Obesity in Canada: Prevalence, Determinants and Potential Interventions

Rabia K Shahid, MD, FRCPC, Shahid Ahmed, MD, FACP, FRCPC.

Department of Medicine, Department of Epidemiology and Community Health, University of Saskatchewan

Word count: 4838

Address for correspondence:

Shahid Ahmed, MD, FRCPC, FACP
Clinical Professor of Medicine
Saskatoon Cancer Center
20 Campus Drive
University of Saskatchewan
Saskatoon, SK
Canada, S7N4H4
Phone: (306) 655-2710
Fax: (306) 655-0633
E-mail: shahid.ahmed@saskcancer.ca
Abstract

Obesity has become a global public health problem. Over the past decades its prevalence has increased in different populations. It is expected to surpass smoking as the leading cause of preventable morbidity and mortality. Various environmental, behavioral, social, cultural and genetic factors contribute to the development of overweight and obesity. Obesity has been linked to varied chronic illnesses including type 2 diabetes, hypertension, cardiovascular disease and cerebro-vascular disease, many cancers, musculoskeletal disorders and impairment of the psychological well-being. Health care costs are considerably higher for overweight and obese individuals. The prevalence of overweight and obese individuals has been rising in Canada. Furthermore, Aboriginal adults have higher rate of obesity compared with non-Aboriginal adults. The increasing burden of obesity can be a major threat to the integrity of the Canadian healthcare system unless active measures are taken in a timely fashion. In this chapter we review comparative prevalence of obesity and its trend in Canada, various determinants and risk factors, and potential strategies for its prevention.
Introduction

Obesity has become a global public health problem. Over the past decades its prevalence has increased in different populations. It has been associated with significant morbidity and mortality (1,2). It is well recognized that obesity increases the risk of various chronic illnesses such as type II diabetes, cardiovascular disease, hypertension, cerebro-vascular accident, gallbladder disease, osteoarthritis, sleep apnea and several cancers (1-5). It also affects the mental health. Health care costs are considerably higher for overweight and obese individuals (1,2). The increasing burden of obesity and its associated comorbid illnesses result in an increasing threat to both the overall health status of Canadians and the Canadian healthcare system. In this paper we review risk factors and determinants of obesity, its prevalence in Canada, and potential interventions to prevent it.

Definitions

The National Heart, Lung, and Blood Institute and the World Health Organization (WHO) have provided uniform definitions of overweight and obesity (6,7). Although "overweight" technically refers to an excess of body weight and "obesity" to an excess of fat, these two words can be defined operationally in terms of the body mass index (BMI). The degree of risk associated with overweight is related to the BMI. A BMI between 25 and 30 kg/m² is low risk, above 30 kg/m² is moderate risk. The WHO and the National Center for Health Statistics define overweight as a BMI >25 and ≤29.9 and obesity as a BMI greater than 30 kg/m².
Etiology and Natural History of Obesity

Several factors contribute to the development of obesity. Among them, lifestyle and diet are the most important risk factors (8-23). People can get obese at any age; however, there are certain times when they are more prone to gain weight.

Prenatal Influences

High caloric intake by mother, maternal smoking and diabetes during pregnancy increase the risk of heavy offspring and obesity later in life (8).

Breastfeeding

Breastfeeding when compared to formula milk is associated with lower risk of overweight. Several studies have shown that feeding infants solely with breast milk during first three or more months of life reduces the risk of being overweight later in the childhood (9,10).

Childhood & Adolescence

The predictive value of childhood obesity varies with age of onset of obesity and family history. It has been reported that obese children under three years of age are at low risk of becoming obese adults unless one or both parents are obese. On the other hand, obesity among older children is an increasingly important predictor of adult obesity (11,12). Likewise, obesity in adolescence is associated with severe obesity in adult.

Adult women & men

The long-term risk of getting obese or overweight in the adulthood seems to be very high. In a prospective cohort study, 14 to 19 percent of women and 26 to 30 percent of men who were normal weight at baseline became overweight within four years of
enrollment into the study (13). Most overweight women gain weight after puberty. The weight gain may be precipitated by number of factors, including pregnancy, oral contraceptive and menopause (13,14). In men, transition from active lifestyle during the teens and twenties to a more sedentary lifestyle thereafter is associated with weight gain (14).

Life style and diet
A low level of physical activity is strongly correlated with weight gain and obesity in both men and women. Sedentary lifestyle lowers energy expenditure thereby promotes weight gain. Epidemiological data support that various dietary habits including a diet high in fat, overeating, night-eating syndrome and frequent fast-food consumption are associated with obesity (14-19). Furthermore, evidence suggests that sleeps deprivation could result in excessive eating, obesity, and altered response to dietary therapy (19).

Drug induced obesity
A number of drugs such as antipsychotics, antidepressants, antiepileptic drugs, antihyperglycemic agents, and hormones can cause weight gain and obesity (21).

Neuroendocrine obesity
Several neuroendocrine disorders including Cushing’s syndrome, hypothyroidism, polycystic ovary syndrome, and excess growth hormone are associated with the development of obesity (23).

Prevalence in Canada
Obesity is expected to surpass smoking as the leading cause of preventable morbidity and mortality. The prevalence of obesity has been rising in Canada. According to
measured height and weight data from 2007-2009 about one in four Canadian adults are obese, nearly 10% higher than in 1978 when obesity rate was 13.8% (24-27) [Figure 1]. When obesity was combined with overweight, self-reported prevalence of obesity and overweight was 51.1% compared with 62.1% when measured data was used. Of children and youth aged six to seventeen, 8.6% are obese.

Self reported obesity rates are usually underreported. According to measured height and weight data from 2007-09, 17.4% people reported to be obese (25). Self-reported obesity across the health regions within Canada is 5.3% to 35.9%. It is more prevalent among Aboriginal peoples than in the non-Aboriginal adult population. For example, 25.7% off-reserve Aboriginal adults reported to be obese compared with 17.4% non-Aboriginal adults in Canada (24). First Nations on reserve have higher prevalence of 36%. The prevalence in men and women is almost similar and is approximately 22%. The prevalence increases with age, peaking in people who are 55 to 64 years old (Figure 2). Of note, obesity rate declines sharply after the age of 75 (24)

The 2007-2009 Canadian Health Measure Survey (CHMS) revealed that an average 45-year old man was about 9.2 kg (20 pounds) heavier than his 1981 counterpart. Since height was not significantly different, the BMI increased by more than 2 kg/m². The waist circumference of an average 45-year old man has increased by 6.4 cm (2.5 inches) (25).

An average 45-year old woman weight has increased by 5.2 kg (12 pounds), while height has stayed relatively constant over the period. As a result, the BMI has increased by 2 kg/m², shifting her from normal weight to the overweight category. The waist circumference has increased by 7.1 cm (2.8 inches) [25]. Independent of age and sex, a
large percentage of adults had suboptimal health benefit ratings for all the fitness components. According to 2007-2009 CHMS average man ‘grip strength’ rating decreased from very good to good, while his ‘sit-and-reach’ score was slightly higher compared with 1981 survey. Though average woman grip strength decreased, her flexibility was approximately the same in 2007-2009 CHMS (25).

**Variation by age and sex**

According to 2004 and 2007-08 Canadian Community Health Survey (CCHS), the prevalence of obesity increases in both men and women up to age 65 and declines in people older than 65. Based on self-reported data, the obesity was more prevalent among men than women (Figure 2). Based on direct measures, in population aged 20 to 39, 19% of males and 21% of females were obese and among aged 40 to 59, 27% of males and 24% of females were obese (24-26). It was not consistently higher among men than women.

**Provincial and Territorial Variation**

The rates of obesity are different across various provinces and territories (Figure 3). As per 2007-08 CCHS, the prevalence of self-reported obesity was 12.8% in British Columbia and approximately 25% in Newfoundland and Labrador. Estimates of obesity in 2007-08 survey were found to be significantly higher overall in Canada as well as in Alberta and Ontario than 2005 survey and significantly higher in 2005 than 2003 in Newfoundland and Labrador.

**Prevalence among aboriginal**
First Nations people who lived off-reserve and Métis people were more likely than the non-Aboriginal population to be physically active in their leisure time: 37% and 39% versus 30%. However, the percentage of Inuit who were physically active (31%) was not significantly different from the percentage for non-Aboriginal people (25,26,28). Despite that self-reported obesity is more prevalent among Aboriginal people (29,30).

**First Nations off-reserve:**
According to 2007/08 CCHS, 25.7% of Aboriginal adults (excluding First Nations on-reserve) were obese. This is comparable to the results of 2006 Aboriginal Peoples Survey (APS), which revealed a self reported prevalence of 26.1%. Similar to general population, prevalence of obesity among Aboriginal with self-reported data is lower than measured data (28). For example, according to 2004 CCHS 37.8% of off-reserve Aboriginal adults were obese on the basis of measured heights and weights, compared with 25.7% as per self-reported data.

**First Nations On-reserve:**
Analysis of the First Nations Regional Longitudinal Health Survey (RHS) showed the prevalence of obesity is 36.0% among adults on reserve (31.8% of males and 41.4% of females) [29,30].

**Métis & Inuit:**
According to the 2006 APS, prevalence of obesity in the Métis population was 26.4% among adults whereas 23.9% Inuit adults were reported to be obese (28).

**Regional Variation**
Studies have found that the prevalence of obesity tends to be lower in more urban regions. For example, the 2003 CCHS revealed that obesity was significantly below the national average in Montreal, Toronto and Vancouver. In both adults and youth, the proportion of being overweight inclines to be higher in rural areas than in metropolitan areas (24,25).

**Changes in the prevalence over time**

*Worldwide*

In recent decades, obesity has turned into a major global issue. The WHO has estimated that more than 1 billion adults worldwide are overweight and at least 300 million are clinically obese (7).

The measured obesity varies from 3.4% in Japan to 34.3% in the United States. Obesity has increased among men and women between 1980s and 2005 in countries like Canada, Australia, England, France, Hungary and United States. Researchers are also anticipating increase in Canada, Australia, England and United States until 2019.

*Changes over time in Canada*

Both measured and self-reported data have shown an increased in the prevalence of obesity in adults aged 18 or older. Obesity rates are high in Canada compared to Organization for Economic Cooperation & Development (OECD) countries but they have not increased substantially in the last 15 years *(Figures 4)*. Two out of 3 men are overweight and 1 in 4 people are obese in Canada, but overall the rate of increase has been one of the slowest in the OECD countries (32). The OECD has projected that proportion of overweight people will rise 5% during the next 10 years.
Changes over time in Aboriginal people

Limited data are available to examine changes in obesity prevalence over time in Aboriginal populations (33,34). On the basis of measured data, it has been estimated that obesity prevalence among adult’s ages 18-74 has increased by 49% (from 19% to 28%). Although prevalence has increased in both sexes, the increase was more significant among males than females (73% increase vs. 31% increase, respectively) [24,25].

According to CCHS self-reported data, obesity among Aboriginal people (excluding First Nations on-reserve) living both in the North (i.e., Yukon, Northwest Territories, and Nunavut) and in southern Canada has increased between 2000-01 and 2005: in the North, from 20.2% to 25.4%, and in southern Canada, from 22.7% to 25.3%. However, only among North-residing Aboriginals ages 55 and older the difference over time was statistically significant. When the effects of age and sex were taken into account, the odds ratio of being obese was greater for Aboriginal people living in the North than for those in the south (33).

Differences in obesity prevalence estimates between Canada and the United States

In 2007–2009, the prevalence of obesity in Canada was 24.1%; over 10 percentage points lower than the prevalence of 34.4% in the United States (Figure 5). Among men, the prevalence of obesity was over 8 percentage points lower in Canada than in the
United States (24.3% compared with 32.6%) and among women, it was more than 12 percentage points lower (23.9% compared with 36.2%).

When comparisons were restricted to the non-Hispanic white population in each country, differences in obesity estimates were somewhat attenuated but the overall prevalence of obesity remained significantly lower in Canada compared with the United States. For instance, approximately 26% of the non-Hispanic white Canadian were obese compared with 33.0% of the non-Hispanic white population in the United States. Among the obese people with BMI in the outer limits the prevalence was fairly similar in the two countries (3.5% in Canada and about 5% in the United States).

The racial makeup of the population in the two countries explains why the difference in prevalence is larger when the general populations are compared than when the non-Hispanic white populations are compared. In the United States, the minority population is mostly comprised of African American and Hispanic who have high prevalence of obesity than the non-Hispanic white population (35). Among nonwhite Canadians, the largest group is comprised of East/Southeast Asian peoples who have lower prevalence of obesity than the white population (35,36).

**Obesity prevalence in the last 20 years in Canada and the United States**

Current obesity prevalence estimates were compared with estimates from the 1988–1994 National Health & Nutrition Examination Survey (NHANES) and the 1986–1992 Canadian Heart Health Surveys (CHHS). In both countries the prevalence of obesity rose significantly since these earlier surveys, and the magnitude of the increases were fairly similar in the two countries (**Figure 6 & 7**). In Canadian men the prevalence rose
by approximately 10 percentage points, and among American men the prevalence rose by 12 percentage points. Among women, the increase was approximately 8 percentage points in Canada and approximately 10 percentage points in the United States.

**Determinants of Obesity in Canada**

Obesity is a significant population health concern. Research has shown that environmental, behavioral, social, cultural and genetic factors all contribute to the development of overweight and obesity. Obesity reduces life expectancy by more than 10 years as a comorbid illness with an increased risk of chronic conditions including diabetes, cancers, cardiovascular and musculoskeletal disease. Moreover, it is also related to impairment of the psychological well-being.

Populations who are moderately active or active in their leisure time are less likely to be obese. It has been shown that obese men consumed significantly more calories (2,820 versus 2,600 calories) as well contain higher percentages of total fat compared with non-obese men (24,26). The same is true for obese women; who tend to consume more calories (2,160 versus 1,970) than non-obese women.

In addition to more proximal factors such as physical activity, sedentary behavior and diet which contribute to obesity there are several key distal factors that correlate with obesity including socioeconomic status, community, and environmental factors. Certain population groups have higher rates of obesity in Canada. These groups include Aboriginal peoples, many immigrant groups, those living in rural, remote areas, Atlantic region and, finally, those with a lower socio-economic status. Some of the of factors that are suspected to contribute to higher rates of obesity among marginalized populations
include inequitable access to affordable, nutritious, safe, and culturally appropriate food and safe, adequate, and appropriate facilities for active recreation.

Analyses of the 2007/08 Canadian Community Health Survey (CCHS) propose that the relation between income and obesity varies by gender. As income increases obesity tends to decrease in women, however, similar pattern was not observed for men (Figure 9). In addition, among women but not in men, household income was associated with obesity. Marital status was found to be related to obesity among women, but not in men. Women, who were never married, widowed, separated or divorced, were more likely to be obese (24-26).

Education has been shown to be associated with obesity, especially among men. An inverse pattern between education level and obesity prevalence has been observed for both men and women in the Canadian population. Men with secondary education or less are more likely to be obese than those who completed postgraduate education whereas the difference is less pronounced among women. For instance, the 2004 CCHS revealed that Canadian men with secondary education or less than secondary education have obesity rates of 32% and 35%, respectively compared with obesity rate of 22% in men with post-secondary education (p<0.05).

The community-level factors such as neighborhood-level socioeconomic status correlate with obesity. The data from the 2005, 2007 and 2008 CCHS looked at disparities in obesity by socioeconomic status in Canada’s Census Metropolitan Areas (CMAs). The analyses revealed that obesity was more prevalent in the most socioeconomically deprived areas than in the least deprived areas (24). For instance, the obesity rates were 26% and 25% in the most socioeconomically deprived areas of
Regina, Saskatchewan and Halifax, Nova Scotia, respectively compared with 14% and 11.2% in the highest socioeconomic status areas. There is also evidence of a relation between obesity and the community food environment and that relative availability of different types of food retailers around individuals' homes correlates with the bodyweight status of residents (37-39). The odds of being obese are related to diet and exercise. People who consume fruit and vegetables less frequently are more likely to be obese than those who eat such foods more often (40). A Canadian study reported that lower the ratio of fast-food restaurants and convenience stores to grocery stores and product vendors near people's homes, the lower the odds of being obese (37). Furthermore, community consumption of traditional foods has been associated with lower rates of obesity. The 2002/03 RHS reported that small First Nations communities which are more likely to consumed traditional foods had obesity rates of 25.7% compared with 44.2% in large communities (29).

**Obesity and Economic Implication**

There are currently few Canadian data on the long-term health impacts of obesity especially in children. Some studies focus on direct costs, while others examine indirect costs, or both (41). It has been estimated that obesity cost the Canadian economy approximately $4.6 billion in 2008, up $735 million or about 19% from $3.9 billion in 2000, based on costs associated with the eight chronic diseases most consistently linked to the obesity. Estimates rise to approximately $7.1 billion when it was based on the costs associated with 18 chronic diseases linked to the obesity (24, 27,42). Of note, the economic impact of obesity is not confined to health service delivery. Productivity
losses stemming from more widespread absenteeism and disability affect several economic sectors (41). Obesity influences physician cost that increases with age compared with normal weight persons. For example, 5.3% higher cost for obese young adults aged 18-39 years, 7.0% higher for obese middle-aged individuals aged 40-59 years and 28.3% higher for obese older adults aged 60 years or above (43).

**Potential Interventions to Address Obesity**

Obesity is not simply an issue of energy expenditure and intake, but rather is affected by a number of upstream factors that create the context in which people make decisions about physical activity and/or energy intake (Figure 10). These contextual forces interact with underlying biological susceptibilities and often place eating and exercise behavior beyond an individual’s rational control (44). The causes of obesity are complex and multifaceted. These include not only individual choices but also environmental and social determinants. There has been an increasing focus on identification of potential risk factors and prevention and treatment strategies due to rising costs and poor health outcomes associated with obesity.

Different interventions in combination with a comprehensive prevention strategy at individual level can avoid up to 25,000 deaths from chronic diseases every year resulting in 40,000 years of life in good health (45,46). An organized program of counseling of obese people by their family doctors can also lead to an annual gain of 40,000 years of life in good health.
Cost-effectiveness of Prevention

Therapy for obesity either decrease energy intake or increase energy expenditure. Treatment includes behavior modification, dietary therapy, exercise, pharmacotherapy, liposuction, surgery and complementary therapies. Strategies aimed at preventing weight gain and obesity are vital and more cost effective than merely treating obesity once it has developed. Most prevention programs will cut health expenditures for chronic diseases and would cost less than CAD 200 million every year (46). Prevention can promote health at a lower cost than many other treatments offered today by OECD health systems. In Canada, all of the prevention programs examined will be cost-effective in the long run – relative to the internationally accepted standard of around CAD 50,000 per year of life gained in good health. Nevertheless, some programs will take a longer time to produce their health effects and therefore will be less cost-effective in the short run.

The costs of overweight or obesity may be grouped into two categories: direct and indirect costs. Direct costs are those for which payments are made, and indirect costs are those for which resources are lost (41). Direct costs include the cost of treatment, care and rehabilitation for illnesses associated with overweight or obesity (Figure 11). Indirect costs, referred to as “Negative Outputs / Welfare Losses,” include reductions in economic productivity stemming from the poorer health, absenteeism, disability and premature mortality that are a result of overweight or obesity. Welfare losses, resulting from increased pain and suffering for example, are also considered indirect costs though they are rarely measured (46).
**Strategies for Prevention**

Obesity is a major challenge to the Canadian Society hence a combination of top-down and bottom-up approach is required to address it (Figure 12). A comprehensive, multisectoral response is required to reverse the rising prevalence of obesity in Canada. Some key priority areas that require immediate attention in relationship with obesity are discussed below. The various approaches to deal with obesity are as follows:

- Research, surveillance and knowledge promotion
- Health services and clinical interventions that target individuals.
- Community-level interventions that directly influence individual and group behaviors.
- Public policies that target broad social or environmental determinants like government-level interventions including taxing unhealthy food, improving serving size, school level solution such as limiting access to unhealthy food.

**Research, surveillance & knowledge promotion**

There have been concerns in the past about the availability of evidence and surveillance in relation to obesity in the Canada. With the recent release of new surveys like CHMS, more information is available for dissemination and intervention. However, there is a gap in the existing population-level data. It is important to identify and fill those gaps for effective surveillance and future prevention strategy. All the sources of data should be utilized to obtain important and useful information. Among those
'administrative data’ which is economical and plentiful is one of the key sources for future planning.

Developing and implementing effective interventions need better knowledge about various approaches that work in different settings with different populations as well as economic analyses to assess value for money. Social inequities, as a determinant of obesity, are a key priority area for research for effective preventative strategies. The lack of understanding about how socio-economic factors, such as poverty and income inequality, can act to increase the risk of obesity among certain marginalized groups. Furthermore, much of the research conducted on obesity and health in Canada is not producing policy-related data and information, thus limiting its usefulness to policy analysts and policy makers. It is vital to formulate existing and new data into a useable format which is accessible to policy makers. There is a need to increase funding for less traditional areas of policy-related research, such as historical research, research on values, and synthesis of research findings.

In light of the concerns raised over policy-related obesity research, development of a long-term data collection framework has been proposed. This framework will

- Review existing data sources and identify data gaps.
- Develop research which could assist policy makers to make informed decisions.
- Address relevant privacy issues research.

The collection of evidence on obesity and health should be identified as a priority area for action and research and action on obesity should be conducted side by side.
Individual-based interventions

The Canadian clinical practice guidelines for obesity provide recommendations regarding the prevention, screening and management of obesity in the clinical and community health settings (47). These recommendations include education to encourage and support changes in behavior and attitudes; behavior modification training or therapy, including family-oriented behavior therapy for children; dietary interventions, such as an energy-reduced diet; regular physical activity in adults; and combined dietary and physical activity therapy among others (47-50).

Community-based interventions

Community-based obesity prevention interventions include programs delivered in key settings such as workplaces and schools. A number of initiatives at the community level can be effective in influencing level of physical activity and healthy eating that are known to affect obesity.

Early Child Care and School Health

The foundation for lifelong good health is set in childhood. Hence, a life course approach to address factors influencing behavior and choices relating to balanced diets and physical activity is vital to tackle obesity. Early childhood is an important period for obesity prevention (51). In 2002-2003, about 54% of Canadian children aged six months
to five years were in some type of non-parental child care (52). Child care providers are in a unique position to educate parents about healthy eating and activity habits, and also to provide a healthy environment for children to eat, play, and grow. Likewise, the school setting is a key location for health promotion within the community hub for the delivery of a variety of services and programs for all family members including provision of education on obesity related health risks, nutrition, and physical activity (53). School-based prevention programs, without additional resources, can help students to eat better, be more active, and achieve healthier weights. Nutrition and physical activity lessons can be integrated in core curriculum including classroom subjects, physical education, and after-school programs. Schools can also promote health outside of the classroom, by surrounding students with opportunities to eat healthy and stay active. The optimal physical education program will foster a lifetime commitment to physical activity as part of a healthy lifestyle (54).

*Urban Design and Transportation: Healthy Activity Environment*

An activity-friendly environment offers a variety of safe and affordable ways to be active thereby encourages physical activity (55). Community designs that discourage urban sprawl, prioritize recreation space, and facilitate safe walking and biking can increase everyday opportunities to be active (51). Mixed-use development by allowing residential and commercial uses near each other, lowering the cost of sports programs or equipment, ensuring more equal access to recreation spaces and places are some interventions that can promote active transportation in a community. In addition crime-
and violence-prevention measures to make neighborhoods feel safer is important to eliminate a major barrier to being active outdoors.

Inter-sectoral collaboration among transportation and city planners, private developers and employers, and community groups and educators is crucial for an activity-friendly environment to address obesity. Moreover, there should be further research on the relationship between urban design, transportation and physical planning and obesity for creation of best preventative strategies.

Food Secure Canada: Healthy Food Environment

Access to food is a fundamental human right (56). The food environment includes features of the community, such as the number and kinds of food outlets in a neighborhood as well as consumer experience, such as the kinds of foods that are available, affordable, and of good quality (57). Healthy food options may not readily be available, easily accessible, or affordable (58,55). There is evidence that low-income and underserved communities often have limited access to stores that sell healthy food, especially high-quality fruits and vegetables. Furthermore rural communities often have a higher number of convenience stores, where healthy foods are less available than in larger, retail food markets (59).

Agriculture policy that focuses on increased planting and buying of fresh fruits and vegetables and revenue policy that focuses on increasing taxes on unhealthy foods and subsidizing the cost of healthy choices can promote healthy food environment. Local governments can use zoning regulations to address health and welfare of residents,
who do not have access to healthy food by allowing designation of community food
gardens and farmers markets and by limiting commercial food retail, such as fast food
businesses. Communication policy can restrict advertisement on unhealthy foods.
Improving transportation options to food sources such as supermarkets and farmers’
markets by increasing bus routes or using supermarket-sponsored shuttle services can
increase a community’s access to healthy foods.

**Public policies**

Collaboration among various levels of government and broad stakeholder consultations
are required to balance environmental, economic, social and cultural needs and to
coordinate community planning and design (60). A number of public policy approaches
can be undertaken to address obesity at the population level. These include land
development, urban planning and transportation planning that promote active
commuting and recreational physical activity; subsidy programs to support healthy
eating (e.g. the Northern Fruit and Vegetable Pilot Programme in Ontario); financial
incentives to promote physical activity (e.g., the Children’s Fitness Tax
Credit and the Federal Tax Credit for Public Transit); food labeling to help consumers
understand the health implications of their choices; financial disincentives, such as a tax
on “unhealthy” foods and beverages; and regulation of marketing to children, especially
for energy-dense, nutrient-poor foods and beverages (60-63).

**Conclusions**
There has been dramatic increase in prevalence of obesity, in Canada, over the last 30 years. This growing crisis is leading into a huge financial burden. The factors that lead to obesity are multifactorial and complex. Strategies aimed at preventing weight gain and obesity are vital than merely treating obesity once it has developed. Encouraging healthy weights will require multidisciplinary approach in all sectors and government level. Social, economic, environmental and physical factors must be incorporated in health policies and procedure to implement the change.
References


   GA. Impact of overweight on the risk of developing common chronic diseases

   mass index and cancer: results from the Northern Sweden Health and Disease

   guidelines on the identification, evaluation, and treatment of overweight and

7. WHO Consultation on Obesity. Obesity: Preventing and managing the global
   March 14th 2014).

8. Power C, Jefferis BJ. Fetal environment and subsequent obesity: a study of


25. Statistics Canada, Canadian Health Measures Survey: Cycle 1 Data Tables: Introduction (Ottawa, Ont.: Statistics Canada, 2010). [www.statcan.gc.ca\pub\82-623-x\2010001\part-partie1-eng.htm](http://www.statcan.gc.ca\pub\82-623-x\2010001\part-partie1-eng.htm) (accessed March 13th 2014)


33. B. Nolin, P. Lamontagne and A. Tremblay, Nunavik Inuit Health Survey 2004, Quanupptaa? How are we? Physical Activity, Anthropometry and Perception of Body Weight (Québec.: Nunavik Regional Board of Health and Social Services, 2007).


41. INSPQ. The economic impact of obesity and overweight


51. Obesity prevention strategies. Harvard School of Public Health


(accessed September 2014)

52. Bushnik T. Child Care in Canada. Statistic Canada.


53. Lagarde F, LeBlanc CMA, McKenna M, et al. School policy framework : implementation of the WHO global strategy on diet, physical activity and health


Figure 1: Percentage of the population age eighteen years or above, who were obese (measured and self-reported), by year, in Canada during the period of 1978-2007.

Figure 2: Prevalence of self-reported obesity among men and women eighteen years and older, by age group, 2007

Figure 3: Prevalence of Self-Reported Obesity among People 18 Years and Older, by Province, and Year

Figure 4. Rates of overweight and obesity in G-7 countries in 2009-10.


Source: Center for Disease Control and Prevention; 1. Significantly different from estimate for Canada; 2. Use with caution (coefficient of variation 16.6%-33.3%)

Source: Center for Disease Control and Prevention; 1.Significantly different from 0 (p<0.005); 2. Estimate age-standardized by the method to the 2000 United States Census population using age groups 20-39, 40-59, and 60-74

Source: Center for Disease Control and Prevention; 1. Significantly different from 0 (p<0.005); 2. Estimate age-standardized by the method to the 2000 United States Census population using age groups 20-39, 40-59, and 60-74.
Figure 9: Prevalence of self-reported obesity among people eighteen years and older, by income decile, 2007

Figure 10: Obesity is caused by multiple factors that interact at various levels.
Figure 11: Obesity and overweight affect economy by direct (cost of treatment of illnesses associated with overweight or obesity) and indirect costs (Productivity losses, absenteeism and disability).

Figure 12: Strategies for Obesity Prevention.