several stratifying variables were employed in cross-tabulations of data for females, with the greatest priority given to age, province/territory, a distributive measure of household income (details below), and education. Age was interpreted not only as a biological condition that is often highly predictive of increased risks to health, but also as a proxy variable representing life stages and the roles and status assumed by or ascribed to women of different ages. Where deemed relevant to a particular topic area and indicator, additional variables were employed in cross-tabulations, including Aboriginal identity (self-identified by individuals living off-reserve), urban or rural residence, racial origin, household living arrangement (e.g., female lone parent households), length of time in Canada, and pregnancy. Other important groups among women, such as First Nations, Métis, women with disabilities, or refugee women, could not be included in this analysis due to limited time, resources or the lack of national data.

A Note about Income

Income is an important determinant of health and because opportunities to earn and use income are influenced by gender inequality, it merits further discussion. Women's distinct disadvantages with respect to income are difficult to capture in standard measurements of income. Household income measures are inadequate proxy measures for women's actual material resources, because women may be less likely to benefit from an equitable share among members of households (1,2). Although our gender-based analysis gives due consideration to the importance personal income holds for women's self-determination in acquiring the resources and means to improve health (3,4), a distributive measure of household income lent other advantages to this analysis. In this report, we used the variable 'Distribution of Household Income-Health Region Level', available in the CCHS. This variable provided the benefit of a relative measure of

income insecurity. Based upon an adjusted ratio of income to low income cutoffs (corresponding to household and community size), the variable provides a relative measure of respondents' household income to that of all other respondents living in a similar social and geographical environment (i.e., health region). Residents are distributed into ten categories (i.e., deciles) of approximately equal percentage of the population according to their relative income insecurity for their region. The measure provides for more meaningful comparisons of socioeconomic status of women living in provinces and regions that range widely for costs and standards of living, and reflects the distinct and important dimension of relative material deprivation. Note that the calculation of this variable was not supported by data available for women in the territories.

The same selection of stratifying variables (including the distributive income variable described above) was not always available in the various data sources employed, nor always supported for cross-tabulation with healthy living variables. As one example, the Census of Agriculture included variables for income (i.e., gross farm receipts) and education, however the census data collection and weighting methodologies did not permit linkage between these socioeconomic variable and injury data within the same data set.

Data Manipulation and Methods of Analysis

We used similar methods in our analysis of primary data from CCHS, CTUMS and CADUMS sources, although some specific data treatment methods varied due to the unique sampling methodology of each survey and the specifications that accompanied different types of data products (e.g., Public Use Microdata Files for CADUMS and CTUMS; annonymized Master File data for all CCHS cycles).

Statistical analysis software (SAS for all CCHS data; SPSS 20 for CADUMS and CTUMS) was used to develop code to compute unweighted and weighted estimated frequencies and weighted estimates of proportionate distributions for all healthy living variables and cross-tabulations. Sample weights, specific to each data source, were applied for the purpose of adjusting estimates to represent the age-sex structure of the Canadian target population for the corresponding period. The extent of potential sampling error for each result was estimated by a coefficient of variation, which accounted for the complex sampling design of each survey. CTUMS CVs were obtained manually from tabulated values in the user guide; CCHS data required application of a bootstrap method (macro program Bootvar) of computation; and the SPSS Complex Samples Add-on for SPSS 20 was used to calculate precise standard errors and CVs for CADUMS data. Results were checked against the data release guidelines provided in corresponding user guides. Confidence limits (95%) were derived for each estimate.

Where possible, response categories were regrouped into larger categories to limit data suppression and improve the quality of estimates. Necessary data suppression was noted and those cross-tabulations that produced insufficient results to allow for comparison were omitted. The data were cleaned for not-applicable

categories. Non-responses to survey items were treated as missing data and excluded from analysis. A proportion of missing values was calculated for each cross-tabulation according to the following formula: Missing values (%) = 100 - [Total responses / Total sample size)*100].

Results from all sources were summarized in tables and charts. Where available, confidence limit values were converted into customized high/low error bars in Excel bar charts, where the width of the error bars depicted the degree of variability associated with each estimate. Relationships between healthy living variables and stratifying variables were explored through simple bivariate analysis. Visual inspection of confidence intervals across different categories was used to assess differences between proportions, where non-overlapping 95% confidence intervals defined statistically significant differences, a degree of difference unlikely to be due to chance.

Additional Information

Additional information regarding the data used is provided in the topic summaries that follow, including limitations of certain data sources and measures for representing risk or protective factors that are particularly relevant to women and girls. Measurement gaps and current initiatives to improve the evidence for women's health living are also described, where possible. As noted above, further technical detail, such as definitions and decisions concerning the treatment of specific variables, can be found in the Technical Appendix.

References

(1) Phipps S, Woolley F. Control over money and the savings decisions of Canadian households. J Socio Econ 2008 Apr;37(2):592-611.

(2) Yodanis C, Lauer S. Economic inequality in and outside of marriage: individual resources and institutional context. Eur Sociol Rev 2007 Dec;23(5):573-83.

(3) Haworth-Brockman M, Donner L, Isfeld H. A field test of the gender-sensitive core set of leading health indicators in Manitoba. Int J Public Health 2007;52 Suppl:49-67.

(4) Lin V, Gruszin S, Ellickson C, Glover J, Silburn K, Wilson G, et al. Comparative evaluation of indicators for gender equity and health. Kobe, Japan: WHO Centre for Health Development; 2003.

Body Weights

Meredith Evans and Barbara Clow

In recent years, governments, health practitioners, researchers and the media in Canada, as elsewhere in the world, have sounded an alarm about rising rates of overweight and obesity (1,2). In 2010 the Public Health Agency of Canada published a report entitled *Curbing Childhood Obesity*, which emphasized the impact of a "national crisis" of obesity on children (3). Similarly, in 2011, the Public Health Agency of Canada and the Canadian Institute for Health Information released a joint report, entitled *Obesity in Canada*, which focused on rapidly increasing rates of obesity as well as the "financial burden" of obesity-related conditions on the health care system – estimated at $4.6-7.1 billion per year (4).

Concern about overweight and obesity is rooted in the belief that these conditions contribute to or even cause a variety of chronic diseases. The World Health Organization (WHO) describes obesity as "one of the most significant contributors to ill health" (5) (p. 1-2). The Public Health Agency of Canada likewise states that "childhood obesity can lead to a number of long-term health issues" and that "if action is not taken now to promote healthy weights in children, Canadian youth will be forced to deal with serious health issues later in life" (6). In addition to being understood as the cause of ill health, a body weight classification of "obese" is itself defined as a chronic disease by the WHO and Health Canada (5,7). Indeed, body weight classifications have, increasingly, come to define women and men, boys and girls as healthy or unhealthy.

In order to address the purported epidemic of obesity and its potential effects on health, the *Integrated Pan-Canadian Healthy Living Strategy* identifies three target areas for policy and program interventions – physical activity, healthy eating and healthy (8). Although diet and exercise figure prominently in the Strategy, they are largely discussed in relation to their ability to influence weight (8, 9). "Healthy body weight" is thus framed as the ultimate goal of the Strategy, as well as, to use Eric Oliver's words, a "barometer of wellness" (9). While this approach to weight and health applies to everyone, as we will see it has different implications for women and girls than for men and boys.

Alongside the widespread support for healthy living strategies that focus on overweight and obesity, there is also an emerging critique of currently accepted views about body weight and health. Gard and Wright, among others, have argued that evidence of an obesity epidemic and a causal link between obesity and chronic diseases is weak or non-existent (10). Feminist scholars of the discourse on women's bodies have also pointed to the harm caused by an obsession with the ideal of a thin, sculpted, highly-sexualized female body (11). This chapter builds on these two critiques and our analysis of CCHS data to argue that the focus on overweight and obesity in healthy living strategies is potentially detrimental to girls' and women's health.

The chapter first examines the ways in which body weights are measured, paying attention to the critique of the Body Mass Index (BMI) as a measure for understanding body size. We then consider the relationship between obesity, poor health and chronic diseases and the extent to which the current emphasis on obesity threatens to draw attention away from other health risks, such as malnutrition and, disordered eating, and food insecurity. Finally, we consider how the preoccupation with obesity affects women and their health, specifically through stigma, discrimination, and poor body image. The chapter concludes with a call for health promotion policy and practices that shift attention away from overweight and obesity to a more balanced view of women's health and well-being.

Measuring Body Weight

The Body Mass Index (BMI), which was devised over 150 years ago, has become the most widespread measure for reporting upon body weight in general and obesity in particular (10,12). BMI is designed to express the relationship between a person's weight and height, with the goal of capturing a sense of proportionality, and is calculated by dividing an individual's weight (in kilograms) by her or his height (in metres) squared (kg/m^2) (13). Health Canada uses the same classification system as the WHO in relation to BMI (14):

Underweight: BMI < 18.50 kg/m^2;
Normal weight[1]**:** BMI 18.50-24.99 kg/m^2;
Overweight: BMI 25.00-29.99 kg/ m^2;
Obese, class I[2]**:** BMI 30.00-34.99 kg/ m^2;
Obese, class II: BMI 35.00-39.99 kg/ m^2; and
Obese, class III: BMI > 40.00 kg/m^2.

Brownell suggests that BMI has become a standard tool used because measuring body weight is both easier and more cost-effective than directly measuring body fat (15). Moreover, reports on BMI rates are often based on self-reported data, which makes this approach cheaper even than measuring BMI. Yet BMI-defined body weight classifications have been criticized on a number of grounds. BMI does not differentiate between weight that is based on fat or muscle and other lean tissues, nor does it take into account different body shapes and sizes (16). As a result, BMI generally overestimates fat levels for those with lean, muscular bodies, such as some athletes, while underestimating fat levels for those with less muscular development. Lemieux et al. also point out that BMI does not capture nutritional status, with the result that individuals whose health is compromised by malnourishment may still be classified within the "normal" range of 18.50-

[1] We use the term "normal weight" in this chapter because it is the term utilized by researchers working with BMI. But we recognize that the label implies that some individuals are "normal" while others are "abnormal" – a sentiment with which we do not agree.

[2] Although obesity is technically classified into three stages of severity, it is often referred to as a single category (a BMI of 30 kg/m^2 or greater). When we use term "obesity" in this chapter, we are referring to this inclusive category unless otherwise indicated.

24.99 kg/m^2 (17). At the same time, BMI ranges are not standardized, and vary between countries as well as across time. Indeed, Health Canada's BMI ranges have been revised on several occasions in recent years, with the WHO guidelines being adopted only in 2000(13,18,19). Of note was the decision to adopt WHO guidelines for reducing the lower BMI cut-off from 20 kg/m^2 to 18.50 kg/m^2, a change that Lemieux et al. note could mask eating disorders that contribute to underweight – a condition most common in young women and girls (17).

Many researchers have also observed that BMI may not be accurate or appropriate for ethnically diverse populations because it was developed with and for Caucasians (17-19). For instance, Burkhauser and Cawley demonstrate that the difference in obesity rates between white women and African-American women in the United States doubles when BMI is used rather than the measure of percentage of body fat, with African-American women having much higher BMI scores (20). Similarly, a report from the 2007-2008 Inuit Health Survey points out that BMI can be influenced by leg length, meaning that someone with long legs will have a lower BMI than someone with shorter legs and a similar sized torso (21). Egeland observed that if BMI is calculated using sitting height rather than standing height, the proportion of the Inuit population in the "healthy weight" category increases and the proportion of overweight and obesity decreases slightly (21). These examples clearly demonstrate the limitations of using BMI as a universal measure for diverse populations.

The limitations of BMI are also evident when we consider the differences in anatomy and physiology of female and male bodies. Healthy female bodies typically have a higher fat content than healthy male bodies because adipose tissue serves as an energy reserve for reproduction, including storage of hormones, pregnancy and lactation. Some researchers have also suggested that relying on BMI may skew assessments of obesity in women because women are shorter, on average, than men (16). As we saw with respect to Inuit people, variations in standing height can influence assessments of body weight. Despite acknowledged differences between female and male bodies, the same formula is used to derive BMI for both sexes. The Public Health Agency of Canada warns that women are more likely than men to be labelled obese class II and obese class III as a result (4).

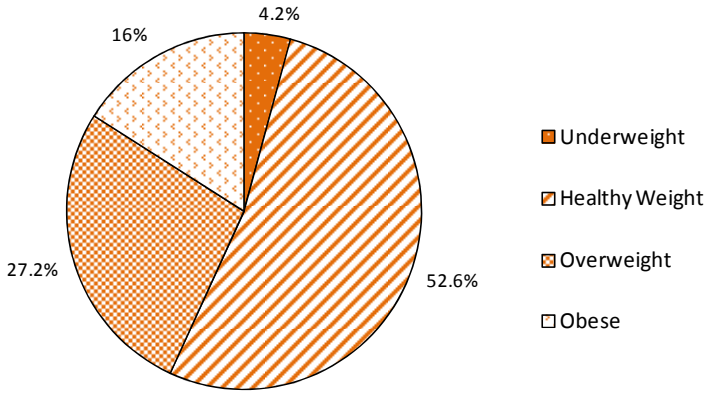
Ultimately, one of the principal limitations of BMI is that it may or may not provide an accurate measure of health. As Petite and Clow point out in their literature review, it is "unclear whether BMI captures the relationship between weight and wellness" (22) (p. 7). They suggest that, in fact, "the point at which weight becomes unhealthy may vary between individuals and across populations" (22) (p. 7). Health Canada concedes some of the limitations of BMI and acknowledges the importance of other measures of health risk associated with body weight, such as waist circumference, waist-to-hip ratio, or skin fold measurement. According to the *Canadian Guidelines for Body Weight Classification in Adults*, for example, a waist circumference (WC) at or above 88 cm (35.2 in) is deemed to put women at increased-risk of obesity-related health conditions, although the evidence in support of these cut-offs is still quite limited (13, 17). Health

Canada also recognizes that, at the individual level, there is considerable variability in the degree of risk associated with a specific BMI or WC and practitioners are cautioned that "the estimation of an individual's health risk should not be based on measures of body weight and waist measurement alone" (13). Nonetheless, *The Guidelines* focus overwhelmingly on BMI and describe it as "most useful indicator, to date, of health risks associated with overweight and underweight" (13). Indeed, Lemieux et al. note that *The Guidelines* continue to describe people with a BMI in the overweight range as at "increased risk' even if their waist circumference is low" and despite evidence that "people who are in the overweight range while showing low levels of abdominal adipose tissue generally display a risk profile similar to that of nonobese [sic] subjects" (17).

Body Weight among Women in Canada

According to data from the CCHS, almost half of women living in Canada have BMIs that would classify them as either overweight (27.2% or 3,281,300 women) or obese (16% or 1,924,600 women) (Figure 1). A small percentage are classified as underweight (4.2% or 501,700), and just over one half of all women are classified as having a normal body weight (52.6% or 6,337,700).

Figure 1: BMI Classifications for Women in Canada, 2007-2008

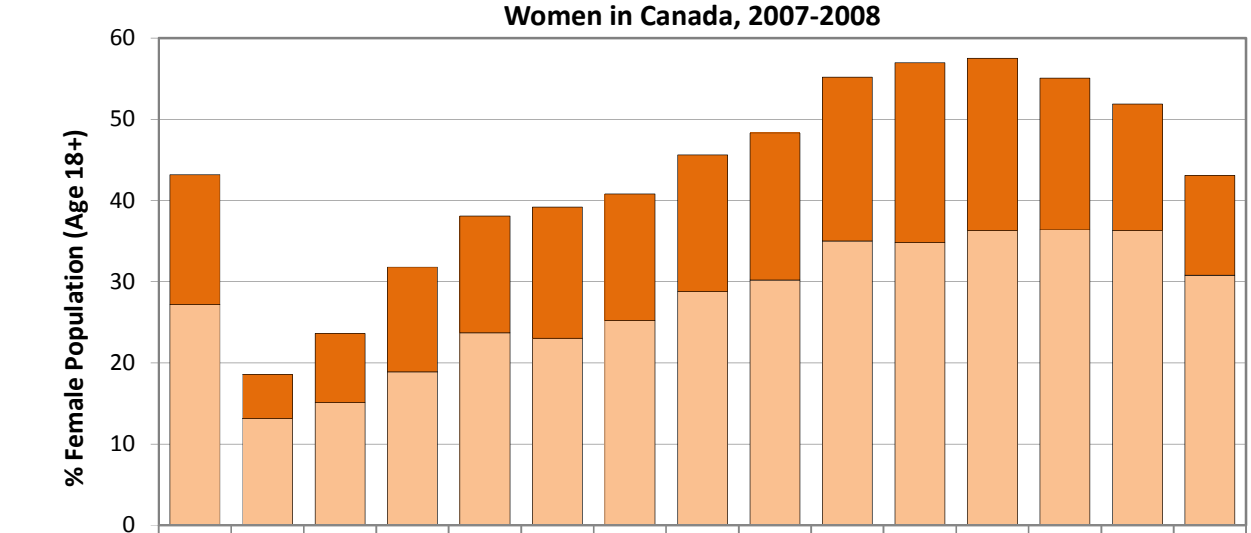


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 6.8%.

According to the guidelines, this means that close to one half of women in Canada are considered "unhealthy" simply by virtue of having a BMI over 25, and regardless of whether or not they are ill or infirm (5,7), as will be discussed in more detail in the following section.

It is important to consider the influence of other factors, including age, ethnicity, social standing and poverty (as well as sex) upon body weight (16). For instance, BMI has been found to increase with age among women in Canada (23,24). According to data from the 2007-2008 CCHS, rates of overweight and obesity both increase from ages 18 to 69 among women, peaking for those 65-69 years and decreasing slightly for women over 70 years of age (Figure 2).

Figure 2: Prevalence of Obesity/Overweight (BMI), by Age
Women in Canada, 2007-2008



	All	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Obese	16	5.5	8.5	12.9	14.4	16.2	15.6	16.8	18.1	20.2	22.2	21.2	18.7	15.6	12.3
Overweight	27.2	13.1	15.1	18.9	23.7	23	25.2	28.8	30.2	35	34.8	36.3	36.4	36.3	30.8

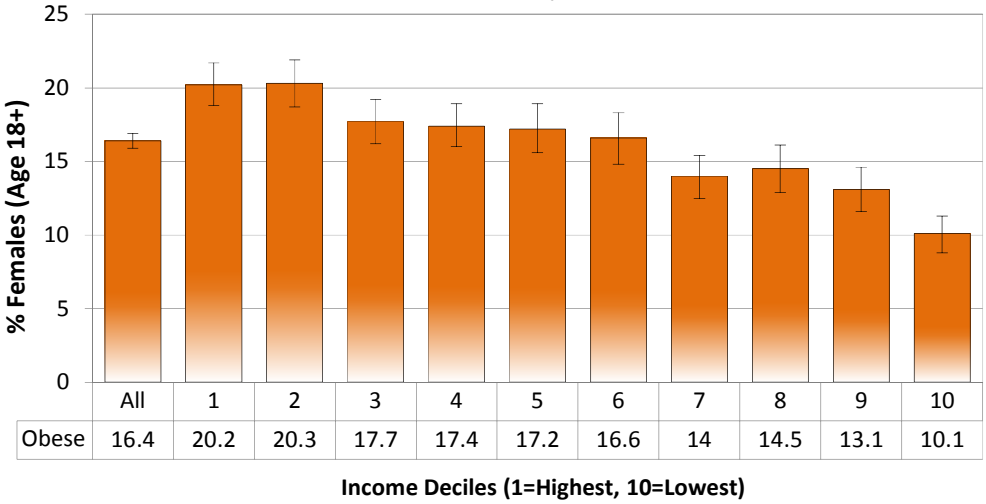
Age Groups

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 6.8%.

The increased risk of chronic diseases associated with higher BMI scores could be influenced by the corresponding increased risk of developing chronic illness also seen among women as they age (25).

Research has demonstrated that socio-economic status (SES), in this case defined by income and education levels, is inversely related to increasing overweight and obesity for women in Canada; poverty and lower levels of education are associated with higher rates of overweight and obesity (26,27). Findings from the 2007-08 CCHS follow this pattern (Figure 3). Obesity rates are twice as high for women in the

Figure 3: Prevalence of Obesity (BMI), by Income
Women in Canada, 2007-2008



	All	1	2	3	4	5	6	7	8	9	10
Obese	16.4	20.2	20.3	17.7	17.4	17.2	16.6	14	14.5	13.1	10.1

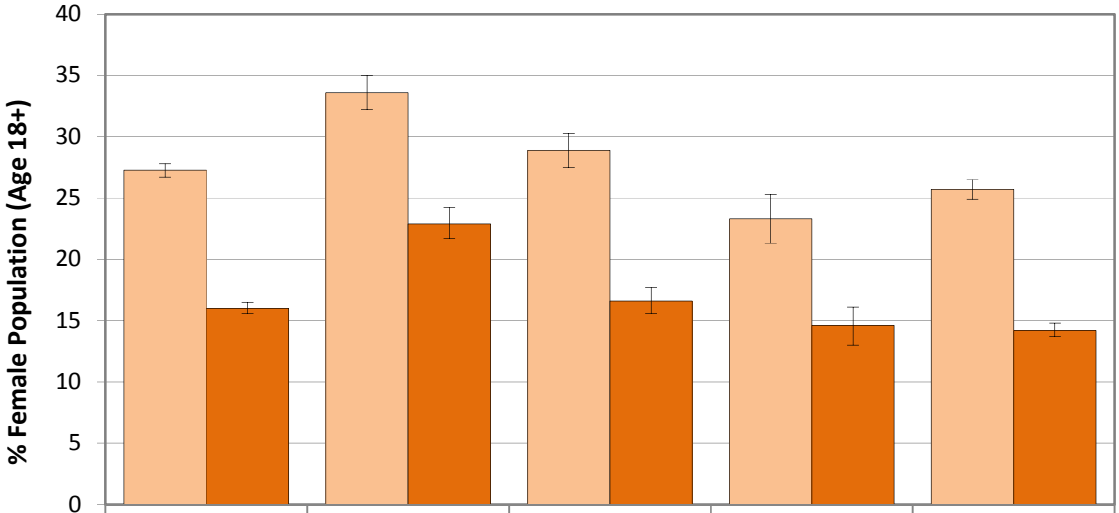
Income Deciles (1=Highest, 10=Lowest)

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Missing Values = 12.6%.

lowest two income deciles compared to the highest income deciles (Figure 3). This interpretation is consistent with earlier reports from Statistics Canada that found that women with lower household incomes are more likely than women with higher household incomes to be obese (23,28).

Education affects the income of women living in Canada: a grade 12 diploma is required for many jobs in Canada and numerous positions require some kind of post-secondary education or training as well (29). Additionally, education supports better health through access to and understanding and use of health-related information (30). The 2007-2008 CCHS data show that overweight and obesity rates are highest among women with less than a secondary school education and a secondary school education (Figure 4). Moreover, this relationship has remained consistent over time; McLaren et al. undertook an analysis of data from the 1978 Canada Health Survey and the 2005 CCHS survey, demonstrating that BMI increased as education decreased for women in both 1978 and 2005 (31). Note that the categories in Figure 4 are not mutually exclusive, as the proportion of women with more than high school (secondary) completion are also represented in the categories related to post-secondary completion. Nevertheless, the figure illustrates that a likely significantly greater proportion of women who are either overweight or obese have not completed high school.

Figure 4: Prevalence of Obesity &Overweight, by Education Level
Women in Canada, 2007-2008



	All	< Secondary	Secondary	< Post-secondary	Post-secondary
Overweight	27.3	33.6	28.9	23.3	25.7
Obese	16	22.9	16.6	14.6	14.2

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Missing Values = 13.9%.

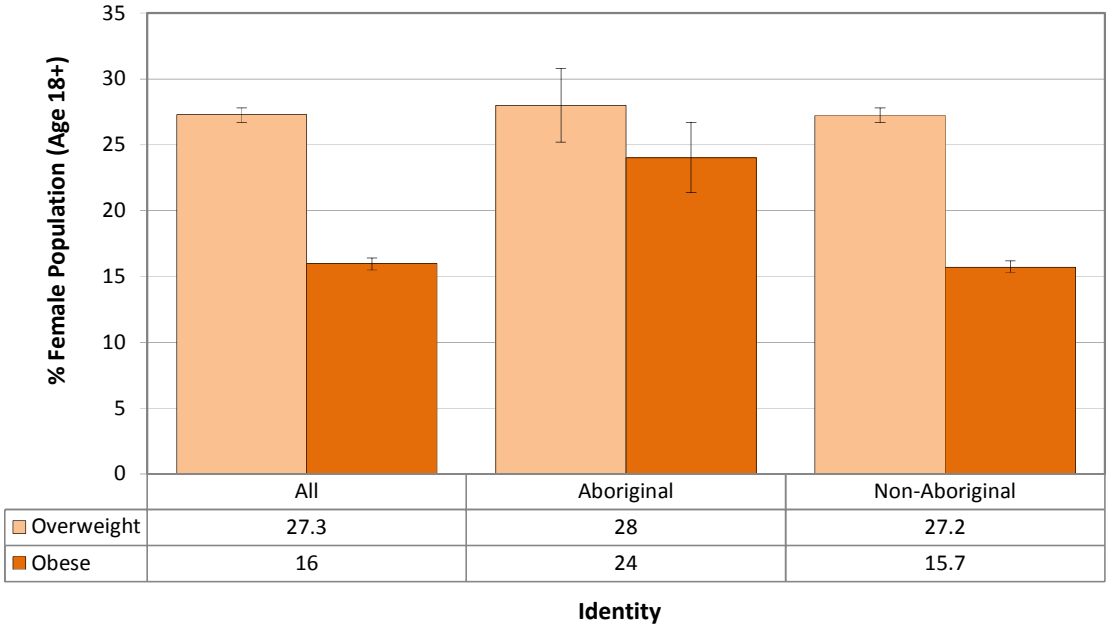
Socioeconomically disadvantaged mothers also appear to be at especially high risk of obesity (32). In the United States, the highest rates of obesity are found among groups with the highest poverty rates and the least education (26). Poor households in Canada are similarly most likely to experience both obesity and food insecurity[3] (33). Drewnowski suggests this phenomenon could be related to inequitable access to healthy food and the relatively low cost of energy-dense, but nutritionally-poor foods, resulting in weight gain (34) (p. 734). In other words, it may be easier and cheaper to buy chips rather than carrots, fatty rather than lean meats (26, 33). These associations are explored in detail in the chapter on women and food insecurity in this publication.

It is often assumed that obesity is caused by low SES, but obesity has also been described as "an antecedent to social and economic disadvantage" (35) (p. 1019-1020). In other words, low SES may lead to obesity, but obesity may also lead to low SES through stigmatization, discrimination, social isolation, job loss and decreased wages. In addition, interpretations of the link between low SES and obesity are complicated by the relationship between SES and health. Studies have consistently demonstrated that poverty increases the risk of both acute and chronic illnesses among women (36). For example, 28% of low-income people living in Canada reported poor health compared to only 6% of high-income people, a relationship that appears to be independent of body weight (37). As noted earlier, poor health may lead to weight gain. It is consequently critical to consider BMI alongside a combination of other factors that influence poor health and chronic disease.

The relationship between SES, obesity and health can be seen in the case of Aboriginal women in Canada. The Aboriginal population in Canada has higher rates of poor health and chronic disease as compared to the non-Aboriginal population (38). Overweight and obesity rates are also higher for off-reserve Aboriginal women than for non-Aboriginal women (Figure 5). Findings from the First Nations Regional Longitudinal Health Survey likewise suggest that rates of overweight and obesity among First Nations women are higher than the general population of women (77). These differences may be tied to the comparatively low SES of Aboriginal people in Canada. Aboriginal women earn lower incomes than non-Aboriginal women, and, in 2005, approximately 30% of Aboriginal women (off-reserve) lived in low-income households, almost double the rate of non-Aboriginal women (16%) (39). Recent data also suggest that more than one in three Aboriginal women drops out of high school, another factor that could be detrimental to good health (40).

[3] Food insecurity refers to uncertainty whether there is sufficient money to obtain enough food to meet the needs of all members of a household. For a detailed explanation of the concept, see the chapter of Women and Food Insecurity in this publication.

Figure 5: Prevalence of Overweight and Obesity (BMI), by Aboriginal Identity
Women in Canada, 2007-2008



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Missing Values = 13.9%.

Disproportionally high rates of poverty and low levels of education could influence the high rates of overweight and obesity among Aboriginal women, but these factors regularly take a back seat in discussions of Aboriginal populations and chronic diseases. Instead, high rates of obesity and/or the potential impact of personal attributes and lifestyle receive a great deal of attention in research as well as in health promotion policies and programs (41). For example, the "Let's be healthy together" project in Ontario has developed an educational toolkit for Aboriginal communities, adopting the standard focus of healthy living initiatives on individual health education rather than looking at the impact of long-standing structural and systemic inequities (42). A simplistic focus on obesity as the sole or most important cause of chronic diseases ignores the very real impact that social inequalities have on health.

Rethinking the Implications of Focusing on Body Weights in Women's Health

Among the most worrisome effects of focusing on body weight and BMI is the predilection to label overweight and obese people as sick or even "diseased" regardless of their actual health status (10). If overweight and obesity are understood as causing illness, there may also be a tendency to regard these conditions as "risky". In fact, when we look at BMI classifications, we can see that every weight category is associated with some degree of risk, even the "normal" weight range.

Underweight: BMI < 18.50 kg/m2, increased health risk;
Normal weight: BMI 18.50-24.99 km/m2, least health risk;
Overweight: BMI 25.00-29.99 kg/m2, increased health risk;
Obese, class I: BMI 30.00-34.99 kg/m2, high health risk;
Obese, class II: BMI 35.00-39.99 kg/m2, very high health risk; and
Obese, class III: BMI > 40.00 kg/m2, extremely high health risk (13).

According to Ross, defining obesity as a disease depends upon the association of BMI with various chronic illnesses, such as cardiovascular diseases and diabetes (16). Mainstream interpretations of the associations between high BMI levels and chronic diseases often infer causation – that high BMIs cause chronic diseases. For example, according to the WHO, "At least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity" (78). There is debate, however, about whether obesity leads to chronic diseases or vice versa, or, even the true nature of the relationship between weight and disease. Oliver acknowledges that the prevalence of heart disease, diabetes, and other ailments is higher among people who are obese than among those who are not, but he maintains that "there is little evidence that adiposity (that is, excess fat tissue) is producing these pathologies. Indeed, some types of body fat are actually protective against many diseases, particularly for women and people over sixty-five" (9) (p. 5). Ross likewise concludes that population studies on the associations between elevated BMI and chronic diseases focus on measuring the prevalence of obesity and comparing it with the prevalence of specific diseases, and therefore "provide little or no information about the impact of fatness and changing levels of fat on the health of individuals" (16) (p. 102-103). Specifically, Ross demonstrates that the relationship between ischaemic heart disease and obesity is consistently weak, as is the relationship between non-insulin dependent diabetes mellitus and obesity. He concludes that referring to obesity as a "disease" is a misuse of the term because "obesity is not a diagnosable illness in its own right, meaning that if you are fat you are ill" (16) (p. 95). These arguments serve as a caution for how data on BMI in a population should be presented and interpreted. That is, data on BMI alone do not tell a complete story about women's health.

Jutel argues that weight is perceived as a constant threat since "there is reproduction ad infinitum of beliefs that individuals should reduce weight if they are large and should monitor their weight vigilantly if they are not" (43) (p. 286). Flegal contends, however, that "the net health implications of the increases [in overweight and obesity] are not completely clear," pointing out that rates of hypertension, elevated cholesterol, cardiovascular mortality and average blood pressure have dropped in many countries at the same time that rates of overweight and obesity have increased (44) (p. S511). It is also the case that cardiovascular risk factors remain high among non-overweight and non-obese individuals in the US. Moreover, a recent study by Flegal et al. demonstrated that moderately "overweight" people live longer than those in the "normal" or "healthy" weight category (45). According to Gard and Wright, "the relationship between food, physical

activity and body weight is described as 'obvious' despite a scarcity of evidence to that effect" (10) (p. 43). Oliver argues that there is "little evidence that obesity itself is a primary cause of our health woes" (9) (p. 2). Excess weight, he asserts, can only be directly linked to the health risk of added stress on joints, potentially making it more difficult to exercise (9). Exercise and diet are likely more influential on health than weight but Jutel points out that programs may focus on weight gain and loss because they are easier to quantify than exercise and diet (43) (p. 284).

Part of the reason that obesity is cast in this role of "epidemic" (5,8) is the practice of lumping all three classes of obesity together and reporting them as a single rate. Rates of overweight and obesity are also often grouped together (24). As a result, the proportions of those deemed "at risk" of chronic diseases equally include individuals who are only slightly overweight by BMI standards as well as those who are carrying substantial amounts of extra weight. Gard and Wright expose the problems associated with combining these categories as well as with the general understanding of weight as a public health crisis (10). In their book, *The Obesity Epidemic*, they question the notion that there is an ideal BMI range (between 18.50-24.99kg/m^2) that every single person should strive for. They criticize this simplistic understanding of the body as a "machine" whose size can be controlled through diet and exercise, and suggest that this approach overlooks differences between individuals including "cultural values, socio-economic class, ethnicity, gender, geographical location and age" (10) (p. 48). In a similar vein, Evans argues that reducing health to body size means that "bodies are medicalized in a way which allows for only two alternatives: fat, unfit and unhealthy; and thin, fit and healthy" (12) (p. 265). Evans criticizes the widespread use of BMI "not as a diagnostic tool, but as a direct measure of health, assuming a linear relationship between weight and health" (12) (p. 262).

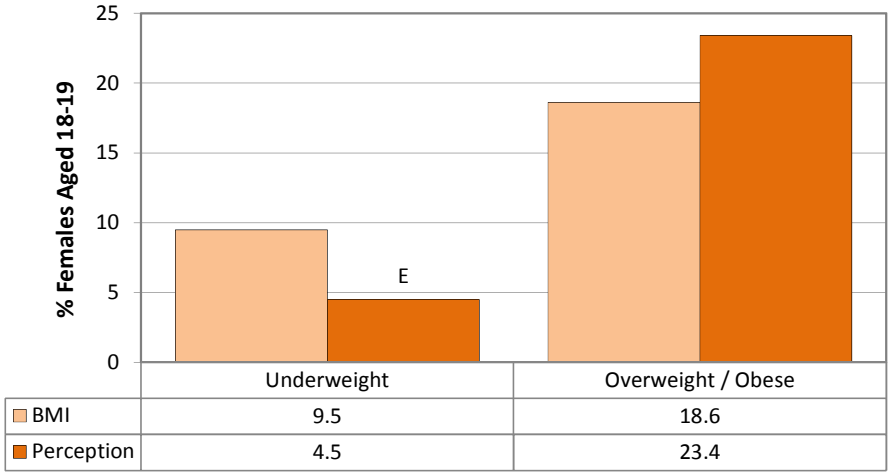
The persistent attention to body weights in healthy living policies and programs also runs the risk of overshadowing the health implications of underweight and dieting, which may have a greater impact on women and girls than on men and boys. Aphramor outlines how the focus on overweight and obesity has generated a number of myths, including "that everyone who is fat is unhealthy and would be healthier and feel better if they lost weight; that weight-loss behaviour is risk free; that sustained weight loss is always and equally achievable with suitable changes and commitment at an individual level" (46) (p. 317). Such narratives, she points out, do not reflect the realities of weight loss and being underweight. A recent study estimated that in one year the number of Americans who die from conditions linked to overweight and obesity is less than the number of those who die from the resulting malnourishment of being underweight (45). Approximately 4% of women in Canada have a serious eating disorder and 10% of those women are expected to die from that disorder (47).

Young women have the highest underweight rates in Canada. According to the 2007/2008 CCHS, women between 18 and 24 years have underweight BMI rates that are more than twice the national average for women (Figure 6). Underweight rates are not tracked for girls younger than 18, despite the fact that underweight rates are demonstrably higher for young women and pose a high fatality risk. For those aged 12-

17 years, the CCHS only identifies the categories of “neither overweight nor obese,” “obese,” or “overweight” according to age- and sex-specific cut-off points defined by Cole et al. (48). These classifications encourage practitioners and program managers to focus on overweight and obesity and ignore risks posed by being underweight.

High rates of underweight among younger women can be attributed, at least in part, to poor body image, dieting and eating disorders. Body dissatisfaction is apparent in CCHS data that compare measured BMI with perceptions of weight (Figure 6). Among women aged 18 to 24, slightly more than half who are underweight actually recognize that they are underweight while the rest consider themselves as either at a normal weight or too heavy.

Figure 6: BMI Classification Versus Perception of Under and Overweight, Young Women in Canada, 2007-2008

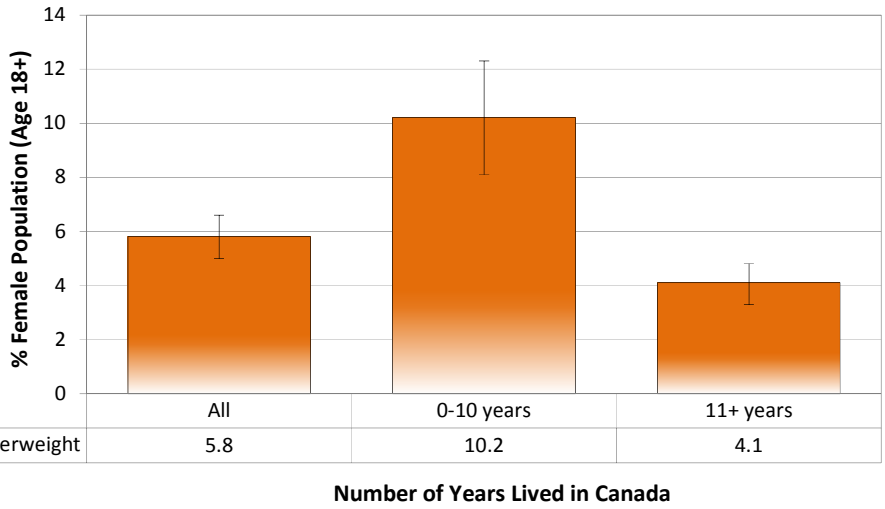


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 6.8%.

Poor body image is also tied to body dissatisfaction and poor self-esteem, as contemporary culture perpetuates the idea that a women’s self-worth depends on her appearance (49). For women, negative body attitudes often translate into negative feelings about themselves more generally (50). A study using CCHS data from 2000/2001 found that women of all ages within the “normal” weight range reported wanting and attempting to lose weight. The same study demonstrated that women within both the “normal” weight and underweight ranges had distorted weight perceptions (thinking they were a larger size than they were) (51). Ball et al. also found that underweight women are less satisfied with aspects of life including work/career/study, family relationships, friendships, and social activities (35).

Underweight is not only linked to youth, eating disorders, and poor body image, but also to poverty and food insecurity. According to CCHS data, underweight is higher for women who are recent immigrants – having lived in Canada for a period of less than 10 years. The proportion of recent immigrant women who are in the underweight BMI category is higher than the national average for women in Canada and is more than double the proportion for women who have lived in Canada for 11 years or longer (Figure 7). Bergeron et al. suggest that because immigrants in Toronto and Vancouver are less likely than non-immigrants to have an elevated BMI, there is evidence of a "healthy immigrant effect" (52). According to this argument, recent immigrants have not yet adopted the unhealthy lifestyles prevalent in many Western countries, with the result that they are thinner and presumed to be healthier than people born in Canada. But this argument neglects other studies that suggest immigrants, and particularly immigrant women, are highly vulnerable to being unemployed and living in poverty, which can exacerbate food insecurity and its consequences, including nutrient insufficiency, being underweight and experiencing poor overall health (33,53). It is possible that immigrant women whose BMIs fall within the "normal" range may not be so healthy.

Figure 7: Prevalence of Underweight (BMI), by Years in Canada
Women in Canada , 2007-2008



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008.

In addition to overlooking the dangers associated with being underweight, the focus on overweight and obesity in many healthy living strategies has masked the risks of weight loss and dieting, measures encouraged in order to decrease obesity rates. According to Olmsted and McFarlane, among others, the North American diet industry – which is worth 35 to 50 billion dollars annually – promotes thinness as desirable at all costs (47). Healthy living strategies typically do not advocate dieting directly, but the goal of decreasing body weights to the "normal" range, combined with the social and economic consequences of obesity have spawned a culture of perpetual dieting, especially for women (47,54). Millions participate in today's diet culture, striving to lose weight and to be thin; however, dieting and weight loss may have more negative than positive effects on health (47,55).

Jutel suggests that there is a link between weight-control practices and disordered eating (43). Dieting has been linked to an increased risk of laxative abuse, binge eating, and purging (56-58). Not all women develop serious eating disorders as a result of weight-control practices, but they may compromise their health in other ways. Jutel points out that the focus on weight loss and pressures to be thin encourage not only eating disorders but also unhealthy choices more generally (43). Ikeda et al. argue that dieting typically leads to a decrease in dietary quality (59). Guest et al. demonstrate that dieting in healthy weight adolescent women can lead to subtle levels of chronic under-nutrition (60). Dieting has been linked to other health problems such as compromised immunity, adverse skeletal integrity, and increased cardiovascular health risk (61-63) in (46). Dieting can furthermore have an adverse effect on mental health as it can reinforce a sense of failure and contribute to low moods (46,64-67). According to Olmsted and McFarlane, the majority of dieters "will be unsuccessful in this endeavour, will remain dissatisfied with their bodies, and will blame themselves" (47). The risks of dieting should be taken seriously, not only because dieting threatens health but also because it does not work. In one study, dieters faced a 95% failure rate (46). Furthermore, Oliver maintains that there is a clear lack of evidence that weight loss, if successful, improves health and reduces the risk of disease for previously overweight and obese individuals (9). Despite the many physical and mental health risks associated with weight loss, "an unchallenged convention" persists in which being overweight is assumed to be more risky than weight loss (46) (p. 320).

Stigmatization of Overweight and Obese Women in Canada

In addition to health concerns related to underweight, the emphasis on overweight and obesity in healthy living programs and policies is helping to entrench weight-related stigma. According to Oliver, body weight has become "one of our most potent markers of social status whereby those with the resources or wherewithal to keep themselves thin [are thought to] rightly deserve their place at the top of the social ladder" (9) (p. 6). He argues that it is even socially acceptable to think of weight "as a barometer of a person's character" (9).

While "fat stigma" can affect anyone who is overweight or obese, it often affects women more deeply and directly than it affects men. Stigmatization of overweight and obese women is shaped by a history of unrealistic cultural expectations of female beauty and control of bodies. Although the discourse on healthy body weights suggests that everyone is at risk of becoming obese, the epidemic is gendered insofar as women are held to a more rigid standard of body size (68). Women are also most likely to equate self-worth with appearance, including what they think they look like and what they think others think they look like (69). Moreover, the stigma attached to overweight and obesity is not restricted to adult or even adolescent females. Austin et al. conducted a study with grade five students (11-12 years of age) in Nova Scotia, observing that in this population poor body satisfaction increases as BMI increases (70).

Fat stigmatization has been justified on the grounds that body weight is, ostensibly, something individuals can control. Lupton argues that health and thinness have been strongly linked with "moral control, self-discipline and 'caring about yourself," so that "the uncontrolled, non-exercised, overweight body, whether male or female, has become a grotesquerie, subject to public ridicule and private shame" (11) (p. 38). "The fat body" she contends, "has become the ultimate stigma, a potent sign of loss of control, greed, weakness of character and immorality" (p. 39) which is underpinned by the assumptions that control can be "achieved by deliberate, intentional action involving the body, such as dieting, having enough sleep and physical exercise…" (11) (p. 38). Ross argues that the belief that excess weight results from a lack of self-control "reinforces our cultural prejudices about the sinfulness of being fat" (p. 106) and encourages people to feel justified in fat shaming and discrimination (16). As a result, overweight and obese women are marked as failing to "control" their bodies or "take care" of themselves due to laziness or irresponsibility (9). Because women are so often judged on appearance, thinness is valued especially for women and has even been described as a "gendered status symbol" (71,72).

Evans suggests that the assumption that obesity causes chronic disease combined with the understanding that body weight is under individual control justifies a "blame the victim" approach to obesity (73). A recent study demonstrates that stigma increased when study participants were told that body weight is easily controllable (74). Overweight and obese women may be especially vulnerable to "stigmatization, prejudice, and discrimination in relation to employment and promotion opportunities, education, income, health care, housing opportunities, friendships, and even financial support within families" (35) (p. 1019).

At the same time, weight-related stigma can itself jeopardize women's physical and mental health. For example, Olson et al. found that the fear of being weighed was the most important reason women gave for postponing or cancelling medical appointments (75). Weight stigma also helps to explain correlations found between increased BMI and decreased use of preventive health care services (75,76). Aphramor and Flegal et al. have hypothesized that poor outcomes in the management of cardiovascular diseases may have more to do with this kind of reluctance to seek health care than with overweight or obesity (45,46). Stigma can also increase the risk of depression, anxiety, low self-esteem as well as poor social relationships and poor psychological health in general. Ball et al. point out that obese young women have poor life satisfaction and poor future life aspirations compared with those who are neither overweight or obese, or underweight (35).

Conclusion

In this chapter, we have introduced a complex discussion regarding body weights and health, including the limitations of BMI as a measure of body weight, the debate about the link between body weight and chronic diseases and the dangers of underweight, weight control practices and stigmatization. Current policy and practice directions, particularly healthy living strategies, focus on weight, despite the fact that there is limited evidence that overweight or obesity cause chronic diseases and considerable evidence that the obsession with

weight has negative consequences for women's health. Focusing on overweight and obesity also leads to the neglect or masking of other health concerns that disproportionately affect women and girls. Moreover, the emphasis on weight control shifts attention away from the fact that nutrition and physical exercise are important not because they can support weight reduction, but because they can contribute to the physical, emotional and social well-being of women and girls.

Health promotion and healthy living strategies would be enhanced if they paid attention to barriers and inequities that prevent some women in Canada from having access to affordable, acceptable and nutritious foods as well as affordable and safe opportunities for physical activity. Initiatives that address structural barriers are critical not only for improving nutritious eating and promoting exercise, but also for changing the "blame the individual" phenomenon that is implicit in many healthy living strategies. Focusing on the built environment, active transportation strategies, food industry standards, community gardens and kitchens, and the social determinants of health all have a place in a comprehensive healthy living strategy. Body-positive campaigns and health promotion initiatives that challenge widespread and unrealistic ideals of health and beauty could also help combat the risks of dieting and eating disorders for women and girls. This kind of balanced approach to healthy living would serve to broaden responsibility for health and well-being to include institutions, government, and society at large, as well as individuals, helping to re-shape both thought and action in relation to women's health and body weights.

References

(1) Public Health Agency of Canada. Healthy living [Internet]. Ottawa: Public Health Agency of Canada; 2012 [cited 15 Mar 2012]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/index-eng.php

(2) Public Health Agency of Canada. Childhood obesity [Internet]. Ottawa: Public Health Agency of Canada; 2012 [cited 1 May 2012]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/framework-cadre/2011/index-eng.php

(3) Public Health Agency of Canada. Curbing childhood obesity: a federal, provincial and territorial framework for action to promote healthy weights. Ottawa: Public Health Agency of Canada; 2010.

(4) Hodgson C. Obesity in Canada. Ottawa: Public Health Agency of Canada, Canadian Institute for Health Information; 2011.

(5) World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser 2000;894:i-xii, 1-253.

(6) Public Health Agency of Canada. Our health our future: a national dialogue on healthy weights dialogue report. Ottawa: Public Health Agency of Canada; 2011.

(7) Health Canada. Food and nutrition: nutrition policies and dietary guidance in Canada (2005) [Internet]. Ottawa: Health Canada; 2007 [cited 1 May 2012]. Available from: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/context/nut_pol_diet_guid-pol_nut_lig_direc-eng.php

(8) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 15 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/ipchls-spimmvs/pdf/ipchls-spimmvs-eng.pdf

(9) Oliver JE. Fat politics: the real story behind America's obesity epidemic. New York: Oxford University Press; 2006.

(10) Gard M, Wright J. The obesity epidemic: science, morality, and ideology. London: Routledge; 2005.

(11) Lupton D. Medicine as culture: illness, disease and the body in Western societies. 2nd ed. London: Sage Publications; 2003.

(12) Evans B. 'Gluttony or sloth': critical geographies of bodies and morality in (anti)obesity policy. Area 2006 Sep;38(3):259-267.

(13) Health Canada. Canadian guidelines for body weight classification in adults. Ottawa: Health Canada; 2003.

(14) Statistics Canada. Health profile: definitions, sources and symbols [Internet]. Ottawa: Statistics Canada; 2011 [cited 10 June 2012]. Available from: http://www12.statcan.gc.ca/health-sante/82-228/help-aide/DQ-QD04.cfm?Lang=E

(15) Brownell KD. Definition and classification of obesity. In: Brownell KD, Fairburn CG, editors. Eating disorders and obesity: a comprehensive handbook. New York: Guilford Press; 1995. p. 386-91.

(16) Ross B. Fat or fiction: weighing the 'obesity epidemic'. In: Gard M, Wright J, editors. The obesity epidemic: science, morality and ideology. London and New York: Routledge; 2005. p. 86-106.

(17) Lemieux S, Mongeau L, Paquette M, Laberge S, Lachance B. Health Canada's new guidelines for body weight classification in adults: challenges and concerns. Can Med Assoc J 2004 Nov 23;171(11):1361-3.

(18) Duncan E, Schofield G, Duncan S, Kolt G, Rush E. Ethnicity and body fatness in New Zealanders. N Z Med J 2004 Jun 4;117(1195):U913.

(19) Razak F, Anand S, Shannon H, Vuksan V, Davis B, Jacobs R, et al. Defining obesity cut points in a multiethnic population. Circulation 2007 Apr 24;115(16):2111-8.

(20) Burkhauser R, Cawley J. Beyond BMI: the value of more accurate measures of fatness and obesity in social science research. J Health Econ 2008 Mar;27(2):519-29.

(21) Egeland GM. Inuit health survey 2007-2008: Nunatsiavut. 2010 May.

(22) Petite K, Clow B. The impact of overweight and obesity on maternal and newborn health: a critical review of the literature. Halifax: Atlantic Centre of Excellence for Women's Health; 2010.

(23) Langlois K, Garriguet D, Findlay L. Diet composition and obesity among Canadian adults. Health Rep 2009 Dec;20(4):11-20.

(24) Tjepkema M. Adult obesity. Health Rep 2006 Aug;17(3):9-25.

(25) Healthy Aging and Wellness Working Group of the Federal/Provincial/Territorial (F/P/T) Committee of Officials (Seniors). Healthy aging in Canada: a new vision, a vital investment from evidence to action. 2006 Sep.

(26) Drewnowski A. Obesity and the food environment: dietary energy density and diet costs. Am J Prev Med 2004 Oct;27(3 Suppl):154-62.

(27) Matheson FI, Moineddin R, Glazier RH. The weight of place: a multilevel analysis of gender, neighborhood material deprivation, and body mass index among Canadian adults. Soc Sci Med 2008 Feb;66(3):675-90.

(28) Tremblay MS, Perez CE, Ardern CI, Bryan SN, Katzmarzyk PT. Obesity, overweight and ethnicity. Health Rep 2005 Jun;16(4):23-34.

(29) Hallett B. Aboriginal people in Manitoba. Winnipeg: Service Canada; 2006.

(30) Colman R. A profile of women's health indicators in Canada. Ottawa: Women's Health Bureau, Health Canada; 2003 Jul.

(31) McLaren L, Auld MC, Godley J, Still D, Gauvin L. Examining the association between socioeconomic position and body mass index in 1978 and 2005 among Canadian working-age women and men. Int J Public Health 2010 Jun;55(3):193-200.

(32) MacFarlane A, Abbott G, Crawford D, Ball K. Personal, social and environmental correlates of healthy weight status amongst mothers from socioeconomically disadvantaged neighborhoods: findings from the READI study. Int J Behav Nutr Phys Act 2010;7:23.

(33) Health Canada. Household food insecurity in Canada in 2007-2008: key statistics and graphics [Internet]. Ottawa: Health Canada; 2011 [cited 10 Apr 2012]. Available from: http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/insecurit/key-stats-cles-2007-2008-eng.php

(34) Drewnowski A, Eichelsdoerfer P. The economics of obesity: why are poor people fat? In: Dubé L, Bechara A, Dagher A, Drewnowski A, LeBel J, James P, et al, editors. Obesity prevention: the role of brain and society on individual behavior. London: Academic Press; 2010. p. 727-43.

(35) Ball K, Crawford D, Kenardy J. Longitudinal relationships among overweight, life satisfaction, and aspirations in young women. Obes Res 2004 Jun;12(6):1019-30.

(36) Cohen M. Impact of poverty on women's health. Can Fam Physician 1994 May;40:949-58.

(37) Tremblay S, Ross N, Berthelot J. Regional socio-economic context and health. Health Rep 2002;13(Suppl).

(38) Health Canada. First Nations, Inuit and Aboriginal health: diseases and health conditions [Internet]. Ottawa: Health Canada; 2011 [cited 15 May 2012]. Available from: http://www.hc-sc.gc.ca/fniah-spnia/diseases-maladies/index-eng.php

(39) O'Donnell V, Wallace S. First Nations, Métis and Inuit women. In: Statistics Canada. Women in Canada: a gender-based statistical report. 6th ed. Ottawa: Statistics Canada; 2011.

(40) Statistics Canada. Women in Canada: a gender-based statistical report. 6th ed. Ottawa: Statistics Canada; 2011.

(41) Canadian Obesity Network. First Nations face new threat [Internet]. Edmonton: Canadian Obesity Network; 2012 [cited 22 Jun 2012]. Available from: http://www.obesitynetwork.ca/de.aspx?id=116

(42) Health Nexus. Let's be healthy together [Internet]. Toronto: Best Start: Ontario's Maternal, Newborn and Early Child Development Resource Centre [cited 1 Jun 2012]. Available from: http://www.beststart.org/aboriginal/index.html.

(43) Jutel A. Does size really matter? Weight and values in public health. Perspect Biol Med 2001 Spring;44(2):283-96.

(44) Flegal KM. The obesity epidemic in children and adults: current evidence and research issues. Med Sci Sports Exerc 1999 Nov;31(11 Suppl):509-14.

(45) Flegal KM, Graubard BI, Williamson DF, Gail MH. Excess deaths associated with underweight, overweight, and obesity. JAMA 2005 Apr 20;293(15):1861-7.

(46) Aphramor L. Is a weight-centred health framework salutogenic? Some thoughts on unhinging certain dietary ideologies. Soc Theory Health 2005 Nov;3(4):315-40.

(47) Olmsted M, McFarlane T. Body weight and body image. In: Desmeules M, Stewart DE, Mao Y. Women's health surveillance report: a multidimensional look at the health of Canadian women. Ottawa: Canadian Institute for Health Information; 2003.

(48) Cole T, Bellizzi M, Flegal K, Dietz W. Establishing a standard definition for child overweight and obesity worldwide: international survey. BMJ 2000 May 6;320(7244):1240-3.

(49) Wolf N. The beauty myth: how images of beauty are used against women. New York: Morrow; 1991.

(50) McFarlane T, McCabe RE, Jarry J, Olmsted MP, Polivy J. Weight-related and shape-related self-evaluation in eating-disordered and non-eating-disordered women. Int J Eat Disord 2001 Apr;29(3):328-35.

(51) Gucciardi E, Wang SC, Badiani T, Stewart DE. Beyond adolescence: exploring Canadian women and men's perception of overweight. Womens Health Issues 2007 Nov-Dec;17(6):374-82.

(52) Bergeron P, Auger N, Hamel D. [Weight, general health and mental health: the status of diverse sub-groups of immigrants in Canada]. Can J Public Health 2009 May-June;100(3):215-20. French.

(53) Chui T. Immigrant women. In: Statistics Canada. Women in Canada: a gender-based statistical report. 6th ed. Ottawa: Statistics Canada; 2011.

(54) Pingitore R, Spring B, Garfield D. Gender differences in body satisfaction. Obes Res 1997 Sep;5(5):402-9.

(55) Gaesser G. Thinness and weight loss: beneficial or detrimental to longevity? Med Sci Sports Exerc 1999 Aug;31(8):1118-28.

(56) Beiner L, Heaton A. Women dieters of normal weight: their motives, goals, and risks. Am J Public Health 1995 May;85(5):714-7.

(57) Neumark-Sztainer D, Story M, Falkner N, Beuhring T, Resnick M. Sociodemographic and personal characteristics of adolescents engaged in weight loss and weight/muscle gain behaviors: who is doing what? Prev Med 1999 Jan;28(1):40-50.

(58) Rafiroiu A, Sargent R, Parra-Medina D, Drane W, Valois R. Covariations of adolescent weight-control, health-risk and health-promoting behaviors. Am J Health Behav 2003 Jan-Feb;27(1):3-14.

(59) Ikeda J, Amy N, Ernsberger P, Gaesser G, Berg F, Clark C, et al. The National Weight Control Registry: a critique. J Nutr Educ Behav 2005 Jul-Aug;37(4):203-5.

(60) Guest J, Bilgin A, Pearce R, Baines S, Zeuschner C, Le Rossignol-Grant C, et al. Evidence for under-nutrition in adolescent females using routine dieting practices. Asia Pac J Clin Nutr 2010;19(4):526-533.

(61) Nieman DC, Nehlsen-Cannarella SL, Henson DA, Koch AJ, Butterworth DE, Fagoaga OR, et al. Immune response to exercise training and/or energy restriction in obese women. Med Sci Sports Exerc 1998 May;30(5):679-86.

(62) Shapses S, Cifuentes M. Weight reduction and bone health. In: New S, Bonjour JP, editors. Nutritional aspects of bone health. Cambridge, UK: RSC; 2003. p. 589-608.

(63) Olson M, Kelsey S, Bittner V, Reis S, Reichek N, Handberg E, et al. Weight cycling and high-density lipoprotein cholesterol in women: evidence of an adverse effect: a report from the NHLBI-sponsored WISE study. J Am Coll Cardiol 2000 Nov 1;36(5):1565-71.

(64) Allan J. A biomedical and feminist perspective on women's experiences with weight management. West J Nurs Res 1994 Oct;16(5):524-43.

(65) Wooley S, Garner D. Obesity treatment: the high cost of false hope. J Am Diet Assoc 1991 Oct;91(10):1248-51.

(66) Garner D, Wooley S. Confronting the failure of behavioral and dietary treatments for obesity. Clin Psychol Rev 1991;11(6):729-80.

(67) Burns M, Gavey N. 'Healthy weight' at what cost? 'Bulimia' and a discourse of weight control. J Health Psychol 2004 Jul;9(4):549-65.

(68) Boero N. All the news that’s fat to print: the American “obesity epidemic” and the media. Qual Sociol 2007 Mar;30(1):41-60.

(69) Vogel A. Body image and self-esteem. In: Reid C, Dyck L, McKay H, Frisby W, editors. The health benefits of physical activity for girls and women: literature review and recommendations for future research and policy. Vancouver: British Columbia Centre of Excellence for Women's Health; 2002.

(70) Austin SB, Haines J, Veugelers PJ. Body satisfaction and body weight: gender differences and sociodemographic determinants. BMC Public Health 2009;9:313.

(71) Godley J, McLaren L. [Socioeconomic Status and Body Mass Index in Canada: Exploring Measures and Mechanisms]. Can Rev Sociol 2010 Nov;47(4):381-403. French.

(72) Eckersley R. Losing the battle of the bulge: causes and consequences of increasing obesity. Med J Aust 2001 Jun 4;174(11):590-2.

(73) Evans J. Physical education and health: a polemic or 'let them eat cake!'. European Physical Education Review 2003;9(1):87-101.

(74) American Association for the Advancement of Science. Female fat prejudice persists even after weight loss, study finds [Internet]. 29 May 2012 [cited 1 June 2012]. Available from: http://www.eurekalert.org/pub_releases/2012-05/uom-ffp052812.php

(75) Olson CL, Schumaker HD, Yawn BP. Overweight women delay medical care. Arch Fam Med 1994 Oct;3(10):888-92.

(76) Fontaine KR, Faith MS, Allison DB, Cheskin LJ. Body weight and health care among women in the general population. Arch Fam Med 1998 Jul-Aug;7(4):381-4.

(77) The First Nations Information Governance Centre. RHS Phase 2 (2008/2010) preliminary results, revised edition. Ottawa: The First Nations Information Governance Centre; 2011

(78) World Health Organization. Obesity and overweight. Fact sheet no. 311 [Internet]. Geneva: World Health Organization; 2012 [cited 1 March 2012]. Available from: http://www.who.int/mediacentre/factsheets/fs311/en/.

.

Eating Well

Margaret Haworth-Brockman

The concept of healthy living includes an emphasis on eating well, or healthy eating. Specifically, there is a focus on making healthy food *choices*. While there is a great deal of literature in the area of women and nutrition, for our purposes here, we have confined our exploration to the national survey data available, as well as an analysis of the recent literature about women's nutritional needs and eating habits. Thus, in this section, we explore what is meant by healthy eating, what evidence there is about women and their diets, and an analysis of women's interest in and ability to really choose the foods they eat. The sections on healthy body weights and food insecurity provide additional information that is essential to understanding how complicated the notion of "healthy eating" can be.

Defining Healthy Eating

The *Integrated Pan-Canadian Healthy Living Strategy (Strategy)* sets a few targets to be reached by 2015 specific to diet (1). They are:

- Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables, from 3% to 50%;
- Increase the proportion of persons aged 2 years and older who consume at least two daily servings of fruit to 75% from 28%; and
- Increase by 20% the proportion of Canadians who make healthy food choices according to national health indicators.

The Strategy draws these goals from international scholarly work done for the World Health Organization *Global Strategy on Diet, Physical Activity and Health* (2). As has been seen elsewhere in this document, there is international interest in reducing the burden of disease and the associated costs of non-communicable diseases, particularly diabetes mellitus, cardio-vascular diseases and cancers. One of the reasons suggested for the increasing incidence and prevalence of non-communicable diseases globally is the tendency for populations to move away from traditional diets to "transitional diets" which were once common only in high-income countries (3). According to Paarlberg (4) and others (5), traditional diets are defined as being low in "both calories and micronutrients (accompanied by pervasive under-nutrition)" (4). Transitional diets are understood to provide adequate basic energy for most people but an inadequate balance of nutrients (5)

and are considered a step along the way to "an affluent diet that provides excessive calorie (sic) energy, accompanied by health problems linked to obesity…" such as is typical for North Americans (4)[1].

While healthy eating is not explicitly defined, a careful read of the *Global Strategy* shows that it is understood to mean a diet that is low in processed foods (which tend to have high fat, salt or sugar content, or some combination of all three, as well as to be low in dietary fibre) and richer in whole foods. The *Global Strategy* advises that populations be encouraged to:

- *achieve energy balance and a healthy weight;*
- *limit energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats and towards the elimination of transfatty acids;*
- *increase consumption of fruits and vegetables, and legumes, whole grains and nuts;*
- *limit the intake of free sugars;*
- *limit salt (sodium) consumption from all sources and ensure that salt is iodized.* (2) (Paragraph 22).

There is similarly an emphasis in Canada placed on the value of eating plenty of fresh fruits and vegetables and whole grains, thereby ensuring adequate dietary fibre, as well as sufficient essential minerals, vitamins and other nutrients (1,2).

Healthy eating is understood to mean a diet low in processed foods and richer in whole foods.

According to the Pan-Canadian *Strategy*, 21% of Canadians reported their eating habits as fair or poor in 2001, compared to 17% in 1997, and 15% in 1994. Consequently the *Strategy* also includes goals to "improve healthy eating patterns, behaviours, and choices among Canadians; and improve access to, and affordability of, healthy food choices", and also includes examples of improved label information as well as programs that encourage people to change their eating habits (1). In the following sections we review the survey data available on what women in Canada have reported they eat.

What are Women in Canada Eating?

Much of the available evidence about what women in Canada are eating is based on how women's diets match the federal *Canada's Food Guide*. Health Canada issued an updated *Canada's Food Guide* in 2007, based "on the best available evidence …Since 1942, the food guide has been transformed many times - it has adopted new names, new looks, and new messages, yet has never wavered from its original purpose of guiding food selection and promoting the nutritional health of Canadians"(6). According to Health Canada,

[1] Some studies have found that people who move from home lands to urban areas may continue with a traditional diet but also adopt foods of their new society, thus increasing their caloric intake without improving their diet composition (85,86).

"Having the amount and type of food recommended and following the tips in Canada's Food Guide will help: Meet your needs for vitamins, minerals and other nutrients; Reduce your risk of obesity, type 2 diabetes, heart disease, certain types of cancer and osteoporosis; Contribute to your overall health and vitality" (6). The recommendations for food intake are separated for males and females and have changed from version to version, based on available evidence as well as on the advice of the different committee members over the years (7).

The *Guide's* current daily recommendations for women are listed in Table 1. There are additional suggestions for cooking and eating in the *Guide*, including instructions for reducing salt consumption and the additional nutrients women need while pregnant or nursing an infant, as well as vitamin D for women over the age of 50. The *Guide* was adapted for First Nations, Métis and Inuit peoples, making the same recommendations for food groups, but including wild game and plants for those women (and men) whose food comes more directly from the surrounding land.

Table 1. Canada's Food Guide daily serving recommendations for females (2007).

	Teens	**Adults**	
Age	**14-18 years**	**19-50 years**	**51+ years**
Vegetables and Fruit	7	7-8	7
Grain products	6	6-7	6
Milk and alternatives	3-4	2	3
Meat and alternatives	2	2	2

Canadian females eat an average of 2,000 kcalories / day, eating more in the late teen and early adult years than at other times in their lives[2] (8). A Canadian study that modeled caloric intake and expenditure levels from 1976-2003 showed a strong association between rising obesity prevalence in the population and rising energy consumption, with most of the latter accounted for by several food commodities: salad oils, wheat flour, soft drinks, shortening, rice, chicken and cheese (9). The data are not reported by sex, however, and Garriguet did not find that women's caloric intake in 2004 (as reported in the CCHS) was greater than it was 1972. However, Krahn et al. report on studies that illustrate that as many as 80% of community-dwelling seniors in the rural US are either undernourished or over-nourished, pointing to the importance of looking more closely at where there may be differences among women in their eating and nutrition (10), as is illustrated throughout this section.

[2] Survey data did not include women who were pregnant or breastfeeding. Daily serving and calorie recommendations for pregnant and lactating women are typically higher than for other women their age.

Protein is an indispensible macronutrient required for providing the body with nitrogen and the amino acids essential to preserve and maintain bodily functions (11), as well as contributing to bone mineral density (12). As such, it has been shown that humans as well as many animals have innate behaviours to ensure that protein intake is tightly regulated (11). Women eat from a large variety of protein sources, ranging from eggs, poultry, fish and red meats to legumes and soy, and according to the serving recommendations should be eating 100-300 grams of protein per day. Garriguet reported that females in Canada averaged 200 grams or less, across all ages, with 14% to 18% of girls aged 9 to 18 and 15% of women over 71 consuming less than 100 gm/day (8). Two recent studies investigated whether seniors were eating enough protein to prevent bone degeneration. Bonjour speculates that the recommendation for 0.8 g/kg bodyweight / day of protein may be insufficient to prevent fragility and fractures (12), unless elderly women also get sufficient physical activity to facilitate muscle protein anabolism and ensure a balance of energy expenditure and food intake (see also Volkert and Sieber (13)).

Data used here are drawn from the CCHS Cycle 2.2 (2004), which focussed on nutrition, and the CCHS annual components for 2009/2010. The 2004 data are the most recent for many of the nutrition factors explored here.

The 2004 CCHS asked respondents (excluding pregnant or breastfeeding women) about their recall of foods eaten in the past 24 hours (N= 35,107), but not about the quantities. (A sub-sample was surveyed again 3 to 10 days later, n=10,786). Respondents were asked about the foods they recalled eating and from these the servings per day were calculated (see Garriguet 2007 (8)).

Carbohydrates, the primary source of caloric energy, are required for immune responses and energy reserves and are found in fruit, vegetables, milk, nuts, grains, seeds and legumes (14). The *Canada Food Guide* recommends that women eat whole grains in the form of minimally-processed breads and cereals. The complex carbohydrates found in these foods are more beneficial to body function than simple sugars as they also include more roughage, or dietary fibre, which enhances digestion and prevents absorption of bile acids (15). Simply put, the slower breakdown to glucose and simple sugars leaves us feeling fuller for longer, and thus less likely to feel the need to eat again soon. Responses to the 2004 CCHS showed that the proportion of women not meeting the daily minimum requirements for grain products increases with age. By age 71, 66% of women had less than five servings of grain products daily (8).

It is worthwhile to note that there has historically been controversy about whether the minimum requirements set in the *Canada Food Guide* are too high and encourage overeating (7). Although initial findings indicate that women are not eating more calories than they did in the early 1970s, Garriguet notes that averages across Canada mask important differences within the population (8). More Canadians from higher income groups, for example, have a diet that more closely follows the food guide. Over one quarter of adults and children “ate or drank something from a fast-food outlet” on the day preceding the CCHS interview and over one fifth of Canadians of all ages obtained their calories from “other foods” (8). As noted below, “other

foods" (jams, condiments, salad dressing, soft drinks, etc.) as designated in the 1992 food guide comprised the second largest food source for women.

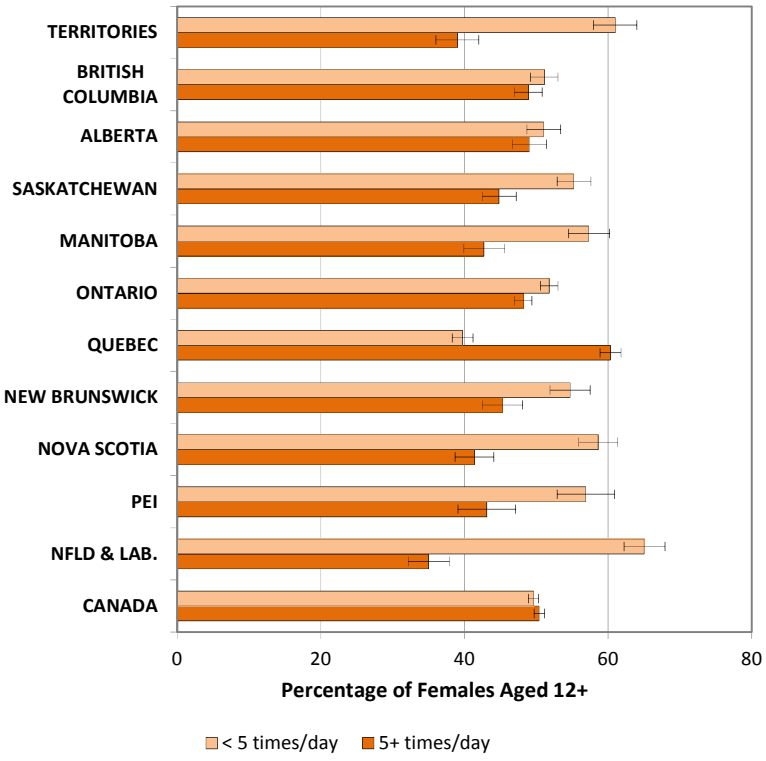
In a comprehensive examination of the 2004 CCHS data, Langlois et al. found that high dietary calorie intake was associated with obesity in women, but not with one particular food or food group. The authors point out that this finding contradicts earlier studies, but Langlois et al. used statistical methods to account for under-reporting of energy intake and under-reporting of fat intake, which earlier studies had not done (16). In a related study, Garriguet found that although off-reserve Aboriginal respondents to the 2004 CCHS did not, on average, have greater daily caloric intake than non-Aboriginal people, there was a significant discrepancy among women aged 19 to 30. Aboriginal women in this age group consumed an average of 359 calories more per day than non-Aboriginal women with no associated difference in energy expenditure (i.e., they were not any more physically active), a difference the author attributes in part to Aboriginal women's higher rates of obesity (17).

Fruits and Vegetables

Fruits and vegetables are considered essential to a balanced diet because they provide complex carbohydrates, dietary fibre, and many of the essential micro-nutrients, such as iron, folic acid, vitamins and minerals (18).

The 2009-2010 CCHS provides the most up-to-date survey results regarding women's consumption of fruits and vegetables[3]. Figure 1 illustrates that nationally, an equal proportion of women are eating fruit and vegetables 5 or more times per day as are eating them less often. However, there is considerable variation across the country. Women in Newfoundland and Labrador and the Territories are the least likely to consume fruits and vegetables frequently, whereas the reverse is true for Quebec

Figure 1. Frequency of Fruit and Vegetable Consumption Canadian Females, 2009-2010

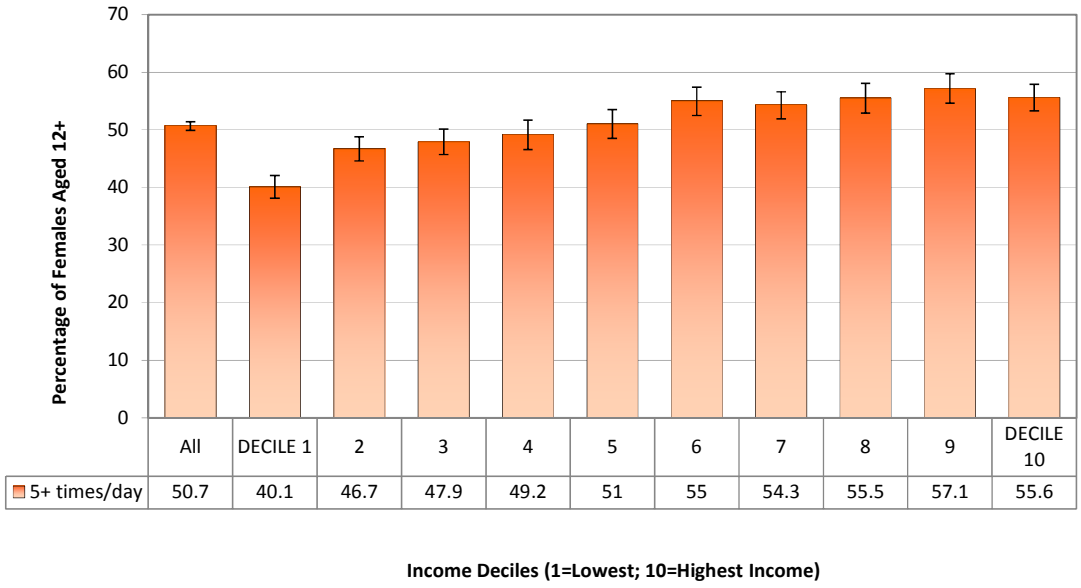


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010.

[3] Note that these data represent respondents' reports of "times consumed", and not standard servings. Analyses of the 2004 CCHS data by Garriguet did include conversions to servings (8).

residents. Women in British Columbia and Alberta, more like the national averages, demonstrate an equal likelihood of eating or not eating fruits and vegetables 5 or more times per day.

Figure 2. Frequency of Fruit and Vegetable Consumption by Income Canadian Women, 2009-2010



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010.

As Figure 2 illustrates, there is a clear gradient by income for fruits and vegetables eaten among women in Canada. The percentage of women who eat fruits and vegetables 5 or more times per day steadily increases from 40.1% in the lowest income decile, to 55.6% in the highest income decile, a significant increase with household income. A similar gradient was found with increasing levels of education among women. Eating fruits and vegetables did not differ significantly with age among women, although a larger percentage of older women (aged 65 years or more) ate fruit more often women who were under 65. There was similarly no difference between women who lived in rural compared with urban areas, however more than 10% fewer respondents to the CCHS who identified as Aboriginal (off-reserve) reported eating fruits and vegetables 5 or more times per day, compared with non-Aboriginal women. The First Nations Regional Health Survey (2008/10) found that the greatest percentage of adults (36.1%) reported eating vegetables once per day and another 26.8% reported having vegetables several times per day[4], and similarly the largest proportion of adults reported eating fruits once per day (28.7%) or a few times per week (29.1%) (19). In a study among Inuvialuit of arctic Canada, Erber et al. (2010) found that women and men with greater material wealth (measured on a scale of "material style of life") consumed fruits and vegetables an average 1.6 times per day, with consumption decreasing with lower scores of material wealth (20).

[4] Another 26.7% of adults reported having vegetables a few times per week.

Dehghan et al. explored the 2004 CCHS data to look at factors associated with fruit and vegetable consumption among adults aged 18-64 years (21). As in the 2009/2010 CCHS results, fewer than 35% women consumed fruits, vegetables or both five or more times per day, and women with higher education levels and older adults reported more consumption of fruit and vegetables. Among those who were more likely to eat more fruits and vegetables every day, were women who also reported that they never smoked and did not drink alcohol. This suggests that women who eat more fruits and vegetables are also able to engage in lifestyle behaviours that fit with the healthy living concept.

One of the reasons cited for women's lower consumption of fruits and vegetables when they have a lower income is the expense of fresh produce (22,23). According to a news article from the CBC, a healthier diet generally costs more because North Americans are encouraged to have a 2,000 calorie/day and it is cheaper to buy low-nutrient, high-calorie junk food. However, a study by the US Department of Agriculture challenged this notion, suggesting that when measured by weight, fresh foods are less expensive (24). The emphasis on fresh produce may be a distraction as well as a moot point. Studies in Canada have repeatedly shown that in many rural and remote communities there are virtually *no* fresh foods available to be bought or if there are, the prices are inflated (25,26). We saw this reflected in Figure 1, in which women from the territories were much less likely to report consuming 5 or more servings per day. Even in inner cities in the south, the selection is considerably poorer than in similar markets in suburban areas. The Canada Food Guide includes frozen and canned fruits and vegetables in its recommendations for daily servings, but this is not necessarily evident in the paper copies of the guide available. It would be worthwhile to investigate whether women consider canned and frozen foods when they are reporting on the relative ease with which they obtain the foods they eat, or whether they focus just on fresh produce when interviewed.

Nevertheless, Hanson and Stout have commented that, "People with diets with fewer fresh foods, namely those who consume less than the recommended 5-10 servings of fruit and vegetables every day, tend to over-consume processed foods" (27). As noted, the concern raised by governments and experts is that processed foods are nutritionally poor, in particular because of the high levels of salt they include.

Any foods that are prepared for eating by freezing, cutting, milling or even washing are technically "processed". Many foods such as milk are safer to eat, with fewer bacteria and other toxins, when processed, and added vitamins and minerals can prevent disease. However in the context of eating well, processed foods are more narrowly defined and understood to be foods that require very little further preparation when removed from their packages. Processed foods are understood to be high in salt (including preservative salts, such as monosodium glutamate), preservatives such as nitrates, fillers and sweeteners such as tapioca or corn syrup, partially and fully hydrogenated oils, and also low in dietary fibre because of the refined sugars (fructose, glucose, corn starch) they contain. A number of sources propose that packaged foods should have fewer than 5 ingredients to assure they are most closely to their natural state.

Salt

Salt is required by the body in small quantities to regulate facets of cellular metabolism and the body's circulation and muscles. Salt deficiency – hyponatremia – can lead to a build-up of cellular and systemic water, causing malfunctions of the kidneys, heart, liver and brain (28). The condition is rare and is most often temporarily seen in high performance athletes, especially when they drink too much water, or in people who get heat stroke.

Too much salt, however, is much more common. It is associated with hypertension and cardiovascular diseases (29-32); osteoporosis (33-35); kidney stones and kidney disease (31,35); stomach cancer (35) and severe asthma (29,36).

International concerns about healthy eating have been increasingly focussed on the quantity of salt people consume each day (35). Most sodium is consumed as table salt (meaning salt used in food preparation), sodium chloride (NaCl). A US study estimated that 90% of people's sodium intake comes from sodium chloride, with processed foods providing the main source, accounting for 77% of average daily intake. Only 6% of daily consumption is attributed to cooking habits and 5% to adding salt at the table, while 12% is found naturally in foods (37).

International guidelines recommend *adequate intake* (AI) values, depending on women's ages, and there are also international standards for *tolerable upper intake levels* (UL), as shown in Table 2.[5] As the table illustrates, girls and most women in Canada are eating as much as 83% more than the tolerable upper intake level of salt each day.

Table 2: Sodium AIs and ULs for various life stage groups and percentage consumed above ULs for females. (37)

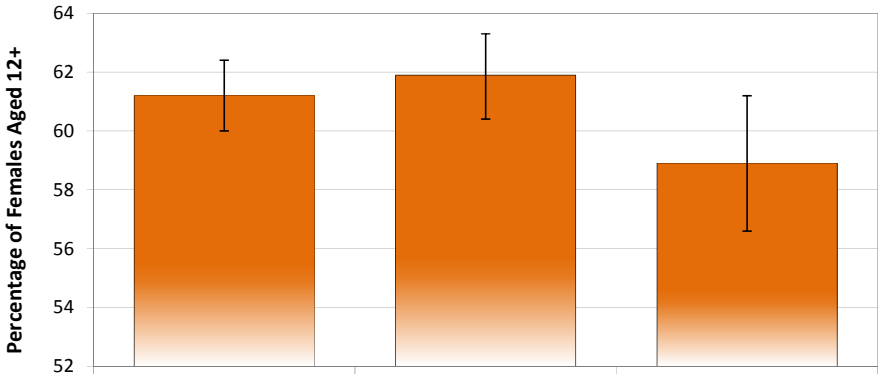
Life stage groups	AI (mg/day)	UL (mg/day)	Percentage above UL (95% confidence interval)
			Female
9-13 years	1,500	2,200	83.0
14-18 years	1,500	2,300	82.0
19-30 years	1,500	2,300	76.3
31-50 years	1,500	2,300	72.1
51-70 years	1,300	2,300	62.3
Over 70 years	1,200	2,300	45.1

SOURCE: Garriguet, D. (2007). Sodium consumption at all ages. *Health Reports*, Ottawa: Statistics Canada. 18:2, 47-52.

[5] See page 95 for more information about daily intake recommendations.

The 2009-2010 CCHS asked respondents whether their knowledge of salt content influences their food choices. As Figure 3 illustrates, 61.2% of women in Canada reported they make such decisions, with women who lived in urban areas more likely to choose their foods based on the salt content (although the difference may not be statistically significant). Concern and ability to choose foods based on the amount of salt they contain increased with women's age, particularly between the teen years and ages 40 and up (Figure 4), and it did also with household income level (Figure 5).

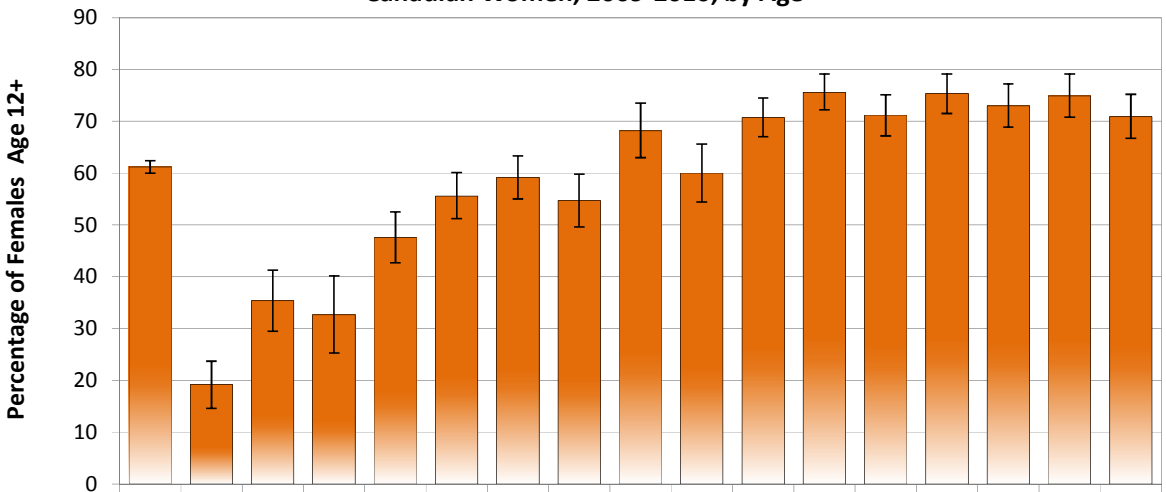
Figure 3. Food Choice Influenced by Salt Content, Urban-Rural Comparisons, Canadian Females, 2009-2010



	All	URBAN	RURAL
Yes/Sometimes	61.2	61.9	58.9

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010. Note scale. Rural women less likely to make food choices on the basis of salt content, though this may not be a significant difference.

Figure 4. Food Choice Influenced by Salt Content, Canadian Women, 2009-2010, by Age

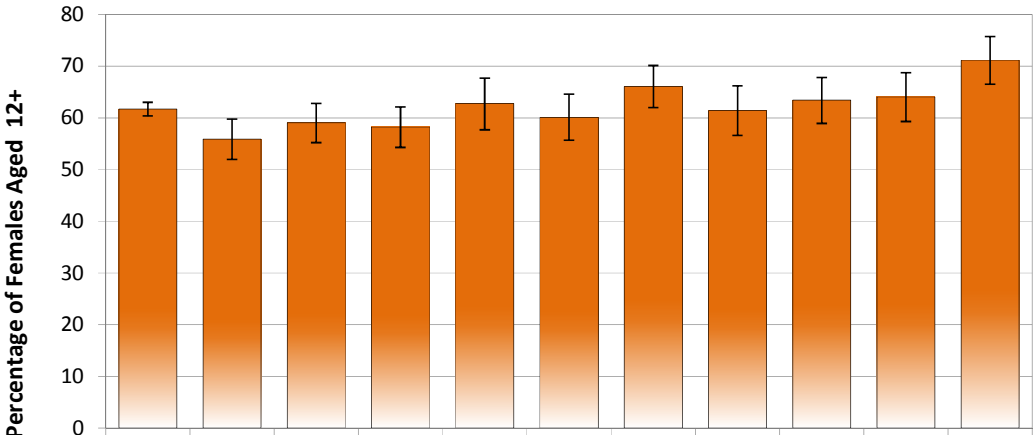


	All	12-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Yes/Sometimes	61.2	19.2	35.4	32.7	47.6	55.6	59.2	54.7	68.2	60	70.7	75.6	71.2	75.3	73	74.9	70.9

Age Groups

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010. Certainly, rising concern with salt in foods with advancing age, most increase between teen years and 40s.

Figure 5. Household Income and Food Choice Influenced by Salt Content, Canadian Females, 2009-2010



	All	DECILE 1	2	3	4	5	6	7	8	9	DECILE 10
Yes/Sometimes	61.7	55.9	59	58.2	62.7	60.1	66	61.4	63.4	64	71.1

Income Deciles (1=Lowest; 10=Highest Income)

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010. Income apparently affects the degree to which salt content factors into food choice.

In a recent study involving women with low-income in the cities of Saskatoon and Winnipeg, researchers found that some women felt unable to get to stores where fresh groceries were available (27). The study describes the relative "food deserts", city areas with few or no grocery stores. While there may have been fast food restaurants nearby, women described planning lengthy walks or their dependence on public transportation or friends and family to get any fresh foods. For women with a physical disability or who care for children or others, the distances are too great (27). Women, then, may not easily be able to get to foods that have a lower salt content, even if that is their desire.

Although the amount of salt women added to their foods while cooking or at the table was not measured by the 2004 CCHS, Garriguet found that people who reported eating foods high in sodium were more likely to "very often" also add salt to their foods. Respondents (males and females together) who "said they 'never' added extra salt were consuming much less sodium in a day". However, even among these respondents, the percentage who consumed more than the recommended UL was the same as that for the population as a whole (37).

The 2004 CCHS included questions about whether respondents tried to cut back on their salt intake and found that people 31 years or older who had been diagnosed with hypertension did appear to know they should be reducing their sodium consumption. They were less likely to report adding salt to their foods "occasionally" or "very often" (8). However in a detailed analysis of the 2004 CCHS data, Shi et al. found that adults aged 30 and over with hypertension have a significantly higher average sodium intake (p=.0124)

than other respondents, and women between 50 and 69 years were among those particularly likely to have higher salt intake (p=.0083) than their counterparts without hypertension (38).

Tanase et al. point out that in addition to consuming too much sodium, Canadians concurrently take in too little potassium (K), found in fruits, vegetables and dairy products (39)[6]. Potassium works in tandem with sodium in regulating metabolism and fluids, and insufficient potassium is linked with hypertension. Tanase et al. found that few Canadians had adequate intakes of potassium, and they note that the public emphasis on sodium reduction would be more beneficial if it included information about the value of increasing potassium intake (39).

Concern about increasing sodium consumption among Canadians spurred the creation of a Sodium Working Group by Health Canada in 2007. The group released its report, *Sodium reduction strategy for Canada*, in July 2010 with recommendations for federal and provincial governments, manufacturers and community agencies to collaborate to reduce the amount of salt in processed foods sold in Canada as well as to provide better education to Canadians about dietary sodium (31).[7] The goal was to reduce the population's (males and females) average daily consumption from 3,400 mg to the recommended 2,300 mg (one teaspoon) by 2016. The report is available on the Health Canada web-site but the working group was disbanded, the recommendations were set aside and a new Food Expert Advisory Committee (originally called the Food Regulatory Advisory Committee) was convened by the Health Minister (27). Critics of the change-over believe the federal government did not want to impose new regulations on the food industry (40).

Sugar, Fats and Fillers

The 2004 CCHS asked respondents about their consumption of "other foods", a category in the 1992 Canada Food Guide. This category – which includes candy, potato chips, soft drinks, coffee, alcohol and jam – was found to account for 22% of the total calories consumed by Canadians, the second largest source of food energy (41). Langlois and Garriguet (42) found that 20% of all calories consumed come from sugar, and although as much of 30% of this sugar is from natural sources such as milk and fruit, the majority of the sugar comes from processed foods like syrup, soft drinks and salad dressings.

Twenty percent of all calories women consume come from sugar.

[6] The authors used data from the Total Diet Study conducted in Canada, along with the data from the CCHS Cycle 2.2 (39)

[7] There were additional recommendations for research, monitoring and evaluation

The First Nations RHS found that 20.9% of adults reported consuming soft drinks several times a day, and 25.7% reported having them a few times a week. However, a further 21.4% of respondents reported that they *never* or *rarely* drink pop (19). For adults in Canada in general, soft drinks accounted for 11.3% of calories consumed from "other foods" (8).

Langlois and Garriguet did find that "absolute daily sugar consumption varied substantially with age. It was lowest among women aged 71 or older (83 grams or 20 teaspoons) and highest among teenage boys aged 14 to 18 (172 grams or 41 teaspoons)" (42). However, when the average percentage of daily calories was measured, they found that from age 19 on, "women derived a significantly higher percentage of their total calories from sugar than did men" (42).

Fats are an essential part of human diets because they provide energy and assist with the absorption of vitamins (43), but they are another set of foods that women in Canada tend to over-consume. Fat intake for adults aged 19 or older is recommended to be 20% to 35% of total calories. According to Garriguet there was a considerable reduction in the percentage of calories from fats from 1972 to 2004 on average, however a "substantial share of the population [males and females] surpassed the suggested maximum" (8). The 2004 CCHS revealed that the primary sources of fat were foods from the meat and alternatives category, accounting for one-third of the fat intake for adults, and another one-quarter were from the "other foods". Significantly, Garriguet found that most fat consumed by respondents came for a small number of particular foods: a "sandwich" category of pizzas, sandwiches (including submarine sandwiches), hamburgers and hot dogs (15.9%); and sweets such as cookies, doughnuts and cakes (8.5%) (8).

Besides needing to reduce their fat intake, women are encouraged to also be aware of the kinds of fats they eat. Monounsaturated fats (found in olive and safflower cooking oils, for example) benefit insulin and blood sugar levels and polyunsaturated fats (such as omega-3 fatty acids in some fish) may be particularly beneficial to heart function and circulation (43). Saturated fats, fats which are solid at room temperature, should be eaten in much smaller quantities. They are naturally found in animal meats as well as in solid margarines, butter and shortenings. Diets which include higher levels of saturated fats are associated with raised low-density lipoprotein (LDL) and total cholesterol levels, which in turn are associated with heart disease and type 2 diabetes (43). Trans fats, used in processed foods to extend their shelf life and to create the smooth mouth-feel many people have come to enjoy, are now understood to dangerously increase cholesterol levels and there has been a campaign of public education and pressure on food companies to prevent their ingestion. Health Canada required all food labels to list the quantity of trans fats as of 2005 (44). Women in Canada are faced with an additional dilemma that packaged foods labelled as low fat may be higher in calories since reduced saturated fats often mean an increase in added sugars.

There has been some media attention to the fact that much of what North Americans eat is not what it seems. Many packaged and fast foods contain fillers, with corn sugars (or corn syrup) predominating, particularly in the United States where corn production is heavily subsidized (45). As one author notes, "a complicated stew of government subsidies, politics and the whims of Mother Nature … moves us away from fruits and vegetables and toward meat, dairy products and the sugar- and sodium-loaded processed foods for which crops like corn and wheat serve as the raw ingredients" (46).

Also in the media recently have been articles and reports about industrial chemicals, wood pulp and other toxins used to kill bacteria, and fillers added to keep processed foods cheaper, and more "appealing" to consumers (47-49). Not all such fillers are included in the list of ingredients on labels, not to mention that fast food restaurants do not typically attach their ingredient lists to the foods they sell. When women buy processed and fast foods they may not be aware of all that they are paying for and eating.

Micro-Nutrients and Supplements

Whole, unprocessed foods in sufficient quantities and balance can provide the nutrients human bodies require for optimum metabolism and system function. The ability to get enough of the nutrients our bodies need can depend on the soils in which foods are grown, as well as on packaging, cooking methods, shelf life and other factors. To that end, some micro-nutrients are routinely added to common groceries. These include the addition of iodine to table salt sold in North America to prevent goitre, iron and B Vitamins added to packaged cereals for neurological and haematological well-being, vitamin D fortified milk, and fluoride added to water supplies to promote oral health.

The ability to get enough of the nutrients we require can depend on the soil in which foods are grown, packaging, shelf life and cooking methods.

Micronutrients are required in trace amounts, less than 100mg/day, and cannot be produced in the body. New research evidence arises regularly but based on the latest evidence, there are recommendations called **dietary reference intakes**, about which and how much of micro-nutrients are needed to stay healthy.
Additional terms used internationally are:
Estimated average requirement (EAR) -the amount of a nutrient estimated to meet the requirement of half of all healthy individuals in a given age and sex group.
Recommended dietary allowance (RDA) – calculated from the EAR, is the average daily dietary intake of a nutrient that is sufficient to meet the requirement of nearly all (97-98%) healthy persons.
Adequate intake (AI) - established when an EAR (and thus an RDA) cannot be determined; a nutrient has either an RDA or an AI. The AI is based on experimental data or determined by estimating the amount of a nutrient eaten by a group of healthy people and assuming that the amount they consume is adequate to promote health.
Tolerable upper intake level (UL)- the highest continuing daily intake of a nutrient that is likely to pose no risks of adverse health effects for almost all individuals. As intake increases above the UL, the risk of adverse effects increases.
Acceptable macronutrient distribution range (AMDR) – is used for protein, carbohydrate and fat, macro-nutrients required in much greater quantities for survival.
Source: Health Canada.

In this section we take a look at a few micro-nutrients that are important to women's physiological health. We consider calcium and Vitamin D, iron and folic acid because of their current prominence in the research literature and because of the attention that is focussed on whether or not women are getting sufficient quantities in their daily diets.

Calcium and Vitamin D are considered here together because of their natural interactions. Both nutrients are essential to maintaining bone density and strength, as vitamin D is essential to the absorption of calcium (50). Because women are more prone to osteoporosis, a potentially debilitating condition that can severely limit daily activities and lead to painful fractures and breaks, women are the focus of medical and media advice regarding these nutrients.

The estimated average requirement (EAR) for women is 1,000 mg of calcium per day for women aged 50 or older (which is 20 mg/day higher than for men) until women reach the age of 71 (51). Garriguet found that Canadians (men and women together) obtained an average of 771 mg of calcium per day primarily from milk, cheese, vegetables (except potatoes) and yogurt, meaning that women were getting about 80% of the EAR (51). The author notes that 48% of women who were 50 years old or more reported taking calcium supplements, but total dietary intake of calcium remained inadequate for 45% to 70% of Canadians, depending on the age group (see Table 3, (51)).

Adequate Vitamin D is required for bone growth and the immune system. Sufficient intake by mothers prenatally and while breastfeeding protects children against rickets as well as respiratory tract infections (52). Appropriate intake levels of Vitamin D, and the means to achieve those levels, have been the subject of considerable recent research and media attention. The Institute of Medicine EAR for Vitamin D intake for women is 10 g / day (53). Most dietary Vitamin D is obtained from milk and margarine (because they are fortified with Vitamin D), fish, eggs and beef. Vitamin D is also synthesized by the body when it receives enough sunlight. Public health efforts to protect against skin cancers by reducing people's exposure to the sun began to raise clinicians concerns that inhabitants of the northern hemisphere are no longer getting enough time in the sun to produce Vitamin D naturally, particularly as harsh winters already limit time in the sun (54). These seemingly conflicting pieces of information can create confusion for women who wish to know what is the best way to get the Vitamin D they need while still managing the risks associated with overexposure to sunlight (55).

Using the data from the 2004 CCHS, Garriguet found that more than 80% of women and men had insufficient Vitamin D intake based on their diets alone. Forty-four percent of all women took vitamin D supplements; this rose to 57% among women who also reported having a diagnosis of osteoporosis. Based on the data from the CCHS as well as two Quebec surveys, Mark found that girls in Canada (ages 9-18) were not getting sufficient levels of Vitamin D, particularly girls from low-income households or who were food-

insecure. The authors associated this lower intake with, among other things, girls drinking sweetened beverages instead of milk to drink (56).

Iron deficiency is a critical problem for women and girls in many parts of the world, with the most affected being women and girls of childbearing age, particularly during pregnancy and the postpartum period (57,58). In Canada, iron deficiency anaemia is fairly rare (41). Iron is routinely added to bread flours and packaged cereals with the result that most women can have a diet that is rich enough to provide their dietary needs for iron. Many women in Canada take iron supplements, particularly as a prenatal supplement or if their menstrual periods are heavy. Derbyshire points out that supplements may be required in some instances, but dietary changes can also be sufficient to ensure women are getting the amount of iron they need (57). Nevertheless there is a significant population of Aboriginal children who do not get enough iron in their diets (59,60). Hinds et al. caution that elderly women (and men) may also be at risk as their appetites decline and if they are served bland or unfamiliar foods in a long term residence or other facility (61).[8]

In a study of 1,770 elderly women and men (aged 60 or over) who participated in a national survey in the US, Hinds et al. found that women had lower intakes of iron but higher intakes of folate than men, and women who were white were significantly more likely to be obtaining more than the daily intakes recommended by the US Food and Nutrition Board as compared with women from other backgrounds (61). Folate, a B Vitamin, is found naturally in leafy green vegetables, some fruits and dried beans and peas (18). Since the 1990s it has been routinely added to some packaged cereals. Folate deficiency is a result of insufficient folic acid, associated with smoking tobacco, inadequate diet, diseases of the liver, kidney or intestines, as well as some environmental conditions. The Recommended Dietary Allowance (RDA) is 400 microg/d of dietary folate equivalents (DFE) for adults 19 years and over. Because folate deficiency has been linked to preterm births and neural tube deformities, lactating and pregnant women are advised to take in an additional 100 and 200 microg of DFE/d, respectively (62,63).

The 2004 CCHS included questions about the supplemental vitamins and mineral taken by respondents in the month preceding the survey. Vatanparast et al. found that significantly higher numbers of females took supplements, compared with males, in all age groups (64). Higher household incomes, greater education and being food-secure were also positively associated with using supplements. The authors found that elderly women who took supplements were more likely to meet the adequate intake level for calcium. The authors suggest that people with lower household incomes may already be at risk for inadequate food intake, which supplements could help alleviate (64).

According to Sacco and Tarasuk (2011), Health Canada is proposing to allow manufacturers to add vitamins and minerals to “a wide variety of foods, at their discretion”, excluding stable and standardized foods such as

[8] In a review of published literature, Krahn et al. found that a significant number of community dwelling elderly people also demonstrated deficiencies in micro-nutrients (10).

wheat flour, eggs, nuts and legumes.[9] In a review of the 2004 CCHS data, the authors found that the foods that could be fortified are associated with lower nutrient intake and suboptimal eating patterns. The authors consequently suggested that fortifying these foods would be counter-productive to efforts to encourage "healthy" eating patterns (65) .

Women Trying to Eat Well

There is considerable public pressure directed to women, exhorting them to eat well and feed their families well too. Media fashions and fad foods may wax and wane, but advertisements for "healthy" foods are more likely to be directed to women – witness the intense pressure currently for women to buy and consume large numbers of small packages of yogurt – whereas men, teenagers and younger children are more likely to be the target audience for "fun" foods such as sugared cereals, soft drinks and packaged pizzas (see Kitch (66) for example). Advertisers and marketers have long taken advantage of the gendered roles many women have to shop for and prepare family meals. Gendered reviews have pointed out the conflicting messages in many women's magazines. Articles and essays encourage women to eat well and get fit (67,68), but the advertisements appear alongside "consistently advertised foods and non-alcoholic beverages high in empty calories and low in nutritional value" (67). As the most recent CCHS found, most women report that they are primarily responsible for these tasks in their household.

Thus women are inundated with information about nutrition and healthy eating. Recent legislation (44) requiring more informative labels on food packages was introduced to help people make decisions about what foods they buy. In a longitudinal study in Canada, Goodman et al. found that food product labels were the most common source of information about nutrition for women and men (67%), with internet sources (51%) and newspapers or magazines (43%) also cited by respondents (69). When label information about trans fats became mandatory in 2006, a significantly greater number of respondents reported referring to food labels to make their choices. Respondents in the study reported that taste and nutrition were the primary factors in their selection of foods (69). Women, people with higher incomes and education levels, and those who perceived themselves to be very knowledgeable about nutrition were among those more likely to refer to food labels in their food selections. Conversely, Chen et al. found that in the US women with lower socio-economic levels, rural residents and people who considered themselves overweight were the populations less likely to use food labels (70).

A study in northern Manitoba found that older women and men (aged 60 years or more) were aware of healthy eating messages, and believed it was important to eat well, but understanding the information on package labels, determining portion sizes and comprehension of vitamin D requirements were among the

[9] A list of the foods currently considered to be excluded can be found at http://www.nature.com/ejcn/journal/v65/n3/suppinfo/ejcn2010261s1.html. The link is also available via the paper by Saccor and Tarasuk (65).

areas with which they were less familiar. As health promotion programs regarding "food choices" are typically targeted to women who are raising families, the authors recommend that the particular needs of elderly community-living residents be accounted for with other programming and formats (10). It is worth noting that more than one kind of program may be valuable as MacLellan et al. found that women and men preferred an array of education approaches to learn about eating well. Cooking tips, recipes and advice about supplements were considered the most popular forms of information (71).

Planning, shopping and preparing foods all take time. Women have reported that they do not have enough time to regularly make meals at home, even if they so wish. In one study (which adjusted for differences in socio-economic status), women reported there were fewer family meals together, and they were less able to monitor their own or their children's diets if they had full-time employment (72). As Van der horst et al. note, "It is very likely that motivations related to time, effort and cooking are of increasing importance for food decisions in our society." Garriguet found, for example, that older women were most likely to eat a home-prepared meal, compared to other Canadians (8), which may be associated with having some more time at home, as well as having more limited incomes.

The chapter on food security demonstrates that food insecurity is a persistent problem for some women. Food insecurity can dramatically affect women's nutrition. As noted earlier, low-income, food-insecure girls had lower milk intakes and drank more sweetened beverages than other teen girls their age. (56). Similarly, Egeland found that food insecurity among some Inuit women compromised their nutrition (73). Inuit women who were not food secure had diets that were associated with lower dietary intake of Vitamin C, Vitamin D and calcium, folate, fibre and iron, and a greater consumption of carbohydrates. Where a more traditional diet was available and feasible, women consumed more protein and protein-related micronutrients and had a lower intake of saturated fats, carbohydrates and sodium (73). As the authors comment, transitional diets and food insecurity combine among some arctic women to create conditions for nutrient-poor, calorie dense diets seen in other parts of the world (see also Erber et al. (20)).

Food insecurity can dramatically affect women's nutrition. Transitional diets and food insecurity create nutrition conditions seen in other parts of the world.

Other circumstances can keep women from eating well. Crawford et al. 2011 found that compared to their counterparts, middle-aged women with depressive symptoms were significantly more likely to eat fast foods more often than women without depressive symptoms. Hirth et al. found similar results among women with post-traumatic stress disorder (74), as did Zellner et al. among women who described their lives as stressful (75). The work involved in buying food and preparing meals requires not only considerable time, but also effort and interest that women may find overwhelming. Furthermore there is not uniform agreement on what eating well means or whether it is important, and women's understanding of which foods are healthful and why varies (76,77).

A number of studies have found, further, that people do not necessarily want to just eat what is supposed to be good for them. As Lindsay points out, healthy living programs are not universally adopted, even among those who believe that they are beneficial (78). Meals and the foods we eat are more than just a means to ingest the correct quantities of nutrients. There is a large body of literature written about the meaning of cooking, foods, and family meals quite apart from the nutritional value they impart (79). As an example, Garnweidner et al. found that new immigrants who took part in a study in Norway spoke about the "importance of preserving aspects of their original food cultures and related these aspects to taste, preparation effort and method, and adherence to religious dietary rules. They often perceived the food of the host country as 'tasteless and boring'" (80).

Armed with as much information as possible, women still need to be able to navigate through media messages, health promotion materials and food labels. In a review of the evidence on changing body weights and related health promotion messages, Bacon and Aphramor refer to the newer trend for Health at Every Size (HAES) and refocusing attention to "intuitive eating" or "mindful eating"[10] – relearning to rely on internal regulation to modify one's eating habits. In this paradigm food is valued for nutritional, psychological, sensual, cutrual and other reasons. HAES assists people to understand the relationships between what they eat and how they feel, both physically and emotionally (81).

Conclusions

Eating well, or healthy eating, is a complicated prospect. Nutritional science is a vast discipline with new information regularly arising, much of it contradictory, as seen in the cases of iron or vitamin D. In addition, the world of food production and marketing is competitive. Thus women are faced with a dizzying array of messages about what and how to eat, but must also find the time, the means and the interest to procure and prepare whole foods.

From the evidence examined in this chapter we have seen that many women in Canada are not getting enough of some nutrients and far too much of other food "products"[11] in their diets. Women in Canada fit the description of a population in transition to or who have adopted a diet typical of high-income countries – a diet that is high in calories but deficient in essential nutrients (4).

Thus women in Canada meet the criteria of populations who would benefit from the healthy eating goals of the *Global Strategy on Diet, Physical Activity and Health* (2) (see p. 2). The *Integrated Pan-Canadian Healthy Living Strategy* includes some examples of programs and innovations that were supported by the

[10] The authors comment that mindful eating in this context is not related to trying to lose weight, but rather following one's body and intuition to eat only what is needed and wanted, thus ensuring a balanced diet (81). See also the chapter on Healthy Body Weights.

[11] As author Michael Pollan has noted, "food products" have usually little in the way of real food remaining in them (87).

Public Health Agency of Canada, including manufacturers that have voluntarily improved their product labels and communities that have initiated local programs (1). Community gardens, for example, were found in one study to significantly increase the proportion of adults who reported eating vegetables "several time a day" from 18.2% to 84.8%, ($P < 0.001$) (82). In other research, interventions that supported women to eat from a Mediterranean diet led to lower fast-food consumption (83).

Most women in Canada women cannot produce the food they eat. While it is valuable for women to be as informed as possible about their foods, and to choose and consume accordingly, there are many reasons why it is not possible for individual women to consistently make "healthy food choices". For women in non-farming rural and remote areas, there may be few fresh foods available or they are prohibitively expensive. Although this has been decried for some time, it is only recently that some communities have found effective ways to work together to change the inequitable costs of foods in the north (84). Using pre-packaged foods of some kind is a way of life in Canada. Recognizing this fact, the Sodium Working Group made recommendations for the federal and provincial governments to impose regulations on packaged foods to reduce the salt and fat content which have not been acted upon by the federal government. As this chapter has demonstrated, achieving the healthy eating goals of the *Integrated Pan-Canadian Healthy Living Strategy* for women in Canada will require considerable changes to the way foods are provided. Public health or policy recommendations must acknowledge what and how women eat, including the potential impossibility of merely changing habits.

References

(1) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 19 Jul 2012]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/ipchls-spimmvs/pdf/ipchls-spimmvs-eng.pdf

(2) World Health Organization. Global strategy on diet, physical activity and health. Geneva: World Health Organization; 2004.

(3) Lock K, Pomerleau J, Causer L, Altmann DR, McKee M. The global burden of disease attributable to low consumption of fruit and vegetables: implications for the global strategy on diet. Bull World Health Organ 2005 Feb;83(2):100-8.

(4) Paarlberg R. Governing the dietary transition: linking agriculture, nutrition, and health: 2020 conference paper 8. Proceedings of IFPRI 2020 Conference: Leveraging Agriculture for Improving Nutrition & Health. Washington: International Food Policy Research Institute; 2011 Feb.

(5) Popkin BM. The nutrition transition and its health implications in lower-income countries. Public Health Nutr 1998 Mar;1(1):5-21.

(6) Health Canada. History of the food guide [Internet]. Ottawa: Health Canada; 2007 [cited 19 Jul 2012]. Available from: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/context/hist-eng.php

(7) Shwartz D. The politics of food guides: first guide, Canada's Official Food Rules, released 70 years ago. CBC News: Health [Internet]; 30 Jul 2012 [cited 3 Aug 2012]. Available from: http://www.cbc.ca/news/health/story/2012/07/27/f-food-guide-70.html

(8) Garriguet D. Canadians' eating habits. Health Rep 2007 May;18(2):17-32.

(9) Slater J, Green CG, Sevenhuysen G, Edginton B, O'Neil J, Heasman M. The growing Canadian energy gap: more the can than the couch? Public Health Nutr 2009 Nov;12(11):2216-24.

(10) Krahn VM, Lengyel CO, Hawranik P. Healthy eating perceptions of older adults living in Canadian rural and northern communities. J Nutr Gerontol Geriatr 2011;30(3):261-73.

(11) Griffioen-Roose S, Mars M, Siebelink E, Finlayson G, Tomé D, de Graaf C. Protein status elicits compensatory changes in food intake and food preferences. Am J Clin Nutr 2012 Jan;95(1):32-8.

(12) Bonjour J. Protein intake and bone health. Int J Vitam Nutr Res 2011 Mar;81(2-3):134-42.

(13) Volkert D, Sieber CC. Protein requirements in the elderly. Int J Vitam Nutr Res 2011 Mar;81(2-3):109-19.

(14) Mayo Clinic. Carbohydrates: how carbs fit into a healthy diet [Internet]. Rochester: Mayo Foundation for Medical Education and Research;8 Feb 2011 [cited 26 Jul 2012]. Available from: http://www.mayoclinic.com/health/carbohydrates/my01458

(15) Weickert MO, Pfeiffer AF. Metabolic effects of dietary fiber consumption and prevention of diabetes. J Nutr 2008 Mar;138(3):439-42.

(16) Findlay L, Garriguet D, Langlois K. Diet composition and obesity among Canadian adults. Health Rep 2009 Dec;20(4):11-20.

(17) Garriguet D. Obesity and the eating habits of the Aboriginal population. Health Rep 2008 Mar;19(1):21-35.

(18) Office of Dietary Supplements. Dietary supplement fact sheet: folate [Internet]. Bethesda: National Institutes of Health; 2011 [cited 15 Aug 2012]. Available from: http://ods.od.nih.gov/factsheets/Folate-HealthProfessional/

(19) First Nations Information Governance Centre. First Nations regional longitudinal health survey: RHS phase 2 (2008/10) preliminary results, revised edition. Ottawa: First Nations Information Governance Centre; 2011.

(20) Erber E, Beck L, Hopping BN, Sheehy T, De Roose E, Sharma S. Food patterns and socioeconomic indicators of food consumption amongst Inuvialuit in the Canadian Arctic. J Hum Nutr Diet 2010 Oct;23 (Suppl 1):59-66.

(21) Dehghan M, Akhtar-Danesh N, Merchant AT. Factors associated with fruit and vegetable consumption among adults. J Hum Nutr Diet 2011 Apr;24(2):128-34.

(22) McCracken M, Watson G. Women need safe, stable, affordable housing: a study of social, private and co-op housing in Winnipeg. Winnipeg: Prairie Women's Health Centre of Excellence, Women's Health Clinic; 2004.

(23) Kierstead P, Wiebe R. Don't we count as people? Saskatchewan social welfare policy and women's health. Winnipeg: Prairie Women's Health Centre of Excellence; 2004.

(24) Healthy foods can cost less: comparing price per calorie versus by weight or portion size leads to different conclusions. CBC News: Health [Internet]; 18 May 2012 [cited 10 Aug 2012]. Available from: http://www.cbc.ca/news/health/story/2012/05/18/food-nutrition-cost.html

(25) Hanson Y. Recipes for food insecurity: women's stories from Saskatchewan. Winnipeg: Prairie Women's Health Centre of Excellence; 2011.

(26) Aboriginal Affairs and Northern Development Canada. Revised northern food basket: highlights of price survey results for 2006, 2007 and 2008 [Internet]. Gatineau: Government of Canada; 19 Dec 2009 [cited 15 Aug 2012]. Available from: http://www.aadnc-aandc.gc.ca/eng/1100100035983

(27) Hanson Y, Stout R. Cartographies of salt: sodium, healthy eating and the built environment. Winnipeg: Prairie Women's Health Centre of Excellence; 2012.

(28) Mayo Clinic. Hyponatremia [Internet]. Rochester: Mayo Foundation for Medical Education and Research; 14 Jul 2011 [cited 19 Jul 2012]. Available from: http://www.mayoclinic.com/health/hyponatremia/DS00974

(29) Doyle ME, Glass KA. Sodium reduction and its effect on food safety, food quality, and human health. Compr Rev Food Sci Food Saf 2010 Jan;9(1):44-56.

(30) Vasan RS, Beiser A, Seshadri S,et al. Residual lifetime risk for developing hypertension in middle-aged women and men: the Framingham Heart Study. JAMA 2002 Feb 27;287(8):1003-10.

(31) Health Canada. Sodium reduction strategy for Canada: recommendations of the Sodium Working Group. Ottawa: Nutrition Evaluation Division, Health Canada; 2010.

(32) Public Health Agency of Canada. Tracking heart disease and stroke in Canada. Ottawa: Public Health Agency of Canada; 2009.

(33) Hansen MA, Overgaard K, Riis BJ, Christiansen C. Role of peak bone mass and bone loss in postmenopausal osteoporosis: 12 year study. BMJ 1991 Oct 19;303(6808):961-4.

(34) Heaney RP. Role of dietary sodium in osteoporosis. J Am Coll Nutr 2006 Jun;25(3 Suppl):271-6.

(35) Consensus Action on Salt and Health (CASH). The international low salt cookbook: heart healthy recipes from around the world. London: World Action on Salt and Health; 2011.

(36) He FJ, MacGregor GA. A comprehensive review on salt and health and current experience of worldwide salt reduction programmes. J Hum Hypertens 2009 Jun;23(6):363-84.

(37) Garriguet D. Sodium consumption at all ages. Health Rep 2007 May;18(2): 47-52.

(38) Shi Y, de Groh M, Morrison H, Robinson C, Vardy L. Dietary sodium intake among Canadian adults with and without hypertension. Chronic Dis Can 2011 Mar;31(2):79-87.

(39) Tanase C, Koski K, Laffey P, Cooper M, Cockell K. Canadians continue to consume too much sodium and not enough potassium. Can J Public Health 2011 May-Jun;102(3):164-8.

(40) Ontario Sodium Summit aims to reduce salt consumed by Ontarians. The Toronto Star [Internet]. 2012 Feb 20 [cited 2012 Apr 9]. Available from: http://www.thestar.com/living/article/1133515--ontario-sodium-summit-aims-to-reduce-salt-consumed-by-ontarians

(41) Donner L, Isfeld H, Haworth-Brockman M, Forsey C. A profile of women's health in Manitoba. Winnipeg: Prairie Women's Health Centre of Excellence; 2008.

(42) Langlois K, Garriguet D. Sugar consumption among Canadians of all ages. Health Rep 2011 Sep;22(3):23-7.

(43) Mayo Clinic. Dietary fats: know which types to choose [Internet]. Rochester: Mayo Foundation for Medical Education and Research; 15 Feb 2011 [cited 14 Aug 2012]. Available from: http://www.mayoclinic.com/health/fat/NU00262

(44) Government of Canada. Canada Gazette 137(1). Ottawa: Public Works and Government Services Canada; 2003.

(45) Keim B. Fast food: just another name for corn [Internet]. Wired Science 10 Nov 2008 [cited 15 Aug 2012]. Available from: http://www.wired.com/wiredscience/2008/11/fast-food-anoth/

(46) Carr D. Corn subsidies make unhealthy food choices the rational ones [Internet]. Grist 22 Sep 2010 [cited 15 Aug 2012]. Available from: http://grist.org/article/food-2010-09-21-op-ed-corn-subsidies-make-unhealthy-food-choices

(47) Hadish C. Ground beef uproar increase questions about food fillers [Internet]. The Gazette 9 Arp 2012 [cited 14 Aug 2012]. Available from: http://thegazette.com/2012/04/09/ground-beef-uproar-increases-questions-about-food-fillers/

(48) Reimer M. 15 Food companies that serve you 'wood' [Internet]. The Street 2 Mar 2011 [cited 11 Aug 2012]. Available from: http://www.thestreet.com/story/11012915/1/cellulose-wood-pulp-never-tasted-so-good.html

(49) Jahren AH, Kraft RA. Carbon and nitrogen stable isotopes in fast food: signatures of corn and confinement. Proc Natl Acad Sci U S A 2008 Nov 18;105(46):17855-60.

(50) Mayo Clinic. Calcium and calcium supplements: achieving the right balance [Internet]. Rochester: Mayo Foundation for Medical Education and Research; 2012 [cited 15 Aug 2012]. Available from: http://www.mayoclinic.com/health/calcium-supplements/MY01540.

(51) Garriguet D. Bone health: osteoporosis, calcium and vitamin D. Health Rep 2011 Sept;22(3):7-14.

(52) Biesalski HK. Vitamin D recommendations: beyond deficiency. Ann Nutr Metab 2011;59(1):10-6.

(53) Office of Dietary Supplements. Dietary supplement fact sheet: Vitamin D [Internet]. Bethesda: National Institutes of Health; 24 Jun 2011 [cited 15 Aug 2012]. Available from: http://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/

(54) NHS Choices. Sun and vitamin D advice given [Internet]. London: National Health Services (NHS); 17 Dec 2010 [cited 22 Aug 2012]. Available from: http://www.nhs.uk/news/2010/12December/Pages/sunlight-exposure-and-vitamin-d-advice.aspx

(55) CBC News: Health. Boning up on the sunshine vitamin [Internet]; 20 Nov 2010 [cited 22 Aug 2012]. Available from: http://www.cbc.ca/news/health/story/2008/05/16/f-health-vitamin-d.html

(56) Mark S. Vitamin D status and recommendations to improve vitamin D status in Canadian youth. Appl Physiol Nutr Metab 2010 Oct;35(5):718.

(57) Derbyshire E. Strategies to improve iron status in women at risk of developing anaemia. Nurs Stand 2012 Jan 18-24;26(20):51-7.

(58) Lin V, Gruszin S, Ellickson C, Glover J, Silburn K, Wilson G, et al. Comparative evaluation of indicators for gender equity and health. Kobe, Japan: WHO Centre for Health Development; 2003.

(59) Christofides A, Schauer C, Zlotkin SH. Iron deficiency anemia among children: addressing a global public health problem within a Canadian context. Paediatr Child Health 2005 Dec;10(10):597-601.

(60) Christofides A, Schauer C, Zlotkin SH. Iron deficiency and anemia prevalence and associated etiologic risk factors in First Nations and Inuit communities in Northern Ontario and Nunavut. Can J Public Health 2005 Jul-Aug;96(4):304-7.

(61) Hinds H, Johnson A, Webb M, Graham A. Iron, folate, and vitamin B12 status in the elderly by gender and ethnicity. J Natl Med Assoc 2011 Sep-Oct;103(9-10):870-7.

(62) McNulty H. Folate requirements for health in different population groups. Br J Biomed Sci 1995 Jun;52(2):110-9.

(63) Bailey LB, Gregory JF 3rd. Folate metabolism and requirements. J Nutr 1999 Apr;129(4):779-82.

(64) Vatanparast H, Adolphe J, Whiting S. Socio-economic status and vitamin/mineral supplement use in Canada. Health Rep 2010 Dec;21(4):19-25.

(65) Sacco JE, Tarasuk V. Discretionary addition of vitamins and minerals to foods: implications for healthy eating. Eur J Clin Nutr 2011;65(3):313-20.

(66) Kitch CL. Food Is love: food advertising and gender roles in modern America. J Am Hist 2007;93(4):1331.

(67) Mastin T, Campo S. Conflicting messages: overweight and obesity advertisements and articles in Black magazines. Howard J Comm 2006 Oct;17(4):265-85.

(68) Madden H, Chamberlain K. Nutritional health messages in women's magazines: a conflicted space for women readers. J Health Psychol 2004 Jul;9(4):583-97.

(69) Goodman S, Hammond D, Pillo-Blocka F, Glanville T, Jenkins R. Use of nutritional information in Canada: national trends between 2004 and 2008. J Nutr Educ Behav 2011 Sep-Oct;43(5):356-65.

(70) Chen X, Jahns L, Gittelsohn J, Wang Y. Who is missing the message? Targeting strategies to increase food label use among US adults. Public Health Nutr 2012 May;15(5):760-72

.

(71) Maclellan D, Morley C, Traviss K, Cividin T. Toward evidence-based, client-centred nutrition education guidelines: dietitian and consumer survey results. Can J Diet Pract Res 2011;72(3):111-116.

(72) Crawford D, Ball K, Mishra G, Salmon J, Timperio A. Which food-related behaviours are associated with healthier intakes of fruits and vegetables among women? Public Health Nutr 2007;10(3):256-65.

(73) Egeland GM, Johnson-Down L, Cao ZR, Sheikh N, Weiler H. Food insecurity and nutrition transition combine to affect nutrient intakes in Canadian arctic communities. J Nutr 2011 Sep;141(9):1746-53.

(74) Hirth JM, Rahman M, Berenson AB. The association of posttraumatic stress disorder with fast food and soda consumption and unhealthy weight loss behaviors among young women. J Womens Health 2011 Aug;20(8):1141-9.

(75) Zellner DA, Loaiza S, Gonzalez Z, Pita J, Morales J, Pecora D, et al. Food selection changes under stress. Physiol Behav 2006 Apr 15;87(4):789-93.

(76) Lawrence W, Skinner C, Haslam C, Robinson S, Inskip H, Barker D, et al. Why women of lower educational attainment struggle to make healthier food choices: the importance of psychological and social factors. Psychol Health 2009 Nov;24(9):1003-20.

(77) Lynch EB, Holmes S, Keim K, Koneman SA. Concepts of healthful food among low-income African American women. J Nutr Educ Behav 2012 Mar-Apr;44(2):154-9.

(78) Lindsay J. Healthy living guidelines and the disconnect with everyday life. Crit Publ Health 2010;20(4):475-87.

(79) D'Sylva A, Beagan BL. 'Food is culture, but it's also power': the role of food in ethnic and gender identity construction among Goan Canadian women. J Gender Stud 2011;20(3):279-89.

(80) Garnweidner LM, Terragni L, Pettersen KS, Mosdøl A. Perceptions of the host country's food culture among female immigrants from Africa and Asia: aspects relevant for cultural sensitivity in nutrition communication. J Nutr Educ Behav 2012 Jul-Aug;44(4):335-42.

(81) Bacon L, Aphramor L. Weight science: evaluating the evidence for a paradigm shift. Nutr J 2011 Jan 24;10:9.

(82) Carney P, Hamada J, Rdesinski R, Sprager L, Nichols K, Liu B, et al. Impact of a Community gardening project on vegetable intake, food security and family relationships: a community-based participatory research study. J Community Health 2012 Aug;37(4):874-81.

(83) Bedard A, Goulet J, Riverin M, Lamarche B, Lemieux S. Effects of a dietary intervention promoting the adoption of a Mediterranean food pattern on fast-food consumption among healthy French-Canadian women. Br J Nutr 2010 Dec;104(11):1662-5.

(84) CBC News: North. Rising food prices in North spark protest [Internet]. 26 Aug 2012 [cited 4 Sep 2012]. Available from: http://www.cbc.ca/news/canada/north/story/2012/08/26/north-food-protest-nunavut-cost.html

(85) Colon-Ramos U, Kabagambe EK, Baylin A, Ascherio A, Campos H, Peterson KE. Socio-economic status and health awareness are associated with choice of cooking oil in Costa Rica. Public Health Nutr 2007 Nov;10(11):1214-22.

(86) Earland J, Campbell J, Srivastava A. Dietary habits and health status of African-Caribbean adults. J Hum Nutr Diet 2010 Jun;23(3):264-71.

(87) Pollan M. In defense of food: an eater's manifesto. New York: Penguin Press; 2008.

Food Insecurity

Meredith Evans

Food security is a central dimension of healthy living. It involves ensuring that people have access to sufficient amounts of safe, affordable, nutritious, and culturally acceptable food. In the absence of food security, it is impossible to make healthy choices and to meet the basic nutritional needs of the body. The United Nations (UN) has deemed food insecurity so important to health and life that it is defined as a basic human right (1).

Food security is a gendered issue because of the structural and societal roles that are related to affording and preparing foods. In most cultures women, for example, play key roles in planning for, acquiring and preparing healthy foods. Any examination of healthy living must consequently consider how women experience and respond to food insecurity – both for themselves and for their families and communities.

Understanding of food insecurity has expanded over the years, from a definition based solely on having insufficient food – often linked to low income – to a broader view that includes worrying about food as well as poor or uncertain food quality and quantity. Health Canada defines households as experiencing food insecurity if "at times during the previous year, these households were uncertain of having, or unable to acquire, enough food to meet the needs of all their members because they had insufficient money for food" (2). The World Health Organization has expanded on the relationship between income and food insecurity, identifying three dimensions of food security: 1) food availability – having sufficient quantities of food available on a consistent basis; 2) food access – having sufficient resources to obtain appropriate foods for a nutritious diet, as well as culturally appropriate food; and 3) food use – having knowledge of basic nutrition and safe food-handling information as well as access to adequate, clean water and sanitation (3).

These newer perspectives underscore the importance of considering food insecurity in "healthy living", both in terms of what gets measured and interventions promoted. Household food insecurity is recognized as both a public health concern and a social phenomenon in Canada (4-7). Individuals living in food insecure households are more likely to suffer from poor health than those who are food secure (4). Food insecurity compromises a healthy diet and can lead to poor physical and mental health (8, 9). While the *Integrated Pan-Canadian Healthy Living Strategy* mentions the need to "improve access to, and affordability of, healthy food choices", food insecurity does not figure in the healthy living targets established in the *Strategy* (10)(p. 19), despite the fact that many studies have demonstrated that healthy dietary "choices" are often not possible for those living in poverty (4, 11). It is consequently the purpose of this chapter to examine the ways in which and the extent to which food insecurity poses a serious threat to the health of some women in Canada.

This chapter draws on Canadian Community Health Survey (CCHS) data collected in 2007-08 to study food insecurity among women in Canada. It examines factors that influence rates of food insecurity for women, such as age, education, income, Aboriginal identity and other social determinants of health, and explores the connection between food insecurity and other elements of healthy living, including healthy body weights and nutrition. The chapter demonstrates the importance of addressing the socio-economic and other inequities that are at the heart of food insecurity and that create barriers to healthy living in its fullest sense.

Measuring Food Insecurity

Measurements of household food insecurity in the CCHS are based on whether households, either with or without children, were able to afford adequate amounts food during the preceding 12 months.[1] Household food insecurity status is determined by analyzing aggregated responses to a set of 18 questions. Adopted from the U.S. Department of Agriculture model of food security status levels in 2000, the CCHS measures four degrees of household food insecurity:

1. **Food secure:** Household members show no or minimal evidence of food insecurity.

2. **Food insecure *without* hunger:** Household members feel anxious about running out of food or compromise on the quality of foods they eat by choosing less expensive options. Little or no reduction in household members' food intake is reported.

3. **Food insecure with *moderate* hunger:** Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food insecure households with children, such reductions are not observed for children at this stage.

4. **Food insecure with *severe* hunger:** At this level, all households with children have reduced the children's food intake to an extent that the children have experienced hunger. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake (12).

[1] Households with children are defined as those with individuals aged 15 or less, or aged 16 or 17 who are the child, grandchild, child-in-law, niece or nephew of another household member.

For the purposes of this discussion, we have designated three degrees of food insecurity as follows:

- food insecurity without hunger will be referred to as "mild food insecurity"[2];
- food insecurity with moderate hunger will be referred to as "moderate food insecurity", and;
- food insecurity with severe hunger will be referred to as "severe food insecurity."

When analyzing the CCHS data, the three levels of mild, moderate and severe food insecurity are sometimes amalgamated for specific indicators under the umbrella of "food insecurity", while for other indicators, the levels of moderate and severe food insecurity are grouped together in a single category, designated as "moderate and severe food insecurity", and mild food insecurity remains a separate category. These groupings were necessary for data reliability purposes.

As noted in the methods section, the CCHS does not include Aboriginal populations living on Reserves and Crown Lands, residents of institutions (hospitals, nursing homes, jails), members of the Canadian Forces and residents of remote regions (particularly areas within three northern territories) (13). Other groups are likewise excluded from the data collected by the CCHS, which is important to note for this topic area. For example, homeless individuals are excluded because the CCHS research method reaches participants through privately-owned landline telephones. Additionally, because the CCHS allows for participants to identify only as male or female, it may exclude transgender and intersex persons who do not identify as male or female. Because many of these populations are vulnerable and/or marginalized, they may be at heightened risk of poverty and food insecurity and their exclusion from the CCHS survey may underestimate the prevalence of food insecurity in the general population as well as among women.

The questions posed in the CCHS survey to determine food insecurity status are entirely income-related, measuring whether individuals have sufficient financial means to afford food, and our analysis in this section is constrained by the limitations of these data. Other CCHS measures, including the use of home care services, food choices, and fruit and vegetable consumption, might be added to food insecurity measures to allow for a fuller picture of food insecurity among women in Canada.

Women and Food Insecurity

Women have specific experiences related to food and household food insecurity. Cultural norms and traditional gender roles typically designate women as responsible for the majority of household care-giving work, including feeding the members of the household through food planning, purchasing and preparation (14). Reinforcing these roles are broad cultural understandings of women as nurturers and caregivers for their

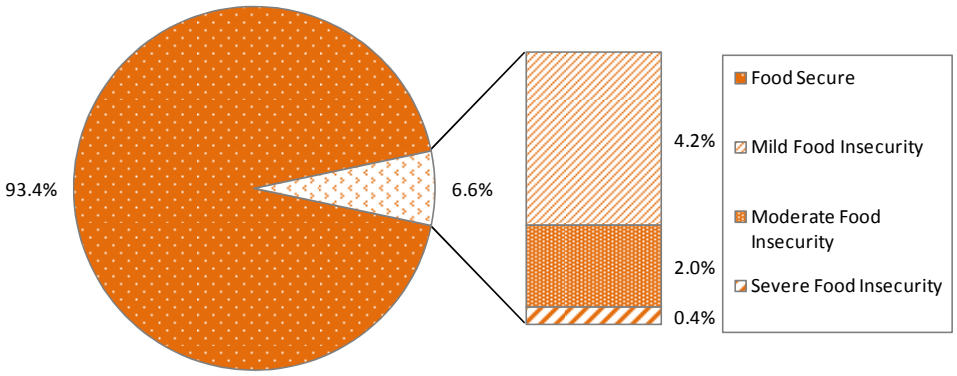
[2] The use of the term "mild" in this context is not meant to imply that those experiencing the lowest levels of food insecurity are not suffering hardship or deprivation. Rather the term has been adopted for ease of reference to indicate relative degrees of food insecurity.

families, particularly for children. As such, women often bear the burden of managing household food insecurity, including worry about, planning and budgeting for food provisioning, and going without to ensure that others in their households eat as well as is possible. Household food insecurity is typically considered a private "family" issue, with the result that it is "often out of sight of those concerned with food policy" (15)(p. 225). Like other dimensions of women's work, managing food insecurity is frequently invisible.

The Food and Agricultural Organization (FAO), a specialized agency of the UN, recognizes the gendered dimension of food insecurity, stating that "a better understanding of intra-household dynamics playing a role in households' food security situation has contributed to an increased demand for accurate sex-disaggregated data related to food production and food security" (16). Sex-disaggregated statistics from Canada allow for a closer consideration of women's experiences of food insecurity. According to data from the CCHS survey, in 2007-2008 6.6% or approximately 894,800 women in Canada lived in food insecure households (Figure 1). Of those, 4.2% or 564,000 experienced mild food insecurity while 2.0% or 274,200 women experienced moderate food insecurity and 0.4% or 56,400 women experienced severe food insecurity.

Food insecurity is influenced by many aspects of women's lives and their experiences differ based on their

Figure 1: Proportion of Food Secure / Insecure Households, Canadian Women, 2007-2008



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Missing Values = 4.1%.

ethnic and/or racial identity, where they live, how old they are, their income and education levels, and whether or not they have children and partners. When we look at the relationship between food insecurity and such factors, it becomes evident that food insecurity is detrimental to the health of many different groups of women in Canada.

It has been demonstrated that women who experience food insecurity have diets with nutritional deficiencies and they consume fewer fruits and vegetables (8,20,21). Because of the high costs of fruits and vegetables, these foods are often the first sacrificed (19). A healthy diet is important for disease prevention, and food

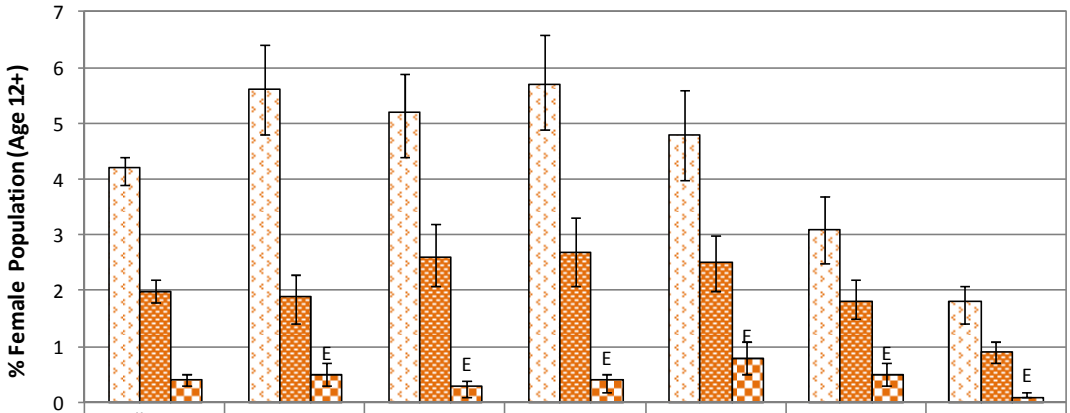
insecurity's negative impact on women's nutritional intake can have severe consequences. Women living with food insecurity are more likely to experience poorer self-rated health, longstanding health problems and activity limitations (17). Food insecurity also raises women's chances of developing multiple chronic conditions and of reporting heart disease, diabetes, high blood pressure, cancer and food allergies (18, 19).

Food insecurity is also associated with women's poor mental health and well-being, as the inability to acquire and consume nutritious food and worrying about food can lead to increased stress, anxiety, depression and fatigue. Women who experience food insecurity therefore are at greater risk of suffering from major depression and distress and of having poor social support (18, 22). Tarasuk points out that social isolation is linked to food insecurity, another factor which can be detrimental to mental health (17). Olson et al., in their study of women in rural low-income families, note an association between food insecurity and depressive symptoms (23). Similarly, a "hunger of the mind" phenomenon was explored by Chilton and Booth in a study of African American women, where feelings of depression and hopelessness were linked to experiences of food insecurity (24).

Women of all ages experience food insecurity in Canada. According to the CCHS data (Figure 2), women 30-49 years of age experience high rates of food insecurity – above the averages for all ages combined – for all three levels: mild, moderate and severe. Young women also experience high rates of food insecurity. Adolescent females (12-19 years old) experience a high rate of mild food insecurity significantly above the national average, and also a high rate of severe food insecurity (although not significantly higher than the national average). Young women (20-29 years old) experience high rates of mild and moderate food insecurity, rates above national averages. Rates of severe food insecurity are highest among women aged 40 to 49.

Studies on women's food insecurity in Canada suggest that those over 35 years of age experience the highest rates of hunger and food insecurity (25). McIntyre argues that this could be because older women are "simply 'burnt out' after years entrenched in poverty, leaving them less able to be resourceful and provide for their children and themselves" or because "community and program supports are targeted towards younger mothers and may be less available for older women" (25)(p. 414). Mothers could also be experiencing high rates of food insecurity because they are protecting their children by sacrificing their own food intake to ensure their children get the most and the healthiest foods in the household (26). Statistics Canada's report on food insecurity highlights the role of parents in protecting children by demonstrating that adult food insecurity levels are typically higher in households with children (27). The use of the gender-neutral term "parents" by Health Canada acknowledges the roles of both mothers and fathers, but neglects to explore how women and mothers are much more likely to be responsible for the care of children and therefore more likely to compromise their own diets.

Figure 2: Levels of Household Food Insecurity, by Age
Canadian Women, 2007-2008



	All ages	12-19	20-29	30-39	40-49	50-59	60+
Mild	4.2	5.6	5.2	5.7	4.8	3.1	1.8
Moderate	2	1.9	2.6	2.7	2.5	1.8	0.9
Severe	0.4	0.5	0.3	0.4	0.8	0.5	0.1

Age Categories

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 4.1%.

Girls who experience hunger are more likely to have poorer health, are significantly more likely to be obese and have more medical diagnoses, and are at greater risk of scholastic difficulties (28-30). While parents may try to protect their daughters from going hungry, girls' awareness that their parents are worried about feeding the household or are sacrificing their diets might also negatively affect girls' health (28-30).

In their analysis of the 2000-2001 CCHS data, Ingrid Ledrou and Jean Gervais observed that young people in Canada may be at high risk of food insecurity because many are students or have just entered the workforce and are consequently living on small budgets (31). High rates of youth unemployment could be an additional contributing factor; in March 2012 the youth (aged 15 to 24 years) unemployment rate in Canada was 13.9%, compared to 7.2% for all ages (32).

Although rates of food insecurity among older women (aged 60 years and older) are lower than for other age groups of women, they represent a vulnerable population that may struggle to achieve an adequate and healthy diet. They experience higher rates of chronic diseases as a result of food insecurity, are more likely to be overweight and are more susceptible to depression than food secure older women (33,34). Unattached senior women living on a pension are at particular risk, as evidenced by Green et al.'s study of seniors living in Nova Scotia. Their research shows that unattached senior women and men on public pensions (Old Age Security or Canada Pension Plan) often lack the necessary funds for a nutritious diet (35). In addition to

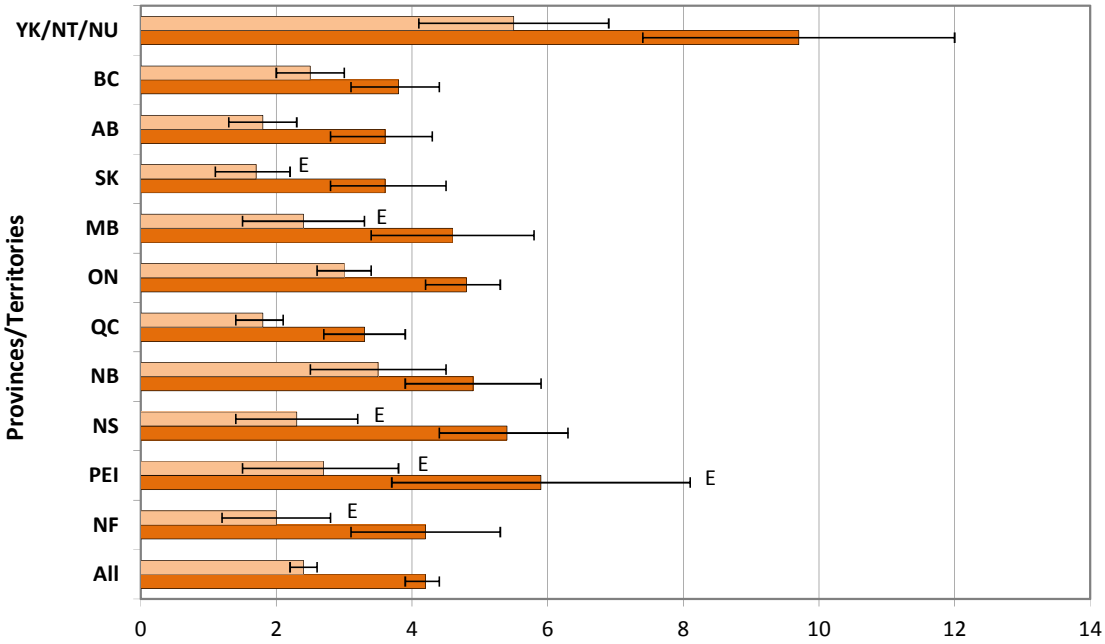
financial constraints, physical restrictions related to illness or disability can also create barriers for older women in relation to both purchasing and preparing food.

Location of residence is also related to rates and experiences of food insecurity. As Figure 3 demonstrates, the three territories of Yukon, the Northwest Territories and Nunavut together experience the very highest rates of food insecurity compared to all provinces in Canada. Women in the territories experience all three levels of food insecurity at more than twice the national average. High rates of food insecurity in the territories may be related, in part, to the remoteness of the communities because residents may have limited access to affordable healthy foods (36, 37). Martin, in her research in a remote Inuit-Métis community in Labrador, observed that store-bought processed foods are more accessible but nutritionally inferior to traditional diets of Indigenous peoples (38). High food costs have been cited as one contributing factor to food insecurity in the territories; for instance, a basket of food in Igloolik, Nunavut costs twice as much as in Montreal, Quebec (39). Furthermore, the potential lack of social programs in remote areas could exacerbate food insecurity.

Women living in rural areas experience food insecurity for a variety of reasons, but women living in urban Canada experience rates of food insecurity higher than women living in rural Canada (Figure 4). According to our analysis of CCHS data, rates of mild, moderate and severe food insecurity are higher than the national average for women living in urban areas. These high rates may be linked to urban *food deserts*, a phenomenon in which socially-distressed neighbourhoods with low household income have limited access to sources of affordable, healthy food. Food deserts have been identified in some Canadian concentration of food retailers in the suburbs (40). Large supermarkets with lower prices are typically located in higher-income suburban areas, while urban neighbourhoods are left with high-cost small corner stores, fast-food outlets and restaurants. Since women are disproportionally responsible for family food purchasing, they often face the challenge of finding and paying for transportation to affordable supermarkets with high quality and nutritious food (41, 42).

***Food deserts** are socially-distressed low-income neighbourhoods with poor access to healthy food.*

Figure 3: Levels of Household Food Insecurity, by Province/Territories
Canadian Women, 2007-2008

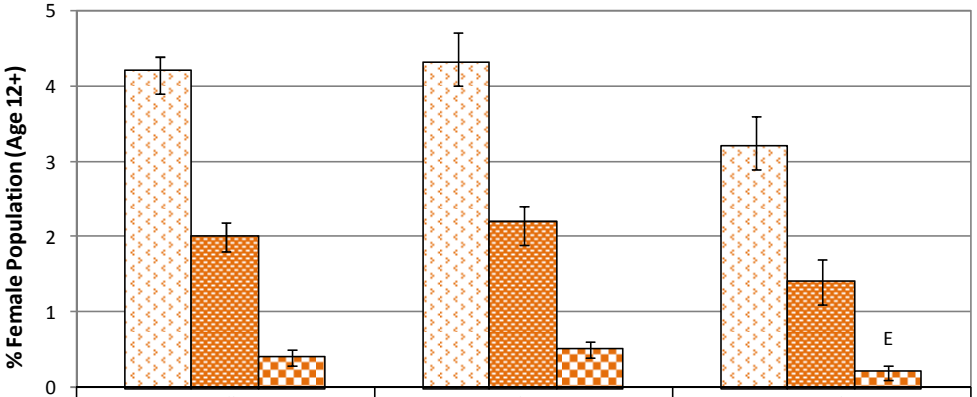


	All	NF	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YK/NT/NU
Moderate / Severe	2.4	2	2.7	2.3	3.5	1.8	3	2.4	1.7	1.8	2.5	5.5
Mild	4.2	4.2	5.9	5.4	4.9	3.3	4.8	4.6	3.6	3.6	3.8	9.7

% Female Population (Aged 12+)

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 4.1% .

Figure 4: Levels of Household Food Insecurity, by Urban/Rural Residence
Canadian Women, 2007-2008

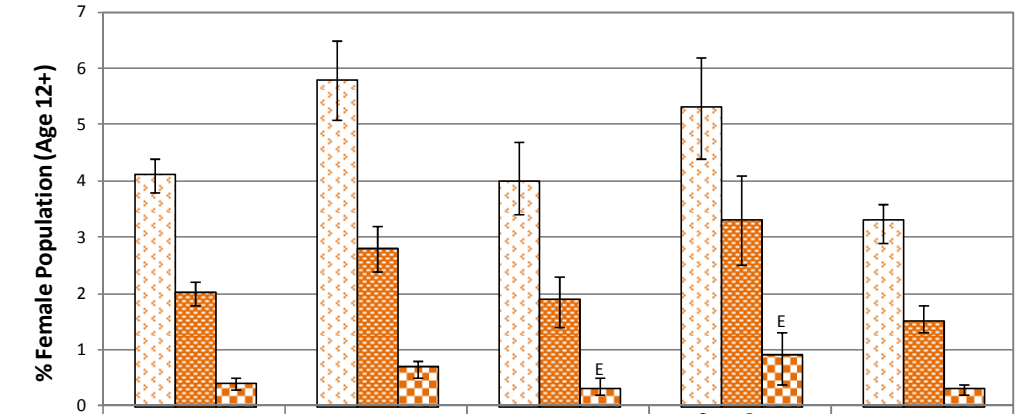


	All	Urban	Rural
Mild	4.2	4.3	3.2
Moderate	2	2.2	1.4
Severe	0.4	0.5	0.2

Urban/Rural

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV)."E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 4.1%.

Figure 5: Levels of Household Food Insecurity, by Education
Canadian Women, 2007-2008



	All	Less than Secondary	Secondary School	Some Post-Secondary	Post-Secondary
Mild	4.1	5.8	4	5.3	3.3
Moderate	2	2.8	1.9	3.3	1.5
Severe	0.4	0.7	0.3	0.9	0.3

Level of Education

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 4.7%.

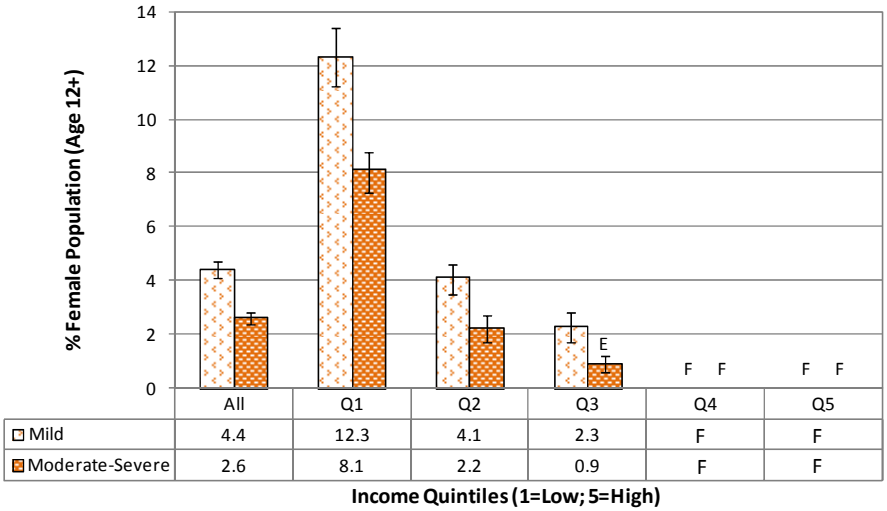
All three categories of food insecurity (mild, moderate and severe) are highest for women who have not completed high school, as demonstrated in Figure 5. Women who have graduated from a post-secondary institution experience the lowest rates of food insecurity, followed by women who have graduated from secondary school (Figure 5). Women in Canada who have some post-secondary education experience the highest rates of severe food insecurity – above the national averages – followed by women who have less than a secondary school education. The high rates of food insecurity for women with some post-secondary education include those still in school as well as those who have withdrawn. In both cases, the financial burden of a post-secondary education may be a factor for food insecurity for women in Canada and especially young women. According to Meldrum and Willows, Canadian university students who have to rely on financial assistance in the form of student loans are a population at risk of food insecurity (43). The authors argue that these students have insufficient funds to support both their education and their personal needs, including nutrition (43). Food costs for women pursuing post-secondary education can also be higher because of the phenomenon of urban food deserts, at least in communities with urban campuses. At the same time, female students may not have cooking skills to prepare healthy meals or feel that they have time to cook, and living on their own in modest student housing is generally not conducive to cost-effective bulk food purchasing (43).

Women with less than a secondary school education make lower wages and are more likely to live in poverty, factors that could influence the high rates of food insecurity experienced by this group. In 2006, over 16% of women in Canada between the ages of 25 and 64 had not received any certificate, diploma, or degree (44). Notably, more than one in three Aboriginal women drops out of high school (45). Along with Aboriginal women, young mothers and young women from single-parent households are the most likely to drop out of high school and are therefore groups at greater risk of experiencing food insecurity (45-47).

Food insecurity is often measured in relation to income; survey questions focus on whether or not respondents have skipped meals or compromised the quality of their diets because of a lack of money. CCHS data are derived, to a considerable degree, from these kinds of measures and they clearly show the relationship between poverty and food insecurity. Women whose household income falls in the lowest income quintile experience both mild food insecurity and moderate/ severe food insecurity at rates more than twice the national averages Figure 6). Food insecurity rates decrease for women as income increases, particularly for the second and third income quintiles. These findings are consistent with Health Canada reports on food insecurity, as well as with earlier research that suggests women are more likely to report food insecurity if their household income is chronically inadequate (1,17). Tarasuk argues that food insecurity is inextricably linked to financial insecurity (17). Health Canada even defines access to food in terms of having enough money to purchase food (1). This link to income is important when exploring the gendered dimensions of food insecurity, as a greater proportion of women than men live in poverty in Canada, as elsewhere around the globe (49). Lone mothers, Aboriginal women, visible minority women, immigrant women and senior women in Canada are at particular risk of low income due to marginalization and

discrimination (45). The gender wage gap is partly responsible for women's increased vulnerability: women aged 25 to 29 working full time earned 85 cents for every dollar earned by men in the same age group while women aged 50 to 54 earned 72 cents for every dollar earned by their male counterparts (50). Not only are women more likely than men to have poorly-paid jobs, they are also more likely to have precarious employment – work that is casual, part-time, or otherwise insecure (51,52). Women's caregiving responsibilities play a large role in their ability to get and hold full-time well-paid jobs (53). Access to nutritious food is directly affected by low incomes because healthy foods such as fresh produce and lean meats are typically more expensive than unhealthy energy-dense foods (54). Furthermore women's food budgets may often be the only flexible part of their budgets, with the result that they cut back on food to be able to meet other expenses, such as shelter, clothing and medications (19). Mothers often compromise their own food intake in order to protect their children from hunger. In her study of low-income women who experience food insecurity, McIntyre determined that mothers living in low-income households typically eat last and eat food of lower quality (9).

Figure 6: Levels of Household Food Insecurity, by Income Quintile
Canadian Women, 2007-2008



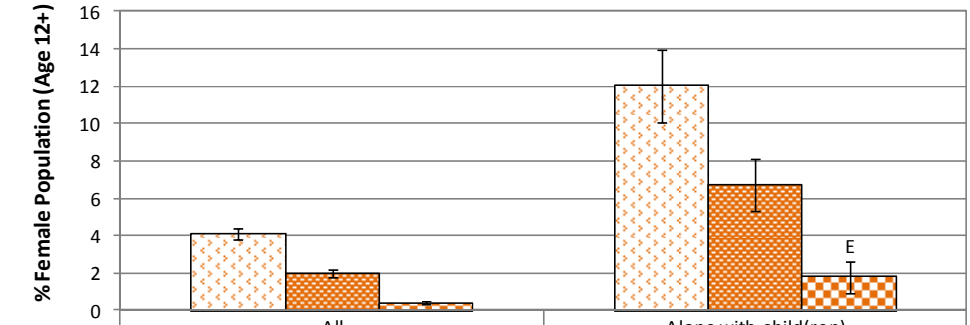
SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "F" signifies data with a coefficient of variation (CV) > 33.3%. Data were too unreliable to be published. Missing Values = 20%.

While income is a critical component in food security, it is not a straightforward or uncomplicated relationship. For example, food insecurity is uncommon for women in high income households, but it still exists. This phenomenon could be explained by the fact that household income measurements are not sensitive to sudden economic changes resulting in temporary periods of food insecurity (100). Moreover, measures of household income do not take into consideration control over household resources as women may be less likely to have this control than are men (48). These findings underscore the importance of a sex- and gender-based analysis of current approaches to food security in particular and to healthy living in general.

Lone mothers experience disproportionally high rates of food insecurity.

Household structure also plays a role in rates and experiences of food insecurity in Canada. Lone mothers experience the highest rates of food insecurity compared to women in other family structures and living arrangements in Canada. Statistics Canada defines a lone parent as an individual who lives with one or more of their own children, without a married or common-law spouse in the household (55). According to Health Canada, lone parent households (led by either women or men) have the highest rates of food insecurity (1), but this is largely a women's issue because most lone parents are female. In 2006, more than 80% of all Canadian lone-parent families were led by females, with the majority between the ages of 25 and 44 years of age (45). More Aboriginal women (18%) than non-Aboriginal women (8%) are lone mothers (45). According to the CCHS data, over one-fifth of lone mothers are food insecure (20.6%), with severe food insecurity over four times the national average (1.8%), and moderate and mild food insecurity (6.7% and 12.1%, respectively) over three times the national average (Figure 7). In a study with low-income lone mothers in Atlantic Canada, McIntyre et al. determined that 96.5% were food insecure in the preceding year and 78% were food insecure in the month prior to the study (25). Similar to all food insecure mothers, lone mothers have been found to protect their children's diets by compromising their own (9, 25).

Figure 7: Levels of Household Food Insecurity, Lone Mothers Compared to other Women in Canada, 2007-08



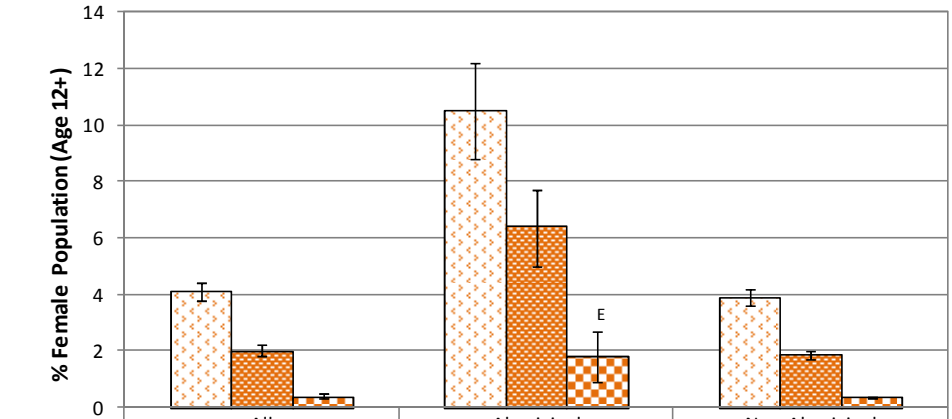
	All	Alone with child(ren)
Mild	4.1	12.1
Moderate	2	6.7
Severe	0.4	1.8

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. % Missing Values = 4.6%. "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Much of the food insecurity data for other living arrangement categories were too unreliable to publish. Moderate and severe levels of food insecurity results produced coefficients of variation (CV) greater than 33.3%.

As we saw earlier, poverty is a key factor in food insecurity and female lone parents make up one of the lowest income groups in Canada. In 2008, 21% of lone mothers were considered low-income (after-tax), compared to only 6% of couples with children (45). High unemployment rates among lone mothers are partly responsible for this disparity, as lone mothers are less likely to be employed than women in two-parent households (45), and this is related – at least in part – to the lack of affordable childcare across Canada (56). Lone mothers whose annual household income falls below Statistics Canada's low-income cut-off are at particularly high risk.

In Canada, Aboriginal women are at a disproportionately high risk of food insecurity. In 2006, only 4% of girls and women in Canada identified as First Nations, Métis, or Inuit; however, a high proportion of Aboriginal women living off-reserve are food insecure (Figure 8) (45), and Aboriginal women in Canada are more likely than non-Aboriginal women to experience food insecurity (57). As illustrated in Figure 8, Aboriginal women living off-reserve in Canada experience over twice the rate of mild food insecurity, over three times the rate of moderate food insecurity and over four times the rate of severe food insecurity3compared to non-Aboriginal women. According to a 2006 Statistics Canada report, more than half of Aboriginal women living off-reserve and heading households with children were food insecure (7). The CCHS data discussed in this report are limited as they only report on off-reserve Aboriginal populations, but

Figure 8: Levels of Household Food Insecurity, by Aboriginal Identity
Women in Canada, 2007-2008



	All	Aboriginal	Non-Aboriginal
Mild	4.1	10.5	3.9
Moderate	2	6.4	1.9
Severe	0.4	1.8	0.4

Aboriginal/Non-Aboriginal Identity

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 4.5%.

[3] N.B. the figures for severe insecurity but must be interpreted with caution.

they reflect the experiences of a significant proportion of Aboriginal women as three in four Aboriginal women in Canada live off-reserve (45). Moreover, findings from the 2008/10 First Nations Regional Health Survey (RHS) indicate that "more than half of First Nations households were categorized as being 'moderate' to 'severely' food insecure". Unfortunately, these data are not currently disaggregated by sex in published documents, but according to the National Report on the 2008/10 RHS, released in 2012, gender plays a key role in food insecurity (103).

High rates of poverty among Aboriginal women undoubtedly contribute to similarly high rates of food insecurity. In 2005, for example, the average annual income of Aboriginal women was approximately $5,000 less ($16,000) than for non-Aboriginal women ($21,000) and close to 30% of Aboriginal women (off-reserve) lived in low income households, almost double the 16% rate of non-Aboriginal women (59). Aboriginal women are not only more likely than non-Aboriginal women to experience food insecurity, but also those living in food-insecure households are more likely to experience poorer mental and physical health and well-being, including high stress, increased rates of cigarette smoking, life dissatisfaction and a weak sense of community belonging (60).

As with the general population of women in Canada, the relationship between income and food insecurity is not straightforward for Aboriginal women. For example, as noted earlier, the high cost of groceries, particularly in Northern and remote communities, has been cited as a possible explanation for high rates of food insecurity (58). A bag of potatoes that cost $2.49 in Ottawa, Ontario, cost $7.49 in Clyde River, Nunavut (59). But according to the 2008/10 National Report on the RHS, "remote [First Nations] communities had fewer households categorized as severely food-insecure (10.7%), compared to households in urban (51%) or rural (43.7%) locations" (103). These differences may be linked to increased reliance on traditional over processed foods in some communities. Traditional foods are not only healthier but also may be less expensive. Because RHS data were not available by sex, we do not know if First Nations women's experiences are similar to or different from these broader patterns. But many factors affect the ability to obtain traditional foods, including "environmental pollution on traditional hunting, fishing and harvesting lands; decreased access to traditional lands; changes in animal migratory patterns; insufficient traditional knowledge transfer from elders to young people; loss of taste for traditional foods due to marketed foods; and not having someone in the family to harvest, hunt or fish due to employment or lack of resources" (62)(p. 8). These factors may have differing effects for women and children in communities and more research is needed about the relationship between gender, traditional foods and food security (61, 38).

Other racialized populations of women are also at high risk of food insecurity. According to a recent report from Health Canada, food insecurity is common among recent immigrants, those who have lived in Canada for a period of less than 10 years, as compared to non-immigrants and immigrants who have lived in Canada for a period of 10 years or more (1). One in five women in Canada is an immigrant (not born in Canada) (45) and these women are twice as likely as Canadian-born women to be living on low income (63). High rates of

poverty may be linked to lower employment rates: 51.5% of immigrant women are employed compared to 59.5% of non-immigrant women (63). A study of Colombian immigrants and food bank use in London, Ontario, also suggests that "lack of support, social constraints and an economic vulnerability that limits their access to healthy foods and recreational facilities are major obstacles to food security and a healthy lifestyle" for this group (64)(p. 77). Though low income and lower levels of education are typically associated with food insecurity, pan-Canadian data suggest immigrants in poverty have more education than those who are Canadian-born (65). According to Rush et al., recent immigration was associated with greater hunger, possibly related to cultural adjustment, lack of familiarity with the Canadian social welfare system, and lack of familiarity with the food available in Canada (64).

A variety of other marginalized women are also at high risk of food insecurity. For example, HIV has been linked to epidemics of food insecurity around the globe including in resource-rich countries such as Canada (78,79). A study with women and men living with HIV/AIDS in British Columbia found that they were almost five times more likely than the general population to experience food insecurity (79). Food insecurity is a serious health concern for HIV-positive individuals as it can negatively influence their treatment regimens, their quality of life and their survival (78).

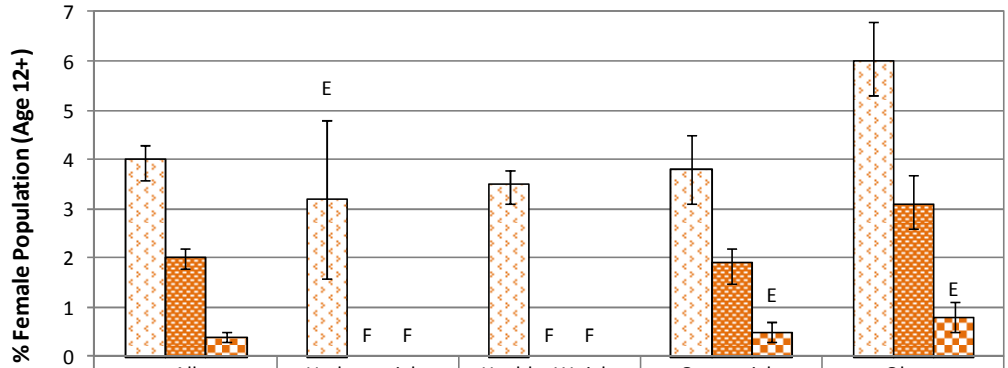
Women with drug addictions are also at risk of food insecurity. In a study with injection drug users (IDUs) in Vancouver, 64.7% of participants reported mild and moderate levels of food insecurity (80). In another research project, close to two-thirds of HIV-positive IDUs in Vancouver reported severe food insecurity (78). Non-injection drug users are also at high risk of food insecurity. In their study, Werb et al. suggest that non-injection crystal methamphetamine use is closely associated with malnutrition among street-involved youth in Vancouver (81). Gambling and substance addictions were identified as determinants of food insecurity for Inuit women, as both contribute to "taking away money needed for purchasing food and engaging in hunting activities, gambling and addiction negatively affects important food-sharing networks, disrupts household dynamics and strains family relationships" (39)(p. 199). Finally, smoking has also been linked to food insecurity in some low-income households (82).

Homeless women are not included in the CCHS survey, but other research demonstrates that they face much higher rates of food insecurity than the general population in Canada (83). Poverty contributes to food insecurity for homeless women are a vulnerable population and it may also jeopardize their health by creating conditions where they are forced to engage in high-risk behaviours, such as trading sex for money and food (83).

Transgender populations are also not represented in the CCHS data, but they are also a group at high risk of poverty as they have disproportionally lower incomes than the population at large and face greater obstacles to securing stable income and quality housing (101, 102). This means they are also likely at increased risk of food insecurity.

Overweight and obesity is also associated with high rates of food security among women in Canada, as evidenced by CCHS data (Figure 9). Based on available data (some estimates were too unreliable to publish), obese women are more likely to report moderate and especially mild levels of food insecurity compared to women ascribed to other body mass classifications.

Figure 9: Levels of Household Food Insecurity, by BMI
Canadian Women, 2007-2008



	All	Under-weight	Healthy Weight	Overweight	Obese
Mild	4	3.2	3.5	3.8	6
Moderate	2	F	F	1.9	3.1
Severe	0.4	F	F	0.5	0.8

BMI classification

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2007/2008. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. "F" signifies data with a coefficient of variation (CV) greater than 33.3%. Data were too unreliable to be published. Missing Values = 17.2%. Pregnant women are excluded from measures of BMI.

Because "obesity connotes excessive energy intake and hunger reflects an inadequate food supply, [therefore] the increased prevalence of obesity and hunger in the same population seems paradoxical" (74)(p. 766). In other words, we are frequently told and assume that obesity and overweight are about eating too much, rather than about being unable to eat well and regularly. But previous research has consistently demonstrated a strong positive association between food insecurity and obesity in women (26, 66). It is not clear whether food insecurity causes obesity, whether obesity causes food insecurity, or whether they influence each other (19). Some researchers have argued that body weight, measured by the body mass index (BMI),[4] increases for women as food insecurity becomes more severe (67,68).

Others suggest that body weights are higher for women who experience moderate food insecurity but that those who experience severe food insecurity in fact have low body weights, resulting from malnutrition and simple food deprivation (69, 70). Some studies have suggested that body weight is inversely related to

[4] BMI is calculated by dividing an individual's weight (in kilograms) by their height (in meters), squared (kg/m^2).

socioeconomic status among women in Canada, a connection that parallels the links outlined above between food insecurity and income (71, 72). Nevertheless, research in the US, Australia and Europe has demonstrated that the risk of obesity is 20-40% higher in women who experience food insecurity regardless of variations in income, lifestyle behaviours, or education (73).

Various explanations for the food security-obesity paradox have been proposed. The high cost of healthy foods, such as fruits and vegetables and lean meats, could contribute to higher BMI levels in women who experience food insecurity: they often have to rely on energy dense, nutritionally poor foods that are less expensive but also can contribute to weight gain (21). Increased BMI in women who experience food insecurity could also be a related to binge-eating after prolonged periods of food scarcity, a practice associated with weight gain for women (19, 75). Townsend et al. have also suggested that charitable and social food programs may likewise encourage a "food stamp cycle," in which food is plentiful at the beginning of a payment period but becomes less so as monthly resources are used up. This cycle might encourage deprived women to binge eat when they receive their next supply of food stamps because they know that later in the month they will be hungry again (70).

Understanding that nutritional deficiencies can arise from food insecurity also helps to shed light on chronic diseases typically associated with obesity such as diabetes, high blood pressure and heart disease (21). Women with longstanding health problems or activity limitations are also more likely to be food insecure (17). Food insecurity is particularly problematic for women with pre-existing chronic conditions that require special diets for health management (76). For instance, women living with diabetes in Canada are at a high risk of food insecurity (a risk of 12%) and food insecurity, in turn, makes it difficult to manage diabetes (77).

CCHS data and other research present a complex picture of food insecurity among women in Canada. Low-income, a traditional explanation of food insecurity, certainly plays a large role in which women are most likely to be food insecure. But it is also clear that other social determinants affect vulnerability to and experiences of food insecurity. Young women, poor women, lone mothers, Aboriginal and immigrant women, less educated women and women with addictions and those living in urban food deserts all appear to be at heightened risk of food insecurity. While these groups of women may be more likely than others to experience food insecurity because they are more likely to be living in poverty, it is also the case that food insecurity can strike even when women are not impoverished, undereducated or unemployed. Moreover, food insecurity has complicated effects in the lives of women, rendering them more vulnerable to malnutrition, hunger, stress, obesity and ill health.

Improving Food Security in Canada

Charitable Food Programs

Charitable food assistance programs, including food banks, school breakfast and lunch programs, community gardens and other charitable food programs, are the primary mechanisms for responding to food insecurity in Canada (84,85). Approximately 700,000 individuals make use of food banks each month, a number that has been relatively consistent throughout the past decade (86). However, between 2008 and 2010, food bank usage in Canada grew by 28% and reached a peak of 867,948 individuals in March 2010 (86). While charitable food programs are important resources for women who experience food insecurity, they are not without problems. According to Tarasuk and Eakin, food bank operations in Canada may actually mask the severity and extent of food insecurity in the country (94). At the same time, food banks and community gardens may not be easy to reach for those with limited resources for transportation. In a study by Tsang et al., for example, food insecure individuals – most of whom were mothers – identified lack of transportation as the most common barrier to using a food program in Coburg, Ontario (88). Similar barriers could confront those trying to supplement their supply of food through community gardens.

Other studies of charitable food programs suggest that food quality and quantity may not be optimal. In a study of food programs in Victoria, British Columbia, for example, it was determined that most charitable food providers rely on poor-quality donated foods (89). Similarly, a study of food bank hampers in Ontario revealed that the contents of each hamper were intended to last three days, but failed to provide three days' worth of nutrients (64), which may result in persistent nutritional inadequacies for women who use food programs (84). Another study determined that 70% of women who used the food banks in Toronto still experienced severe food deprivation (93). Rock et al. suggest that that the general public may be ill-informed about the realities of food insecurity in Canada, which may partially account for poor-quality food donations (90). Furthermore, it is also the case that food wholesalers and retailers sometimes use food banks as dumping grounds for food they cannot sell for a profit, thereby avoiding the costs of disposing of dated or inferior products while receiving charitable tax credit for the donations (94).

Food Preparation Skills and Collective Kitchens

Public health nutrition initiatives have often focused on improving nutrition knowledge and food skills for low-income individuals as a way to promote healthy living, reduce overweight and obesity and address food security (95). However, McLaughlin et al. demonstrated that the quantity and quality of at-home food preparation skills are high among food insecure low-income women in Toronto (95). Such research challenges notions that low-income women lack food preparation skills, knowledge or motivation, as well as the idea that food skills alone are an adequate mechanism for protecting households from food insecurity

(95). Furthermore, initiatives that focus on individual behaviours fail to address structural inequities and social determinants that lead to food insecurity.

Collective kitchens have also developed across Canada over the past few decades as another response to food insecurity (96). Collective kitchens are described by Tarasuk and Reynolds as the "pooling of resources and labour to produce large quantities of food" (97)(p. 13). Collective kitchens are seen as less stigmatizing than food banks and Ripat has argued that participants in community kitchen programs are less likely to blame themselves for poverty and food insecurity (17,98). Furthermore, the community ties and networks created by community kitchens can be effective in combating the social isolation frequently experienced by the poor and food insecure populations (87). This effect may be especially important for women, given the gendered nature of food provisioning and preparation.

At the same time, it is unclear whether collective kitchens are effective in improving food security levels for participants. Tarasuk points out that these programs are often limited by financial constraints and they may not be accessible if user fees are required of participants (87). Moreover, collective kitchens, like food skill development programs, can perpetuate the perception that food insecurity results from poor food and income management skills and are therefore best addressed through individual education rather than through combating broader structural and systemic inequities (87). Indeed, Tarasuk and Reynolds argue that because collective kitchens, like food banks, cannot themselves reduce or eliminate poverty through the redistribution of wealth, they are ill-equipped to affect the structural inequities that perpetuate food insecurity (87, 97). However, it is important to note that many food bank organizations, including Food Banks Canada, advocate strongly for action aimed at poverty reduction.

Policy Action

A variety of research has linked the rise of food banks and other charitable or collective food programs in Canada with the breakdown of the state's welfare system and social safety net (87, 85). Riches argues that food banks, like other charitable food programs, "permit[s] the state to neglect their obligation to protect vulnerable and powerless people" and "encourage[s] the view that food poverty is not a critical public policy issue" (85)(p. 654, 658). He notes that surplus food redistribution fails to address the social determinants of food insecurity (85). These kinds of analyses have led to increasing calls for improvements to Canada's social safety net in order to protect individuals from food insecurity (84,86,99). Tarasuk suggests that the interrelationship between food insecurity and financial insecurity demonstrates the need for solutions that are unrelated to food, which instead work to improve the financial security of low-income households (17). She maintains, in particular, that effective strategies to combat food insecurity must address issues related to economic constraints, including support for low-waged workers, affordable housing programs and affordable child care programs (87), all of which would help address issues for low income, food-insecure women. McIntyre et al. have likewise concluded that increases in parental support payments could help decrease the

high rates of food insecurity experienced by low-income lone mothers, and they recommended that healthy food should be made both affordable and accessible (9).

Food Banks Canada, in a compelling 2010 report on hunger in Canada, recommended the implementation of a federal poverty prevention and reduction strategy, the maintenance of current federal monetary transfers to provincial, territorial and First Nations governments, the continual reformation of provincial income last-resort programs, the creation of a federal affordable housing strategy, reforms to the Employment Insurance system, an increase in federal investment in childcare, a review of seniors and poverty and an increase in the Canada Child Tax Benefit (86). As with other recommendations, these strategies all aim to address structural inequities that are at the root of food insecurity and that have a differential impact on diverse groups of women in Canada.

Conclusion

Food insecurity is a gendered health issue, influenced by structural inequities, such as poverty and gendered social roles. To be sure, different groups of women across Canada experience food insecurity differently, and various factors explored in this chapter, including living arrangements, income, age, and race and ethnicity, determine the degree to which women in Canada are at risk of and experience food insecurity.

Because social inequities underpin food insecurity, short term solutions, such as food banks, and policy strategies that focus on individual behaviours and actions, including healthy living strategies, are limited in their capacity to address the issue. As food insecurity has a detrimental impact on women's physical and mental health in Canada, especially for poor and marginalized groups, it is imperative that future government policies and strategies address the social inequities that perpetuate the problem of food insecurity.

References

(1) Right to Food. What is the right to food? [Internet]. 2012 [cited 17 Apr 2012]. Available from: http://www.righttofood.org/work-of-jean-ziegler-at-the-un/what-is-the-right-to-food/

(2) Health Canada. Household food insecurity in Canada in 2007-2008: key statistics and graphics [Internet]. Ottawa: Health Canada. 2011 [cited 10 Apr 2012]. Available from: http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/insecurit/key-stats-cles-2007-2008-eng.php

(3) World Health Organization. Trade, foreign policy, diplomacy and health: food security [Internet]. Geneva: World Health Organization. 2012 [cited 17 Apr 2012]. Available from: http://www.who.int/trade/glossary/story028/en/

(4) Tarasuk V. Health implications of food insecurity. In: Raphael D, editor. Social determinants of health: Canadian perspectives; 2004. p. 187-200.

(5) Power EM. Individual and household food insecurity in Canada: position of the Dietitians of Canada. Can J Diet Pract Research 2005(66):43-46.

(6) Rideout K, Seed B, Ostry A. Putting food on the public health table - Making food security relevant to regional health authorities. Can J Public Health 2006 May-Jun;97(3):233-6.

(7) Health Canada. Canadian community health survey, cycle 2.2, nutrition (2004): income-related household food security in Canada. Ottawa: Office of Nutrition Policy and Promotion, Health Canada; 2007.

(8) Tarasuk V, Beaton G. Women's dietary intakes in the context of household food insecurity. J Nutr 1999 Mar;129(3):672-9.

(9) McIntyre L, Glanville N, Raine K, Dayle J, Anderson B, Battaglia N. Do low-income lone mothers compromise their nutrition to feed their children? Can Med Assoc J 2003 Mar 18;168(6):686-91.

(10) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada: 2005 [cited 15 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/ipchls-spimmvs/pdf/ipchls-spimmvs-eng.pdf

(11) Drewnowski A. Obesity and the food environment: dietary energy density and diet costs. Am J Prev Med 2004 Oct;27(3):154-62.

(12) Statistics Canada. Canadian Community Health Survey (CCHS): annual component 2008 and 2007-2008 derived variable (DV) specifications. Ottawa: Statistics Canada; 2008.

(13) Statistics Canada. Canadian Community Health Survey (CCHS): annual component 2011 [Internet]. Ottawa: Statistics Canada. 10 Jan 2012 [cited 20 Mar 2012]. Available from: http://tinyurl.com/a672a4k

(14) DeVault ML. Feeding the family: the social organization of caring as gendered work. Chicago: University of Chicago Press; 1991.

(15) van Esterik P. Right to food; right to feed; right to be fed. The intersection of women's rights and the right to food. Agr Hum Values 1999;16(2):225-32.

(16) Food and Agriculture Organization of the United Nations. Agri-gender statistics toolkit: data items [Internet]. Rome: Food and Agriculture Organization. [cited 1 Apr 2012]. Available from: http://www.fao.org/gender/agrigender/agri-gender-toolkit/data-items/en/

(17) Tarasuk V. Household food insecurity with hunger is associated with women's food intakes, health and household circumstances. J Nutr 2001 Oct;131(10):2670-6.

(18) Vozoris N, Tarasuk V. Household food insufficiency is associated with poorer health. J Nutr 2003 Jan;133(1):120-6.

(19) Olson CM. Food insecurity in women: a recipe for unhealthy trade-offs. Top Clin Nutr 2005 Oct/Dec;20(4):321-8.

(20) Olson CM. Nutrition and health outcomes associated with food insecurity and hunger. J Nutr 1999 Feb;129(2S Suppl):521-4.

(21) Adams E, Grummer-Strawn L, Chavez G. Food insecurity is associated with increased risk of obesity in California women. J Nutr 2003 Apr;133(4):1070-4.

(22) Siefert K, Heflin C, Corcoran M, Williams D. Food insufficiency and the physical and mental health of low-income women. Women Health 2001;32(1-2):159-77.

(23) Olson CM, Anderson K, Kiss E, Lawrence FC, Seiling SB. Factors protecting against and contributing to food insecurity among rural families. Family Econ Nutrition Rev 2004;16(1):12-20.

(24) Chilton M, Booth S. Hunger of the body and hunger of the mind: African American women's perceptions of food insecurity, health and violence. J Nutr Educ Behav 2007 May-Jun;39(3):116-25.

(25) McIntyre L, Glanville N, Officer S, Anderson B, Raine K, Dayle J. Food insecurity of low-income lone mothers and their children in Atlantic Canada. Can J Public Health 2002 Nov-Dec;93(6):411-5.

(26) Dinour LM, Bergen D, Yeh M. The food insecurity-obesity paradox: a review of the literature and the role food stamps may play. J Am Diet Assoc 2007 Nov;107(11):1952-61.

(27) Statistics Canada. Household food insecurity, 2007-2008 [Internet]. Ottawa: Statistics Canada; 2010 [cited 1 Apr 2012]. Available from: http://www.statcan.gc.ca/pub/82-625-x/2010001/article/11162-eng.htm

(28) Kirkpatrick SI, McIntyre L, Potestio ML. Child hunger and long-term adverse consequences for health. Arch Pediatr Adolesc Med 2010 Aug;164(8):754-62.

(29) Miller E, Wieneke KM, Murphy JM, Desmond S, Schiff A, Canenguez KM, et al. Child and parental poor health among families at risk for hunger attending a community health center. J Health Care Poor Underserved 2008 May;19(2):550-61.

(30) Roustit C, Hamelin A, Grillo F, Martin J, Chauvin P. Food insecurity: could school food supplementation help break cycles of intergenerational transmission of social inequalities? Pediatrics 2010 Dec;126(6):1174-81.

(31) Ledrou I, Gervais J. Food insecurity. Health Rep 2005 May;16(3):47-51.

(32) Statistics Canada. Labour force survey, March 2012 [Internet]. Ottawa: Statistics Canada; 5 Apr 2012 [cited 17 Apr 2012]. Available from: http://www.statcan.gc.ca/daily-quotidien/120405/dq120405a-eng.htm

(33) Sharkey JR, Johnson CM, Dean WR. Food access and perceptions of the community and household food environment as correlates of fruit and vegetable intake among rural seniors. BMC Geriatr 2010 Jun 2;10:32.

(34) Kim K, Frongillo EA. Participation in food assistance programs modifies the relation of food insecurity with weight and depression in elders. J Nutr 2007 Apr;137(4):1005-10.

(35) Green RJ, Williams PL, Johnson CS, Blum I. Can Canadian seniors on public pensions afford a nutritious diet? Can J Aging 2008 Spring;27(1):69-79.

(36) Liese AD, Weis KE, Pluto D, Smith E, Lawson A. Food store types, availability, and cost of foods in a rural environment. J Am Diet Assoc 2007 Nov;107(11):1916-23.

(37) Sharkey JR, Horel S. Neighborhood socioeconomic deprivation and minority composition are associated with better potential spatial access to the ground-truthed food environment in a large rural area. J Nutr 2008 Mar;138(3):620-7.

(38) Martin, DH. Food stories: a Labrador Inuit-Metis community speaks about global change [dissertation]. Halifax: Dalhousie University; 2009.

(39) Beaumier MC, Ford JD. Food insecurity among Inuit women exacerbated by socio-economic stresses and climate change. Can J Public Health 2010 May-Jun;101(3):196-201.

(40) Larsen K, Gilliland J. Mapping the evolution of 'food deserts' in a Canadian city: supermarket accessibility in London, Ontario, 1961-2005. Int J Health Geogr 2008 Apr 18;7:16.

(41) Morland K, Wing S, Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. Am J Prev Med 2002 Jan;22(1):23-9.

(42) Smoyer-Tomic KE, Spence JC, Amrhein C. Food deserts in the prairies? Supermarket accessibility and neighborhood need in Edmonton, Canada. Prof Geog 2006 Aug;58(3):307-26.

(43) Meldrum L, Willows N. Food insecurity in university students receiving financial aid. Can J Diet Pract Res 2006 Spring;67(1):43-6.

(44) Statistics Canada. British Columbia (code59) [table]: 2006 community profiles. 2006 census. Statistics Canada catalogue no. 92-591-XWE [Internet]. Ottawa: Statistics Canada; 13 Mar 2007 [cited 1 Apr 2012]. Available from: http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E

(45) Statistics Canada. Women in Canada: a gender-based statistical report. Ottawa: Statistics Canada; 2011.

(46) Donner L, Isfeld H, Haworth-Brockman MJ, Forsey C. A profile of women's health in Manitoba. Winnipeg: Prairie Women's Health Centre of Excellence; 2008.

(47) Haworth-Brockman MJ, Isfeld H, Pederson A, Clow B, Liwander A, Kinniburgh BA, editors. Careful measures: an exploration of the sex and gender dimensions of a deprivation index. Vancouver: British Columbia Centre of Excellence for Women's Health; 2011.

(48) Che J, Chen J. Food insecurity in Canadian households. Health Rep 2001 Aug;12(4): 11-22.

(49) Townson, M. Women's poverty and the recession. Ottawa: Canadian Centre for Policy Alternatives; 2009.

(50) Statistics Canada. Earnings and incomes of Canadians over the past quarter century, 2006 census: earnings [Internet]. Ottawa: Statistics Canada; 2008 [cited 20 May 2012]. Available from: http://www12.statcan.ca/census-recensement/2006/as-sa/97-563/p10-eng.cfm

(51) Catalyst. Catalyst quick take: Canadian women [Internet]. 2012 [cited 20 Mar 2012]. Available from http://www.catalyst.org/knowledge/canadian-women

(52) The Conference Board of Canada. Gender income gap [Internet]. n.d. [cited 15 Mar 2012]. Available from: http://www.conferenceboard.ca/hcp/details/society/gender-income-gap.aspx

(53) Statistics Canada. General social survey: an overview, 2009. Ottawa: Social and Aboriginal Statistics Division, Statistics Canada; 2009.

(54) Kirkpatrick S, Tarasuk V. The relationship between low income and household food expenditure patterns in Canada. Public Health Nutr 2003 Sep;6(6):589-97.

(55) Statistics Canada. Definitions [Internet]. Ottawa: Statistics Canada; 2010 [cited 17 Apr 2012]. Available from: http://www.statcan.gc.ca/pub/85-002-x/2010001/definitions-eng.htm

(56) Mikkonen J, Raphael D. Social determinants of health: the Canadian facts. Toronto: York University School of Health Policy and Management; 2010.

(57) Willows ND, Veugelers P, Raine K, Kuhle S. Prevalence and sociodemographic risk factors related to household food security in Aboriginal peoples in Canada. Public Health Nutr 2009 Aug;12(8):1150-6.

(58) Lambden J, Receveur O, Marshall J, Kuhnlein HV. Traditional and market food access in Arctic Canada is affected by economic factors. Int J Circumpolar Health 2006 Sep;65(4):331-40.

(59) O'Donnell V, Wallace S. First Nations, Métis and Inuit women. In: Women in Canada: a gender-based statistical report. Ottawa: Statistics Canada; 2011.

(60) Willows N, Veugelers P, Raine K, Kuhle S. Associations between household food insecurity and health outcomes in the Aboriginal population (excluding reserves). Health Rep 2011 Jun;22(2):15-20.

(61) Power EM. Conceptualizing food security for aboriginal people in Canada. Can J Public Health 2008 Mar-Apr;99(2):95-7.

(62) Hanson Y. Recipes for food insecurity: women's stories from Saskatchewan. Winnipeg: Prairie Women's Health Centre of Excellence; 2011.

(63) Chui T. Immigrant women. In: Women in Canada: a gender-based statistical report. Ottawa: Statistics Canada; 2011.

(64) Irwin JD, Ng VK, Rush TJ, Nguyen C, He M. Can food banks sustain nutrient requirements? A case study in Southwestern Ontario. Can J Public Health 2007 Jan-Feb;98(1):17-20.

(65) National Council of Welfare. Poverty profile: a special edition: a snapshot of racialized poverty in Canada. Ottawa: National Council of Welfare; 2012.

(66) Franklin B, Jones A, Love D, Puckett S, Macklin J, White-Means S. Exploring mediators of food insecurity and obesity: a review of recent literature. J Community Health 2012 Feb;37(1):253-64.

(67) Holben DH, Pheley AM. Diabetes risk and obesity in food-insecure households in rural Appalachian Ohio. Prev Chronic Dis 2006 Jul;3(3):A82.

(68) Laraia BA, Siega-Riz AM, Gundersen C. Household food insecurity is associated with self-reported pregravid weight status, gestational weight gain, and pregnancy complications. J Am Diet Assoc 2010 May;110(5):692-701.

(69) Hanson KL, Sobal J, Frongillo EA. Gender and marital status clarify associations between food insecurity and body weight. J Nutr 2007 Jun;137(6):1460-5.

(70) Townsend M, Peerson J, Love B, Achterberg C, Murphy S. Food insecurity is positively related to overweight in women. J Nutr 2001 Jun;131(6):1738-45.

(71) Matheson FI, Moineddin R, Glazier RH. The weight of place: a multilevel analysis of gender, neighborhood material deprivation, and body mass index among Canadian adults. Soc Sci Med 2008 Feb;66(3):675-90.

(72) Ball K, Mishra G, Crawford D. Which aspects of socioeconomic status are related to obesity among men and women? Int J Obes Metab Disord 2002 Apr;26(4):559-65.

(73) Burns C, Gibbon P, Boak R, Baudinette S, Dunbar J. Food cost and availability in a rural setting in Australia. Rural Remote Health 2004 Oct-Dec;4(4):311.

(74) Dietz W. Does hunger cause obesity? Pediatrics 1995 May;95(5):766-7.

(75) Policy J, Herman CP. Dieting and binging: a causal analysis. Am Psychol 1985 Feb;40(2):193-201.

(76) Terrell A, Drew C, Vargas R. Is food insecurity associated with chronic disease and chronic disease control? Ethn Dis 2009 Summer;19:S3-3-6.

(77) Gucciardi E, Vogt JA, DeMelo M, Stewart DE. Exploration of the relationship between household food insecurity and diabetes in Canada. Diabetes Care 2009 Dec;32(12):2218-24.

(78) Shannon K, Kerr T, Milloy MJ, Anema A, Zhang R, Montaner JSG, et al. Severe food insecurity is associated with elevated unprotected sex among HIV-seropositive injection drug users independent of HAART use. AIDS 2011 Oct 23;25(16):2037-42.

(79) Normen L, Chan K, Braitstein P, Anema A, Bondy G, Montaner J, et al. Food insecurity and hunger are prevalent among HIV-positive individuals in British Columbia, Canada. J Nutr 2005 Apr;135(4):820-5.

(80) Anema A, Wood E, Weiser SD, Qi J, Montaner JSG, Kerr T. Hunger and associated harms among injection drug users in an urban Canadian setting. Subst Abuse Treat Prev Policy 2010 Aug 26;5:20.

(81) Werb D, Kerr T, Zhang R, Montaner JSG, Wood E. Methamphetamine use and malnutrition among street-involved youth. Harm Reduct J 2010 Mar 8;7:5.

(82) Armour BS, Pitts MM, Lee C. Cigarette smoking and food insecurity among low-income families in the United States, 2001. Am J Health Promot 2008 Jul-Aug;22(6):386-92.

(83) Tarasuk V, Dachner N, Poland B, Gaetz S. Food deprivation is integral to the 'hand to mouth' existence of homeless youths in Toronto. Public Health Nutr 2009 Sep;12(9):1437-42.

(84) Dachner N, Gaetz S, Poland B, Tarasuk V. An ethnographic study of meal programs for homeless and under-housed individuals in Toronto. J Health Care Poor Underserved 2009 Aug;20(3):846-53.

(85) Riches G. Food banks and food security: welfare reform, human rights and social policy. Lessons from Canada? Soc Policy Admin 2002 Dec;36(6):648-63.

(86) Food Banks Canada. HungerCount 2010. Toronto: Food Banks Canada; 2010.

(87) Tarasuk V. A critical examination of community-based responses to household food insecurity in Canada. Health Educ Behav 2001 Aug;28(4):487-99.

(88) Tsang S, Holt AM, Azevedo E. An assessment of the barriers to accessing food among food-insecure people in Cobourg, Ontario. Chronic Dis Inj Can 2011 Jun;31(3):121-8.

(89) Bocskei EM, Ostry AS. Charitable food programs in Victoria, BC. Can J Diet Pract Res 2010 Spring;71(1):46-8.

(90) Rock M, McIntyre L, Rondeau K. Discomforting comfort foods: stirring the pot on Kraft Dinner® and social inequality in Canada. Agric Hum Values 2009;26(3):167-76.

(91) Starkey L, Kuhnlein H. Montreal food bank users' intakes compared with recommendations of Canada's Food Guide to Healthy Eating. Can J Diet Pract Res 2000 Summer;61(2):73-5.

(92) Teron A, Tarasuk V. Charitable food assistance: what are food bank users receiving? Can J Public Health 1999 Nov-Dec;90(6):382-4.

(93) Tarasuk V, Beaton G. Household food insecurity and hunger among families using food banks. Can J Public Health 1999 Mar-Apr;90(2):109-13.

(94) Tarasuk V, Eakin J. Food assistance through surplus food: insights from an ethnographic study of food bank work. Agric Hum Values 2005;22:177-86.

(95) McLaughlin C, Tarasuk V, Kreiger N. An examination of at-home food preparation activity among low-income, food-insecure women. J Am Diet Assoc 2003 Nov;103(11):1506-12.

(96) Engler-Stringer R, Berenbaum S. Collective kitchens in Canada: a review of the literature. Can J Diet Pract Res 2005 Winter;66(4):246-51.

(97) Tarasuk V, Reynolds R. A qualitative study of community kitchens as a response to income-related food insecurity. Can J Diet Pract Res 1999 Spring;60(1):11-6.

(98) G. Ripat. Community kitchens in Winnipeg: people cooking together, building community together [dissertation]. Winnipeg: University of Manitoba; 1998.

(99) Kirkpatrick SI, Tarasuk V. Food insecurity in Canada: considerations for monitoring. Can J Public Health 2008 Jul-Aug;99(4):324-7.

(100) Rose D. Economic determinants and dietary considerations of food insecurity in the United States. J Nutr 1999 Feb;129(2S Suppl):517-20.

(101) Gehi P, Arkles G. Unraveling injustice: race and class impact of Medicaid exclusions of transition-related health care for transgender people. Sex Res Social Policy 2007 Dec;4(4):7-35.

(102) Bauer G, Hammond R, Travers R, Kaay M, Hohenadel KM, Boyce M. “I don’t think this is theoretical; this is our lives”: how erasure impacts health care for transgender people. J Assoc Nurses AIDS Care 2009 Sep-Oct;20(5):348-61.

(103) First Nations Information Governance Centre. First Nations regional health survey (RHS) 2008/10: national report on adults, youth and children living in First Nations communities. Ottawa: First Nations Information Governance Centre; 2012.

Physical Activity

Ann Pederson, Anna Liwander and Wendy Rice

Wen and Wu (1) recently argued that physical inactivity is second only to tobacco as a major threat to health worldwide. They also argue that today "being inactive is perceived as normal" and lack of exercise is viewed as a "personal choice" rather than a practice requiring medical attention and concerted public policy intervention (1), making it challenging for researchers, public health advocates and policy makers to garner attention and resources to address physical inactivity.

Regular participation in physical activity has been associated with numerous positive health effects for women, including reduced risk of Type 2 diabetes, osteoarthritis, osteoporosis, obesity, some cancers, coronary heart disease, dementia, depression, stress and anxiety (4, 5). Physical activity can also improve balance, flexibility, posture, and mobility and there is evidence to suggest the benefits of physical activity may also extend to greater job satisfaction and improved cognitive functioning (4, 6-8). For the elderly, physical activity has been associated with improved quality of life (9, 10) and for children and youth, physical activity is associated with higher levels of self-esteem as well as reduced risk of anxiety and stress (11). Research also suggests that physical activity may be one of the practices that women can engage in to reduce the risk of breast cancer (5, 12).

The *Integrated Pan-Canadian Healthy Living Strategy* (13) identified physical activity as one of the first areas of action to improve chronic disease prevention and promote good health, setting a goal of a 20% increase in the proportion of Canadians who participate in regular physical activity by 2015. In 2005, when the *Strategy* was released, 50.1% of women where considered "moderately active" or "active" in their leisure-time. Six years later, in 2011, the rates had increased to 52.3% (age-standardized rates) (14).

Much survey research in Canada on physical activity has relied upon self-reporting and focused on leisure-time activity but more recent studies have broadened their questions to also include physical activity performed in the workplace and through transportation such as walking or cycling. Researchers have also introduced the use of electronic monitoring devices—accelerometers and pedometers—to help quantify participation in physical activity as a means to validate or replace self-reports. Despite this broadened frame for

Physical activity has been associated with numerous positive health effects, including reduced risk of Type 2 diabetes, osteoarthritis, osteoporosis, obesity, some cancers, coronary heart disease, dementia, depression, stress and anxiety. Physical activity may be one of the practices that women can engage in to reduce the risk of breast cancer.

conceptualizing physical activity and these enhancements in measuring it, many women in Canada are not necessarily sufficiently active to achieve the health benefits that have been associated with physical activity. The public health and policy challenge is therefore how to support more women to be physically active and to be active at a sufficient level of intensity to benefit their health.

Women's overall engagement in physical activity is likely a function of many factors, including women's preferences for particular forms of leisure-time activities such as walking and gardening, current norms for how girls and women spend their time (that is, attending school, working, and/or caregiving) and how active those settings are, combined with the barriers that girls and women face in securing opportunities for safe, affordable and enjoyable recreation (15-17). Further, some women are more physically active than others, whether as function of resources, opportunities, geography or preference. From a public policy perspective, it is important to understand both aggregate and sub-group experiences of physical activity in order to devise strategies to increase girls' and women's levels of physical activity. Moreover, new research is emerging that we need to look not only at physical activity per se if we want to improve women's health but also to consider how the study of sedentary behaviour—the subject of another chapter in this profile—may enhance public health efforts to increase physical activity among women in Canada.

*"The broad components of **physical activity** are occupational, transport, domestic, and leisure time, which consists of exercise, sport, and unstructured recreation. Most sports contribute to overall physical activity but someone can be very physically active through occupational labour, domestic tasks, or active transport without engaging in sport or exercise" (18)*

In this chapter, we outline definitions and measures of physical activity and present the results of our analyses of the Canadian Community Health Survey (CCHS), Canadian Health Measures Survey (CHMS) and published reports on rates, trends and the nature of girls and women's physical activities, as well as reported barriers to participating in physical activity. We also consider current policy and practice related to physical activity and how physical activity is associated with other dimensions of healthy living, including body weight, healthy eating and substance use.

Defining Physical Activity

Physical activity is "movement that increases heart rate and breathing" and "any bodily movement produced by skeletal muscles that requires energy expenditure" (3). Extending this point, Khan and colleagues (18) recently proposed that "The broad components of *physical activity* [our emphasis] are occupational, transport, domestic, and leisure time, which consists of exercise, sport, and unstructured recreation. Most sports contribute to overall physical activity but someone can be very physically active through occupational

labour, domestic tasks, or active transport without engaging in sport or exercise" (18). In this framework, *exercise* has the specific features of "planned, structured and repetitive bodily movement, the objective of which is to improve or maintain physical fitness" (18) whereas *sport* is a "subset of exercise that can be undertaken individually or as a part of a team. Participants adhere to a common set of rules or expectations, and a defined goal exists" (18). These distinctions between physical activity, exercise and sport establish a common framework for those working to understand physical activity through research and/or foster physical activity through policies and programs.

Within this overall conceptual framework, participation in physical activity can be further characterized according to its *duration* (i.e., length of time in which an activity is performed) and *frequency* (i.e., number of times an activity is performed) which can be combined to generate a measure of *intensity* or *energy expenditure* (e.g., rate at which activity is being performed or the magnitude of the effort required to perform an activity) (3). Participation can also be categorized according to *type of activity* (e.g., walking, cycling, dancing) and *when* it occurs (i.e., leisure-time, at work, transportation etc.). When combined, these elements provide the basis for determining whether a person is sufficiently active to achieve health benefits.

Measuring Physical Activity

In this chapter, we report on our analyses of sex-disaggregated data from the Canadian Community Health Survey (CCHS) 2005 and 2007/2008 and the Canadian Health Measures Survey (CHMS) 2007-2009 to describe women's participation in physical activity. The CCHS measures both leisure-time physical activity and active transportation through self-reporting. The survey focuses on the types of physical activities that Canadians have participated in during the past 3 months, whether they walk or bike to work and the frequency and duration of these activities. Two indices—one for leisure-time physical activities only and one that combines leisure-time and transportation—are derived from the CCHS to categorize Canadians as "active", "moderately active" or "inactive" based on their average daily energy expenditure values (kcal/kg/day) over the past three months.[1] The three categories are differentiated as:

[1] For each leisure time physical activity engaged in by the respondent, an average daily energy expenditure is calculated by multiplying the number of times the activity was performed by the average duration of the activity by the energy cost (kilocalories per kilogram of body weight per hour) of the activity. The index is calculated as the sum of the average daily energy expenditures of all activities.

Physically active: using 3 or more kilocalories per kilogram of body weight per day (for example, walking an hour or jogging 20 minutes a day).

Moderately active: using 1.5 to less than 3 kilocalories per kilogram of body weight per day (for example, walking 30 to 60 minutes a day or taking an hour-long exercise class three times a week).

Physically inactive: using less than 1.5 kilocalories per kilogram of body weight per day (for example, walking less than half an hour a day) (2).

When the *Integrated Pan-Canadian Healthy Living Strategy* (13) was released in 2005, the focus was to increase the proportion of Canadians who were physically active based on a benchmark of 30 minutes per day of moderate-to-vigorous physical activity, consistent with the recommended physical activity guideline at the time (2). More recently, the Canadian Society for Exercise Physiology (CSEP) released the *Canadian Physical Activity Guidelines* (3) suggesting that Canadians should engage in 150 minutes of moderate-to-vigorous physical activity per week in bouts of at least 10 minutes to achieve substantial health benefits. CSEP names two categories to describe the relative intensity of the physical activity that someone should participate in:

Moderate intensity physical activity: 3.0-5.9 times the intensity of rest for adults (for example, brisk walking 3 miles per hour or faster, water aerobics, general gardening, bicycling slower than 10 miles per hour)

Vigorous intensity physical activity*:* 6.0 or more times the intensity of rest for adults (for example, running, swimming laps, aerobic dancing, heavy gardening, hiking uphill or with a heavy backpack) (3).

Despite the fact that the new guidelines have lowered the weekly physical activity benchmark from 210 minutes to 150 minutes per week, most women are still not engaging in enough physical activity. The new guidelines, however, have given women more flexibility within the week to engage in physical activity as they no longer need to meet daily benchmarks but weekly ones.

The other main data source in this chapter is the Canadian Health Measures Survey (CHMS) which used accelerometer data collected by a waterproof activity monitor to record information about participants' physical activity patterns. Participants wore the device for a week at all times except when sleeping (19) and accelerometer signals were translated into steps accumulated per minute. Although the use of accelerometers may reduce the risk of recall bias and social desirability bias (which can be problematic in surveys relying on self-reports such as the CCHS) (2), accelerometer data may fail to capture all upper body movements so activities such as lifting or gardening may be missed.

Light-intensity activities (including walking slowly and gardening) were not included in the *Integrated Pan-Canadian Healthy Living Strategy* nor the *Canadian Physical Activity Guidelines* from CSEP, despite the fact that these activities may also have positive health benefits (20-22). From the perspective of this profile, we are particularly interested in the contribution of light-intensity activities to women's health because there are indications that women may be more likely to participate in light-to-moderate-intensity activities than vigorous-intensity activities (23-26). Women with young children, for example, often engage in light-to-moderate physical activities sporadically throughout the day and are often multi-tasking, which may make it challenging for them to remember their activities and to report them, in contrast to recalling planned, vigorous-intensity physical activities (11, 27, 28). Xue et al. (22) argue that it is particularly important to encourage light-to-moderate physical activity among older women as "most of the decline in physical activity in older women was due to a decrease in walking and doing household chores rather than regular exercise" (22).

Forsey and Haworth-Brockman (29) have also offered a critique of the use of the term "moderate" based on an analysis of physical activity among women in Manitoba. They are critical of the use of the term "moderate" to "describe both an individual's activity *level* (moderately active) and the *intensity* of an activity (moderate effort)" when the term moderate is used to denote not enough activity according to the *Physical Activity Guideline* requirements, but it is sufficient for the intensity. Forsey and Haworth-Brockman also argue that the CCHS overlooks "the breadth and diversity of activities that Canadians and Manitobans perform in their lives" (29) and that there are other surveys that offer a more comprehensive conceptualization of physical activity and that use clearer measurements, such as the Manitoba *In Motion* survey (29, 30). This survey adopts a conceptual framework that includes *all* activities performed throughout the day, including activities performed at work, school and at home (29) and may therefore provide a better estimate of women's actual participation in physical activity.

Population surveys that only focus on certain intensity levels (such as moderate-to-vigorous) or focus on activities conducted during a certain time of the day (such as leisure-time) are likely to miss out on rich data related to how women actually live, and could potentially mislabel women as inactive when some women's day-to-day activities in fact may make them more active than they appear in such surveys (29). Pate et al. (31) have illustrated this point by using accelerometer data to compare energy expenditures between two people with different activity patterns. Their analysis showed that the first person participated in light-intensity physical activities for 75% of the time that she was monitored and spent the remaining 25% of the time sedentary (e.g., sitting), while the second person participated in one hour of moderate-to-vigorous physical activity but spent 70% of the time sedentary and 23% in light activities. According to measures of physical activity that track primarily moderate-to-vigorous activities, the second person would be deemed physically active while the first person would be classified as sedentary. When comparing metabolic equivalent units[2] (MET), however, the results show that the first person, who was considered sedentary, actually had a higher energy expenditure than the person who was considered active (31). This scenario may be particularly important for correctly understanding the level of activity among girls and women and it is therefore important to bear these potential limitations in mind when reviewing data on physical activity.

Women and Physical Activity in Canada

This section describes women's physical activity during leisure-time, their most common activities, women's participation in active transportation, such as walking or cycling to work and school, occupational activities and whether women have access to fitness facilities in or near the workplace.

Active: walking an hour or jogging 20 minutes per day.

Moderately active: walking 30-60 minutes per day or taking an hour-long exercise class three times a week (2).

Women's Participation in Leisure-time Physical Activity

Our analysis of the CCHS (2007/2008) indicates that the overwhelming majority of women in Canada self-reported participation in some kind of leisure-time physical activity in the three months prior to the survey: 90.8% (95% confidence interval [CI], 90.5-91.2). To achieve health benefits, however, policy makers and public health researchers are concerned not only whether women are active at all but whether they are active at a sufficient level of intensity. Published results from the CCHS by Statistics Canada suggest that the percentage of women who are considered "moderately active" or "active" in their leisure-time has slightly increased since 2003 when 48.9% of women reported

[2] Metabolic equivalent units (MET) is the ratio of a person's working metabolic rate relative to their resting metabolic rate. One MET is the energy cost of resting quietly (31).

being moderately active or active. In 2011, 52.3% (95% CI, 51.3-53.2) of Canadian women were moderately active or active in their leisure-time (age-standardized rates) (14).

Results from the CCHS (2007/2008) show that 22.6% (95% CI, 22.1-23.1) of women in Canada were considered active and 24.6% (95% CI, 24.1-25.1) moderately active in their leisure time. Young women (12-17 years) were most likely to report being active and the rates decrease proportionally with age. The percentage of women being moderately active, however, remained fairly stable across age groups but a decrease can be noted among women aged 75 years and older, where 12.2% (95% CI, 10.7-13.7) of women aged 75-79 years were active and 19.9% (95% CI, 18.0-21.8) moderately active.

Women in British Columbia, Alberta and Manitoba had the highest percentage of women identified as being active whilst women in Quebec and Newfoundland and Labrador were least likely to report this. Merchant and colleagues (2007) studied seasonal variation and physical activity and found that Canadians are more likely to participate in regular physical activity if the weather is dry and moderate. The strongest relationship between seasonal variations and physical activity was found in Saskatchewan and British Columbia and the weakest in Newfoundland and Labrador. Physical activity rates can also be influenced by the built environment in different provinces and territories as physical activity is associated with walkability, residential density and access to fitness facilities (32).

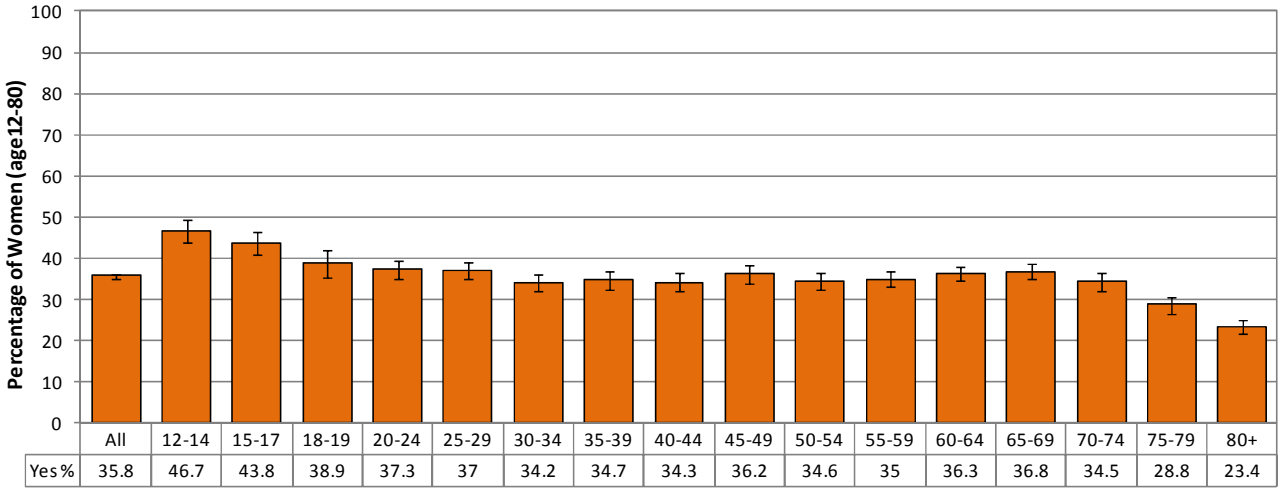
Being active is also associated with income and women in higher income groups are more likely to report being active or moderately active than women in lower income groups. More than 30% (31.7%; 95% CI, 29.5-33.8) of women in the highest income decile reported being active in 2007/2008 according to the CCHS, compared to only 18.2% (95% CI, 16.9-19.5) of women in the lowest income decile. It is not entirely clear how income is associated with activity levels but an analysis by Gordon-Larsen et al. (2006) which assessed the geographic and social distribution of physical activity facilities, found that people with lower socio-economic status have less access to facilities, which in turn was associated with decreased physical activity (33). Spinney and Millward (34) suggest both income and time deprivation (not having enough time to do the things one needs to do) can contribute to low levels of physical activity but that time poverty is a greater barrier to participation in physical activity than income.

The association between education and being active is less clear in our analysis of the CCHS (2007/2008), where women with less than high school education were as likely as women with post-secondary education to report being active, but women with post-secondary education were somewhat more likely to report being moderately active. Similarly, no differences were noted when comparing the percentage of non-Aboriginal and off-reserve Aboriginal women that were active and moderately active in the CCHS 2007/2008.

Daily Leisure-time Physical Activity

Our analysis of the CCHS (2007/2008) suggests that 35.8% (95% CI, 35.2-36.3) of women in Canada reported participating in leisure-time physical activity lasting over 15 minutes per occasion (based on a one-month average of data reported for a 3-month period). Younger women were somewhat more likely to report participation in more than 15 minutes of leisure-time physical activity than older women. There was also a significant decline in participation rates when comparing girls aged 15-17 years (43.8%; 95% CI, 41.1-46.6) with young women aged 20-24 years (37.3%; 95% CI, 35.1-39.5). Another drop in participation rates was noted between the ages 25-29 years and 30-34 years, which may signal changes in commitments during childbearing years and early motherhood for many women in Canada. A marked decline was also noted among women aged 70 years and older (Figure 1).

Figure 1. Participate in Daily Leisure Time Physical Activity For More Than 15 Minutes, by Age Women in Canada, 2007/2008

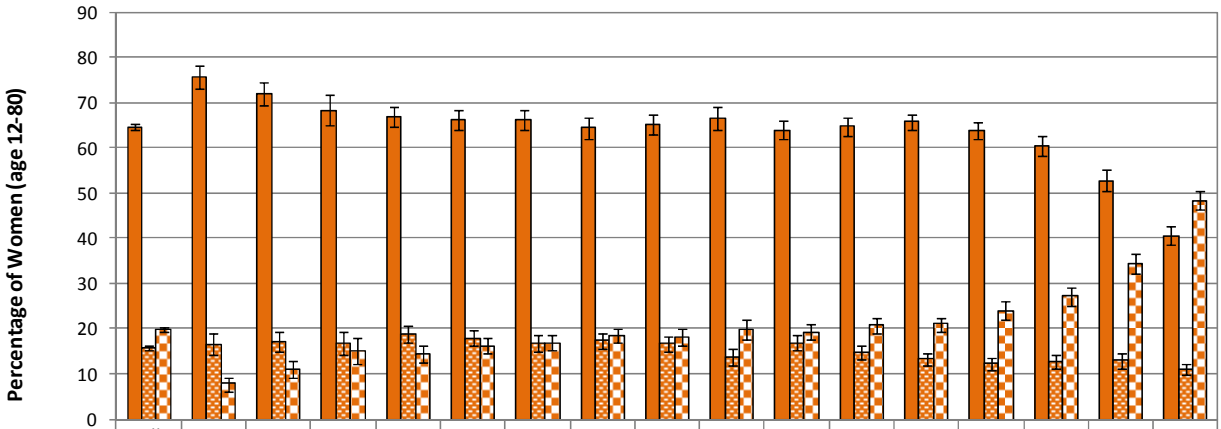


	All	12-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Yes %	35.8	46.7	43.8	38.9	37.3	37	34.2	34.7	34.3	36.2	34.6	35	36.3	36.8	34.5	28.8	23.4

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 1.6%.

Although 35.8% (95% CI, 35.2-36.3) of women reported participating in leisure-time physical activity lasting more than 15 minutes, not all women reported being active on a regular basis. Results from the CCHS (2007/2008) suggest that 64.6% (95% CI, 64.0-65.2) of women in Canada reported doing this regularly, 15.7% (95% CI, 15.2-16.1) occasionally and 19.7% (95% CI, 19.2-20.2) infrequently. The proportion of women reporting regular participation in 15 minutes of leisure-time physical activity per day declined gradually with age (Figure 2).

Figure 2. Frequency of Participation in Leisure Time Physical Activity Longer than 15 Minutes, by Age Women in Canada, 2007/2008



	All	12-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Regularly %	64.6	75.7	71.8	68.2	66.8	66.2	66.2	64.3	65.3	66.4	63.9	64.7	65.7	63.8	60.3	52.7	40.6
Occasionally %	15.7	16.5	17.1	16.7	18.8	17.8	16.9	17.3	16.6	13.8	16.9	14.6	13.3	12.2	12.6	12.9	11
Infrequently %	19.7	7.8	11.1	15.1	14.3	16.1	16.9	18.5	18.2	19.8	19.2	20.7	21	24	27.1	34.4	48.3

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 1.6%.

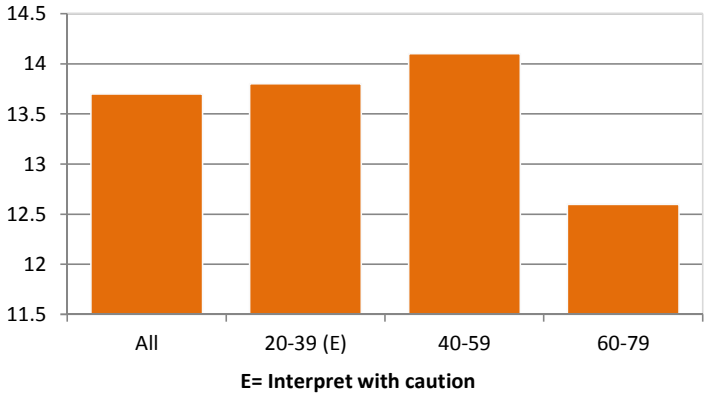
Together, these analyses suggest that while most women in Canada engage in some physical activity during their leisure-time, only a small proportion do so for more than 15 minutes per day and even fewer women participate in more than 15 minutes of physical activity per day *regularly*.

Weekly Physical Activity

The recently published *Canadian Physical Activity Guidelines* (3) set a weekly benchmark for physical activity for adults of 150 minutes of moderate-to-vigorous physical activity per week in bouts of 10 minutes or more in order to attain health benefits. Although previous guidelines had set daily recommendations for physical activity, CSEP decided to change the daily reference to a weekly reference in order to reflect "the aggregated evidence more precisely" (35). CSEP argues that recommendations for "weekly physical activity also carries the inherent advantage of being flexible, allowing a variety of individual approaches to meet the recommendation" (35).

Accelerometer results from the CHMS indicate that women's participation in physical activity seldom meets these weekly guidelines. In fact, CHMS results from 2007-2009 published by Colley et al. (36) suggest that these guidelines *may be met by fewer than 14% of women in Canada* aged 20-79 years (13.7%; 95% CI, 10.1-17.3) (Figure 3).

Figure 3. Attaining more than 150 minutes a week of moderate-to-vigorous physical activity accumulated in bouts of at least 10 minutes, by Age Women in Canada, 2007-2009

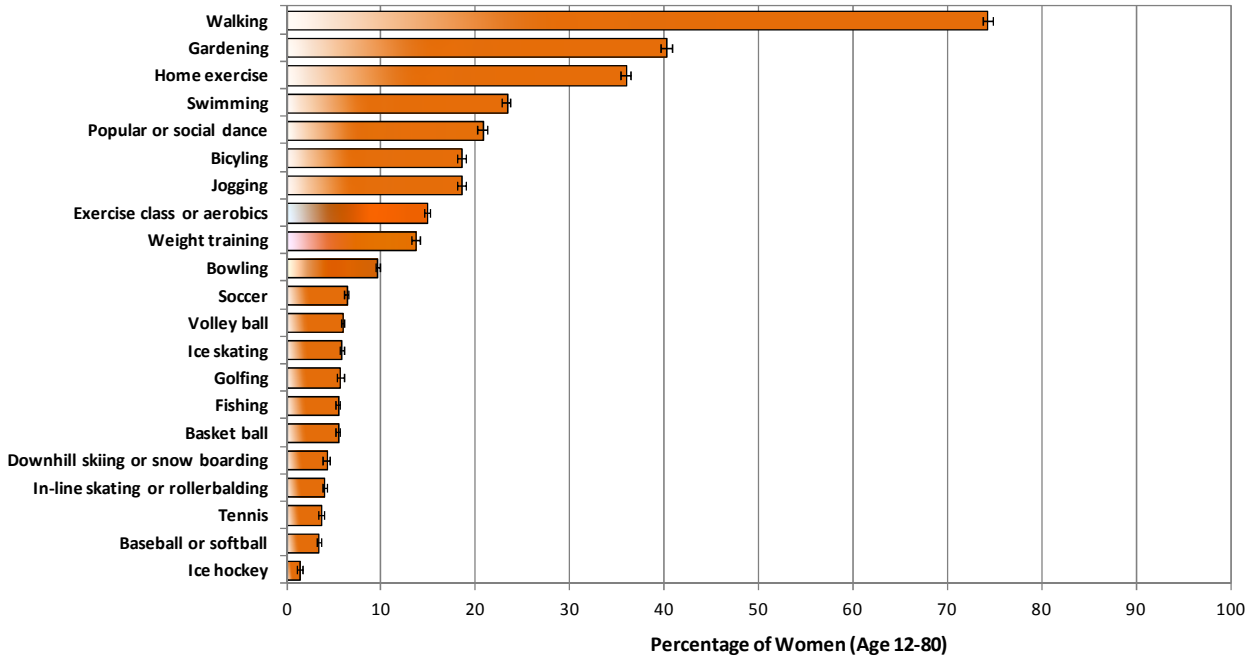


SOURCE: Canadian Health Measures Survey 2007-2009 (36). "E" =Interpret these results with caution

Women's Most Common Leisure-time Activities

The five most commonly-reported leisure-time physical activities among women in Canada, according to the CCHS (2007/2008), include walking (74.2%; 95% CI, 73.7-74.8), gardening (40.2%; 95% CI, 39.6-40.8), home exercises (35.9%; 95% CI, 35.3-36.4), swimming (23.3%; 95% CI, 22.8-23.8), and dancing (20.8%; 95% CI, 20.3-21.2). Women were less likely to report participating in organized sports such as hockey, baseball/softball, basketball and volleyball (Figure 4).

Figure 4. Types of Leisure Time Physical Activities Participated in Over the Last Three Months Women in Canada, 2007/2008



Source: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 1.6% Note that the categories are not mutually exclusive. Respondents could participate in more than one of these activities.

According to an analysis of the First Nations Regional Longitudinal Health Survey (RHS) conducted in 2008-2010, First Nations women report participation in similar activities, with walking being the most common activity in the past 12 months, followed by gardening, berry picking or food gathering, dancing (including aerobics, traditional and modern dance), and swimming (37).

Active Transportation, Occupational Activities and Physical Activity Facilities at Work

Physical activity can be obtained through more than just leisure-time activities, including through active forms of transportation (such as walking or cycling to work and school or by using other "non-motorized" transportation) (38), while running errands (39), as well as through occupational activities and domestic work (18).

Active transportation could act as a mechanism for reducing disparities in physical activity levels.

Active Transportation

Active transportation can be an important source of daily physical activity but is largely influenced by community design and the 'built environment'. The built environment refers to elements of the physical environment such as sidewalks, bicycle paths and patterns of land usage and how the physical form of communities and transportation systems can influence opportunities for physical activity (40). It includes parks, buildings, and transportation systems and the assessment of whether a space and place is suitable for walking or cycling.

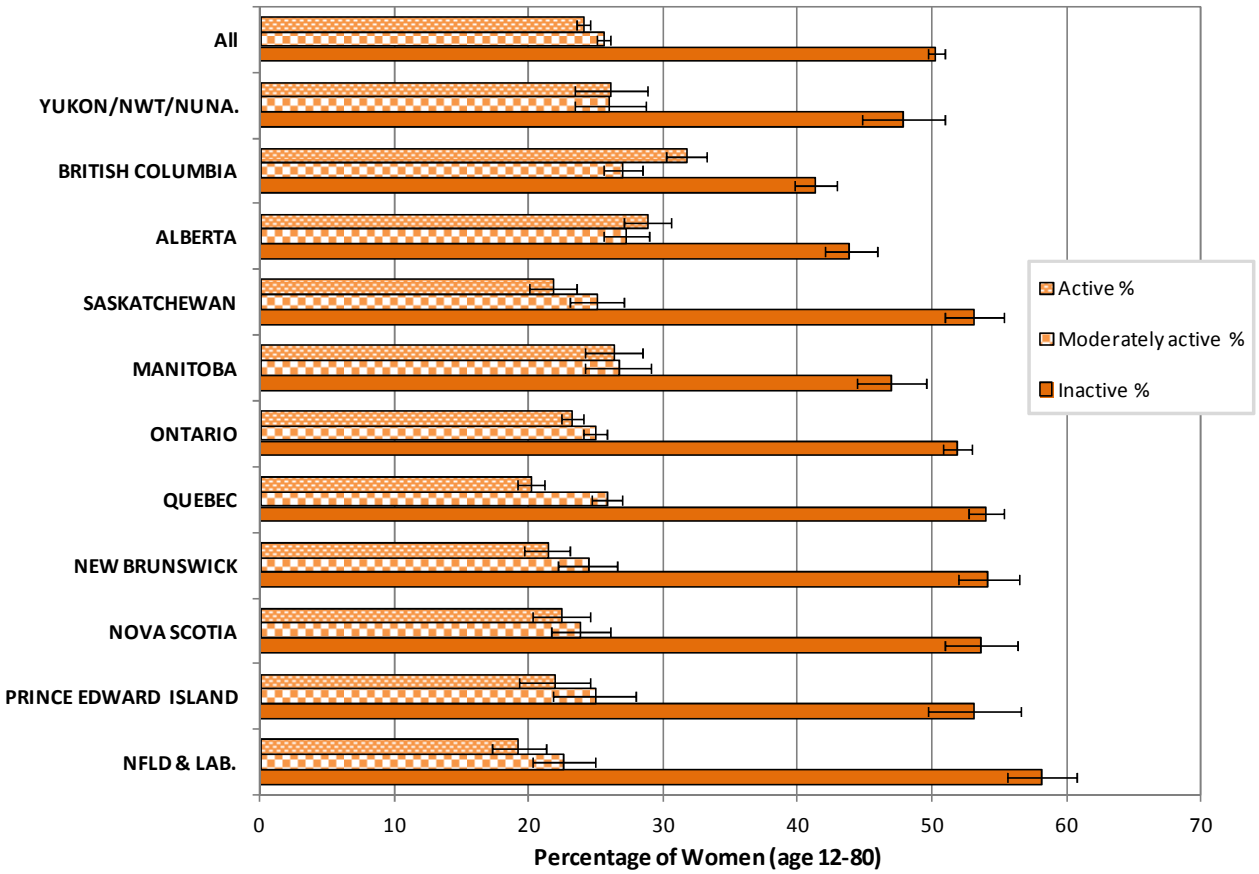
Butler and colleagues (39) suggest that young people and those who are physically active during leisure time are more likely to engage in active transportation (defined as cycling at all and walking 6 or more hours per week to school, work or errands). However, they suggest that active transportation could also act as a mechanism for potentially reducing disparities in physical activity levels (39, 41). For example, they found that low income was highly associated with walking, in contrast to other forms of physical activity in which those with higher income are more likely to participate (39). Investing in infrastructure that facilitates walking and cycling safely could therefore be an important strategy to support participation in physical activity for women living with low income (and others).

Butler et al. (39) also found that women in Canada were more likely to walk (23.02%, 95% CI, 22.54-23.51) than bike (5.7%, 95% CI, 5.43-5.97) to school, work or for errands (39). For women, *walking* was associated with having an income of less than $60,000 a year, being currently in school, being a resident of the urban core, and being active or moderately active in the leisure-time. *Cycling*, on the other hand, was associated with being single, currently in school, having an income of less than $20,000 a year, and being active or moderately active in the leisure-time (39).

In our analysis of **both leisure-time physical activity and transportation** (defined as spending at least 6 hours a week walking or bicycling) from the CCHS (2007/2008), it was found that 91.8% (95% CI, 91.4-92.1) of women in Canada self-reported participation in leisure-time physical activity or transportation. This is a small increase from the proportion of women who reported participation in leisure-time activities only (90.8%; 95% CI, 90.5-91.2). In 2007/2008, 24.1% (95% CI, 23.6-24.6) of women were considered active and 25.6% (95% CI, 25.1-26.1) moderately active when leisure-time activities and transportation were combined, which is also a small increase compared to leisure-time only.

Similarly to participation in leisure-time activities only, young women were more likely to be active than older women when looking at both leisure-time and transportation. Women in British Columbia, Alberta, the three Territories and Manitoba were more likely to report being *active* than the national average. Women in other provinces, however, are below the national average. For example, in British Columbia, 31.7% (95% CI, 30.2-33.2) of women reported being active but only 19.2% (95% CI, 17.2-21.3) of women in Newfoundland and Labrador (Figure 5).

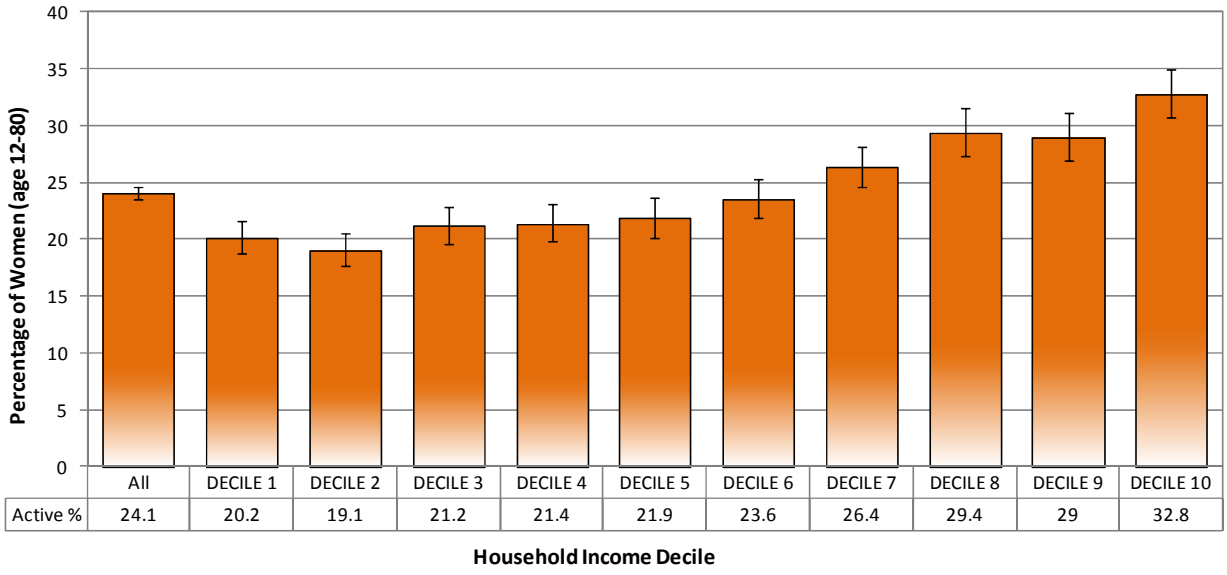
Figure 5. Level of Leisure and Transportation Physical Activity, by Province Women in Canada, 2007/2008



SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 2.0%

Women in high income groups were more likely to be active than women in lower income groups, ranging from 32% (95% CI, 30.7-35.0) of women in income decile 10 (highest) to 20.2% (95% CI, 18.8-21.7) in the lowest income decile (Figure 6).

Figure 6. Percent of Respondents Classified as Active during Leisure-Time and Transportation, By Household Income. Women in Canada, 2007/2008



Source: Canadian Community Health Survey (CCHS), 2007/2008.1
Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 2.2%

Occupational Activities and Availability of Fitness Facilities at Work

Many women in Canada spend a large portion of their workday sitting but some women are physically active at work. Results from the CCHS (2005) as published by Statistics Canada suggest that 8% of women report heavy work or carrying heavy loads as part of their "normal" daily activities. One in four women (25%) report that they usually lift or carry light loads or climb stairs or hills and 42% report that they stand or walk often (42).

A number of health promotion initiatives have focused on increasing physical activity at work. These initiatives range from providing physical activity advice or counselling (43), incentives and rewards, or providing environmental support such as open stairwells or fitness facilities at the workplace (44). In the CCHS (2007/2008) participants were asked whether they have access to fitness facilities at or near their place of work. This included access to a pleasant place to walk, jog, bicycle or rollerblade, playing fields or open spaces for ball games or other sports, a gym or physical fitness facilities, organized fitness classes, any organized recreational sport teams, showers and/or change rooms, as well as access to programs to improve health, physical fitness or nutrition. In 2007/2008, 76.6% (95% CI, 75.8-77.4) of women aged 15-75 years

who worked at a job or business (or who had a job but were absent from work), reported having access to any of these facilities at work. Women at the higher end of the income scale were more likely to have jobs that provided physical activity facilities than women in lower income groups, ranging from 84.7% (95% CI, 82.4-87.0) of women in the highest income decile to 68.9% (95% CI, 65.5-72.4) of women in the lowest income decile (45). Although women report having access to these facilities, it is not clear whether and how often they used them.

Barriers to Women's Participation in Physical Activity

Research (11) suggests that participation in physical activity can be challenging for some women, particularly older women, women living with disabilities and for women with limited access to safe environments and/or affordable facilities where they can be physically active. Women report various barriers to participation in physical activity including individual, social and systematic barriers. Women may experience *socio-economic barriers* (e.g., cost of recreation), *organizational barriers* (e.g., lack of supportive policies and facilities, transportation), *communication barriers* (e.g., information does not reach certain populations), *cultural barriers* (e.g., how physical activity among girls and women is viewed in a particular cultural context) and *gender barriers* (e.g., specific norms about appropriate physical activities based upon sex that impair women's opportunities to engage in certain activities) (15).

A Canadian study identified external factors, personal-influencing factors, community-influencing factors, organizational-supporting factors, and interpersonal supporting factors as barriers to women with low SES engaging in physical activity (15).

Physical activity is a gendered experience. As the CCHS (2007/2008) data illustrate, most women prefer individual activity to team sports, show a preference for walking, dancing and gardening over hockey and baseball, and many women report family responsibilities and lack of time as barriers to participation in physical activity (46-51). Other barriers include volunteer and work commitments, lack of motivation, injuries and other existing health conditions (52). Lack of information and culturally appropriate activities have been reported as barriers among new immigrants, while limited opportunities for physical activity that are tailored for those living on a low income may prevent some women from participating (15). A Canadian study (15) focusing specifically on women with low socio-economic status and their participation in physical activity identified *external factors* (climate, transportation, built environment etc.); *personal influencing factors* (family influence and support, health issues etc.); *community influencing factors* (access to childcare etc.); *internal factors* (fatigue, discrimination, body image, skill level etc.); *organizational supporting factors* (family, professional support etc.); and *interpersonal supporting factors* (friends, champions etc.) as barriers to activity (15).

The social construction of physical activity (and sport, in particular) as a male domain represents another important barrier to women's engagement in physical activity (53). The fact that girls and women are less active than boys and men, and tend to have a strong preference for certain activities, may be an indication that some sports and physical activities are still seen as male domains (54-56) where spaces for female participation are limited. Ideals of the female body and what it means to be "feminine" may also have an impact on women's participation in physical activity (57), as well as issues of safety (58).

Physical Activity Policies and Programs

Policy makers and researchers in Canada have invested in the development and dissemination of guidelines regarding the appropriate intensity and type of physical activity for children, adults and seniors. The Canadian Society for Exercise Physiology (CSEP) collaborated with the Public Health Agency of Canada (PHAC) to undertake a rigorous process to develop *Canadian Physical Activity Guidelines* for children, youth, adults and older adults in 2011 (59-62). Reflecting emerging evidence, these guidelines make the following recommendations for adults:

- To achieve health benefits, adults aged 18-64 years should accumulate at least 150 minutes of moderate-to-vigorous intensity aerobic physical activity per week, in bouts of 10 minutes or more.
- It is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week.
- More physical activity provides greater health benefits (59).

Despite evidence suggesting that girls and women may be less active than boys and men (36) and that physical activity is a gendered experience, the Guidelines are currently gender-neutral and the technical reports used to develop them contend that the recommendations apply equally to girls and women as they do to boys and men (35). While the *Integrated Pan-Canadian Healthy Living Strategy* acknowledged the importance of paying attention to gender in order to reduce disparities among Aboriginal people and other at-risk populations, no sex- or gender-specific goals related to physical activity are proposed. Nor is there much discussion in the *Strategy* of the context in which women live and the gendered barriers they may face related to engaging in physical activity.

Efforts to increase physical activity rates have traditionally focused on encouraging individual girls and women to increase their physical activity by increasing their leisure-time participation in recreation and sport, as opposed to focusing on actions that increase overall physical activity levels in the population by changing the social and physical organization of work, school and play. Individually-oriented approaches

have had limited effect on increasing overall physical activity levels and have led researchers to explore the links between physical activity and the characteristics of the 'built environment' (40, 63-65).

Women, Physical Activity and Healthy Living

Physical activity can be linked to other aspects of women's healthy living including body weights, healthy eating and substance use. Some researchers (66) suggest that physical activity and body weights are associated and that lack of physical activity can increase the risk of obesity, whilst others (67) have questioned this association. A recently published article in *The Lancet* (32) suggests that obesity might, in fact, be a determinant of physical activity and not the other way around, as noted in the discussion of body weights in this profile. Physical activity can also be associated with eating disorders among girls and women. Eating disorders are more common among female athletes and it has been suggested that long training hours combined with a focus on physical aesthetics and performance may contribute to eating disorders among female athletes (11). It has also been suggested that "certain girls and women, who are predisposed to developing an eating disorder, tend to participate in sports that trigger this phenomenon" (11).

Physical activity has also been associated with tobacco use and young women who are physically active are less likely to use tobacco (68). Further, young women who are not active may initiate smoking at an earlier age than those that are physically active (69, 70). Additionally, it has been suggested that physical activity "has the potential to counter the negative health benefits of both smoking (such as heart disease) and smoking cessation (such as weight gain)" (11). Reid and colleagues (11) argue that "For women who are in the process of reducing their consumption of cigarettes, or quitting altogether, physical activity contributes to feelings of well-being by reducing measures of anxiety and depression" (11).

Summary

The majority of women in Canada report participating in some kind of physical activity but most women are insufficiently active given current *Physical Activity Guidelines* from the Canadian Society for Exercise Physiology (3). These guidelines suggest that Canadian adults should engage in 150 minutes of moderate-to-vigorous physical activity per week in bouts of at least 10 minutes to achieve health benefits. In 2007/2009, it was estimated that these guidelines may be met by fewer than 14% of women in Canada aged 20-79 years (36).

The *Integrated Pan-Canadian Health Living Strategy* (13) established a goal of a 20% increase in the proportion of Canadians who participate in regular physical activity by 2015. In 2005, when the *Strategy* was published, 50.1% of women reported being moderately active or active in their leisure-time. Six years later, in 2011, the rates had increased to 52.3% (14).

Some women seem to have greater access to physical activity facilities, which may provide more options for being active, whilst others may experience barriers to participation in physical activity due to lack of financial resources or transportation, time or concerns about safety (15). Some of the most common barriers to participation in physical activity as reported by women include family responsibilities and lack of time (46-51). Regular participation in physical activity is important as it has been associated with numerous positive health effects for women including reduced risk of Type 2 diabetes, osteoarthritis, osteoporosis, obesity, some cancers, coronary heart disease, dementia, depression, stress and anxiety (4, 5). As noted, research (5, 12) also suggests that physical activity may be one of the practices that women can engage in to reduce the risk of breast cancer.

There are several challenges with measuring and conceptualizing physical activity, including the tendency to only report leisure-time physical activity when women in fact engage in many other activities at work, home or through transportation. In this chapter, we have discussed the challenges with focusing on moderate-to-vigorous intensity activities as these measures may fail to provide a complete picture of women's physical activities. There is need for research to address light-intensity activities as well as a need to consider gender in order to improve women's participation in physical activity. Finally, our analyses suggest that the current focus on an individual approach to increasing physical activity among women might be enhanced with greater attention to how the built and social environment could enhance opportunities for women to be active.

References

(1) Wen CP, Wu X. Stressing harms of physical inactivity to promote exercise. The Lancet. 2012;380(9838):192-3.

(2) Statistics Canada. Leisure-time physical activity [Internet]. Ottawa: Statistics Canada; 2010 [cited Sept 19 2011]. Available from: http://www.statcan.gc.ca/pub/82-229-x/2009001/deter/lpa-eng.htm

(3) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines glossary of terms [Internet]. Ottawa: CSEP; 2012 [cited Jun 19 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/PAGuidelinesGlossary_E.pdf

(4) Bhui K, Fletcher A. Common mood and anxiety states: gender differences in the protective effect of physical activity. Soc Psychiatry Psychiatr Epidemiol. 2000;35(1):28-35.

(5) Picard A. Physical activity and health. Canadian Association for the advancement of women and sport and physical activity [Internet]. Ottawa: CAAWS; 2001 [cited 19 Jan 2012]. Available from: http://www.caaws.ca/e/health/article.cfm?id=163

(6) Public Health Agency of Canada. The benefits of physical activity [Internet]. Ottawa: Public Health Agency of Canada; 2007 [cited 15 Dec 2012]. Available from: http://www.phac-aspc.gc.ca/alw-vat/intro/key-cle-eng.php

(7) Fahrenwald NL, Shangreaux P. Physical activity behavior of American Indian mothers. Orthopaedic Nursing. 2006;25(1):22-9.

(8) Cox M. The influence of an employee fitness program upon fitness, productivity, and absenteeism. Ergonomics. 1981;24:795-806.

(9) Pronk NP, Goodman MJ, O'Connor PJ, Martinson BC. Relationship between modifiable health risks and short-term health care charges. JAMA. 1999 Dec;15;282(23):2235-9.

(10) Colditz GA. Economic costs of obesity and inactivity. Medicine and Science in Sports and Exercise. 1999;31(11 Suppl):S663-7.

(11) Reid C, Dyck L, McKay H, Frisby W. The health benefits of physical activity for girls and women literature review and recommendations for future research and policy. Vancouver: British Columbia Centre of Excellence for Women's Health; 2000.

(12) Brown WJ, Burton NW, Rowan PJ. Updating the evidence on physical activity and health in women. American Journal of Preventive Medicine. 2007;33(5):404-11.e25.

(13) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 15 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

(14) Statistics Canada. Health trends [Internet]. Ottawa: Statistics Canada; 2012 [cited 15 Jun 2012]. Available from: http://www12.statcan.gc.ca/health-sante/82-213/index.cfm?Lang=eng

(15) BC Healthy Living Alliance. Physical Activity Strategy. Why don't people participate? [Internet]. Vancouver: BC Healthy Living Alliance; 2012 [cited 19 Jun 2012]. Available from: http://www.physicalactivitystrategy.ca/pdfs/Why_Dont_People_Participate.pdf

(16) Alberta Recreation & Parks Association. Benefits databank [Internet]. 2010 [cited 5 Feb 2012]. Available from: http://benefitshub.ca

(17) Burdette HL, Whitaker RC. A national study of neighborhood safety, outdoor play, television viewing, and obesity in preschool children. Pediatrics. 2005;116(3):657-62.

(18) Khan KM, Thompson AM, Blair SN, Sallis JF, Powell KE, Bull FC, et al. Sport and exercise as contributors to the health of nations. The Lancet. 2012;380(9836):59-64.

(19) Statistics Canada. Canadian health measures survey [Internet]. Ottawa: Statistics Canada [cited 3 Mar 2012]. Available from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5071&lang=en&db=imdb&adm=8&dis=2

(20) Woodcock J, Franco OH, Orsini N, Roberts I. Non-vigorous physical activity and all-cause mortality: systematic review and meta-analysis of cohort studies. International Journal of Epidemiology. 2011;40(1):121-38.

(21) Buman MP, Hekler EB, Haskell WL, Pruitt L, Conway TL, Cain KL, et al. Objective light-intensity physical activity associations with rated health in older adults. American Journal of Epidemiology. 2010;172(10):1155-65.

(22) Xue Q-L, Bandeen-Roche K, Mielenz TJ, Seplaki CL, Szanton SL, Thorpe RJ, et al. Patterns of 12-year change in physical activity levels in community-dwelling older women: can modest levels of physical activity help older women live longer? American Journal of Epidemiology. 2012;176(6):534-43.

(23) Abbey SE, Garfinkel PE. Chronic fatigue syndrome and depression: cause, effect, or covariate. Reviews of Infectious Diseases. 1991;13 Suppl 1:S73-83.

(24) Abel T, Graf N, Niemann S. Gender bias in the assessment of physical activity in population studies. Soz Praventivmed. 2001;46(4):268-72.

(25) Banks-Wallace J, Conn V. Interventions to promote physical activity among African American women. Public Health Nurs. 2002;19(5):321-35.

(26) Ainsworth BE. Challenges in measuring physical activity in women. Exerc Sport Sci Rev. 2000;28(2):93-6.

(27) MacKay LM, Oliver M, Schofield GM. Demographic variations in discrepancies between objective and subjective measures of physical activity. Open Journal of Preventative Medicine. 2011;1(2):13-9.

(28) Collins BS, Miller YD, Marshall AL. Physical activity in women with young children: how can we assess "anything that's not sitting"? Women Health. 2007;45(2):95-116.

(29) Forsey C, Haworth-Brockman M. Profiling physical activity patterns among women in Manitoba: what does “moderate” mean? Statistics Canada's 24th International Methodology Symposium October 28-31, 2008; Ottawa: Statistics Canada; 2009.

(30) Health Leisure and Human Performance Research Institute. In Motion survey. Winnipeg: University of Manitoba; 2007.

(31) Pate RR, O'Neill JR, Lobelo F. The evolving definition of "sedentary". Exercise and Sport Sciences Reviews. 2008;36(4):173-8.

(32) Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJF, Martin BW. Correlates of physical activity: why are some people physically active and others not? The Lancet. 2012;380(9838):258-71.

(33) Gordon-Larsen P, Nelson MC, Page P, Popkin BM. Inequality in the built environment underlies key health disparities in physical activity and obesity. Pediatrics. 2006;117(2):417-24.

(34) Spinney J, Millward H. Time and money: a new look at poverty and the barriers to physical activity in Canada. Social Indicators Research. 2010;99(2):341-56.

(35) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines - background information [Internet]. Ottawa: CSEP; 2011 [cited 5 Mar 2012]. Available from: http://www.csep.ca/guidelines

(36) Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian adults: Accelerometer results from the 2007 to 2009 Canadian health measures survey. Health Rep. 2011 Mar;22(1):7-14.

(37) The First Nations Information Governance Centre. RHS phase 2 (2008/10) preliminary results. Ottawa: The First Nations Information Governance Centre; 2011.

(38) Sallis JF, Frank LD, Saelens BE, Kraft MK. Active transportation and physical activity: opportunities for collaboration on transportation and public health research. Transportation Research Part A. 2004;38(4):249-68.

(39) Butler GP, Orpana HM, Wiens AJ. By your own two feet: factors associated with active transportation in Canada. Canadian Journal of Public Health. 2007;98(4):259-64.

(40) Brownson RC, Hoehner CM, Day K, Forsyth A, Sallis JF. Measuring the built environment for physical activity: state of the science. American Journal of Preventive Medicine. 2009;36(4):S99-S123.e12.

(41) Berrigan D, Troiano RP, McNeel T, DiSogra C, Ballard-Barbash R. Active transportation increases adherence to activity recommendations. American Journal of Preventive Medicine. 2006;31(3):210-6.

(42) Statistics Canada. Physically active Canadians – findings [Internet]. Ottawa: Statistics Canada [cited 4 Dec 2011]. Available from: http://www.statcan.gc.ca/pub/82-003-x/2006008/article/phys/10307-eng.htm

(43) Kahn EB, Ramsey LT, Brownson RC, Heath GW, Howze EH, Powell KE, et al. The effectiveness of interventions to increase physical activity. A systematic review. American Journal of Preventive Medicine. 2002;22(4 Suppl):73-107.

(44) Sallis J, Bauman A, Pratt M. Environmental and policy interventions to promote physical activity. American Journal of Preventive Medicine. 1998;15(4):379-97.

(45) Statistics Canada. Canadian community health survey: detailed information for 2007 (cycle 4.1) [Internet]. Ottawa: Statistics Canada; 2008 [cited 19 Nov 2011]. Available from: http://www23.statcan.gc.ca:81/imdb/p2SV.pl?Function=getSurvey&SurvId=3226&SurvVer=0&InstaId=15282&InstaVer=4&SDDS=3226&lang=en&db=imdb&adm=8&dis=2

(46) Thompson JL, Allen P, Cunningham-Sabo L, Yazzie DA, Curtis M, Davis SM. Environmental, policy, and cultural factors related to physical activity in sedentary American Indian women. Women Health. 2002;36(2):59-74.

(47) Drew S, Paradice R. Time, women, and well-being. Feminism and Psychology 1996;6(4):563-8.

(48) Jaffee L, Lutter JM, Rex J, Hawkes C, Bucaccio P. Incentives and barriers to physical activity for working women. American Journal of Health Promotion. 1999;13(4):215-8.

(49) Health, Leisure and Human Performance Research Institute. The health, leisure and human performance research institute annual report July 1, 2005 to June 30, 2006. Winnipeg: Health, Leisure and Human Performance Research Institute; 2007.

(50) Brisson C, Larocque B, Moisan J, Vezina M, Dagenais GR. Psychosocial factors at work, smoking, sedentary behavior, and body mass index: a prevalence study among 6995 white collar workers. Journal of Occupational & Environmental Medicine. 2000;42(1):40-6.

(51) Jaffee L. Motivation to be physically active in a work setting. Melopomene. 1996;15(3):23-7.

(52) Kliman AM, Rhodes R. Do government brochures affect physical activity cognition? A pilot study of Canada's physical activity guide to healthy active living. Psychol Health Med. 2008;13(4):415-22.

(53) Schell L, Rodriguez S. Our sporting sisters: how male hegemony stratifies women in sport. Women in Sport & Physical Activity Journal. 2000;9(1):25-30.

(54) Gilbert ED. Towards a richer understanding of girls' sport experiences. Women in Sport and Physical Activity Journal. 2001;35(9):206-12.

(55) Davison KK, Cutting TM, Birch LL. Parents' activity-related parenting practices predict girls' physical activity. Med Sci Sports Exerc. 2003 Sep;35(9):1589-95.

(56) Robbins LB, Pender NJ, Kazanis AS. Barriers to physical activity perceived by adolescent girls. J Midwifery Womens Health. 2003 May-Jun;48(3):206-12.

(57) Roper E, Halloran E. Attitudes toward gay men and lesbians among heterosexual male and female student-athletes. Sex Roles. 2007;57(11-12):919-28.

(58) Napolitano M, Marcus B. Breaking barriers to increased physical activity. Physician and Sports Medicine. 2000;28(10):88-93.

(59) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines for adults 18 - 64 years [Internet]. Ottawa: CSEP; 2012 [cited 19 Oct 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-adults-ENG.pdf

(60) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines for children 5 - 11 years [Internet]. Ottawa: CSEP; 2012 [cited 19 Jun 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-child-ENG.pdf

(61) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines for youth 12 - 17 years [Internet]. Ottawa: CSEP; 2012 [cited 19 Jun 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-youth-ENG.pdf

(62) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines for older adults 65 years and older [Internet]. Ottawa: CSEP; 2012 [cited 19 June 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-older%20adults-ENG.pdf

(63) Heath GW, Brownson RC, Kruger J, Miles R, Powell KE, Ramsey LT. The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. Journal of Physical Activity & Health. 2006;3(Suppl1):S55-S76.

(64) Humpel N, Owen N, Leslie E. Environmental factors associated with adults' participation in physical activity: a review. American Journal of Preventive Medicine. 2002;22(3):188-99.

(65) Saelens B, Sallis J, Frank L. Environmental correlates of walking and cycling: findings from the transportation, urban design, and planning literatures. Ann Behav Med. 2003;25(2):80-91.

(66) Steinbeck KS. The importance of physical activity in the prevention of overweight and obesity in childhood: a review and an opinion. Obesity Reviews. 2001;2(2):117-30.

(67) Biddle SJ, Gorely T, Marshall SJ, Murdey I, Cameron N. Physical activity and sedentary behaviours in youth: issues and controversies. The Journal of the Royal Society for the Promotion of Health. 2004;124(1):29-33.

(68) Canadian Association for the Advancement of Women and Sport and Physical Activity. Active & free: young women, physical activity and tobacco [Internet]. Ottawa: CAAWS [cited 10 Aug 2012]. Available from: www.caaws.ca/activeandfree/e/index.cfm

(69) Pate RR, Heath GW, Dowda M, Trost SG. Associations between physical activity and other health behaviors in a representative sample of us adolescents. American Journal of Public Health. 1996;86(11):1577-81.

(70) British Columbia Centre of Excellence for Women's Health & Girls Action Foundation. Girls, physical activity & culture. A backgrounder: practical tools & resources for facilitators of girls' empowerment groups. 2012.

Sedentary Behaviour

Anna Liwander, Ann Pederson and Wendy Rice

Sedentary living – a concept that may encompass sedentary behaviour, physical inactivity and light physical activities – has been described as an "unhealthy and costly lifestyle" (1) and one of the biggest public health problems in the 21st century (2). In 2002, a US based organisation (3) coined the phrase "Sedentary Death Syndrome" to categorise the health conditions associated with a sedentary lifestyle, including cancer, heart disease, osteoporosis, hypertension and many other conditions. Over the years, however, researchers have come to the conclusion that these behaviours (sedentary behaviour, physical inactivity and light activity) may in fact have differential impact on women's health and that it is valuable to understand and address sedentary behaviour as a distinct problem that is not simply having a low level of physical activity (4, 5) but rather is a characteristic of how people in Canada live their everyday lives. For example, a woman who runs regularly or meets the minimum recommended physical activity guidelines may still face health challenges if she is sedentary during most of her waking hours.

As in many other countries around the world, research indicates that both adults and children in Canada spend increasing time in activities characterized by little physical movement and low energy expenditure (6-10). Such "sedentary behaviours" include time spent sitting at school, in the workplace and for transportation, as well as leisure-time activities such as watching television, using a computer or playing video games, or communicating through various technologies.

Sedentary behaviours are characterized by little physical movement and low energy expenditure. They include sitting and watching television, using a computer, reading, occupational sitting and motorized transportation.

Mounting evidence also suggests that sedentary behaviour is an important health issue for Canadians (11). Epidemiological studies of sedentary behaviour suggest that it is associated with a number of negative health effects, including weight gain, type 2 diabetes mellitus (12), some cancers (13-15), abnormal glucose metabolism (16), metabolic syndrome (16, 17) and cardiovascular disease (12, 16). Some research also suggests that sedentary behaviour may be associated with psychological problems (7, 9, 18, 19), depression (20), lower self-esteem, decreased academic performance (9, 21), and reduced bone mineral density (7, 22). While it is unclear what role diet might play in these associations as not all studies control for diet and other potential confounders, Shields and Tremblay (23) argued that their analysis of sedentary behaviours in relation to obesity showed that "among Canadian men and women, the odds of being obese increased as weekly hours of television viewing rose" (23) and that the association between television viewing and

obesity was independent of both leisure-time physical activity and diet, suggesting that something else explains the relationship (such as sedentary behaviour).

Although we currently lack studies examining the impact that sedentary behaviour may have on the global burden of disease and life expectancy, a group of researchers (24) has looked at the impact that sitting and television viewing have on life expectancy in the US. Their results showed that reducing time spent sedentary could potentially increase life expectancy in the US by two years if the number of hours spent sitting were reduced to fewer than three hours per day (<3 h/day). A study conducted in Canada (18) followed 17,000 people over 12 years and suggested that in the Canadian population "those who spent most of their time sitting were 50% more likely to die during the follow-up than those that sit the least" even after controlling for confounding factors such as age, smoking and physical activity (18). These findings affirm the importance of understanding and addressing sedentary behaviour as a distinct population health challenge.

It has also been suggested that sedentary behaviour may pose certain health effects specific to women such as greater risk of endometrial and ovarian cancers (5, 7, 14, 15, 22, 25). Atkin et al. (22) argue that sedentary behaviour among women may be associated with increased risk of poor mental health which may be a "result of different patterns of sedentary behaviour between genders or, in the case of psychological well-being, reflect contrasting psychological mediators that underpin prolonged engagement in sedentary behaviour" (22). Hence sex-disaggregated and gender-informed analyses of sedentary behaviour are important for understanding and addressing this area of healthy living.

Women's sedentary behaviours are likely influenced by a number of factors, including how workplaces, schools, communities and the transportation system are organised but also safety concerns and personal preferences for certain activities. Guidelines (9, 26) have been established to limit sedentary behaviour among children and youth, however, these are not sex specific and no guidelines are presently available to inform policy and programs for adults.

To date, most research and health guidelines in this field have focused on increasing physical activity as the key to reducing sedentary behaviour. However as these strategies still tend to focus on individual rather than structural approaches to fostering physical activity, they may not be adequate to address sedentary behaviour because the problem is not merely avoiding a select set of behaviours but rather addressing an entire way of life. Changes in organizational practices and the built environment may be the key to changing this way of living. With technology, urbanization and a reliance on motorized transport as ubiquitous features of everyday life across Canada, it is time to think beyond short-term, episodic programs aimed at increasing physical activity—especially those only focused on leisure-time physical activity—and consider instead the ways that we can support change in women's everyday lives that is health promoting.

As a starting point for developing responses to sedentary behaviour, we begin this chapter with a description of the nature and parameters of sedentary behaviour and how it is defined and measured in the Canadian Community Health Survey (CCHS) and the Canadian Health Measures Survey (CHMS). From this base, we then describe what is known about the nature of girls and women's sedentary behaviour in Canada, current policy and practice related to sedentary behaviour, and how sedentary behaviours are associated with other dimensions of healthy living including body weight, healthy eating and smoking.

Defining Sedentary Behaviour

There is some inconsistency in the literature regarding how the concept of sedentary behaviour is defined, categorized and measured. Three closely related terms—physical inactivity, light-intensity physical activity and sedentary behaviour—are sometimes used interchangeably or in confusing ways. For example, though many researchers argue that sedentary behaviour is distinct from a lack of physical activity (12, 17, 27-34), as we are in this report, others use the terms *sedentary* and *physically inactive* interchangeably as labels for individuals or groups (35, 36) or classify individuals as sedentary solely on the basis that they do not meet physical activity guidelines. That is, they use the term "sedentary" as a characteristic of individuals or groups based upon their accumulated activity (measured by intensity and duration) when they are not necessarily focusing on the specific features of "sedentary behaviours" such as sitting down to work or study.

Women that meet physical activity guidelines, as well as those that do not participate in any physical activity may still be at risk for disease based on their time spent sedentary.

Pate and colleagues (34) found that past research often classified people that did not participate in enough moderate-to-vigorous physical activity (MVPA) as sedentary, when they might actually be participating in light-intensity activities. It may be particularly important to distinguish between light-intensity physical activity and sedentary behaviour when looking at women's activity patterns because women tend to participate in more light-to-moderate physical activities than moderate-to-vigorous ones as discussed in the previous chapter. Given this activity pattern, many women may be inaccurately classified as sedentary if sedentary behaviour is not considered separately apart from light-intensity activities in a particular classification scheme, leading to an overestimate of the numbers of sedentary women and policy and program responses based on a misunderstanding of the nature of women's daily lives.

The newly-established Sedentary Behaviour Research Network (33), a global network formed in 2011, recently published a statement urging researchers to adopt the following as a common definition of sedentary behaviour:

"We suggest that journals formally define sedentary behaviour as any waking behaviour characterized by an energy expenditure ≤1.5 METs while in a sitting or reclining posture. In contrast, we suggest that authors use the term "inactive" to describe those who are performing insufficient amounts of MVPA (i.e., not meeting specified physical activity guidelines)." (33)

In Canadian contexts, sedentary behaviour has been defined as a distinct class of behaviours characterized by little physical movement and low energy expenditure (7-9). These behaviours are often considered to require ≤1.5 metabolic equivalent tasks (MET) where one MET is the energy cost of resting quietly (34). Sedentary behaviour typically includes practices such as television viewing, computer use, reading, occupational sitting and motorized transportation. The concept could also include other behaviours that usually involve sitting such as dining, communication-based sedentary behaviours (37), arts and crafts, listening to music (38), personal care and social interactions (39), but these practices are not yet routinely captured in national research studies (39) such as the CCHS and CHMS. As Figure 1 illustrates, many aspects of a "typical" day can be regarded as sedentary. In the example depicted in this figure, the only point of the day when the person is not sedentary is when they undertake a brisk 30 minute walk. While this pattern may be consistent with the recommendations of physical activity guidelines[1] (if the person walks at sufficient speed), this figure illustrates the pervasive nature of sedentary behaviour in the everyday lives of many employed adults.

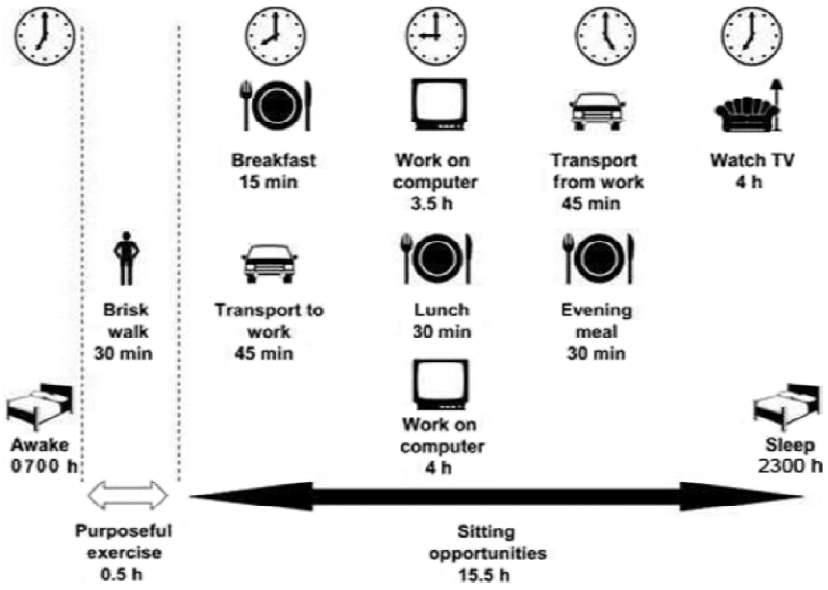


Figure 1. The nature of adult's sedentary behaviour over a typical day
(Reproduced from Dunstan et al. 2010, European Endocrinology, Vol. 6, p. 20, with permission from Touch Medical Media (www.touchmedicalmedia.com) (16)).

[1] The Canadian physical activity guidelines from the Canadian Society for Exercise Physiology recommend 150 minutes of moderate-to-vigorous physical activity per week in bouts of at least 10 minutes (40) (see chapter on physical activity).

In this profile, we adopt the view that sedentary behaviour, light, moderate and vigorous activities are all distinct categories characterized by progressively higher levels of energy expenditure and should be seen as a continuum (Figure 2).

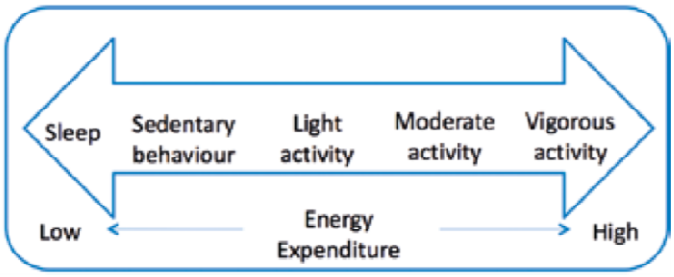


Figure 2. Movement continuum of energy expenditure
(Reproduced with permission from BHF National Centre (41).
Figure is adapted by the BHFNC, original figure from Tremblay et al. 2010)

Measuring Sedentary Behaviour

In this chapter, we report on our analyses of sex-disaggregated data from the Canadian Community Health Survey (CCHS) 2007/2008 and the Canadian Health Measures Survey (CHMS) 2007-2009. The CCHS calculates rates of sedentary behaviour based on self-reported leisure-time spent in specific sedentary activities in a typical week over the previous three months. Activities inquired about in the CCHS include using a computer, playing video games, watching television or videos and reading (though not counting reading at work or at school). Currently, the CCHS excludes employment-based sedentary behaviours and those performed at school, while dining, etc.

It is important to interpret self-reports of sedentary behaviour data cautiously as most of these practices are undertaken sporadically throughout the day and may be difficult to recall as opposed to something like regularly scheduled physical activities (7). Given these limitations with self-reported data (7, 23), accelerometer data which monitor movement and record the intensity of activity are used in some survey research on sedentary behaviour, including the CHMS.

The CHMS employs both household interviews and accelerometer data to obtain the metabolic equivalent of tasks (MET) and step counts (42, 43). The intensity cut-point to classify someone as sedentary is set to "1 to less than 2 MET" [2] in the CHMS and an accelerometer count of less than 100 counts per minute (42). Although accelerometer data may be a more accurate measure of sedentary behaviour than self-reported data,

[2] Note that this is a situation in which a person is classified as sedentary in the CHMS and that this is not consistent with the most recent recommendations for measuring sedentary behaviour, which is ≤1.5 METS (34).

accelerometer data may not capture all upper body movement and therefore underestimate physical energy expenditures in some people.

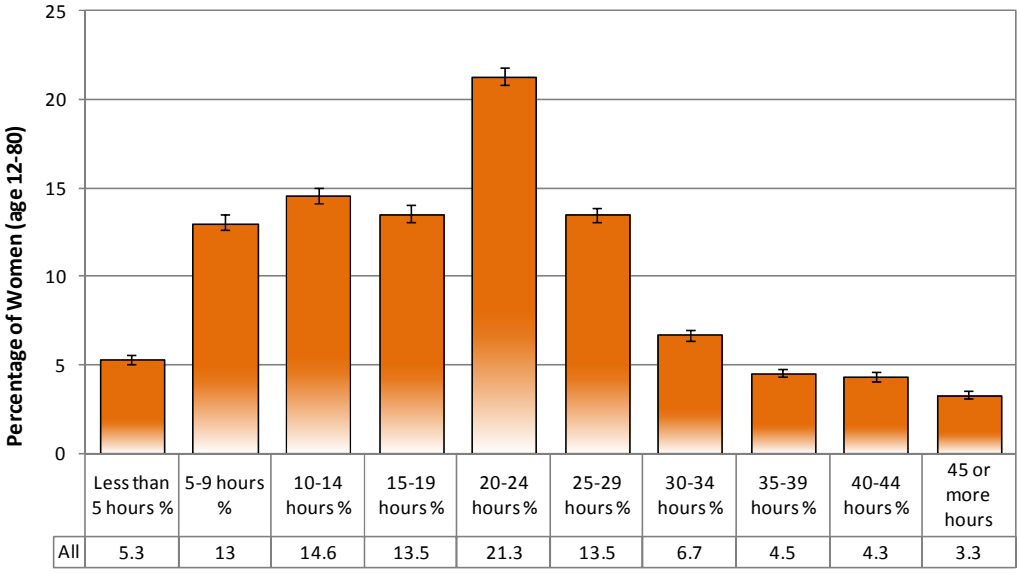
In 2011, the Canadian Society for Exercise Physiology (CSEP), in partnership with several other key agencies, including ParticipACTION (9), released the world's first evidence-based guidelines on sedentary behaviour for children (aged 5-11 years) and youth (aged 12-17 years). The guidelines suggest that children and youth spend no more than 2 hours per day on recreational screen time and that time spent on sedentary transportation, extended sitting and indoors should be limited throughout the day (9). In 2012, guidelines (26) were also released for the early years, suggesting that children aged 0-4 years should spend no more than 1 hour of prolonged sitting or being restrained (e.g., stroller, high chair) at a time (26). Screen time (including watching TV, using computers, electronic games etc.) is not recommended for children under the age of 2 years and should be limited to under one hour per day for children aged 2-4 years (9, 44).

The Canadian Community Health Survey measures sedentary behaviour as the total number of hours spent in a typical week in the previous three months in sedentary activities including using a computer, using the Internet, playing video games and watching television or videos. The Canadian Health Measures Survey measures total sedentary time using accelerometer data.

Women and Sedentary Behaviour in Canada

Women in Canada spend on average 9.8 hours per day in sedentary pursuits (42, 43). Girls (6-19 years) are slightly less sedentary and spend on average 8.7 hours per day sedentary (43). When looking at sedentary behaviours during leisure-time only, our analysis of the CCHS (2007/2008) suggests that many women spend a significant portion of their leisure-time sedentary. In fact, one third of women report spending more than 24 hours per week watching TV, using a computer, playing video games or reading during their leisure-time. Approximately one in five women (21.3%; 95% confidence interval [CI], 20.8-21.8) spend 20-24 hours per week in these behaviours (Figure 3).

Figure 3. Total Number of Leisure-Time Hours Per Week Spent in Sedentary Behaviours Women in Canada, 2007/2008



	Less than 5 hours %	5-9 hours %	10-14 hours %	15-19 hours %	20-24 hours %	25-29 hours %	30-34 hours %	35-39 hours %	40-44 hours %	45 or more hours
All	5.3	13	14.6	13.5	21.3	13.5	6.7	4.5	4.3	3.3

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 3.0%.

Sedentary behaviour becomes more common during adolescence (45-47). Results from the CCHS (2007/2008) suggest that girls under the age of 20 are more likely to spend 40 hours or more on leisure-time sedentary behaviours than women aged 20-59 years, but that these behaviours become more common again around retirement age. Certain sedentary behaviours may also be more common in certain age groups. Results from the CCHS (2007/2008) suggest that young women were more likely to use computers, while older women tend to spend more time watching TV. Leatherdale (37) suggests that girls spend a lot of time in communication-based sedentary behaviour, such as talking on the telephone, texting or instant messaging. This is particularly common in younger age groups, and it has been estimated that 58% of girls (grades 5-8) spend more than 2 hours per day talking on the phone, texting or instant messaging (48). However, the majority of studies of sedentary behaviour to date have focused on television viewing and computer use, and fewer studies have explored girls' and women's use of more recent forms of technology (such as portable communication and entertainment devices) and sedentary behaviour. Additional data are needed to fully establish any distinct sex and/or gender differences in patterns of sedentary behaviour among youth.

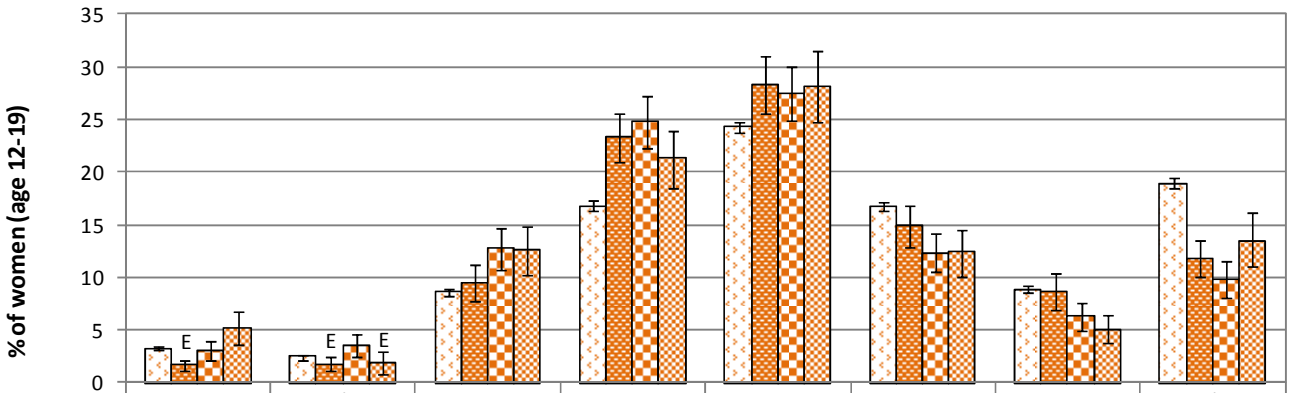
Although we recognize that women engage in a number of different practices that can be understood as sedentary behaviours, the analysis reported below is limited to the areas of focus in the CCHS 2007/2008, namely television viewing, computer use, gaming and reading.

Television Viewing

Television viewing is the most common leisure-time sedentary behaviour reported by women in Canada. Results from the CCHS (2007/2008) suggest that 18.9% (95% CI, 18.5-19.4) of women spend more than 20 hours per week watching TV. Frequent television viewing (more than 20 hours per week) tends to increase with age. In 2007/2008, only 10.5% (95% CI, 9.3-11.7) of 35-39 year old women reported watching TV more than 20 hours per week but the proportion rose to 40% (95% CI, 39.5-42.9) among women aged 75 years and older. An increase in frequent television viewing can be observed around retirement age with 29.1% (95% CI, 27.4-30.7) of 60-64 year olds and 37.7% (95% CI, 35.5-39.9) of 65-69 year olds reporting more than 20 hours of television viewing per week.

Girls (aged 12-19 years) are somewhat less likely to be frequent television viewers during their leisure-time. In 2007/2008, this was reported by 11.8% (95% CI, 10.1-13.5) of girls aged 12-14 years, 9.8% (95% CI, 8.1-11.5) of girls aged 15-17 years and 13.5% (95% CI, 11.0-16.1) of girls aged 18-19 years. Many girls, however, tend to spend more time watching television than what has been suggested in the sedentary behaviour guidelines from CSEP (9) (Figure 4).

Figure 4. Number of Leisure Time Hours Spent Watching Television or Videos Women in Canada, 2007/2008



	None %	Less than 1 hour %	1-2 hours %	3-5 hours %	6-10 hours %	11-14 hours %	15-20 hours %	More than 20 hours %
All	3.3	2.5	8.6	16.8	24.3	16.7	8.9	18.9
12 TO 14 YEARS	1.7	1.8	9.5	23.3	28.3	14.9	8.7	11.8
15 TO 17 YEARS	3.1	3.5	12.8	24.8	27.5	12.3	6.3	9.8
18 TO 19 YEARS	5.2	1.9	12.6	21.3	28.2	12.4	5.1	13.5

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6-33.3%. Interpret these results with caution. Missing values = 2.3%.

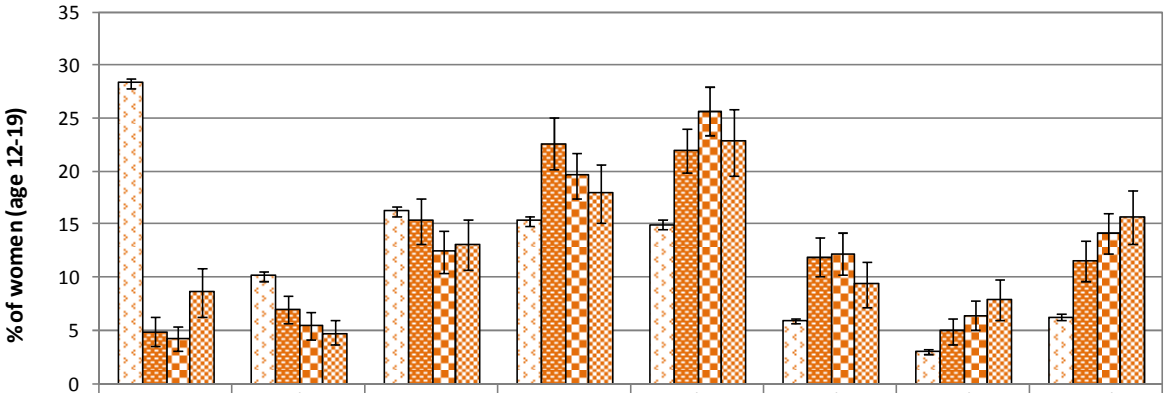
Shields & Tremblay (49) report that frequent television viewers (those who watch more than 20 hours per week) were more likely to have lower levels of education (less than secondary graduation), to be in the lowest household income group and to be living in rural areas. Television viewing is also more common among women who never married compared to women that are married or live common law. Recent immigrants are less likely to be frequent television viewers compared to those who are Canadian-born. Shields & Tremblay (49) also report that frequent television viewing is more common in Nunavut (40%), New Brunswick (32%) and Quebec (31%) compared to the national average (29%).

Computer Use

Internet and computer use are increasingly common sedentary behaviours (50, 51) but results from the CCHS (2007/2008) suggest that, overall, computer use during leisure-time is still less common than television viewing among women in Canada. In 2007/2008, the majority of women spent between 1-10 hours per week using computers during their leisure-time. Sixteen percent (16.3%; 95% CI, 15.8-16.7) spent 1-2 hours per week, 15.4% (95% CI, 14.9-15.8) spent 3-5 hours and 14.9% (95% CI, 14.5-15.4) spent 6-10 hours using computers.

Frequent computer use (more than 20 hours per week) was only reported by 6.2% (95% CI, 6.0-6.5) of women but was more common in younger age groups. For example, in 2007/2008, 14.1% (95% CI, 12.2-16.0) of girls aged 15-17 years reported spending more than 20 hours per week using computers during their leisure-time, as did 15.7% of 18-19 year olds (95% CI, 13.2-18.2) (Figure 5).

Figure 5. Number of Leisure Time Hours Spent on Computer Use Per Week Women in Canada, 2007/2008



	None %	Less than 1 hour %	1-2 hours %	3-5 hours %	6-10 hours %	11-14 hours %	15-20 hours %	More than 20 hours %
All Women	28.3	10.1	16.3	15.4	14.9	5.9	3	6.2
12 TO 14 YEARS	4.8	7	15.3	22.6	21.9	11.9	4.9	11.6
15 TO 17 YEARS	4.2	5.4	12.4	19.6	25.6	12.2	6.4	14.1
18 TO 19 YEARS	8.6	4.7	13.1	17.9	22.8	9.4	7.9	15.7

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values = 3.6%.

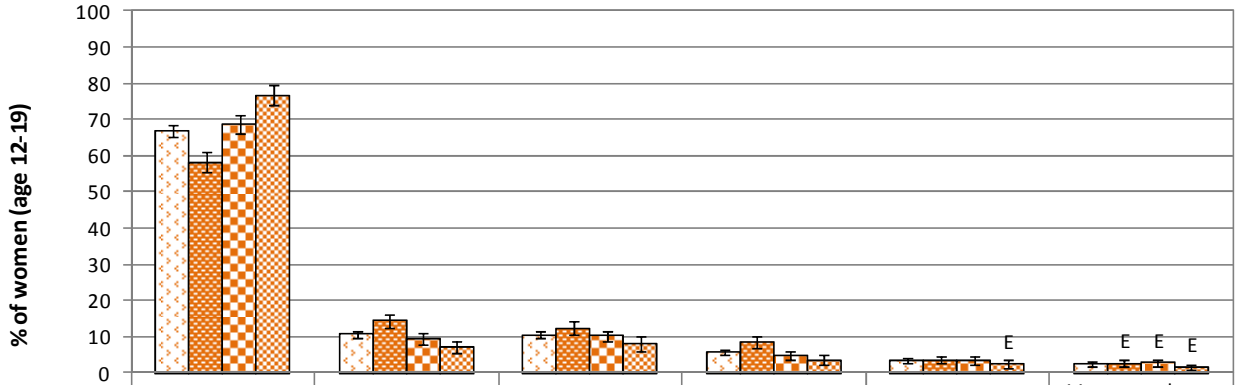
Although these data suggest that the number of hours using a computer during leisure-time tends to increase with age among girls in Canada (aged 12-19 years), it should be noted that the sample size of girls in the study was very small and the overlapping confidence intervals reported indicate that there is the possibility of no association between age and increased computer use among girls in Canada. To further explore this potential association, further cross-sectional surveys with a larger sample of girls aged 12-19 should be conducted.

Shields & Tremblay (49) found that women and men who reported frequent leisure-time computer use were more likely to not have been married, to have postsecondary graduation and to be unemployed. Further, they note that the proportion of frequent leisure-time computer users is higher in Nunavut (20%), British Columbia (18%) and Ontario (16%) than the national average (15%).

Playing Video Games

Reports of frequent use of video games were not very common in any age group of women. Only 2.5% (95% CI, 2.0-3.1) of women in Canada reported spending 11 or more hours on video games per week and 10.8% of women spend less than one hour per week on video games. Girls (aged 12-19 years) do not tend to spend much time on video games either, with less than 3% of girls spending 11 or more hours per week on video games (Figure 6).

Figure 6. Number of Leisure Time Hours Per Week on Video Games
Women in Canada, 2007/2008



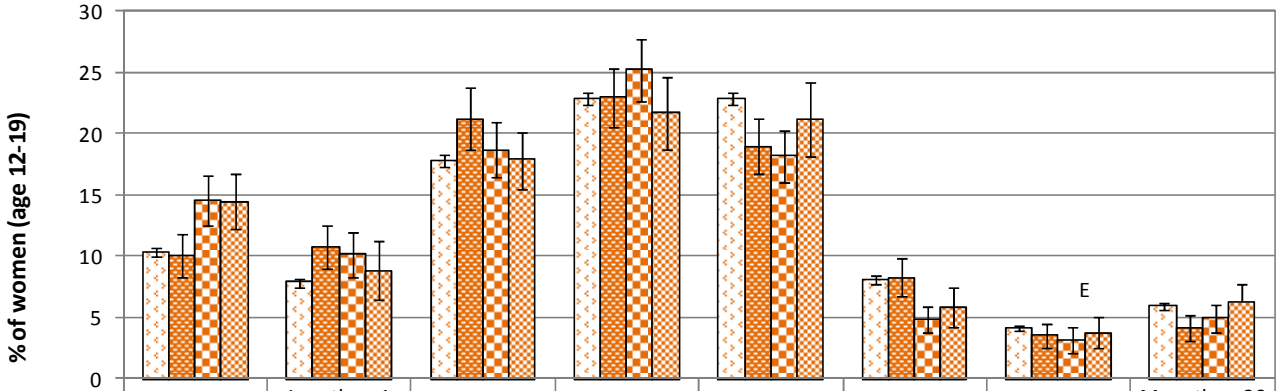
	None %	Less than 1 hour %	1-2 hours %	3-5 hours %	6-10 hours %	11 or more hours %
All	66.8	10.8	10.5	6	3.4	2.5
12 TO 14 YEARS	58.3	14.4	12.5	8.5	3.7	2.7
15 TO 17 YEARS	68.9	9.6	10.2	4.9	3.5	2.9
18 TO 19 YEARS	76.7	7.1	8.1	3.7	2.6	1.7

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6-33.3%. Interpret these results with caution. Missing values = 3.8%.

Reading

Many women in Canada tend to spend time reading during their leisure-time. Almost 23% (22.9%; 95% CI, 22.4-23.4) of women spent 3-5 hours or 6-10 hours per week reading respectively. Six percent (95% CI, 5.7-6.2) of women spent more than 20 hours per week reading during their leisure-time (Figure 7). Shields & Tremblay (49) observed that time spent reading was fairly consistent across all age groups, with women aged 65 years and older spending more time reading than any other age group. Girls (aged 12-19 years) do not report spending much time reading during their leisure time. Results from the CCHS (2007/2008) suggest that 4.2% (95% CI, 3.1-5.2) of girls aged 12-14 years reported reading more than 20 hours per week during leisure-time. This was also reported by 5% (95% CI, 3.8-6.1) of 15-17 year olds and 6.3% (95% CI, 4.8-7.8) of 18-19 year olds (Figure 7).

Figure 7. Number of Leisure Time Hours Spent Reading
Women in Canada, 2007/2008



	None %	Less than 1 hour %	1-2 hours %	3-5 hours %	6-10 hours %	11-14 hours %	15-20 hours %	More than 20 hours %
All	10.4	7.9	17.8	22.9	22.9	8.1	4.1	6
12 TO 14 YEARS	10.1	10.8	21.2	23	18.9	8.3	3.6	4.2
15 TO 17 YEARS	14.6	10.2	18.7	25.3	18.2	4.8	3.2	5
18 TO 19 YEARS	14.5	8.8	17.9	21.7	21.2	5.8	3.7	6.3

SOURCE: Canadian Community Health Survey (CCHS), 2007/2008.1. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6-33.3%. Interpret these results with caution. Missing values= 7.0%.

Reasons for Being Sedentary

As the chapter on physical activity indicated, research studies have reported a wide range of factors that women identify as barriers to being physically active such as lack of time, the demands of caregiving (52-55), concerns about safety (56) and cost of recreation. Some of these factors undoubtedly contribute to girls and women being sedentary but, to date, sedentary practices have not been investigated to the same extent as physical activity. That is, we need to move past the simple frame of thought in which we define women as sedentary because they are not physically active and explore what it is that girls and women are doing as they live their daily lives. When we understand what it is that girls and women value enough to spend time doing, whether it is reading, communicating, doing art work or studying, we will come to a better understanding of how sedentary behaviour forms a part of their everyday lives. From there we can begin to explore how girls' and women's sedentary behaviour practices are shaped and what might be done to foster active, health-promoting choices.

A few studies (56, 57) have pointed to an association between neighbourhood characteristics and sedentary behaviour. For example, television viewing among girls has been associated with both the socioeconomic characteristics of the household and the neighbourhood (57), and children's television viewing time has been linked to their mother's perception of neighbourhood safety (56). Further, studies have shown that higher income neighbourhoods often have more community resources for recreation which can offer children and youth more options for being active instead of watching television or playing computer games in their leisure time (57). Studies like these suggest that sedentary behaviours, like all health practices, are deeply influenced by social, physical and economic conditions.

Sedentary Behaviour Policy and Programs

Public health agencies are just beginning to address sedentary behaviour independently of physical activity but most research and health guidelines to date have focused on increasing physical activity as the key to reducing sedentary behaviour. The Canadian Sedentary Behaviour Guidelines for children and youth (9, 26), however, represent one step in the right direction for reducing time spent in sedentary pursuits. Although these guidelines are directed for children and youth under the age of 17 years, the guidelines are also intended for parents, caregivers and others that are responsible for young children and could therefore indirectly have an impact on adult women, as they are often primary caregivers. There are currently no guidelines recommending restrictions on the amount of time that adults spend sedentary (58)—a potentially significant gap in current policy.

The Canadian Society for Exercise Physiology released the world's first evidence-based guidelines on limiting sedentary behaviour for children and youth in 2011 (9, 26).

However, the minutes of an October 2012 meeting of the Sedentary Behaviour Research Network (59) indicate that discussions of guidelines for adults and older adults are under way and systematic evidence reviews to inform them are in the planning stages. This news suggests that guidelines for adults will be available in a few years. However, given that any guidelines are going to be developed on the basis of existing evidence, it remains unlikely that we will see gender-responsive guidance any time soon. Current guidelines for children and youth do not make sex- or gender-specific recommendations even though it has been suggested, and we have shown that the types and patterns of sedentary behaviours may vary between females and males.

As noted earlier in this chapter, many studies on sedentary behaviour to date have focused on a limited number of behaviours and have largely failed to address those that may be more common among girls and women including communication-based sedentary behaviours (37), arts and crafts (38), personal care and social interactions (39). Additionally, studies often focus on behaviours during the leisure-time and therefore fail to present a complete picture of girls' and women's daily life. Policies should also recognise the potential barriers that women may face in reducing their sedentary time, such as neighbourhood safety which has been linked to physical inactivity and sedentary behaviour (56).

In order to establish effective policies with respect to sedentary behaviour for women, it is important to understand women's daily lives and their opportunities for reducing time spent being sedentary. This requires a solid research base from which to build policy directions and suggest interventions specific to the issue of sedentary behaviour. Although a large number of research studies and polices have focused on increasing physical activity, few efforts have been made to reduce time spent sedentary per se. However, reduced time spent sitting is occasionally identified as a secondary aim in physical activity interventions, following goals to increase physical activity rates (31).

Structural approaches to addressing sedentary behaviour are needed because the problem is not merely avoiding a select set of behaviours but rather addressing an entire way of life. Changes in organizational practices and the built environment will be important as developments in transportation, communication and the structure and organization of workplaces and schools have essentially created reduced demands for physical activity over the course of the day (5) and fundamentally encourage sedentary behaviour.

Women, Sedentary Behaviour and Healthy Living

Sedentary behaviour has been found to be associated with other aspects of healthy living including body weights, nutrition and substance use although these associations are often confounded with physical activity and the associations with sedentary behaviours are not yet entirely clear. While some studies (28, 60) suggest that both sedentary behaviour and physical inactivity are associated with obesity, others (23, 28, 61-63) have questioned these associations and some studies have failed to establish this link in youth. A study by Saskia

te Velde et al. (39) looking at both sedentary behaviour and physical activity and the association with overweight showed that both sedentary behaviour and physical activity played an important role in overweight among boys but sedentary behaviour played a larger role for overweight than physical activity in overweight among girls. This finding reinforces the need for further research which examines sex-and gender-based influences and outcomes in relation to sedentary behaviour, which has also been suggested by Atkin et al.(22).

Further, although some (28, 64) argue that young people's sedentary behaviour competes with more active activities, Biddle et al. (28) suggest that television viewing and playing video games are largely uncorrelated with physical activity, that the amount of television viewing per person has not changed for 40 years and that "body fatness is not related in any clinically meaningful way with key sedentary behaviours" (28). More data are needed to clarify these debates.

The number of hours spent sedentary could be an important factor in explaining the associations between sedentary behaviour and other health practices or outcomes, as well as the type of sedentary behaviour. For example, Shields & Tremblay (23) suggest that people who use computers during their leisure-time for more than 11 hours per week may have an increased risk of obesity compared to people who use computers for 5 or fewer hours per week. Yet several studies (65-67) exploring the association between television viewing and excess body weight have led to somewhat inconclusive results, and still others (39, 68-70) have pointed to an increased risk of overweight and obesity among children and adolescents.

Not all sedentary behaviours have been associated with obesity – suggesting that there are differences among the activities that are classified as "sedentary". For example, some studies suggest that reading is not associated with the same health concerns as many other sedentary behaviours. Shields & Tremblay (23) found that time spent reading was not related to obesity and in a study of adolescent girls' recreational sedentary behaviour, Bauer et al. (38) found that time spent watching TV was associated with lower levels of physical activity and less healthful dietary habits. Similarly, spending a lot of time "hanging around" was associated with lower levels of physical activity but also showed an association with a higher soft drink intake and eating fast food more frequently. Spending time talking on the phone was not associated with physical activity but was linked to higher soft drink intake. Reading, on the other hand, "was the only recreational sedentary behaviour associated with healthful dietary behaviours" (38). Shields & Tremblay (23) also argue that reading shows a different pattern than other sedentary behaviours as it is not associated with obesity. Ultimately, Biddle and colleagues (28) suggest that the rising concern that youth spend time in sedentary pursuits at the cost of physical activity may be unwarranted and that "there appears to be time for both of these behaviours" (28). As the body of sedentary behaviour research expands, these—and other—patterns will need to be clarified.

Finally, sedentary behaviour has also been associated with smoking. For example, Kaufman and colleagues (71), found an association between smoking and time spent sedentary, in which current smokers were more likely to be sedentary than former smokers and those who had never smoked.

Summary

Sedentary behaviour is an emerging field defined by the Canadian Society for Exercise Physiology (9) as "any waking behaviour characterized by an energy expenditure ≤1.5 metabolic equivalents (MET) while in a sitting or reclining posture". These behaviours include, but are not limited to, television viewing, computer use, reading, occupational sitting and motorized transportation. Evidence (11) suggests that sedentary behaviour is an important health issue for Canadians and that it is valuable to understand and address sedentary behaviours as a distinct problem that is not simply having low levels of physical activity, but rather is a characteristic of how people in Canada live their lives.

Sedentary behaviour has been associated with a number of negative health effects, including weight gain, type 2 diabetes mellitus (12), some cancers (13-15), abnormal glucose metabolism (16), metabolic syndrome (16, 17) and cardiovascular disease (12, 16). Some research also suggests that sedentary behaviour may be associated with psychological problems (7, 9, 18, 19), depression (20), lower self-esteem, decreased academic performance (9, 21), and reduced bone mineral density (7, 22, 72). It has also been suggested that sedentary behaviour may pose certain health effects specific to women such as greater risk of endometrial and ovarian cancers (5, 7, 14, 15, 22, 25).

Accelerometer results from the Canadian Health Measures Survey (42, 43) suggest that girls (6-19 years) spend on average 8.7 hours per day sedentary (43), and adult women spend approximately 9.8 hours per day in sedentary pursuits. Television viewing is the most common leisure-time sedentary behaviour among women.

As a relatively new topic area, the data on sedentary behaviour are currently limited and the literature in this field is comparatively small. Most policies and practices to date tend to focus on strategies to increase levels of physical activity as a way to reduce sedentary behaviour but in 2011, the Canadian Society for Exercise Physiology released the world's first evidence-based guidelines on sedentary behaviour for children and youth. Current guidelines, however, do not make sex- or gender-specific recommendations even though types and patterns of sedentary behaviours seem to vary between females and males and distinct health outcomes have been associated with women's sedentary behaviour. As a result, there is a need to explore the concept more thoroughly to better understand the nature of girls and women's sedentary behaviour and the effect it has on their lives in order to formulate more gender-sensitive policies and practices to reduce sedentary time among women. Indeed, the challenge is not merely one of understanding and addressing sedentary behaviour but rather tackling the much larger issue of sedentary living. Addressing sedentary

living will involve more than finding strategies to increase leisure-time physical activity and will require multi-sectoral changes in the organization of work, school, transportation as well as play.

Women and girls need to be involved in future research examining the nature and meaning of sedentary behaviour and sedentary living. As the research on reading indicates, some sedentary behaviours may be associated with positive health outcomes whereas others may be more likely to be associated with poorer health. By understanding these associations better, policy makers and public health advocates may be better placed to support the health of girls and women in Canada.

References

(1) The Movement. Increasing activity can reduce the billions sedentary living costs businesses annually [Internet]. Kingston (NY): Kinetic Concepts; 2012 Oct 2 [cited 24 Jan 2012]. Available from: https://www.themovementonline.net/blog/item/42-increasing-activity-can-reduce-the-billions-sedentary-living-costs-businesses-annually

(2) American Psychological Association. Sedentary lives can be deadly: physical inactivity poses greatest health risk to Americans, expert says [Internet]. Rockville (MD): ScienceDaily; 2009 [cited 10 Aug 2012]. Available from: http://www.sciencedaily.com/releases/2009/08/090810024825.htm

(3) Booth F, Chakravarthy M. Cost and consequences of sedentary living: new battleground for an old enemy. In: Corbin CB, Pangrazi RP, Franks D, editors. President's Council on Physical Fitness and Sports research digest. Washington: President's Council on Physical Fitness and Sports; 2002 Mar;3(16).

(4) Hamilton M, Healy G, Dunstan D, Zderic T, Owen N. Too little exercise and too much sitting: inactivity physiology and the need for new recommendations on sedentary behavior. Curr Cardio Risk Rep 2008;2(4):292-8.

(5) Owen N, Healy GN, Matthews CE, Dunstan DW. Too much sitting: the population health science of sedentary behavior. Exerc Sport Sci Rev 2010;38(3):105-13.

(6) Public Health Agency of Canada. Healthy living [Internet]. Ottawa: Public Health Agency of Canada; [cited 13 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/index-eng.php

(7) Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. Appl Physiol Nutr Metab 2010;35(6):725-40.

(8) Tremblay M, LeBlanc A, Kho M, Saunders T, Larouche R, Colley R, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. Int J Behav Nutr Phys Act 2011;8(1):1-22.

(9) Canadian Society for Exercise Physiology (CSEP). Canadian sedentary behaviour guidelines for children (aged 5-11 years) and youth (aged 12-17 years): clinical practice guideline development report [Internet]. Ottawa: CSEP; 2011 Feb [cited 15 Jan 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/Canadian%20Sedentary%20Behaviour%20Guideline_Report_final.pdf

(10) Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet 2012;380(9838):219-29.

(11) Tremblay MS, LeBlanc AG, Janssen I, Kho ME, Hicks A, Murumets K, et al. Canadian sedentary behaviour guidelines for children and youth. Appl Physiol Nutr Metab 2011;36(1):59-64.

(12) Wilmot EG, Edwardson CL, Achana FA, Davies MJ, Gorely T, Gray LJ, et al. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. Diabetologia 2012;55(11):2895-905.

(13) Arem H, Irwin M, Zhou Y, Lu L, Risch H, Yu H. Physical activity and endometrial cancer in a population-based case-control study. Cancer Causes Control 2011;22(2):219-26.

(14) Gierach G, Chang S, Brinton L, Lacey J, Hollenbeck A, Schatzkin A, et al. Physical activity, sedentary behavior, and endometrial cancer risk in the NIH–AARP Diet and Health Study. Int J Cancer 2009;124(9):2139-47.

(15) Howard R, Freedman D, Park Y, Hollenbeck A, Schatzkin A, Leitzmann M. Physical activity, sedentary behavior, and the risk of colon and rectal cancer in the NIH-AARP Diet and Health Study. Cancer Causes Control 2008;19(9):939–53.

(16) Dunstan DW, Barr ELM, Healy GN, Salmon J, Shaw JE, Balkau B, et al. Television viewing time and mortality. Circulation. 2010;121(3):384-91.

(17) Bankoski A, Harris TB, McClain JJ, Brychta RJ, Caserotti P, Chen KY, et al. Sedentary activity associated with metabolic syndrome independent of physical activity. Diabetes Care 2011;34(2):497-503.

(18) Katzmarzyk PT, Churhc TS, Craig CL, Bouchard C. Sitting time and mortality from all causes, cardiovascular disease, and cancer. Med Sci Sports Exerc 2009;41(5):998-1005.

(19) Owen N, Bauman A, Brown W. Too much sitting: a novel and important predictor of chronic disease risk? Br J Sports Med 2009;43(2):81-3.

(20) Teychenne M, Ball K, Salmon J. Physical activity, sedentary behavior and depression among disadvantaged women. Health Educ Res 2010;25(4):632-44.

(21) Canadian Society for Exercise Physiology (CSEP). Canadian sedentary behaviour guidelines for children (aged 5-11 years) and youth (aged 12-17 years): clinical practice guideline development report. Ottawa: CSEP; 2011 Feb.

(22) Atkin A, Adams E, Bull F, Biddle SH. Non-occupational sitting and mental well-being in employed adults. Ann Behav Med 2012;43(2).

(23) Shields M, Tremblay MS. Sedentary behaviour and obesity. Ottawa: Statistics Canada; 2008.

(24) Katzmarzyk PT, Lee I-M. Sedentary behaviour and life expectancy in the USA: a cause-deleted life table analysis. BMJ Open 2012 Jul 9;2(4).

(25) Marshall SJ, Ramirez E. Reducing sedentary behavior: a new paradigm in physical activity promotion. Am J Lifestyle Med 2011;5(6):518-30.

(26) Canadian Society for Exercise Physiology (CSEP). Canadian sedentary behaviour guidelines for the early years (0-4 years) [Internet]. Ottawa: CSEP; 2012 [cited 15 Jan 2012]. Available from:: http://www.csep.ca/CMFiles/Guidelines/CSEP_SBGuidelines_early-years_en.pdf

(27) Patel AV, Rodriguez C, Pavluck AL, Thun MJ, Calle EE. Recreational physical activity and sedentary behavior in relation to ovarian cancer risk in a large cohort of US women. Am J Epidemiol 2006 Apr 15;163(8):709-16.

(28) Biddle S, Gorely T, Marshall S, Murdey I, Cameron N. Physical activity and sedentary behaviours in youth: issues and controversies. J R Soc Promot Health 2004 Jan;124(1):29-33.

(29) Guthold R, Ono T, Strong KL, Chatterji S, Morabia A. Worldwide variability in physical inactivity: a 51-country survey. Am J Prev Med 2008 Jun;34(6):486-94.

(30) British Heart Foundation National Centre for Physical Activity and Health. Sedentary behaviour: evidence briefing. Loughborough (UK): British Heart Foundation National Centre for Physical Activity and Health; 2012.

(31) Chau JY, der Ploeg HPv, van Uffelen JGZ, Wong J, Riphagen I, Healy GN, et al. Are workplace interventions to reduce sitting effective? A systematic review. Prev Med 2010 Nov;51(5):352-6.

(32) Chau JY, van der Ploeg HP, Merom D, Chey T, Bauman AE. Cross-sectional associations between occupational and leisure-time sitting, physical activity and obesity in working adults. Prev Med 2012 Mar-Apr;54(3-4):195-200.

(33) Sedentary Behaviour Research Network. Letter to the editor: standardized use of the terms “sedentary” and “sedentary behaviours”. Appl Physiol Nutr Metab 2012 Jun;37(3):540-2.

(34) Pate RR, O'Neill JR, Lobelo F. The evolving definition of "sedentary". Exerc Sport Sci Rev 2008 Oct;36(4):173-8.

(35) Reilly JJ, Coyle J, Kelly L, Burke G, Grant S, Paton JY. An objective method for measurement of sedentary behavior in 3- to 4-year olds. Obes Res 2003 Oct;11(10):1155-8.

(36) Maffeis C, Zaffanello M, Schutz Y. Relationship between physical inactivity and adiposity in prepubertal boys. J Pediatr 1997 Aug;131(2):288-92.

(37) Leatherdale ST, Ahmed R. Screen-based sedentary behaviours among a nationally representative sample of youth: are Canadian kids couch potatoes? Chronic Dis Inj Can 2011 Sep;31(4):141-6.

(38) Bauer K, Neumark-Sztainer D, Fulkerson J, Hannan P, Story M. Familial correlates of adolescent girls' physical activity, television use, dietary intake, weight, and body composition. Int J Behav Nutr Phys Act 2011;8(1):1-10.

(39) te Velde S, De Bourdeaudhuij I, Thorsdottir I, Rasmussen M, Hagstromer M, Klepp KI, et al. Patterns in sedentary and exercise behaviors and associations with overweight in 9-14-year-old boys and girls–a cross-sectional study. BMC Public Health 2007 Jan;7:16.

(40) Canadian Society for Exercise Physiology (CSEP). Canadian physical activity guidelines for adults 18 - 64 years [Internet]. Ottawa: CSEP; 2012 [cited 19 Oct 2012]. Available from: http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-adults-ENG.pdf

(41) British Heart Foundation National Centre. Sedentary behaviour evidence briefing. Loughborough (UK): British Heart Foundation National Centre for Physical Activity and Health; 2012.

(42) Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian adults: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. Ottawa: Statistics Canada; 2011.

(43) Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian children and youth: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. Ottawa: Statistics Canada; 2011.

(44) Tremblay MS, LeBlanc AG, Carson V, Choquette L, Connor Gorber S, Dillman C, et al. Canadian physical activity guidelines for the early years (aged 0–4 years). Appl Physiol Nutr Metab 2012;37(2):345-56.

(45) Brodersen NH, Steptoe A, Boniface DR, Wardle J. Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences. Br J Sports Med 2007 Mar;41(3):140-4.

(46) Kristjansdottir G, Vilhjalmsson R. Sociodemographic differences in patterns of sedentary and physically active behavior in older children and adolescents. Acta Pædiatrica 2001;90(4):429-35.

(47) Caspersen CJ, Pereira MA, Curran KM. Changes in physical activity patterns in the United States, by sex and cross-sectional age. Med Sci Sports Exerc 2000 Sep;32(9):1601-9.

(48) Leatherdale ST. Factors associated with communication-based sedentary behaviors among youth: are talking on the phone, texting, and instant messaging new sedentary behaviors to be concerned about? J Adolesc Health 2010 Sep;47(3):315-8.

(49) Shields M, Tremblay MS. Screen time among Canadian adults: a profile. Ottawa: Statistics Canada; 2008.

(50) Nelson MC, Neumark-Stzainer D, Hannan PJ, Sirard JR, Story M. Longitudinal and secular trends in physical activity and sedentary behavior during adolescence. Pediatrics 2006 Dec;118(6):e1627-34.

(51) Fotheringham M, Wonnacott R, Owen N. Computer use and physical inactivity in young adults: public health perils and potentials of new information technologies. Ann Behav Med 2000;22(4):269-75.

(52) Drew S, Paradice R. Time, women, and well-being. Fem Psychol 1996 Nov;6(4):563-8.

(53) Jaffee L. Motivation to be physically active in a work setting. Melopomene 1996;15(3):23-7.

(54) Jaffee L, Lutter JM, Rex J, Hawkes C, Bucaccio P. Incentives and barriers to physical activity for working women. Am J Health Promot 1999 Mar-Apr;13(4):215-8.

(55) Brisson C, Larocque B, Moisan J, Vezina M, Dagenais GR. Psychosocial factors at work, smoking, sedentary behavior, and body mass index: a prevalence study among 6995 white collar workers. J Occup Environ Med 2000 Jan;42(1):40-6.

(56) Burdette HL, Whitaker RC. A national study of neighborhood safety, outdoor play, television viewing, and obesity in preschool children. Pediatrics 2005;116(3):657-62.

(57) MacLeod KE, Gee GC, Crawford P, Wang MC. Neighbourhood environment as a predictor of television watching among girls. J Epidemiol Community Health 2008 Apr;62(4):288-92.

(58) Matthews CE, Chen KY, Freedson PS, Buchowski MS, Beech BM, Pate RR, et al. Amount of time spent in sedentary behaviors in the United States, 2003-2004. Am J Epidemiol 2008 Apr 1:167(7):875-81.

(59) Sedentary Behaviour Research Network. Record of discussion. International Congress on Physical Activity and Public Health; October 31, 2012; Sydney, Australia.

(60) Steinbeck K. The importance of physical activity in the prevention of overweight and obesity in childhood: a review and an opinion. Obes Rev 2001 May;2(2):117-30.

(61) Ekelund U, Aman J, Yngve A, Renman C, Westerterp K, Sjöström M. Physical activity but not energy expenditure is reduced in obese adolescents: a case-control study. Am J Clin Nutr 2002 Nov;76(5):935-41.

(62) Johnson M, Figueroa-Colon R, Herd S, Fields D, Sun M, Hunter G, et al. Aerobic fitness, not energy expenditure, influences subsequent increase in adiposity in black and white children. Pediatrics 2000 Oct;106(4):E50.

(63) Salbe AD, Weyer C, Lindsay RS, Ravussin E, Tataranni PA. Assessing risk factors for obesity between childhood and adolescence: birth weight, childhood adiposity, parental obesity, insulin, and leptin. Pediatrics 2002 Aug;110(2 Pt 1):299-306.

(64) Mutz D, Roberts D, van Vuuren D. Reconsidering the displacement hypothesis: television's influence on children's time use. Communic Res 1993 Feb;20(1):51-75.

(65) Hardy LL, Dobbins TA, Denney-Wilson EA, Okely AD, Booth ML. Descriptive epidemiology of small screen recreation among Australian adolescents. J Paediatr Child Health 2006 Nov;42(11):709-14.

(66) Burke V, Beilin LJ, Durkin K, Stritzke WGK, Houghton S, Cameron CA. Television, computer use, physical activity, diet and fatness in Australian adolescents. Int J Pediatr Obes 2006;1(4):248-55.

(67) Must A, Bandini LG, Tybor DJ, Phillips SM, Naumova EN, Dietz WH. Activity, inactivity, and screen time in relation to weight and fatness over adolescence in girls. Obesity 2007;15(7):1774-81.

(68) Dietz WH, Gortmaker SL. Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. Pediatrics 1985;75(5):807-12.

(69) Fleming-Moran M, Thiagarajah K. Behavioral interventions and the role of television in the growing epidemic of adolescent obesity--data from the 2001 Youth Risk Behavioral Survey. Methods Inf Med 2005;44(2):303-9.

(70) Boone J, Gordon-Larsen P, Adair L, Popkin B. Screen time and physical activity during adolescence: longitudinal effects on obesity in young adulthood. Int J Behav Nutr Phys Act 2007;4(1):1-10.

(71) Kaufman A, Augustson EM, Patrick H. Unraveling the relationship between smoking and weight: the role of sedentary behavior. J Obes 2012;2012:735465.

(72) Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. Appl Physiol Nutr Metab 2010 Dec;35(6):725-40.

Smoking Tobacco

Anna Liwander, Ann Pederson and Wendy Rice

Tobacco use damages women's health both through their own tobacco use and through exposure to other people's smoking. Hence numerous health strategies in Canada (1-4) have focused on both reducing tobacco use through preventing initiation and supporting smoking cessation as well as limiting exposure to second-hand smoke through smoking restrictions. The *Integrated Pan-Canadian Healthy Living Strategy* (5) identified tobacco as one of the major contributors to cardiovascular disease, cancer, diabetes and respiratory disease and noted that tobacco control was an existing area of emphasis and action by governments and health systems in Canada. Given the long history of tobacco-related action in the country, the *Strategy* focused on the newer target areas of promoting healthy eating, physical activity and healthy weights. Yet given the pervasive effects of smoking on women's health, addressing tobacco use remains a critical aspect of any healthy living agenda for women in Canada.

In the past two decades, smoke-free policies—that is, policies which limit or prohibit smoking in particular settings—have expanded to include not just workplaces and indoor areas but also some outdoor public places such as restaurant patios and, more recently, beaches, parks and playgrounds. These policies have the potential to encourage women to make healthier choices and increase their access to healthier environments but also risk further stigmatizing female smokers, some of whom often occupy marginalized positions in Canadian society. Women who smoke are often stigmatized for doing so, particularly if they are pregnant and/or mothering.

Smoke-free policies have played an important role in reducing overall smoking prevalence but Amos and colleagues (6) argue that "these declines have not been equitable across population subgroups". For example, it has been suggested that smoke-free policies have not considered socio-economic disparities and have had limited impact on girls and women with low-socioeconomic status (6, 7). In 2011, 17.9% of women in Canada reported current smoking according to Statistics Canada (8) but smoking rates are higher in some groups, including young women, women living with low income, single mothers, Aboriginal women (9) and women who have survived sexual and physical abuse (10). The fact that smoking is more common in some groups than others suggests that tobacco control efforts may benefit from being aligned with these usage patterns.

Overall smoking rates are decreasing in Canada but are higher in some groups of women, including young women, women with low income, single mothers, Aboriginal women and women who have survived sexual and physical abuse.

Smoking is associated with a number of serious health issues including heart disease, stroke, chronic obstructive pulmonary disease (COPD), cervical cancer, breast cancer and lung cancer (11, 12). Women who smoke tobacco are also at risk of developing health problems related to hormonal status and reproductive function. For example, smoking during pregnancy poses health risks for both the woman and the fetus, including increased risk of preterm delivery, spontaneous abortion, growth restrictions for the fetus, increased risk of sudden infant death syndrome (SIDS) and may increase the risk of long-term behavioural and psychiatric disorders for the child (13). Health Canada (14) also notes that cigarette smoking could lower estrogen levels, leading to early menopause, and may be associated with infertility.

Exposure to second-hand smoke may increase the risk of coronary heart disease (15), lower respiratory infections, asthma and lung cancer (16). Delayed sex-specific effects of second-hand smoke may put girls and women at particular risk of certain health outcomes such as breast cancer (6, 12). Despite evidence suggesting that women may be particularly vulnerable to the effects of smoking, tobacco policies have largely been sex- and gender-blind (6).

In this chapter, we describe smoking rates among women in Canada with a particular focus on pregnant and breastfeeding women—the two times when researchers and health care providers have paid the most attention to women's smoking. We discuss smoking cessation and women's exposure to second-hand smoke as well as how smoking is associated with other practices that are a focus of concern in healthy living, particularly the use of alcohol and experiences of violence. Finally, we argue that given the current patterns of prevalence and frequency of smoking among women in Canada, efforts to address tobacco use may need to be tailored to specific sub-populations of women as well as the traditional focus on reducing maternal smoking.

Defining and Measuring Smoking

Smoking refers to the inhalation of the smoke of burning tobacco in cigarettes, pipes or cigars while second-hand smoke refers to the smoke that smokers exhale from a burning cigarette (17) and which may in turn be inhaled by other people. Cigarettes remain the most common form of tobacco use in Canada but other forms of tobacco are consumed and, in some parts of the world, are more common forms of tobacco use among women and girls.

In order to classify smokers, measurements typically document the frequency of smoking and quantity of cigarettes smoked. Given that the effects of smoking are tied to the intensity and duration of exposure, Statistics Canada (18) identifies three main categories of smokers: *current smoker* (which includes daily smokers and occasional smokers), *daily smoker* (a smoker who smokes cigarettes every day) and *occasional smoker* (an individual who smoked at least one cigarette during the past 30 days but not every day). Other categories of smoking status include former smokers and never-smoker (among others) (19).

In this chapter, smoking rates are described primarily using sex-disaggregated, self-reported data from the Canadian Community Health Survey (CCHS) 2005 and 2009/2010. We also report smoking rates from the Canadian Drug Use Monitoring Survey (CADUMS) 2010 and publically available summary data tables and publications including results from the Canadian Tobacco Use Monitoring Survey (CTUMS) 2006, the Canadian Maternity Experiences Survey (MES) 2006/2007 and the First Nations Regional Longitudinal Health Survey (RHS) 2008/2010. Results from the MES were used to report on smoking during pregnancy. This was also included in the CCHS but secondary analyses of CCHS results were not feasible due to the small sample of women who reported smoking during pregnancy in that survey. Results from the RHS were used to describe smoking among Aboriginal women living on reserve specifically.

Many studies on smoking, including the CCHS, MES, CTUMS and RHS, rely on self-reported rates of tobacco use which may be subject to social desirability bias due to the increasing stigma attached to smoking, in particular smoking during pregnancy. Rates that have been reported may therefore under-represent the actual percentage of women who smoke. More objective measures, such as measuring carbon monoxide in expired air or biomarkers such as serum, saliva, urine or hair concentration of cotinine (the primary metabolite of nicotine) (19-22), have not been used in these larger national surveys in Canada to date.

Women and Tobacco Use in Canada

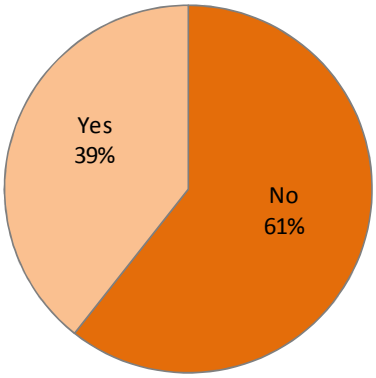
This section focus on the prevalence and frequency of smoking among women in Canada including smoking during pregnancy and while breastfeeding, smoking cessation and exposure to second-hand smoke.

Prevalence and Frequency of Smoking among Women in Canada

Overall smoking rates are decreasing in Canada (23). Among women, a modest decrease can be noted when comparing smoking rates between 2003 and 2011. Statistics Canada (8) reports that in 2003, more than 21% of women in Canada (aged 12 years and older) were considered current smokers (daily or occasional) and 16.3% were classified as daily smokers according to self-reported results from the CCHS. In 2011, the rates had decreased to 17.9% of women reported being current smokers and 13.5% daily smokers.

Results from CADUMS (2010) suggest that 39.3% (95% confidence interval [CI], 37.4-41.2) of women in Canada have consumed at least 100 cigarettes in their lifetime (Figure 1).

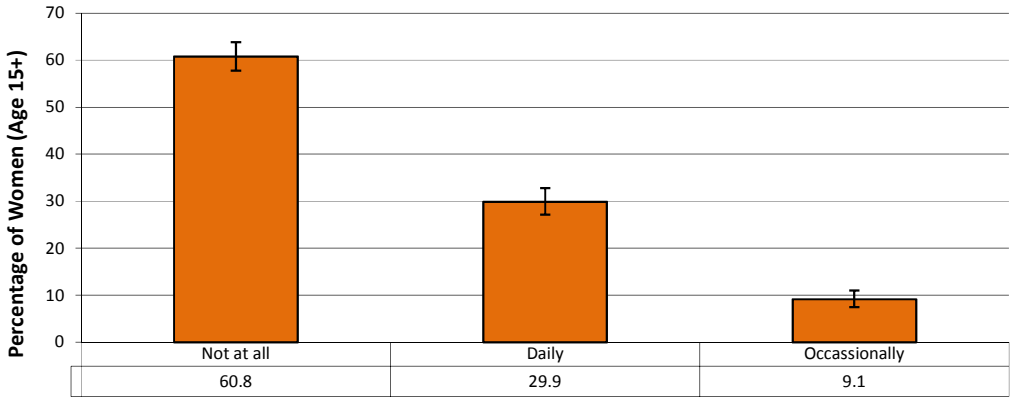
Figure 1. Percentage of women who have smoked at least 100 cigarettes in their lifetime Women in Canada, 2010



SOURCE: Canadian Drug Use Monitoring Survey (CADUMS), 2010. SPSS Complex Sample software was used to calculate the standard errors, which were used to produce the coefficient of variation (CV). Missing values: 0%.

Among these women, 29.9% (95% CI, 27.1-32.8) were currently considered daily smokers and 9.1% (95% CI, 7.5-11.0) occasional smokers. The majority of women, however, had stopped smoking (60.8%; 95% CI, 57.8-63.8) (Figure 2).

Figure 2. Current smoking behaviour among women who have ever smoked, Women in Canada, 2010



SOURCE: Canadian Drug Use Monitoring Survey (CADUMS), 2010. SPSS Complex Sample software was used to calculate the standard errors, which were used to produce the coefficient of variation (CV). Missing values: 0%.

Some women are more likely to smoke than others and smoking rates in Canada tend to vary depending on where women live, their socioeconomic status, level of education, age and Aboriginal identity. Results from the CCHS (2009/2010) suggest that the largest proportion of daily and occasional smokers could be found in the three territories (Yukon, Nunavut and the Northwest Territories) where 48.7% (95% CI, 44.7-52.7) of women who reported ever smoking were daily smokers and 10.5% (95% CI, 8.2-12.8) occasional smokers. The daily smoking rate in the three territories was almost twice as high as in most Canadian provinces. Women in Saskatchewan were also more likely to report daily smoking (30.4% of women who reported ever smoking) than the female average in Canada.

The daily smoking rate in the three territories was almost twice as high as in most Canadian provinces among women who reported ever smoking.

Smoking rates also vary by socioeconomic status and the majority of female daily smokers were found in low socioeconomic groups. Results from the CCHS (2009/2010) suggest that 41.5% (95% CI, 39.1-43.8) of women in the lowest income decile (who reported ever smoking) were daily smokers and daily smoking rates decreased steadily with higher income. Results from the CCHS (2009/2010) also indicate that daily smoking rates are higher among women with lower levels of education, ranging from 36% (95% CI, 34.2-37.9) of women with less than secondary education to 20.8% (95% CI, 19.8-21.8) of women with post-secondary education. Occasional smoking rates, however, do not seem to follow the same pattern. Occasional smoking was reported by 7.2% (95% CI, 6.2-8.1) of women with less than secondary education (who had ever smoked) and by 8.1% (95% CI, 7.4-8.7) of women with post-secondary education.

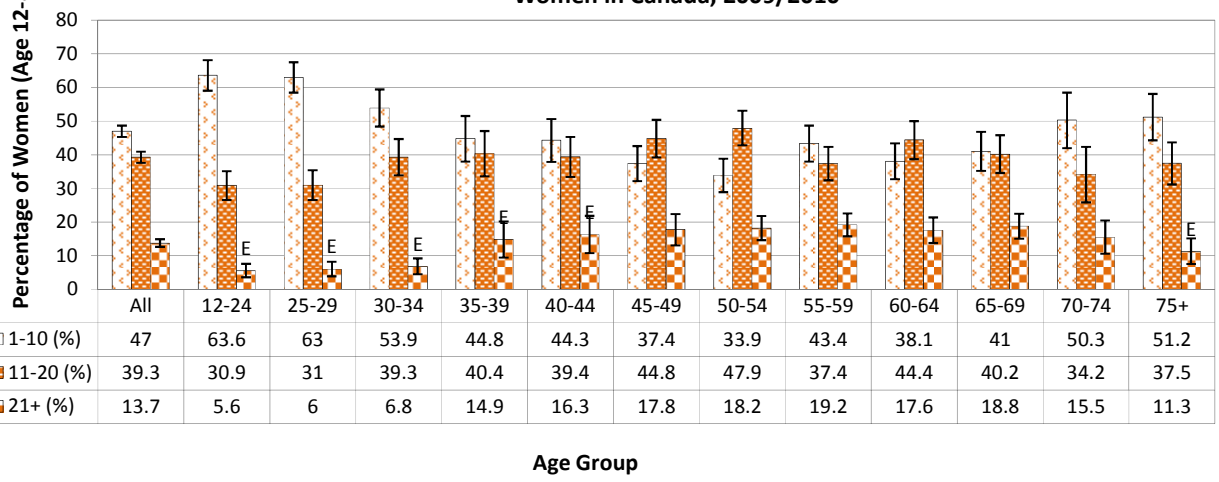
Smoking rates decrease with age and results from the CCHS (2009/2010) suggest that daily smoking was more common in younger age groups and least common among women aged 65 years and older. Occasional smoking rates also decrease with age and the highest percentage of occasional smokers was found in the younger age groups (12-24 year olds). Smoking among young women is particularly concerning as the majority of smokers begin daily smoking when they are teenagers and those who initiate daily smoking at an early age are more likely to smoke more cigarettes per day and are also less likely to quit smoking (24).

Smoking rates in the Aboriginal population are high and it has been estimated that the rates could be more than double the rates in the general Canadian population (25). Results from the CCHS (2009/2010) suggest that Aboriginal women living off-reserve are more likely to be both daily smokers (43.1%; 95% CI, 39.8-46.4) and occasional smokers (10.3%; 95% CI, 8.2-12.4) than non-Aboriginal women (25.1%; 95% CI, 24.3-25.8 daily smokers and 7.8%; 95% CI, 7.2-8.3 occasional smokers). Smoking rates among First Nations girls may be of particular concern and although we do not have age-specific rates from the CCHS for the Aboriginal population, results from the First Nations Regional Longitudinal Health Survey (25) suggest that 33% of First Nations girls (aged 15-17 years) living on reserve reported smoking in 2008/2010.

Number of Cigarettes Smoked by Women in Canada

Data from the CCHS (2009/2010) suggest that among female daily smokers, 47% (95% CI, 45.3-48.7) smoke 1-10 cigarettes per day and 39.3% (95% CI, 37.6-40.9) smoke 11-20 cigarettes per day. Close to 14% (13.7%; 95% CI, 12.6-14.9) of female daily smokers smoke more than a pack of cigarettes (21 cigarettes or more) per day. This is most common among women aged 45-69 years. As seen in Figure 3, young female daily smokers tend to smoke fewer cigarettes per day than women in older age groups (26).

Figure 3. Number of Cigarettes Smoked Each Day Among Daily Smokers, by Age Women in Canada, 2009/2010



	All	12-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
1-10 (%)	47	63.6	63	53.9	44.8	44.3	37.4	33.9	43.4	38.1	41	50.3	51.2
11-20 (%)	39.3	30.9	31	39.3	40.4	39.4	44.8	47.9	37.4	44.4	40.2	34.2	37.5
21+ (%)	13.7	5.6	6	6.8	14.9	16.3	17.8	18.2	19.2	17.6	18.8	15.5	11.3

SOURCE: Canadian Community Health Survey (CCHS), 2009/2010. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV range from 16.6% to 33.3%. Interpret these results with caution. Missing values: 0.6%.

Smoking during Pregnancy, Breastfeeding and Post-partum

Smoking during pregnancy is not only harmful for mothers but also increases the risk of pre-term delivery, spontaneous abortion, growth restrictions for the fetus sudden infant death syndrome (SIDS) and long-term behavioural and psychiatric disorders for the fetus and child (13). It has also been suggested that children of women who smoked during pregnancy may also be more likely to become smokers "because of biological predispositions established during fetal development" (27).

As noted earlier in this chapter, CCHS data could not be used to describe women's smoking behaviour during pregnancy due to the small sample size. In this section we therefore rely on results from the Canadian Maternity Experiences Survey (MES) 2006/2007 as reported in *What Mothers Say* (28) from the Public Health Agency of Canada (PHAC). It should be noted that this survey also relies on self-reports so the actual prevalence of smoking during pregnancy may be higher than reported.

The Public Health Agency of Canada (28) reports that in 2005, 13.4% of women who gave birth in the previous 5 years reported smoking during pregnancy. Results from the First Nations RHS (29) suggest that smoking rates during pregnancy among First Nations women may be particularly concerning as an analysis from the survey estimated that 46.9% of women reported smoking during pregnancy in 2008/2010.

In the MES (28), women were asked to retrospectively report their smoking status at three time points: 1) during the 3 months prior to pregnancy (or before realizing they were pregnant); 2) during the last 3 months of pregnancy; and 3) post-pregnancy (5-14 months postpartum). In 2006/2007, almost 16% (15.8%; 95% CI, 14.9-16.7) of women self-reported smoked daily *prior to pregnancy* and 6.2% (95% CI, 5.6-6.9) smoked occasionally. The largest proportion of women did not smoke at all (78%; 95% CI, 77.0-78.9) (Figure 4).

During the *last three months of pregnancy*, reported smoking rates decreased, with only 6.9% (95% CI, 6.2-7.5) of women reporting daily smoking, 3.6% (95% CI, 3.2-4.1) reporting occasional smoking and 89.5% (95% CI, 88.8-90.2) did not smoke at all (Figure 5).

Smoking rates *post-pregnancy* were slightly higher than during pregnancy but did not exceed smoking rates prior to pregnancy. Daily smoking was reported by 11.7% (95% CI, 10.9-12.4) of women, 4.9% (95% CI, 4.4-5.4) were occasional smokers and 83.5% (95% CI, 82.6-84.3) did not smoke at all (Figure 6).

Figure 4. Smoking pre-pregnancy
Women in Canada, 2006/2007

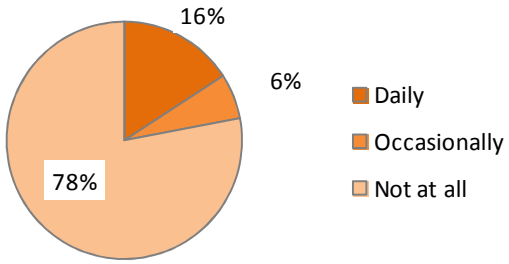


Figure 5. Smoking during pregnancy
Women in Canada, 2006/2007

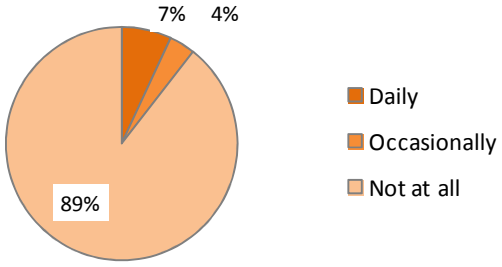
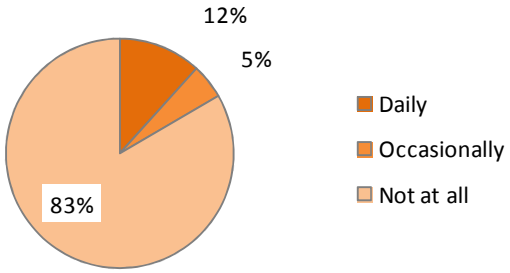


Figure 6. Smoking post-pregnancy
Women in Canada, 2006/2007



SOURCE FOR 4,5 AND 6: Canadian Maternity Experiences Survey (2006/2007), What Mothers Say.

Al-Sahab (30) notes that women living on low income, women with less social support and heavy smokers are more likely to smoke during pregnancy. Results from the MES (2006/2007) support this observation and suggest that 20.0% (95% CI, 17.7-22.3) of women with a household income at or below the low income cut-off smoked daily or occasionally during pregnancy in comparison with only 7.7% (95% CI, 6.9-8.4) of women with a household income above the low income cut-off (28). Further, results from the MES (28) suggest that women without a partner and women who do not attend prenatal classes are more likely to smoke during pregnancy than women who are partnered and those who attend prenatal classes. In the United States, it has been reported that women with higher education, older women, light smokers (<50 ng/ml baseline cotinine), women with high social support, those with non-smoking partners and family members, as well as immigrant and minority women are more likely to quit smoking when pregnant (31). Many women, however, stop smoking before their first prenatal visit or in the first few weeks of pregnancy, which makes it difficult to capture the proportion of women who smoke in very early pregnancy and the proportion who quit, but this has been estimated at 25% [personal communication with L Greaves, PhD, September, 2012].

An emerging body of research (31, 32) suggests that some women resume smoking following delivery. It has been estimated that among those who quit smoking prior to getting pregnant or while pregnant, relapse at one year postpartum could be as high as 90% (31). Results from the MES (28) suggest that in 2006/2007, 47.0% (95% CI, 43.4-50.6) of women who smoked daily or occasionally prior to pregnancy, but were not smoking during the third trimester of pregnancy, had actually resumed smoking daily or occasionally 5-14 months postpartum. Smoking prior to pregnancy, during pregnancy and postpartum was more common among younger women (15-19 years) than in any other age group (28).

Women who smoke while breastfeeding may pass nicotine to the baby through breast milk. Goldade et al. (33) suggest that women who smoke are less likely to initiate breastfeeding and often breastfeed for a shorter period of time than women who do not smoke. Results from the CCHS (2005) indicate that 10% (95% CI, 8.8-11.2) of women who identified themselves as occasional smokers smoked daily while breastfeeding their last baby. This rate may be higher in younger women and CCHS data (2005) indicate that 19.9% (95% CI, 15.3-24.5) of women aged 18-24 years reported smoking daily while breastfeeding.

Rates of daily smoking while breastfeeding follow a similar pattern as smoking rates in general and smoking rates during pregnancy. That is, smoking while breastfeeding is more common among women with lower levels of education and income. In 2005, 30.3% (95% CI, 24.1-36.6) of female occasional smokers with less than secondary education reported smoking daily while breastfeeding and 19.0% (95% CI, 13.5-24.6) reported occasional smoking. More than one in five women (21.3%; 95% CI, 17.9-24.7) in the lowest income group and 11.8% (95% CI, 8.9-14.8) of women in the second lowest income group who identified themselves as occasional smokers smoked daily while breastfeeding their last baby (34).

The number of cigarettes smoked may also have an impact on breastfeeding duration as women who smoke a large number of cigarettes often breastfeed for shorter periods of time (34). Results from the CCHS (2005) suggest that among women who smoked daily while breastfeeding their last baby, most smoked 6-10 cigarettes per day (45.1%; 95% CI, 38.6-51.5), followed by 1-5 cigarettes per day which was reported by 31.2% (95% CI, 25.5-36.9) of women (34).

Smoking Cessation

Treatment for tobacco dependence can include several types of interventions including behavioural interventions (such as advice and counselling), pharmaceutical interventions (such as nicotine replacement therapies), or a combination of both. Nicotine replacement therapies (NRT) include nicotine gums and patches that are intended to reduce nicotine withdrawal symptoms for people that are trying to quit smoking. These were recently added to the WHO's Model List of Essential Medicines; a list that is used by many governments as a "guide for determining which medicines should be made available to their citizens at low cost" (35). However, access to affordable cessation medications, such as NRT, still remains a challenge for some people in Canada including low-income smokers and smokers with mental health issues, reducing their likelihood for successful smoking cessation. Murray and colleagues (36) argue that disadvantaged groups may experience particular barriers to accessing smoking cessation services because many services are located in more affluent areas. Other barriers include fear of being judged and lack of knowledge about existing services. Given that smoking is often concentrated in particular groups and that these groups do not necessarily have access to cessation service or experience other barriers to smoking cessation, it has been suggested that smoking is one of the main contributors to health inequities (36).

Research (6, 37) also suggests that women may experience greater difficulty quitting smoking than men, which could be a function of biological and psychosocial aspects of addiction and dependence (6, 28, 38). For example, Amos et al. (6) argue that "smoking has a perceived functional value in the lives of low-income single mothers, who use smoking to cope and provide care in disadvantaged circumstances, making cessation more difficult". It has also been suggested that women metabolize nicotine differently than men (39) and that nicotine replacement therapy may be less effective for women (6, 40).

Women metabolize nicotine differently than men and nicotine replacement therapy may be less effective for women.

Leatherdale and Shields (41) analysed smoking cessation data from the Canadian Tobacco Use Monitoring Survey (CTUMS) (2006) and found that 48.3% of female smokers (aged 15 or older) made one or more attempts to quit that lasted at least 24 hours in the past year. Cessation aids are thought to reduce the likelihood of relapse and among the women who made at least one quit attempt, 49.2% used either a nicotine patch, nicotine gum or other pharmaceutical-based cessation aids to quit smoking, with the nicotine patch being the most common cessation aid (35.4%). The main reason for not using cessation aids include concern

over potential side effects (23.4%), cost (22.3%) and some women did not believe that the products actually work (18.7%) (41). Advice from a health professional has been shown to be an important factor in smoking cessation. Although 83.8% of smoking women indicated that they had seen a doctor in the past 12 months, less than half (48.2%) had been advised to reduce/quit smoking and 50.2% had been provided information on cessation aids (41).

In the CCHS (2009/2010) participants were asked to identify whether they have done anything to improve their health in the last year and what the most important change was. Among women who reported that they had done anything to improve their health, most women reported that they exercised more (51.6%), had improved their eating habits (17.1%) or lost weight (11.3%). Just over 4% (4.3%; 95% CI, 4.0-4.6) of women said that "smoking less or quit smoking" was the single most important change they had made. This was fairly consistent across all age groups but more common in the territories than any of the provinces, and slightly more common in the lowest income decile compared to other income groups. Less smoking (or smoking cessation) as the single most important change made to improve health was stated by 6.9% (95% CI, 5.2-8.5) of Aboriginal women living off-reserve and 4.2% (95% CI, 3.9-4.5) of non-Aboriginal women.

In 2009/2010, results from the CCHS show that 66.1% (95% CI, 65.3-66.9) of females who had ever smoked considered themselves former smokers, meaning that they were not smoking at the time of the interview but had smoked at least 100 cigarettes in their lifetime. The rates of former smokers were higher among women with post-secondary graduation, women in higher income groups, among older women and non-Aboriginal women. No differences, however, were noted when comparing urban and rural areas. The largest percentage of former smokers was found in the highest age group (65 years and older) where the rate was 82.4% (95% CI, 81.3-83.5). Rates of former smokers were fairly consistent across Canada (around 60% among those who ever smoked), with the exception of British Columbia where 70.8% (95% CI, 68.6-73.1) of women who ever smoked reported being former smokers, and the three territories where the rate of former smokers was much lower (40.9%; 95% CI, 37.4-44.4) (26). The most frequently reported reason for beginning to smoke again (among women who had made at least one quit attempt in the past year), was experiencing stress, needing to relax or calm down (39.2%), addiction or habit (23.9%), and having family and friends who smoke (12.9%) (41).

Exposure to Second-hand Smoke

Healthy living discussions on tobacco should include second-hand smoke exposures because women can be exposed to the harmful effects of other people's tobacco use in the home, in vehicles, at the workplace and in public places. As noted earlier in this chapter, exposure to second-hand smoke is associated with a number of health effects for smokers and non-smokers, including coronary heart disease (15), lower respiratory infections, asthma and lung cancer (16). Barnoya and Glantz (15) suggest that exposure to second-hand smoke could increase the risk of coronary heart disease by almost 30%. Girls and women may be at particular risk of certain health effects associated with exposure to second-hand smoke, including breast

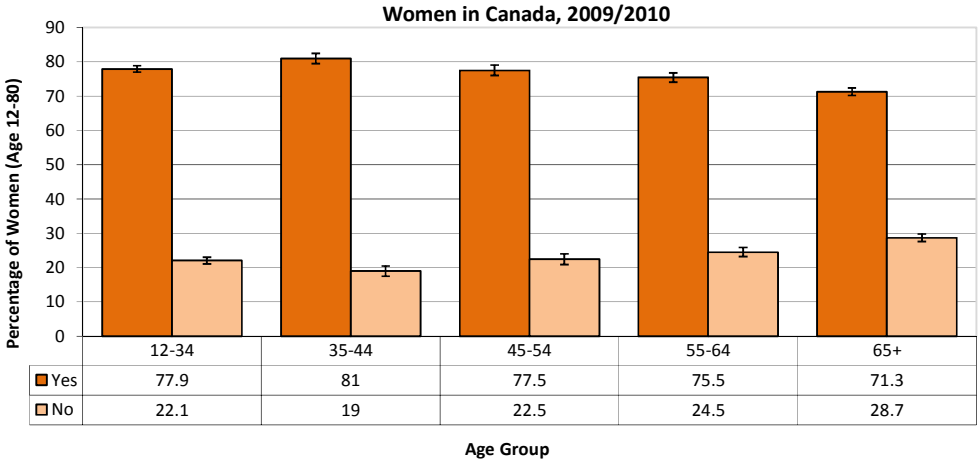
cancer, which is a sex-specific delayed effect of second-hand smoke on adolescent girls (6, 12). Öberg and colleagues (16) also argue that women may be at greater risk of experiencing exposure to second-hand smoke because smoking regulations have not reached into homes which is the "main place of exposure for women and children" (16). Further, in their estimate of the worldwide burden of disease attributed to exposure to second-hand smoke, Öberg et al. (16) found that most deaths from second-hand smoke occur in women (47% in women compared to 28% in children and 26% in men).

Several gender-related factors can influence women's exposure to second-hand smoke (42-44), including unequal power and income differences. For example, some women may not feel comfortable, or have the power, to negotiate smoke-free policies in the household or in the car if their partner smokes. Women are also more likely to work in the service industry or in private homes where they may be exposed to second-hand smoke (45). Restrictions on smoking in the workplace and public spaces can therefore be important supports for limiting women's exposure to second-hand tobacco smoke.

Statistics Canada (8) reports that in 2010, 5% of non-smoking girls and women aged 12 years and older were exposed to second-hand smoke at home and 15% in vehicles and/or public places. Although exposure to second-hand smoke in the home and in vehicles has decreased over the last few years, a slight increase can be noted in the percentage of women who report being exposed to second-hand smoke in public places (8), which may be a result of increased awareness of second-hand smoke in the general population leading more people to report exposure, but may also be an indication of the transfer of smoking from one setting to another.

Results from the CCHS (2009/2010) suggest that 79.1% (95% CI, 78.3-79.9) of female respondents had some sort of smoking restriction in the home. While women in nearly all age groups report smoking restrictions in their homes, the older age groups were slightly less likely to have restrictions and nearly 30% of women in the oldest age category reported having no restrictions (Figure 7).

Figure 7. Smoking Restrictions in the Home, by Age Women in Canada, 2009/2010

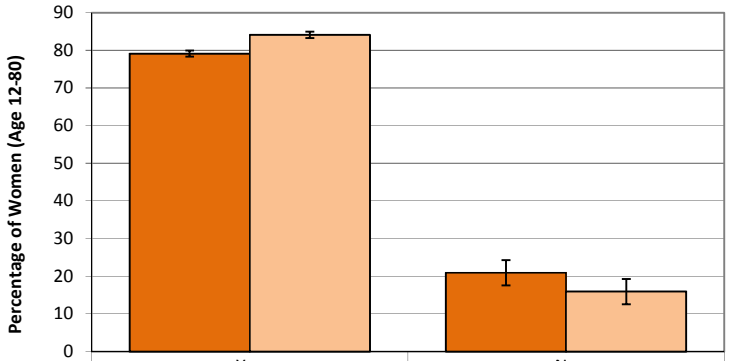


	12-34	35-44	45-54	55-64	65+
Yes	77.9	81	77.5	75.5	71.3
No	22.1	19	22.5	24.5	28.7

SOURCE: Canadian Community Health Survey (CCHS), 2009/2010. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values: 3.6%

Pregnant women were more likely to report smoking restrictions in the home than non-pregnant women. In 2009/2010, 84.1% (95% CI, 80.7-87.5) of pregnant women had smoking restrictions at home (Figure 8). According to Leatherdale and Shields (41), having children in the home is "the strongest predictor of having a smoke-free home". Regional comparisons in exposure to second-hand smoke at home show that 10% of women in Nunavut and Manitoba reported being exposed to second-hand smoke at home compared to only 4-5% of women in British Columbia, Ontario and Alberta (8).

Figure 8. Smoking Restrictions in the Home, All Women compared to Pregnant Women Women in Canada, 2009/2010



	Yes	No
All Women	79.1	20.9
Pregnant Women	84.1	15.9

SOURCE: Canadian Community Health Survey (CCHS), 2009/2010. Bootstrapping techniques were used to produce the coefficient of variation (CV). Missing values: 3.6%

Policy and Practice Regarding Tobacco Use

All provinces and territories in Canada have implemented smoking restrictions in indoor public spaces and/or workplaces (20, 22). These policies were implemented to shift practices and norms in public places, to reduce indoor air pollution and improve the health of the general public and workers, especially in reducing respiratory symptoms among bar and restaurant workers (46-48).

In recent years, some municipalities have adopted more comprehensive smoke-free polices that have extended their breadth and scope to restrict smoking in large outdoor public areas such as parks, beaches and playgrounds as well as in private enclosed spaces such as apartment buildings and private cars. Vancouver was among the first cities in Canada to implement outdoor smoking policies in parks and beaches in 2012. Cities have adopted these policies as a result of

Smoke-free policies have had limited impact on girls and women with low socio-economic status.

increased awareness of the negative effects of exposure to second-hand smoke and strong public interest in second-hand-smoke protection (49). A research group led by the BC Centre of Excellence for Women's Health in Vancouver has explored the impact that these outdoor smoking policies may have on marginalization and stigmatization of smokers. They note that smoke-free policies may contribute to inequities as the policies may have differential impacts based on gender (42-44), age (50), ethnicity (51) and income level (43, 53). For example, the denormalization of tobacco use may result in smokers having difficulty finding housing, they may be discriminated against at work and experience feelings of shame that may prevent smokers from seeking health care. This is supported by Bell and colleagues (53) who note that "stigmatizing smoking is likely to increase health inequalities among disadvantaged women and men who smoke by decreasing their access to care and smoking cessation interventions". Pregnant women may be particularly vulnerable as the social stigma attached to smoking during pregnancy may cause additional delays in treatment seeking and prevent many women from seeking cessation assistance. It has also been argued that smoke-free policies have not considered socio-economic disparities and have had limited impact on girls and women with low-socioeconomic status (6, 7).

In Canada, the federal *Tobacco Control Strategy* (54) aims to reduce tobacco-related death and disease among Canadians through a focus on protection, prevention, cessation and harm reduction but the Strategy does not consider sex or gender nor the health effects that are associated with smoking tobacco for women (5, 35) . Given the inequity that exist in smoking rates between women and men, as well as between groups of women, there is a clear need for gender-sensitive smoke-free policies that adopt a wider health and social justice approach (44). Efforts to address tobacco use should also be tailored to certain groups of women, including low income women and women with mental health issues that often experience barriers in accessing cessation services and may be in need of free nicotine replacement therapies (NRT) and other interventions in order to enhance their likelihood for successful smoking cessation.

Women, Smoking and Healthy Living

Tobacco use has been found to be associated with other aspects of healthy living including the use of alcohol, experiences of violence and food insecurity as well as concerns about body weight. For example, research (55) suggests that young women (15-19 years) who consume alcohol may be more likely to use other substances such as tobacco and that smokers also tend to consume more alcoholic drinks than non-smokers. It has also been suggested that having a smoker in the household may increase the risk of engaging in heavy drinking (56).

Smoking tobacco is associated with coping with experiences of abuse or violence. Tjaden and Thoennes (57) note that "Girls who have been physically or sexual abused are twice as likely to smoke, drink or use drugs as those who were not abused". They are also more likely to initiate substance use at an earlier age, to use substances more often and in greater quantities (57). Others (45) have noted that smoking is linked with food

insecurity as purchasing cigarettes may increase the risk of household or female poverty and can cause food insecurity among those living with low income. Some women may also be more reluctant to quit smoking because of concerns related to body image and body weight. This tendency is possibly a result of tobacco marketing where cigarettes are often branded as a means to achieve cultural ideals of thinness (58).

Summary

In 2011, 17.9% of women in Canada reported current smoking (8) but the rates are higher in some groups of women including young women, women living with low income, single mothers, Aboriginal women (9) and women who have survived sexual and physical abuse (10). Women are also exposed to other peoples tobacco use and, in 2010, 5% of non-smoking girls and women (aged 12 years and older) reported being exposed to second-hand smoke at home and 15% in vehicles and/or public places (8). Hence both exposure to second-hand smoke and smoking remain important health issues for women and girls.

A complex set of issues affect women's tobacco use and it has been suggested that there are both biological and social factors that contribute to girls and women being particularly vulnerable to health outcomes resulting from tobacco use (27). For example, girls and women who smoke may be at greater risk of developing health problems such as cervical cancer and chronic obstructive pulmonary disease (11, 12), and smoking can affect women's hormonal status and reproductive function (14). Additionally, there are delayed sex-specific effects of second-hand smoke that may put girls and women at particular risk of certain health outcomes such as breast cancer (6, 12). Gender-related factors may influence women's smoking behaviour and their ability to negotiate smoke-free environments, including unequal power and income differences within families that may pose barriers for some women to implement a smoke-free home and/or car. Despite these differences between women and men, as well as between groups of women, smoke-free policies have been largely sex and gender blind. Although smoke-free policies have been effective in reducing smoking rates in the general population, these declines have not been equitable across population subgroups (6) and it is time to explore how gender-responsive programs and policies could enhance tobacco control efforts and reduce women's smoking and exposure to second-hand smoke.

References

(1) Health Canada. Federal tobacco control strategy [Internet]. Ottawa: Health Canada; [cited 12 Dec 2011]. Available from: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/about-apropos/role/federal/strateg-eng.php

(2) PEI Strategy for Healthy Living Steering Committee. Prince Edward Island strategy for healthy living. Charlottetown (PE): Department of Health and Social Services; 2003.

(3) BC Healthy Living Alliance. Tobacco reduction strategy. Vancouver: BC Healthy Living Alliance; 2007.

(4) Tobacco Strategy Advisory Group. Building on our gains, taking action now: Ontario's tobacco control strategy for 2011-2016 [Internet]. Toronto: Tobacco Strategy Advisory Group; 2010 [cited 1 Mar 2012]. Available from: http://archive.tobacco.org/news/309304.html

(5) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 15 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

(6) Amos A, Greaves L, Nichter M, Bloch M. Women and tobacco: a call for including gender in tobacco control research, policy and practice. Tob Control 2012;21(2):236-43.

(7) Greaves L, Johnson J, Bottorff J, Kirkland S, Jategaonkar N, McGowan M, et al. What are the effects of tobacco policies on vulnerable populations? A better practices review. Can J Public Health 2006 Jul-Aug;97(4):310-5.

(8) Statistics Canada. Health trends [Internet]. Ottawa: Statistics Canada; 2012 [cited 15 Jun 2012]. Available from: http://www12.statcan.gc.ca/health-sante/82-213/index.cfm?Lang=eng

(9) Poole N, Greaves L, editors. Highs and lows: Canadian perspectives on women and substance use. Toronto: Centre for Addiction and Mental Health; 2007.

(10) Nichols HB, Harlow BL. Childhood abuse and risk of smoking onset. J Epidemiol Community Health 2004 May;58(5):402-6.

(11) Canadian Women's Health Network. Highs & lows: Canadian perspectives on women and substance use [Internet]. Winnipeg: Canadian Women's Health Network; 2007 [cited 15 Jun 2012]. Available from: http://www.cwhn.ca/node/39425

(12) Johnson KC, Miller AB, Collishaw NE, Palmer JR, Hammond SK, Salmon AG, et al. Active smoking and secondhand smoke increase breast cancer risk: the report of the Canadian expert panel on tobacco smoke and breast cancer risk (2009). Tob Control 2011 Jan;20(1):e2.

(13) Shea AK, Steiner M. Cigarette smoking during pregnancy. Nicotine Tob Res 2008;10(2):267-78.

(14) Health Canada. Smoking and your body – pregnancy [Internet]. Ottawa: Health Canada; 2007 [cited 3 Nov 2011]. Available from http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/body-corps/preg-gros-eng.php

(15) Barnoya J, Glantz SA. Cardiovascular effects of secondhand smoke: nearly as large as smoking. Circulation 2005;111(20):2684-98.

(16) Öberg M, Jaakkola MS, Woodward A, Peruga A, Pruss-Ustun A. Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries. Lancet 2011 Jan 8;377(9760):139-46.

(17) Health Canada. Health concerns. Cigarette smoke: it's toxic – what is second-hand cigarette smoke? [Internet] Ottawa: Health Canada; 2007 [cited 15 Jun 2012]. Available from: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/second/fact-fait/tox-eng.php

(18) Statistics Canada. Health trends Statistics Canada – definitions [Internet]. Ottawa: Statistics Canada; 2010 [cited 17 Jun 2012]. Available from: http://www12.statcan.gc.ca/health-sante/82-213/help-aide/DQ-QD04.cfm?Lang=eng&TABID=0&PROFILE_ID=0&PRCODE=46&IND=R&SX=MALE&change=no

(19) Health Canada. Tobacco use statistics – terminology [Internet]. Ottawa: Health Canada; [cited 23 Nov 2011]. Available from: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/ctums-esutc_term-eng.php

(20) Americans for Nonsmokers' Rights (ANR). Canada [Internet]. Berkley (CA): ANR; [cited 10 Aug 2012]. Available from: http://www.no-smoke.org/learnmore.php?dp=d14%7Cd35%7Cp213

(21) Byrne DG, Mazanov J. Sources of adolescent stress, smoking and the use of other drugs. Stress Medicine 1999 Oct;15(4):215-27.

(22) Wikipedia. Smoking in Canada [Internet]. n.d. [cited 10 Aug 2012]. Available from: http://en.wikipedia.org/wiki/Smoking_in_Canada

(23) Greaves L, Jategoankar N, Sanchez S. Turning a new leaf: women, tobacco, and the future. Vancouver: British Columbia Centre for Excellence in Women's Health; International Network for Women against Tobacco; 2006.

(24) Chen J, Millar WJ. Age of smoking initiation: implications for quitting. Health Rep 1998 Spring;9(4):39-46(Eng)

(25) First Nations Information Governance Centre. Regional longitudinal survey (RHS) 2002/03. Results for adults, youth, and children living in First Nations communities. Ottawa: First Nations Information Governance Centre; 2005.

(26) Statistics Canada. Canadian community health survey - annual component (CCHS): detailed information for 2010 [Internet]. Ottawa: Statistics Canada; 2011 [cited 17 Jun 2012]. Available from: http://www23.statcan.gc.ca:81/imdb/p2SV.pl?Function=getSurvey&SurvId=3226&SurvVer=1&InstaId=15282&InstaVer=7&SDDS=3226&lang=en&db=imdb&adm=8&dis=2

(27) Greaves L, Jategaonkar N. Tobacco policies and vulnerable girls and women: toward a framework for gender sensitive policy development. J Epidemiol Community Health 2006 Sep;60(Suppl 2):57-65.

(28) Public Health Agency of Canada. What mothers say: the Canadian maternity experiences survey. Ottawa: Public Health Agency of Canada; 2009.

(29) First Nations Information Governance Centre. First Nations regional health survey (RHS) phase 2 (2008/10): national report on adults, youth and children living in First Nations communities. Ottawa: The First Nations Information Governance Centre; 2012.

(30) Al-Sahab B, Saqib M, Hauser G, Tamim H. Prevalence of smoking during pregnancy and associated risk factors among Canadian women: a national survey. BMC Pregnancy Childbirth 2010 May 24;10:24.

(31) Greaves L, Poole N, Okoli CTC, Hemsing N, Qu A, Bialystok L, et al. Expecting to quit: a best-practices review of smoking cessation interventions for pregnant and post-partum women. 2nd ed. Vancouver: British Columbia Centre of Excellence for Women's Health; 2011.

(32) Bittoun R, Femia G. Smoking cessation in pregnancy. Obstet Med 2010 Sep;3(3):90-3.

(33) Goldade K, Nichter M, Nichter M, Adrian S, Tesler L, Muramoto M. Breastfeeding and smoking among low-income women: results of a longitudinal qualitative study. Birth 2008;35(3):230-40.

(34) Statistics Canada. Canadian community health survey (CCHS): detailed information for 2005 (cycle 3.1) [Internet]. Ottawa: Statistics Canada; 2007 [cited 17 Jun 2012]. Available from: http://www23.statcan.gc.ca:81/imdb/p2SV.pl?Function=getSurvey&SurvId=3226&SurvVer=0&InstaId=15282&InstaVer=3&SDDS=3226&lang=en&db=imdb&adm=8&dis=2

(35) Kishore S, Bitton A, Cravioto A, Yach D. Enabling access to new WHO essential medicines: the case for nicotine replacement therapies. Global Health 2010 Nov 19;6:22.

(36) Murray RL, Bauld L, Hackshaw LE, McNeill A. Improving access to smoking cessation services for disadvantaged groups: a systematic review. J Public Health (Oxf) 2009 Jun;31(2):258-77.

(37) Perkins K, Donny E, Caggiula A. Sex differences in nicotine effects and self-administration: review of human and animal evidence. Nicotine Tob Res 1999 Dec;1(4):301-15.

(38) Perkins K. Sex differences in nicotine versus nonnicotine reinforcement as determinants of tobacco smoking. Exp Clin Psychopharm 1996;4(2):166-77.

(39) Heikkilä K, Nyberg ST, Fransson EI, Alfredsson L, De Bacquer D, Bjorner JB, et al. Job strain and tobacco smoking: an individual-participant data meta-analysis of 166,130 adults in 15 European studies. PLoS One 2012;7(7):e35463.

(40) Stewart MJ, Greaves L, Kushner KE, Letourneau NL, Spitzer DL, Boscoe M. Where there is smoke, there is stress: low-income women identify support needs and preferences for smoking reduction. Health Care Women Int 2011 May;32(5):359-83.

(41) Leatherdale ST, Shields M. Smoking cessation: intentions, attempts and techniques. Health Rep 2009 Sep;20(3):31-9.

(42) Greaves L, Vallone D, Velicer W. Special effects: tobacco policies and low socioeconomic status girls and women. J Epidemiol Community Health 2006 Sep;60(Suppl 2):1-2.

(43) Robinson J, Ritchie D, Amos A, Cunningham-Burley S, Greaves L, Martin C. 'Waiting until they got home': gender, smoking and tobacco exposure in households in Scotland. Soc Sci Med 2010 Sep;71(5):884-90.

(44) Moore RS, Annechino RM, Lee JP. Unintended consequences of smoke-free bar policies for low-ses women in three California counties. Am J Prev Med 2009 Aug;37(2 Suppl):138-43.

(45) Greaves LJ, Hemsing NJ. Sex, gender, and secondhand smoke policies: implications for disadvantaged women. Am J Prev Med 2009 Aug;37(2 Suppl):131-7.

(46) Eagan TML, Hetland J, Aarø LE. Decline in respiratory symptoms in service workers five months after a public smoking ban. Tob Control 2006 Jun;15(3):242-6.

(47) Hahn EJ, Rayens MK, York N, Okoli CTC, Zhang M, Dignan M, et al. Effects of a smoke-free law on hair nicotine and respiratory symptoms of restaurant and bar workers. J Occup Environ Med 2006 Sep;48(9):906-13.

(48) Ayres JG, Semple S, MacCalman L, Dempsey S, Hilton S, Hurley JF, et al. Bar workers' health and environmental tobacco smoke exposure (BHETSE): symptomatic improvement in bar staff following smoke-free legislation in Scotland. Occup Environ Med 2009 May;66(5):339-46.

(49) Thomson G, Wilson N, Edwards R. At the frontier of tobacco control: a brief review of public attitudes toward smoke-free outdoor places. Nicotine Tob Res 2009 Jun;11(6):584-90.

(50) Robinson J, Amos A, Ritchie D, Greaves L, Cunningham-Burley S, Martin C. Volunteered, negotiated, enforced: understanding the intergenerational transmission of new non-smoking norms around children. Sociol Health Illn 2011;31(3): 66-80.

(51) Tong EK, Tang H, Tsoh J, Wong C, Chen Jr MS. Smoke-free policies among Asian-American women: comparisons by education status. Am J Prev Med 2009;37(2 Suppl):144-50.

(52) McLellan DL, Kaufman NJ. Examining the effects of tobacco control policy on low socioeconomic status women and girls: an initiative of the Tobacco Research Network on Disparities (TReND). J Epidemiol Community Health 2006 Sep;60(Suppl 2):5-6.

(53) Bell K, Salmon A, Bowers M, Bell J, McCullough L. Smoking, stigma and tobacco 'denormalization': further reflections on the use of stigma as a public health tool. A commentary on Social Science & Medicine's Stigma, Prejudice, Discrimination and Health Special Issue (67:3). Soc Sci Med 2010 Mar;70(6):795-9.

(54) Health Canada. The federal tobacco control strategy: a framework for action. Ottawa: Health Canada; 2002.

(55) Davis CG. Risks associated with tobacco use in youth aged 15–19 analysis drawn from the 2004 Canadian addiction survey. Ottawa: Canadian Centre on Substance Abuse; 2006.

(56) World Health Organization. 16th WHO model list of essential medicines. Geneva: World Health Organization; 2009.

(57) Tjaden P, Thoennes N. Extent, nature and consequences of intimate partner violence: findings from the national violence against women survey. Washington: Centers for Disease Control and Prevention; National Institute of Justice; 2000. Report No.: NCJ 181867.

(58) Sarna L, Bialous SA. Why tobacco is a women's health issue. Nurs Clin North Am 2004 Mar;39(1):165-80.

Drinking Alcohol

Anna Liwander, Ann Pederson and Wendy Rice

Alcohol is the substance most commonly used by women in Canada (1) and is an emerging public health issue, especially among girls and women of childbearing years (25-34 years), among whom rates of heavy drinking are increasing (2). Alcohol use is not named as one of the existing priorities in the *Integrated Pan-Canadian Healthy Living Strategy* (3) from 2005 despite the fact that the vast majority of Canadians consume alcohol. However, the *Strengthened Pan-Canadian Healthy Living Strategy Framework* (4) from 2010 (an update and revision to the 2005 version) includes alcohol as one of the existing priorities to build upon. Recommendations for a *National Alcohol Strategy* (5) to reduce alcohol-related harm in Canada were developed in 2007 and a few years later, in 2011, the first national set of low-risk drinking guidelines (5) were released in Canada with support from federal, provincial and territorial health ministers.

Results from the Canadian Drug Use Monitoring Survey (CADUMS) suggest that the majority of women in Canada drink alcohol: in 2010, 73.9% of women in Canada reported that they had consumed alcoholic beverages in the past 12 months. The majority of women who reported drinking were considered *light infrequent drinkers* which is defined by Health Canada (6) as "a person who drinks less than once per week on average in a year, and usually consumes less than 5 drinks on each drinking occasion". While such light drinking may lead to decreased risk of some health conditions for some women (7, 8), long-term alcohol use and/or heavy drinking have been associated with several health concerns, including cancer (breast, mouth, pharynx, larynx, esophagus, liver, colon and rectum) (9), osteoporosis, high blood pressure, heart disease, stroke and obesity among others (9-12). In 2010, heavy drinking was reported by 13.6% of women in Canada according to results from CADUMS (2010).

In Canada, a standard drink contains 13.6 grams of alcohol which is equivalent to 341 ml (12 fl. oz.) of beer or cider (5% alcohol) or 142 ml (5 fl. oz.) of wine (12% alcohol) or 43 ml (1.5 fl. oz.) of spirits (40% alcohol).

Research (13) suggests that women may be particularly vulnerable to the health effects of alcohol due to their body size, genetics and life circumstances. Because women often have a smaller body size and weigh less than men, they reach higher blood alcohol levels than men for the same quantity of alcohol consumed. Women also tend to have less water in their bodies to dilute alcohol, which makes the blood alcohol concentration higher. Additionally, it has been found that women have less alcohol-metabolizing enzyme (gastric alcohol dehydrogenase) that breaks down alcohol in the stomach (14, 15) than men. As a result, women's alcohol absorption may be slower (16) and more alcohol may be absorbed into the bloodstream and

sent to the brain than in men. Given these different effects, research (14) suggests that women may "experience a more rapid progression to addiction or dependence on alcohol than men".

The health effects of long-term alcohol use and/or heavy drinking in women include cancer, osteoporosis, high blood pressure, heart disease, stroke and obesity among others.

Health effects associated with long-term drinking include increased risk of heart disease, brain and liver damage (17), breast cancer, stroke, diabetes and high blood pressure (9). Sex-specific health effects associated with long-term drinking in women include reproductive health problems (12, 18), such as irregular menstrual cycles and absence of ovulation, endometriosis and potentially infertility (19).

Alcohol use during pregnancy can affect the mother but also the child as it increases the risk of Fetal Alcohol Spectrum Disorders (FASD) (20-25). FASD is an umbrella term used to describe birth defects associated with maternal alcohol consumption. Drinking while breastfeeding has also received some attention but existing evidence is inconsistent about the potential health effects on the baby.

Given the myriad effects of alcohol on women, the subject is an important element of a discussion on women and healthy living. This chapter examines alcohol use among women in Canada by describing women's drinking patterns based on national survey data, including alcohol use during pregnancy and while breastfeeding. Given the association of alcohol use with other aspects of health, we briefly discuss its relationship with other healthy living topics such as tobacco use and experiences of violence or abuse. We also explore risk factors that may influence alcohol use among women and discuss policies and practices in Canada related to alcohol use. Alcohol policy discussions in Canada have recently begun to embrace low-risk drinking guidelines specifically designed for women; this shift to sex-specific guidelines is a significant new policy direction and is a landmark within the field of healthy living.

Defining and Measuring Alcohol Use

Establishing a safe level of alcohol consumption is challenging because it is dependent on individual responses to alcohol, food intake, body weight and genetic factors (26). In 2011, the Canadian Centre on Substance Abuse (7) released the first pan-Canadian low-risk drinking guidelines. These guidelines were developed by a team of independent experts on behalf of the National Alcohol Strategy Advisory Committee (NASAC). The guidelines define low-risk drinking for women as no more than 2 drinks on most days, up to a total of 10 drinks a week, in order to reduce long-term health risks; and no more than 3 drinks on one occasion to reduce the risks of harm and injury (7, 27). Further, women are advised to refrain from drinking when pregnant or planning a pregnancy, when using other drugs, driving a vehicle, conducting dangerous physical activities, when being responsible for the safety of others or when making important decisions. People living with mental or physical health problems are advised not to drink alcohol, and children and

youth are advised to delay drinking until their late teens and to have no more than 1-2 drinks per occasion (7, 27). *Heavy drinking* is defined by Statistics Canada (28) and Health Canada (6) as consuming 5 or more drinks per occasion 12 or more times over the past year for both women and men. Recent evidence, however, suggest that the threshold for heavy drinking should be lowered to 4 or more drinks per occasion for women due to their increased vulnerability to the effects of alcohol (2, 12).

In this chapter, low-risk drinking for women is defined as no more than 2 drinks on most days, up to a total of 10 drinks a week and no more than 3 drinks on one occasion.

Heavy drinking for women is defined as consuming 4 or more drinks per occasion.

In this chapter, sex-disaggregated data from the Canadian Community Health Survey (CCHS) 2005 and 2009/2010 and the Canadian Alcohol and Drug Use Monitoring Survey (CADUMS) 2010 have been analysed to describe women's drinking behaviour. The CCHS defines heavy drinking as consuming 5 or more drinks on one occasion for both women and men and CADUMS defines heavy drinking as 4 or more drinks in a single sitting for women and 5 or more drinks for men. Published results from the Canadian Maternity Experiences Survey (MES) 2006/2007 have also been used to explore women's drinking behaviours during pregnancy and results from the First Nations Regional Longitudinal Health Survey (2008/2010) have been used to report drinking behaviours among women living in First Nations communities—data that were not available within either the CCHS and CADUMS.

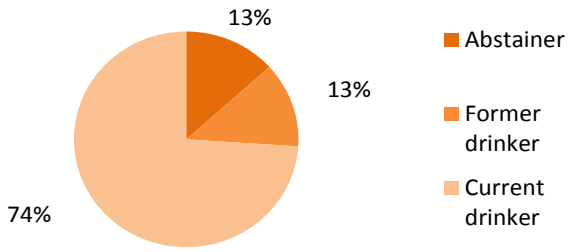
Many surveys on alcohol use, including those in this chapter, rely on self-reporting which may be subject to social desirability bias. Stockwell and colleagues note that there is "a tradition in alcohol epidemiology of estimating the extent of underreporting. When compared against official alcohol sales data, population surveys typically underestimate actual consumption by between 40% and 60%" (29). This is particularly important in view of the social stigma attached to women's alcohol use and which may lead women to under-report their actual alcohol use.

There are also challenges associated with the reference periods for which data on alcohol use is collected. For example, the CCHS asks participants to recall their alcohol use in the past year and week. Short reference periods, such as the last week, can minimize the risk of recall bias but may not capture women's "typical" consumption throughout the year, which could vary depending on seasons and timing of holidays. Short reference periods may also fail to capture the consumption patterns of infrequent drinkers. Longer reference periods, such as the past 12 months, might therefore be a better measure of alcohol use among women in Canada, since the majority are infrequent drinkers, but could also increase the risk of recall bias and still result in some under-estimation of the level and frequency of alcohol consumption among women (30).

Prevalence and Frequency of Drinking among Women in Canada

The majority of women in Canada drink alcohol. According to our analysis of CADUMS (2010), 73.9% (95% confidence interval [CI], 72.1-75.7) of women in Canada (aged 15 years and older) reported being current drinkers (drank in the past 12 months), 12.7% (95% CI, 11.5-14.1) former drinkers (did not drink in the past 12 months), and 13.3% (95% CI, 12.0-14.8) reported that they never drink (abstainer) (Figure 1). Further, 57.6% (95% CI, 55.6-59.6) of women in Canada reported using alcohol in the past 30 days (CADUMS 2010).

Figure 1. Current drinking status Women in Canada, 2010



SOURCE: Canadian Drug Use Monitoring Survey (CADUMS), 2010. SPSS Complex Sample software was used to calculate the standard errors, which we then used to produce the coefficient of variation (CV).

Results from the CCHS (2009/2010) suggest that among women who reported drinking in the past 12 months, most women drank more often than once a month. The majority of women in Canada tend to drink 2-3 times per week or 2-3 times a month. In Quebec, 21.2% (95% CI, 19.8-22.6) of women and 20.4% (95% CI, 17.8-23.1) of women in the three territories reported consuming alcohol 2-3 times per week. However, this was only reported by 13.3% (95% CI, 12.0-14.7) of women in the Atlantic provinces. In British Columbia, women tend to drink more frequently with 6.5% (95% CI, 5.5-7.5) of women reported drinking 4-6 times a week and 8.5% (95% CI, 7.4-9.6) reporting that they drank every day. In the Atlantic provinces, however, only 3.5% (95% CI, 2.8-4.2) drank 4-6 times a week and 3.5% (95% CI, 2.8-4.1) consumed alcohol every day.

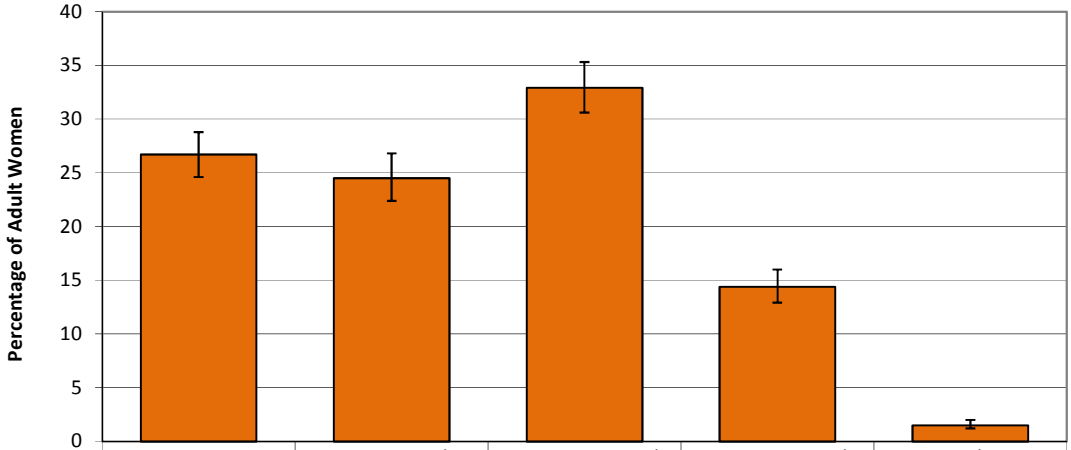
Results from the CCHS (2009/2010) suggest that among women who reported drinking in the past 12 months, most women drank more often than once a month. The majority of women in Canada tend to drink 2-3 times per week or 2-3 times a month. In Quebec, 21.2% (95% CI, 19.8-22.6) of women and 20.4% (95% CI, 17.8-23.1) of women in the three territories reported consuming alcohol 2-3 times per week. However, this was only reported by 13.3% (95% CI, 12.0-14.7) of women in the Atlantic provinces. In British Columbia, women tend to drink more frequently with 6.5% (95% CI, 5.5-7.5) of women reported drinking 4-6 times a week and 8.5% (95% CI, 7.4-9.6) reporting that they drank every day. In the Atlantic provinces, however, only 3.5% (95% CI, 2.8-4.2) drank 4-6 times a week and 3.5% (95% CI, 2.8-4.1) consumed alcohol every day.

The percentage of women reporting *weekly* alcohol consumption tends to decrease with age but those reporting *daily* alcohol consumption increases with age according to results from the CCHS (2009/2010). For example, 18.5% (95% CI, 17.1-19.9) of 30-39 year olds reported drinking alcohol once a week but only

between 10-13% of women aged 60 years and older. Daily alcohol use, on the other hand, was reported by 2.5% of women aged 30-39 years but 13-16% of women aged 60 years and older. Daily and weekly drinking both tend to increase with income. Results from CCHS (2009/2010) suggest that women in higher income groups are more likely to report drinking once a week or more often, compared to women in lower income groups. Differences in frequency of drinking alcohol also vary by level of education, where higher education is associated with more frequent alcohol consumption.

More frequent drinking was also noted among non-Aboriginal women compared to Aboriginal women (living off reserve). Results from CCHS (2009/2010), suggest that Aboriginal women are more likely to report drinking at the lower frequency of 2-3 times a month than non-Aboriginal women (23.7%; 95% CI, 20.0-27.4 compared to 14.5%; 95% CI, 14.0-15.1). Non-Aboriginal women, however, are more likely to report drinking alcohol 2-3 times a week (17.8% among non-Aboriginal women compared to 11.4% among Aboriginal women), 4-6 times a week (4.8% compared to 2.8%) and every day (6.3% compared to 3.2%) according to the CCHS (2009/2010). Results from the First Nations Regional Health Survey (31), suggest that among adult women living in First Nations communities, 32.9% (95% CI, 30.6-35.3) used alcohol 2-3 times a month, 14.4% (95% CI, 12.9-16.0) used alcohol 2-3 times a week and only 1.5% (95% CI, 1.2-2.0) drank every day in 2008/2010 (Figure 2).

Figure 2. Frequency of Alcohol use in the 12 months prior to RHS (excluding abstainers) Women living in First Nations communities in Canada, 2008/2010



	2-3 times a year	Once a month	2-3 times a month	2-3 times a week	Daily
Percentage	26.7	24.5	32.9	14.4	1.5

SOURCE: First Nations Regional Longitudinal Health Survey (RHS), 2008/2010 (31)

Low-risk Drinking

As noted earlier in this chapter, the current low-risk drinking guidelines state that women should drink no more than 2 drinks on most days, up to a total of 10 drinks a week, in order to reduce long-term health risks, and no more than 3 drinks on one occasion to reduce the risks of harm and injury (7, 27). Among women who report daily drinking, results from the CCHS (2005) suggest that 21.0% (95% CI, 20.5-21.5) reported consuming on average one drink per day in the week prior to being interviewed and 3.9% (95% CI, 3.7-4.1) reported drinking an average of 2 drinks per day.

Light drinking can be associated with some health benefits such as reduced risk of illness and premature death caused by heart disease, stroke and diabetes (7), but only for some women. Age is an essential factor when talking about potential health benefits associated with light drinking as the positive effect that light drinking may have on heart health does not become relevant until older age when heart problems are more common (7). However, results from the CCHS (2005) suggest that women in some age groups are more likely to consume one or two drinks per day than others. For example, 24.7% (95% CI, 22.9-26.6) of 20-24 year olds reported drinking one drink per day and 24.5% (95% CI, 22.3-26.7) of women aged 40-54 years but only 16.8% (95% CI, 15.6-18.0) of women aged 70 years or older. Women aged 18-24 also have the highest percentage of women reporting 2 drinks a day (5.3% for 18-19 year olds and 5.2% for 20-24 year olds), compared to only 3.2% (95% CI, 2.5-3.9) of women aged 70 years and older (CCHS 2005).

Light drinking can be associated with health benefits such as reduced risk of illness and premature death caused by heart disease, stroke and diabetes, but only for some women.

Daily alcohol consumption is more common in higher income groups. The percentage of women who consumed on average one drink per day increased steadily with income from 16.0% (95% CI, 14.4-17.7) in decile 1 (the lowest income group) to almost one in three women (30.3%; 95% CI, 28.2-32.3) in the highest income decile according to results from the CCHS (2005). One drink a day was reported by 20% or more females in deciles 5-10. A similar trend was noted among women reporting that they drank on average 2 drinks a day, ranging from 2.8% (95% CI, 2.1-3.5) in the lowest income group (decile 1) to 6.4% (95% CI, 5.3-7.5) of women in the highest (decile 10). Minor educational differences were noted in the amount of alcohol consumed per day but women with secondary graduation or higher were more likely to report drinking 1 or 2 drinks per day. No differences were noted when looking at Aboriginal status and women living in urban versus rural settings. In terms of women's weekly alcohol consumption, results from the CCHS (2005) show that the great majority (92.9%; 95% CI, 92.5-93.2) did not exceed the 10 drink threshold that distinguishes low- from high-risk drinking. Nearly 90% (89.0%; 95% CI, 87.0-91.0) of women aged 18-19 years, 94.9% (95% CI, 94.0-95.8) of 35-39 year olds, and 97.2% (95% CI, 96.3-98.1) of women

aged 80 years and older, reported drinking fewer than 10 drinks per week. Women in lower income deciles were more likely to report drinking less than 10 drinks per week compared to women in higher income groups (CCHS 2005).

Problematic Drinking

Heavy Drinking

Female heavy drinking has been associated with increased risk of osteoporosis, breast cancer, reproductive problems, heart disease and stroke (14), as well as brain damage, gastric ulcers (25, 32) and liver damage (25). Some health risks have been shown to be greater among women compared to men, including heart disease, and brain and liver damage (17).

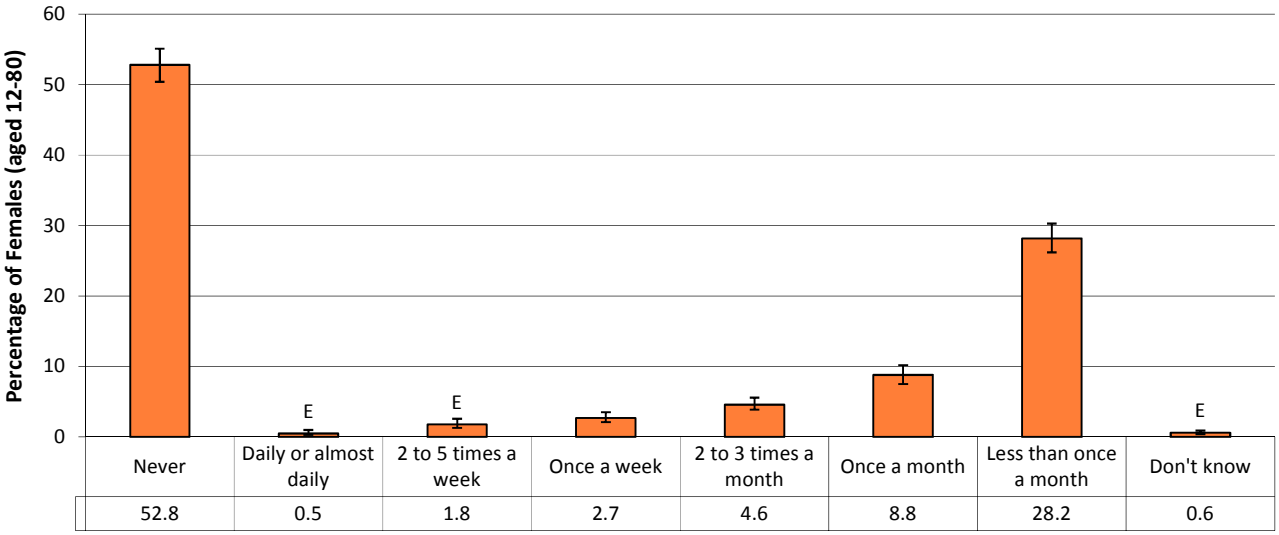
Until recently, heavy drinking had been defined by Statistics Canada (33) and Health Canada (6) as consuming 5 or more drinks on a single occasion at least 12 times over the past year, which was a standard that applied to both men and women. Recent evidence, however, suggests that 4 or more drinks on a single occasion is a better benchmark of heavy drinking for women.

Lowering the threshold of what is considered heavy drinking for women from 5+ drinks to 4+ drinks per occasion may increase the prevalence of heavy drinking for women by at least 50% (12).

Bialystok and colleagues (12) conducted an analysis of the Canadian Addiction Survey (CAS) and CADUMS to compare the rates of women who report drinking 5+ drinks/occasion monthly or more with women reporting 4+ drinks/occasion monthly or more in the past year. Their preliminary analysis of four national surveys suggests that by lowering the threshold of what is considered heavy drinking for women from 5 or more drinks to 4 or more drinks per occasion, it may increase the estimated prevalence of heavy drinking for women (aged 15-44 years) by at least 50%. The heavy drinking rates rose from 13.6% to 24.7% in CADUMS (2010), from 17.6% to 24.2% in CADUMS (2009), from 16.3% to 25.1% in CADUMS (2008) and from 20.2% to 25.3% in CAS (2004) (12). Such an increase in the prevalence of heavy drinking could have significant costs for individual women as well as the health and social services systems.

Our analysis of the CADUMS (2010) data suggests that most women in Canada did not engage in heavy drinking in the past year but more than a quarter of women who reported drinking engaged in heavy drinking less than once a month (28.2%; 95% CI, 26.2-30.3) (Figure 3).

Figure 3. Frequency of Consuming Four or More Drinks per Occasion in the Past 12 Months
Women in Canada, 2010



SOURCE: Canadian Drug Use and Monitoring Survey (CADUMS), 2010. SPSS Complex Sample software was used to calculate the standard errors, which we then used to produce the coefficient of variation (CV). "E" signifies data with a CV range from 16.6% to 33.3%. Interpret these results with caution. Missing values = 0.8%.

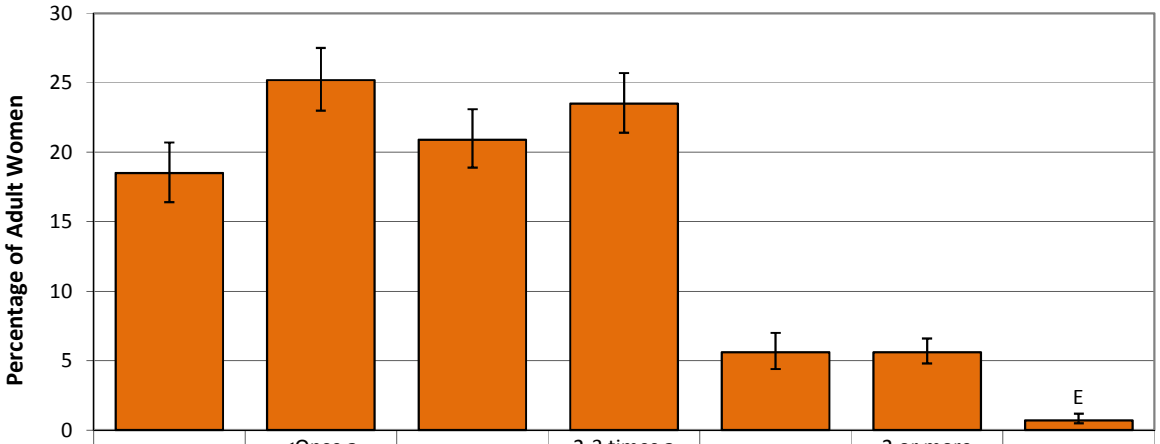
Heavy drinking is considerably more common among younger women than in older women. Results from CADUMS (2010) suggest that 26.3% (95% CI, 22.2-30.8) of women aged 18-29 years reported heavy drinking, which is higher than in any other age group. Statistics Canada notes that the percentage of heavy female drinkers has increased since 2003 (34) and there are also indications that young women's alcohol consumption patterns are changing. In a study on gender-specific trends in alcohol use among 15-year olds in 24 countries and regions, Simons-Morton and colleagues (35) found that Canada was one of four countries where the percentage of drunkenness (had so much alcohol that they were drunk) was higher among girls than boys. Girls and young women may face particular risk from heavy alcohol use at a young age given that it may increase the risk of hypertension, osteoporosis, and reproductive health problems, and increase vulnerability to STIs, pregnancy, violence and injury (36). The association between alcohol and violence has been a subject of discussion (12, 37). For example, research (38) suggests that violence is more common when aggressors have been drinking, but also that violence is more common when victims are drinkers (39). Sexual assault and intimate partner violence (IPV) are both considered strong risk factors for heavy drinking among girls and women (12).

Heavy drinking is associated with marital status; never married women report the highest prevalence of monthly heavy alcohol use (22.3%; 95% CI, 19.3-25.6) followed by divorced/separated women (12.6%E; 95% CI, 8.5-18.4– interpret with caution). Results from CADUMS (2010) also suggest that among women who are married or living in a common-law partnership, 11.7% (95% CI, 10.1-13.5) report monthly heavy alcohol use.

In the results from CADUMS (2010), we observed slight differences when comparing women's heavy alcohol use in various provinces (the three territories are excluded in these data). Women in Ontario, British Columbia and the Prairies were less likely to report heavy drinking (four or more drinks per occasion once a month or more often in the past 12 months), compared to women in the Atlantic provinces where 15.0% (95% CI, 13.5-16.7) of women reported heavy drinking and 16.5% (95% CI, 13.8-19.7) of women in Quebec.

The BC Adolescent Health Survey, conducted by the McCreary Centre Society, gathers information about young people's physical and emotional health (40). Results from 2003 suggest that girls who identify as bisexual and Aboriginal women tend to report higher rates of heavy drinking. For example, results from the survey indicate that the percentage of girls (grade 7-12) who report heavy drinking has increased and that bisexual girls are twice as likely to report heavy drinking as heterosexual youth the same age (41). Results from the First Nations Regional Longitudinal Health Survey (RHS) and the CCHS (2009/2010) indicate that First Nations girls (12-17 years) are more likely to engage in heavy drinking than non-Aboriginal girls (42). Results from the RHS (2008/2010) also suggest that among adult women living in First Nation communities who consumed alcohol in the past year, almost one in four (23.5%; 95% CI, 21.4-25.7) engaged in heavy drinking (5 or more drinks per occasion) 2-3 times a month (31) (Figure 4)—though as we described above, many women living in First Nations communities did not report frequent or heavy alcohol use.

Figure 4. Frequency of Binge Drink in the 12 months prior to the RHS
Women living in First Nations communities in Canada, 2008/2010



	Never	<Once a month	Once a month	2-3 times a week	Once a week	2 or more times a week	Daily
Percentage	18.5	25.2	20.9	23.5	5.6	5.6	0.7

SOURCE: First Nations Regional Longitudinal Health Survey (RHS), 2008/2010 (31).

Rather than using a numerical cut point, heavy drinking has also been defined as anything that exceeds the low-risk drinking guidelines. This is actually a lower threshold than the 4 or more drinks per occasion benchmark suggested by Bialystok et al. (12). Using this approach to measuring heavy drinking, our analysis of CCHS (2005) data suggest that only 1.8% (95% CI, 1.6-2.0) of women who reported drinking in the previous year consumed 3 or more drinks per day and 7.1% (95% CI, 6.8-7.5) reported drinking 10 or more drinks per week (excludes those who did not drink in the last 12 months). Among daily drinkers, however, there appears to be a cluster of young women who are more likely to report daily alcohol consumption than any other age group. This group includes 3.8% (95% CI, 2.6-5.0) of 18-19 year olds and 3.9% (95% CI, 3.0-4.9) of 20-24 year olds report drinking 3 or more drinks per day (CCHS 2005).

In addition to the amount and frequency of drinking among women, it is also important to consider the circumstances in which women drink (7, 43-45). With respect to settings, heavy drinking is more likely to take place in bars and nightclubs than in restaurants or at home (46, 47). Beyond the specific setting in which some women drink, some women report using alcohol and other substances to cope with problems, manage stress and to increase confidence. It has been suggested that many women experience stress due to their high workload associated with family responsibilities, care-giving and other unpaid, domestic labour as well as paid labour, which could affect their drinking behaviour (14). Poole and Greaves (17) argue that girls and women may use substances, including alcohol, as a result of gendered experiences including physical and sexual abuse (which has shown to be associated with substance use problems). Other gendered influences that could affect women's alcohol consumption include alcohol marketing directed towards girls and women (17) which encourages girls and women to visit pubs and clubs by providing free entrance and inexpensive drinks (48).

Schinke, Fang and Cole (49) looked at risk factors associated with substance use among adolescent girls and found that unstructured activities after school, higher levels of depression, substance use among best friends and maternal alcohol use might increase substance use among young girls. Other gender-specific factors that may increase young women's risk of alcohol use include "low self-esteem, history of trauma, depression, anxiety, eating disorder, early onset of puberty, lack of coping skills, teen pregnancy, poor relationships with family, peers, peer and parental substance use, school transitions, frequent moving, marketing, and media" (36).

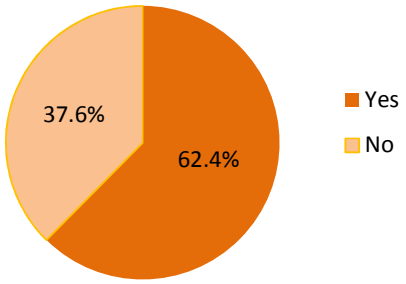
Alcohol Use during Pregnancy and while Breastfeeding

Maternal alcohol use increases the risk of Fetal Alcohol Spectrum Disorders (FASD) developing which can have lifelong consequences for the child, mother, family and society. FASD includes birth defects, brain damage and problems with vision and hearing (13). To date, researchers have been unable to agree on a threshold for what may be considered a "safe level" of alcohol use during pregnancy but the Canadian low-risk drinking guidelines advise women to refrain from drinking when pregnant or planning a pregnancy (27). There may also be some health risks associated with drinking while breastfeeding since alcohol is transferred

to the breast milk. Although the current evidence base is limited and inconclusive, it has been suggested that drinking while breastfeeding may have negative effects on the newborns' central nervous system and may also affect the process of breastfeeding itself and the infants' sleeping patterns (7, 50). The pan-Canadian low-risk drinking guidelines advise women not to drink before breastfeeding (7).

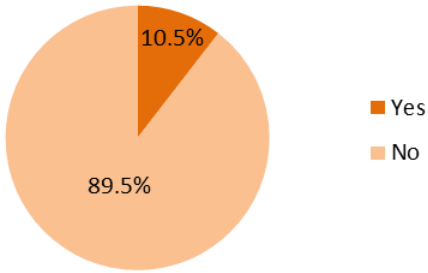
In 2006/2007, 10.5% (95% CI, 9.7-11.2) of women who participated in the Canadian Maternity Experiences Survey (MES) reported that they had consumed alcohol during pregnancy (51). Results from the MES are self-reported and are therefore likely to underestimate practices such as alcohol use during pregnancy which are stigmatized. Results from the MES (2006/2007) indicate that women are considerably more likely to report alcohol use during the three months prior to pregnancy or before knowing they were pregnant than to report alcohol use during pregnancy: while 62.4% of women reported drinking pre-pregnancy, only 10.5% reported drinking during pregnancy (Figures 5 & 6).

Figure 5. Consumed alcohol pre-pregnancy Women in Canada, 2006/2007



SOURCE: Canadian Maternity Experiences Survey (MES), 2006/2007 (51).

Figure 6. Consumed alcohol during pregnancy Women in Canada, 2006/2007



SOURCE: Canadian Maternity Experiences Survey (MES), 2006/2007 (51).

Among women who drank in the three months prior to becoming pregnant, the largest proportion reported drinking once a week (14.5%; 95% CI, 13.5-15.5) or less than once a month (14.4%; 95% CI, 13.5-15.3), followed by once a month (10.4%; 95% CI, 9.6-11.2). Frequent drinking (once a week or more) during the three months prior to pregnancy was more common among women in Quebec and British Columbia, while not drinking at all was more common in Nunavut, Ontario and Alberta. When measuring both frequent drinking (once a week or more) and infrequent drinking (two to three times per month or less), the three jurisdictions with the highest proportion of female drinkers in the three months prior to pregnancy were Prince Edward Island, Saskatchewan and the Northwest Territories. During pregnancy, however, Quebec stands out as the single province where drinking (both frequent and infrequent drinking) is reported by more than 20% of women (51). Drinking prior to, or during pregnancy, was more common among women living in households above the low-income cut-off (LICO[1]) than in those living at or below LICO. Further, maternal age is also

[1] LICO is an income threshold below which a family will likely devote a larger share of its income on the necessities of food, shelter and clothing than the average family (51).

associated with drinking during pregnancy with drinking increasing with age, both when looking at drinking during the three months prior to becoming pregnant and during pregnancy, with the exception of women aged 40 years and older where lower levels were noted (51).

Maloney and colleagues (52) note that alcohol use tend to decrease during pregnancy but often increase again when women are breastfeeding. The Canadian Maternity Experiences Survey (MES) did not examine drinking while breastfeeding but results from the CCHS (2005) suggest that almost every one in four women (23.7%; 95% CI, 22.2-25.3) drank alcohol while breastfeeding their last child (this figure excludes women who did not breastfeed or try to breastfeed as well as women who identify themselves as abstainers). A steady increase in alcohol consumption while breastfeeding is noted across income groups, with women in higher income groups being more likely to drink while breastfeeding. Among women in income decile 9, for example, 31.7% (95% CI, 25.7-37.6) reported drinking while breastfeeding compared with less than 20% of women in deciles 1 and 2 (16.8% and 19.2% respectively).

Educational differences can also be observed with regard to drinking while breastfeeding. Our analysis of results from the CCHS (2005) suggests that women with higher education are more likely to drink while breastfeeding. Almost 26% (25.7%; 95% CI, 23.8-27.5) of women with post-secondary education who were breastfeeding reported drinking while breastfeeding their last baby (note: this excludes non-drinkers).

Although the CCHS captures the percentage of women who consumed alcohol while breastfeeding, the survey does not provide any information on how soon after drinking these women actually breastfed. In recent years, a new body of research has emerged around managing risks, including expressing milk after drinking and discarding it (so-called 'pump and dump' practices), as well as guidelines that determine the time needed before breastfeeding after drinking. Mennella (53) notes that although "the practice of 'pumping and dumping' does not reduce the alcohol content of the breast milk" it assists in "maintaining milk production while waiting to resume breastfeeding" (53). Koren (54) suggests that women should avoid breastfeeding for approximately 2 hours after drinking one alcoholic beverage but notes that the timing is very dependent on body weight, which affects milk-alcohol concentration.

Reducing Alcohol Use

In the CCHS (2009/2010), participants are asked to identify whether they have done anything to improve their health in the last year and what the most important change has been. Among women who reported that they had done something to improve their health, only 0.3% of women stated "drank less alcohol" as the single most important change they had made. This compares with those reporting that they would exercise more (51.6%), improve eating habits (17.1%), lose weight (11.3%), and smoke less or quit smoking (4.3%). Despite this finding, results from CADUMS (2010) show that 12.7% (95% CI, 11.5-14.1) women in Canada identified themselves as former drinkers in 2010, which means that they have used alcohol in their lifetime but not in the past year (6).

Alcohol use is a common social activity in Canadian society but it can also be socially stigmatized, especially for pregnant or breastfeeding women. Research suggests that the stigma attached to alcohol use during pregnancy may prevent women from seeking care (17). Women may also face *personal barriers* (feelings of shame and guilt), *interpersonal barriers* (fear of losing children or lack of family support), *community/social barriers* (social stigma), and *structural/program barriers* (costs associated with treatment and reliable child care, lack of women centered services etc.). Aboriginal women, ethnic minorities, women who inject drugs or use other substances, as well as women with mental disorders, may all experience additional barriers in accessing and remaining in alcohol treatment (1).

Policy and Practice Regarding Alcohol Use

The *WHO Global Alcohol Strategy* (55) and national policy documents such as the *National Alcohol Strategy* in Canada (5) both establish goals for reducing harmful use of alcohol but none of these specifically discusses women's alcohol consumption except in the context of pregnancy and breastfeeding. The *WHO Strategy* (55) also recognizes that domestic violence against women is an underlying cause of harmful drinking and has a serious impact on individuals, families and societies as well as contributes to social and health inequalities. British Columbia's *Public Health Approach to Alcohol Policy* (56), however, provides valuable sex-disaggregated data on drinking patterns among women and men in the province and notes that there are different low-risk drinking guidelines for each. Canadian low-risk drinking guidelines, released in 2011, recognize that some people are more vulnerable to the effects of alcohol than others, including women, and set different low-risk drinking guidelines for women and men. The guidelines specify that women should drink less alcohol than men, and women who are pregnant or planning a pregnancy should not drink at all. The emergence of a dialogue and guidelines targeted specifically to women's alcohol use is a promising direction in alcohol and health policy. However, clear guidelines "recommending the use of 4+drinks/per occasion instead of 5+ drinks for women as the preferred indicator for all future surveys and other forms of research" are needed (12).

Scholars and practitioners in Canada have been involved for several years in trying to "gender" the *National Framework for Action to Reduce the Harms Associated with Alcohol and Other Drugs and Substances in Canada*. For example, in 2009, the Canadian Centre of Substance Use (57) released a background paper that described what a sex- and gender-analysis of the Framework might entail. This included asking questions on whether influences of sex, gender and diversity have been considered in the priority areas; if assumptions about the influences of sex, gender and diversity have been made in the priority areas; and how the influences of sex, gender and diversity affect the work within the priority area. Examples for each of the 13 priority areas in the Framework were presented, including the need to consider specific treatments for pregnant women with substance use and to reach out to Canada's North and recognize the role of Aboriginal culture in accessing treatment services in rural and remote communities (57). Further, at the BC Centre of

Excellence for Women's Health, work has been done to identify promising directions in gender-informed prevention and treatment programming for girls and women in relation to alcohol use. For example, Poole and Gonneau (36) note that successful programming and interventions for girls and young women should consider the following principles:

> ***Increasing support during life transitions***; healthy adolescent transition to adulthood; transition into secondary school and post-secondary and/or work.
>
> ***Fostering resiliency***; strength-based skill-building approach; build on protective factors; coping strategies; how to obtain help; access resources; plan for the future.
>
> ***Establishing healthy relationships***; increase social support; improve relationships with peers, intimate partnerships and relationships with parents.
>
> ***Understanding and integrating gender identity***; gender socialization and gender-role development, establishing a healthy female body image.
>
> ***Listening to girls****;* hearing, understanding and supporting girls and young women; creating a safe space (36).

Some alcohol programs have also adopted harm-reduction approaches that do not necessarily focus on complete abstinence but on how to mitigate harms associated with alcohol use, the use of other substances and housing, for example. Given that women's substance use can be stigmatized, especially for pregnant women, these programs can encourage women to access substance-use treatment and support (58). In fact, harm-reduction programs that are also addressing stigma have shown to increase access to treatment and support for pregnant women (17, 58).

Women, Alcohol and Healthy Living

Heavy drinking has strong associations with poor mental health, experiences of violence or abuse and the use of other substances (59), and women may be at particular risk of heavy drinking due to their greater risk of experiencing physical and sexual abuse compared to men (17, 60, 61). In fact, research suggests that alcohol problems may be as much as 15 times higher among women who have experienced intimate partner violence than those who have not. Women who experience violence at an early age are also more likely to start using alcohol at a younger age than other women (61). Women that engage in heavy drinking can also be at greater risk of experiencing sexual abuse (62).

Women who report heavy drinking are also more likely to use tobacco and those who smoke are generally more likely to consume alcohol. Tough and colleagues (63) report that women who consumed alcohol after

realizing that they were pregnant were more likely to be tobacco users as well. De Finney and colleagues (64) suggest that the association between heavy drinking and smoking may be particularly strong currently among young Aboriginal women.

Body weight is an important contributor to the effect that alcohol has on an individual and women with low body weight can be at greater risk of intoxication (10). The association between alcohol use, overweight and obesity has also been discussed but is less clear. While some studies (10, 65) suggest that alcohol intake may be associated with a greater risk of overweight and obesity among youth, others (66, 67) have indicated that heavy alcohol use may in fact be associated with lower risk of overweight and obesity.

McCarty et al. (10) argue that alcohol use can be particularly harmful for young women with body image or weight concerns because girls that do not eat properly, or who have a low daily caloric intake, may have an increased risk of intoxication and alcohol poisoning. Field et al. (68) also note that those girls who engage in unhealthy dieting practices tend to drink more alcohol than girls that have healthier eating behaviours.

Alcohol policy is not always incorporated into discussions of healthy living and its absence from the *Integrated Pan-Canadian Healthy Living Strategy* reflects the distinct history of research, policy and action on alcohol (and other substances). Yet given the scale and nature of the health effects of alcohol use, particularly heavy drinking, it is important to include attention to alcohol use within the field of "healthy living" and to generate intersectoral support for action to reduce the harms associated with alcohol use among women in Canada.

Summary

Alcohol is the most commonly used substance by women in Canada (1). As the rate of heavy drinking among girls and women of childbearing years (25-34 years) has increased, it is timely to ensure that alcohol use is a focus of attention within public health and women's health. (2). Drinking practices are complex and influenced by a variety of factors (48), including income, age, education, region, Aboriginal identity and marital status. As discussed above, women with high income tend to drink more often and are more likely to be heavy drinkers than women with lower income levels. Young women are more likely to drink daily and women who have never been married are more likely to be heavy drinkers. Aboriginal girls and women tend to report drinking less frequent than non-Aboriginal females but are at greater risk of heavy drinking. These patterns lead to the need for multiple responses to alcohol use among women and encourage policy makers and programmers to provide appropriate programming for girls and women.

The recently developed pan-Canadian low-risk drinking guidelines specify that women should drink no more than 2 drinks on most days, up to a total of 10 drinks a week, in order to reduce long-term health risks, and no more than 3 drinks on one occasion to reduce the risks of harm and injury. Although we have yet to

accurately determine how many girls and women drink at rates within and above those recommended in the guidelines, survey data suggest that young women may be at particular risk of drinking beyond the level prescribed by the low-risk drinking guideline.

Heavy drinking has traditionally been defined as 5 or more drinks per occasion but recent evidence suggest that the threshold should be lowered to 4 drinks or more for women as the health effects of alcohol use have been shown to be reached at a lower level of consumption among women than men. A preliminary analysis using the 4+ drinks threshold as a measure of heavy drinking, instead of the 5+ measure, suggests that the prevalence of heavy drinking may increase by at least 50% among women aged 15-44 years (2, 12). Bisexual and Aboriginal youth (41) as well as girls and women who have experienced physical and sexual abuse or trauma (59), and girls with eating disorders (68) are all at greater risk of heavy alcohol use.

Alcohol use during pregnancy is an important health problem as it increases the risk of Fetal Alcohol Spectrum Disorders (FASD). In 2006/2007, alcohol use during pregnancy was reported by 10.5% of women who had been pregnant in the last 5 years (51). Maternal alcohol use is heavily stigmatized and could prevent many women from seeking treatment. However, harm-reduction programs that address stigma have been shown to increase access to treatment and support for pregnant women (17, 58). Such approaches are promising directions for alcohol treatment programming and should enhance both women's and children's health.

References

(1) Health Canada. Best practices: treatment and rehabilitation for women with substance use problems [Internet]. Ottawa: Health Canada; 2001 [cited 2 Mar 2012]. Available from: http://www.hc-sc.gc.ca/hc-ps/pubs/adp-apd/bp_women-mp_femmes/sectionII-eng.php

(2) Poole N, Thomas G, Greaves L, Bialystok L, Dell C. Patterns of alcohol use among women of childbearing years in Canada: implications for FASD prevention. 2nd European conference on FASD: 'Fetal alcohol spectrum disorders: clinical and biochemical diagnosis, screening and follow-up. Barcelona: 2012 October 22.

(3) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 15 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

(4) Public Health Agency of Canada. Strengthened Pan-Canadian healthy living strategy framework [Internet]. Ottawa: Public Health Agency of Canada; 2010 [cited 10 May 2011]. Available from: http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/ipchls-spimmvs/fw-eng.php

(5) Canadian Centre on Substance Abuse. National alcohol strategy: reducing alcohol-related harm in Canada [Internet]. Ottawa: Canadian Centre on Substance Abuse; [cited 10 Mar 2012]. Available from: http://www.ccsa.ca/Eng/Priorities/Alcohol/Pages/default.aspx

(6) Health Canada. Canadian alcohol and drug use monitoring survey. Summary of results for 2010 [Internet]. Ottawa: Health Canada; 2011 [cited 14 Feb 2012]. Available from: http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2010/summary-sommaire-eng.php#defin

(7) Butt P, Beirness D, Gliksman L, Paradis C, Stockwell T. Alcohol and health in Canada: a summary of evidence and guidelines for low-risk drinking. Ottawa: Canadian Centre on Substance Abuse; 2011.

(8) Stockwell T, Butt P, Beirness D, Gliksman L, Paradis C. The basis for Canada's new low-risk drinking guidelines: a relative risk approach to estimating hazardous levels and patterns of alcohol use. Drug Alcohol Rev 2012 Mar;31(2):126-34.

(9) Canadian Centre on Substance Abuse. Canada's low-risk drinking guidelines: frequently asked questions. Ottawa: Canadian Centre on Substance Abuse; 2012.

(10) McCarty CA, Kosterman R, Mason WA, McCauley E, Hawkins JD, Herrenkohl TI, et al. Longitudinal associations among depression, obesity and alcohol use disorders in young adulthood. Gen Hosp Psychiatry 2009 Sep-Oct;31(5):442-50.

(11) Farhat T, Iannotti R, Simons-Morton B. Overweight, obesity, youth, and health-risk behaviors. Am J Prev Med 2010 Mar;38(3):258-67.

(12) Bialystok L, Thomas G, Greaves L, Poole N. Report on alcohol use among women in their childbearing years. Unpublished.

(13) Fuhrmann B, Hasenwinkle V, Kucharski A, Lutke J, Mahabir G, Pitman L, et al. Women and alcohol: a women's health resource [Internet]. Vancouver: British Columbia Centre of Excellence for Women's Health; 2007 [cited 6 Jan 2012]. Available from: http://www.health.gov.bc.ca/women-and-children/pdf/women-and-alcohol-brochure.pdf

(14) BC Centre of Excellence for Women's Health. Women and alcohol: women's health resource. Vancouver: British Columbia Centre of Excellence for Women's Health; 2007.

(15) Kinney J. Loosening the grip: a handbook of alcohol information. 6th ed. Boston: McGraw Hill; 2000.

(16) Greenfield SF. Women and alcohol use disorders. Harv Rev Psychiatry 2002 Mar-Apr;10(2):76-85.

(17) Poole N, Greaves L, editors. Highs and lows: Canadian perspectives on women and substance use. Toronto: Centre for Addiction and Mental Health; 2007.

(18) Nolen-Hoeksema S. Gender differences in risk factors and consequences for alcohol use and problems. Clin Psychol Rev 2004 Dec;24(8):981-1010.

(19) Emanuele MA, Wezeman F, Emanuele NV. Alcohol's effects on female reproductive function. Alcohol Res Health 2002;26(4):274-81.

(20) Canadian Institute for Health Information. Women's health surveillance report: a multi-dimensional look at the health of Canadian women. Ottawa: Canadian Institute for Health Information; 2003.

(21) Mukherjee R, Hollins S, Turk J. Fetal alcohol spectrum disorder: an overview. J R Soc Med 2006 Jun;99(6):298–302.

(22) Henderson J, Gray R, Brocklehurst P. Systematic review of effects of low–moderate prenatal alcohol exposure on pregnancy outcome. BJOG 2007 Mar;114(3):243-52.

(23) Mukherjee R, Hollins S, Abou-Saleh M, Turk J. Low level alcohol consumption and the fetus. BMJ 2005 Feb 19;330(7488):375–6.

(24) Poole N. Fetal Alcohol Spectrum Disorder (FASD) prevention: Canadian perspectives. Ottawa: Public Health Agency of Canada; 2008.

(25) Poole N, Dell C. Girls, women and substance use. Ottawa: Canadian Centre on Substance Abuse; 2005.

(26) Stockwell T, Room R. Constructing and responding to low-risk drinking guidelines: conceptualisation, evidence and reception. Drug Alcohol Rev 2012 Mar;31(2):121-5.

(27) Canadian Centre on Substance Abuse. Canada's low-risk drinking guidelines [Internet]. Ottawa: Canadian Centre on Substance Abuse; 2011 [cited 15 Mar 2012]. Available from: http://www.ccsa.ca/eng/priorities/alcohol/canada-low-risk-alcohol-drinking-guidelines/Pages/default.aspx

(28) Statistics Canada. Heavy drinking [Internet]. Ottawa: Statistics Canada; 2010 [cited 22 Feb 2012]. Available from: http://statcan.gc.ca/pub/82-229-x/2009001/deter/hdx-eng.htm

(29) Stockwell T, Zhao J, Thomas G. Should alcohol policies aim to reduce total alcohol consumption? New analyses of Canadian drinking patterns. Addict Res Theory 2009;17(2):135-51.

(30) Dawson DA. Methodological issues in measuring alcohol use. Alcohol Res Health 2003;27(1):18-29.

(31) First Nations Information Governance Centre (FNIGC). First Nations Regional Health Survey (RHS) 2008/2010: national report on adults, youth and children living in First Nations communities. Ottawa: FNIGC; 2012.

(32) National Institute on Alcohol Abuse and Alcoholism. Alcohol: a women's health issue. Bethesda (MD): National Institutes of Health; 2003.

(33) Statistics Canada. Heavy drinking, 2010 [Internet]. Ottawa: Statistics Canada; 2010 [cited 15 Mar 2012]. Available from: http://www.statcan.gc.ca/pub/82-625-x/2011001/article/11462-eng.htm

(34) Statistics Canada. Health trends [Internet]. Ottawa: Statistics Canada; 2011 [cited 17 Apr 2012]. Available from: http://www12.statcan.gc.ca/health-sante/82-213/index.cfm?Lang=ENG

(35) Simons-Morton B, Farhat T, ter Bogt T, Hublet A, Kuntsche E, Nic Gabhainn S, et al. Gender specific trends in alcohol use: cross-cultural comparisons from 1998 to 2006 in 24 countries and regions. Int J Public Health 2009 Sep;54(Suppl 2):199-208.

(36) Poole N, Gonneau G. Preventing heavy alcohol use among girls and young women. Vancouver: British Columbia Centre of Excellence for Women's Health; 2011.

(37) Martin SL, Beaumont JL, Kupper LL. Substance use before and during pregnancy: links to intimate partner violence. Am J Drug Alcohol Abuse 2003 Aug;29(3):599-617.

(38) Graham K, Bernards S, Wilsnack SC, Gmel G. Alcohol may not cause partner violence but it seems to make it worse: a cross national comparison of the relationship between alcohol and severity of partner violence. J Interpers Violence. 2011 May;26(8):1503-23.

(39) Graham K, Bernards S. Canada: Alcohol and partner physical aggression in the 10 provinces. In: Graham K, Bernards S, Munne M, Wilsnack SC, editors. Unhappy hours: alcohol and partner aggression in the Americas. Washington: Pan American Health Organization; 2009. p. 91-111.

(40) McCreary Centre Society. About the AHS [Internet]. Vancouver: McCreary Centre Society; 2012 [cited 22 Sep 2012]. Available from: http://www.mcs.bc.ca/ahs

(41) Saewyc E, Poon C, Wang N, Homma Y, Smith A. Not yet equal: the health of lesbian, gay, & bisexual youth in BC. Vancouver: McCreary Centre Society; 2007.

(42) First Nations Information Governance Centre. RHS phase 2 (2008/10) preliminary results [Internet]. Ottawa: First Nations Information Governance Centre; 2011 [cited 19 Apr 2012]. Available from: http://www.rhs-ers.ca/sites/default/files/RHSPreliminaryReport.pdf

(43) Demers A, Kairouz S, Adlaf E, Gliksman L, Newton-Taylor B, Marchand A. Multilevel analysis of situational drinking among Canadian undergraduates. Soc Sci Med 2002 Aug;55(3):415-24.

(44) Kairouz S, Gliksman L, Demers A, Adlaf E. For all these reasons, I do...drink: a multilevel analysis of contextual reasons for drinking among Canadian undergraduates. J Stud Alcohol 2002 Sep;63(5):600-8.

(45) Kairouz S, Greenfield TK. A comparative multi-level analysis of contextual drinking in American and Canadian adults. Addiction 2007 Jan;102(1):71-80.

(46) Clapp JD, Reed MB, Holmes MR, Lange JE, Voas RB. Drunk in public, drunk in private: the relationship between college students, drinking environments and alcohol consumption. Am J Drug Alcohol Abuse 2006;32(2):275-85.

(47) Butt P, Beirness D, Cesa F, Gliksman L, Paradis C, Stockwell T. Alcohol and health in Canada: a summary of evidence and guidelines for low risk drinking. Ottawa: Canadian Centre on Substance Abuse; 2011.

(48) Quinn K, Rugkhla P, Women's Health Victoria. Women and alcohol: gender impact assessment. Melbourne: Women's Health Victoria; 2010.

(49) Schinke SP, Fang L, Cole KCA. Substance use among early adolescent girls: risk and protective factors. J Adolesc Health 2008 Aug;43(2):191-4.

(50) Giglia R, Binns C. Alcohol and lactation: a systematic review. Nutr Diet 2006;63(2):103-16.

(51) Public Health Agency of Canada. What mothers say: the Canadian maternity experiences survey. Ottawa: Public Health Agency of Canada; 2009.

(52) Maloney E, Hutchinson D, Burns L, Mattick RP, Black E. Prevalence and predictors of alcohol use in pregnancy and breastfeeding among Australian women. Birth 2011 Mar;38(1):3-9.

(53) Mennella J. Alcohol's effect on lactation. Alcohol Res Health 2001;25(3):230-4.

(54) Koren G. Drinking alcohol while breastfeeding. Will it harm my baby? Can Fam Physician 2002 Jan;48:39-41.

(55) World Health Organization. Global strategy to reduce the harmful use of alcohol [Internet]. Geneva: World Health Organization; 2010 [cited 5 Apr 2012]. Available from: http://www.who.int/substance_abuse/alcstratenglishfinal.pdf

(56) British Columbia Office of the Provincial Health Officer. Public health approach to alcohol policy: an updated report from the Provincial Health Officer. Victoria: British Columbia Ministry of Healthy Living and Sport; 2008 Dec.

(57) Canadian Centre on Substance Abuse. Applying a sex/gender/diversity-based analysis within the national framework for action to reduce the harms associated with alcohol and other drugs and substances in Canada. Ottawa: Canadian Centre on Substance Abuse; 2009.

(58) Parkes T, Poole N, Salmon A, Greaves L, Urquhart C. Double exposure: a better practices review on alcohol interventions during pregnancy. Vancouver: British Columbia Centre of Excellence for Women's Health; 2008.

(59) Greaves L, Poole N. Victimized or validated? Responses to substance-using pregnant women. Canadian Women Studies 2004;24(1):87-92.

(60) Tjaden P, Thoennes N. Extent, nature and consequences of intimate partner violence: findings from the national violence against women survey. Washington: U.S. Department of Justice; 2000.

(61) National Center on Addiction and Substance Abuse at Columbia University. The formative years: pathways to substance abuse among girls and young women ages 8-22. New York: CASA; 2003.

(62) Quinn K, Rugkhla P. Women and alcohol: gender impact assessment. Melbourne: Women's Health Victoria; 2010.

(63) Tough S, Tofflemire K, Clarke M, Newburn-Cook C. Do women change their drinking behaviors while trying to conceive? An opportunity for preconception counseling. Clin Med Res 2006 June;4(2):97-105.

(64) De Finney S, Janyst P, Greaves L. Aboriginal adolescent girls and smoking: a qualitative study. Vancouver: British Columbia Centre of Excellence for Women's Health; 2009.

(65) Oesterle S, Hill K, Hawkins J, Guo J, Catalano R, Abbott R. Adolescent heavy episodic drinking trajectories and health in young adulthood. J Stud Alcohol 2004 Mar;65(2):204-12.

(66) Simon G, Von Korff M, Saunders K, Miglioretti D, Crane P, van Belle G, et al. Association between obesity and psychiatric disorders in the US adult population. Arch Gen Psychiatry 2006 Jul;63(7):824–30.

(67) Kleiner KD, Gold M, Frost-Pineda K, Lenz-Brunsman B, Perri M, Jacobs W. Body mass index and alcohol use. J Addict Dis 2004;23(3):105-18.

(68) Field A, Austin S, Frazier A, Gillman M, Camargo C, Colditz G. Smoking, getting drunk, and engaging in bulimic behaviors: in which order are the behaviors adopted? J Am Acad Child Adolesc Psychiatry 2002 Jul;41(7):846-53.

Sexual Behaviour

Margaret Haworth-Brockman

As we have noted throughout this document, the concept of healthy living should include more than just losing weight or getting exercise. We considered it critical to include gender-based violence, including sexual violence, because it is such an important aspect of women's lives (1,2); these are explored in a separate chapter. The analysis of the data on gender-based violence led us to realize the value of also looking at sexual health indicators as part of what really contributes to women's healthy living.

The terms "sexual health" and "healthy sexuality" are sometimes used interchangeably, but a 2010 WHO report notes that, "the term "healthy sexuality" [is] considered to be problematic, as it suggests that there is "unhealthy sexuality", which might be used to designate expressions of sexuality that are not considered acceptable in some societies" and could lead to discrimination (3). The report recommends a number of indicators that could be used within and across nations to monitor and support the right to sexuality without violence, coercion or limitations on personal expression (3). The recommendations reflect a perspective that expressions of sexuality and sexual behaviour have important implications for emotional, mental, and spiritual health as well as physical wellness.

The Public Health Agency of Canada has developed indicators for a new survey on sexual health, sexuality and sexual behaviour for Canada (4). As the results from this work are not available yet, this profile must rely on other national survey data that have focused on behaviours that create risk for sexually transmitted infections (STIs, including HIV/AIDS) and unplanned pregnancies. A significant limitation to the survey data on sexual behaviour, however, is the lack of information about women over the age of 49. This may represent a lack of imagination about sexuality among older women, but it is more likely an artefact of the focus on "risky behaviour" among teenagers and young adults, particularly concerns about teen pregnancies. This chapter examines what is known about sexual behaviour among women in Canada, women's precautions against pregnancy and infection, as well as other factors that may hinder or contribute to healthy sexual living.

Sexual Activity

Most women in Canada report being sexually active. The majority of women aged 18 years and older reported having had sexual intercourse some time in their lives in the 2005 CCHS (Figure 1a), and over 94% of women aged 18 to 34 years and 88% or more of all other women (aged 15 and older) reported having sexual intercourse in the 12 months preceding the survey (Figure 1b). As noted, there are currently no national survey data about the sexual activity of women aged 50 years and older, leaving a large gap in the

information available. The First Nations Regional Health Survey however has data about adult women and men aged 40-54 and over 55 years (5).

Figure 1a. Canadian Women Reporting Ever Having Intercourse, By Age, 2005

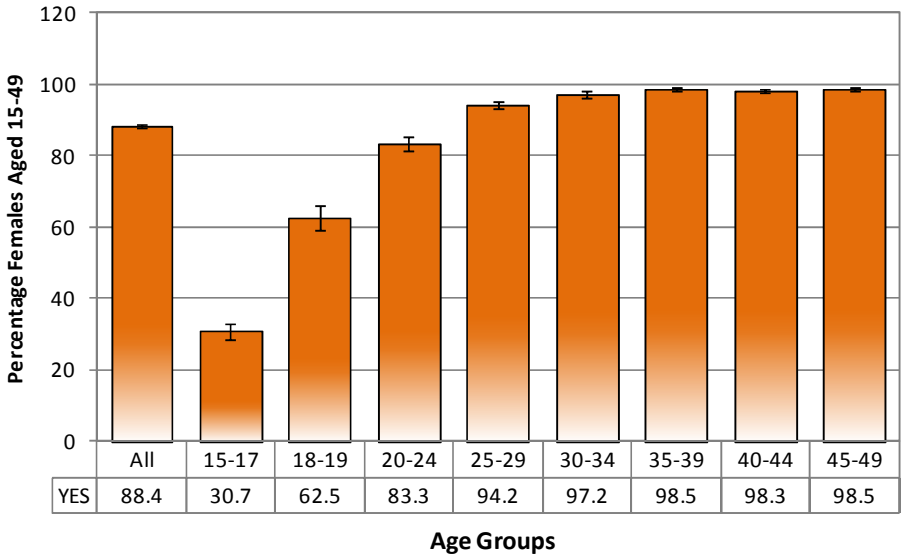
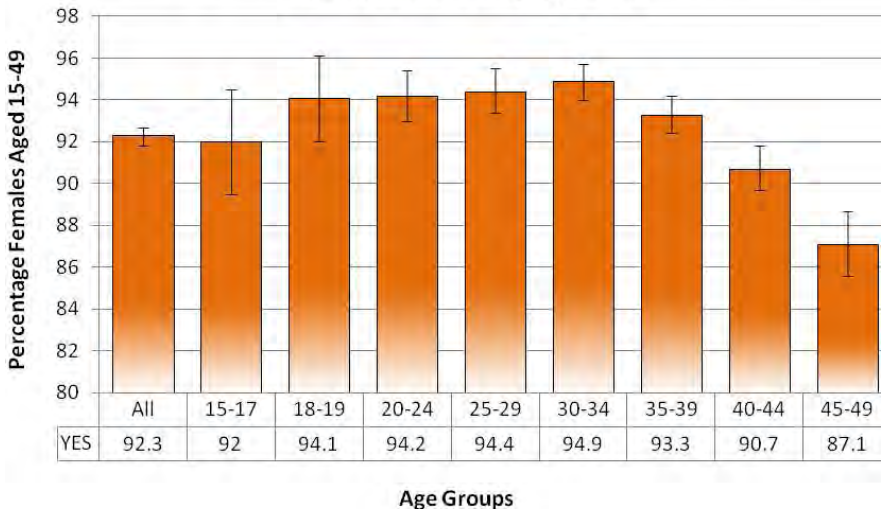


Figure 1b. Canadian Women Reporting Having Intercourse Within the Past 12 months By Age, 2005

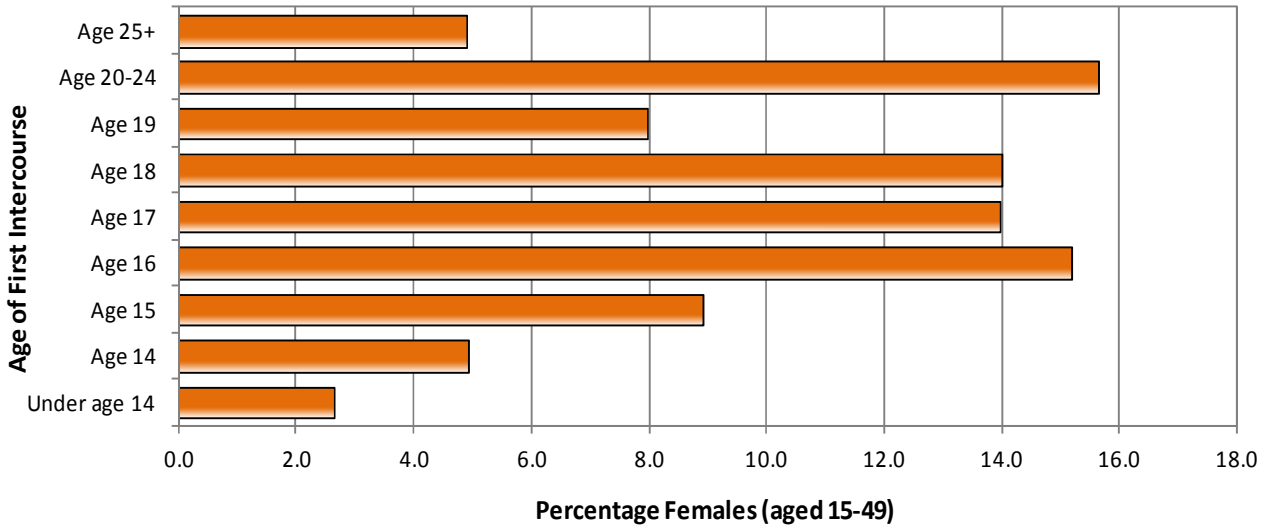


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), Cycle 3.1, 2005.

As noted and will be discussed more fully later, sexual activity among teens has been a public health focus because of concerns about unplanned pregnancy and sexually transmitted infections. CCHS data show that more than 1 in 4 girls aged 15-17 in Canada in 2005 reported having had sexual intercourse (Figure 1a), with

over 16% reporting having had sex by the time they were aged 15 and another 15% reported being 16 years old, the age of legal consent, when they first had intercourse (Figure 2). According to Rotermann, these 2005 figures reflect a decline in the number of young women aged 15-16 having sexual intercourse from surveys done in 1996/97 and 2003. The proportion of teenage girls reporting that they had become sexually active before age 15 also decreased significantly from 1996/97 to 2005. Over one-quarter of young women aged 15-19 who had had intercourse in the previous year had more than one partner (6).

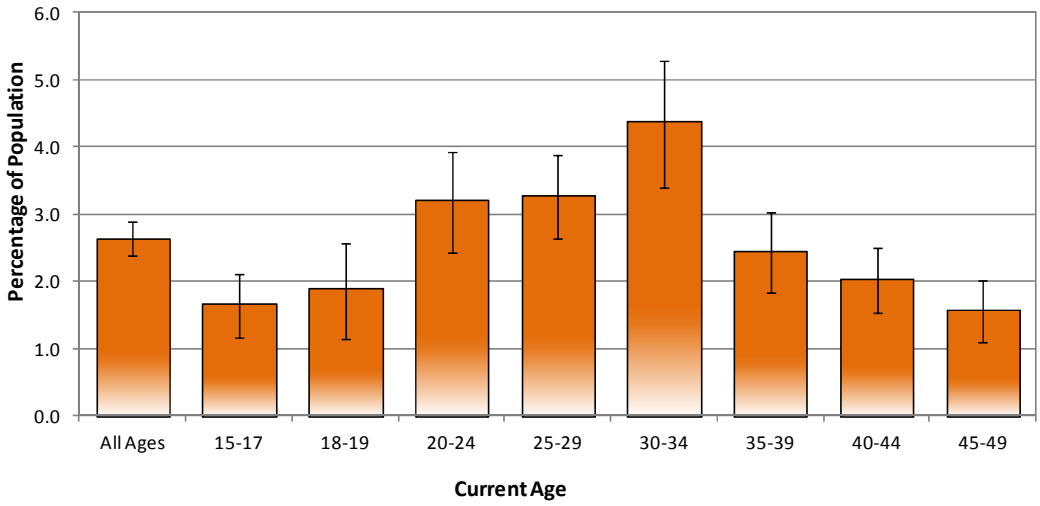
Figure 2. Age at First Intercourse
All Canadian Females (Aged 15-49), 2005



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010.

As Rotermann noted, there have been changes in age at first intercourse. More young women (ages 18 -19 in 2009/2010) had intercourse at the ages of 16 or 17, whereas women in their late twenties or early thirties at the time of the 2009/2010 CCHS survey were more likely to have had first intercourse either at age 16 or between the ages of 20 and 24. It is notable however, that fewer teens reported having sex before the age of 14 than older women had had 10 and 15 years earlier. That is, there appears to be a trend away from having intercourse at a very young age (Figure 3a).

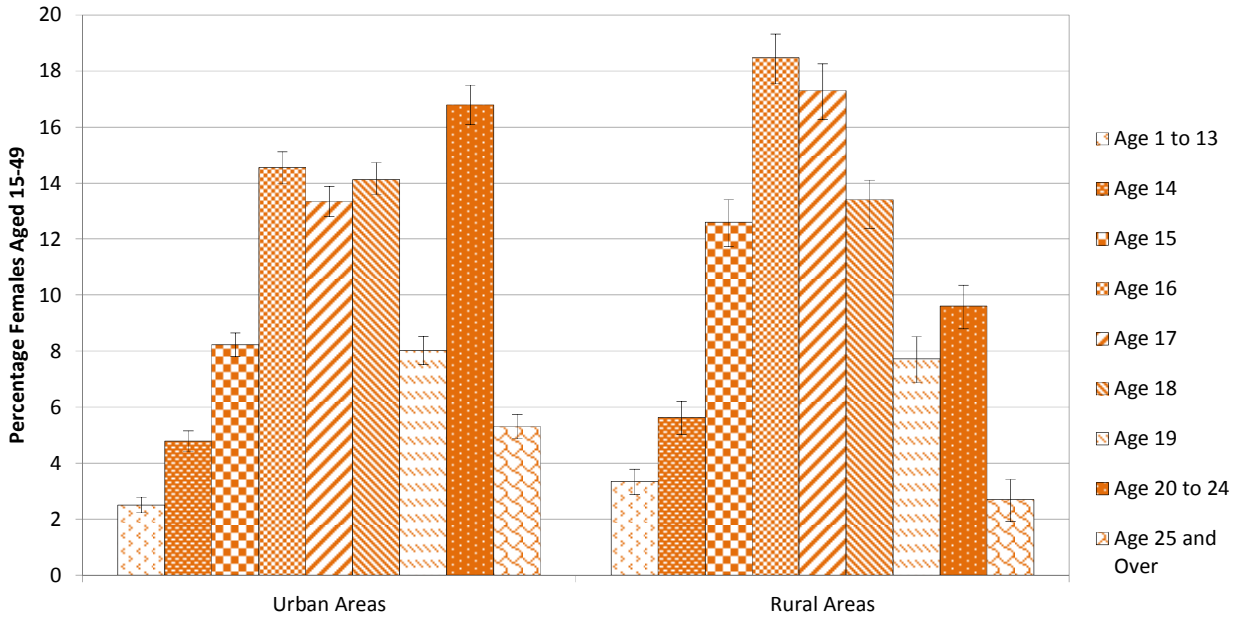
Figure 3a: First Intercourse Before the Age of 14, by Current Age
Women in Canada, 2009-2010



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010.

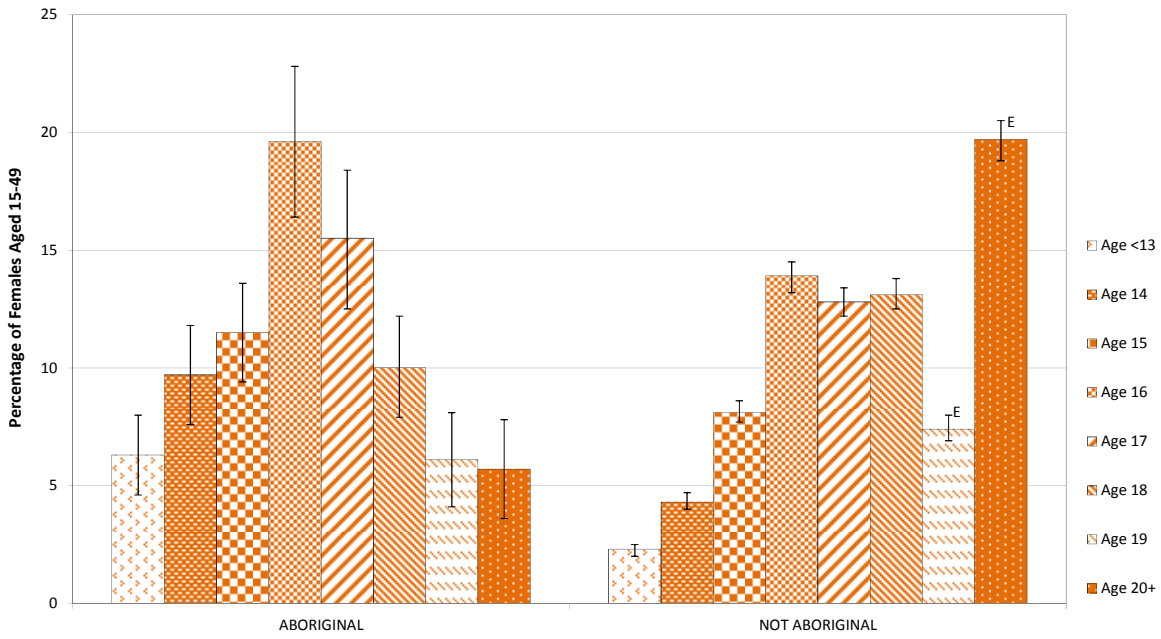
Not all women's experiences are the same and age of first intercourse varied among young women in Canada. Rural living and Aboriginal teens were more likely to report having had sex at a younger age (Figures3b, 3c), and girls in the lowest income households were more likely to have had intercourse before the age of 14(4.8%, confidence interval [CI] 4.1%-5.5%) than girls from homes with higher incomes (1.5%, CI 1.2% -1.8%).

Figure 3b. Age at First Intercourse
By Area of Residence, Canadian Females, 2009/2010



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010.

Figure 3c. Age at First Intercourse by Identity
Canadian Females, 2009-2010



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009/2010.

A comprehensive, longitudinal study of heterosexual couples in the US (the National Survey of Sexual Health and Behaviour) confirmed that women (and men) engage in other activity besides penetrative vaginal sexual intercourse (7). According to Nahmias 2011 (8), more adults reported having engaged in both anal and oral sex as compared to responses in a US national survey in 1992. The survey found that giving and receiving oral sex is now an integral part of sexual activity in the United States for many adults (7)(9), almost as frequent as vaginal sex for 20- to 24-year-olds. Older women report less oral sex with age, but oral sex is still practiced in the oldest age group (70 years and over) (9)(the results are reported for females only in this paper). Similar results were found in national surveys from the UK (10).

Young women are also sexually active in a variety of ways. A 2011 study found that young women had varying definitions of sex (11). Some young women included anal and oral sex in their definitions, while others did not. Furthermore, "Time between sex events, new condom use, and new erection were used [variously] to define unique sex events. Some believed sex began with foreplay. Others believed sex began when the penis entered the vagina. Some believed sex ended when the penis was withdrawn from the vagina. Others believed sex ended with orgasm for one or both partners" (11). A better understanding of young women's sexual activity can be important to understanding teens' risk for pregnancy but also their enjoyment of sex. These findings also suggest that questions about sexual activity should be broader than about vaginal intercourse alone. The potential risks associated with sexual behaviour among 15 year olds, for example, are mainly linked to the emotional and behavioural characteristics of this developmental stage. Early sex initiation is considered to have detrimental implications for self-perceptions, social status and future health behaviours (12).

Women's choices for sexual partners can vary also. Eleven percent of young women in a 2011 study reported some same-sex sexual experience (13). Among young women who reported any same-sex attraction, women who said they were homosexual or bisexual had an elevated likelihood of having engaged in same-sex behaviour (4.7 ratio). However, among women who reported they were attracted exclusively to men, those who had had heterosexual sex were more than four times as likely to have also engaged in same-sex activity. Thus, a significant proportion of "straight" youth in the 2011 study also engaged in same-sex activity at some time in their lives (13).

Most women (72%) reported having only one sexual partner in the previous 12 months in the 2009/10 CCHS. Women in the lowest income quintile were most likely to have had no sexual partner, compared with women in other income groups. More women in the Atlantic provinces (78.4%) reported having had one partner than elsewhere in Canada, while women in the Territories (6.9%) and BC (5.3%) were most likely to report having 3 or more partners in the previous 12 months. More women who were Aboriginal (off-reserve) had more than one partner in the previous 12 months (14.7% compared with 8.6%), but most women had one partner whether Aboriginal (68.9%) or non-Aboriginal (72.2%) (see also (5)). Mark et al. found that 19.2% of 412 women over the age of 18 years who participated in a study of adults' sexual behaviour in the US and Canada, "indicated that they had 'cheated' during their current relationship (i.e., engaged in sexual interactions with someone other than their partner that could jeopardize, or hurt, their relationship)" (14). According to the authors, unhappiness in their current relationship and low compatibility in sexual attitudes and values were predictive of such cheating. Women's unhappiness in their current relationship was found to be more predictive of "cheating" than marital status or religiosity (14).

There are numerous reasons why women may not wish to be or cannot be sexually active at some point in their lives. Women who have recently given birth, for example, may be cautious about resuming sexual intercourse, including feeling concerned about healing well, physical discomfort, sleep disruption and general fatigue (15). Resuming sexual activity and sexual satisfaction in the postpartum period was found to be enhanced when clinicians and counsellors took time with women to discuss their experiences and emotions (15).

There are numerous reasons why women are not or cannot be sexually active sometime in their lives, including a shortage of partners for senior women.

Women have cited anxiety, depression, past sexual abuse, poor communications with their partners as well as physical illness as reasons for low desire (16). More women who are prematurely (surgically in this study) and naturally menopausal may have lower desire than women who are pre-menopausal, but up to 27% women who have not reached menopause have expressed unhappiness with their level of desire (16). A US study found that many clinicians (nurses and physicians) did not know how to initiate conversations about sexual activity and

ask if their female patients had questions or difficulties, nor were they certain where to refer women for counselling and assistance when women raised concerns about their low desire (17).

The limited availability of partners and physical illness can prevent older women (ages 57-85) from enjoying sexual activity (18). The results of a longitudinal cohort study (19) found that restrictions on the ability to enjoy sexual activity and function are associated with specific illnesses, such as diabetes, as well as certain medications, such as prescription drugs for hypertension (18), and that poor physical health is more strongly associated with sexual problems among older women than among older men (20). Although women with hypertension, for example, may not find that the condition interferes with vaginal intercourse, some women do experience difficulties (such as discomfort, pain or other lack of enjoyment) with the declines in estradiol (estrogen) that accompany menopause. However, mental distress, including strain in an intimate relationship, was a primary reason for reduced sexual activity and enjoyment for older women (20). More significant for senior women compared to other factors, however, is that men's higher mortality can limit sexual frequency, by reducing the number of heterosexual partners available (18).

Younger women's physical health can also limit their sexual activity. In a study of women with chronic heart disease (CHD), Reid et al. found that few adolescents (14%) or young adults (48%) with CHD were sexually active (defined here as having at least one partner in the previous three months), compared with their healthy peers (21). Notably, 72% of the adolescents and 36% of the young adults who were sexually active also engaged in one or more types of potentially risky sexual behaviour (i.e., two or more partners in the past 3 months, questionable birth control, using drugs or alcohol before sex at least sometimes), which the authors found to be a high proportion. On the other hand, women with complex CHD were more focused on their fertility and the risks of passing along genes related to CHD to their babies, as well as concerns about potentially adverse effects of pregnancy on their own health. Reid et al. concluded that practitioners should discuss sexual health and mediating risk with patients who have CHD, and that women with complex diseases require particular attention (21).

A recent study found that sexual compliance (defined as willingly engaging in sexual activity that one does not initially desire) is a common behaviour among young people in committed relationships (22). Among 63 young adults (ages 18–24 years) in committed, heterosexual relationships, 17% of all sexual activity was rated as sexually compliant. Those occasions of sexual compliance were rated as less enjoyable and more unexpected. The study participants reported that they agreed to having sex with their partners because they saw sexual activity as an implicit contract between partners, their partner was aware of their low desire and would be willing to have sex if the circumstances were reversed, or because they were wanting to deflect pressure they had felt from their partners in the past (22).

Despite the extent of implicit and explicit sexual behaviour in the media, women have reported that there are still standards about sexual behaviour among their peers. Young women in both rural and urban settings reported that young women are judged more harshly than young men if they transgress the sexual norms of

their social circles, whatever those norms might be (23). Shoveller et al. suggest that detailed examination of the intersections between everyday experiences, social context and teenagers' personal agency may lead to better understanding of young women's sexual behaviour (23)

Summary

Women's sexual behaviour is more wide ranging than vaginal intercourse, and changes with their circumstances, preferences and life stages. Oral sex, for example, is at least as common as vaginal intercourse among young women, and has many of the same emotional implications (24). Public health programs aimed at reducing the transmission and evolution of STIs need to take into account specific sexual behaviours, and the cultural shifts that influence their prevalence (8). The new national survey from PHAC will include questions about sexual satisfaction and pleasure, sexual self-acceptance and communication, "to be more reflective of the multidimensional nature of sexual health" (4). Equally important, however, is the willingness of clinicians and counsellors to inquire about any concerns women may have about their sexual activity and satisfaction, and be prepared to assist women as needed.

Women and Condoms

It is remarkable that there are very little data about contraception use in this country (25), considering its importance in providing women with freedom to control their fertility. The exception is that there are data regarding the use of condoms. Male condoms are considered the most effective method for reducing the risk of transmission of HIV and other STIs (26), and thus condoms are highly promoted. In a recent study approximately three-quarters of sexually active 15- to 19-year olds who had had multiple partners or who were not married or in a common-law relationship reported using condoms regularly (6). However the condom failure rate for pregnancy may be as high as 14% in the first year of use and many women use other forms of contraception to prevent pregnancy when they are in stable relationships (26).

This section explores data and other evidence about condom use among women in Canada, starting with a discussion about condoms for contraception and followed by women's use of condoms in "high risk" behaviours which can affect the acquisition and transmission of infections.

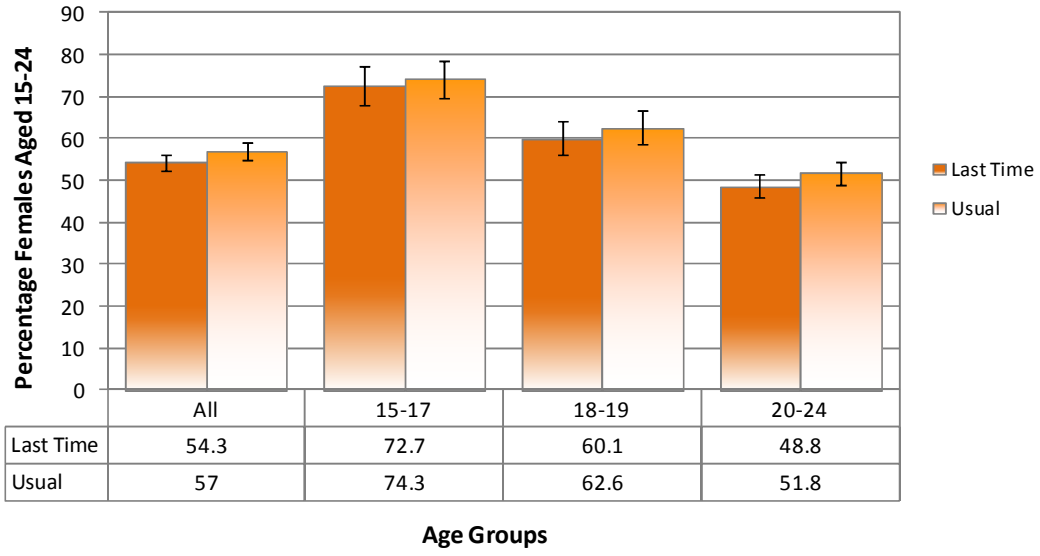
Women and Condoms for Birth Control

As mentioned above, survey data on women's use of contraceptives in Canada are very limited, and the questions about condom use in the 2005 CCHS were tailored to specific groups of women and men, particularly those considered high risk. There are some data, however, about women who use condoms.

*Sexually active adults, aged 15-49 not in a monogamous relationship and/or between the ages of 15 & 24 are considered **high risk**.*

More than half of all women under the age of 25 in Canada reported using a condom as their contraceptive of choice in the 2005 CCHS (Figure 4). These data are similar as for women who reported using a condom for birth control during their most recent sexual intercourse. McCall et al. note that while younger women may be more likely to use condoms, when they are in more permanent relationships, many women change to other contraception methods (26).

Figure 4. Condom Used as Birth Control Method By Age, Canadian Women (Aged 15-24), 2005



	All	15-17	18-19	20-24
Last Time	54.3	72.7	60.1	48.8
Usual	57	74.3	62.6	51.8

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), Cycle 3.1, 2005.

Women, Condoms and Preventing STI Transmission

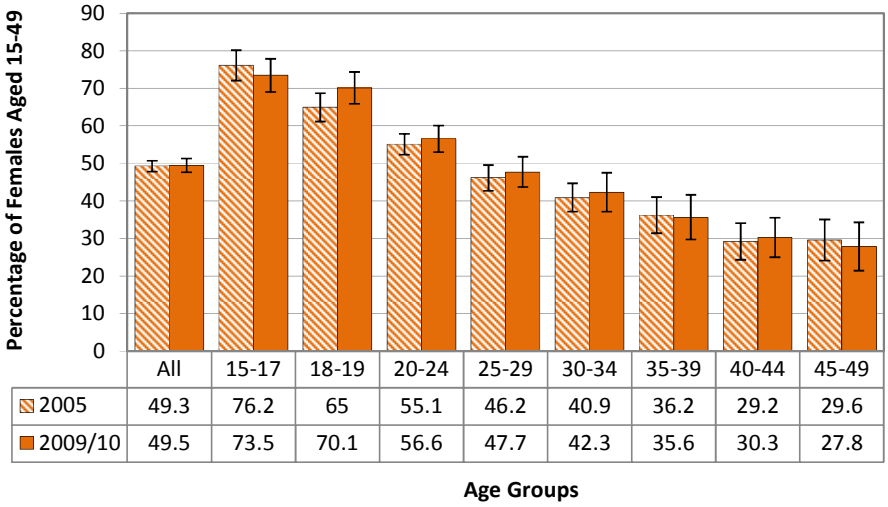
Condoms are promoted for casual sexual partners that is, for situations where a woman (or man) cannot be certain that her partner does not have an STI. (We note that there is no guarantee that a woman in an on-going relationship knows if her partner is infected.) Additionally, condoms are promoted for use between partners when one of them *does* know that she or he carries an infectious disease; the transmission of HIV

and annual incidence of HIV are reduced by 95% among couples that are serodiscordant (one partner is infected and the other is not) when condoms are used (26).

The CCHS had questions about condom use among populations considered to be "high risk". The high risk population is defined by CCHS as "sexually active adults between ages of 15 and 49 not in a monogamous union, and/or sexually active adults between the ages of 15 and 24"[1]. The definition is not restricted to any sexual orientation or gender identity of the partners involved, and there is no specification in the questions about whether male or female condoms were used.

As Figure 5 shows, about 50% of women in Canada who are considered high risk reported using a condom during their last sexual intercourse in the 2005 and the 2009/10 CCHS surveys. Women in most age groups reported slightly greater use of condoms in 2009/10, but there was very little variation among women by province, Aboriginal identity, or education level.

Figure 5. Condom Use During Last Sexual Intercourse, High Risk Canadian Women, Comparing 2005 & 2009/10



	All	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49
2005	49.3	76.2	65	55.1	46.2	40.9	36.2	29.2	29.6
2009/10	49.5	73.5	70.1	56.6	47.7	42.3	35.6	30.3	27.8

SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), Cycle 3.1, 2005.

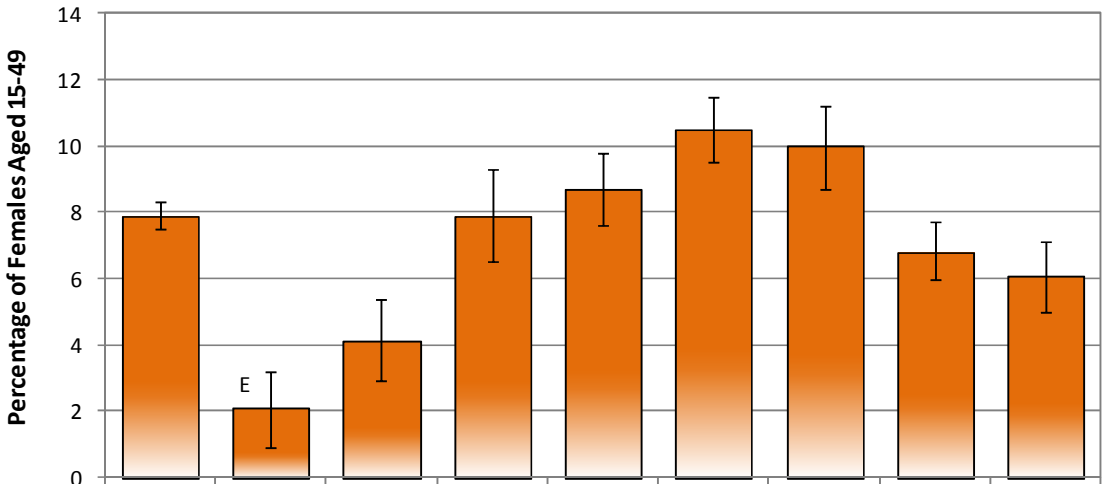
A survey of 15 year-olds in Canada, Israel and more than 20 European countries, found that in 2005/06 almost 27 % of those surveyed had had sex and almost 86 % reported using condoms or the contraceptive pill at last intercourse. According to the authors, this reflects little change since 2001/02 in prevalence of sexual initiation for this age group and a general increase in being well-protected at last intercourse (12). There were wide variations among countries and, although most adolescents were well protected and condoms were "by far" the most frequent method of contraception used in this age group, up to one third of sexually active 15 year-olds in some countries were at risk for either STIs or pregnancy, or both (12) because they were not using condoms or some other contraceptive. Factors that contribute to high risk sex and risky sexual behaviours among young women are explored in more detail below.

[1] This definition arises because "early sexual intercourse, unprotected sex, and having multiple sexual partners put youth [and others] at risk of Human Immunodeficiency Virus (HIV) and other sexually transmitted infections (STIs) and of unplanned pregnancy. Individuals aged 15 to 24 experience some of the highest rates of STIs" (6).

Perhaps what is most concerning is how few high risk women *over* the age of 24 reported using condoms. Using male condoms requires cooperation from the male partner and condom use can often be a point of contention between partners (26). For women, there is a justifiable fear of suggesting condom use because it might result in a partner's suspicion about HIV serostatus or other STI infections; there is frequently also a fear of violence and other repercussions such as economic privation. In particular, it can be difficult for women to negotiate safer sex practices with occasional partners (27).

With limited data available about women and safer sex practices, it can be valuable to look at sexually transmitted infections among women as a proxy measure of healthy living and to potentially indicate where there are programming and policy needs. As many as 7.9% of women in Canada aged 15-49 reported having been diagnosed with an STD (sexually transmitted disease, now termed as STI) at some time in their lives, in the 2005 CCHS (Figure 6a). While differences among women were small by education level, income, and urban/rural living, Aboriginal women were more than twice as likely as non-Aboriginal women to report having been diagnosed with an STD (Figure 6b). These proportions are likely reflected in the provincial and territorial differences seen among women for diagnoses (Figure 6c), as there are proportionately more Aboriginal women in the territories than elsewhere in Canada.

Figure 6a. Ever Diagnosed with a Sexually Transmitted Disease By Age, Canadian Women, 2005



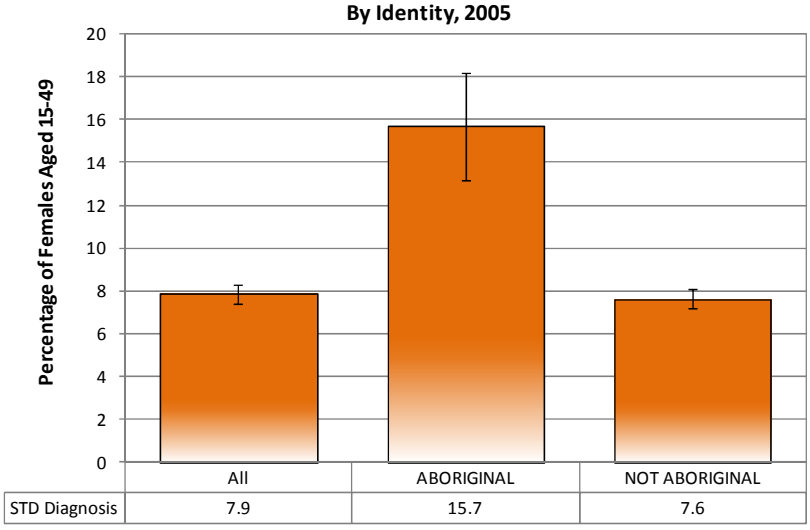
SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), Cycle 3.1, 2005.

Surveillance data from the Public Health Agency of Canada (2011) illustrate that a focus on STI prevention among younger adults and teens is warranted. The highest rates of Chlamydia are seen to be among young women, aged 15–19 and 20-24 (Figure 7). Chlamydia rates have remained steady or increased among women in every province since 1991 (28). Biologically, the tissue around the cervix of young women is more vulnerable to infection than the urethral area in men, but up to three times more infections may be asymptomatic in women. Nevertheless, young women are more likely to actively seek and receive treatment than young men because of public health efforts for regular PAP tests and in the course of other reproductive and perinatal care (29).

While much lower, rates of gonorrhea infections have also risen among women over the past 10 years (30). Gonorrhea rates were as high as 654/100,000 among women aged 20-24 in the 1980s and then declined by 1990, but as Figure 8 illustrates, infection rates have been rising again.

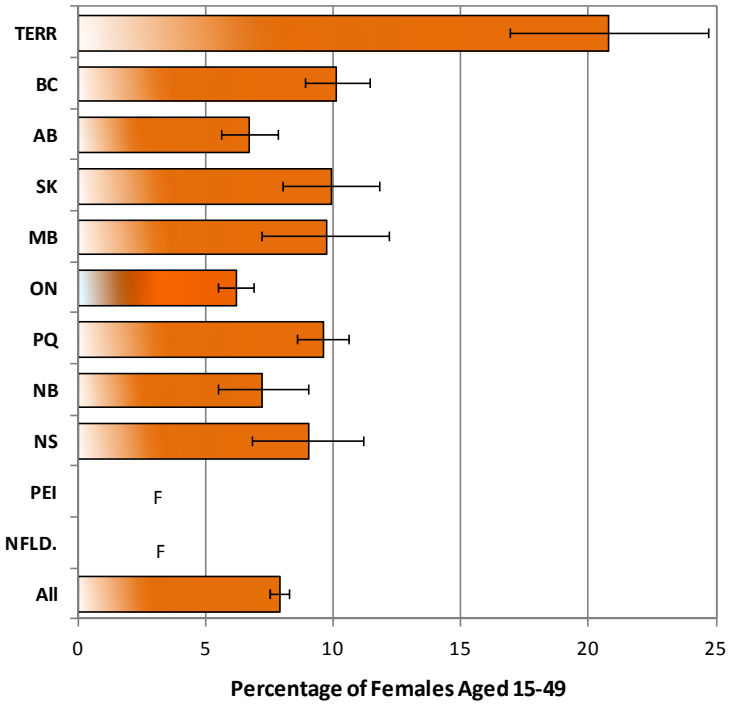
For both STIs there was a substantial drop in infection in the mid1990s and then a resurgence since 1998 in all age groups that has not yet reached a plateau. We wonder if these increased infections are due to a related decrease in

Figure 6b. Canadian Women Ever Diagnosed with an STD By Identity, 2005



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), Cycle 3.1, 2005.

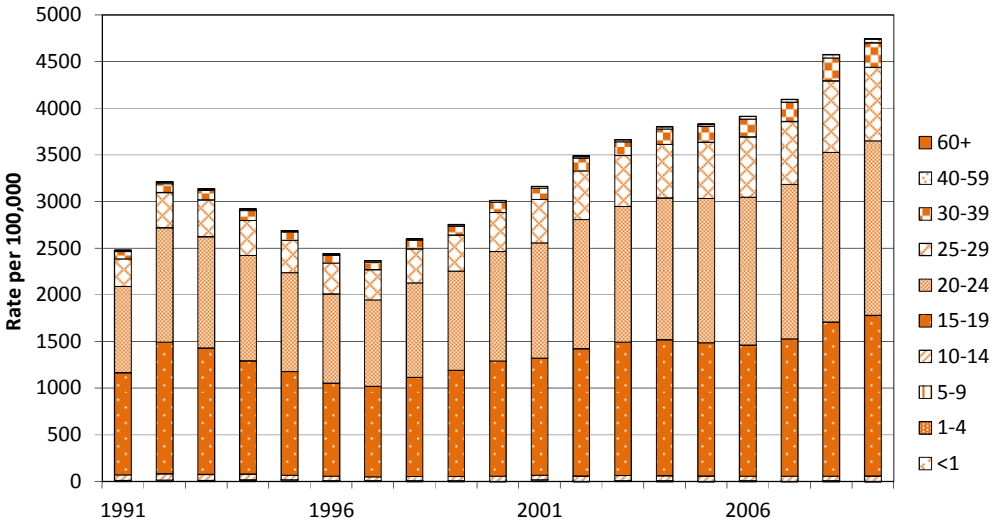
Figure 6c. Ever Diagnosed with an STD By Province of Residence, Canadian Women, 2005



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), Cycle 3.1, 2005.

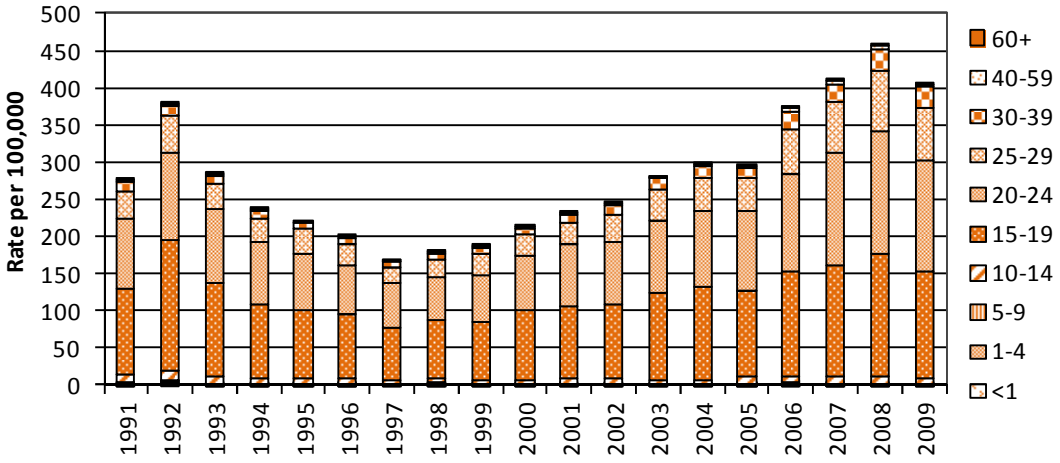
public health education on risk and condom use, broader reach in testing the population, increased infectivity of the agents or some combination of these factors.

Figure 7. Chalmydia Rates Among Women in Canada, by Age, 1991-2009



SOURCE: Public Health Agency of Canada March 2011 Surveillance Data.

Figure 8. Gonorrhea Rates for Females in Canada, by Age 1980-2009



SOURCE: Public Health Agency of Canada March 2011 Surveillance Data.

Nahmias et al. commented on the increased transmission of syphilis and gonorrhea during oral sex worldwide (8). They reported that there are indications that increased oral sex is also causing the spread of other STIs. HPV, for examples is an increasingly common cause of throat and mouth cancers (8). Herpes simplex type 1 has also been found to have greater genital to genital transmission following primary infections via oral-genital transmission (8).

HIV and AIDS are similarly increasing among some women in Canada (31). The unwillingness of sexual partners to use condoms has been reported as a leading reason for HIV acquisition (32), and this is a particular concern for women who may have less personal power such as women in prisons, or women who use sex for survival, populations whose HIV acquisition is disproportionally high. As was noted earlier, women aged 40 and over reported low use of condoms in high risk sex, which can be contributing to the increasing percentage of positive HIV test reports for women aged 40-49 years (33).

These examples illustrate that the quantitative and qualitative data available about sexual behaviours are limited, particularly as they relate to the potential for disease and suffering. Because many women receive regular reproductive health care, there are opportunities for public education, but the information and support provided should address women's various sexual behaviours as well as the power dynamics that allow or prevent women from staying healthy. Donner et al. (25) commented that it would be beneficial to focus attention on the sexual behaviour of older women as well as teens and young adults, to understand the circumstances of high risk sex for women and the best supports for women and their partners to prevent STI transmission. In Canada, there are some programs designed to prevent the transmission of STIs to and from older women (see for example *Older Women Loving Safely*[2]).

Female Condoms

Condoms for women to wear were first developed and marketed in the late 1980s and early 1990s (34). They were developed to provide women with an alternative if their male partners were unwilling to use a male condom. Made with thicker materials, they are effective in preventing STI transmission. The female condom has been reported to be as protective against HIV transmission as the male condom, and has been shown to provide similar protection against pregnancy as other barrier methods (7-15% effectiveness as contraceptives). However female condoms are considered more difficult to use than male condoms, and a failure rate of 26% for pregnancy has been reported during the first year of use (26).

Female condoms have been critiqued because they are expensive (35), noisy, and scarce in Canada (36). When women are expected to carry the cost of these devices, they often elect to use another method. The

[2] http://www.serc.mb.ca/content/dload/OlderWomenLovingSafely/file and http://www.serc.mb.ca/content/dload/0lderwomenlovingsafelyposter/file

uptake of female condoms is increasing internationally in jurisdictions where they are widely distributed and available free of charge (35).

More recently an "Invisible Condom", an applicator with spermicidal gel, has been tested (37). Early testers found both the gel formulation and the applicator were acceptable by women and their male sexual partners. As it is possible to use the applicator and gel without a sexual partner appearing to notice, it may be an effective contraceptive and preventative for women whose male partners refuse to wear a male condom (38).

Understanding Risky Sexual Behaviour

Different women, young and older, have high risk sex for different reasons. Much of the current research literature on risky sexual behaviour focuses on two factors in women's lives: alcohol and other substance use, and street involvement including working in the sex trade. This section reviews literature about these two areas, as well as other factors in women's lives that may lead to risky sexual activity.

"It's noisy, it's ugly and it's expensive... but it may be the safest sex around."(36)

Alcohol, Substance Use and Sexual Risk

A number of American studies confirm that drinking alcohol contributes to unplanned sexual intercourse among young women (39-41). Goldstein et al found that alcohol use was more likely to be a factor in new, compared with repeat, sexual behaviours. Alcohol was also associated with less likelihood of discussing safer sex with a partner as well as a decreased likelihood of using contraceptives in a new vaginal sex experience (41). Ronis and O'Sullivan also found higher lifetime use of alcohol was associated with earlier initiation to intimate sex in Canadian teens. However, having greater self-esteem was also found to be associated with girls choosing to have sex, suggesting that young women are not always coerced into sex, nor engaging in sex only as a result of alcohol use (40).

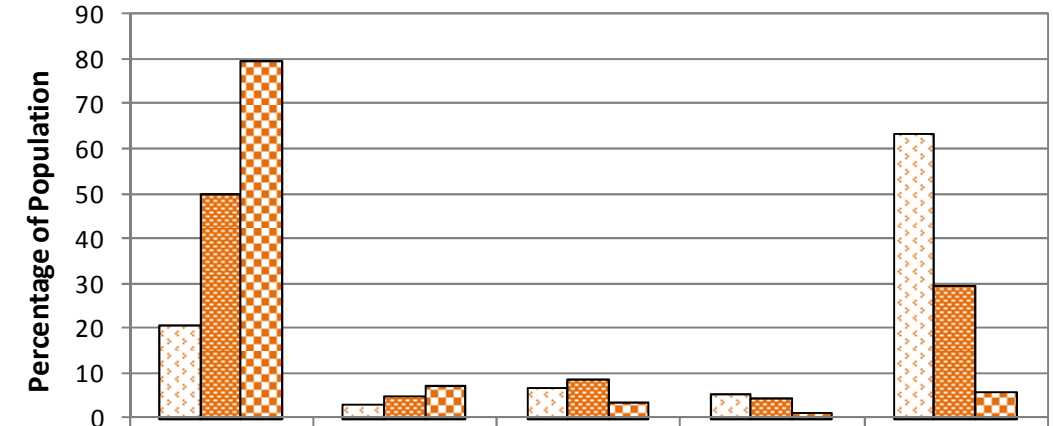
Studies have found that women who are intravenous drug users (IDUs) are likely to engage in risky sexual behaviour, particularly if they are trading sex for survival (42), including for housing and drugs (43). HIV infection is considerably higher among female IDUs compared with other women in Canada. A study of women who are IDUs in Montreal and Vancouver found an HIV prevalence of 29% among women sex trade workers but also a prevalence of 29.2% among women who did *not* participate in the sex trade. Women who were engaged in the sex trade were found to also have riskier drug-related behaviours (borrowing needles, more than one use of heroin per day) (42), but the fact that HIV prevalence was similar among women who did and did not trade sex suggests

Women, younger and older, have high risk sex for a variety of reasons.

that the women's networks remain risky for HIV exposure, whether or not the women are trading sex for money and survival (see for example (32)).

Figure 9 illustrates that 79% of women in a study on intravenous drug users reported always using condoms for vaginal sex with male clients.[3] Fewer women reported using condoms with sex partners who were not clients. Only 50% of the women reported always using condoms for vaginal sex with male casual partners. These patterns are similar for condom use during anal or oral sex. Most women reported that they never use condoms with their regular male sex partners (44). What we do not know is whether these are partners of choice and whether the women would have liked to use condoms during sex with these partners.

Figure 9: Condom Use During Vaginal Sex, by Relationship to Partner Female Intravenous Drug Users, 2006



	Always	Usually	Sometimes	Occasionally	Never
Regular	20.8	3	6.6	5.4	63.5
Casual	49.7	5	8.4	4.2	29.4
Client	79.6	7.3	3.6	1.1	5.7

Consistency of Use

SOURCE: Public Health Agency of Canada. I-Track: Enhanced Surveillance of Risk Behaviours among People who Inject Drugs. Phase I Report, August 2006. Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.

[3] We note that these data are limited to sexual activity between women and men only.

Street Involvement

Street-involved youth report higher rates of sexual activity and participate in more risky sexual behaviours than their peers who are not homeless (45-47). A California study found most street-involved youth were sexually active (84-98%) and inconsistently used condoms, with regular, casual or sex trade partners. Teenage girls in the study were far more likely to use both injection drugs and non-injection drugs, to be sexually active, to have been diagnosed with an STI, have multiple sexual partners and to not use a condom than their male counterparts, (48). A history of sexual assault and early romantic involvement (sic) may increase the likelihood for teenage girls to be sexually active and to become pregnant. Thrane et al suggest that runaway teens have a multiplicity of needs that require a complex array of medical, social, emotional, and educational resources to promote positive sexual health outcomes (49).

Women in Vancouver who lived on the streets or were street-involved were pressured into having unprotected sexual intercourse for a number of reasons: working away from the main streets because of fear of police, violent clients and servicing clients in public spaces or cars (47). All of these factors prevented women from negotiating condom use and safer sex-work. The authors suggest sexual risk is increased when policies and legislation prohibit sex-work and drug use, setting up a greater likelihood that women are exploited and at risk of violence when their sex trade and drug use behaviour are forced to be more covert.

Age Differences between Partners

Negotiating safer sex is easier if women's partners are closer in age to them. A 2007 study found that having a partner $\geq$ 4 years older was associated with not using a condom at last intercourse, having more than one partner in the past year and having unplanned vaginal intercourse while using alcohol or drugs (50). The researchers found a significant number of teen women had older male sexual partners, leading to riskier sexual behaviours. Similarly, research with very young mothers in Winnipeg found that many of them had children by men who were as much as 25 years older than they were. The adolescents in the Winnipeg study were as young as 12 years when first having sex, and did not have any information about sex, reproduction or safer sex before their first sexual encounters (51).

Negotiating safer sex is easier for young women whose partners are close in age to them.

Sexual "Minorities" and Multiple Partners

There is evidence that girls who are among a "sexual minority", lesbian or bisexual teens, have a significantly higher odds ratio of having an STI than girls who are attracted only to males (52). Authors of a study in several US cities found that lesbian and bisexual women are more likely than their straight peers to have unprotected sex with a male. Dating violence and forced sex was also experienced more by young women and men who had had sex with someone of the same sex or with both sexes. Lesbian and bisexual

girls were more likely to have ever had sex than heterosexual girls and had more sexual partners in their lifetime; they were also more likely to have had sexual intercourse before the age of 13. These young women, termed "sexual minority youths" (who identify themselves as gay or lesbian, bisexual, or unsure of their sexual identity) were less likely to use condoms or other birth control methods (53).

Values

While there is evidence that individual characteristics and choices can outweigh peer and family expectations (40), other research suggests that family values, particularly mothers as role models for young women, remain important in determining whether or not adolescent girls will engage in sexual activity. Young women have reported that they feel pressure from peers to be sexually active and to take risks. They are cynical about the double standards they perceive in relation to young peoples' sexual health in comparison to the high profile sex is given in the media (54). Adolescents may sort through prospective partners based on social similarity (such as shared religious views), but once a relationship is developing, there may not be an overriding shared vision to proceed with sexual behaviour (55).

It has been suggested that the representation of young parents varies across socio-economic groups. There is evidence to suggest that pregnancy and parenthood among young women is more socially acceptable in some social circles than in others (56). Some very young mothers in Winnipeg reported, for example, that while their own mothers were not happy about their daughters' pregnancies initially, the young women received a great deal of support, and there were no thoughts of relinquishing the babies or terminating the pregnancies (51). In a British study, open relationships (here, meaning more communicative) between parents and children, particularly among families who were less deprived, led to parents having more influence over the children's sexual and reproductive behaviours (56). Furthermore, where school attendance was poor, and educations not as widely valued, young parenthood was perceived more favourably by young parents in deprived communities. According to Smith et al. assessments of the socio-economic environment young people live in must include long-standing traditions of young parenthood in the local communities (56).

In contrast to the environments and economic and social conditions that can lead to street involvement, substance use and sex trade, Cowan found that young people who did not engage in risky behaviours, including sexual activity, were those who were anticipating a future and planning to further their schooling (57). Conversely, Kim et al. found that young women were less likely to use condoms if they were getting low grades in school, English was not their first language and if they belonged to some ethnic groups (58).

Mental Health and Well-Being

As noted earlier, young women with strong self-esteem (40) as well as those with low self-esteem are more likely to engage in early sexual behaviour (59) in studies. Research is thus concluding that risky behaviour is complex and that as seen above young women are engaging in risky behaviours for a variety of reasons, many of them based in the context of their peers, such as prevalence of alcohol use or local community perceptions of teen parenthood. However, some authors find that individual factors outweigh family, peers, and the wider community as predictors of whether young women will be sexually active (40).

Young women who have depression may be more likely to take risks and have unsafe sex. An Australian study, for example found that men and women with severe mental illness were likely to engage in risky sexual behaviour (60). Young women who engaged in risky sexual behaviour were found to be at greater risk of depression in a 2010 study, however being sexually active at all was counted among the risky behaviours, along with having unplanned sex when using substances, and not using effective contraception at last intercourse (61). The study authors concluded that health providers treating teenagers for depression should inquire about risky sexual behaviour but it would seem that it would be important to be specific about where the risk lies. Sexual activity in and of itself may not be risky, if the young woman is emotionally prepared and engaging willingly. Safer sex practices may be the more pressing issue, although it is worth remembering that young women who see themselves among the "sexual minority" may be more vulnerable to coercion.

Sexualization

Some researchers and parents have raised alarms about the role of social media in creating sexual risk for girls and young women. Gail Dines, for example, writes and speaks on the influence of pervasive social media messages about unrealistic sexual behaviour and pressures for teenage girls (62), which may lead them to sexual activity for which they are not yet ready, at increasingly younger ages (63). Additionally, there is considerable concern about how these media lead to teen boys and men objectifying girls, as illustrated in a recent on-line story in which a popular hip-hop artist "encouraged boys to "turn girls out" by pushing them "up against the wall" as part of his "fatherly advice"" (64). The American Psychological Association released a report in 2010 summarizing the available literature on the numerous ways girls are objectified in media and the effects this objectification and premature sexualization has on girls and women (65). The report has been critiqued for an over-emphasis on women and girls as passive victims of media and a somewhat limited definition of sexualization (see for example Lerum and Dworkin (66), but the report does encapsulate the many ways sexuality and sexual behaviour are portrayed in North America, and provides evidence of creating social environments in which females may feel pressured into sexual behaviour they do not really want, are not prepared for and which may put them at risk.

Lack of Information

In a research study with young adults, participants primarily viewed condoms as a means of preventing pregnancy, and few described disease prevention as their main motivation for using condoms (67). Only 13% of teens in one study, for example, had received information about HIV/AIDS (58). There may be a number of reasons for this confusion of information, some of which included adolescents' tendencies to ignore or dismiss risk, but it also seems likely that complete and accurate information may not be available to them. Many teens, for example, consider oral sex as "benign" and do not understand that it can be a risk for STI transmission (41).

Novels for adolescents were replete with sex-related behaviours, most of which were between uncommitted heterosexual partners. Discussions of the consequences of sex were rare.

Given the current pervasiveness of sexualized media, some teenagers find their school-based sex education programs are not relevant. Young women and men appreciate sexual and reproductive health programs that include information about relationships, but that also represent sex in a positive light, not just as inherently risky (68). Siebold et al., for example, found that study respondents had to turn to popular magazines to get the information they wanted and to help themselves in negotiating social expectations among their peers (54). According to the authors, "Young women in the study were forceful in identifying a need for a much better approach to education within schools directed at both sexes and one that is factual, relevant and all encompassing".

Teenage girls frequently receive their information about sexual behaviour from media (69), which they find more informative and relevant to their lives, and less embarrassing than talking with school counsellors. A number of studies report that teens find media sources are more likely to give them the information they need about pleasure, feelings and relationships (Arthurs and Zacharias, 2006 cited in (69)). However, adults may have reason to be concerned about the messages teens are getting. Callister et al. reviewed 40 contemporary novels written for adolescents and the books were "replete with sex-related information and descriptions of sexual behaviour ranging from passionate kissing to sexual intercourse, most of which were between unmarried or uncommitted heterosexual partners" and discussions of the consequences of sex were rare, and then only in terms of emotional consequences" (69).

Summary

A review of research on interventions found that although studies have overwhelmingly focussed on individual sexual behaviours, interventions directed to individuals demonstrated little change in health outcomes (70). As Shoveller et al. noted, although much of the primary prevention research in the past has attempted to explain sexual health outcomes, such as STIs, by focusing on individual behaviours, characteristics and qualities (70), a more ecological view is required. Kaestle et al. concur, stating that in the case of street-involved young women, "Research that seeks to examine the multidimensional nature of street youth sexual activity may benefit by situating these behaviours within the physical, social, economic and political context …" (52). The authors comment further that such multi-dimensional models may be considered more acceptable as interventions if they are framed in terms of their ability to reduce the transmission of infectious diseases.

Similarly, adolescent pregnancy requires a more holistic approach. Becoming a teen mother has been associated with long-term poverty, interrupted education and unemployment. The children of mothers who had their first baby as a teen in Manitoba, for example, do not fare as well in school, nor is their health as good, compared with their peers whose mothers were older when they first gave birth (71). At the same time, some women have reported that becoming a mother at a very young age was a turning point, and in many cases provided joy and purpose to otherwise difficult lives (51). This evidence points to a need for better economic and systemic supports for young women who do become mothers.

As this section has highlighted, sexual behaviour and sexual health should be considered more broadly than strictly in terms of preventing disease or unplanned pregnancies. A 2010 WHO task force emphasized, for example, "laws and policies related to sexual behaviour, such as sex work and homosexuality, have a significant influence on people's sexual health, which must be captured in indicators" (3). In Canada these would include policies and attitudes regarding sexual violence, adolescent sexual expression and the physical, emotional and mental health "risks" of sexual behaviours among older as well as young women.

Although primary prevention research has focused on individual behaviours, a more ecological view is required.

References

(1) Gender, Ethnicity and Health Unit, PAHO. Basic indicators for gender equity analysis in health. Washington: Pan American Health Organization; 2005.

(2) Haworth-Brockman MJ, Isfeld H. Better evidence to improve women's health with gender and health statistics: health indicator frameworks. Winnipeg: Prairie Women's Health Centre of Excellence; 2012.

(3) World Health Organization. Measuring sexual health: conceptual and practical considerations and related indicators. Geneva: World Health Organization; 2010.

(4) Public Health Agency of Canada. Canadian sexual health indicators survey—pilot test and validation phase: final technical report. Ottawa: Centre for Communicable Diseases and Infection Control, Infectious Diseases Prevention and Control Branch, Public Health Agency of Canada; 2012.

(5) First Nations Information Governance Centre. First Nations regional health survey: RHS phase 2 (2008/10) preliminary results (revised ed.). Ottawa: First Nations Information Governance Centre; 2011.

(6) Rotermann M. Trends in teen sexual behaviour and condom use. Health Rep 2008 Sep;19(3):53-7.

(7) Center for Sexual Health Promotion, Indiana University. National survey of sexual health and behavior [Internet]. Bloomington: Indiana University; 2010 [cited 14 Feb 2012]. Available from: http://www.nationalsexstudy.indiana.edu/

(8) Nahmias SB, Nahmias D. Society, sex, and STIs: human behavior and the evolution of sexually transmitted diseases and their agents. Ann N Y Acad Sci 2011 Aug;1230(1):59-73.

(9) Herbenick D, Reece M, Schick V, Sanders SA, Dodge B, Fortenberry JD. Sexual behaviors, relationships, and perceived health status among adult women in the United States: results from a national probability sample. J Sex Med 2010 Oct;7 Suppl 5:277-90.

(10) Johnson AM, Mercer CH, Erens B, Copas AJ, McManus S, Wellings K, et al. Sexual behaviour in Britain: partnerships, practices, and HIV risk behaviours. Lancet 2001 Dec 1;358(9296):1835-42.

(11) Mehta CM, Sunner LE, Head S, Crosby R, Shrier LA. "Sex Isn't Something You Do with Someone You Don't Care About": Young Women's Definitions of Sex. J Pediatr Adolesc Gynecol 2011 Oct;24(5):266-71.

(12) Nic Gabhainn S, Baban A, Boyce W, Godeau E, Wagener Y. How well protected are sexually active 15-year olds? Cross-national patterns in condom and contraceptive pill use 2002-2006. Int J Public Health 2009 Sep;54 Suppl 2:209-15.

(13) McCabe J, Brewster KL, Tillman KH. Patterns and correlates of same-sex sexual activity among U.S. teenagers and young adults. Perspect Sex Reprod Health 2011 Sep;43(3):142-``50.

(14) Mark KP, Janssen E, Milhausen RR. Infidelity in heterosexual couples: demographic, interpersonal, and personality-related predictors of extradyadic sex. Arch Sex Behav 2011 Oct;40(5):971-82.

(15) Lee JT, Tsai JL. Transtheoretical model-based postpartum sexual health education program improves women's sexual behaviors and sexual health. J Sex Med 2012 Apr;9(4):986-96.

(16) West SL, D'Aloisio AA, Agans RP, Kalsbeek WD, Borisov NN, Thorp JM. Prevalence of low sexual desire and hypoactive sexual desire disorder in a nationally representative sample of US women. Arch Intern Med 2008 Jul 14;168(13):1441-9.

(17) Mansell D, Salinas GD, Sanchez A. Attitudes toward management of decreased sexual desire in premenopausal women: a national survey of nurse practitioners and physician assistants. J Allied Health 2011 Summer;40(2):64-71.

(18) Karraker A, Delamater J, Schwartz CR. Sexual frequency decline from midlife to later life. J Gerontol B Psychol Sci Soc Sci 2011 Jul;66(4):502-12.

(19) Waite LJ, Laumann EO, Levinson W, Tessler Lindau S, McClintock MK, O'Muircheartaigh CA, et al. National social life, health, and aging project (NSHAP) [Internet]. Chicago: Chicago University; 2010 [cited 1 Feb 2012]. Available from: http://www.norc.org/Research/Projects/Pages/national-social-life-health-and-aging-project.aspx

(20) Laumann EO, Waite LJ. Sexual dysfunction among older adults: prevalence and risk factors from a nationally representative U.S. probability sample of men and women 57–85 years of age. J Sex Med 2008 Oct;5(10):2300-11.

(21) Reid GJ, Siu SC, McCrindle BW, Irvine MJ, Webb GD. Sexual behavior and reproductive concerns among adolescents and young adults with congenital heart disease. Int J Cardiol 2008;125(3):332-8.

(22) Vannier SA, O'Sullivan LF. Sex without desire: characteristics of occasions of sexual compliance in young adults' committed relationships. J Sex Res 2010 Sep;47(5):429-39.

(23) Shoveller JA, Johnson JL, Langille DB, Mitchell T. Socio-cultural influences on young people's sexual development. Soc Sci Med 2004;59(3):473-87.

(24) Malacad BL, Hess GC. Oral sex: behaviours and feelings of Canadian young women and implications for sex education. Eur J Contracept Reprod Health Care 2010;15(3):177-85.

(25) Donner L, Isfeld H, Haworth-Brockman M, Forsey C. A profile of women's health in Manitoba. Winnipeg: Prairie Women's Health Centre of Excellence; 2008.

(26) McCall J, Vicol L. HIV infection and contraception. J Assoc Nurses AIDS Care 2011 May-Jun;22(3):193-201.

(27) Carrieri MP, Rey D, Serraino D, Trémolières F, Méchali D, Moatti JP, et al. Oral contraception and unprotected sex with occasional partners of women HIV-infected through injection drug use. AIDS Care 2006 Oct;18(7):795-800.

(28) Public Health Agency of Canada. Reported cases and rates of chlamydia by province/territory and sex, 1991 to 2009 [Internet]. Ottawa: Public Health Agency of Canada; 2010 Nov [cited 27 Sep 2012]. Available from: http://www.phac-aspc.gc.ca/std-mts/sti-its_tab/chlamydia_pts-eng.php

(29) Knight R. Who really gets chlamydia? Intersections: a newsletter of the Institute of Gender and Health 2011;3(1):12-13.

(30) Public Health Agency of Canada. Reported cases and rates of gonorrhea by age group and sex, 1980 to 2009 [Internet]. Ottawa: Public Health Agency of Canada; 2010 Nov [cited 27 Sep 2012]. Available from: http://www.phac-aspc.gc.ca/std-mts/sti-its_tab/gonorrhea-eng.php

(31) Public Health Agency of Canada. Population-specific HIV/AIDS status report: women. Ottawa: Public Health Agency of Canada; 2012.

(32) McKeown I, Reid S, Turner S, Orr P. Sexual violence and dislocation as social risk factors involved in the acquisition of HIV among Manitoba women. Winnipeg: The Prairie Women's Health Centre of Excellence; 2001.

(33) Public Health Agency of Canada. HIV/AIDS epi updates - July 2010. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada; 2010.

(34) Two female condoms close to entering U.S. market. Contracept Technol Update 1989 Apr;10(4):49-50.

(35) Mantell JE, Stein ZA, Susser I. Women in the time of AIDS: barriers, bargains, and benefits. AIDS Educ Prev 2008 Apr;20(2):91-106.

(36) O'Grady K. The female condom... it's noisy, it's ugly and it's expensive, but it's the safest sex around. Network 2002.

(37) Trottier S, Omar RF, Désormeaux A, Drouin J, Gagnon MT, Vezina F, et al. Safety, tolerance and acceptability of the Invisible Condom® and its vaginal applicator in healthy women and their male sexual partners. Contraception 2007 Aug;76(2):117-25.

(38) Mbopi-Keou F, Trottier S, Omar RF, Nkele NN, Fokoua S, Mbu ER, et al. A randomized, double-blind, placebo-controlled safety and acceptability study of two Invisible Condom® formulations in women from Cameroon. Contraception 2009 Nov;80(5):484-92.

(39) Enyeart Smith TM, Wessel MT. Alcohol, drugs, and links to sexual risk behaviors among a sample of Virginia college students. J Drug Educ 2011;41(1):1-16.

(40) Ronis ST, O'Sullivan LF. A longitudinal analysis of predictors of male and female adolescents' transitions to intimate sexual behavior. J Adolesc Health 2011 Sep;49(3):321-3.

(41) Goldstein AL, Barnett NP, Pedlow CT, Murphy JG. Drinking in conjunction with sexual experiences among at-risk college student drinkers. J Stud Alcohol Drugs 2007;68(5):697-705.

(42) Spittal PM, Bruneau J, Craib KJP, Miller C, Lamothe F, Weber AE, et al. Surviving the sex trade: a comparison of HIV risk behaviours among street-involved women in two Canadian cities who inject drugs. AIDS Care 2003 Apr;15(2):187-95.

(43) Corneil TA, Kuyper LM, Shoveller J, Hogg RS, Li K, Spittal PM, et al. Unstable housing, associated risk behaviour, and increased risk for HIV infection among injection drug users. Health Place 2006 Mar;12(1):79-85.

(44) Public Health Agency of Canada. I-Track: enhanced surveillance of risk behaviours among injecting drug users in Canada: phase I report. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada; 2006.

(45) Marshall BDL. The contextual determinants of sexually transmissible infections among street-involved youth in North America. Cult Health Sexual 2008;10(8):787-99.

(46) Halcón LL, Lifson AR. Prevalence and predictors of sexual risks among homeless youth. J Youth Adolesc 2004 Feb;33(1):71-80.

(47) Shannon K, Strathdee SA, Shoveller J, Rusch M, Kerr T, Tyndall MW. Structural and environmental barriers to condom use negotiation with clients among female sex workers: implications for HIV-prevention strategies and policy. Am J Public Health 2009 Apr;99(4):659-65.

(48) Clements K, Gleghorn A, Garcia D, Katz M, Marx R. A risk profile of street youth in Northern California: implications for gender-specific human immunodeficiency virus prevention. J Adolesc Health 1997 May;20(5):343-53.

(49) Thrane LE, Chen X. Impact of running away on girls' pregnancy. J Adolesc 2012 Apr;35(2):443-9.

(50) Langille DB, Hughes JR, Delaney ME, Rigby JA. Older male sexual partner as a marker for sexual risk-taking in adolescent females in Nova Scotia. Can J Public Health 2007;98(2):86-90.

(51) Murdock L. Young Aboriginal mothers in Winnipeg. Winnipeg: Prairie Women's Health Centre of Excellence; 2009.

(52) Kaestle CE, Waller MW. Bacterial STDs and perceived risk among sexual minority young adults. Perspect Sex Reprod Health 2011 Sep;43(3):158-63.

(53) Kann L, Olsen EO, McManus T, Kinchen S, Chyen D, Harris WA, et al. Sexual identity, sex of sexual contacts, and health-risk behaviors among students in grades 9-12--youth risk behavior surveillance, selected sites, United States, 2001-2009. MMWR Surveill Summ 2011 Jun 10;60(7):1-133.

(54) Siebold C. Factors influencing young women's sexual and reproductive health. Contemp Nurse 2011 Feb;37(2):124-36.

(55) Lejeune BC, Zimet GD, Azzouz F, Fortenberry JD, Aalsma MC. Religiosity and sexual involvement within adolescent romantic couples. J Relig Health Epub 2011 Jul 7.

(56) Smith DM, Roberts R. Social inequality and young pregnancy: the causal attributions of young parents in London, UK. Health Place 2011 Sep;17(5):1054-60.

(57) Cowan BW. Forward-thinking teens: the effects of college costs on adolescent risky behavior. Econ Educ Rev 2011 Oct 1;30(5):813-25.

(58) Kim H, Reilly-Chammat R, Washburn T. Sexual behavior and contraceptive use among Rhode Island adolescents. Med Health R I 2011 Apr;94(4):111-13.

(59) Prinstein MJ, Choukas-Bradley SC, Helms SW, Brechwald WA, Rancourt D. High peer popularity longitudinally predicts adolescent health risk behavior, or does it?: an examination of linear and quadratic associations. J Pediatr Psychol 2011 Oct;36(9):980-90.

(60) Scott D, Happell B. The high prevalence of poor physical health and unhealthy lifestyle behaviours in individuals with severe mental illness. Issues Ment Health Nurs 2011;32(9):589-97.

(61) Wilson K, Asbridge M, Kisely S, Langille D. Associations of risk of depression with sexual risk taking among adolescents in Nova Scotia high schools. Can J Psychiatry 2010 Sep;55(9):577-85.

(62) Dines G. Pornland: how porn has hijacked our sexuality. Boston: Beacon Press; 2010.

(63) CBC Doc Zone. Sext up kids. 11 Oct 2012 [cited 4 Dec 2012]. Available from: http://www.cbc.ca/doczone/episode/sext-up-kids.html

(64) Bandele M. Magazine gives preteens X-rated "fatherly advice" [Internet]. 24 Feb 2012 [cited 24 Feb 2012]. Available from: http://www.momsrising.org/blog/15533/

(65) American Psychological Association, Task Force on the Sexualization of Girls. Report of the APA Task Force on the Sexualization of Girls. Washington: American Psychological Association; 2007.

(66) Lerum K, Dworkin SL. "Bad girls rule": an interdisciplinary feminist commentary on the report of the APA Task Force on the Sexualization of Girls. J Sex Res 2009 Jul-Aug;46(4):250-63.

(67) O'Sullivan LF, Udell W, Montrose VA, Antoniello P, Hoffman S. A cognitive analysis of college students' explanations for engaging in unprotected sexual intercourse. Arch Sex Behav 2010 Oct;39(5):1121-31.

(68) Phillips KP, Martinez A. Sexual and reproductive health education: contrasting teachers', health partners' and former students' perspectives. Can J Public Health 2010 Sep-Oct;101(5):374-9.

(69) Callister M, Coyne SM, Stern LA, Stockdale L, Miller MJ, Wells BM. A content analysis of the prevalence and portrayal of sexual activity in adolescent literature. J Sex Res 2012;49(5):477-86.

(70) Shoveller JA, Johnson JL, Savoy DM, Wia Pietersma WA. Preventing sexually transmitted infections among adolescents: an assessment of ecological approaches and study methods. Sex Educ 2006;6(2):163-83.

(71) Brownell M, De Coster C, Penfold R, Derksen S, Au W, Schultz J, et al. Manitoba child health atlas update. Winnipeg: Manitoba Centre for Health Policy; 2008.

Injuries

Harpa Isfeld, Margaret Haworth-Brockman and Nicola Schaefer

Introduction

Injuries are a major cause of death and disability for women in Canada. According to the Public Health Agency of Canada, there were 24 deaths per 100,000 population among females from injuries and poisoning[1] in 2008 (1), and thus injuries are considered a serious public health concern (2). Since women's lives can be severely altered by injury, in this chapter we explore how injury and the risk of injury affect women's ability to truly enjoy healthy living. Because gender-based violence is a pervasive, consistent part of women's lives in Canada, we have distinguished it–together with self -injury–as a separate area of inquiry in another chapter.

Although injuries often result from accidents, which we may perceive to be unavoidable or the result of bad luck, when seen from a population level and public health perspective, the majority of injuries are considered preventable. Factors that range from the individual to the societal level influence women's risk of injury. Individual behaviours (such as drinking and driving, or not using protective equipment) and unsafe physical environments (poor lighting, stairways) can be modified or remediated to reduce the risk of injuries. Furthermore, injury risks arise through the socially patterned and culturally accepted ways that individuals interact with their environment, fulfill their roles and conduct their work. Though less evident, these factors too are amenable to change, and are an important subject for policy. Although injury reduction is not mentioned in the 2005 *Integrated Pan-Canadian Healthy Living Strategy*, injury prevention has been identified among the next priorities. This analysis of selected topics in women's injury may then represent a timely opportunity to consider issues requiring a more gender sensitive approach.

CCHS Injury Measures

The CCHS captures information on the single most serious activity-limiting injury reported in the past year. Therefore, it does not reflect the incidence or prevalence of all injuries. These data also do not include information on injuries that result in death or institutionalization. Furthermore, the questions posed in the survey do not distinguish between intentional and unintentional injury (3). Note that neither repetitive injuries nor poisonings are included in these injury counts and rates.

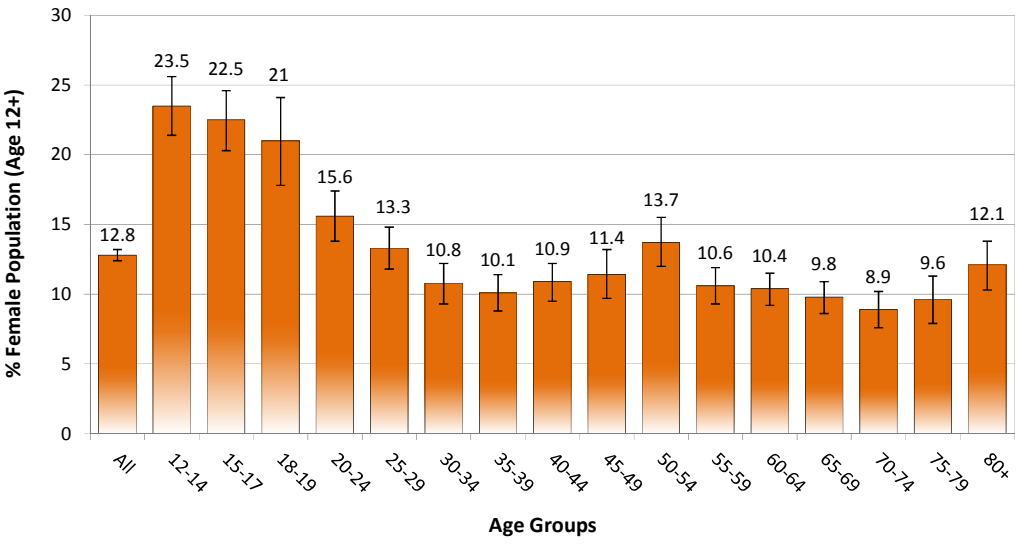
[1] Excludes adverse medical events.

This chapter addresses falls and occupational injuries, two significant causes of injury for Canadian women, particularly in their adulthood and old age. Motor vehicle accidents are also major contributors to women's injuries, but we did not include them here as our focus remains on some of the gendered nature of structures and processes that are specific to women, particularly those that may not so far have received the attention they need. In our analysis of occupational injuries for women, for example, we elected to explore occupational groups either because of the greater number of women affected (i.e., in the female-dominated sectors of health care and "pink collar" work), or because of the emerging importance and lack of attention to women injured in occupations and industries that have so far been considered non-traditional jobs. We begin with a brief overview of the data from the CCHS (2009/2010) of women's self-reports of injuries which limit their activities, and proceed to consider women's experience with injurious falls.

Prevalence of Activity-Limiting Injury

According to the CCHS (2009-2010), 12.8% of Canadian women (1,858,900) suffer an injury serious enough to limit their daily activities each year, and injury risks are clearly associated with age (Figure 1). In 2009-2010, reports of serious injury peaked among young women aged 12 to 19 but declined sharply in women up to age 30. Among older women, injury rates were lower but somewhat elevated among women aged 50-54 and beyond age 80. Young women were also far more likely to suffer repeated injuries than mature or elderly women. Approximately 18% of injured girls and women aged 12 through 19 reported three or more injuries in the previous year, compared to approximately 9% and 5% of injured women aged 20-44 and 45 and older, respectively. Billette and Janz found that Canadian girls aged 12 to 19 stood out in comparison to all other age and sex groups as having the greatest increase in activity limiting injury rates, which rose from 18% in 2001 to 23% in 2009/2010 (3). The authors attributed the change to girls' increasing involvement in sports that carry high risks of injury.

Figure 1: Activity Limiting Injury in the Past Year, by Age
Women in Canada, 2009-2010

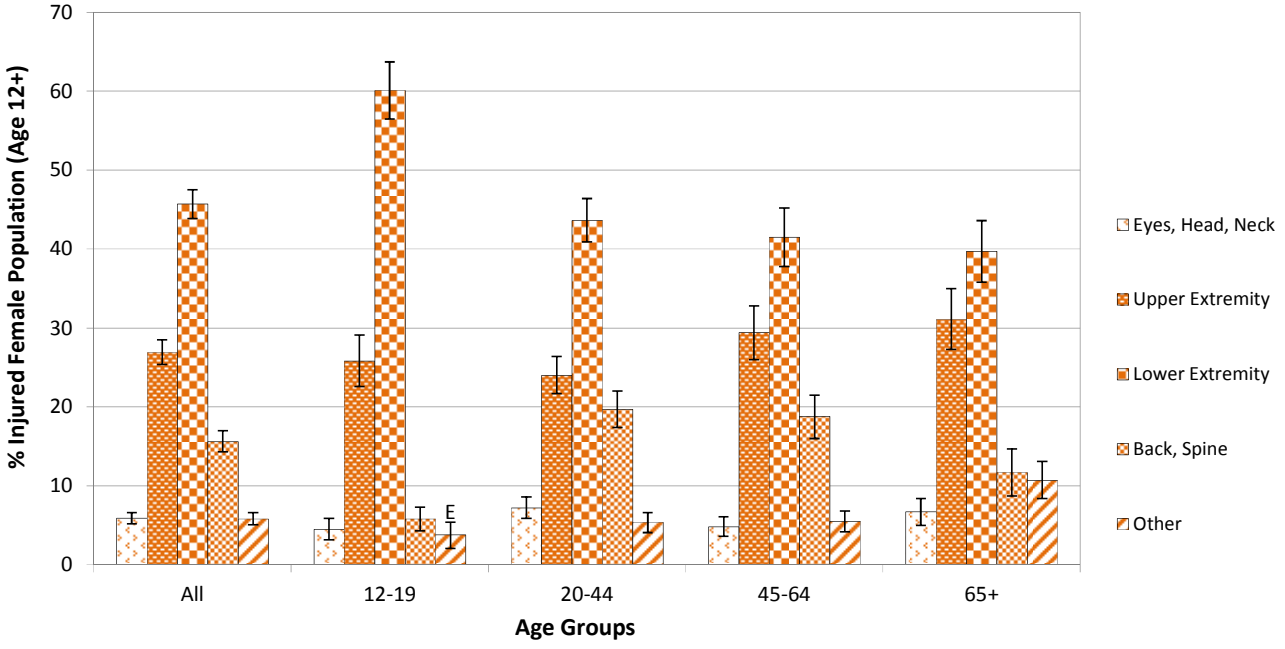


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009-2010.
Missing Values = 0.1%.

The pattern of injury by age is likely to reflect many factors, including young women's greater involvement in higher risk sporting activities or more strenuous work, and older women's diminished health and physical resilience with advancing age. The relatively high injury rate among women in their mid-fifties may indicate a shift in life stage when women's risks of injury increase somewhat because they are no longer as physically resilient as when they were younger. Middle-aged women may either choose to, or be forced, through injury, to reduce their activities and risks. This adjustment may be reflected in the further decline in rates of injury in older age groups, although old age brings added vulnerability. The section of this chapter on injury due to falls provides an opportunity to delve further into data concerning the most common cause of older women's injuries.

Reporting only on their most serious injury within the period, Canadian women's lower extremities were most often injured (45.7%), followed by upper extremities (26.9%), back or spine (15.6%), eyes, head or neck (5.9%), or other parts of the body that mainly included the chest, abdomen or pelvis (5.8%) (see Figure 2). Lower extremities were the most common site of injury in every age group. However, compared to other age groups, young women were most affected by injuries to the lower extremities (70.8%), which is consistent with this age group having more sports injuries (4) (data not shown). In contrast, middle-aged women were more likely to have injuries that affected their back or spine compared to other ages, and upper extremity injuries may have contributed to more injuries of women at advanced ages, although this difference may not be statistically significant.

Figure 2: Body Part Affected in Most Serious Injury, by Age
Women in Canada, 2009-2010

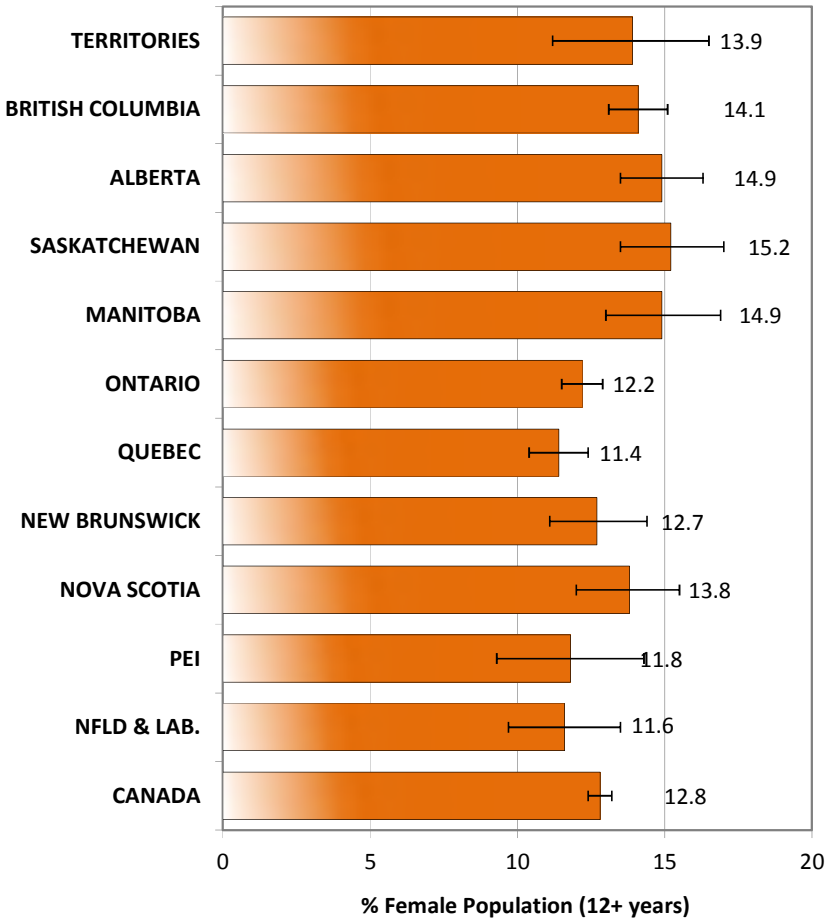


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009-2010. Missing Values = 2.8%.

With advancing age, climbing stairs or walking and, to a lesser degree, unpaid work were increasingly associated with women's injuries. The proportionate contribution of stairs and walking to injuries was four times higher among the oldest compared to the youngest women (33.7% versus 8.1%), and unpaid work was twice as high (37.3% versus 12.2%) (data not shown).

Other cross-tabulations of CCHS data suggest there are regional, cultural and other social and economic influences on the occurrence of injury. For example, women living in the Prairie Provinces are more likely to be injured than women in Central Canada (Figure 3). Larger disparities in injury rates are apparent in comparisons between Aboriginal (off-reserve) and non-Aboriginal women: 17.3% of Aboriginal women reported suffering an activity-limiting injury in the past year compared to 12.7% of non-Aboriginal women, which is likely reflects the younger age structure of Aboriginal Canadians. Among those injured, Aboriginal women also tended to report more frequent injuries (data not shown), although a high degree of variability in these estimates could not assure these were significant differences.

Figure 3: Activity Limiting Injury in Past Year, by Province Women in Canada, 2009-2010

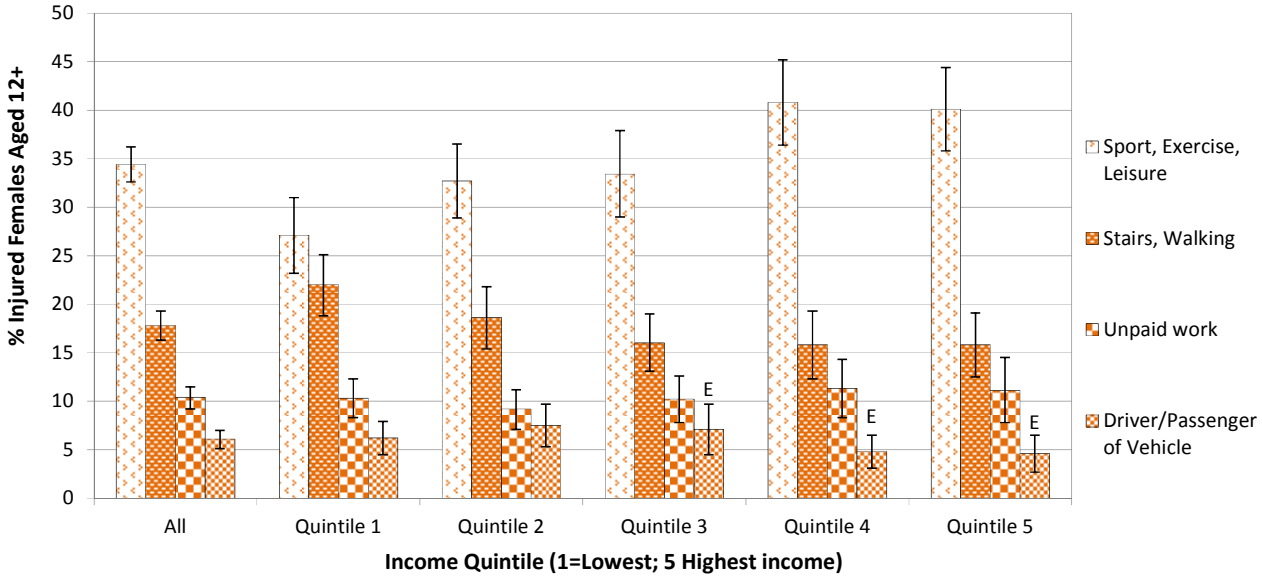


SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009-2010. Missing Values = 0.1%.

Comparisons of injury rates within the past year showed no significant differences by socioeconomic group or by community type (urban/rural). However, an association was found between women's relative economic means (household income) and the type of activity that resulted in their injury (Figure 4). Sport, exercise or leisure activities accounted for increasing proportions of women's injuries with each successive income group (quintile). Among women in the most income secure households, 40.1% had a sport related injury

compared to 27.1% in the least income secure group. A reverse gradient was seen in stair climbing and walking injuries, with fewer injuries among women in more income secure households than in the lower income group (15.8% versus 22%).

Figure 4: Activity Associated with Injury, by Income
Women in Canada, 2009-2010



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009-2010. Missing Values = 19.4%.
NOTE: Approximately 1/3 of injuries are not accounted for by type, that is, designated as "Other".

While women's risk of sports and recreation injuries seems to dominate in this evidence, it is important to consider other groups at risk and inequities that may be raised by this analysis. For example, we need to consider not only issues like the number of young women injured and the health care resources required for their treatment, but also the burden of injury in terms of the social and economic effects of middle-aged women being less able to fulfill their roles in paid work and unpaid contributions to families and communities. We need also to consider more subjective measures of the severity of injury in terms of women's capacity to recover and regain function and resilience, which is often more challenging for older, low income, and socially marginalized women. As well, it is important to consider questions raised by these results. Do higher injury risks among Aboriginal women and women living in the Prairies reflect climatic, economic or socio-cultural factors, or simply demographics of younger age structures? Are the injury risks associated with lower household income – seen in the data for walking and stair climbing – amenable to prevention? If yes, is this population getting the support they need to structural issues underlying their safety? A deeper investigation and analysis are needed to shed light on the circumstances in which women, particularly minority and marginalized women, experience injury risk.

Falls Injuries to Older Women

Falls injuries are characterized by a dramatically different epidemiological pattern than other injuries, largely because they are more common among women than men, and because they increase with age (5). Older individuals (women and men) are disproportionately affected by falls injuries—falls represent 63% of seniors' injuries, but about 25-33% of injuries for young and working age adults (3). Falls are a leading cause of mortality and morbidity among women aged 65 and older (6). Hip fractures, traumatic brain injuries and upper limb injuries are the most common falls injuries requiring hospital admission (7). Dependence, loss of autonomy, confusion, immobilization and depression resulting from a fall also affect the functional status and quality of life of many older Canadian women (6).

As Canada's population ages, the importance of investing in falls prevention grows, spurred by concerns about projected costs associated with the treatment, rehabilitation, and long-term care for those who sustain injuries from falls. Costs are understood to be particularly high because falls injuries are associated with longer average hospital stays than other injuries (7). One study estimated costs to be $2 billion to the health care system for treating Canadians aged 65 and older who had suffered an injury due to a fall (8). Falls also represent a sizeable cost in loss of life, as they cause 18% of Canadian deaths due to injury (all ages, both sexes) (3).

Public health efforts since the 1990s, which aimed to dispel assumptions that falls are inevitable with advancing age, have been credited for promising trends, like decreasing rates of common falls injuries (e.g., hip fractures) for women and men documented in Canadian and international population-based studies (8,9). By 2008-2009, the age-standardized rate of falls-related hospitalizations for seniors had declined in three provinces with well-established falls prevention programming (Ontario, Nova Scotia, and BC), but was high in the territories, where falls prevention programming is more limited (8). Despite these gains, the challenge remains to stay ahead of the demographic curve, as the lower rates applied to a growing old age population still see high numbers of women in need of treatment, care and support, as well as accommodating features in the design of our communities.

Studies of falls and associated injury tend not to distinguish between women and men, but to focus on the demographics of an aging population and the physical aspects of aging among its individuals. The lack of attention to the circumstances and consequences of falls by sex and other factors has been raised in the research literature (e.g., Mackintosh et al. (10)). In the US, for example, a review of older adult injury prevention programs by the Centres for Disease Control and Prevention (CDC) included several recommendations and also identified the need to research underlying causes behind sex, ethnic and racial differences and disparity in fatal and non-fatal falls injuries to seniors (11).

The following provides some illustration of key information that is publically available on older women's falls injuries, including some of women's key concerns and distinct issues requiring attention in prevention programming and the broader policy arena.

Defining Falls Injuries

Injurious falls tend not to be explicitly defined in research, and the need for a standard fall definition has been noted (7,12). Laypersons and health care providers may differ in which falls they count. In health administrative data there are standardized criteria for coding 'unintentional fall-related injuries', a discreet set of injuries[2] (7). The Kellogg International Work Group on the Prevention of Falls provides a definition that is commonly used in the research literature: a fall is "an event which results in a person coming to rest inadvertently on the ground or other lower level and other than a consequence of sustaining a violent blow, loss of consciousness, sudden onset of paralysis such as stroke or an epileptic seizure" (10). Because definitions vary, falls injury data from various sources are generally not comparable, and must be regarded as providing different perspectives and aspects of falls experience—for example, falls that are seen as most salient for individuals surveyed, or falls that come to the attention of health care providers.

In this section, falls injury data are mainly drawn from the Canadian Community Health Survey, although given the limited data on this specific cause of injury in that data set, information from research literature and health administration reports are also employed.

The CCHS provides data on injuries resulting from falls from self-reports by respondents, who are asked to recall their most serious injury in the past year and whether that injury was due to a fall. These data do not provide complete information on the frequency of all injurious falls, but only the extent to which falls contribute to a subset of injuries that respondents consider serious in terms of their effects on their own ability to carry out their usual daily activities. As with other CCHS injury data, falls data miss instances of falls that result in death or institutionalization. Furthermore the CCHS data do not differentiate between unintentional and intentional causes for falls, as the questions were not posed in the survey to that effect (3).The data yield conservative estimates of falls injury, in part because repeat injuries are not recorded, and because these data rely on participants to recall falls over many months. This data collection method results in under-reporting of falls and often inaccuracies concerning the circumstances surrounding falls (10).

What is the Story of Women's Falls?

International falls surveillance data tell us that in a given year, approximately 28-35% of community-dwelling individuals aged 65 and older fall in a given year. This increases to 32-42% in older ages (70+) and 30-50% for nursing home residents (7). Of those who fall, 10% to 30% of community-dwelling individuals

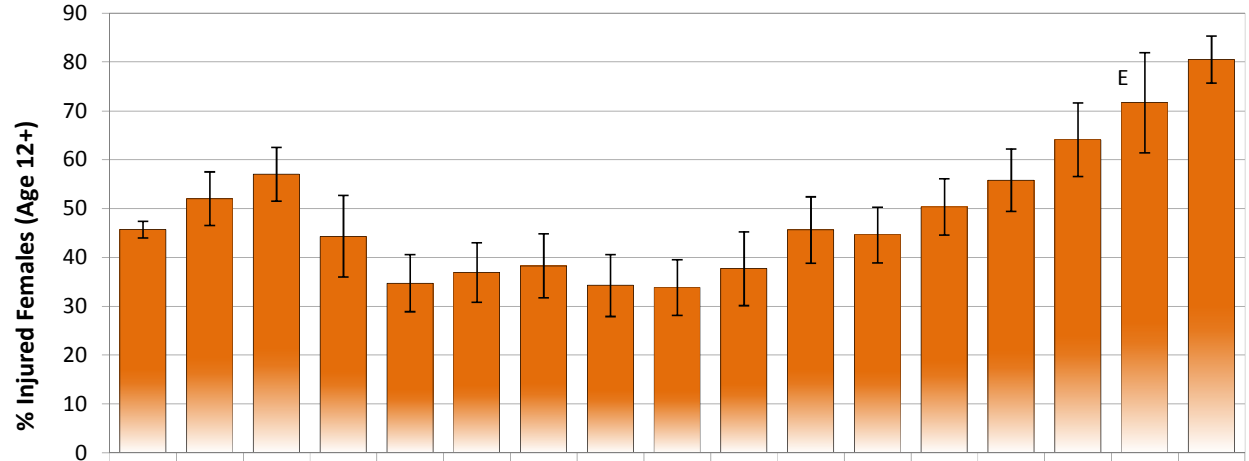
[2] ICD codes for "unintentional fall-related injuries" are E880-E888 in ICD-9 and W00-W19 in the ICD-10 (7).

suffer an injury from their fall (Masud and Morris 2001, cited in Steinman (13); see also Sleet (11)), a percentage that is upwards of 30% and 40% among those living in long-term care facilities (14).

Women have a higher incidence of falls (13,15,16), and significantly more women than men are injured by their falls (10,12). Some estimates place women's rates of injury as 40-60% higher than that for men (17). Ellis and Trent found higher rates of falls injury hospitalization for Californian women than men in every age category after age 50-59 (5). Women were significantly more likely than men to report falls, seek medical care, and/or discuss falls and fall prevention with a healthcare provider. Stevens and Sogolow documented a clear predominance of women among older individuals (age 65+) admitted to hospital for unintentional falls injuries, based upon a nationally representative sample (n=22,560) of admissions to emergency departments in the U.S. Women hospitalized for a fall (approximately 1.1 million) represented 70.5% of older people treated in U.S. emergencies in 2001 (17).

According to the CCHS (2009-2010), 45.7% of women's most serious, activity-limiting injuries in the preceding year were due to falls, which represented over 840,900 injuries. Among both young (12-17) and older women (60+), falls represented more than half of women's injuries, and this proportion increased steadily to 80% among women aged 80 and older. Note that the number of injuries from falls is highest for young women, but older women are proportionately more likely to have a fall injury. Thus, falls injuries in women by age follow a characteristic u-shaped pattern of high rates among female youth and in old age (Figure 5).

Figure 5: Activity Limiting Injury Due to a Fall, by Age
Women in Canada, 2009-2010



	All	12-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Fall Injury	45.7	52	57	44.3	34.7	36.9	38.2	34.3	33.8	37.7	45.6	44.6	50.3	55.8	64.1	71.7	80.5

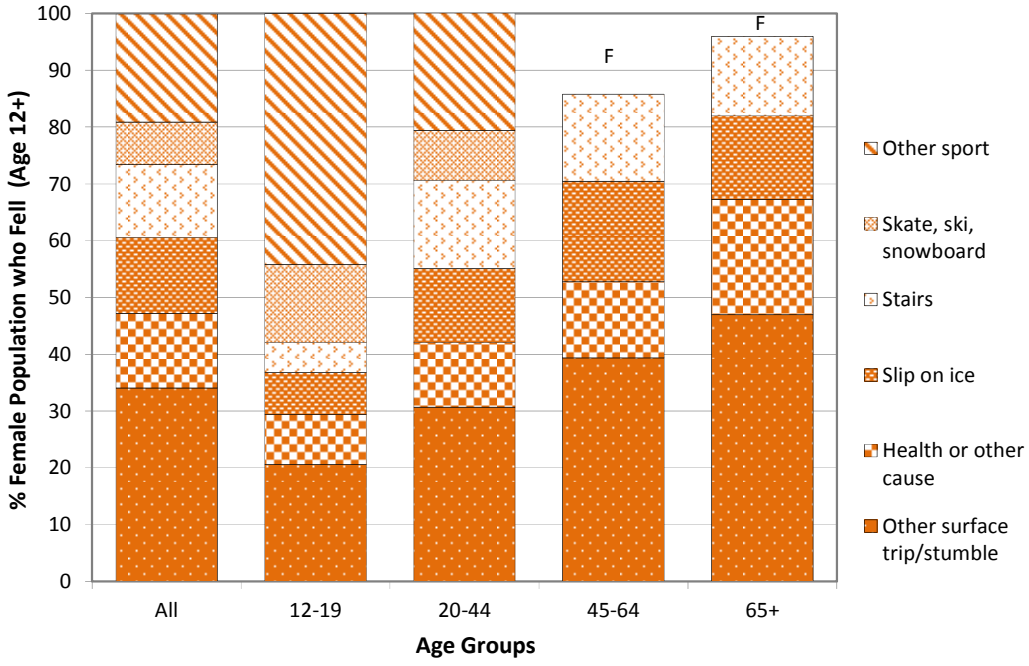
SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009-2010. Bootstrapping techniques were used to produce the coefficient of variation (CV). "E" signifies data with a CV from 16.6% to 33.3%. Interpret with caution. Missing Values = 0.9%.

Characteristics and Circumstances of Women's Falls Injuries

The profile of women's falls injuries is distinct, and differs from that of men. Women are more likely to survive falls and to sustain injuries, often with long-term consequences (7). The most common and serious injuries are fractures of the hip, femur and bones of the forearm (11). Based upon a nationally representative sample of Americans, Stevens and Sogolow found older women (65+) had a 2.2 fold higher rate of emergency admissions for fractures related to unintentional falls injuries than men, with the greatest differences found for leg/foot, arm/hand and lower trunk injuries (17). A Swedish study found that women's forearm fractures from accidental falls were particularly concerning because they reduced handgrip strength, which when inadequately treated with physical therapies, presents a risk for recurrent falls and further injuries (18). Hip fractures are also of special concern as an injury with the highest death rates and longest recovery times among common injury types. Women, more elderly individuals, home care recipients, and long-term care residents are among those with elevated risk for hip fracture (19). Stolee et al. reported the lifetime risk of hip fracture as 17.5% in women, nearly three times the rate for men (19).

As one would expect, the antecedents of women's falls differ by age. The CCHS provided some basic information, showing a predominance of sport-related causes of falls among young women (44% various 'other' sports; 14% specific to skating, skiing or snowboarding), whereas estimates of sport-related falls were too unreliable in older age categories of women (Figure 6). The majority of older women's falls (age 65+) were the result of a trip, stumble or slip on ice (15%) or on stairs (14%), but predominantly on other surfaces (47%) such as tripping on floors or rugs, not necessarily seen as inherently hazardous. Falls were also attributed to health conditions in approximately 1 in 5 falls among older women. According to their analysis of CCHS data, Billette and Janz found that the seniors' slips, trips and stumbles

Figure 6. Circumstances of Falls Injuries in the Past Year, by Age Women in Canada, 2009-2010



SOURCE: Statistics Canada, Canadian Community Health Survey (CCHS), 2009-2010. "F" signifies data with a coefficient of variation (CV) greater than 33.3%. Data were too unreliable to be published.

tended to occur in the home, in the course of household duties (3). Such falls happened more often in the morning hours (31%), which differs from falls among working-aged adults or youth. As these data were not sex-disaggregated, the risk profiles of older women cannot be further differentiated. However, MacKintosh et al., have confirmed that in falls among individuals rehabilitating from stroke, women are more likely to fall indoors (10).

The Story Behind the Story - Diverse and Inequitable Falls Risks and Outcomes

Although survey data do not permit more detailed examinations of the risks and consequences for falls in sub-groups of older women, a few studies have shed light on diverse and inequitable experiences among women. A study based on CCHS data, for example (20), reported that compared to the population of seniors as a whole, those who reported experiencing an injurious fall were more likely to be female (68% vs. 56%); to be in the 80+ age group (28% vs. 21%); to be widowed, separated or divorced (46% vs. 34%); to have post-secondary graduation (34% vs. 32%), and to have a household income of less than $15,000 (14% vs. 10%). Unfortunately, this analysis did not afford stratification of each of the socio-demographic variables by sex. In the U.S., the CDC assessed progress in its falls prevention program through a review of 20 years of funded research. Among their conclusions, the agency identified a need for epidemiologic data on trends and patterns in falls to assess risk factors by setting or sub-population. Specifically, a recommendation was made to begin to address gaps in gender, ethnic, and racial differences in falls injuries (11). Nevertheless, the following is a summary of some evidence available concerning different groups of women.

Income or Socioeconomic Status

International and Canadian studies have shown a relationship between socioeconomic status and falls. In a summation of international research, the WHO Global Report stated: “Older people, especially those who are female, live alone, or in rural areas with unreliable and insufficient income face an increased risk of falls” (7). This relationship is understood to reflect the influence of limited income on poor local environments, poor diet, and inadequate access to health care in illness, which all exacerbate falls risks (7). In France, a study by Lamontagne et al. found that environmental factors were involved in 55% of falls suffered by seniors living in low-income housing, though no gender specific results were described (21). However, the physical environments of senior women living in low-income settings are important considerations for injury prevention. An aging housing stock in urban centres, and limited availability of housing in rural and remote First Nations communities, for example, have been identified as key health risks for Canadian women (22).

Although not a sex-disaggregated analysis, CIHI compared injury profiles by income and age, including falls injuries among older aged individuals (23). The analysis found that, for unintentional injuries, residents of lower income neighbourhoods were more likely to be hospitalized for falls and motor vehicle accidents, compared with residents of affluent neighbourhoods (who were more likely to be struck by or against an object – primarily sport related injuries). Moreover, for younger adults (age 25 to 44), older adults (age 45 to

64) and seniors (age 65+), the rates of hospitalizations for falls showed a socioeconomic gradient, with the highest rates in the least affluent areas. The largest disparities were observed for older adults (aged 45-64), among whom the hospitalization rate for falls in the least affluent neighbourhoods was 1.5 times higher ($p<0.05$) than for those in the most affluent areas. Seniors from the least affluent neighbourhoods were found to have hospitalizations for falls 1.2 times higher ($p<0.05$) than for those in the most affluent areas. The relative difference between income groups was lower in seniors compared to other age groups. However, the absolute difference in rates was the largest because seniors experienced the highest rate of hospitalization for unintentional falls (1,714 per 100,000 population). The analysis suggests that actions to prevent hospitalization for falls and reduce disparities in this age group have the greatest potential benefit.

Race and Ethnicity

According to the WHO *Global Report*, "The relationship between falls and ethnicity and race remains widely open for research" (7). Falls research participants are often solely described as 'white' women (for example, see Miller, (24)). However, some American research has shown elevated risks of falls among Caucasians compared to other racially defined or ethnic sub-populations. Ellis and Trent compared crude and age-standardized rates of hospital discharge for falls (i.e., falls onto the same level) in a California population (age 20+) for 1995-1997, comparing rates for four major race/ethnic groups (25). They found Whites had 2-5 times higher rates than other races. Other studies (cited by Ellis and Trent (25)) found twice the rate of falls fractures among Whites than Blacks, and twice the rate of falls among Whites than Hawaiians of Japanese ancestry. Differences between ethnic groups were attributed to Whites having lower bone mass densities than other populations, or to the confounding influence of different treatment rates by socioeconomic status (25). Few studies examine both race and sex, though Steinman showed that age and education were significant predictors for falls among both women and men, but that race was significant only for Black women, who were 24% less likely to fall than White women (13). As well, a 2011 analysis of US national injury data by age, sex, Hispanic ethnicity and injury type (26) found Hispanic women (and men) had a decreased risk of death from accidental falls. Cultural and socioeconomic contexts were understood to contribute to the risk of falling.

It is interesting to note that Canadian studies show a quite a different pattern. According to Scott et al. women in all health regions of BC had higher rates of hospitalization (case rates) for falls injury than did men (age 65+), and additionally, women in the Northern region had by far the highest age standardized rate, which was understood to reflect the circumstances among Aboriginal women who disproportionately make up northern populations. Rates (1996/1997-2000/01) of falls injury ranged from approximately 18 to 31/1000 in the Fraser and Northern regions, respectively (27). Weiler et al. reported that Canadian Aboriginal women have higher rates of bone fracture than non-Aboriginal women, which the authors showed to be associated with vitamin D deficiencies among Aboriginal women, despite similar dietary intakes among the two populations. The authors attributed the discrepancy to lower absorption of the vitamin due to darker skin

pigmentation and more common residence of Aboriginal women in northern latitudes (28). Cohort studies of administrative datasets have found significantly higher overall and site-specific fracture rates in Aboriginal than non-Aboriginal adults (aged 20 and older) (29,30). Incident rates of hip, wrist and spine fractures among Aboriginal Manitobans was nearly twice and as much as three times the age- and sex-adjusted rate in non-Aboriginal individuals, with women predominating in these fracture types. (29). Several risk factors, including income level, geographic region of residence and diabetes mellitus, have been shown to contribute to higher rates of fracture among Aboriginal people, though other causal factors were thought to remain unaccounted for (30).

Female Sex, Biological Determinants, and Beyond

Older women's greater risk for some serious falls-related injuries, such as hip fracture, are known to reflect biologically based, sex-specific risks, stemming in part from muscle strength and bone mass. Muscle mass declines faster with age for women than for men, especially in the few years after women pass through menopause. As well, women tend to have lower participation in the kinds of physical activities that build and maintain muscular strength (7). Muscle weakness in older women may also arise from medical complications, an area for which further research is needed for women. For example, Statins, a class of cholesterol-lowering medications increasingly prescribed to women, have been linked to muscle fatigue, weakness, aches and cramping, complications for which women may be especially at risk (Tomlinson and Mangione 2005, cited in (31)). Muscle weakness may also arise as a secondary effect of underlying anaemia among elderly women. Duh et al. found anaemia was significantly and independently associated with an increase in injurious falls and, in fact, injuries increased with increasing severity of anaemia. Unfortunately, the data were adjusted for sex, as well as age, and the specific results for women are obscured (32).

Older women's risks related to bone density and bone pathologies have been well documented and are mainly attributed to a heightened rate of bone reabsorption after menopause (33). Further, older women represent the majority of those affected by osteoporosis, which represents a sizeable risk for low trauma fractures (e.g., a fall from standing height, a bed or a chair) or so called 'fragility fractures'. Bone loss is understood to result from declining levels of the natural hormones estrogen and progesterone in a woman's body during and after the completion of menopause. Two randomized clinical trials in the US[3] found that women who received estrogen alone or estrogen plus progesterone therapies saw one-third fewer hip and vertebral fractures in follow-up compared to women taking placebos. While this research underscored the relationship between sex hormones and bone health, other serious complications associated with hormone therapy (e.g.. endometrial cancer, stroke, heart attack, blood clot) warranted precautions for their long-term use, and the need for alternative methods for prevention of bone loss (33).

[3] The clinical trials were sponsored by the National Institutes of Health as part of the Women's Health Initiative (WHI).

According to Stolee et al., whose research focused on home care recipients in Ontario (n=40,279), whether falls result in fractures or fractures result in falls is difficult to disentangle, because falls and fragility fractures share common risk factors (19). The authors observed that hip fracture risk factors include both osteoporosis and falls, but also underweight and malnutrition, tobacco use, cognitive impairment and unsteady gait. The concept of 'frailty' has gained attention in injury research and prevention among the elderly, particular for women. Underweight, obesity, smoking and depressive symptoms are found to be strongly associated with the development of frailty, defined to include self-reported muscle weakness, impaired walking, exhaustion, low physical activity, and unintended weight loss (34). Some research has found that depression increases the risk of falls, as well as low bone mineral density and fractures in older individuals. Anti-depressant use is a known risk factor for falls (cited in Whitson (35)). In a large-scale prospective study of older Canadians which controlled for anti-depressant use, researchers found that depressive symptoms were also associated with falls, although only for older women (it was not statistically significant for men) (35). The study found no association between depressive symptoms and bone mineral density or fractures. As a disproportionate number of those diagnosed and treated for depression are women, and women commonly espouse more integrated views of their physical and mental health, it is important to consider not only mental disorders and physiological pathways, but also the role of emotional and mental health in women's falls risks and consequences.

Existing Health Conditions as Risk Factors

Steinman explored the independent and interactive influences of self-reported vision loss and musculoskeletal factors (upper and lower limb disability measures) on falls risks (13) in a large US study (n=19,671 in 2002, from the Health and Retirement Study). The results showed that among older individuals (aged 65+), women were on average older, had fewer years of education, more disability, poorer vision, more frequent falls, and significantly more hypertension, psychiatric impairments, arthritis, and depression compared to men. Controlling for sociodemographic and chronic illness variables, the analysis concluded that vision was not as important as upper and lower body function and strength in predicting falls in older women or men. However, it also showed that men and women may experience visual impairments differently with respect to falls, because of differences in the chronic diseases and other conditions that affect them as they age. Stroke, psychiatric impairments, and arthritis had the greatest influence on falls risks for women, while other significant predictors were diabetes, heart conditions, upper and lower limb disabilities, and depression. Steinman contends that the existing evidence of women's higher incidence of falls, different types of falls, and distinct physiological bases for falls risks compared to men, calls for sex-disaggregated analysis of predictive factors, and directs his attentions to sex differences in health conditions associated with falls (13).

Women's greater longevity increases the likelihood of their living with concurrent chronic health conditions, some of which pose distinct risks for falls. Cognitive impairments pose challenges for older women's ability

to safeguard themselves against a fall, but also confound research and interventions. While cognitive impairment is a major risk factor for falls in the elderly, many studies also exclude women with cognitive impairments from study population because of concerns over unreliable recall. Mild cognitive impairment and depressive symptoms are known to affect the memory of falls events, and according to Galizia et al., commonly lead to a misattribution of the cause of falls among the elderly as accidental, missing the role of underlying or untreated health impairments (36). The use of multi-disciplinary geriatric evaluations was advocated by the authors as an effective means for clarifying risk and diagnoses for the elderly. Recently, a randomized controlled trial demonstrated that implementation of multidisciplinary assessment followed by treatment of fall risk factors could reduce the incidence of falls in independently living persons of 65 years and older (37).

Although getting sufficient sleep might be seen as an individual choice, women's ability to sleep is more complex, particularly in menopause but also for women who rely on medications which may interfere with their natural sleep patterns. Moreover, some evidence of sex-specific effects of insufficient sleep on falls has emerged. Kuo and associates found that sleep deprivation is independently associated with falls in women, but not in men. The length of time women slept was inversely associated with falling. After adjusting for multiple confounding factors, including use of antihypertensives and psychotropic medications, each hourly decrease in the duration of sleep showed 1.95 times greater odds of falling (95% confidence interval [CI] 1.24 – 3.06). Women who slept less than 5 hours a night were nearly three times (95% CI 1.32 – 4.62) as likely to have fallen in the past year as women who suffered no sleep deprivation, suggesting that short sleep duration may be an important marker for women at risk of falling (38). Similarly, a large scale study of elderly residents of nursing homes in Michigan found that insomnia, and not hypnotic use, predicted future falls. The study accounted for several potential confounding variables, including standard measures of functional status, cognitive status, intensity of resource utilization, proximity to death, illness burden, number of medications, emergency room visits, nursing home new admissions, age, and sex. Unfortunately, the analysis did not explore sex-specific results (39).

Consequences of Injuries from Falls and Risks for Greater Functional Decline

Some of the consequences of falls go unseen, particularly for older women, but should be considered in prevention efforts. Acute injuries are most apparent and are most likely to be treated in hospital and thus they may be given primacy for surveillance, policy and program responses. However, for many older women, treatment of acute injury at hospital does not fully resolve long-term effects of fall-related injuries. This observation led Stel and colleagues to consider the importance of prevention strategies for those falls with sequelae, specifically giving greater attention to those with long-term sequelae, which are more commonly overlooked (40). The authors looked at

Some of the consequences of falls go unseen but should be considered in prevention efforts.

functional decline[4] (including both physical and social dimensions), particularly common and serious for older women injured by a fall. Their study of community-dwelling seniors in Amsterdam injured by a fall (n=204; 112 female) found that 48.2% reported any functional decline following a fall. Furthermore, the study confirmed sex differences in functionality, women being at significantly greater risk than males of losing functionality ($p<0.05$). More specifically, depressive symptoms and falls indoors were risk factors for decline in social dimensions of functionality, while female gender and depressive symptoms were risk factors for decline in physical dimensions of functionality after falling. The authors caution that objective measures of functionality are difficult to attain; consequences are subjectively felt, and may more readily be perceived and reported by females (40), suggesting a gendered component to functional status as it is interpreted and experienced. Nevertheless, being female was identified as a risk factor for functional decline after a fall, as were higher medication use, depressive symptoms and falls that occurred indoors.

Female gender, higher medication use, depressive symptoms and falls inside were risk factors for functional decline after falling (40).

The timeliness of response to older women's injurious falls may influence long-term outcomes. An Australian prospective study of 68 participants in a stroke rehabilitation program found that falls and injuries were common among those who returned home after suffering a stroke (46% fell, among whom 55% were injured). Among those who fell, women not only sustained more injuries than men, but also responded differently to their fall. Women were more likely to lie for longer after a fall, and waited longer in obtaining assistance. The authors drew attention to this finding because other research has shown that those who lie longer after a fall subsequently score lower on functional measures (10). Although small in scale, this study raises questions about individual and contextual factors that may influence women's responses to falls, primarily whether women's greater likelihood of living alone and hence lacking responders to their falls has consequences for their recovery. It also raises questions about women's physical capacity to move after a fall, their efficacy in safely mobilizing themselves after a fall, and whether these results would be comparable in Canada.

Cultural values may determine how older people are viewed, as well as how falls risks are viewed by older people, their care givers and the broader community (7). Cultures in which old age is considered a time to rest, may reduce participation in activities; falls in old age are often regarded as an unavoidable consequence of aging (7). Gender is also shaped by sociocultural contexts. Women in older age are commonly seen as vulnerable, fragile, and their rightful domain is regarded as indoor, private spaces that may shape and limit their participation in social life and physical activity, and constrain their life space. Conceivably, women's

[4] According to the study authors, "functional status, and decline in social and physical activities. Measurements of decline in functional status were based on a validated questionnaire about the degree of difficulty with functional activities: climbing stairs, dressing oneself, rising from a chair, cutting toenails, walking outside and using own or public transport. We asked whether the difficulty to perform these six functional activities had changed as a consequence of the last fall" (40), (page 59)

social status and personal power has influenced women in some cultural contexts to perceive a lack of agency, or ability to take action to prevent injurious falls. Women primarily influenced by mainstream Canadian culture may benefit from a greater sense of empowerment, but this may not be equally shared across communities defined by ethnicity or marginalized social strata.

There are additional unanswered questions. In aging and mobility studies, some scholars have explored gender-distinct patterns using macro-level analyses. Studies in high income countries commonly report that women have greater mobility disability than men. Population-based research in Sweden found that this gender gap narrowed over time, which some have attributed to the influence of advancements in gender equality in this and other high income nations (41). Building on this work, a recently published study by Mechakra-Tahiri et al. explored mobility disability in 71 countries relative to both the Human Development Index (HDI) and the Gender Development Index (GDI) – the GDI incorporating a measure of gender inequity in addition to the socioeconomic and health inequities summarized by the HDI. Their findings showed an association between higher gender inequality – as indicated by the GDI – and greater functional disadvantage for women in national level data (41).

Recurrent Falls, Fear of Falling and Other Psychosocial Factors

The distinction between risk and consequence of falls may be primarily an academic distinction which could distract from the actual experiences of older women. The social and psychological dimensions of women's experience of falls and falls injuries are not often adequately accounted for or integrated within our frameworks for understanding falls risks and consequences. Among those women most vulnerable to falls, the consequences of risks and actual falls include greater risk and more serious subsequent falls and injuries (40).

Fear of falling increases the risk of falling, though is not predictive of an injury from a fall.

Fear is also associated with other factors that increase the risk of falls and affect women's quality of life.

Falls with less serious physical consequences are common and often contribute to the risk of subsequent and more serious falls (40). Unfortunately, neither administrative nor survey data provide complete or reliable information about the less injurious falls that do not result in treatment and are more likely to be forgotten even by those who experience them. Nevertheless, women's risks of recurrent falls are associated with serious outcomes including institutionalization, and need to be better understood. A study of Ontario homecare recipients (n=2304) (42) found 27% (females and males combined) had fallen one or more times in the past year, and

10% fell multiple times. The study confirmed female gender as an important independent risk factor for not only falls but also recurrent falls, as were gait, environmental hazards, and changes in the CHESS scale[5].

Multiple falls have been associated with avoidance of activity. Although poorer physical health or function might be assumed to be an important determinant of behaviour change, a study of 196 older women (65+) a year after hip fracture, found that repeated falls were associated with decreased social participation, irrespective of how well women had regained lower limb function. Further analysis revealed that repeat fallers' experience of depressive symptoms appeared to explain the discrepancy between physical and social functioning (24). Fear of falling too has been shown to have a significant impact on participation in activities (24), and depressive symptoms are also more common among those reporting fear.

Given women's high rates of falls injuries, it seems reasonable that women can fear falling. Boyd and Stevens found that 43.2% of older US women were moderately or very afraid of falling, (compared to 26.4% of men) (12). Fear of falling was also higher for more elderly groups (75 or older), single adults, and individuals with lower incomes–characteristics that are also disproportionately common among older women. Research points to a cyclical relationship between falls and the fear of falls, although fear does not appear to predict injury as an outcome of a fall. Fear of falling has been linked to several other factors. Describing the complex literature, Boyd and Stevens note that functional decline, decreased quality of life, increased risk of institutionalization, activity restriction, depression, loss of social connectivity, decreased self-efficacy and physical frailty have all been linked to the fear of falling. The authors found that the perception of risk as well as belief in the benefit of recognized prevention methods—for example, moderate exercise—did not result in any behaviour change. The findings were interpreted as an illustration of the need for non-individualistic approaches to prevention, specifically those that integrate public health approaches to falls prevention (12).

Little attention has been given to the influence of gender dynamics on falls injury risks and preventive strategies, however Horton and Arber suggested that gender dynamics can be seen to influence the negotiation of falls prevention strategies in the relationship between an informal caregiver and a parent with a history of falls (43). Based upon in-depth interviews with 35 seniors and their caregivers (23 female, 12 male adult children), the authors found that the female and male caregivers differed in the way they approached their parents to prevent subsequent falls. Male caregivers primarily used protective actions with mothers, which fostered submissiveness and increased women's dependence on their sons; sons also may have used coercive actions with their mothers. In contrast, female caregivers either used negotiating or engaging strategies, with a preference for negotiating with their mothers, and engaging fathers whose choice, autonomy and control were acknowledged and the focus for falls preventive actions (43).

[5] The CHESS Scale represents an indicator of the degree of frailty or medical instability. It uses a combination of the following items dealing with changes in health (activities of daily living and cognitive decline), end-stage disease, and signs and symptoms of medical conditions (i.e., edema, shortness of breath, weight loss, dehydration, loss of appetite, diarrhea, vomiting) (42).

Informed Evidence and Frameworks to Prevent Women's Falls

A wide range of determinants directly and indirectly affect falls and the risk of injury from falls. Public health models of falls and falls injury risks have generally grouped factors into gross categories of biological, behavioural, environmental, and socioeconomic risk factors (6,7). A common and notable omission in these treatments is a lack of consideration for sex-specific and particularly gender-nuanced experience of risk. In fact, conditions that predominate among older individuals tend to be painted in gender neutral grey hues, as though these individuals, by virtue of their older age, shed their sex and especially their gender.

In epidemiological research there are increasing numbers of studies incorporating a sex-stratified analysis, or an analysis which considers the interactive influence of sex on variables of interest. However, both a lack of recognition for the importance of sex-stratified analysis as well as challenges concerning the cost of conducting such research, which may require larger sample sizes to achieve statistical power, continue to constrain epidemiological research, thus limiting the evidence base for policy direction. Some analyses conduct initial sex-stratification, identify female sex as a risk factor not amenable to public policy influence, and proceed by controlling for sex in further exploration of risks. Mixed method approaches are still uncommon, so few studies achieve integrated view of risk that consider structural and societal level factors in balance with the more physiologically focused work which narrowly skirts biological determinism. All too often, when the focus isn't women's sex hormones, it becomes the physical environments of seniors, at which time the question often becomes: what are seniors doing to keep themselves safe?

Some analyses conduct initial sex-stratification, identify female sex as a risk factor not amenable to public policy influence, and proceed by controlling for sex in further exploration of falls risks.

But promising public health models of falls risks have been presented and Canadian falls experts have contributed to those models, although it remains to be seen whether their application will retain these sensitivities when adopted in national or provincial 'Healthy Living' policies. Perhaps the prime example of promising models appeared in the WHO *Global Report on Falls Prevention in Older Age.* Based on an extensive review of evidence and international policies and practices, the paper put forward a policy framework which not only accommodated the aforementioned gross categories of key risk factors, but also modeled their relationship to gender and culture, conceived as cross-cutting factors that mediate falls risk. According to the *Global Report*, sex- and gender-specific risks relate to numerous risk factors for falls, including women's higher usage of medications, polypharmacy,[6] physical changes in the postmenopausal

[6] Polypharmacy refers to inappropriate long-term prescription of psychotropic medications to seniors, particularly women. Certain psychotropic medications (e.g., types of tranquilizers), which take a long time for older women to metabolize, have been described as increasing the risk of falling among seniors by 80% (11).

period that affect bone health, vitamin D and Calcium supplementation, low levels of physical activity, fear of falling, living in isolation (as in widowhood), and more often living with disability and with cognitive and sensory limitations, secondary to women's greater average longevity.

Dorresteijn et al. offered a rare look at older peoples' interest and preferences for falls prevention strategies and found the majority are not interested in participating in programs that address concerns about falling. However, among those who are willing to participate, gender and other background characteristics were associated with preferences, showing the need to attend to gender and other sources of diversity among seniors (44). The research of Miler et al. signals that depression and fear are as important a concern among older women as are bone health, balance and gait, and psychosocial concerns such as returning women who fall to social activities need to be recognized as important both to quality of life and to falls prevention and falls injury recovery (24).

In a systematic review of falls incidence associated with prevention programs for community dwelling and institutionalized older adults, Gillespie concluded that interventions that focused on exercise alone did not prove to be effective protection against falls, whereas programs based on interventions directed toward multiple risk factors or to environmental factors resulted in measureable improvements in falls, and falls injuries (45). This may underscore the importance of diverse responses; the popularity of physical activity approaches notwithstanding, issues are complex for older individuals and there is appreciation for programs to remain attentive to risk factors outside of individual control.

Sleet et al. stated that in the U.S., funding to address falls is not reflective of the burden of the problem, though this may rightfully be said of Canada as well. Interventions should be tailored to different sub-populations at greatest risk (11), as should the messages used. In the Canadian context, Scott et al. noted that "more needs to be done at a national level, particularly in targeting high-risk or marginalized populations, such as those with dementia, seniors in remote communities, and Aboriginal seniors" (8). As well, there is a need to effectively communicate falls prevention information in ways that do not raise fear and inadvertently compound risks, such as women's tendencies for greater inactivity. Where physical activity is advocated for falls prevention, as in improving strength and balance, appropriate activities need to be better defined for use in falls primary prevention for older women--the intensity, duration, dosage of exercise that is protective of falls should be made clearer (11).

While it is critical to evaluate the effectiveness of these programs for preventing physical injury, it is also important to consider broader emotional, social and psychological effects of prevention efforts on the recipients of programs. A gender lens is particularly effective in this regard and psychosocial dimensions are important to consider for effective responses. According to Ness et al. screening for risk of falling may have counterproductive effects by inadvertently increasing the fear of falling (46). Such fear commonly leads people to restrict their activities, which can disempower, isolate and reduce the quality of life. Qualitative research by Berlin et al. looked in depth at the lived experience of older women with a history of fragility

fractures and provided valuable insight for effectively empowering women in the management of injury risk (47). The study found that women's advanced age, past injuries and attempts to prevent further injuries had changed their self-perceptions, narrowed their life space, limited social participation, increased feelings of insecurity, influenced their greater need for understanding treatments, and created ambiguous dependency. A prominent theme was women's worry about osteoporosis, which was distinct from concerns regarding aging or falls. This research also underscored the value of patient-centred care; when women's needs, priorities, interests, ideas and resources could be used in planning injury prevention, heightened engagement of older women could also be achieved.

Summary

There is a need to better recognize the importance of falls injuries, as they affect large numbers of aging women, and have long-term impacts. As a consequence of older women's disadvantaged social status, these injuries may not receive the priority treatment they deserve. Falls prevention is not well received by the elderly, and perhaps this can be understood in terms of the fear of falling that is provoked, as well as common frameworks that largely focus on biological underpinnings and individual responsibilities for risks in older women's physical environments. A common statement in preventive approaches is that falls, including recurrent falls, are preventable—but who and what are targets of prevention, individuals and their behaviours alone, or aging community infrastructures and broader health and social policies? Women should be expected to attend only to what shows evidence of helping, and what is within their control. Otherwise, we need more systematic and structural changes to address risks, looking also to who among women are most at risk.

Where interest in falls prevention is found, the concerns and priorities of individuals are known to be gender-specific and distinct. Prevention efforts must attend to gender power dynamics, engaging older women rather than coercing them. We must also adequately account for different capacities among women. There is a need for greater attention to lower income groups, women living in areas characterized by aging infrastructures, women in Aboriginal communities affected by northern location and/or socioeconomic marginalization, women in rural communities which see distinctly escalating aging trends. As well, we need greater sensitivity to the effects of older women's social isolation and depression on falls risks and consequences, and the so-called syndrome of dependency and frailty that characterizes some women in older age and particularly poor health. As well, certain ethnic enclaves see older women as being more limited and having less sense of agency in managing falls risks and consequences. Medication use is often regarded as women's behavioural failing, but prescription practices of physicians have not served to adequately safeguard and inform women. Acute injuries may be the primary driver of policy and program responses, yet older women's falls injury consequences are more complex, and prevention efforts should be cognizant of this.

Before we celebrate the decline in falls and injuries, it is necessary to understand and hear from older women themselves about their falls concerns and consequences—not only physical, but psychological and social consequences, the short- and long-term effects of living with and after falls.

Occupational Injury

Injuries resulting from work and workplace environments are an important, though often overlooked aspect of women's health and injury risks. There is a critical lack of information about women's occupational health compared to that of men (48,49). It has been argued that health and safety promotion efforts are not effective for women because they are largely based on information drawn from male populations and fail to account for the relationship between occupational health outcomes and gender roles (49). Where occupational health and safety initiatives have considered women's distinct needs, the focus has tended to be a narrow consideration of the risks to pregnant women or their fetus, often resulting in restrictions on the work pregnant women do, without resolution of the safety hazards (50).

Despite the gains made toward gender equality, Karen Messing observed that there remains marked sex segregation in the North American labour market (51). Women are still over-represented in the service sector, with large proportions working in health and retail occupations. Sex segregation is particularly accentuated in work with high physical demands, as women are assigned work considered to have light physical demands. This has led to faulty assumptions that the work predominantly performed by women has little or no physical effects. Messing has described not only some serious effects of 'women's work', but also sex- and gender-specific influences (51). There are systemic biases that render women's workplace injuries less visible, less valid, and less often a focus in programs and policy.

Occupational Injury Data
What Counts? Who Are Counted?

The Association of Workers' Compensation Boards of Canada compiles data from various Boards/Commissions across Canada, as part of the National Work Injury/Disease Statistics Program (NWISP). It is important to note that the injuries and diseases recorded in this dataset represent only those for women injured while working in industries governed by workers compensation legislation (coverage varies by province), and only for accepted claims. Therefore, the injury counts and proportions described herein refer to "accepted time-loss injury claims", unless otherwise noted.

Time-loss injury: AWCBC defines a time-loss injury as: "an injury where a worker is compensated for a loss of wages following a work-related injury (or exposure to a noxious substance), or receives compensation for a permanent disability with or without any time lost in his or her employment (for example, if a worker is compensated for a loss of hearing resulting from excessive noise in the work place).

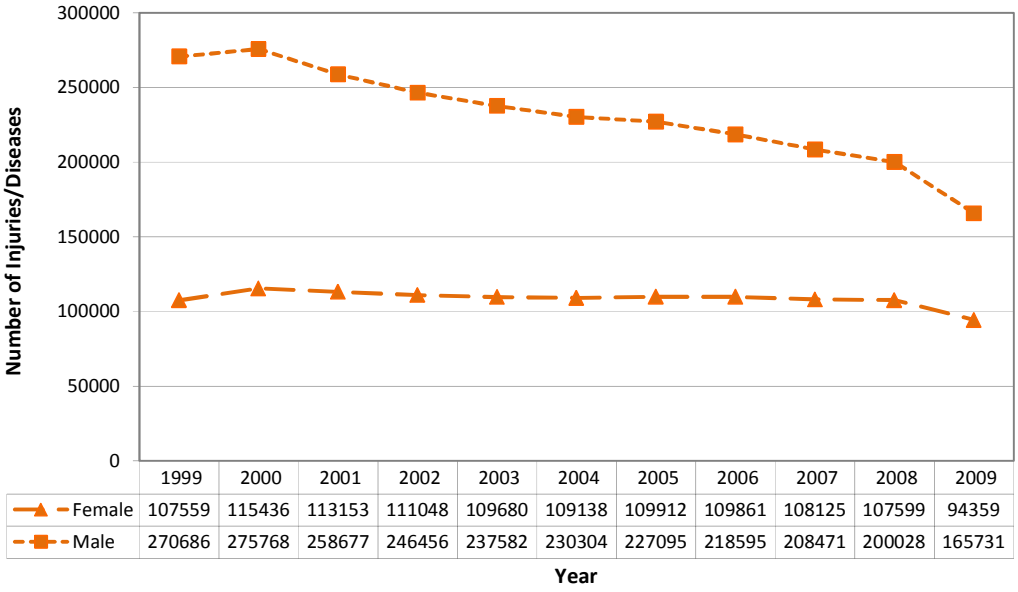
Data are tabulated by body part affected, but also by 'nature of injury/disease', defined as "the principal physical characteristics of an injury/disease" and the 'event or exposure' that directly resulted in the injury/disease. As well, data are provided by industry, which are based on Statistics Canada's 'Standard Industrial Classification', 1980. (Catalogue 12-501).

This section provides a summary of key evidence on some women's occupational injuries, both in industries and occupations in which women predominate, and in non-traditional fields of work. While the focus is largely on women's physical injuries and psychological health resulting from paid employment, some of the discussion provides an opportunity to also consider women's health in unpaid roles.

The Extent of Women's Workplace Injury

An examination of Association of Workers Compensation Boards of Canada (AWCBC) administrative data (52) finds that occupational injury and health consequences are less common for women than for men, and in part this likely reflects women's lower employment and participation rates in the paid workforce. Figure 7 shows little change in the number of women's occupational injury/disease claims over the decade ending 2009, while men's numbers improve markedly. Work-related fatalities are relatively uncommon among women: 40 women died as a consequence of their work and working conditions in 2009, which represents a 21% increase over 33 deaths recorded in 1999[7]. These results beg the question–what accounts for the lack of improvement in women's occupational injuries?

Figure 7. Occupational Injuries/Disease by Sex, Canada, 1999-2009



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Female	107559	115436	113153	111048	109680	109138	109912	109861	108125	107599	94359
Male	270686	275768	258677	246456	237582	230304	227095	218595	208471	200028	165731

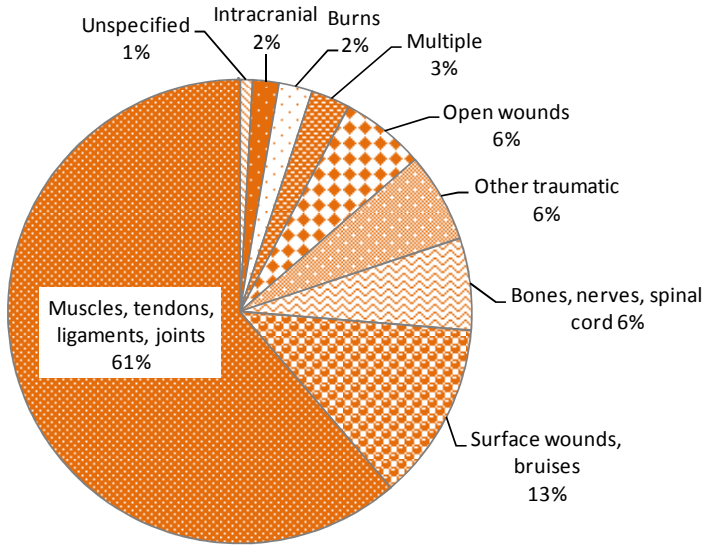
SOURCE: Association of Workers Compensation Boards of Canada. National Work Injury Statistics Program Report. 2009.

[7] Counts of injuries and deaths are not adjusted for changes in population or in age-structure over time.

In 2009, Canadian workers' compensation boards approved 94,359 time-loss injury claims by women. In 2009, workplace injuries were concentrated in the 40-55 age range, peaking at age 45-49. This age distribution of injury contrasts that for males, who see a higher proportion of injuries among 15 to 40 year olds than among women.

Although time-loss injury claims include disease, disorders and undiagnosed symptoms attributed to work, 86% (81,079) of women's successful claims in 2009 were due to traumatic injuries. Systemic diseases accounted for 6% (5,990) of these claims, whereas all other 'nature of injury' categories accounted for no more than 1% of the total (e.g., 1,294 infectious diseases, mainly of intestines; 1,035 mental disorders).[8] Among traumatic injuries alone (see Figure 8), by far the most common (49,678 or 61%) were traumatic musculoskeletal injuries, injuries to muscles, tendons, ligaments, and joints. As well, a substantial number were due to surface wounds and bruises (13%). Interestingly, among accepted claims for systemic diseases, musculoskeletal conditions represented a large majority (70%). Back injuries were the most common among women's occupational injuries (Figure 9); 27.6% of all accepted time-loss claims in 2009 were to the back and spine. The next most common single site of injury was to shoulders (8%), where the clavicle, scapula and trapezius muscles were involved. The leg, ankle and neck also appeared among the top 10 sites of injury, representing 8%, 5% and 3% of all injuries, respectively. Upper extremities appear quite often among the top ten body parts affected by injury, with fingers, wrists, arms, and hands ranking 5th through 10th.

Figure 8. Specific Nature of Traumatic Injuries, Canadian Women, 2009

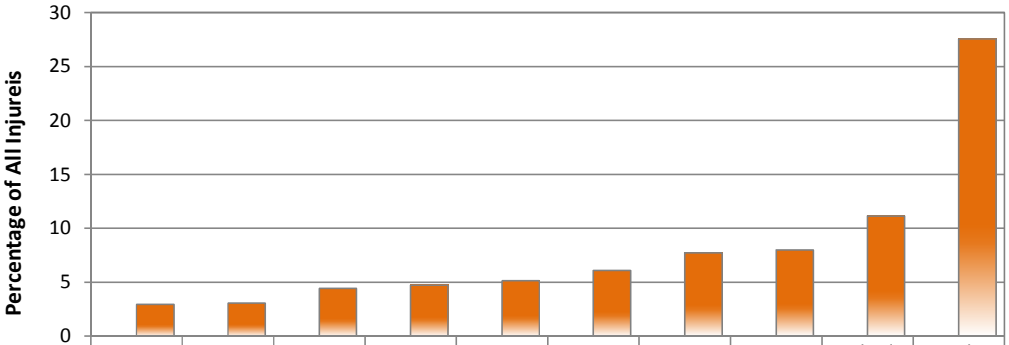


SOURCE: Association of Workers Compensation Boards of Canada. National Work Injury Statistics Program Report. 2009.

[8] 3122 (3%) of all accepted time-loss injuries were not coded.

Nearly one-half of women's workplace injuries were associated with a 'bodily reaction or exertion', and more specifically, half of these events were cases of overexertion (Figure 10). Substantial proportions of workplace injuries were also due to falls (21%) and contact with objects or equipment (16%). Specifically, falls on the same level and being struck by an object were important causes of women's workplace injury.

Figure 9. Body Part(s) Most Commonly Injured at Work
Canadian Women, 2009

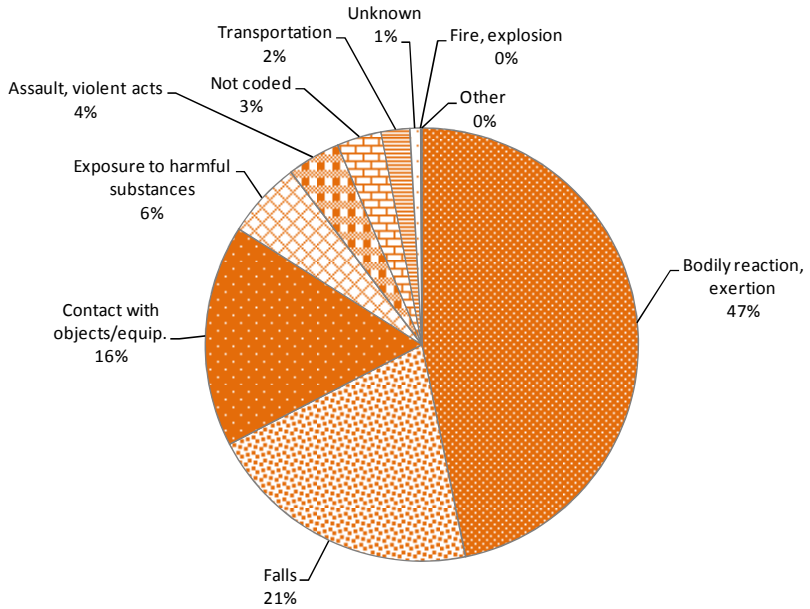


	Hands	Neck	Arm	Wrist	Ankle	Finger	Leg	Shoulder	Multiple sites	Back, spine
Number	2784	2898	4186	4486	4867	5764	7290	7546	10535	26011
Percent	3	3	4	5	5	6	8	8	11	28

Top Ten Sites of Injury

SOURCE: Association of Workers Compensation Boards of Canada. National Work Injury Statistics Program Report. 2009. Accepted time loss injury claims, which also include disorders and diseases resulting from work conditions.

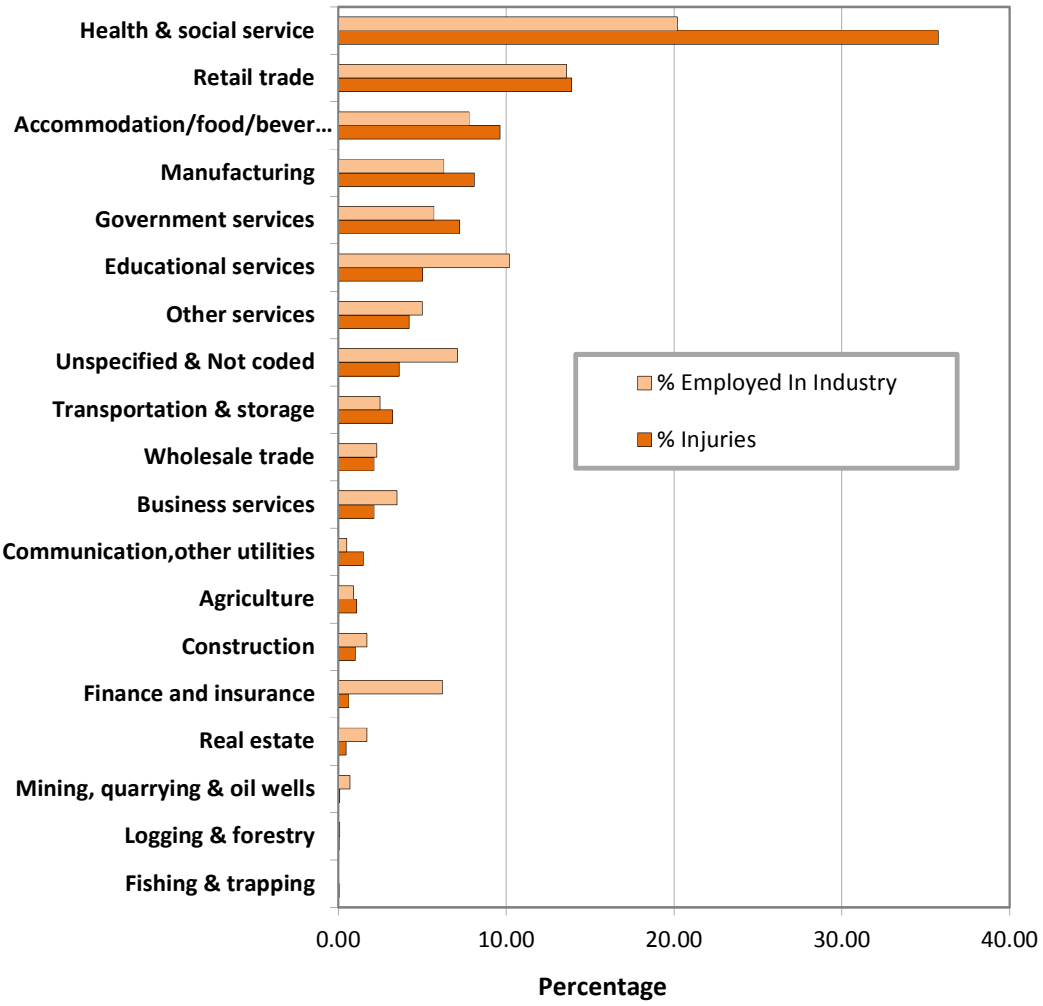
Figure 10. Events Associated with Occupational Injuries,
Canadian Women, 2009



SOURCE: Association of Workers Compensation Boards of Canada. National Work Injury Statistics Program Report. 2009.

Figure 11 illustrates that the health and social service industry represents the single greatest contributor to women's workplace injuries. In 2009, women in this industry made 33,737 claims for injuries to WCBs in Canada, representing 35.8% of all accepted time loss injury claims. These injuries, combined with injuries in retail trade (13,127), accommodation/food and beverage services (9108), manufacturing (7667), and government services (6839) accounted for three-quarters of all of women's approved claims in 2009. In contrast, only 2.3% of women's occupational injuries occurred in work considered non-traditional for women, including 1037 in agriculture, 972 in construction, with far fewer in mining, logging or fishing and trapping industries.

Figure 11: Occupational Injuries to Women (Age 15+) by Industry
Comparing Distribution of Women Employed by Industry, 2009



SOURCE: NWISP, Association of Workers' Compensation Boards of Canada, 2009; Labour Force Survey of Canada, Statistics Canada, 2009. NOTE: Industry categories employed by AWCBC and The Labour Force Survey may differ. Interpret with caution.

The distribution of women's injury by industry represents not only the risks associated with work in those industries but also the number of women employed in various industries, as well as their WCB coverage. When we compare the distribution of women's injuries by industry against the distribution of their numbers employed in those industries (53)(see Figure 11), it's clear that the predominance of injuries in health and social service is disproportionately high relative to the numbers of women working in that sector. To a lesser extent, this also holds true for women in the accommodation, food and beverage service industry, and manufacturing, among others (52,53).

The distribution of women's injuries by industry may also be skewed by underlying gender biases in compensation policies that determine which work and injury types may be recognized. Workers' compensation data underestimate the extent of injury and illness for both women and men. However, research in other countries has also shown that women's occupational injuries and illnesses are undercounted to a greater extent than are men's (54). Women are also more likely to work in industries not mandated for workers' compensation coverage (55).

It is noteworthy that within the scant literature about women's occupational injuries, there is even less concerning risks for minority women. Racialized women are three times more likely than other women to be employed in manufacturing jobs than other Canadian women (56). Based upon a review of census data, Premji et al. found an overrepresentation of immigrants and ethnic and linguistic minorities in high risk jobs in Montreal Canada, confirming other research in the US (57). Both female and male minorities were more likely to work in jobs where the risk of having a compensated work-related health problem or a compensated, severe work-related health problem was higher. The disparities observed were partially explained by the fact that immigrants and minorities, particularly among women, were concentrated in manual jobs, jobs which carry the highest risks for injury (57).

Injuries to Women in the Health Services Sector

In Canada, the overwhelming majority of workers in the health-services sector are females. For example, women comprise 80% of the total healthcare and social-assistance workforce in the province of British Columbia (58). As the members of Women and Health Care Reform have noted, the healthcare workforce in Canada is comprised of "visible" workers on whom policymakers and the general public focus tend to focus (e.g., physicians, nurses and therapists), but also "hidden", ancillary workers (such as cleaners, food service workers, home care workers, receptionists and analysts) whose work is considered less valuable and is increasingly privately contracted (59). Women in all healthcare positions suffer a variety of occupational injuries, from falls, needle-sticks and muscular strain, to repetitive motion disorders and injury resulting from patient violence.

In a study on occupational injury among healthcare workers, Alamgir et al. examined 938 work-related falls over a four year period within a population of B.C. healthcare workers (87% of whom were female). The authors concluded that long-term care workers, care aides, facility support workers and community health workers were most at risk of suffering serious work-related falls. Furthermore, workers over the age of 60 experienced more serious falls than their younger colleagues (60).

Mental stress accounts for very few time-loss claims among health services workers nationwide, despite many studies suggesting that mental burnout and stress are increasing problems in healthcare. On the other hand, musculoskeletal injuries account for the majority of time loss claims for healthcare workers in Canada (61).

Ergonomic Disadvantage for Women

In a 2009 study of workplace injuries in the healthcare sector, Alamgir et al. examined a total of 1,893 injuries among a sample of 42,332 B.C. healthcare employees (89% of whom were female) (58). They concluded that female workers had a significantly higher risk of sustaining compensated occupational injuries than their male colleagues across most subsectors, age groups and experience groups. The authors suggested that the same exposures may apply greater strain on the average woman than on the average man, because of anthropometric differences (differences in body size and proportions between average sized men and women between the sexes (58)).

A survey of North American pediatric otolaryngologists found that the women in a small sample of surgeons (85 males, 15 females) reported significantly more upper extremity pain that they attributed to their surgical practice than did the men. The authors suggested that it is possible that women are simply more likely to seek medical attention for pain than men, but alternatively, it is possible that women are at an ergonomic disadvantage in the operating room as the women in the sample were significantly shorter in stature than their male colleagues. The shortage of research on ergonomic problems for female physicians requires attention because women now outnumber men in North American medical school classrooms (62).

Female workers in health care had a significantly higher risk of sustaining compensated occupational injuries than their male colleagues, across most subsectors, age groups and experience.

Work-Related Low Back Injury in Nursing

Nurses are among the groups of workers with the highest rates of work-related back injury and other musculoskeletal injuries (63). The heavy loads and awkward postures that nurses must work with are a major contributing factor. It has been conservatively estimated that the average weight of a patient is 75.2 kg, and that a nurse (working on a ward) lifts 3000-5000 kg per shift. This clearly exceeds the maximum loads

allowable in a manufacturing setting, where a woman in the 90th percentile of strength should lift only a maximum of 20.91 kg (64). After looking at all recorded work-related injuries in a Canadian teaching hospital for the period from 1999 to 2003, Vieira et al. examined more closely the cases of work-related lower back injury (WLBI) among the orthopedic and ICU nurses in a Canadian teaching hospital. Many of the nurses in the sample (91% female) reported experiencing low back pain during most shifts and a WLBI at least once in their careers. This was attributed to the nature of nursing work, including lifting and turning patients. The authors found that nurses who reported less WLBI and back pain were those who led a more active lifestyle and did not smoke (65).

To follow up on the findings from their 2006 study, Vieira and Kumar closely evaluated nine nursing tasks for different aspects of lumbar strain. This study was done only with female nurses who had never experienced WLBI. They concluded that the tasks performed by orthopedic nurses impose more strain on the low-back musculoskeletal system than do the tasks performed by ICU nurses. Furthermore, the peak-shear forces measured during two of the nursing tasks studied were similar to those reported for nurses with WLBI (63). The authors highlighted the importance of ergonomic intervention to reduce physical loading and increase musculoskeletal safety in professions with high physical demands, such as nursing.

In a review of the literature on occupational hazards for pregnant nurses, Alex found that nurses must cope with long hours, shift work at irregular times, and high physical demands associated with their profession. In later pregnancy, increased levels of progesterone and relaxin prepare the body for birth, but also place a woman at increased risk of musculoskeletal injury. Nurses frequently have to perform forceful, repetitive movements such as those involved in manual patient transfers while on the job. This contributes to nurses being the group of professionals with the highest rates of WLBI. The author suggested that shortening work hours, accommodating frequent breaks, and considering pregnancy risks when making assignments can greatly increase occupational safety and satisfaction among nurses during their pregnancies (66).

A "Women's Work" Disadvantage for Women

In 2006, Baines conducted a gender-based analysis of a subset of data from a large qualitative study of Canadian social service workers. Specifically, Baines examined occupational health and stress in the sector of caring for adults with intellectual disabilities. Disability care jobs are unique within the health services sector in that men and women tend to perform the same tasks, unlike other healthcare jobs in which they tend to be assigned very different tasks. At the three agencies studied, the female care workers were found to bear a disproportionate amount of the client-to-caregiver violence. One factor identified for this was that women spent much more time near clients during "emotional episodes". It was repeatedly reported that there is an unwritten expectation of women to be very mothering and emotionally supportive to clients, an informal segregation of expectations along gender lines (67).

These findings mirror the conditions women face when providing unpaid home care work. Women are more likely to provide personal and emotional support, whereas men are more likely to provide household maintenance and transportation in unpaid home care (68). Women are also expected to provide unpaid care even when they work in the labour market, based on the assumption that women's unpaid care is work assumed to be simply an extension of what women do "naturally", whereas men are more likely to get paid help when providing home care work (68). Baines found that the women suffered much more stress than men related to juggling family and work responsibilities, due to long overtime hours, unpredictable and inconsistent work schedules, and more domestic responsibilities outside of work (67). Indeed, women's endlessly stretchable ability to perform care work in any context, including a context of violence, seems crucial to the survival of many care agencies (67).

Women's endlessly stretchable ability to perform care work in any context seems crucial to the survival of many care agencies.

The work that physicians and nurses perform is critical and highly valued, but the work of the hidden health care workers is also essential to make the system function. Cleaners, technicians, food service workers, receptionists and assistants are jobs performed by women, doing jobs that have historically been considered "women's work"—work that is commonly done by women in the home and thus is persistently undervalued and considered to require very little skill. Policy research from Women and Health Care Reform found that the workers in these areas suffer work-related stress and injury, just as physicians and nurses do. However, because policymakers focus their priorities on medical diagnosis and treatment, the hidden healthcare jobs are often ignored or dismissed, not given the attention they require (59).

In 2008, Alamgir and Yu did a study to identify the groups of people among hospital cleaners who were most at risk of occupational injury using Workplace Health Indicator Tracking and Evaluation data for one healthcare region in B.C. They identified females as one group among hospital cleaners who were most at risk of occupational injury (130 injuries per 100 person years for females, compared to 15 injuries per 100 person years for males). The authors noted that the female hospital cleaners were assigned more repetitive work than males, even when they had the same job title as the males. They also pointed out that women tended to have more domestic responsibilities in their own homes, and therefore less time to relax and exercise outside of work, which could contribute to their higher risk of occupational injury (69).

Calvet et al. investigated occupational injury and gender segregation among Quebec hospital cleaners both before and after the merger of "light" with "heavy" cleaning work (70). In 1994-1995 ("time 1"), hospital cleaning jobs were still segregated into "light and "heavy" work categories, assigned respectively to women and men. In 2006 ("time 2"), the work categories were officially combined and all male and female cleaners had the same job title and description. A small number of hospital cleaners were observed by ergonomists at times 1 and 2 at the same hospital to investigate how the job segregation and desegregation affected the

workers' health. In 2008 ("time 3"), a sample of workers at a second hospital was observed by ergonomists. It was found that after the merger of light with heavy cleaning, some gender differences persisted in job route assignment, time allocation, and musculoskeletal symptoms. Some of the differences were associated with gender stereotyping, others with differences in physical capacities. Route assignment or choice was segregated in that women were more often assigned to day shifts, which involved much more interaction with other people, and many more cognitive demands, because of frequent interruptions of routine and general business of the hospital. It was also found that there were some gendered differences in musculoskeletal symptoms both before and after the merge, but the small sample size limited quantitative conclusions about pain and fatigue at the three time periods. The hospital's priority for improving the gendered discrepancies appeared to be low, which the authors interpreted as illustrative of the devaluation of these low-profile healthcare workers by policymakers (70).

A study done by d'Errico et al. in Massachusetts found risk of injury among hospital employees to be significantly negatively correlated with their socioeconomic status (SES) (71). Over 3000 employees (82% female) at two hospitals were assigned to six SES groups, according to subsector of hospital work. A strong SES gradient in the risk of injury was found, with work injuries generally more severe in lower SES categories, "semi-skilled workers" (supplementary or ancillary workers who perform work such as cleaning), than in than higher SES categories, mostly administrators. Furthermore, it was concluded that these differences in injury risk and severity could be largely explained by differences in workplace exposures. Of interest is the finding that physical factors such as trunk bending and forceful exertion explained most of the variability in injury risk for professional workers, whereas psychosocial factors such as decision latitude had the greatest impact on injury risk among the lower SES groups (71).

Systemic Failures to Protect Workers from Injury

Van Wyk et al. examined the effect of nurses' perceptions of training in patient lifts and transfers on the confidence and safety with which they performed these tasks (64). To do this, they recruited 163 nursing students (143 of whom were female) and 33 nursing staff (all female) from southern Ontario to participate in the study. The nurses rated whether or not they thought they had been trained in each of 19 different manual patient transfers (MPTs). They were then rated in their confidence and accuracy in performing the tasks. Considerable disparity was found between the MPTs for which the nurses thought they had received training and those which were actually taught in the current curriculum. Furthermore, the tasks for which the nurses felt they had received training were the ones that they performed with the most confidence. If a nurse perceived that she received training for a MPT, but had not, the study showed she may attempt the task with less caution (and more confidence) than is prudent. This places both the nurse and the patient at an increased risk of injury. Alternatively, if a nurse did not perceive having received training for a MPT when she had, she may refuse to perform the task, putting more work and strain on other nurses. Thus there was a disconnect

between theory and practice, at least in the minds of the nurses, that can put them and their patients at increased risk of injury (64).

Investigating occupational injury by gender among cooks and food-services workers in two healthcare regions within B.C, Alamgir et al. found female employees reported far more musculoskeletal injuries, allergens, irritations and contusions than their male coworkers. The authors suggested that, though it is possible that this simply represents a greater likelihood of women to seek medical care or time off, it is far more likely that females were generally assigned the more hazardous jobs for these types of injury. For example, women were probably given the more repetitive work, increasing their risk of repetitive strain injuries (72).

Replacing the flooring significantly decreased lower extremity pain for women working in geriatric facilities.

As previously discussed, Calvet et al. examined gender segregation and injury among hospital cleaners in Quebec (70). A decline in the number of women performing this job has been observed since the merge of the heavy and light work, and the authors suggested that women have been selected out of this profession because of perceived or real inability to perform the heavy cleaning previously assigned only to men. They concluded that, overall, the gendered segregation of cleaning jobs before the merge did not protect either men or women from musculoskeletal symptoms, so a return to the old system was not desirable. However, more respect for and attention to the proficiency required to do hospital cleaning tasks, including those associated with female gender would help improve the health and safety of all cleaners, and access for women (70). In this situation, an attempt to remove gendered assignment of tasks, and thus gender segregation, resulted in discriminatory selection of men over women for the job, thus putting women out of work.

In Sweden, Wahlstrom et al. examined the effect of flooring on the frequency of lower back and leg pain in geriatric care nursing assistants. They found that replacing the plain polyvinyl floor in the intervention group facility with a cushioned polyvinyl floor significantly decreased lower extremity pain among the 91 women in the intervention group from their level of pain experienced with the original flooring. Furthermore, lower extremity pain remained significantly lower in the intervention group than among the 62 women in the reference group (at another geriatric care centre) for the two year follow-up period (73). This is an example of a simple change in facilities that can make a significant difference in musculoskeletal problems for women working in healthcare. Furthermore, this illustrates that individuals cannot simply change their behaviour in order to decrease work-related musculoskeletal pain. Policy change is needed in to help protect nurses and other healthcare workers from injury.

Summary

Women account for the vast majority of employees in the health-services sector in Canada, and they suffer a variety of injuries resulting from their work. In some cases, women experience more injury than their male colleagues, due to gendered assignment of tasks. In other cases, women may be at an ergonomic disadvantage in the healthcare workplace because of anthropometric differences between males and females. Nurses in general face long hours, time pressures, and the expectation to lift and maneuver patients and heavy equipment in awkward postures. These all contribute to high levels of work related low back injury in this group, especially during pregnancy. A disconnect between training and practice in manual patient transfers and lifts also likely contributes to injury among nurses.

Often, the expectation placed on women to perform tasks that are considered "women's work" puts women in dangerous or disadvantaged situations, such as in the home care setting. Here, it is the seemingly unlimited capacity of women to provide care work - paid and unpaid- that keeps many home care agencies afloat (59). Women are also underpaid and undervalued in the "ancillary services" branch of healthcare, and this is because of a systemic belief that these jobs require little skill. In some cases, such as the merger of "light" with "heavy" cleaning jobs in Quebec hospitals, an attempt at removing gendered assignment of tasks resulted in preferential selection of men for jobs, putting women out of work. More research, both qualitative and quantitative, is required in the field of women's occupational injury in Canada's health-services sector.

Injuries to Women in Other "Pink Collar" Jobs

The North American workforce is still quite sex-segregated, with most people employed in jobs composed primarily of one sex. This division along gender lines is accentuated when jobs involve physical demands. Women have traditionally been predominant in jobs considered to have "light" physical demands – jobs as administrators, receptionists, secretaries, assembly-line workers, cashiers, and food-service workers (51). There is an under-estimation of injury risk in this type of work, despite many of these jobs resulting in high numbers of women with occupational musculoskeletal disorder (MSD) (51,74-78), repetitive strain injury (RSI) (79-82), carpal tunnel syndrome (CTS) (76,80,83-86) and various venous disorders (87). It has been speculated that the increase in the risk of RSI development indicates that processes of so called "female work" are not well understood in terms of their effects on occupational health (79).

The Gendered Work Environment

Jobs in the pink collar sector are considered as a group because they have several common traits. The women in these jobs typically work part-time, menial, poorly paid, low status jobs with few benefits, supports, and opportunities for advancement ((74,76,82,87,88)).

In a study in which female retail workers in Ontario were interviewed, for example, the women reported that they experience a male-dominated culture, in which women's contributions are undervalued (82). They also experience a gendered hierarchy, where men are in the full-time and managerial positions, and women are in the entry level, part-time jobs. Even when men and women have the same job title and perform the same tasks, the men tended to be placed in full-time jobs with preferred hours, and women were relegated to marginalized part-time and casual positions. The researchers, Zeytinoglu et al., concluded that stress is a major occupational health problem for these women, due to the psychosocial environment in their workplaces, and the gendered nature of their employment. Stress from part-time and casual employment resulted in RSIs, migraines, and feelings of low self-esteem, low motivation, and job dissatisfaction. Part-time work is often viewed as positive for a woman, when it allows her to combine her paid and unpaid work. However, when the part-time position is gendered and does not provide the opportunity for advancement to full-time positions, it can increase stress and decrease the occupational health of a woman (82).

Silverstein et al. investigated whether adjustment for gender[9] would mask important exposure differences between men and women in a study of rotator cuff syndrome (RCS) and CTS and occupational exposures. The authors found that job content was different between men and women who had the same job titles, which thus implies different exposures for men and women. The authors urged caution in adjusting for sex as a confounder in studies when it may in fact be a proxy for specific exposures. The stratification in this study revealed many results that sex-adjusted analysis would have hidden. The researchers recommended exploring sex (and gender) differences and similarities in exposures and outcomes and to look deeper into understanding what may underlie those observed differences (86).

Adjusting for sex as a confounder in occupational injury studies may hide sex-specific workplace exposures to risk.

Pink Collar Injuries and Possible Causes

As noted, research has revealed that certain injuries are common to jobs in the pink collar sector, and may be most common to the women in these jobs. For example, a large Canadian study found that risk for RSI was higher for women in all jobs, and the impact of RSI on the amount of time lost for work was greater for women (79). Another study, consisting of a review of international literature, found that occupational neck pain is more common among women at all ages and that recovery is slower for women (78).

In their 2009 study, Silverstein et al. found that women were twice as likely to have CTS as men, both symptomatically and electro-physiologically. Furthermore, women had significantly increased odds of RCS with increasing forceful exertions when combined with upper arm flexion in the same job, whereas no such

[9] This use of the term "gender" by the authors reflects both their sex-adjustment of the quantitative data and their analysis regarding the gender influences and implications (86).

association was identified among men (86). Similarly, an American study concluded that a significantly higher proportion of their sample who had CTS were female than male. The risk of disability was more than doubled for those people who reported more than three hours per day of occupational hand bending (these results were not separated by sex) (85).

One common theme in these pink collar jobs is highly repetitive work, including work on computers. For example, a Danish study investigating musculoskeletal symptoms in people who use computers in their work found that more men than women reported a decrease in symptoms after an ergonomic intervention in the workplace (77). A Toronto study found that women who experienced both repetitive computer work at their jobs and cervical vertebrae pain/sensitivity had a much poorer outcome from treatment for lateral epicondylalgia (tennis elbow) than their male colleagues. Where cervical signs were present in men, they did not hold any prognostic effect on the lateral epicondylalgia. These authors suggested this was an ergonomic issue for the women in this workplace, as women will have, on average, less strength in cervical and shoulder muscles and smaller stature, and thus, women may use more physical exertion when operating a keyboard and mouse (89). Another Canadian study found similar ergonomic problems for women. The results indicated that early detection of deterioration in hand function among women in repetitive jobs can prevent later upper extremity problems (90).

The retail sector is another area in which women work at highly repetitive jobs. For example, an Italian study on female cashiers found that the risk of CTS development was significantly higher among full-time cashiers than among part-time cashiers, suggesting a stronger relationship between repetitive strain injuries and increasing exposure to repetitive tasks (83). Morgenstern et al. estimated from their study of CTS in more than one thousand female grocery checkers that three out of every five symptomatic workers in the study could attribute their CTS symptoms to occupational exposures (84). Women have also been found to have a higher incidence of ulnar nerve entrapment than men working on assembly lines in manufacturing, another sector that involves highly repetitive motions (91). A French study examined causes of high risk of thumb carpo-metacarpal osteoarthritis (CMC-OA) in women. They found that the risk of occupational CMC-OA is related to the frequency and duration of thumb motions, and the magnitude of forces generated by thumb positions. The authors suggest that contact stresses in female CMC joints are both biologically based and based on workplace ergonomics factors that lead to women's higher risk of injury (92).

A large study in West Virginia using workers' compensation claims (N>56,000) found that women were at a greater risk of many injuries related to repetitive work, such as musculoskeletal injuries, CTS, and upper limb mono neuritis. This greater risk for women was found in many occupations, most of which are female-dominated. However the study results did not indicate the differences in work place injuries sustained was a result of greater numbers of women in a particular occupation. Women were found to be at greater risk of CTS than males, even in the agriculture, wholesale, and transportation sectors, in which there are fewer women than men (76).

Hooftman et al. performed a study that attempted to determine whether men and women with equal tasks perform these tasks in different ways, to see if this could partly explain the female excess in musculoskeletal symptoms (75). The researchers took video recordings of the workers to get data on frequency and duration of exposure to awkward postures, and interviewed the workers to get self-reports of exposure. The results showed that men and women generally report similar exposures, but they seemed to over report their exposure compared to the observations. Sex differences in exposure to awkward postures within the same task were small at most. Hooftman et al concluded that differences in the performance of tasks could not explain the observed female excess in musculoskeletal symptoms (75). Similarly, a review of the literature on women's occupational health in Canada by Karen Messing concluded that differences in exposure to repetitive work is partially responsible for women's higher rates of musculoskeletal symptoms, and that workplace ergonomic problems for women causes the MSD (48).

Allaert et al.'s study on venous disease in women found that all of the study participants could likely attribute their venous disease to occupational causes. At work, all of the study women were required to stand or sit for too long, be exposed to sources of high heat on their legs, or wear garments that compressed the abdomen (87).

Psychosocial Contexts and Supports in Pink Collar Jobs

As noted, jobs in the pink collar sector tend to include low pay, as well as very little control or authority for the workers (76). For example, in Allaert et al.'s study of venous disease in women, not only was the nature of these women's jobs causing their venous problems, but the women had very few supports or control over their working conditions. Only a small proportion of the women thought it might be possible to change their workstations to reduce time sitting, standing, or exposure to heat. Furthermore, most of the women reported not getting enough breaks during the day to stretch or rest their legs. Finally, many of the women thought that compression stockings would be permitted at work, but that they would be a hindrance (87).

An example of low support for food-service workers is found in a 2008 study by Cann et al. (88). In this study, female food-service workers from Ontario reported that they frequently relied upon male coworkers to fetch down heavy items from high shelves for them, and this gave the women a sense of inadequacy on the job. This ergonomic problem, with many of the materials stored too high up for the employees to reach, creates a gendered disadvantage for women in a sector in which 80% of the employees are women. The women in this study also reported concerns about the lack of safety and health training in their workplace, and the fact that they are not allowed to sit down while working, without a doctor's note. The authors concluded that injury risk to these workers was shaped by many workplace components—from the individual job, to the worksite environment, to organizational issues, such as those relating to policy and budget, illustrating that occupational risks can result from practices that are out of the control of the individual worker, and that changes at any level of the workplace hierarchy may lead to changes in the risk for injury to the workers (88).

In their review of Workers Compensation claims database for West Virginia, Islam et al. noted a possible gender and socioeconomic status interaction in predicting risk of work-related injuries among females. Among the compensable injury or illness cases, a greater proportion of females were in the lowest wage category. When cases with diagnoses of burn, MSD, fracture, sprain, and CTS were evaluated, it was found that there was a greater proportion of females than males in the lowest wage categories (76).

Chung et al. have suggested some systemic factors influencing the low levels of support for jobs in the pink collar sector. Low workers' compensation coverage rates in small and non-standardized workplaces can have significant implications for women, who tend to be overrepresented in such workplaces. Furthermore, smaller, non-standard workplaces are generally riskier than larger, more formal organizations, and have historically received less attention in safety education and health promotion programs. Finally, women may face barriers in reporting and acceptance of claims because of many biases among workers' compensation board personnel and health care providers. Ideas about women's occupational injuries and illnesses, particularly those that are not related to a single trauma or event, may influence the acceptance and adjudication process for women's claims (80). Similarly, Cole et al. point out that although jobs often performed by women have been characterized as involving a high risk of work related RSI, recognition of workers compensation claims has been proportionally higher for men in some areas (93).

Silverstein et al. investigated whether adjustment for gender[10] would mask important exposure differences between men and women in a study of rotator cuff syndrome (RCS) and CTS and occupational exposures. High decision latitude and high social support were associated with non-symptoms and non-RCS status among men but not among women. This result is contrary to expectations, in that higher levels of support are usually expected to lead to lower injury rates. Another contradiction to other studies was that more women reported high social support and decision latitude than men. Silverstein suggests that this might have increased the likelihood of women to report symptoms (86).

Effects of Domestic Work

In her 2004 overview of physical exposures in occupations dominated by women, Karen Messing points out that the interaction between work and the domestic responsibilities creates gendered physical demands on women which must be taken into account in studies of women's occupational health (51). A high proportion of the women in a Lebanese study, for example, reported suffering from musculoskeletal symptoms. The authors concluded that psychosocial factors, such as homemaking stress, number of children, and self-rated health affected the severity of musculoskeletal symptoms. Also, physical factors, such as repetitive work, long work hours and working in awkward postures influenced the musculoskeletal symptoms (94).

[10] See footnote 9.

A Swedish study examined the relationships between physical and psychosocial work exposures, engagement in domestic work, and work-home imbalance in relation to symptoms of MSD and emotional exhaustion in women and men. It was found that when domestic and childcare hours per week were added to weekly employment hours, women had a higher total work index than men. Contrary to expectations, no direct association was found between high levels of domestic work and MSD or emotional exhaustion. However, there was a significant association between the combination of high levels of domestic work with low levels of support at employed work and MSD or emotional exhaustion. The fact that women engaged in more domestic work, and that they had more part-time work, indicating less control and support, suggests that they were more at risk for MSD (74).

Non-Traditional Work and Women's Injuries: A Look at Injuries to Farming Women

Sex and gender shape the distinct injury risk profiles for women in non-traditional work. Women differ in biology and physiology, work patterns and exposures, psychosocial contexts, leisure and unpaid work interactions, and whether their workplace safety needs are recognized and acted upon.

Women's distinct and changing roles complicate the assessment of risk on farms, and render their injuries invisible.

Although the research is scant, examples of sex differences in occupational health and injury risks have become apparent in some areas of work that are still uncommon for women. One early study was an analysis of 139 deaths to U.S. female construction workers in the 1980s (95) which showed that female workers in transportation and material moving had 59% higher mortality rates from motor vehicles than male construction workers in the same occupation and 85% higher rates from machinery related causes of death. Females in flagger roles were found to have particularly high fatality rates. Females in the U.S. armed forces were found to experience combat risks differently from males. For example, women showed a stronger association between injury and post-traumatic stress disorder, and suffered more military sexual trauma (96). In another study, safety complaints made by female teens in a variety of jobs were ignored by superiors; the young women reported having to stifle feelings about job risks (97). In interviews with women who work in mining-related occupations in northern Canada, study participants shared that they did not always feel that they could act upon their concerns about safety risks and some women described their efforts to hide their injuries, rather than be scorned by male colleagues (98).

As in other so called non-traditional occupations, limited knowledge and awareness hampers the prevention of workplace injuries for farming women. Injury prevention in agriculture has generally been directed to mid-to-older aged males, who are most often the primary farm operator and whose exposure levels to injury

risks are high. Farm children whose living and play spaces intersect with hazardous work environments are often a second priority population. However women's often indistinct and changing roles, support to their male partners, and wide ranging tasks complicate the assessment of risk and render women's experience of injury invisible. Yet as women's numbers in farming grow and their roles diversify, it becomes increasingly important to understand injury exposures in the work they do. This section characterizes Canadian women who farm, the evidence of women's rates and risks of injury, and several themes regarding areas of concern for women raised in the research literature.

Women who Farm and Farm Injuries in Canada

Despite the pervasive archetype of the male farmer, women account for 26% of Canadian farm operators; that is, 91,180 of 346,195 farm operators recorded by the Census of Agriculture in 2001 were female. Nearly one half of women who farm are in Ontario or Alberta, and more than 10,000 live and work on farms in each of the provinces of Saskatchewan, Quebec and BC (99). Marcum et al. have observed that in the U.S., women and ethnic, racial or linguistic minority groups are increasing among farmers, but research remains limited on these populations (100). In Canada, the average age of farmers is increasing, and at a higher rate than in the overall Canadian population (101). Among female farmers, approximately 30% are over age 55 and a somewhat higher proportions of females than males fall within the more active age range of 35 to 54.

According to the Canadian Census of Agriculture, female farmers are more likely than males to work on farms with lower incomes (55% versus 49% with gross receipts < $50,000), and female sole operators tend to be further disadvantaged (79% versus 55% with gross receipts < $50,000). As with males, female farmers are most likely to participate in cattle (36%) and oilseed or grain farming (20%), but in comparison with men, a smaller proportion of farming women work in any crop production (32% versus 40%). Conversely, a larger proportion of females work on 'other animal' operations (other than cattle, hog, poultry, or sheep) (15% versus 8%), as well as in greenhouses, on fruit and tree nut farms, and sheep farms (99).

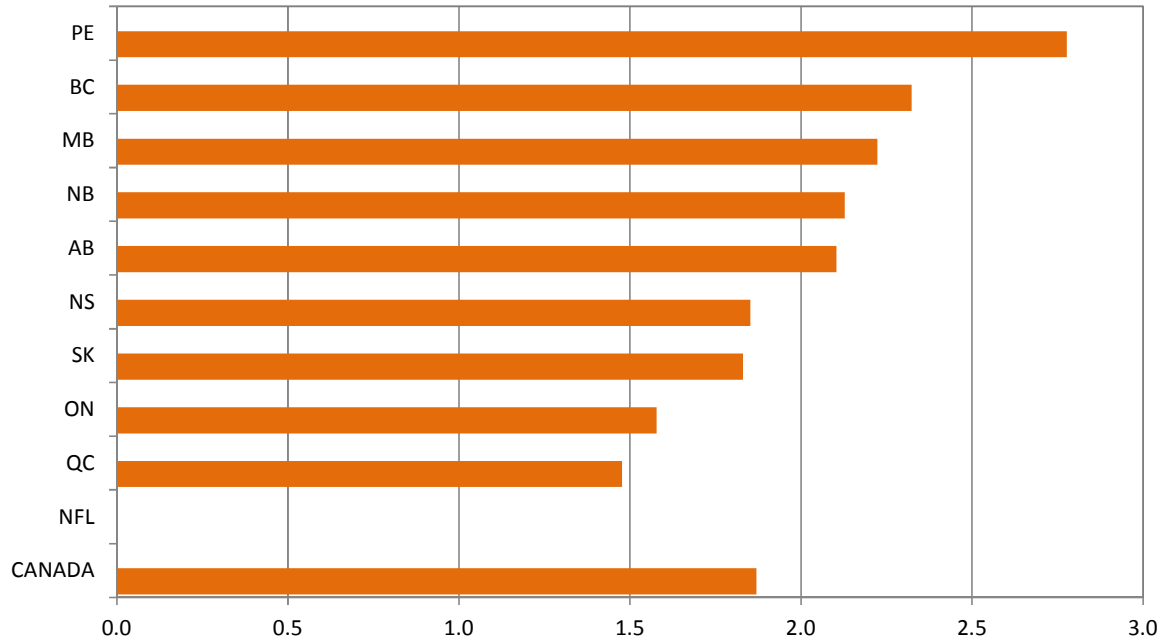
The literature specific to females is relatively limited as males' greater risks of farm injury are commonly described in the literature (100,102-104). Data on farm injuries is also somewhat scarce relative to other industries because farm workers are not collectively covered by occupational health and safety or workers compensation legislation (105). Characterizing Canadian farm women's risks of injury is further complicated because although sex-disaggregated farm injury data are more commonly gathered and published than in the past, challenges persist and, in at least one area, accessibility has actually decreased: the Canadian Census of Agriculture had supported sex-disaggregated injury data in 2001, but the more recent 2006 census does not permit linkage of responses to the injury question with the sex of the respondent. Furthermore, analyses presented in grey and research literature often extend only to the point of confirming a higher rate of fatal or non-fatal farm work injuries among males than females. Where male sex is interpreted as a risk factor for farm injury, the evidence on farming women tends not to be described. It may be important to consider as well that the census only poses the question about injury to farm operators responsible for making decisions regarding daily operations, including up to three operators per farm (101). It is not clear how this might lead to under-estimates of women's farm injuries, if they are not counted as the primary decision-makers.

Farming Can Be Dangerous: Farming is among the most hazardous work in Canada, but much of the evidence available is gender blind. Annual farm fatalities for 1991-1995 ranged from14.6 to 25.6 deaths per 100,000, placing farming as the fourth most dangerous sector in Canada (103). Annual non-fatal injury rates (calculated in 2001) have been estimated at 3.5 per 100 persons among Canadian farm operators (101). An analysis of Canadian Census of Agriculture data found farms that specialized in horses, forestry products and cattle production accounted for the largest percentages of injury cases (103). Major sources of injury in these operations are consistently reported as machinery use (44%), livestock or large animal handling (28.4%), and falls from heights (24.4%)(104, 122). Working with horses has been found to cause the most injuries within a given period of time worked (113). Machinery in general and tractors specifically are large contributors to the most serious injuries, accounting for 25% and 20% of agricultural fatalities, respectively, in some farm populations (110, 121). Yet a significant trend of decreasing fatalities from machine roll-overs for the 1990 to 2005 period has been documented in Canadian surveillance data (110).

Numerous individual-level risk factors have also been described in the farm injury literature, including insufficient sleep, use of medications that affect alertness, and stress (100); hours worked per week (101); and farmers' age (100, 101, 121).

Carruth et al. describe a body of research that has estimated women's injuries to represent anywhere from 11% to 45% of all farm related injuries (106). Maltais' analysis of Canadian Census of Agriculture data found an annual rate of injury of 1.89 per 100 females compared to 4.04% for males (101). Women who were sole operators had an intermediate rate of injury of 3.01% (99). As well, several provinces (PEI, BC, Manitoba, New Brunswick, and Alberta) show substantially higher than average rates of injury to female operators (see Figure 12). Sex-specific influences of aging on farm injuries have generally received little attention. In a review of literature, McCoy et al. describe the average age of injured farm women to range between the 30s and late 40s, although older women (55+) predominated among fatalities (107).

Figure 12. Rate of Injury Among Female Farm Operators, Canada 2001



	CANADA	NFL	QC	ON	SK	NS	AB	NB	MB	BC	PE
Number	1705	0	180	360	270	20	455	15	145	255	10
Rate	1.87	0.00	1.48	1.58	1.83	1.85	2.10	2.13	2.22	2.32	2.78

Rate of injury per 100 female farm operators

SOURCE: Census of Agriculture, 2001.

A rare, focused examination of women's farm injuries, including common injury types, causes and risk factors is found in a study of Southern U.S. female farmers working primarily in beef and other livestock operations (106). In this population, work-related injuries to women were more likely to affect their lower than upper extremities, which agreed with earlier work by Stueland et al., who found 43% lower body and 18% upper body injury among women (cited in Carruth et al. (106)). Typically, causal agents for women's injuries were contact with a foreign object or substance, falls, and overdoing/lifting/ hauling (overexertion). Risk for injury was elevated for women who worked with large animals (nearly 8-fold greater risk), worked five or more days per week (3-fold), reported persistent back pain or weakness (2-4 fold), and who drove tractor or hauled goods to market (3-fold or more). However, working off-farm was not associated with a greater risk of injury, nor was performing supervisory work. The study concluded that an expanding role for women in agriculture is accompanied by risks for injury that increasingly resemble those for male farmers (106).

Some research has found that when farming women work as many hours as men, their risk of farm-related injury meets or even exceeds that for men for certain farm tasks (104). For example, a study of a Colorado farming population found that when hours of exposure to farm work were controlled for, females and males

had equal risks of farm-related injuries for common exposures, including handling animals and materials and transportation, and that females had much higher risks (rate ratio 8.18) of injury when performing several chores grouped as 'other' farm tasks, such as administrative work and weeding (108). Citing a case-control study by Nordstrom et al., McCurdy and colleagues noted that a two-fold greater risk of injury due to falls for male farmers was eliminated when the rate of injury for women and men was adjusted for hours worked (104). Maltais called for more research that differentiates injury outcomes for women and men according to level of exposure and to specific farm tasks (101).

Women are not as frequently injured by machinery and tractors as are males, one report citing an annual incidence of 2.5 injuries per 1000 females compared to 16.2 injuries per 1000 males, (109), another describing much lower odds of fatality or hospitalization from tractor roll-overs (OR, 11.8:1) (110). However, some research suggests that whole body vibrations for those who ride tractors for long periods may have more serious effects on women than on men (107).

The research literature has shown that livestock tasks are key contributors to women and girl's farming injuries. Females have traditionally tended animals, and their involvement in livestock productions is still high; some research has suggested this work has more injurious effects for women. For example, an American longitudinal study found females were at higher risk of injury when performing animal-related tasks (EOR = 3.00), as well as crop-related tasks (EOR = 2.21) (106). Dairy operations are also associated with heightened injury risk, particularly during times of greater contact with animals, such as during milking and feeding, tasks commonly performed by women. Literature reviewed by McCoy et al. described physiological factors predisposing women to injuries in dairying, including forearm RSIs common in milking. Women's physical proportions, shorter average stature, and lesser upper and lower body strength relative to males were understood to increase women's susceptibility for excessive strain and overexertion injuries in performing manual tasks common to dairy farming (107). Marcum et al. found that for older farm women, the odds of being injured while performing animal- and crop-related tasks increased by factors of 3.01 and 2.20, respectively, compared to women who did not perform these tasks (100).

Handling horses is an area of serious concern for injuries to women and girls (111). Hendricks and Hendricks (112) observed that among all farm injuries to female youth in the U.S. (21,503, from 2001 to 2006), the largest proportion (35%) involved horses, whereas male youths' injuries more likely involved an ATV or tractor. Similarly, Pickett et al. found that girls aged 10 through 19 had among the three highest rates of hospitalization for head injuries on Canadian farms. Nearly 70% of these injuries resulted from incidents with large animals, virtually all involving horses (113).

The Influence of Gender Roles and Perceptions

Women's farm injury risks can best be understood in relation to their predominant roles and tasks, as well as their changing relationship to farming. Traditionally, and still among some Canadian farm populations,

women have largely played supportive, though integral roles in family-run farm operations. Several studies have described the most common tasks for farming women as: vegetable gardening, care of livestock, milking, errands, assisting in the harvest, and bookkeeping. As well, there are growing numbers of women who serve as sole owner-operators, and those who undertake managing, marketing tasks, maintenance of computer records, purchasing, and planning as part of their work (107). Women's roles on the farm have changed to include tasks traditionally performed by men, including manual work and operation of machinery. Social, demographic and economic trends, including aging farm populations, smaller families and economic pressures on family farms have drawn more heavily upon the labour of women and seen more daughters entering the family farm business (107).

Canadian farm women are less likely than men to work long hours at farm work; 30.7% of women versus 53.8% of men work over 40 hours per week. However, many female farm operators (46%) also work at off-farm jobs, the largest proportion of whom (23%) work 20-40 hours per week. Women are less likely than men (10% versus 20%) to work long hours off the farm (99)Women's roles are further split by the added time they put toward the care of children and domestic tasks. As described by McCoy, a 1997 survey of a random sample (N=964) of farm women drawn from the Farm Journal publication database found that the majority of women still filled traditional roles, most often (41%) self-identifying as "assistants" to their husbands or as "silent partners" in the farm operation. On average, women spent most of their time on household chores (35 hours per week), and nearly equal portions of time in off and on-farm work (21 and 22 hours per week, respectively) (107). In light of Maltais' findings concerning the protective effects that greater time and experience in farm work have on injury (see text box page 289), women's shorter average duration of farm work may contribute to their injury risks.

Gallagher and Delworth coined the term "third shift" in 1993 to describe the complexity of many farm women's roles and the associated stress, which has been identified as a contributing factor in their experience of depression (114). More recent studies, like that of Thurston et al. (115), have lent support to role overload being an important and distinct determinant of stress for farm women, and one which requires attention to upstream contextual factors (115). Moreover, Xiang et al. reported an association between depression and increased risk for injury among female farmers in Colorado (116). Thurston et al. (105) have advocated for greater consideration of emotional, as well as family needs as part of occupational health and safety initiatives for farming women, reflecting Southern Albertan women's stated priorities. Interviews with these women found that emotional problems and stress were commonly identified among women's top three health problems in the previous two years, along with muscle or joint injury and breathing problems, and accounted for about one-quarter of the problems reported. Women showed significantly greater concern for accidents or injury, stress-related problems and back problems for their family members, compared with men.

According to Carruth and colleagues, a lack of acknowledgement of women in the farming workforce has led to a dearth of information about women's injury risk exposures and safety interventions targeted to women

(106,117). Similarly, Thurston et al., contend that occupational health and safety programming may be failing to engage farm women because of gendered role ascription. Their interviews with farmers in Southern Alberta showed that males most often identify as the primary farmer within couples, despite many women seeing themselves as equal partners in the family farm operation (105).

Injury risks to farming women may also be difficult to clearly discern because of how women themselves characterize their work. A study by Reed (118) showed that self-ascription by women of their farming roles may not accurately describe the range of tasks they actually perform, and thus the extent of their injury exposures. In this Kentucky-Texas study population, women commonly self-identified as homemakers on the farm, despite their regular participation in many farm tasks, such as field irrigation, farm equipment operation, and livestock work. Women's perception of their role may influence whether or not they see themselves as being at risk of injury, which in turn can limit women's participation in occupational health prevention efforts (107).

Injury risks to farming women may be difficult to clearly discern because of how women themselves characterize their work.

In a study of psychological factors underlying the risk for injuries among young participants in an agricultural training program, Westaby and Lee found that safety consciousness and dangerous risk taking strongly predicted injury in the population, though safety knowledge did not (119). They found gender-based differences, with females being more safety conscious and having less dangerous risk-taking attitudes than males.[11] Although the common belief is that women are more concerned about farm safety than are men, results have not been consistent. At least one study, by Cole and colleagues, has found no gender difference in tractor safety perceptions and behaviour (107). In their study of farm women's knowledge and beliefs about injuries McCoy et al. noted challenges in assessing women's valuing of safety because of measurement differences in the literature (107).

Farm culture differs from one population to the next and tasks considered appropriate work for women and men or boys and girls varies, often by socioeconomic status, education level, ethnicity, cultural traditions, region, and even by family (107). However, it appears clear that values regarding gender shape exposure to various tasks and working conditions, and thus to injury. Parents' differential assignment of farm children to different tasks has been raised to explain males' greater exposure to risks for farm work injury. Literature described by Crouchman noted that the three most common tasks performed by farming youth are animal care, crop management and tractor operation and that girls are more likely to be assigned to animal care and boys to tractors (120).

[11] Several other antecedents, including self-esteem, participation in safety activities, and time spent working, were also strongly related to safety cognition, but these were not investigated separately for girls and boys (119).

Changes in farm culture may be contributing to divergent trends among males and females. An analysis of the US Childhood Agricultural Injury Surveys found a declining number and rate of on-farm injuries to youth (under age 20) from 1998 to 2006. However, when analyzed separately by sex, females' rates initially declined, then returned to 1998 levels. Detailed comparison of sex-specific trends in work and non-work related injury indicated that females' rates may have increased in all but the non-work category for females under age 16 years, though none of the results for females were statistically significant. The authors speculated that these observations could be explained by changes in farm task assignment by parents from traditional gender norms which placed boys at more risk, toward more assignment according to developmental ability, as is recommended by safety guidelines. This would be consistent with improvements made in boys' injuries, as well as non-work injuries for younger girls, while older female cohorts may have greater risk for injury than in the past (112).

Are Women Adequately Prepared for Safe Farm Work?

Although females may generally be cautious and concerned about safety, attitudes may not make up for shortfalls in their knowledge, training, or the protection with which they are provided, particularly if preparations for females have not kept pace with changes in their roles and tasks. In one study very few females identified tractor operation as hazardous; most reported knowing very little or nothing about tractors, although they did operate them (117). McCoy and colleagues suggested that farm women do not have the same access to the transfer of knowledge in the farming culture as do men. Parents' views of which farm tasks are appropriate for girls and the lesser likelihood that daughters will take over the farm business may limit the safety information provided to girls and their opportunities for hands-on learning about safety in farm work (107).

Citing the Industrial Accident Prevention Association, among other work, Reed et al. (118) raised the concern that little has been done to ensure that personal protective equipment (PPE) is accessible and appropriately designed for female workers in many industries. Based on their survey of Southern US youth in an agricultural program, the authors found that, with the exception of seatbelts on tractors, girls were less likely to use PPE than were boys. The author concluded that girls may have less exposure to the need for PPE, less access to the devices, or access could be influenced by a lack of proper fit or comfortable wear for females (118). Similarly, in a study of boys and girls (aged 12-18) working on Saskatchewan farms there were gender differences in adherence to occupational health and safety practices. Although girls were as likely as boys to perform task that were hazardous for their age and level of experience, they were not as likely to be required to use PPE. The study's findings suggested that girls may receive less training for machinery use or animal care, and less supervision of their work, although here associations did not achieve statistical significance. The findings suggest that non-machinery tasks, more often performed by girls, may be perceived by farmers as not requiring PPE. The authors suggested there may be additional cultural biases that differentiate and disadvantage females in farm settings (120).

Summary

Although women suffer fewer farm-related injuries than men overall, there are some areas of concern for women. Cattle farming, dairying, and horse handling are important influences on women's risks of injury. The multiplicity of women's roles is a distinct contributor to stress, which is recognized to play an important role in not only mental health, but also injury. Furthermore, the part time and intermittent pattern of farm work that women more commonly do may not afford them the protection from injury hazards that have been associated with full time farm work. Some physical characteristics of women influence their risk of injury, particularly in farm work environments that may be oriented to the average male. Different body proportions, smaller average stature and less strength place women at a greater risk of strains and overexertion injuries in manual farm work.

A lack of clarity persists concerning women's farm injury risks, and research that focuses on women has been limited. Reported rates of farm injuries among women in Canada and North America vary quite widely, and may reflect not only types of commodities farmed and their associated injury risks, but also differences in women's farm roles in various types of operations and populations. The nature of girls' and women's farm work is changing, and with it their rates of injury appear also to be changing. Although the research literature is inconsistent, there is some indication that women who devote the same time to several common farm tasks are at similar risk of injury as men, and at greater risk for some tasks. However, more sex-specific research on particular farm tasks is needed. There is speculation that increases in farm injuries to female youth in some study populations may reflect more female teens being called upon to perform hazardous tasks that younger boys had been assigned in the past—as farm parents respond to child safety programs that discourage task assignment by gender.

While socioeconomic pressures on farms are drawing more women into farm work and traditional roles are increasingly giving way, women's perceived roles and relationship to farming may not be keeping pace with change. Gendered expectations about the roles of females typically underestimate the degree of women's involvement and the hazardous activities women perform. Such perceptions, held also by women themselves, work against their being adequately trained and protected from farm injury hazards. Women and girls have been shown to require greater support for their education in care and operation of large farm equipment. As well, there is a need to fully recognize hazards in all the tasks that females typically perform. Without adequate information on women's risk profiles specific to various tasks, it appears that a lack of awareness and attention in itself may contribute to women's risks.

Conclusions

The *Integrated Pan-Canadian Healthy Living Strategy* of 2005 noted the importance of injury prevention as a priority for future consideration. As we have described in this chapter, women's injuries are a serious concern for public health and for women themselves. However, the evidence available about women's injuries is uneven.

Self-reported data are generally about the most severe recent injury or about injuries that have caused subsequent limitations to mobility, and together they do not provide a complete picture of the extent of women's injuries nor their long-term consequences. Research into older women's falls reveals that there are complex reasons why women fall and that the sequelae are also complex. Many studies about older people and falls, however, mask the particular concerns for women, again leading to an incomplete picture. Administrative data from Workers' Compensation Boards provide important information about women's occupational injuries, but these too may be incomplete as women are more likely to be in precarious, low-paying positions that are not compensable. At the same time, many positions in which women predominate, in the health care and pink collar sectors, have particular risks for injury to women's backs and extremities.

The focus of injury preventions and research on injuries tend to be on acute physical trauma. Women's more traditional work however is associated with injuries that develop over the long term and are difficult to attribute to work. Women's other vulnerabilities must also be considered –sensitivities to chemically toxic environments, mental health relative to harassment and environments hostile to women. In many ways, we still need to address the invisibility of women in considerations of occupational injury.

Critically, as in other factors of women's healthy living, we need to avoid excessive focus on individual and behavioural risks for injury. The evidence presented in this chapter highlights the need to create structural policies and change that attend to the safety of physical environments and vulnerabilities that place women at risk of injury.

References

(1) Butler-Jones D. The Chief Public Health Officer's report on the state of public health in Canada. Influencing health – the importance of sex and gender. Ottawa: Public Health Agency of Canada; 2012.

(2) Public Health Agency of Canada. Facts on injury [Internet]. Ottawa: Public Health Agency of Canada; 2006 [cited 23 Jan 2013]. Available from: http://www.phac-aspc.gc.ca/injury-bles/facts-eng.php

(3) Billette J, Janz J. Injuries in Canada: insights from the Canadian Community Health Survey. Health at a glance (June 2011) Catalogue no. 82-624-X:1-16. Ottawa: Statistics Canada; 2011

(4) Statistics Canada. 2009/2010. Canadian Community Health Survey (CCHS) (master file). Statistics Canada (producer). Using remote access program of Health Division, Statistics Canada (distributor). Ottawa: Statistics Canada; 2010 [cited 28 Mar 2012].

(5) Ellis AA, Trent RB. Do the risks and consequences of hospitalized fall injuries among older adults in California vary by type of fall? J Gerontol A Biol Sci Med Sci 2001 Nov;56(11):M686-92.

(6) Public Health Agency of Canada. Report on seniors' falls in Canada [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 15 Nov 2012]. Available from: http://publications.gc.ca/collections/Collection/HP25-1-2005E.pdf

(7) World Health Organization. WHO global report on falls prevention in older age. Geneva: World Health Organization; 2007.

(8) Scott V, Wagar B, Sum A, Metcalfe S, Wagar L. A public health approach to fall prevention among older persons in Canada. Clin Geriatr Med 2010;26:705-18.

(9) Leslie WD, Sadatsafavi M, Lix LM, Azimaee M, Morin S, Metge CJ, et al. Secular decreases in fracture rates 1986-2006 for Manitoba, Canada: a population-based analysis. Osteoporosis Int 2011 Jul;22(7):2137-43.

(10) Mackintosh SF, Hill K, Dodd KJ, Goldie P, Culham E. Falls and injury prevention should be part of every stroke rehabilitation plan. Clin Rehabil 2005 Jun;19(4):441-51.

(11) Sleet DA, Moffett DB, Stevens J. CDC's research portfolio in older adult fall prevention: a review of progress, 1985-2005, and future research directions. J Safety Res 2008;39(3):259-67.

(12) Boyd R, Stevens J. Falls and fear of falling: burden, beliefs and behaviours. Age Ageing 2009;38(4):423-8.

(13) Steinman BA. Self-reported vision, upper/lower limb disability, and fall risk in older adults. J Appl Gerontol 2008 Aug;27(4):406-23.

(14) Nurmi I, Lüthje P. Incidence and costs of falls and fall injuries among elderly in institutional care. Scand J Prim Health Care 2002 06;20(2):118-22.

(15) Bath PA, Morgan K. Differential risk factor profiles for indoor and outdoor falls in older people living at home in Nottingham, UK. Eur J Epidemiol 1999;15:65-73.

(16) Davis J, Ross P, Nevitt M, Wasnich R. Incidence rates of falls among Japanese men and women living in Hawaii. J Clin Epidemiol 1997;50:589-94.

(17) Stevens JA, Sogolow ED. Gender differences for non-fatal unintentional fall related injuries among older adults. Inj Prev 2005 Apr;11(2):115-9.

(18) Nordell E, Jarnlo G, Thorngren K. Decrease in physical function after fall-related distal forearm fracture in elderly women. Adv Physiother 2003 Dec;5(4):146-54.

(19) Stolee P, Poss J, Cook RJ, Byrne K, Hirdes JP. Risk factors for hip fracture in older home care clients. J Gerontol A Biol Sci Med Sci 2009 Mar;64(3):403-10.

(20) Public Health Agency of Canada, Division of Aging and Seniors. Report on seniors' falls in Canada. Ottawa: Public Health Agency of Canada; 2005.

(21) Lamontagne I, Levesque B, Gingras S, Maurice P, Verreault R. [Environmental hazards for falls in elders in low income housing]. Rev Epidemiol Sante Publique 2004 Feb;52(1):19-27. French.

(22) Terra Housing Consultants. Comprehensive housing needs assessment for the District of Kitimat [Internet]. Kitimat (BC): District of Kitimat; 2012 [cited 5 Dec 2012]. Available from: http://www.kitimat.ca/assets/Municipal~Hall/PDFs/Kitimat%20Housing%20Needs%20Assesment%202012-03-23.pdf

(23) Canadian Institute for Health Information (CIHI). Analysis in brief: factors influencing health: injury hospitalizations and socioeconomic status. Ottawa: CIHI; 2010 Jun.

(24) Miller RR, Ballew SH, Shardell MD, Hicks GE, Hawkes WG, Resnick B, et al. Repeat falls and the recovery of social participation in the year post-hip fracture. Age Ageing 2009 Sep;38(5):570-5.

(25) Ellis AA, Trent RB. Hospitalized fall injuries and race in California. Inj Prev 2001 Dec;7(4):316-20.

(26) Landy DC, Mintzer MJ, Silva AK, Schulman CI. Hispanic ethnicity and unintentional injury mortality in the elderly. J Surg Res 2011 Mar;166(1):28-31.

(27) Scott V, Gallagher E, Smith D, Votova K, Brussoni M. Environmental scan: seniors and veterans falls prevention initiatives in British Columbia. Vancouver: British Columbia Injury Research and Prevention Unit; 2005 Feb.

(28) Weiler H, Leslie W, Krahn J, Wood Steinman P, Metge C. Canadian Aboriginal women have a higher prevalence of vitamin D deficiency than non-Aboriginal women despite similar dietary vitamin D intakes. J Nutr 2007 Feb;137(2):461-5.

(29) Leslie WD, Derksen S, Metge C, Lix LM, Salamon EA, Wood Steinman P, et al. Fracture risk among First Nations people: a retrospective matched cohort study. CMAJ 2004;171(8):869-73.

(30) Leslie W, Derksen S, Metge C, Lix L, Salamon E, Wood Steinman P, et al. Demographic risk factors for fracture in First Nations people. Can J Public Health 2005;96(Suppl 1):45-50.

(31) Rosenberg HR, Allard D. Evidence for caution: women and statin use [Internet]. Toronto: Women and Health Protection; 2007 [cited 28 Nov 2012]. Available from: http://www.whp-apsf.ca/pdf/statinsEvidenceCaution.pdf

(32) Duh MS, Mody SH, Lefebvre P, Woodman RC, Buteau S, Piech CT. Anaemia and the risk of injurious falls in a community-dwelling elderly population. Drugs Aging 2008;25(4):325-34.

(33) National Institutes of Health; National Heart, Lung and Blood Institute. Facts about menopausal hormone therapy [Internet]. Washington: U.S. Department of Health and Human Services; 2005 [cited 22 Jan 2013]. Available from: http://www.nhlbi.nih.gov/health/women/pht_facts.pdf

(34) Woods NF, LaCroix AZ, Gray Pharm S, Aragaki A, Cochrane BB, Brunner RL, et al. Frailty: emergence and consequences in women aged 65 and older in the Women's Health Initiative Observational Study. J Am Geriatr Soc 2005 Aug;53(8):1321-30.

(35) Whitson HE, Sanders L, Pieper CF, Gold DT, Papaioannou A, Richards JB, et al. Depressive symptomatology and fracture risk in community-dwelling older men and women. Aging Clin Exp Res 2008 Dec;20(6):585-92.

(36) Galizia G, Testa G, Mazzella F, Cacciatore F, Ungar A, Masotti G, et al. Multidisciplinary approach to "accidental" falls in the elderly: a case report. Geriatr Gerontol Int 2008 Jun;8(2):130-2.

(37) Peeters GM, de Vries OJ, Elders PJ, Pluijm SM, Bouter LM, Lips P. Prevention of falls incidents in patients with a high risk of falling: design of a randomized controlled trial with economic evaluation of the effect of multidisciplinary transmural care. BMC Geriatr 2007;2:7-15.

(38) Kuo H, Yang C, Yu Y, Tsai K, Chen C. Gender-specific association between self-reported sleep duration and falls in high-functioning older adults. J Gerontol A Biol Sci Med Sci 2010;65A(2):190-6.

(39) Avidan AY, Fries BE, James ML, Szafara KL, Wright GT, Chervin RD. Insomnia and hypnotic use, recorded in the minimum data set, as predictors of falls and hip fractures in Michigan nursing homes. J Am Geriatr Soc 2005 Jun;53(6):955-62.

(40) Stel VS, Smit JH, Pluijm SMF, Lips P. Consequences of falling in older men and women and risk factors for health service use and functional decline. Age Ageing 2004 Jan;33(1):58-65.

(41) Mechakra-Tahiri SD, Freeman EE, Haddad S, Samson E, Zunzunegui MV. The gender gap in mobility in the world: a cross-sectional study. BMC Pub Health 2012 Aug 2;12:598.

(42) Fletcher PC, Hirdes JP. Risk factors for falling among community-based seniors using home care services. J Gerontol A Biol Sci Med Sci 2002 Aug;57(8):M504-10.

(43) Horton K, Arber S. Gender and the negotiation between older people and their carers in the prevention of falls. Ageing Soc 2004 Jan;24(1):75-94.

(44) Dorresteijn T, Rixt Zijlstra G, Van Eijs Y, Vlaeyen J, Kempen G. Older people's preferences regarding programme formats for managing concerns about falls. Age Ageing 2012;41(4):474-81.

(45) Gillespie LD, Gillespie WJ, Cumming R, Lamb SE, Rowe BH. Interventions for preventing falls in the elderly. Cochrane Database Syst Rev 2003;(4):CD000340.

(46) Ness KK, Gurney JG, Wall MM, Olsen RA, Boergerhoff LA. Screening for risk of falling in community-dwelling elderly people may increase fear of falling. J Geriatr Phys Ther 2004;27(3):100-4.

(47) Berlin Hallrup L, Albertsson D, Bengtsson Tops A, Dahlberg K, Grahn B. Elderly women's experiences of living with fall risk in a fragile body: a reflective lifeworld approach. Health Soc Care Community 2009 Jul;17(4):379-87.

(48) Messing K, Mager Stellman J. Sex, gender and women's occupational health: the importance of considering mechanism. Environ Res 2006 Jun;101(2):149-62.

(49) Chawla GK, Khanna GL. Worksite health promotion programme for women. Br J Sports Med 2010;44:i77.

(50) Donner L, Isfeld H, Haworth-Brockman M, Forsey C. Occupational health. In: Donner L, Isfeld H, Haworth-Brockman M, editors. A profile of women's health in Manitoba. Winnipeg: Prarie Women's Health Centre of Excellence; 2008. p. 2/82-2/91.

(51) Messing K. Physical exposures in work commonly done by women. Can J Appl Physiol 2004 Oct;29(5):639-56.

(52) Association of Workers Compensation Boards of Canada (AWCBC). National work injury statistics program report [Custom data request]. Toronto: AWCBC; 2009 [cited 8 Dec 2011].

(53) Statistics Canada. CANSIM table 282-0002 labour force survey estimates (LFS), by sex and detailed age group, annual [Custom data file]. Ottawa: Statistics Canada; [cited 15 Dec 2011].

(54) Messing K, Östlin P. Gender equality, work and health: a review of the evidence. Geneva: World Health Organization; 2006.

(55) Workers Compensation Board of Manitoba. Manitoba workplace injury and illness statistics report for 2000-2005. Winnipeg: Workers Compensation Board of Manitoba; 2006.

(56) Statistics Canada. Women in Canada: a gender-based statistical report (5th edition). Ottawa: Statistics Canada; 2006.

(57) Premji S, Duguay P, Messing K, Lippel K. Are immigrants, ethnic and linguistic minorities over-represented in jobs with a high level of compensated risk? Results from a Montreal, Canada study using census and workers' compensation data. Am J Ind Med 2010 Sep;53(9):875-85.

(58) Alamgir H, Yu S, Drebit S, Fast C, Kidd C. Are female healthcare workers at higher risk of occupational injury? Occup Med (Lond) 2009 May;59(3):149-52.

(59) Women and Health Care Reform. Hidden health care work and women [Internet]. Toronto: Women and Health Care Reform; 2009 [cited 21 Nov 2012]. Available from: http://www.womenandhealthcarereform.ca/publications/hiddenHealthCareWork_en.pdf

(60) Alamgir H, Ngan K, Drebit S, Guiyun Li H, Keen D. Predictors and economic burden of serious workplace falls in health care. Occup Med (Lond) 2011 Jun;61(4):234-40.

(61) Yassi A, Gilbert M, Cvitkovich Y. Trends in injuries, illnesses, and policies in Canadian healthcare workplaces. Can J Public Health 2005 Sep-Oct;96(5):333-9.

(62) Cavanagh J, Brake M, Kearns D, Hong P. Work environment discomfort and injury: an ergonomic survey study of the American Society of Pediatric Otolaryngology members. Am J Otolaryngol 2012;33(4):441-6.

(63) Vieira E, Kumar S. Safety analysis of patient transfers and handling tasks. Qual Saf Health Care 2009 Oct;18(5):380-4.

(64) van Wyk PM, Andrews DM, Weir PL. Nurse perceptions of manual patient transfer training: implications for injury. Work 2010;37(4):361-73.

(65) Vieira ER, Kumar S, Coury HJ, Narayan Y. Low back problems and possible improvements in nursing jobs. J Adv Nurs 2006 Jul;55(1):79-89.

(66) Alex MR. Occupational hazards for pregnant nurses: finding a balance between service and safety. Am J Nurs 2011 Jan;111(1):28-39.

(67) Baines D. Staying with people who slap us around: gender, juggling responsibilities and violence in paid (and unpaid) care work. Gend Work Organ 2006 Mar;13(2):129-51.

(68) National Coordinating Group on Health Care Reform and Women. Women and home care: why does home care matter to women? Toronto: National Coordinating Group on Health Care Reform and Women; 2002.

(69) Alamgir H, Yu S. Epidemiology of occupational injury among cleaners in the healthcare sector. Occup Med (Lond) 2008;58:393-9.

(70) Calvet B, Riel J, Couture V, Messing K. Work organisation and gender among hospital cleaners in Quebec after the merger of 'light' and 'heavy' work classifications. Ergonomics 2012;55(2):160-72.

(71) d'Errico A, Punnett L, Cifuentes M, Boyer J, Tessler J, Gore R, et al. Hospital injury rates in relation to socioeconomic status and working conditions. Occup Environ Med 2007 May;64(5):325-33.

(72) Alamgir H, Swinkels H, Yu S, Yassi A. Occupational injury among cooks and food service workers in the healthcare sector. Am J Ind Med 2007 Jul;50(7):528-35.

(73) Wahlstrom J, Ostman C, Leijon O. The effect of flooring on musculoskeletal symptoms in the lower extremities and low back among female nursing assistants. Ergonomics 2012;55(2):248-55.

(74) Ahlgren C, Olsson EBM, Brulin C. Gender analysis of musculoskeletal disorders and emotional exhaustion: interactive effects from physical and psychosocial work exposures and engagement in domestic work. Ergonomics 2011;55(2):212-28.

(75) Hooftman WE, van der Beek AJ, Bongers PM, van Mechelen W. Is there a gender difference in the effect of work-related physical and psychosocial risk factors on musculoskeletal symptoms and related sickness absence? Scand J Work Environ Health 2009 Mar;35(2):85-95.

(76) Islam SS, Velilla AM, Doyle EJ, Ducatman AM. Gender differences in work-related injury/illness: analysis of workers compensation claims. Am J Ind Med 2001 Jan;39(1):84-91.

(77) Juul-Kristensen B, Jensen C. Self-reported workplace related ergonomic conditions as prognostic factors for musculoskeletal symptoms: the "BIT" follow up study on office workers. Occup Environ Med 2005 Mar;62(3):188-94.

(78) Palmer KT, Smedley J. Work relatedness of chronic neck pain with physical findings--a systematic review. Scand J Work Environ Health 2007 Jun;33(3):165-91.

(79) Ashbury FD. Occupational repetitive strain injuries and gender in Ontario, 1986 to 1991. J Occup Environ Med 1995 Apr;37(4):479-85.

(80) Chung J, Cole DC, Clarke J. Women, work and injury. In: Sullivan TJ, editor. Injury and the new world of work. Vancouver: University of British Columbia Press; 2000. p. 69.

(81) Cole DC, Hogg-Johnson S, Manno M, Ibrahim S, Wells RP, Ferrier SE, et al. Reducing musculoskeletal burden through ergonomic program implementation in a large newspaper. Int Arch Occup Environ Health 2006 Nov;80(2):98-108.

(82) Zeytinoglu IU, Seaton MB, Lillevik W, Moruz J. Working in the margins: women's experiences of stress and occupational health problems in part-time and casual retail jobs. Women Health 2005;41(1):87-107.

(83) Bonfiglioli R, Mattioli S, Fiorentini C, Graziosi F, Curti S, Violante FS. Relationship between repetitive work and the prevalence of carpal tunnel syndrome in part-time and full-time female supermarket cashiers: a quasi-experimental study. Int Arch Occup Environ Health 2007 Jan;80(3):248-53.

(84) Morgenstern H, Kelsh M, Krauss J, Margolis W. A cross-sectional study of hand/wrist symptoms in female grocery checkers. Am J Ind Med 1991;20(2):209-18.

(85) Blanc PD, Faucett J, Kennedy JJ, Cisternas M, Yelin E. Self-reported carpal tunnel syndrome: predictors of work disability from the National Health Interview Survey Occupational Health Supplement. Am J Ind Med 1996 Sep;30(3):362-8.

(86) Silverstein B. Gender adjustment or stratification in discerning upper extremity musculoskeletal disorder risk? Scand J Work Environ Health 2009;35(2):113-26.

(87) Allaert FA, Cazaubon M, Causse C, Lecomte Y, Urbinelli R. Venous disease and ergonomics of female employment. Int J Angiol 2005;24:265-71.

(88) Cann AP, MacEachen E, Vandervoort AA. Lay versus expert understandings of workplace risk in the food service industry: a multi-dimensional model with implications for participatory ergonomics. Work 2008;30(3):219-28.

(89) Waugh EJ, Jaglal SB, Davis AM. Computer use associated with poor long-term prognosis of conservatively managed lateral epicondylalgia. J Orthop Sports Phys Ther 2004 Dec;34(12):770-80.

(90) Tremblay F, Mireault AC, Letourneau J, Pierrat A, Bourrassa S. Tactile perception and manual dexterity in computer users. Somatosens Mot Res 2002;19(2):101-8.

(91) Descatha A, Leclerc A, Chastang JF, Roquelaure Y, Study Group on Repetitive Work. Incidence of ulnar nerve entrapment at the elbow in repetitive work. Scand J Work Environ Health 2004 Jun;30(3):234-40.

(92) Fontana L, Neel S, Claise JM, Ughetto S, Catilina P. Osteoarthritis of the thumb carpometacarpal joint in women and occupational risk factors: a case-control study. J Hand Surg Am 2007 Apr;32(4):459-65.

(93) Cole DC, Ibrahim S, Shannon HS. Predictors of work-related repetitive strain injuries in a population cohort. Am J Public Health 2005 Jul;95(7):1233-7.

(94) Habib RR, El-Zein KE, Hojeij S. Hard work at home: musculoskeletal pain among female homemakers. Ergonomics 2011;55(2):201-11.

(95) Ore T. Women in the U.S. construction industry: an analysis of fatal occupational injury experience, 1980 to 1992. Am J Ind Med 1998 Mar;33(3):256-62.

(96) Maguen S, Luxton DD, Skopp NA, Madden E. Gender differences in traumatic experiences and mental health in active duty soldiers redeployed from Iraq and Afghanistan. J Psychiatr Res 2012 Mar;46(3):311-6.

(97) Curtis Breslin F, Polzer J, MacEachen E, Morrongiello B, Shannon H. Workplace injury or "part of the job"?: towards a gendered understanding of injuries and complaints among young workers. Soc Sci Med 2007 Feb;64(4):782-93.

(98) Stout R. Injury and injury prevention: women in work related to mining. Winnipeg: Prairie Women's Health Centre of Excellence; 2012.

(99) Statistics Canada. 2001 Census of Agriculture [Internet]. Ottawa: Statistics Canada; 2003 [cited 7 Jan 2013]. Available from: http://www.statcan.gc.ca/ca-ra2001/index-eng.htm

(100) Marcum JL, Browning SR, Reed DB, Charnigo RJ. Farmwork-related injury among farmers 50 years of age and older in Kentucky and South Carolina: a cohort study, 2002-2005. J Agric Saf Health 2011 Jul;17(3):259-73.

(101) Maltais V. Risk factors associated with farm injuries in Canada, 1991-2001. Agriculture and Rural Working Paper Series. Ottawa: Statistics Canada; 2007 Apr. Catalogue no. 21-601-MIE No. 084:1-25.

(102) Goldcamp EM. Work-related non-fatal injuries to adults on farms in the U.S., 2001 and 2004. J Agric Saf Health 2010 Jan;16(1):41-51.

(103) Pickett W, Hartling L, Brison R, Guernsey J. Fatal work-related farm injuries in Canada, 1991-1995. Canadian Agricultural Injury Surveillance Program. CMAJ 1999 Jun 29;160(13):1843-8.

(104) McCurdy SA, Carroll DJ. Agricultural injury. Am J Ind Med 2000 Oct;38(4):463-80.

(105) Thurston WE, Blundell-Gosselin HJ, Vollman Robinson A. Health concerns of male and female farmers: implications for health promotion planning. Can J Rural Med 2003 Fall;8(4):239-46.

(106) Carruth AK, Skarke L, Moffett B, Prestholdt C. Women in agriculture: risk and injury experiences on family farms. J Am Med Womens Assoc 2001 Winter;56(1):15-8.

(107) McCoy CA, Carruth AK, Reed DB. Women in agriculture: risks for occupational injury within the context of gendered role. J Agric Saf Health 2002 Feb;8(1):37-50.

(108) Stallones L, Beseler C. Farm work practices and farm injuries in Colorado. Inj Prev 2003;9(3):241-4.

(109) Carlson KF, Gerberich SG, Church TR, Ryan AD, Alexander BH, Mongin SJ, et al. Tractor-related injuries: a population-based study of a five-state region in the Midwest. Am J Ind Med 2005 Mar;47(3):254-64.

(110) DeGroot J, Isaacs C, Pickett W, Brison R. Patterns of fatal machine rollovers in Canadian agriculture. Chronic Dis Inj Can 2011;31(3):97-102.

(111) Hendricks KJ, Layne LA, Goldcamp EM, Myers JR. Injuries to youth living on U.S. farms in 2001 with comparison to 1998. J Agromedicine 2005;10(4):19-26.

(112) Hendricks KJ, Hendricks SA. Changing farm injury trends by sex for youth living on US farms, 1998-2006. J Rural Health 2010 Summer;26(2):182-8.

(113) Pickett W, Dostaler S, Berg RL, Brison RJ, Linneman JG, Marlenga B. Hospitalized head injuries in agricultural settings: who are the vulnerable groups? Accid Anal Prev 2008 Nov;40(6):1943-8.

(114) Gallagher E, Delworth U. The third shift: juggling employment, family, and the farm. J Rural Community Psychol 1993;12(2):21-36.

(115) Thurston W, Blundell-Gosselin H, Rose S. Stress in male and female farmers: an ecological rather than an individual problem. Can J Rural Med 2003 Fall;8(4):247-54.

(116) Xiang H, Stallones L, Chiu Y, Epperson A. Non-fatal agricultural injuries and risk factors among Colorado female farmers. J Agromedicine 1998;5(4):21-33.

(117) Carruth AK, Skarke L, Gilmore K, Brown ER. Potential exposure to hazardous work activities: tractor usage among farmwomen. J Agromedicine 2006;11(3-4):25-34.

(118) Reed DB, Browning SR, Westneat SC, Kidd PS. Personal protective equipment use and safety behaviors among farm adolescents: gender differences and predictors of work practices. J Rural Health 2006 Fall;22(4):314-20.

(119) Westaby JD, Lee BC. Antecedents of injury among youth in agricultural settings: a longitudinal examination of safety consciousness, dangerous risk taking, and safety knowledge. J Saf Res 2003;34(3):227-40.

(120) Crouchman E, Ding K, Hagel L, Dosman J, Pickett W; Saskatchewan Farm Injury Cohort Study Team. Gender and occupational health and safety requirements among Saskatchewan farm adolescents. J Agric Saf Health 2011 Oct;17(4):343-54.

(121) Carlson KF, Gerberich SG, Church TR, Ryan AD, Alexander BH, Mongin SJ, et al. Tractor-related injuries: a population-based study of a five-state region in the Midwest. Am J Ind Med 2005 Mar;47(3):254-64.

(122) Pickett W, Day AG, Hagel L, Sun X, Day L, Marlenga B, et al. Socioeconomic status and injury in a cohort of Saskatchewan farmers. J Rural Health 2011 Summer;27(3):245-54.

Gender-based Violence and Self-Injury

Harpa Isfeld, Margaret Haworth-Brockman and Nicola Schaefer

Introduction

A glance at news headlines on any given day reminds us of the pervasiveness of gender-based violence. It is no longer officially considered socially acceptable, and there are now laws to protect women and to prosecute perpetrators in Canada. Nevertheless, women continue to be assaulted and murdered because of their sex and because of their gendered status in our communities. Cases of the Missing and Murdered Aboriginal women and family involvement in murders of women of certain cultures have not declined. Recognizing the severity of gender-based violence in terms of the injuries caused, as well as the gender inequality it reflects and creates in society, the Pan-American Health Organization explicitly includes gender-based violence in health indicator frameworks (1,2). Here at home, Appendix B of the *Integrated Pan-Canadian Healthy Living Strategy* provides a list of priorities that emerged from consultations with national Aboriginal groups; "domestic, racialized and sexualized violence must be taken into consideration" is part of that list, specified by the Native Women's Association of Canada (3, p. 32). We agree with this emphasis on such a serious issue on which the health of so many women hinges. In thinking about our health indicator framework (see page 62), gender-based violence is experienced by women in their immediate households or communities, and is thus a health determinant. But gender-based violence is also affected by and influences social, political and legal structures; how the victims and perpetrators are perceived by and dealt with by the police, for example (2).

Self-injury is also an expression of gender-based violence, as girls and women more frequently injure themselves without suicidal intent, and often in the context of feeling they have very little power in their lives. Although women who deliberately injure themselves may have mental illnesses, women have said it is a way they themselves can control the harm and pain in their lives, rather than suffering at the hands of others.

In this chapter we look at one type of gender-based violence perpetrated by others – intimate partner violence – and at self-injury in an effort to understand the scope of the issues for women, and we discuss the policy and structural changes needed to ensure that women really have opportunities for healthy lives.

Gender-based Violence – A Look at Intimate Partner Violence

Domestic violence, violence against women, family violence, senior abuse, intimate partner violence, spousal violence, sexual assault, and spousal homicide are all terms used to describe gender-based violence and each has a particular definition. Regrettably, in Canada there is no national measure of gender-based violence overall; population-based victims surveys and crime statistics provide the bulk of information.

It is typical to organize reports of violence according to the relationships of the assailant to the victim of violence, with the understanding that women tend to be assaulted by intimate partners or former partners far more often than by strangers. In victims survey data (e.g., the General Social Survey) intimate partner violence (IPV) includes sexual assaults women suffer within their intimate relationships. Data about sexual assaults in crime statistics, however, refer to violence women experience in other relationships or when there is no relationship to their assailant. IPV more specifically refers to the violent behaviour within a couple, who may be living together (4); in some studies IPV has been examined in the context of dating relationships (5).

Concepts and Measures

Early measures of gender-based violence (conflict tactic scales) (6) were critiqued because they focused on the acts of violence rather than the consequences, failed to examine motives for violence, and ignored the larger context of gender inequality (7-9). National survey data were also questioned, with reasonable scepticism that most violent couples will refuse to participate in such surveys (10).

The growing evidence base on IPV has brought greater depth of information than crime rates and media reports provide. A source of contention, however, has been reports of symmetrical rates of abuse by female and male intimate partners. Crime statistics in some jurisdictions have given the perception that women are increasingly violent, in part because the adoption of zero tolerance for violence policies by law enforcement has seen more counter-charging of women in domestic violence incidents (11). This view of a "gender-balance" of violence within intimate (mostly male-female) relationships, demonstrates that men can be assaulted by their female partners, does not take into account the pervasive sexism and lack of gender equality, called "patriarchal terrorism" by Johnson (10), that causes more severe injuries, more often to women. Women's experiences of such violence is gender-specific because they are less likely to be as physically strong as their male partners and because

Perspectives of a "gender-balance" of violence within intimate (mostly male-female) relationships do not take into account the pervasive sexism and lack of gender equality that causes more severe injuries, more often, to women.

they and their children may be economically dependent. Johnson and Ferraro proposed that researchers should use different sampling techniques to help uncover distinct types of partner assault (12).

The gendered dimensions of relationships for women who are sexual orientation and gender identity minorities, have also been considered challenging to document (13). Research by Janice Ristock, based on interviews with more than 100 lesbians who have suffered abuse and 75 case workers revealed that contrary to popular assumptions, there can be significant violence in lesbian relationships; Ristock estimated that one in four gay and lesbian couples were affected by domestic violence (14). However, limited reporting of these incidents to police, health or social service agencies constrains our ability to quantify the effects, including injuries.

Prevalence of Intimate Partner Violence and Related Injuries

Statistics Canada's General Social Survey (GSS) collects self-reported data on family violence including spousal violence, which is the closest equivalent available for national level data on IPV. In a review of data collected in the 2009 General Social Survey, Shannon Brennan at the Canadian Centre for Justice Statistics reported that 6.4% of Canadian women with a current or former spouse reported being physically or sexually victimized by their spouse in the preceding five years. These rates had remained stable over the preceding 5 years and were not significantly different from the rate of spousal violence reported by men (6.0%). As in previous GSS cycles however, females in Canada reported experiencing more serious forms of spousal violence than males. According to Brennan, "For example, in 2009, females who reported spousal violence were about three times more likely than males (34% versus 10%) to report that they had been sexually assaulted, beaten, choked or threatened with a gun or a knife by their partner or ex-partner in the previous 5 years" (15).

Intimate partner violence poses great risks for women's health. Hamberger noted in her literature review that many women suffer injuries severe enough that they seek medical attention (4). In a summary of the results from the 2004 GSS, AuCoin found that most injuries women reported from spousal abuse were bruises and cuts (96%

Definition of Spousal Violence in the General Social Survey

Statistics Canada defines spousal violence as physical or sexual violence between respondents who are married or living in a common-law relationship at the time of the survey, or had contact with their ex-partner within the preceding five years.

A series of 10 questions measure physical and sexual violence as defined by the Criminal Code, that could be acted upon by police, including acts such as being threatened with violence, being pushed, grabbed, shoved, slapped, kicked, bit, hit, beaten, choked, threatened with a gun or knife or forced into sexual activity.

Respondents are also asked about emotional and financial abuse that they had experienced at the hands of a current or ex-partner within the previous five years. Incidents of emotional and financial abuse are not used to calculate the overall proportion of spousal violence victims. Information about these other forms of abuse is used to create a better understanding of the context in which physical or sexual violence may occur. (15)

and 35%, respectively), followed by "other" injuries (e.g. chipped tooth, dislocation) (9%), miscarriage (8%) and fractures (7%) (16).[1] A recent Canadian study reported that 31.6% of the women who sought care at fracture clinics had experienced some form of IPV in the previous year (17). Data from the National Violence Against Women Survey (NVAWS), the largest national study of partner violence in the U.S., show that women victimized by male partners are twice as likely to be injured as men victimized by female partners (Tjaden & Thoennes, 2000 in Anderson (18)). Amar and Gennaro surveyed American female college students and found that many of the women reporting IPV also reported injury. One fifth of these women reported injuries that were serious, but fewer than half of the injured IPV victims received medical attention (19). Similarly an American study found that 3.1% of all female emergency department patients and 11.3% of those presenting with an injury were recent victims of IPV. These rates are consistent with those reported in the literature at that time (20), but given that there is no universal health care in the U.S., it is reasonable to ask how this proportion relates to the numbers of all women who were abused and how great is under-reporting of IPV.

The 2011 review of data from the GSS found that younger women (25 to 34 years old) were more likely than women in other age groups to be victims of spousal abuse. Across the provinces, self-reported rates of spousal violence were similar, although significantly fewer women in Newfoundland and Labrador reported they had been abused by their spouse in the preceding 5 years. Data are not provided for the three territories (15). A 2008 report from the Public Health Agency of Canada suggests that Aboriginal women are more likely to be assaulted during IPV, based on reports from emergency responders. Certainly women who participated in focus groups for the study reported extensive physical and emotional IPV (21). According to the First Nations Regional Health Survey, 3.7% of respondents (males and females together) reported injuries from domestic or family violence (22).

Head and neck musculoskeletal injuries and contusions have been established as the most common types of injuries associated with IPV (20,23,24). Sheridan and Nash's 2007 literature review support these results, while adding that the face and upper extremities are also common sites of injury. The authors point out that accidental injuries are more often to the extremities, whereas intentional injuries tend to be situated nearer the torso (25).

Closely linked with injury type are the mechanisms of injury. A review of clinical studies of IPV by Sheridan and Nash concluded that being hit by a fist is the most commonly reported mechanism of injury in IPV. The second most common is being struck by an inanimate object used as a weapon, which is much more common in IPV than injury from actual weapons, such as guns and knives. The studies reviewed often showed that more than half of IPV victims reporting to emergency departments are strangled. However, the authors note that it is also very common for IPV victims to be injured by a number of different means (25).

[1] Women also reported that they had experienced some form of emotional or financial abuse in their current or previous relationship, within the preceding 5 years.

Gendered Dimensions of Intimate Partner Violence

As noted, there is evidence that women are as likely as men to use violence against an intimate partner. A Canadian study by Ansara et al. found no gender differences in reports of emotional or financial abuse, or physical IPV among over 15,000 respondents to the 2004 General Social Survey (GSS) (26). However, there is much more to the story of women's experiences of violence than what this might imply. For example, Ansara et al. went on to describe that women were more likely than men to report sexual violence, and that women experienced a disproportionate amount of the most severe and chronic forms of physical abuse (26). Romans et al. drew similar conclusions from the 1999 GSS, adding that women reported more types of violence from their partners (27).

Gender shapes the experience of both perpetrators and victims in violent interactions. Cercone et al. explored the gendered complexities of IPV in dating relationships in a university student population (5). They found that males and females were equally likely to report they had been "expressively" or emotionally violent; that is, they became angry to the point of uttering threats and speaking abusively. Males were more likely to report they had used "instrumental" violence where they had physically assaulted their partner in some way, with the intention of controlling their victim or surroundings. According to the authors, this demonstrated that females tended to use violence to express their immediate emotions, but not necessarily to control their partner's behaviour. In addition, females reported higher levels of fear in response to all potential aggressive and violent behaviours by a partner than males did (5), suggesting a greater subjective impact of IPV on the women in their study.

A review of literature on IPV by Hamberger found the gendered pattern of victimization was decidedly asymmetrical (4). For example, when researchers investigated not only participation in violence but initiation as well, it became clear that males more frequently initiated violent interactions. Furthermore, over the course of a violent relationship, men more often escalated the severity and frequency of violence and committed more violent assaults. Hamberger concluded that within clinical samples, men are more violent as a group than women and more likely to control the dynamics of violence in the relationship (4). The author points out that a better understanding of gender dynamics in IPV is essential to developing sensitive and effective strategies for the prevention of violence and consequent harms.

Women's greater vulnerability in IPV has been explained by men's larger size and greater strength. However, Anderson adds that men's size advantage is a structural component of heterosexual relationships because social norms influence pairings between women who are smaller than their male partners (18).

Risk Factors for IPV and Injury

Several risk factors for IPV have been identified in the literature. "Bad habits" such as drinking, drug abuse or gambling, have been identified as risk factors for perpetrating IPV (28). On the other hand, low levels of education or income (27-30) and young age (29,31) are also associated with increased risk for IPV

victimization. Neither race nor ethnicity has been identified as independent risk factors for IPV, which indiscriminately affects all populations (31).

Two other strong predictors of IPV victimization are poor self-rated health (27,31) and poor mental health. Self-reported mental health concerns were found to be the strongest predictor of abuse in one study of over three thousand female victims of IPV (31). IPV may also have negative mental health outcomes. All IPV victims in Amar and Gennaro's study of female college students had poorer mental health symptom scores than non-victims, and many qualified for psychiatric evaluation, although none was pursuing it. These authors concluded that a history of abuse puts a woman's future mental health at significant risk (19).

Having young children in the home was associated with higher IPV risk for women responding to the 1999 General Social Survey (27). Similarly, having stepchildren in the home has been identified as one of the most significant predictors for homicide in abusive relationships (30). Crandall et al. point out that most of the intentionally injured women in their study were in their reproductive years, meaning that concerns for the safety of both mothers and fetuses become important. The involvement of children introduces further risk of a cycle of family abuse since witnessing IPV as a child is a known risk factor for becoming an IPV perpetrator or victim in later life (24).

Even women who have capacity and support to leave abusive relationships may be constrained by social contexts and unable to effect change in the structural factors that perpetuate their victimization, including gender-based inequalities.

In a review of literature, Logan and Walker found that separation from an abusive partner was a significant risk factor for lethal violence and injury (32). Furthermore, there are other, often overlooked risks that women must face when they separate from their violent partners. They are at high risk for stress, mental health and health problems, have increased conflict over children and concern for child safety, and have economic, structural, psychological, and social barriers to help-seeking (32). Separation has been identified as a risk factor for future IPV, injury and homicide in other studies (27,29-31). This finding is important, in that it should be considered among the reasons why a woman might stay with a violent partner, and counters the assumption that all a woman must do to end the violence is to leave her relationship. Even women who have capacity and support to leave abusive relationships may be constrained by social contexts and unable to effect change in the structural factors that perpetuate their victimization, including gender-based inequalities. Bhandari et al. found that half of the abused women in their study had a history of abusive relationships (23), indicating that women who experience one abusive relationship are likely to have another (19,23).

Bhandari et al. conducted in-depth interviews with women who were referred to the Minnesota Domestic Abuse program, and identified several main predictors of increasing physical abuse frequency: young age, short relationship length, emotional abuse, psychological abuse, sexual abuse, drug dependency, and alcohol dependency (23). Similarly, Campbell et al. investigated risk factors for femicide, or the homicide of women in abusive relationships. They found that the abuser's access to a gun was the strongest single predictor of femicide in the study (30).[2] Another risk factor for increasing abuse identified by Walton-Moss et al. is a history of threatened or actual pet abuse, considered important because it has been observed in other studies that concern for the welfare of a pet may delay a woman in seeking shelter or IPV services, despite increasing violence in her relationship (31).

A common finding is that continued abuse leads to higher risk of injury for women (19,29,33). For example, in their investigation of risk factors for future injury in female victims of IPV, Crandall et al. found two characteristics of the relationship that were associated with injury within the nine month follow-up period: physical abuse in the previous year, and; physical abuse on the index incident date – the first date of injury clinically recorded (24).

Activity limitations or limited mobility have also been investigated as a risk factor for IPV and resulting injury. In two studies based on GSS data, respondents with limited mobility were found to be more likely to report IPV and women with activity limitation were more likely to report more severe and recurring violence – emotional and/or financial abuse, severe physical abuse, sexual abuse, and more types of injury – than those without such limitations.[3] Women with activity limitations were more likely to be IPV victims if they were younger, had children younger than 15 living at home, had less education, were divorced separated or single, and had lower incomes and poorer health than women without activity imitations (34,35). Thus it is evident that gender inequalities intersect with disadvantages of physical mobility for some women, compounding their vulnerability.

In a longitudinal study of factors influencing changes in IPV, Salari and Baldwin found that injurious violence was more likely in couples with a greater income contribution by the woman (36). The authors suggest that the men in these relationships resort to violence because they are compensating for their lack of other resources to display dominant masculinity. Conversely, Crandall et al. found that women were more likely to be abused if they did not contribute to household income as much as their partners (24). These contradictions likely point more to a pervasive condition of women's inequality in some relationships, than to the issue of income and empowerment *per se*.

[2] We note that this study was done in the U.S., where access to guns in households is more common than in Canada. The study does describe, however, important information about how violence can escalate in relationships.

[3] It is noteworthy that males with activity limitations were also more likely to be abused than their male counterparts who did not report activity limitations.

Prevention Strategies

Strategies aimed at preventing injury from IPV (if not preventing IPV itself) commonly focus on improving the ability of front-line healthcare and social services providers to intervene to support victims of abuse. Snider et al. recommended that women's choices and stage of readiness for leaving abusive relationships must be respected by those who lend support. At the same time, research has indicated that abused women tend to underestimate their risk of harm. For the authors, this underscores the importance of having assessment tools to help front-line healthcare providers to identify women who are at increased risk of injury or further injury due to IPV (37). The research literature suggests that all women presenting to emergency departments with facial and head and neck musculoskeletal injuries, including minor or acute injuries, should be screened for IPV (19,23,25,33) and, given the ongoing nature of abuse, that women presenting with such injuries be identified as at-risk for further IPV (33). Sheridan et al. also caution that clinicians should suspect IPV and be cautious if women have blunt-force injuries to the forearms, as these injuries can be defense injuries from blocking an attack (25). The authors' recommendations to clinicians include screening all women who come for care for strangulation, and taking time to assess the nature and cause of any bruises women have.

Sheridan and Nash found in their 2007 literature review that there is a lack of standardization of medical terms concerning mechanisms of injury by IPV (25). Muelleman et al. identified twelve specific injury types that were found more often in battered women than in other injured women, and suggest that these can be used to aid in the detection of IPV. However, they caution that almost twenty percent of the IPV victims in their study did not have any of these injuries. This finding supports the use of universal screening for domestic violence in all injured women, not only those presenting with the most common IPV injuries (20). More standardization of terminology would also improve detection and identification of IPV.

Holt et al. investigated the effectiveness of civic protection orders (CPOs) – equivalent to restraining orders in Canada – at reducing IPV in over 400 female victims of abuse in Seattle (38). They used a case-control design with one group of women having obtained CPOs and another group having been victims of IPV but not having obtained CPOs. They found that rates of abuse decreased over the 9 month follow-up period after the CPOs were obtained. Specifically, a 70% reduction in physical abuse was seen among women who maintained their CPOs. The authors concluded that CPO's appear to be one of the few widely available interventions for victims of IPV that has demonstrated effectiveness (38). Obtaining a protection order was also found to be associated with a lower risk of subsequent injury by Crandall et al. (29).

Obtaining a restraining order of some kind is an individual-level response to gender-based violence. Education for health care providers represents a more systematic and structural level response. However, such responses *after* violence should not be understood as sufficient to *prevent* IPV. Since the release of the *The Report of the Royal Commission on the Status of Women* in 1970, there have been steady changes instituted to address IPV and other gender-based violence, but they have taken place at a snail's pace and

although women may now be taken seriously when they report an assault, violence against women remains endemic. A program of public education undertaken by the Ontario Federation of Indian Friendships Centres (39) since the early 2000s and a new program launched by Status of Women Manitoba (40) are examples of strategies that encourage men to take responsibility for preventing gender-based violence, while also elevating the importance of gender-based violence in the public profile. At the same time, women must feel safe enough (in terms of positive responses from the law, for example) to leave a potentially abusive relationship, and find the social and economic supports they need outside of such relationships. As we see below, there is work to be done to bring a societal shift to understanding the severity of IPV and gender-based violence.

Structural Challenges to Preventing Intimate Partner Violence

In a series of papers, Bhandari et al. reported on their studies surveying Canadian orthopedic surgeons' perceptions and attitudes about IPV (41). According to the authors, orthopedic surgeons are well situated to identify women who are victims of IPV, and may in fact be better positioned than front-line health care professionals because they see their patients multiple times and consequently have opportunities to develop rapport with the patients, seeing them in a calmer state than emergency room doctors (17). They found that most of the surgeons believed it was exceedingly rare to have female victims of IPV in their care. Most of the surgeons reported having no discomfort with the issue of IPV, but many said they had received insufficient training in how to deal with IPV cases. Many were not supportive of the idea of mandatory IPV screening, and most believed that abused women will simply leave an abusive relationship. A few of the surgeons believed that inquiring about IPV would be an invasion of privacy, that victims choose to be victims, or that victims are predisposed to victimization. Thus, it appears that while the surgeons may be well positioned to work with women who have been abused, as the authors thought, the study results demonstrated that the surgeons are not well prepared to deal with IPV. Bhandari et al. point out that contrary to the perceptions of the surgeons in their study, other research has demonstrated alarmingly high rates of IPV among Canadian women. The authors conclude that two major barriers to IPV detection are that the patient is never asked or a healthcare provider is reluctant to inquire (42).

To investigate perceptions about IPV among new physicians, Jonassen and Mazor presented a sample of medical residents with hypothetical situations and asked them how likely they would be to screen for IPV in each situation (43). Overall, male residents were found to be less likely to screen for IPV than females. Interestingly, all residents were less likely to screen for IPV if the patient in the scenario was an older woman.

In both cases, the studies' authors found a need for better education for physicians as well as better resources for screening women (17, 41, 42, 43). Better training and screening methods would improve communication with victims (42). Bhandari et al. argue that more studies on the actual prevalence of IPV are needed to change the misconceptions they found among Canadian orthopedic surgeons in their study (41). In a 2011

paper, Bhandari et al. made recommendations to improve surgeons' preparedness to ask women about IPV and to help women in abusive situations (17). Furthermore, both research teams advocated for more research to increase physicians' understanding of the prevalence of IPV (41), and to determine whether physicians' attitudes to victims can be changed or become more entrenched over their careers (43).

Violence against women is still quite pervasive in many cultures. Raj and Silverman investigated cultural aspects of IPV among female South Asian immigrants in Boston. They found that about 40% of the study sample had a history of IPV victimization from their current partner in the previous year. Many of the women also reported having watched IPV between their own parents growing up and reported that they felt they deserved the abuse they got from their partners. Furthermore, the study found that a low number of South Asian women used any IPV services, which may reflect the paucity of programs providing culturally competent services. Raj and Silverman's study identifies immigrant women in the U.S.A. as particularly vulnerable. Finally, the authors stress that the high prevalence of victim-blaming attitudes found in their study emphasizes the need for community-based education to increase understanding and recognition of IPV, to reduce the shame and stigma associated with victimization, and to increase use of IPV prevention services (44).

Prevention of IPV requires tackling social determinants, including gender and economic inequalities (45). A World Health Organization report notes that it can take decades to alter social norms related to gender (as well as poverty and economic inequality) and that such change requires action in many sectors. Rules or expectations of behaviour – norms – within cultural and social groups, such as those related to gender, ethnicity/race, and class, can encourage violence. Legislative reforms, mass media campaigns and educational programmes that challenge cultural and social norms supportive of violence can help prevent violence (45).

Summary

Intimate partner violence, one form of gender-based violence, has been consistently reported by women in Canada, with little change over the years that survey data have been collected. Researchers have endeavoured to categorize which women may be more likely to be victimized, but the evidence suggests that other than the added risk to young women in relationships, women from all backgrounds can be affected. Colonization and systemic discrimination compound violence against Aboriginal women who, from all available evidence, are disproportionately the victims of gender-based violence (46).

Recent studies point to the lack of preparedness front-line workers may currently have to assess IPV, and further education for providers is warranted. However, societal and structural changes are also needed to ensure that Canadians see that IPV and other forms of gender-based violence requires concerted change in order to achieve full gender equality and extinguish violence against women.

Self-Injury and Women in Canada

Women's self-injury is a gendered behaviour requiring gender-sensitive prevention and intervention strategies. In clinical terms, deliberate self-harm is an umbrella category that includes all forms of self-inflicted injury (which may or may not result in tissue damage), including suicidal intent. Self-injury refers more specifically to bodily injury that results in some type of tissue damage, but that is self-inflicted without intent for suicide (47). Although women's self-injury has been investigated by a few researchers for some time, the severity of the issue received national attention in a 2011 report from the Canadian Institute for Health Information (CIHI) (48,49).

Prevalence of Self-Injury

National data available in Canada about women's self-injuries are based on provincial administrative records from hospitals. According to CIHI, in 2009-10 the age-standardized rate in Canada for emergency department visits for self-injury was 150 women per 100,000 population, and 75 women per 100,000 population for inpatient hospitalizations (48). CIHI reported that rates for self-injury hospitalizations have decreased over the previous 10 years, perhaps as much as 16%, however the report noted that rates may be underestimated for the general population by at least 50%. Others may die from their injuries before care can be sought (49). Thus, hospital use only captures a portion of self-injuries, but Collier has suggested that the rate of hospitalization for self-injury in a general hospital may provide an indicator of the extent to which community-based services are accessible and effective in minimizing self-injury (48, 49).

CIHI does not consistently report on the data for self-injury by sex in the 2011 report, however the appended data tables do provide some sex-disaggregated information. Hospitalization rates for self-injury vary from province to province. In 2009 Prince Edward Island showed the lowest rates for female self-injury (57 hospitalizations per 100,000 population, CI 35-79) and Quebec, Ontario, Manitoba had rates of 67 to 70 per 100,000 population; Newfoundland and Labrador, had the highest rates, at 98 female hospitalizations per 100,000 population (48). The hospitalization rates in the territories are substantially higher than in the provinces for both sexes combined. Female-only data are available for the Northwest Territories, and show a female hospitalization rate of 290 (CI 211-370) per 100, 000 population (48). Such a startling difference in the rates for the territories bears further investigation, particularly in relation to how attitudes and health care services may differ in the north compared with other parts of Canada.

The 2011 report from CIHI found that neighbourhood income was a strong predictor of rates of self-injury. In 2009-2010, most provinces and territories showed a significant difference in the rates between the most and least affluent neighbourhoods. In the least affluent neighbourhoods, rates of hospitalization for self-injury (the data are not separated by sex) were twice as high as the rates in the most affluent neighbourhood (48).

According to the literature, onset for self-injurious behaviour among females typically takes place between 14 and 24 years of age (50). Young women aged 15-19 were hospitalized for self-injury at a rate of over 140 per 100,000 Canada in 2009-2010. Rates declined among women in their 20s and 30s, but rose again between the ages of 35 and 49; emergency department visits for self-injury among women showed a similar pattern (48). In a retrospective study of hospitalizations for self-injury in England, Hawton and Harris focused on patients who were under aged 15 at the time of admission. They found that most were girls and most were aged 12 to 14 when admitted for self-injury (51).

A 2004 Manitoba report on injuries noted that self-inflicted injuries were the leading cause of injury hospitalization among girls aged 10 to 14 years, and women aged 25 to 34 years (52). Furthermore, First Nations women were "about 9 times as likely to be hospitalized for self-inflicted injuries as were non-First Nations women" (53). First Nations women accounted for 35% of hospitalizations for self-injury (52). An exploration of administrative data in Ontario found that in First Nations communities the relative risk (RR) for intentional self-harm was 2.1 for females and 1.4 for males (54). Although there is anecdotal evidence about populations of women who are more likely to injure themselves, with the exception of women in prisons, such dis-aggregations are not available in the published literature.[4]

According to CIHI, the primary cause of self-injury in 2009-10 was poisoning (85%), followed by cutting or piercing (10%), and suffocation (2%). Poisoning refers to overdoses of any prescription or non-prescription drug and ingesting chemicals or otherwise potentially toxic substances (48). Skegg similarly reported that overdoses and cutting were the most common reasons for self-harm hospitalizations (55). Hawton and Harriss found that the most common forms of poison used by teen subjects in their study were analgesics (i.e., paracetamol (acetaminophen) and related compounds, other non-opiate analgesics). Cutting or piercing were rarely used in their study cohort, and if so, occurred in conjunction with poisoning (51). The authors noted that using alcohol or illegal drugs did not seem to play an important role in self-injury in the under 15-year olds in their study (51). Rhodes et al. also found that younger people admitted to emergency departments for self-harm were more likely to have been poisoned with analgesics (56). In other research cutting, scratching, and burning are more consistently found to be the means for non-suicidal self-injury (50). This discrepancy may be explained by differences in study design but further research is warranted.

Pre-disposing Factors

Self-harming behaviours are complex, but they are thought to be largely preventable, or at least modifiable. According to the literature, factors that pre-dispose women to self-injury include a history of mental illness or poor mental health, such as: feelings of hopelessness; a stressful life event or environment characterized by abuse or loss; family or friends' histories of suicides or self-harming, and; difficulty with interpersonal

[4] Klonsky and Muehlenkamp reported that self-injurers in other studies were more likely to be Caucasian than not, but their information is not specific to women (58).

relationships, resulting in social isolation (55,57) (50). In an introduction to the topic, Klonsky and Muehlenkamp wrote, “Self-injury is most often performed to temporarily alleviate intense negative emotions, but may also serve to express self-directed anger or disgust, influence or seek help from others, end periods of dissociation or depersonalization, and help resist suicidal thoughts” (58)(p.1).

In Canada in 2009-2010, about 7 in 10 hospitalizations for self-injury also included a mental illness diagnosis on the hospital record (48). Mood disorders were identified in 23% of hospitalizations for self-injury; substance-related disorders were recorded for 12%; anxiety disorders were indicated for 11%; selected disorders of adult personality and behaviour were recorded in 6%; schizophrenia was present in 3%; multiple health-related diagnoses were present in 14% (48).

As Thomas et al. stated “clinically, self-injury consistently has been linked to a broad range of individual-level problems, ranging from intellectual and developmental difficulties to emotional dysfunctions, and to physical and behavioral maladaptation. Such typologies reduce the act to individual pathology rather than, as Kilty noted, a possible coping mechanism in a debilitating environment” (p. 193 (59). Kilty (60) and Dell et al. (61) however, point to gendered relations and structural oppressions as important factors. Women who do not have control over many aspects of their lives use self-injury as a way to take charge. In a 2000 study, Fillmore and Dell interviewed women who had been in prisons as well as prison staff and their results demonstrated that women who self-injure have had traumatic past experiences and that they continue to feel they have no control over their lives (62). Analyses by Kilty (60), Thomas et al. (59) and Dell et al. (61) are focused on incarcerated women, however it is reasonable to posit that other women who are self-injurious but not involved with the law may also find their environments debilitating.

Alexander and Clare also stress that self-injury must be understood, not as a symptom of some individual disorder, but as a coping response that arises within a social context. In their research with lesbians and bisexual women, the authors found that the stigma surrounding self-injurers – the experience of being regarded as different or in some way unacceptable – as well as abuse and invalidation, were central to the development and continuation of self-injury, that is, it can be cyclical (63).

In keeping with the rates presented above, reports in the clinical psychology literature reveal that many women start self-injuring during adolescence, which according to Alexander and Clare is a time when suppressed events from childhood are re-triggered by demands to fit in with peers and by the expectations of society (63). Hawton and Harriss noted the importance of social relationships for adolescents. According to their research, adolescent females were more likely to self-harm if they were having difficulties with their family, friends, or in school (51). Klonsky and Muehlenkamp also cite childhood sexual abuse is an antecedent to self-injury (58). In their study, Fillmore and Dell found that women who self-injured had been brutalized in one way or another; one woman reported that she began to injure herself when her assailant was no longer around, because her feelings of lack of control continued (62).

Craigen noted that the media may have a role in perpetuating or instigating self-injury for some women. Movies such as *Girl Interrupted* and *Thirteen* (64) and pro-injury personal blogs and videos may provide a means for women to communicate, compare, and share their self-injurious behaviours. It appears mainstream media has the deleterious effect of making self-injury look "cool."(64). According to Nixon et al. study, 15% of respondents in their study reported television or movies as the source of ideas to harm themselves (50).

Policy and Interventions

Researchers have made suggestions for interventions for identifying and supporting women who self-injure. In a European study, Hawton and Harris found that outpatient care offered to female self-injurers was sufficient for dealing with the immediate crisis, although they warn those offering the services must remain aware of the social relationships in a patient's life as they can influence whether she continues to self-injure (51). With a focus on clinical therapy, Klonsky and Muehlenberg reviewed a few different treatments for patients who self-injure, including cognitive behavioural therapy and psychodynamic therapy each of which, according to their review, has had some effect (58).

In contrast, Fillmore and Dell recommended in 2000 that women who self-harm should be supported and empowered. Isolation within a prison, for example, or placement in a more secure facility (which are usually men's facilities, and thus the women are segregated) was considered counter-productive as it perpetuates a punitive response, without addressing the women's needs. The experience of being placed on "suicide watch" or being under surveillance for possible further anti-social and violent behaviour is humiliating and creates an overriding sense of disempowerment. Dell et al. and other researchers argue that it is possible to create an environment that is rehabilitative even in a prison setting (59-61,65).

Other authors have suggested education and awareness programs for the general public and primary care physicians, screening programs for individuals who have been identified as high risk, pharmacotherapy and psychotherapy in certain circumstances, as well as follow-up care for persons who have previously self-harmed (49,64,66,67). For example, in her review of the literature Keren Skegg also found a few common protective factors against self-injury including social support and a sense of belonging (55).

According to Mann et al., some of the most promising interventions are those focusing on educating physicians about how to recognize and treat depression (68). Alexander and Clare cautioned, however, that historically the response from individual professionals (e.g., doctors, psychiatrists, etc) "often contributed to the sense of invalidation and difference that women [who self-injure] experienced" (63).

Summary

Although hospitalization and emergency room visit rates for self-injury in women may have declined in Canada, it is still a little-understood manifestation of gender-based violence. Research done with women who are outside the margins of "regular" society – criminalized women and sexual minority women – illustrate,

first, the "otherness" that teens and women may feel and, second, that self-injury is used to cope with having little control over their own lives. These social and psychological contexts illustrate the importance of gender sensitive approaches to mental health strategies that facilitate girls' and women's self-empowerment and social inclusion.

As the CIHI report notes, however, many women who are admitted to a hospital for self-injury have had encounters with the mental health system already (48). According to the literature, they also seek out services prior to the self-injury (such as visits to primary care physicians or hospitalizations for a mental illness) (69). Thus, each of these direct contacts with the health care system represents an important opportunity for screening and intervention. Mental health assessment and treatment are appropriate for women who self-injure as a way to close the gap in social and health services (70).

Conclusion

In this chapter, we have merely touched on what is unfortunately a vast topic – gender-based violence. There is no doubt that gender-based violence receives more attention from policy-makers, practitioners and the public than in decades past. There are laws to protect women and in many parts of Canada there are community resources for women who are abused. But the problem is not fixed. From the Highway of Tears, to the shortage of rape counsellors and shelters, to the most recent accusations of assault by police, we are reminded that many women are battered and there are too few places for them to turn for help.

There will be real change when women are recognized to be full, equal participants in Canadian society and when men and women recognize that is not acceptable to abuse women in any way.

References

(1) Pan American Health Organization (PAHO). Gender-based analysis of health data for decision making. Washington: PAHO; 2009.

(2) Haworth-Brockman MJ, Isfeld H. Better evidence to improve women's health with gender and health statistics: health indicator frameworks. Winnipeg: Prairie Women's Health Centre of Excellence; 2012.

(3) The Secretariat for the Intersectoral Healthy Living Network. The integrated pan-Canadian healthy living strategy [Internet]. Ottawa: Public Health Agency of Canada; 2005 [cited 15 Sep 2011]. Available from: http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

(4) Hamberger LK. Men's and women's use of intimate partner violence in clinical samples: toward a gender-sensitive analysis. Violence Vict 2005 Apr;20(2):131-51.

(5) Cercone JJ, Beach SR, Arias I. Gender symmetry in dating intimate partner violence: does similar behavior imply similar constructs? Violence Vict 2005 Apr;20(2):207-18.

(6) Straus MA. The conflict tactics scale and its critics: an evaluation and new data on validity and reliability. In: Straus MA, Gelles RJ, editors. Physical violence in American families: risk factors and adaptations to violence in 8,145 families. Piscataway (NJ): Transaction; 1992. p. 49-73.

(7) Currie DH. Violent men or violent women: whose definition counts? In: Bergen RK, editor. Issues in intimate violence. Thousand Oaks (CA): Sage; 1998. p. 97-111.

(8) Dobash RP, Dobash RE, Wilson M, Daly M. The myth of sexual symmetry in marital violence. Soc Probl 1992;39:71-91.

(9) Kurz D. Physical assaults by husbands: a major social problem. In: Gelles RJ, Loseke DR, editors. Current controversies on family violence. Newbury Park (CA): Sage; 1993. p. 88-103.

(10) Johnson MP. Patriarchal terrorism and common couple violence: two forms of violence against women. J Marriage Fam 1995;57:283-95.

(11) Isfeld H. Winnipeg environmental scan. Ottawa: National Crime Prevention Centre of Justice Canada; 2004.

(12) Johnson MP, Ferraro KJ. Research on domestic violence in the 1990s: making distinctions. J Marriage Fam 2000(62):948-63.

(13) Banks C. The cost of homophobia: literature review of the economic impact of homophobia on Canada. Saskatoon (SK): Gay and Lesbian Health Services of Saskatoon; 2001.

(14) Ristock J. No more secrets: violence in lesbian relationships. New York: Routledge; 2002.

(15) Canadian Centre for Justice Statistics. Family violence in Canada: a statistical profile. Ottawa: Statistics Canada; 2011.

(16) Canadian Centre for Justice Statistics. Family violence in Canada: a statistical profile. Ottawa: Statistics Canada; 2004.

(17) Bhandari M, Sprague S, Dosanjh S, Petrisor B, Resendes S, Madden K, et al. The prevalence of intimate partner violence across orthopaedic fracture clinics in Ontario. J Bone Joint Surg Am 2011 Jan 19;93(2):132-41.

(18) Anderson KL. Theorizing gender in intimate partner violence research. Sex Roles 2005 Jun;52(11):853-65.

(19) Amar AF, Gennaro S. Dating violence in college women: associated physical injury, healthcare usage, and mental health symptoms. Nurs Res 2005;54:235-42.

(20) Muelleman RL, Lenaghan PA, Pakieser RA. Battered women: injury locations and types. Ann Emerg Med 1996;28(5):486-92.

(21) National Clearinghouse on Family Violence, Public Health Agency of Canada. Aboriginal women and family violence. Ottawa: Public Health Agency of Canada; 2008.

(22) First Nations Information Governance Centre. First Nations Regional Health Survey: RHS Phase 2 (2008/10) preliminary results (Revised edition). Ottawa: The First Nations Information Governance Centre; 2011.

(23) Bhandari M, Dosanjh S, Tornetta P, Matthews D, Violence Against Women Health Research Collaborative. Musculoskeletal manifestations of physical abuse after intimate partner violence. J Trauma 2006 Dec;61(6):1473-9.

(24) Crandall ML, Nathens AB, Rivara FP. Injury patterns among female trauma patients: recognizing intentional injury. J Trauma 2004 Jul;57(1):42-5.

(25) Sheridan DJ, Nash KR. Acute injury patterns of intimate partner violence victims. Trauma Violence Abuse 2007 Jul;8(3):281-9.

(26) Ansara DL, Hindin MJ. Exploring gender differences in the patterns of intimate partner violence in Canada: a latent class approach. J Epidemiol Community Health 2010 Oct;64(10):849-54.

(27) Romans S, Forte T, Cohen MM, Du Mont J, Hyman I. Who is most at risk for intimate partner violence? A Canadian population-based study. J Interpers Violence 2007 Dec;22(12):1495-1514.

(28) Balci YG, Ayranci U. Physical violence against women: evaluation of women assaulted by spouses. J Clin Forensic Med 2005;12(5):258-63.

(29) Crandall ML, Nathens AB, Kernic MA, Holt VL, Rivara FP. Predicting future injury among women in abusive relationships. J Trauma 2004 Apr;56(4):906-12.

(30) Campbell JC, Webster D, Koziol-Mclain J, Block C, Campbell D, Curry MA, et al. Risk factors for femicide in abusive relationships: results from a multisite case control study. Am J Public Health 2003;93(7):1089-97.

(31) Walton-Moss BJ, Manganello J, Frye V, Campbell JC. Risk factors for intimate partner violence and associated injury among urban women. J Community Health 2005 Oct;30(5):377-89.

(32) Logan TK, Walker R. Separation as a risk factor for victims of intimate partner violence: beyond lethality and injury: a response to Campbell. J Interpers Violence 2004 Dec;19(12):1478-86.

(33) Lipsky S, Caetano R, Field CA, Bazargan S. Violence-related injury and intimate partner violence in an urban emergency department. J Trauma 2004 Aug;57(2):352-9.

(34) Cohen MM, Forte T, Du Mont J, Hyman I, Romans S. Adding insult to injury: intimate partner violence among women and men reporting activity limitations. Ann Epidemiol 2006 Aug;16(8):644-51.

(35) Forte T, Cohen MM, Du Mont J, Hyman I, Romans S. Psychological and physical sequelae of intimate partner violence among women with limitations in their activities of daily living. Arch Womens Ment Health 2005 Nov;8(4):248-56.

(36) Salari SM, Baldwin B. Verbal, physical, and injurious aggression among intimate couples over time. J Marriage Fam 2002(23):523-50.

(37) Snider C, Webster D, O'Sullivan CS, Campbell J. Intimate partner violence: development of a brief risk assessment for the emergency department. Acad Emerg Med 2009 Nov;16(11):1208-16.

(38) Holt VL, Kernic MA, Wolf ME, Rivara FP. Do protection orders affect the likelihood of future partner violence and injury? Am J Prev Med 2003 Jan;24(1):16-21.

(39) Ontario Federation of Indian Friendship Centres (OFIFC); Ontario Native Women's Association (ONWA). A strategic framework to end violence against Aboriginal women. Thunder Bay (ON): ONWA, OFIFC;2007 Sep.

(40) Manitoba Status of Women. Manitoba's multi-year domestic violence prevention strategy. Winnipeg: Government of Manitoba; 2012.

(41) Bhandari M, Sprague S, Tornetta P 3rd, D'Aurora V, Schemitsch E, Shearer H, et al. (Mis)perceptions about intimate partner violence in women presenting for orthopaedic care: a survey of Canadian orthopaedic surgeons. J Bone Joint Surg Am 2008 Jul;90(7):1590-7.

(42) PRAISE Investigators, Bhandari M, Sprague S, Dosanjh S, Wu V, Schemitsch EH. PRevalence of Abuse and Intimate Partner Violence Surgical Evaluation (P.R.A.I.S.E.): rationale and design of a multi-center cross-sectional study. BMC Musculoskelet Disord 2010 Apr 23;11:77.

(43) Jonassen JA, Mazor KM. Identification of physician and patient attributes that influence the likelihood of screening for intimate partner violence. Acad Med 2003 Oct;78(10 Suppl):20-3.

(44) Raj A, Silverman JG. Intimate partner violence against South Asian women in greater Boston. J Am Med Womens Assoc 2002 Spring;57(2):111-4.

(45) Butchart A, Mikton C, Kieselbach B; WHO's Prevention of Violence Team. Global campaign for violence prevention: plan of action for 2012-2020. Geneva: World Health Organization; 2012.

(46) Native Women's Association of Canada. What their stories tell us: research findings from the Sisters in Spirit initiative. Thunder Bay (ON): Native Women's Association of Canada; 2010.

(47) O'Donovan A. Pragmatism rules: the intervention and prevention strategies used by psychiatric nurses working with non-suicidal self-harming individuals. J Psychiatr Ment Health Nurs 2007 Feb;14(1):64-71.

(48) Canadian Institute for Health Information (CIHI); Statistics Canada. Health indicators 2011 [Internet]. Ottawa: CIHI; 2011 [cited 20 Oct 2012]. Available from: https://secure.cihi.ca/free_products/health_indicators_2011_en.pdf

(49) Collier R. Self-injury rates indicate Canadian mental health services are inadequate. CMAJ 2011 July 12;183(10):15-6.

(50) Nixon MK, Cloutier P, Jansson SM. Nonsuicidal self-harm in youth: a population-based survey. CMAJ 2008 Jan 29;178(3):306-12.

(51) Hawton K, Harriss L. Deliberate self-harm by under-15-year-olds: characteristics, trends and outcome. J Child Psychol Psychiatry 2008 Apr;49(4):441-8.

(52) Government of Manitoba. Injuries in Manitoba: a 10-year review [Internet]. Winnipeg: Government of Manitoba; 2004 [cited 15 Jan 2013]. Available from: http://www.gov.mb.ca/healthyliving/hlp/docs/injury/ten/injuriesmb.pdf

(53) Donner L, Isfeld H, Haworth-Brockman M, Forsey C. A profile of women's health in Manitoba. Winnipeg: Prairie Women's Health Centre of Excellence; 2008.

(54) Fantus D, Shah BR, Qiu F, Hux J, Rochon P. Injury in First Nations communities in Ontario. Can J Public Health 2009 Jul-Aug;100(4):258-62.

(55) Skegg K. Self-harm. The Lancet 2005 Oct 22-28;366(9495):1471-83.

(56) Rhodes AE, Bethell J, Spence J, Links PS, Streiner DL, Jaakkimainen RL. Age-sex differences in medicinal self-poisonings: a population-based study of deliberate intent and medical severity. Soc Psychiatry Psychiatr Epidemiol 2008 Aug;43(8):642-52.

(57) Olfson M, Gameroff MJ, Marcus SC, Greenberg T, Shaffer D. National trends in hospitalization of youth with intentional self-inflicted injuries. Am J Psychiatry 2005 Jul;162(7):1328-35.

(58) Klonsky ED, Muehlenkamp JJ. Self-injury: a research review for the practitioner. J Clin Psychol 2007 Nov;63(11):1045-56.

(59) Thomas J, Leaf M, Kazmierczak S, Stone J. Self-Injury in correctional settings: "pathology" of prisons or of prisoners? Criminol Public Policy 2006;5(1):193-202.

(60) Kilty JM. Under the barred umbrella: is there room for a women-centered self-injury policy in Canadian corrections? Criminol Public Policy 2006;5(1):161-82.

(61) Dell CA, Fillmore CJ, Kilty JM. Looking back 10 years after the Arbour inquiry: ideology, policy, practice, and the federal female prisoner. The Prison J 2009 Sep;89(3):286-308.

(62) Fillmore C, Dell C; The Elizabeth Fry Society of Manitoba. Prairie women, violence and self-harm [Internet]. Winnipeg: Prairie Women's Health Centre of Excellence; 2000 [cited 5 Nov 2012]. Available from: http://www.pwhce.ca/pdf/self-harm.pdf

(63) Alexander N, Clare L. You still feel different: the experience and meaning of women's self-injury in the context of a lesbian or bisexual identity. J Community Appl Soc Psychol 2004 Mar;14(2):70-84.

(64) Craigen LM, Milliken TF. The self-injury experiences of young adult women: implications for counseling. J Humanist Educ Dev 2010 Spring;49(1):112-26.

(65) Bosworth M. Self-harm in women's prisons. Criminol Public Policy 2006;5(1):157-9.

(66) Goodman Lesniak R. The lived experience of adolescent females who self-injure by cutting. Adv Emerg Nurs J 2010 Jun;32(2):137-47.

(67) Lindholm T, Bjarehed J, Lundh LG. Functions of nonsuicidal self-injury among young women in residential care: a pilot study with the Swedish version of the inventory of statements about self-injury. Cogn Behav Ther 2011 Sep;40(3):183-9.

(68) Mann JJ, Apter A, Bertolote ,J., Beautrais A, Currier D, Haas A, et al. Suicide prevention strategies: a systematic review. JAMA 2005 Oct 26;294(16):2064-74.

(69) Luoma JB, Martin CE, Pearson JL. Contact with mental health and primary care providers before suicide: a review of the evidence. Am J Psychiatry 2002 Jun;159(6):909-16.

(70) Strike C, Rhodes AE, Bergmans Y, Links P. Fragmented pathways to care: the experiences of suicidal men. Crisis 2006;27(1):31-8.