Recommendations for an Obesity Reduction Strategy for British Columbians

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Ministry of Health Services
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Submitted by:
Centres for Public & Population Health
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Executive summary

The issue of an increasing overweight and obese population is a pressing health concern for British Columbia (BC). Nineteen per cent of the adult population in BC is obese and another 40% is overweight. Even more disturbing is the fact that 7% of children and youth are obese and another 20% are overweight. Research shows that excess weight in childhood continues into adulthood, suggesting that, without significant intervention, the steady increase from the past two decades will continue.

Being overweight or obese substantially increases the risk for many chronic diseases including diabetes (along with complications such as kidney disease, blindness and amputations), cardiovascular disease (high blood pressure, heart disease and stroke), various cancers, liver disease, gallbladder disease and osteoarthritis, as well as mental health problems and premature death. Along with the negative effects of obesity on health, obesity cost the province an estimated $860 million in 2006 ($450 million in direct costs and $410 million in indirect costs). If obesity rates remain stable, the economic costs (direct and indirect) are projected to be $1 billion by 2011 and $1.1 billion in 2016[1].

While these statistics are alarming, there is reason to be hopeful. There is widespread knowledge in BC about the risk factors, the causes and the consequences of obesity. There is growing awareness of the problem amongst all sectors of society, including the general public. There is a desire to take action and several initiatives are underway, some led by government, some by government organizations (e.g., health authorities and schools), some by non-government organizations and some by private industry.

The obesity epidemic is a result of decades of societal change which has created an obesogenic environment. Combatting obesity requires changes to the built (physical) environment, creation of more opportunities for physical activity and shifts in the food system to produce and market higher quantities of healthier food and beverages and fewer quantities of less-healthy ones. In addition, personal behaviours need to change, help needs to be provided to people who are overweight or obese and a better system created for monitoring obesity rates. These outcomes require action by individuals, all-of-society and all-of-government. Individual level changes will only be effective at a population level if accompanied by changes to the environment. The healthy choice needs to be the easy choice.

Tobacco reduction is an excellent example of a societal issue that is being addressed using a coordinated, multi-sector, multi-strategy approach. Strategies that have contributed to a reduction in tobacco use, many of which may apply to obesity reduction, include taxation, advertising restrictions, labelling, smoking bans in public buildings and workplaces and social marketing.

The recommendations in this report were developed following broad consultation across all sectors in BC including all levels of government, non-government organizations, professional groups, academics and representatives of the food and beverage industry. While there was consensus on many of the recommendations, there were differences of opinion in several areas (see Appendix 3). The BC Obesity Reduction Strategy (ORS) Task Force carefully considered the alternate viewpoints, the best available evidence and expert opinion, cost effectiveness and the range of options for the BC context in finalizing the recommendations to address the overweight and obesity epidemic in BC.

Ideally all recommendations in this report need to be addressed but in practice not all can be done right away and a phased-in approach will be required. Considering the work to date, estimates of cost effectiveness and the BC context, the recommendations have been grouped as:

- Immediate: building on existing actions, likely to be cost-effective and can be implemented in a short timeframe.
- Longer-term: can be initiated in the short-term but full implementation requires a longer timeframe.
- Leadership: facilitates implementation of the overall strategy.

Recommendations focus on:

- Tackling the obesogenic environment;
- Encouraging and increasing physical activity;
- Encouraging healthy food and beverage choices and discouraging less-healthy food and beverage choices;
- Enhancing health services; and
- Evaluating the effectiveness of initiatives and ongoing monitoring of obesity rates.

As obesity is more prevalent among vulnerable populations in BC (Aboriginal, rural and remote and socio-economically disadvantaged populations), a provincial plan should both address the needs of the entire population and give priority and targeted resources to these high risk groups.

Immediate actions:

1. BC government to take a leadership role in obesity reduction in BC by:
    a. Developing a coordinated, all-of-society and all-of government plan.
    b. Developing intersectoral mechanisms and processes involving government at all levels (federal, provincial, local, health authorities and school system), non-government organizations and private sector organizations to mobilize resources and take action on BC-specific obesity reduction initiatives.
    c. Giving priority to and targeting action at populations most at-risk for obesity (Aboriginal, rural and remote and socio-economically disadvantaged populations).
2. Extend the *Nutritional Guidelines for Vending Machines in BC Public Buildings* to:
    a. All food service venues in BC Public Buildings; and
    b. Vending machines and food service venues in local government buildings.
3. Extend the *Guidelines for Food and Beverage Sales in BC Schools* to licensed child care, pre-school and after-school programs.
4. Phase-in enhanced treatment services for overweight and obese people, starting with bariatric surgery and better adherence to clinical guidelines on managing obesity in primary care.

5. Implement regulatory measures which:
    a. Tax less-healthy food and beverages starting with sugar-sweetened beverages;
    b. Restrict the advertising, sponsorship and marketing of less-healthy food and beverages that are directed at children;
    c. Require food service establishments to make nutrition information visible to consumers at the point of service; and
    d. Align the price and quantity of sugar-sweetened beverages in food service establishments and prohibit free refills.
6. Through partnerships between governments, non-government organizations and the private sector, mobilize communities to:
    a. Create intersectoral healthy living/obesity reduction action plans for their community; and
    b. Adapt the EPODE (Europe) model (see Glossary of Terms) for prevention of childhood obesity by building on the SCOPE BC (see Glossary of Terms) project experience and expanding to other BC communities starting with those that are rural and remote.
7. Build on, coordinate and expand existing programs and initiatives which help licensed child care, pre-schools and schools adopt a comprehensive school-based health promotion approach, including the integration of food preparation skills, healthy eating and physical activity into the BC school curriculum.
8. Develop a program to monitor obesity rates in BC.

Longer-term actions:

1. Implement a social marketing/education campaign to promote healthy eating and physical activity.
2. Update programs and modify environments to support obesity reduction:
    a. Implement policies, practices and plans to improve the built environment and create new options for active transportation;
    b. Focus on hospitals, workplaces and communities to make them more breast-feeding friendly;
    c. Implement programs to reduce recreational screen time (television viewing and computer use); and
    d. Build on programs that improve access to healthy foods in rural and remote communities.
3. Make health promotion in the workplace a priority by implementing programs that support healthy eating, physical activity and healthy weights.

Leadership:

1. Consult, collaborate with and support Aboriginal communities and organizations in *their* development and implementation of an obesity reduction strategy.

2. Work with the federal government and the food and beverage industry to reduce the fat, sugar and sodium content of foods and portion sizes.

The BC government has an opportunity to take a strong leadership role in implementing a multi-sectoral, multi-strategy plan to reduce rates of obesity and overweight in BC. Effective action could make BC the first jurisdiction to reverse this epidemic and not only reduce rates of obesity and overweight but also:

- Improve the overall health of the population, reduce inequities and reduce the burden of most of the common chronic diseases such as diabetes, heart disease and cancer;
- Contribute to reducing health care costs and to the sustainability of the health care system;
- Contribute to economic productivity and growth; and
- Align with BC's plans for environmental sustainability.

Glossary of terms

Definitions for the purposes of this report:

BC Public Buildings: BC public buildings owned or leased by Her Majesty (through the Accommodation and Real Estate Services Division ("ARES"), Ministry of Labour and Citizens' Services,) or provincial public bodies, including health authorities, public post-secondary Institutions (i.e. university colleges, colleges and public institutions) and Crown corporations[2].

Built environment: man-made structures, including transportation infrastructure, schools, office buildings, housing and parks[3].

EPODE (Ensemble, Prévenons L'Obésité des Enfants: Together Let's Prevent Childhood Obesity): a collaborative that focuses on preventing childhood obesity. EPODE started in France and aims to create sustainable behavioural change at both population and individual levels by engaging multiple stakeholders such as government at the national and local levels, the school system, recreation organizations, the non-profit sector, health professionals, companies, shop and restaurant owners, local producers and media. EPODE has expanded to many towns and cities in France, Spain and Belgium and is being considered in other countries including Canada.

Food and beverage industry: businesses and their associations which produce, process, distribute, market and sell food and beverages in BC and/or to BC residents.

Food security: a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice[4].

Healthy eating: eating which is consistent with the principles outlined in Eating Well with *Canada's Food Guide* (2007). The guide describes the amount of food people need and what *type* of food is part of a healthy eating pattern. The eating pattern in Canada's Food Guide includes foods from each of the four food groups – vegetables and fruit, grain products, milk and alternatives and meat and alternatives – plus a certain amount of added oils and fats[5].

Healthy food choices: foods and beverages that are core to shaping a healthy eating pattern and include[6]:

- Fruits and vegetables, in particular those prepared with little or no added fat, sugar or salt;
- Grain products, in particular whole grains those lower in fat, sugar or salt;
- Lower fat milk and milk alternatives; and
- Lean meat, meat alternatives and fish, all prepared with little or no added fat or salt.

Healthy living: making positive choices that enhance personal physical, mental and spiritual health. A person makes these choices when he/she[7]:

- Eats nutritiously, choosing a variety of foods from all of the food groups as suggested by Canada's Food Guide;
- Builds a circle of social contacts to create a supportive environment of people who care for and respect him/her;
- Stays physically active to keep the body strong, reduce stress, and improve energy levels;
- Chooses not to smoke; and
- Puts an end to other negative lifestyle practices.

Less-healthy food choices: foods and beverages for which *Eating Well with Canada's Food Guide* recommends that consumption be limited and includes[8]:

- Cakes and pastries
- Chocolate and candies
- Cookies and granola bars
- Ice cream and frozen desserts
- Doughnuts and muffins
- French fries
- Potato chips, nachos and other salty snacks
- Alcohol
- Fruit flavoured drinks
- Soft drinks
- Sports and energy drinks
- Sweetened hot or cold drinks

Obesogenic environment: an environment that promotes obesity on a population level by encouraging physical inactivity and unhealthy food choices[9].

Physical activity: any body movement produced by skeletal muscles that requires energy expenditure[10]. This includes any movement such as crawling, walking, running, or lifting that one engages in. For the purposes of this paper physical activity includes recreational physical activity and sport.

Physically active: people 12 or older who self-report leisure time involvement in walking for exercise, downhill skiing or snowboarding, gardening or yard work, bowling, swimming, baseball or softball, bicycling, tennis, popular or social dance, weight-training, home exercises, fishing, ice hockey, volleyball, ice skating, basketball, in-line skating or rollerblading, soccer, jogging or running, golfing, exercise class or aerobics.

SCOPE (Sustainable Childhood Obesity Prevention through Community Engagement): a Child Health BC initiative which started in 2009 and applies and adapts for BC, the community-based EPODE model in two communities: Prince George and Abbotsford.

Social marketing: the use of principles and techniques to influence a target audience to voluntarily accept, reject, modify, or abandon a behaviour for the benefit of individuals, groups, or society as a whole[11]. Genuine social marketing embraces a community-based, health promotion approach to chronic disease management, engaging multiple stakeholders to plan, implement and evaluate population-based interventions[12,13] to address multiple levels of influence on health behaviours[14, 15].

1.0 Introduction

British Columbians pride themselves on being active and healthy, but the truth is that over the past few decades, much of the population has fallen victim to the same problems that have affected the rest of the western world: less physical activity, poorer eating habits and greater numbers of individuals who are overweight and obese than in previous decades. Obesity and overweight has now reached epidemic proportions in British Columbia, with 3 out of every 5 adults being classified as overweight or obese.

It is time to reverse this trend and to tackle the obesogenic environment that threatens people's health. This will require leadership and strong and bold action to create the required societal changes.

Many reports have been written about reducing obesity, and while some successful programs and interventions have made dents, obesity is a complex problem and actions to address it have been made without adequately tackling the obesogenic environment. Such actions are important in supporting individuals to make positive lifestyle changes.

The recommendations outlined in this report are different because:

- They focus on an **"all-of-society" and "all-of-government"** approach. Recommendations involve all levels of government, government organizations (e.g., health authorities and schools), non-government organizations, charitable organizations, academia, schools, citizen and community groups and private sector associations/industries and businesses. This all encompassing approach is important because of the multiple factors influencing obesity.
- They focus on **changing the obesogenic environment**, not just individual behaviours.
- They are **comprehensive** and involve the prevention of obesity (healthy eating, physical activity and the environment), the treatment of those that are overweight or obese and monitoring of overweight and obesity rates. Previous efforts focused mostly on prevention and, to a lesser extent, monitoring. Treatment was not typically considered in previous reports.
- They rely on **private sector** associations/industries and businesses and non-government and charitable organizations – in addition to government and health authorities – to mobilize the required resources.

Reduction in tobacco use in BC has been achieved through a combination of strategies:

- Social marketing and public/consumer education programs
- Health warnings on tobacco packages
- Tobacco cessation programs
- Limitations on advertising, sponsorship, displays and sales of tobacco
- Banning smoking in public and work places
- Increasing prices
- Ongoing monitoring

A similar multi-sector, multi-faceted approach will be required to reduce rates of obesity and overweight in BC.

Tobacco reduction is an excellent example of a societal issue that is being addressed using a coordinated, multi-sector, multi-strategy approach. Strategies that have contributed to a reduction in tobacco use, many of which may apply to obesity reduction, include:

- Social marketing and public/consumer education about the hazards of smoking;
- Identifying the hazards of smoking on tobacco packages;
- Development of tobacco cessation programs to support people to quit smoking;
- Restrictions on the sale of tobacco to children;
- Limitations on the advertising, sponsorship, display and sales of tobacco;
- Banning smoking in public and work places;
- Increasing the price of tobacco through taxation; and
- Ongoing monitoring of smoking rates in the population.

Of note is that social marketing and public education to reduce tobacco use were not effective until accompanied by regulatory measures which targeted the environment (e.g., restrictions on the advertising and sales of tobacco, smoking bans in public and work places, product labelling and taxation).

While there are many parallels between reducing tobacco use and obesity reduction, there are also many differences which makes obesity reduction an even greater challenge. Differences include[16]:

- Food is a requirement of life;
- Many obesity-causing foods provide some nutritional benefit;
- Exercise can help to offset overeating; and
- Whereas there is a relatively small number of large tobacco companies, there is a very large number and diversity of organizations involved in the production, processing, distribution and sales of food and beverages.

2.0 Facing the challenge

2.1 Scale of the problem

2.1.1 Prevalence of obesity and related complications

Obesity is defined as excess body fat accumulation that may impair health. There are several methods used to measure obesity, but the most common is the body mass index (BMI).

In adults, the BMI is defined as a person's body weight in kilograms divided by their height in metres squared (kg/m^2). The BMI can be calculated using actual or self-reported measures; however, self-reported measures tend to underestimate BMI, as individuals typically report greater heights and lower weights. Also, BMI does not differentiate between muscle mass and fat mass and therefore may not be reliable for pregnant women, athletes and body builders.

Adults with a BMI between 25.0 and 29.9 kg/m^2 are considered overweight. Those with a BMI of 30 kg/m^2 or more are considered obese, and those with a BMI of 40 kg/m2 or more are considered morbidly obese[17].

BC adults:

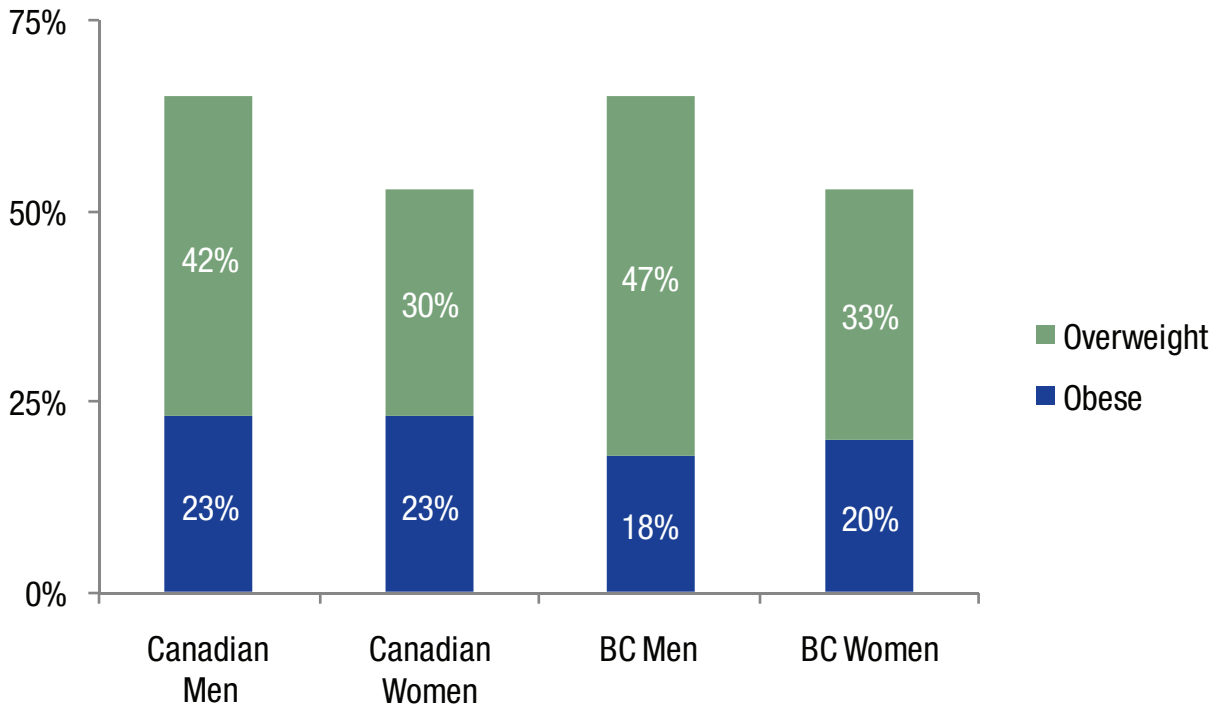
- 19% (nearly 1 in 5) is obese
- 40% (2 in 5) is overweight
- 1.8 million are obese or overweight

BC children:

- 7% (more than 1 in 15) is obese
- 20% (2 in 5) is overweight
- 189,500 are obese or overweight

Using 2004 Canadian Community Health Survey (CCHS) measured data, 600,000 adults (19% of all adults; 18% of men and 20% of women) in BC were classified as obese and another 1.2 million (40% of all adults; 47% of men and 32% of women) as overweight[18]. The BC rate for adult obesity was below the Canadian average of 23%, while the rate for overweight was above the Canadian average of 36%. In Canada, the rate of adults overweight and obese increased from 49% to 59% between 1978/79 and 2004.

Figure 1: Prevalence of Obese and Overweight in BC and Canadian Adults (18+) Based on Measured BMI (2004)



Source: Statistics Canada 2004 Canadian Community Health Survey: Nutrition

In children and youth (less than 18 years old), the definition of overweight and obesity based on BMI is more complicated because in normally-growing children, the relationship between weight and height fluctuates. Therefore, overweight and obesity is determined by plotting BMI to determine a BMI percentile for age and gender. Obesity is defined as a BMI >95th percentile and overweight as a BMI between the 85th and 95th percentile.

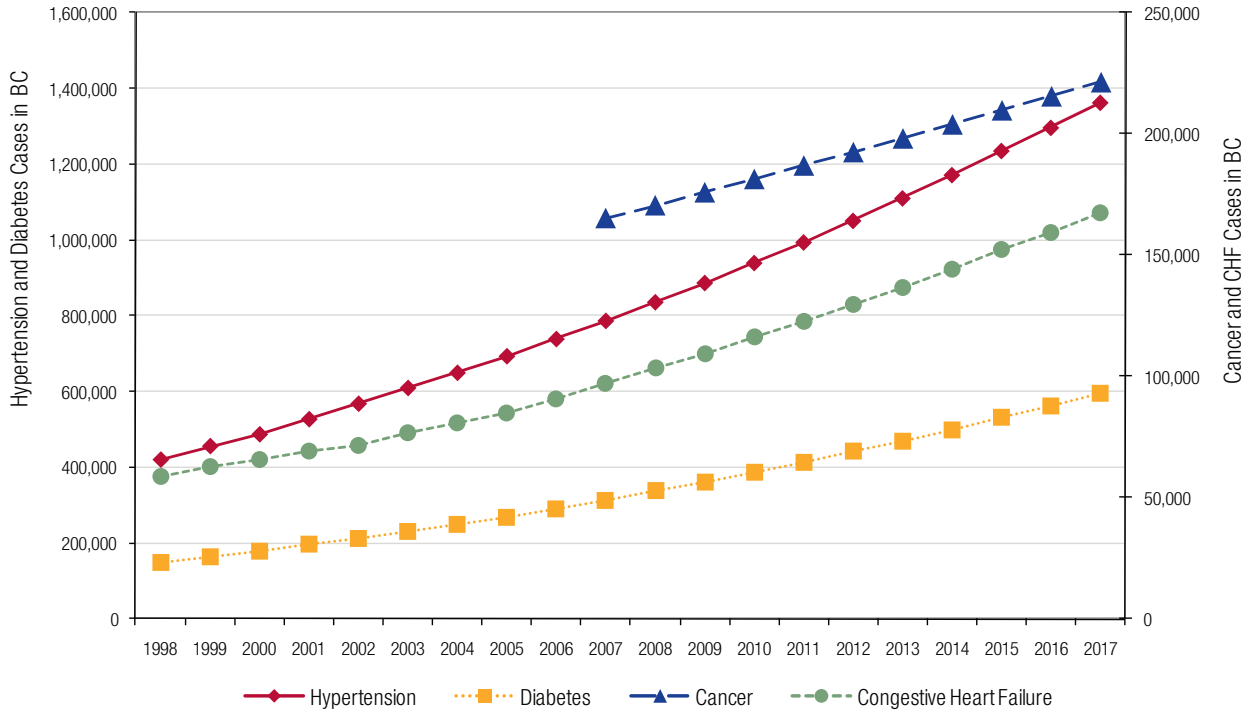
Using 2004 CCHS measured data, 51,000 children (7%) age 2 to 17 in BC were classified as obese and 138,500 (20%) as overweight[19]. The BC rate for childhood obesity was below the Canadian average of 8%, while the rate for overweight was above the Canadian average of 18%. The rate of overweight and obese children increased from 15% to 26% between 1978/79 and 2004[20]. The percentage of children aged 2 to 5 who were overweight or obese remained virtually unchanged during this period. By contrast, the overweight or obesity rate of adolescents aged 12 to 17 more than doubled from 14% to 29%, and their obesity rate tripled from 3% to 9%[21].

Being overweight or obese results in substantially increased risks for chronic diseases such as type 2 diabetes (along with complications such as kidney disease, blindness and amputations), cardiovascular diseases (high blood pressure, heart disease and stroke), various cancers (breast, colorectal, endometrial, esophageal, kidney, ovarian, pancreatic and prostrate), liver disease, gallbladder disease and osteoarthritis, as well as mental health problems such as depression and premature death[22].

Consistent with increases in the numbers of adults who are overweight and obese, the prevalence of obesity-related chronic diseases is steadily increasing and, unless action is taken, is expected to do so for the foreseeable future. The projected average annual increases in BC for diabetes, hypertension, congestive heart failure and cancer are 9.5%, 8.1%, 8.1% and 3.4% respectively.

Figure 2: Prevalence of Selected Obesity Related Chronic Diseases: Diabetes, Congestive Heart Failure, Hypertension and Cancer

(Diabetes, Congestive Heart Failure and Hypertension - observed cases 1998 to 2004, projected cases 2005 to 2017; Cancer - projected cases 2007 to 2017)



Sources:

Hypertension, diabetes and congestive heart failure - PHC Priority Population, Primary Health Care, Medical Services Division, BC Ministry of Health. PHSA projection was projected based on the trends of the average annual age-specific prevalent increments between 2002/03 and 2003/04 and between 2003/04 and 2004/05 and PEOPLE 31 population projection.

Cancer: BC Cancer Statistics from the Surveillance & Outcomes Unit of BC Cancer Agency (BCCA).

A recent Canadian study showed that 95% of children with type 2 diabetes were obese and almost 40% already had at least one complication as a result of their obesity or diabetes (i.e. high blood pressure, high cholesterol, kidney disease) at an average age of only 13.5 years[23]. If this trend continues and there is not appropriate remediation, the current generation of children may be the first in history to have a shorter lifespan than their parents.

2.1.2 Eating habits

Surveys were conducted in 1999 and 2004 that provide information about the food and nutrient intakes of Canadians (2004) and British Columbians (1999).

The surveys provide some interesting and relevant data related to overweight and obesity rates:

- 5 out of 10 Canadian women and 7 out of 10 men have energy intakes that exceed their energy needs. The same is true for 3 out of 10 adolescents and 1 out of 5 children[24].
- Nearly two-thirds of British Columbians did not eat enough fruit and vegetables[25].
- 25% of British Columbians' daily calories came from "other" foods that contained mostly fat, sugar and/or calories[26].

The survey results, combined with increasing obesity prevalence rates, suggest there is room for improvements at individual, societal, systems and environmental levels.

Calorie intake exceeds energy needs for:

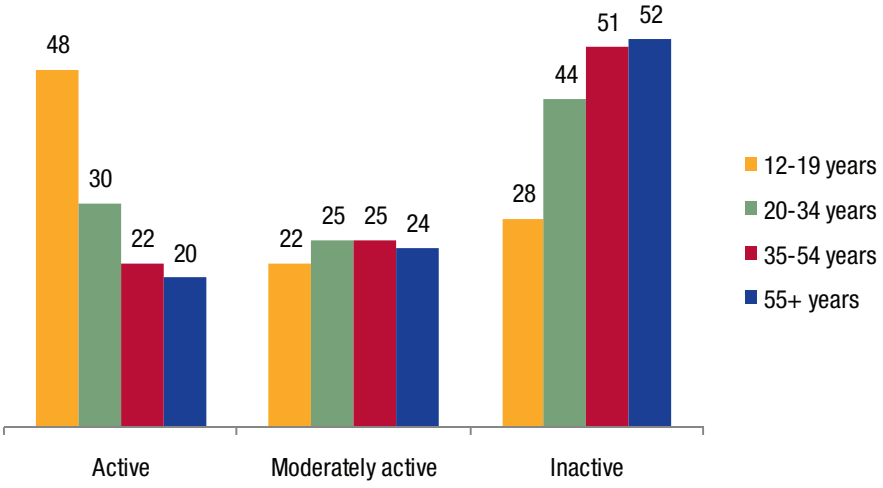
- 5 out of 10 Canadian women
- 7 out of 10 Canadian men

25% of British Columbians' daily calories come from "other" foods which are primarily foods that are high in fat and/or sugar such as butter, margarine, oils, cookies, cakes, donuts, chocolate, alcohol, pop, fruit drinks, jams, candy and chips.

2.1.3 Physical activity

Physical activity is an essential component of a healthy lifestyle. In BC, only 58% of those over age 12 are physically active. Rates range from 50% in Richmond to 70% in the Kootenay Boundary health service delivery area[27]. The BC rate is slightly higher than the Canadian average rate of 54%. Physical activity rates decrease with age, with 72% of the Canadian population between ages 12 and 19 being physically active and less than 50% of those over age 35 being active[28].

Figure 3: Level of Physical Activity, by Age, Canadian Population (2005)



Source: Statistics Canada, CANSIM Table105-0433[29]

2.2 Costs of obesity in BC

The costs of obesity are both direct and indirect. Direct costs are the health care costs for treating obesity and its complications. Indirect costs are those related to lost productivity because of the effects of obesity on the declining health of the workforce[30].

In 1997, the direct costs to BC for obesity-related diseases were estimated at $380 million per year and the indirect costs at $400 million, for a total cost of $780 million[31].

In 2006, the direct costs to BC for obesity-related diseases were estimated at $450 million per year and the indirect costs at $410 million, for a total cost of $860 million[32]. With no increase in prevalence rates, the economic costs (direct and indirect) are projected to be $1 billion by 2011 and $1.1 billion in 2016[33].

In 2006, obesity cost British Columbia $860 million per year:

- Direct costs: $450 million per year
- Indirect costs: $410 million per year

If there is no change to the obesity rate, these costs are projected to increase to $1 billion in 2011 and $1.1 billion in 2016.

The rising direct costs of obesity threaten the sustainability of the publicly-funded health care system. Reducing obesity rates will reduce this threat, improve the health of the population and ultimately increase productivity and promote economic prosperity.

2.3 Vulnerable/most at risk populations

While obesity affects almost all segments of society, there are some populations in BC that are at higher risk of being overweight or obese than others, including:

- Aboriginal people.
- Those living in rural and/or remote areas of BC.
- Socio-economically disadvantaged men, women and children.

A 'progressive universal' approach is suggested for the implementation of the recommendations in this report. This approach advocates for meeting the needs of the entire population, while at the same time, giving priority and targeting resources to more vulnerable groups. With this approach, there is a deliberate effort to ensure that inequities in health status related to obesity are neither created nor exacerbated.

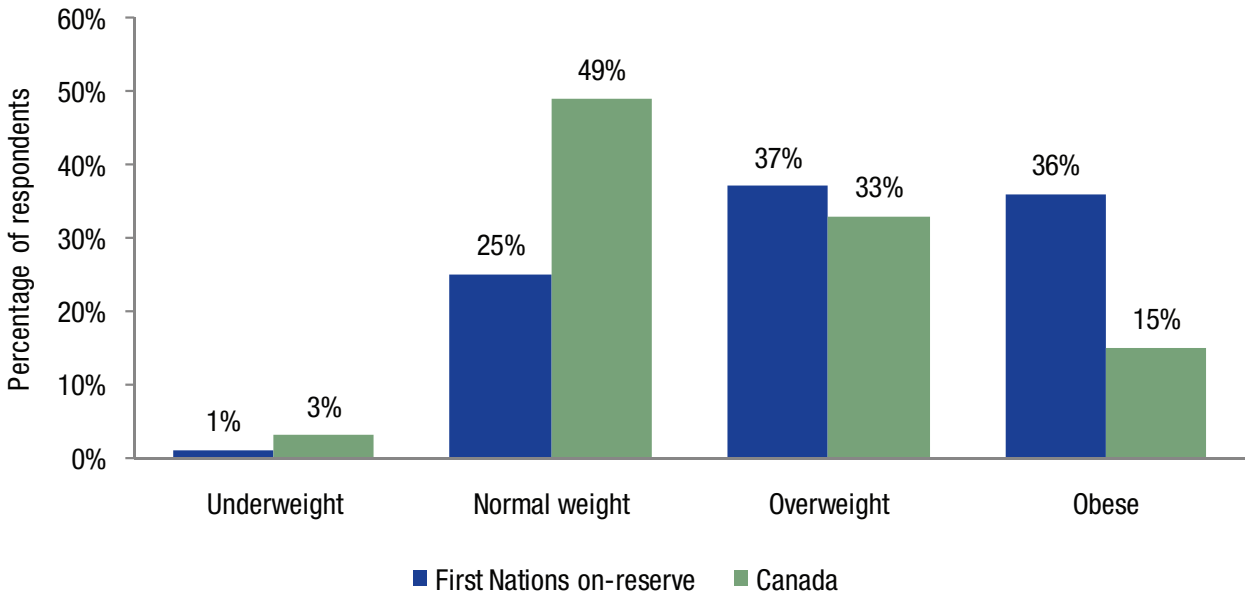
2.3.1 Aboriginal people

Using 2005 Canadian Community Health Survey *self-reported BMI* data (excludes people living on reserve), 23% of Aboriginal people age 18 years and older in BC were obese and 32% were overweight (total of 54%). This compares to 13% and 36% for other Canadian people reporting that they were obese or overweight respectively (total of 49%).[34] The difference is most pronounced in Aboriginal women[35].

The rates of overweight and obesity among First Nations children are two to three times higher than the rates for non-Aboriginal Canadian children[36].

Aboriginal people living on-reserve are also affected by higher rates of obesity and overweight than other Canadians. Self-reported 2002/2003 data indicated that 73% of First Nations people living on-reserve were overweight or obese compared to an already high rate of 48% among other Canadians (2003 self-reported data)[37].

Figure 4: Self-reported BMI Among Adults, First Nations On-reserve (2002-03) and Canada (2003)



Source: A Statistical Profile on the Health of First Nations in Canada: Determinants of Health, 1999 to 2003.

Challenges in accessing "traditional" foods such as fish, tendencies to eat western diets high in carbohydrates, simple sugars, and fats, and sedentary, inactive lifestyles have likely contributed to the epidemic of obesity and other chronic conditions among Aboriginal populations. Aboriginal groups clearly experience a disproportionate level of food insecurity due to poverty and remote locations[38].

2.3.2 Residents of rural and remote communities

Residents of rural and remote areas in BC are more at risk of being overweight or obese compared to those living in cities. For example, the prevalence of overweight or obesity ranges from 30% in Vancouver to 64% in the Northwest region[39].

Table 1: % Adults Overweight or Obese Self-reported in BC in 2007/08 by Health Service Delivery Area

Health Service Delivery Area	Total	Men	Women
BC	45%	53%	36%
East Kootenay	54%	69%	39%
Kootenay Boundary	50%	55%	45%
Okanagan	46%	52%	39%
Thompson / Cariboo	55%	60%	50%
Fraser East	50%	57%	43%
Fraser North	44%	53%	34%
Fraser South	44%	52%	36%
Richmond	32%	42%	23%
Vancouver	30%	39%	21%
North Shore / Coast Garibaldi	41%	50%	33%
South Vancouver Island	46%	55%	37%
Central Vancouver Island	53%	59%	47%
North Vancouver Island	52%	59%	45%
Northwest	64%	75%	52%
Northern Interior	61%	69%	53%
Northeast	62%	67%	56%
Canada	51%	59%	43%

Source: Statistics Canada, Canadian Community Health Survey, CANSIM annual data table 105-0501

2.3.3 Socio-economically disadvantaged men, women and families

In developed countries there is an overall gradient for obesity rates. Rates tend to decrease progressively with increasing socio-economic status, whether the latter is measured by income, education or occupation-based social class[40].

In Canada, men and women with lower levels of education have higher rates of obesity than those with higher levels of education (high school and above). From measured 2004 BMI data, 21% of Canadian women with a postsecondary degree were overweight or obese compared to 37% with less than a high school education and 32% with some postsecondary education. Among men, 22% with a postsecondary degree were obese as compared to 35% with less than high school[41]. Children and adolescents were more likely to be overweight or obese in households where a high school diploma or less was the highest level of education, compared to households with a postsecondary graduation level of education (31% vs. 25%)[42].

The relationship between obesity and income in Canada is similar to other jurisdictions. In 1986/92 there was a clear gradient with higher income men and women having lower obesity rates (high income men at 12% vs low income at 22%; high income women at 13% vs 26% for low income). In 2004 there was still the same gradient for women but a higher prevalence (19% of high income vs 28% of low income)

but had reversed for men (26% of high income men vs 21% for low income)[43]. Why in Canada there now appears to be more obesity among more affluent men is not well understood but may be related to the fact that among lower income men the rates of smoking are higher and there is more likelihood of being in occupations that involve more physical labour. Canadian children (age 2-11) living in poor families had an obesity rate of 25% compared to 16% in more affluent families[44].

The higher rates of obesity in socio-economically disadvantaged men, women and children in Canada have been explained by:

- Less-healthy food choices that alleviate hunger at low cost (such as fast foods, and foods high in fat, sugar, carbohydrates, salt and fat) and limited access to healthy food choices; and
- Limited time and resources to engage in recreational physical activities.

From the graphic in Figure 1, it can be seen that the prevalence of overweight (but not obesity) in men is considerably higher than in women suggesting that obesity rates in men may increase – this will require careful monitoring.

3.0 Obesity: a complex problem

At a simple level of analysis, obesity is caused by an imbalance between 'energy in' – the food consumed – and 'energy out' – what is used by the body primarily through physical activity. While that simple problem seems easy to solve, the role that the outside world plays in individual behaviour is significant.

Many external factors affect the choices people make – physical environment, time pressures, socioeconomic factors, advertising, and other outside influences. In today's world, food systems over-produce and encourage over-consumption of inexpensive, high calorie foods, built environments promote sedentary behaviours and socio-cultural shifts push people to prioritize "convenience eating" over healthy eating and physical activity.

3.1 Looking at interconnected causes and solutions

The common perception is that if only people ate less and did more, the problem of obesity would be solved. However, the reality is that there is an underlying complexity to obesity, which means that tackling it is difficult and requires a multifaceted approach. Obesity is the consequence of the interplay between a wide variety of variables and determinants related to individual biology, eating behaviours and physical activity, set within a social, cultural and environmental landscape.

Recognizing that obesity is a complex problem is a first critical step to understanding why it is such a challenging issue and why appropriate complex problem-solving approaches must be considered.

The focus of many of the reports to date that make recommendations to address the problem of obesity has been on behaviour change. While this is an important component of any response to obesity, it does not address the complexity of the problem. Recommendations have varied from the highly specific to the more generic, and they have varied in their basis from hard evidence, to "promising practices", to expert opinion and the opinion of the general public. With so many options for action and more recommended actions than can be realistically implemented, sorting through these actions can be difficult.[45]

3.2 Leadership for cooperative action

To effect true change at a systems level, community-wide action is needed that involves governments at all levels, non-profit organizations, health professionals and agencies, the private sector and other committed groups and individuals. By combining resources across sectors, change can be created not just in behaviours but also in the environment that played a role in creating these behaviours.

The BC government has an opportunity to take a strong leadership role in implementing a multi-sectoral, multi-strategy action plan to reduce rates of obesity and overweight in BC. Effective action could make BC the first jurisdiction to reverse this epidemic and not only reduce rates of obesity and overweight but also:

- Improve the overall health of the population and reduce the burden of most of the common chronic diseases such as diabetes, heart disease and cancer;
- Contribute to reducing health care costs and to the sustainability of the health care system;
- Contribute to economic productivity and growth; and
- Align with BC's plans for environmental sustainability.

4.0 Developing a multi-sectoral obesity reduction strategy for BC

4.1 Approaches recommended to address the obesity epidemic in BC and other jurisdictions

Several reports were reviewed to identify approaches and actions recommended to reduce obesity:

- BC Provincial Health Officer's Report. 2005. *Food, Health and Well-being in BC.*
- Legislative Assembly of BC. 2006. *A Strategy for Combatting Childhood Obesity and Physical Inactivity in BC.*
- BC Healthy Living Alliance. 2010. *Recommendations for Tackling Overweight and Obesity in BC: Submission to the BC Government from the BC Healthy Living Alliance.*
- World Health Organization. 2009. *Interventions on Diet and Physical Activity: What Works.*
- Centres for Disease Control and Prevention. *Division of Nutrition, Physical Activity and Obesity,* website accessed July 5, 2010.
- Centres for Disease Control and Prevention. 2009. *Recommended Community Strategies to Prevent Obesity in the US.*
- Institute of Medicine. 2009. *Local Government Actions to Prevent Childhood Obesity.*
- *Obesity in Australia: A Need for Urgent Action.* 2009.
- *Healthy Weight, Healthy Lives: A Cross-Government Strategy for England.* 2008.

While each of the reports offered different frameworks for their recommendations, several themes emerged in many or all of the reports:

- Addressing the obesity epidemic requires multiple interventions at multiple levels. No single intervention will be successful at reducing obesity in the population. Action by a variety of sectors not traditionally associated with "health" will be required.
- High-intensity school-based interventions to support healthy eating and physical activity were foundational to obesity reduction. Interventions included providing healthier snacks and meals at schools, banning or restricting less-healthy food and beverage choices, developing programs which support walking and bicycling to school, making physical education mandatory from kindergarten to grade 12, and actively involving parents in plans to reduce obesity in schools and, in some reports, at home.
- Expanding joint-use agreements to maximize the utilization of educational facilities after-hours was frequently recommended, as was extending the current restrictions on the sales of less-healthy food choices in schools to child care, pre-school, after-school programs and areas surrounding schools as well as to public buildings/venues.

- Limiting recreational screen-time (computers, television and video games) was the most common means recommended to reduce sedentary behaviour. Applying screen-time guidelines in child care, pre-school and after-school programs is suggested as a starting point.
- The importance of the built environment was identified, including urban designs which encourage safe and active transportation and neighbourhoods which incorporate grocery stores and multiple recreational opportunities.
- Healthy eating and increasing physical activity in socially and economically disadvantaged communities was discussed. Recommended interventions included providing subsidies for the production, transport and/or retailing of healthy food choices to/in these communities, creating incentives for retailers to locate grocery stores in these communities and reducing transportation barriers for people to access grocery stores and recreational opportunities.
- Community-based, intersectoral action was a recurring theme, including the development and spread of projects such as EPODE, Shape Up Somerville and Healthy Living Cambridge Kids.
- Workplace policies and programs which support healthy eating and physical activity were recommended.
- Development of baby and breastfeeding-friendly communities and workplaces were consistently identified as important themes.
- Education of consumers was commonly recommended, mostly through mass media and social marketing-type campaigns. Simplified ways to label healthy and less-healthy food choices were identified as important consumer education tools (both pre-packaged foods and foods sold in restaurants).
- Working with industry to reduce the fat, salt and sugar content of foods was a frequently mentioned recommendation.
- Regulatory and/or economic levers were recommended to support specific strategies such as reducing advertising to children and food labelling. Subsidies on healthy food choices and taxes on less-healthy food choices were also recommended.
- Prevention of obesity (most often targeting children) was stressed; few mentioned treatment (based on the belief that prevention was potentially more effective than treatment in reducing obesity at a population level). Where treatment was discussed, the recommendations involved increasing support at the primary care level and/or in the workplace. Some reports discussed the benefits of specialized bariatric surgery for the morbidly obese.
- The continuing need to build the evidence base and monitor rates of obesity was consistently recommended.

4.2 Efforts to date to address the obesity epidemic in BC

Since 2005, there has been a significant investment in strategies to increase healthy eating and physical activity in BC. The majority of coordinated efforts have been publicly-funded and led by the provincial or local governments and/or non-government organizations. Most of the initiatives have targeted school children and/or school environments and BC Public Buildings. Examples of initiatives include

the BC Government's ActNow BC initiative, the Aboriginal ActNow BC initiative, Action Schools! BC, lesson plans that form the Healthy Eating and Physical Activity Learning Resource, BC School Fruit and Vegetable program, the Farm to School Salad Bar, the Healthy Buddies Program, Sip Smart! BC and policies that limit vending machine options in schools and BC Public Buildings.

Representatives from the BC government have been actively participating in national discussions with industry representatives to reduce access to and consumption of less-healthy food choices:

- Development of national trans-fat guidelines (led by Health Canada).
- Development of voluntary national sodium reduction targets for the food industry (released in July 2010 with an objective of reducing the average sodium intake of Canadians to 2,300 mg per day by 2016)[i]. (led by Health Canada)
- Discussions to strengthen the code and related programs that address marketing and advertising to children (led by the Public Health Agency of Canada).
- Other discussions are expected in the near future to address issues such as serving sizes and the Nutrition Facts table (to be led by Health Canada).

Much has already been done to reduce obesity in BC:

- BC government's actions in BC schools and public buildings
- Discussions with industry to reduce trans-fat and sodium
- Initiation of two community-based, intersectoral action projects under SCOPE BC
- Establishment of the Centre for Healthy Weights – Shapedown BC program

However, much more needs to be done and this will require an intensive, coordinated, all-of-society and all-of-government approach.

Two community-based, intersectoral action projects to prevent childhood obesity were initiated earlier this year in BC, one in Abbotsford and one in Prince George, under the auspices of the Sustainable Childhood Obesity Prevention through Community Engagement (SCOPE) Project. This type of community-based, intersectoral approach has been successfully implemented in select European and United States communities, substantially reducing rates of childhood obesity over 3 to 5 years in those communities (specifics are discussed in the recommendation section 1.2 Mobilize communities). Ongoing monitoring and annual reporting on outcomes is included as part of the SCOPE project implementation. Community-based, intersectoral action projects similar to SCOPE are among a limited number of interventions that have shown a positive impact on childhood obesity rates at a population level.

In terms of treatment for overweight and obesity, there are no publicly-funded, comprehensive treatment programs for adults who are overweight or obese in BC. Bariatric surgery is available for a small number of morbidly obese adults but access has declined in recent years. There is no publicly-funded bariatric surgery program for youth in BC.

There are two publicly-funded centres for the treatment of obesity in youth in BC, one in Vancouver and one in Prince George (Centre for Healthy Weights - Shapedown BC Program).

i Although sodium by itself does not cause obesity, it is a common component in less-healthy foods, so contributes to the obesity problem.

There is a multitude of commercial weight loss programs in BC, although scientifically credible outcome evaluation has been minimal. Sustainment of weight loss has been identified as an issue.

Progress has been made on several fronts but the obesity problem continues. An intensive, coordinated, all-of-society and all-of-government approach is needed to reduce obesity rates in BC.

4.3 Summary of the consultative process used to develop the recommendations for an obesity reduction strategy for BC

In June 2009, in response to concerns from the public health community and health care system leaders, the Provincial Health Services Authority (PHSA), with the support of the Ministries of Health Services and Healthy Living and Sport, established a multi-sectoral Obesity Reduction Task Force to lead the development of recommendations for an Obesity Reduction Strategy (ORS) for BC. Four working groups were established: Food, Physical Activity, Treatment and Data & Evidence.

Each working group conducted a brief review of the literature and evidence and prepared a summary and analysis of the recommendations of related international, national and provincial reports. They completed a scan of the BC environment to identify current initiatives and gaps and then crafted options for policies, programs and education relative to their topic area to reduce obesity in BC.

The recommendations for an obesity reduction strategy for BC outlined in this report bring together the combined research and wisdom of the four working group reports, as well as the participation of more than 100 stakeholders who provided thoughtful comment and feedback at the Obesity Reduction Strategy Stakeholder Forum held on June 3, 2010 in Vancouver. See Appendix 2 for a listing of people and organizations that contributed to the development of this strategy.

While there was consensus on many of the recommendations, there were significant differences of opinion in several key areas, most of which involved BC-specific policy or regulatory action (taxes, advertising to children, front of package product information on pre-packaged foods, product information on menu items in food service establishments and expanding the vending machine guidelines to local government buildings). The BC ORS Task Force carefully considered the alternate viewpoints, the best available evidence and expert opinion, cost effectiveness and the range of options for the BC context in finalizing the recommendations in this report. While arguments in favour of consumer education, self-regulation and avoiding singling out/penalizing one sector(s) of the industry were discussed, the ORS Task Force felt that the seriousness of the obesity epidemic required a more aggressive, action-oriented approach. Voluntary measures by industry have not been successful in reducing obesity rates at a population level in other jurisdictions. A discussion of the alternative viewpoint for each area of divergent opinion is available in Appendix 3.

5.0 Recommendations for an Obesity Reduction Strategy for BC

5.1 Purpose

The recommendations in this report support the targets originally established by the BC government for chronic disease prevention, which aim to:

1. Reduce the percentage of BC adults who are overweight or obese by 20%.
2. Increase the percentage of the BC population who are physically active by 20%.
3. Increase the percentage of the BC population (aged 12+) who eat fruits and vegetables at least five times per day by 20%.

Recommendations focus on:

- Tackling the obesogenic environment;
- Encouraging and increasing physical activity;
- Encouraging healthy food and beverage choices and discouraging less-healthy food and beverage choices;
- Enhancing health services; and
- Evaluating the effectiveness of initiatives and ongoing monitoring of obesity rates.

5.2 Recommendations

Recommendations for an ORS for BC are divided into 9 themes:

As obesity is more prevalent among vulnerable populations in BC (Aboriginal, rural and remote and socio-economically disadvantaged populations), a provincial plan should both address the needs of the entire population and give priority and targeted resources to these high risk groups.

1.0 Develop a coordinated approach to obesity reduction in BC.

- 1.1 Leadership by the BC government; action by all-of-society and all-of-government
- 1.2 Mobilize communities
- 1.3 Aboriginal specific obesity reduction strategy

2.0 Promote active, healthy living.

- 2.1 Supportive built environments

- 2.2 Comprehensive school-based health promotion approach and healthy eating and physical activity policies in licensed child care, pre-school and after-school programs
- 2.3 Reduce recreational screen-time

3.0 Increase access to healthier food choices and reduce access to less-healthy food choices.

- 3.1 Policies and programs
- 3.2 Economic levers

4.0 Support consumers to make healthier food and lifestyle choices.

- 4.1 Social marketing/consumer education
- 4.2 Restrict advertising, sponsorship and marketing to children
- 4.3 Point-of-purchase strategies, including product information in food service establishments

5.0 Promote healthy weights during pregnancy and the early years.

- 5.1 Prenatal care and breastfeeding
- 5.2 Early years

6.0 Focus on the workplace.

- 6.1 Health promotion in the workplace

7.0 Care for those who are overweight and obese.

- 7.1 Continuum of overweight/obesity services

8.0 Develop partnerships with the federal government and other provinces and territories.

- 8.1 Federal partnerships and collaboration

9.0 Monitor the progress and impact of the actions taken.

- 9.1 Evaluate the implementation and effectiveness of the recommendations
- 9.2 Ongoing monitoring

Obesity Reduction Strategy: Themes

1. Develop a coordinated approach to obesity reduction in BC.
2. Promote active, healthy living.
3. Increase access to healthier food choices and reduce access to less-healthy food choices.
4. Support consumers to make healthier food and lifestyle choices.
5. Promote healthy weights during pregnancy and the early years.
6. Focus on the workplace.
7. Care for those who are overweight and obese.
8. Develop partnerships with the federal government and other provinces and territories.
9. Monitor the progress and impact of the actions taken.

The next section includes a discussion of each theme and a listing of recommendations with an estimate of the cost and potential effectiveness of each. Potential players are identified to participate in the implementation of each of the recommendations. Where it was straightforward, a lead player is also identified; where it was not straightforward, a lead player will need to be identified as part of the detailed implementation planning.

Abbreviations used for the estimates of cost and potential effectiveness are:

H	High
M	Medium
L	Low

Abbreviations for potential players to participate in implementation of the recommendations are:

A	Academia
CG	Consumer groups
FG	Federal government
HAs	Health authorities
HPs	Health professionals
I	Industry (food and beverage, recreation & entertainment)
Indiv	Individuals, families, caregivers

LG	Local government
M	Media
NGOs	Non-government organizations
PG	Provincial government
SD&S	School districts & schools
Workplaces	Employers, unions, employees and associations

Ideally all recommendations will be addressed but in practice not all can be done right away and a phased-in approach will be required. Considering the work to date, estimates of cost effectiveness and the BC context, the recommendations have been grouped as:

Immed	Immediate	Building on existing actions, likely to be cost-effective and can be implemented in a short timeframe.
LT	Longer-term	Can be initiated in the short-term but full implementation requires a longer timeframe.
Leadership	Leadership	Facilitates implementation of the overall strategy.

Recommendations

1. Develop a coordinated approach to obesity reduction in BC.

1.1 Leadership by the BC Government; action by all-of-society and all-of-government

There are many worthwhile initiatives underway to reduce obesity in BC which are being led by federal, provincial and local level governments, government organizations (e.g., health authorities and schools), non-government organizations and the private sector. Coordination of these initiatives in the form of an action plan which involves all-of-society and all-of-government, tackles the obesogenic environment, supports individuals in making positive lifestyle changes and includes functional goals and measures is essential. The former ActNow Assistant Deputy Minister's Committee, now the Cross-Government Chronic Disease Prevention Committee already exists and could take a leadership role in the coordination of cross-provincial government initiatives.

The BC government, while not expected to solve the obesity epidemic on its own, has an important role in leading the development and implementation of a plan for BC. Leadership, participation and action by other levels of government and all-of-society will be necessary for implementation of the plan and reversal of the obesity epidemic. It was this kind of leadership and cooperative action that led to a reduction in the numbers of people who smoke and reduced drinking and driving over the past decade. The same should work for reducing obesity.

As discussed in section 2.3, there are some populations in BC that are at higher risk of being overweight or obese than others, including:

- Aboriginal people.
- Those living in rural and/or remote areas of BC.
- Socio-economically disadvantaged men, women and families.

A provincial obesity action plan should address the whole population of BC but priority and targeted resources need to be given to these higher risk populations as the recommendations in this report are implemented. Another consideration that is beyond the scope of this report but critical to reducing obesity rates in these populations is the need for improvements in the underlying health determinants (e.g., income, housing, food security, education and training and work and working conditions).

Recommendations	Players	Timeline	Cost & Effectiveness
1.1.1 BC government to take a leadership role in obesity reduction in BC by: ■ Developing a coordinated, all-of-society and all-of-government plan. ■ Developing intersectoral mechanisms and processes involving government at all levels (federal, provincial, local, health authorities and school system), non-government organizations and private sector organizations to mobilize resources and take action non BC-specific obesity reduction initiatives. ■ Giving priority to and targeting actions at populations at higher risk for obesity (Aboriginal people, those living in rural and/or remote areas and socio-economically disadvantaged men, women and families).	Lead: PG Implement: All	Immed	Cost: L Effectiveness: H (potentially)

1.2 Mobilize communities

Community level action, through formal or informal coalitions and networks, is an important component of an obesity reduction strategy. Community coalitions are groups of public- and private-sector organizations that, together with individual citizens, work to achieve a shared goal through the

coordinated use of resources, leadership and action[46]. Many formal and informal healthy eating and physical activity related coalitions and networks exist in BC communities, each of which has a specific focus. Creating opportunities to bring people from each of these initiatives together to develop a coordinated, intersectoral community-based action plan for people of all ages would be beneficial and would build on work that is already underway.

Community-based approaches to childhood obesity prevention have been successful in programs such as EPODE (Ensemble, Prévenons L'Obésité des Enfants: Together Let's Prevent Childhood Obesity) in Europe and Shape Up Somerville and Healthy Living Cambridge Kids in the United States. These programs are collaborative initiatives that aim to create sustainable behavioural change at both the population and individual levels by simultaneously engaging multiple stakeholders such as government at the national and local levels, the school system, recreation organizations, the non-profit sector, health professionals, companies, shop and restaurant owners, local producers and media. The results of these initiatives have been very positive in small and medium sized communities. Similar models have yet to be tested in large, metropolitan communities.

These community-based collaborative processes are among the few interventions so far identified in the world literature that have shown evidence of a reduction of obesity prevalence population-wide.

An evaluation of EPODE in 9 communities showed a decrease in the prevalence of obesity and overweight from 20.5% to 18.6% over a 2-year period (2005-2007)[47]. Although the magnitude of these numbers may seem modest, it has to be remembered that the prevalence of obesity and overweight in communities that did not have an EPODE program increased by 3.5% over a 10-year period (1992-2002)[48]. Thus, a 1.9% decrease in the prevalence of obesity and overweight over 2 years actually reflects a tremendous impact of the intervention.

Evaluation of the Shape Up Somerville initiative 1-year post implementation showed a significant decrease in BMI when compared to control communities with a similar demographic profile[49]. Three years after implementation of the Healthy Living Cambridge Kids program, the proportion of obese children decreased from 20.2% to 18.0%[50] .

Sustainable Childhood Obesity Prevention through Community Engagement (SCOPE) is a BC initiative that started in 2009 and is applying this proven approach to childhood obesity prevention in two communities: Prince George and Abbotsford. There is an excellent opportunity, building on the EPODE experience, for the BC government to take a lead in coordinating an intersectoral process with NGOs and the private sector to mobilize the resources to implement SCOPE more widely across BC communities.

Recommendations	Players	Timeline	Cost & Effectiveness
1.2.1 Build on successful initiatives already underway in BC communities and integrate into local intersectoral healthy living/obesity reduction action plans for each community.	All	Immed	Cost: L Effectiveness: H (potentially)

Recommendations	Players	Timeline	Cost & Effectiveness
1.2.2 Adapt the EPODE (Europe) model for prevention of childhood obesity by building on the SCOPE BC project experience and expanding to other BC communities, starting with those that are rural and remote.	All	Immed	Cost: M-H initially, then L-M (with private sector support) Effectiveness: H

1.3 Aboriginal specific obesity reduction strategy

Several initiatives are underway to address obesity and obesity-related issues/complications in Aboriginal populations (e.g., food security, diabetes and other chronic diseases). Forty community-based healthy eating and active living projects are underway under the umbrella of Aboriginal ActNow BC. This active living, health promotion strategy incorporates Aboriginal people's knowledge and traditional approaches to healing, while supporting the role of communities in the health and well-being of their people[51].

Reducing obesity in children has been identified as one of seven key target areas in BC by First Nations health leaders. Support for the strategy by governments and other organizations will be important to the success of the strategy.

Recommendations	Players	Timeline	Cost & Effectiveness
1.3.1 Consult, collaborate with and support Aboriginal communities and organizations in *their* development and implementation of an obesity reduction strategy.	Lead: Aboriginal communities Participants: All	Leadership	Cost: H Effectiveness: H (potentially)

2. Support active, healthy living.

Supportive built environments

The built environment consists of all man-made structures, including transportation infrastructure, schools, office buildings, housing and parks.

Recent research demonstrates that the built environment impacts levels of physical activity and eating habits[52]. Altering the built environment through strategies such as changing zoning bylaws to encourage the development of complete, appropriate-density communities with adequate parks, playgrounds, recreation centres and grocery stores and creating safe infrastructure for walking and bicycling can reduce the reliance on automobiles and encourage more active means of transportation. One U.S. study reported that one-fifth of all automobile trips in urban areas are one mile or less, and over two-fifths of

these trips are less than 3 miles, suggesting there is significant potential to shift people from cars to more active forms of transportation in urban communities[53].

In addition to the external built environment, internal building design also has a role to play in encouraging healthy lifestyles. Designing buildings so that stairs are more convenient than elevators, creating showers and secure bicycle storage and making drinking fountains accessible are examples of design features which encourage healthier lifestyles. Inclusion of kitchen areas in schools is also important to help students learn food preparation and cooking skills.

Achieving a shift in the built environment requires strong partnerships between local governments (including the planning, engineering and parks and recreation departments), the health sector and organizations that are committed to building social and community networks. The establishment of a small grant process (in the $10,000 - $20,000 range) and the development of a scorecard system to help communities assess progress against standardized measures are recommended as ways to support local governments in incorporating healthy living policies and programs into their community plans.

These recommendations to improve the built environment align well with government efforts to address environmental sustainability.

Recommendations	Players	Timeline	Cost & Effectiveness
2.1.1 Create or revise policies, practices and plans related to land use and transportation to promote healthy living, including: ■ Developing complete, appropriate-density communities with infrastructure that facilitates safe, accessible and active transportation such as bicycle paths, bicycle lanes, bicycle racks, shared-use paths, sidewalks, lighting, street crossings, traffic calming and walking school buses. ■ Increasing public transit capacity and accessibility. ■ Providing ready access to healthier food, such as space for community gardens, locations for farmers' markets and proximity to grocery stores which sell healthy food choices. ■ Providing ready access to opportunities for physical activity such as playgrounds, parks and recreation centres.	LG, I, NGOs, PG, SD&S	LT	Cost: M Effectiveness: L-M
2.1.2 Educate the public about the importance of land use and transportation planning decisions on health.	CG, HAs, LG, Media, NGOs, PG, SD&S	LT	Cost: M Effectiveness: L-M

Recommendations	Players	Timeline	Cost & Effectiveness
2.1.3 Develop building standards that encourage healthy living and implement in BC Public Buildings and local government buildings (e.g., design buildings that make stairs more convenient than elevators, create showers and secure bicycle storage and making drinking fountains accessible).	LG, NGOs, PG, HAs, SD&S	LT	Cost: M Effectiveness: L-M
2.1.4 Implement a grant process and community scorecard system to support local governments to incorporate healthy living policies and programs into their community plans.	PG	Immed	Cost: M-H Effectiveness: H
2.1.5 Implement strategies to improve the safety (and perception of safety) of neighbourhoods, such as block watch programs and parent park-minding programs.	Indiv, LG, M, NGOs, SD&S	LT	Cost: L Effectiveness: L-M
2.1.6 Expand the implementation of neighbourhood learning centres across BC, including the community use of schools to support healthy living.	LG, NGOs, SD&S	LT	Cost: L Effectiveness: L-M

2.2 Comprehensive school-based health promotion approach and healthy eating and physical activity policies in licensed child care, pre-school and after-school programs

Child care, pre-school, school and after-school settings offer powerful opportunities to influence children and youth to develop healthy behaviours that could endure for life. These children, in turn, have the potential to influence parents and families to adopt healthy behaviours at home. Parents, on the other hand, have the potential to influence the behaviours of children. Children of two obese parents have 2.2 times the risk of being obese compared with children of two normal-weight parents; this increases to 22.3 times the risk if both parents are severely obese[54]. This inter-relationship points to the need for a multi-prong approach that includes children, parents and their families.

A comprehensive school-based health promotion approach involves parents and the broader community and focuses on teaching health knowledge and skills in the classroom, changing the social and physical environment of the school and creating links with the wider community. This type of approach has shown to be effective in encouraging healthy eating and physical activity in children and youth and in improving health and educational outcomes[55].

In BC, several schools have been successful in incorporating health promoting approaches into their curricula, school programs and/or environment. Learning from these schools and building on, coordinating and expanding existing programs and initiatives will further help schools adopt a comprehensive health promotion approach.

One of the health promoting concepts that BC schools are required to implement is daily physical activity for their students. The requirement for students up to grade 9 is 30 minutes per day and it is 150

minutes per week for students in grades 10 to 12. There is currently no system to monitor whether this requirement is met and anecdotally there appears to be significant variation.

With some adaptation, the comprehensive school-based health promotion approach can be applied to licensed child care, pre-school and after-school programs. Some programs have successfully incorporated this approach and their experience can be used to assist others. Examples of health promoting initiatives in these settings include guidelines for duration of play, lessons on healthy eating, use of LEAP BC (Literacy, Education, Activity and Play) resources for families, caregivers and early learning practitioners to integrate literacy, education, activity and play and the development of school-based early learning services for adults and their young children such as StrongStart BC.

Recommendations	Players	Timeline	Cost & Effectiveness
2.2.1 Build on, coordinate and expand existing programs and initiatives which help schools adopt a comprehensive school-based health promotion approach (K-12).	HAs, PG, SD&S	Immed	Cost: M Effectiveness: M-H
2.2.2 Monitor whether the 30 min daily physical activity requirement in schools (K-12) is being met; provide support to schools where the requirement is not being met.	PG, SD&S	Immed	Cost: L Effectiveness: L-M
2.2.3 Conduct an analysis of the cost effectiveness of increasing the daily activity requirement in schools from 30 to 60 min (K-12) and using a physical education specialist to offer the program.	PG, SD&S	LT	Cost: M Effectiveness: L-M
2.2.4 Support parents to create home environments for themselves and their families that encourage them to adopt healthy habits related to eating and physical activity. Consider starting with a program that targets parents and caregivers of vulnerable children such as those in government care.	Indiv, HAs, I, M, NGOs, PG, SD&S	Immed	Cost: L Effectiveness: M
2.2.5 Support licensed child care, pre-school and after-school programs to apply a health promoting approach to their programming and physical environment.	HAs, I, M, NGOs, PG, SD&S	LT	Cost: M Effectiveness: M-H

2.3 Reduce recreational screen time

Research has linked excessive television viewing and computer use in children and adolescents to a variety of health and social problems. Screen time competes with time for participation in physical activity and exposes children to inappropriate advertising (e.g., commercials for less-healthy foods that are high in calories)[56]. A Canadian Institute for Health Information study reported that the most significant

behavioural difference between overweight and non-overweight Canadian grade school children and male youth was the amount of time spent in front of a television, video or computer screen[57].

The Canadian Paediatric Society recommends that screen time in children and adolescents be limited to no more than 2 hours per day. The Health Behaviour in School-aged Children (HBSC) Survey's most recent cycle (2005-2006) reported that Canadian youth are accumulating more than 6 hours of screen time on weekdays and more than 7 hours per day on weekends (20 hours per week). Children most at risk of spending a lot of time in front of screens are adolescents, those with parents with lower education, those from larger communities, those not participating in organized activities, those with inactive parents and children with disabilities[58]. The explosion in mobile and online media, more children owning mobile media and increases in home internet access have contributed to increases in screen time in recent years.

Screen time:

- The average Canadian child spends more than 20 hours per week in front of a "screen."
- More than 90% of children start watching television before age 2; most start at 5 months old.

In addition to more hours, children are watching television at a younger age. In 1971, the average age at which children began to watch television was 4 years old; today, it is 5 months[59]. More than 90% of children begin watching television before age 2 despite recommendations to the contrary[60]. Canadian data from the 2004/2005 National Longitudinal Survey of Children and Youth (NLSCY) indicated that 27% of children aged from 2 to 3 years and 22% of children aged from 4 to 5 years were watching more than 2 hours of television per day.

Strategies suggested by an expert US panel[61] brought together to discuss children, television and weight status included:

- Using school-based curricula to reduce children's screen time
- Eliminating television from children's bedrooms
- Encouraging mindful viewing by monitoring media watched
- Budgeting television time and deliberately choosing programs to be viewed
- Turning off the television while eating
- Providing training for health care professionals to counsel on reducing children's media use

Delivering a classroom-based screen time reduction curriculum was one of the few strategies supported by evidence that reduces the effects of television viewing on children's weight[62]. School-based education programs that focus on screen-time reduction are effective in reducing screen time and obesity. One randomized controlled study demonstrated a significant decrease in BMI and waist circumference in grade 3 and 4 students that participated in an 18-lesson (18 hours), 6-month school based program to reduce television, videotape and video game use[63]. The program was taught by the classroom teachers and included self-monitoring and self-reporting of television, videotape, and video game use, television turnoff during which children were challenged to watch no television or videotapes and play no video games for 10 days. After the turnoff, children were encouraged to follow a 7-hour per week time budget. Additional lessons taught children to become "intelligent viewers" by using their viewing and video

game time more selectively. Several final lessons enlisted children as advocates for reducing media use. Newsletters that were designed to motivate parents to help their children stay within their time budgets and that suggested strategies for limiting television, videotape, and video game use for the entire family were distributed to parents.

Screen-time reduction curriculum has also been successfully applied in preschool settings[64].

Recommendations	Players	Timeline	Cost & Effectiveness
2.3.1 Implement classroom-based curriculum for reducing recreational screen time in BC schools.	NGOs, PG, SD&S	LT	Cost: L Effectiveness: M-H
2.3.2 Educate parents and the public about guidelines and strategies for reducing recreational screen time.	Indiv, NGOs, PG, SD&S	LT	Cost: M-H Effectiveness: unknown
2.3.3 Continue to partner with the entertainment technology industry to develop tools to allow parents to manage the time that their children spend playing games and on-line.	FG, I, PG, SD&S	LT	Cost: L (high to industry) Effectiveness: unknown
2.3.4 Continue to partner with the entertainment technology industry to develop more physically active video games.	FG, I, PG	LT	Cost: L (high to industry) Effectiveness: unknown

3. Increase access to healthy food choices and reduce access to less-healthy food choices.

3.1 Policies and programs

The BC Nutrition Survey (2004) showed that only one-third of British Columbians (35%) met the minimum recommendations in *Eating Well with Canada's Food Guide* for vegetable and fruit consumption on a given day. In contrast, other foods, primarily high in fat and/or sugars, comprised about 25% of the energy intake of adults on a given day[65]. These habits, in addition to larger portion sizes, are contributing to the obesity problem in BC.

Access to healthy food and beverages positively impacts people's choices. On the other hand, the absence of access to such options is a factor in choosing foods that are less-healthy. While some of the changes required to shift the balance in access from less-healthy to healthy food choices are being worked on federally (see recommendation 8.0), BC-specific policies and programs can be developed in certain areas to generate short-term action. An incremental approach to applying existing policies and programs to new settings, beginning with BC Public Buildings and local government buildings, is

proposed as an effective way to lead the public to healthier choices. This strategy was shown to be effective in reducing tobacco use.

Considerable work has been done in BC schools and, to a lesser extent, BC Public Buildings to increase access to healthier food choices and to reduce access to less-healthy food choices. Guidelines have been developed for food and beverage sales in BC schools and for vending machine sales in BC schools and BC Public Buildings. These guidelines are based on the recommendations in *Eating Well with Canada's Food Guide* and provide direction for operators of BC schools and BC Public Buildings about specific food and beverage choices which may or may not be sold. Extending these guidelines beyond vending machines to food service establishments that operate in BC Public Buildings would promote the healthier choice becoming the easier choice.

The BC Healthy Living Alliance (BCHLA) has been working with local governments to implement the guidelines for healthier food products in local government buildings. The response to date has been very positive and this work offers a prototype for supporting other local governments to move in this direction.

Similar guidelines could be developed and applied to licensed child care, pre-school and after-school programs in BC, as well as geographic areas that surround schools. Healthy eating habits early in life are important to developing healthy eating habits and healthy weights later in life.

People who live in rural and remote communities have higher rates of overweight and obesity than those living in urban communities. One of the factors is the higher cost of and availability of food, especially healthier food. Programs such as BC's Produce Availability Initiative are important in improving access to fresh produce, vegetables and fruit in rural and remote communities.

Recommendations	Players	Timeline	Cost & Effectiveness
3.1.1 Extend the Nutritional Guidelines for *Vending Machines in BC Public Buildings* to all food service venues in BC Public Buildings.	PG, I	Immed	Cost: L (may be high cost to industry) Effectiveness: H
3.1.2 Expand the implementation of the *Nutritional Guidelines for Vending Machines in BC Public Buildings* to all food and beverage sales in local government buildings, including vending machines and all food service venues.	LG, I, NGOs, PG	Immed	Cost: M (may be high cost to industry) Effectiveness: H
3.1.3 Implement the *Guidelines for Food and Beverage Sales in BC Schools* in licensed child care, pre-school and after-school programs through government regulation, adapting as required for these settings.	I, NGOs, PG, SD&S, program operators	Immed	Cost: M (may be high cost to industry) Effectiveness: H

Recommendations	Players	Timeline	Cost & Effectiveness
3.1.4 Restrict less-healthy food and beverage sales in geographic areas surrounding schools.	LG, PG, SD&S	LT	Cost: L (may be high cost to industry) Effectiveness: unknown
3.1.5 Build on programs that improve access to healthy food choices in rural and remote communities.	LG, I, PG	LT	Cost: M Effectiveness: unknown

3.2 Economic levers.

There is strong and convincing evidence that excessive consumption of less-healthy food and beverages is associated with excess weight gain in both children and adults.

Studies have shown that if the price of a particular food or beverage increases or decreases, consumption will decrease or increase. Research has shown that the purchase of healthy food choices increase when prices decrease and the purchase of less-healthy food choices decrease when prices increase[66,67,68]. The extent of the response is affected by the magnitude of the price change.

Prices of healthier food and beverage choices have increased at higher rates than less-healthy ones in recent years. One study reported that the price of some healthy staples – milk, bread, eggs and some meats – rose at a rate 20% faster than inflation between 1989 and 2007, while in comparison soft drinks, edible fats and oils and cakes and biscuits dropped below rates of inflation – soft drinks by 20% and cakes and biscuits by 10%[69]. Similar results were found in a study that reported a 34% reduction in the price of carbonated drinks relative to all other prices (fruits and vegetables, cheese, meats, cereal, etc)[70] between 1978 and 2010. A third study trended retail prices for 378 foods and beverages in major supermarket chains and reported a significant price disparity between healthy and less-healthy foods and that the disparity is growing. The mean cost of foods in the healthy food group was $27.20/1000 kcal and the 4-year price increase was 29.2%; the mean cost of foods in the less-healthy food group was $3.32/1000 kcal and the 4-year price increase was 16.1%[71]. While comparable statistics are not available for BC, it is interesting to note that the 2009 monthly cost of a nutritious food basket for a family of four is $872. This means that a family of four on income assistance would need more than 100% of their income to cover shelter and food costs[72].

Another price-related factor which may contribute to the overconsumption of sugar sweetened beverages is the mismatch between price and volume. In fast food outlets across BC, it is common for very large sized servings of sugar-sweetened beverages to be significantly discounted relative to smaller sized servings, thereby encouraging over-consumption. Unlimited numbers of free refills of sugar sweetened beverages is another factor that potentially contributes to over-consumption.

Studies have shown that taxes included in the shelf price have a greater effect on consumption than sales taxes applied on purchases[73].

Learning from the tobacco experience, educating consumers to reduce their consumption of less-healthy food and beverage choices will not be enough to counterbalance the aggressive marketing of these products. Consumer education in combination with taxing less-healthy food and beverage choices, however, will help to shift consumer behaviour. Such actions were successful in reducing access to, and therefore consumption of, other less-healthy products such as tobacco and alcohol when used as a complement to social marketing[74,75,76,77,78,79].

Recommendations	Players	Timeline	Cost & Effectiveness
3.2.1 Implement regulation to introduce a substantial tax on the shelf price of less-healthy food and beverages, starting with sugar-sweetened beverages.	PG	Immed	Cost: L (revenue neutral) Effectiveness: M-H
3.2.2 Implement regulation to align the price and quantity of sugar-sweetened beverages in food service establishments and prohibit free refills.	PG	Immed	Cost: L Effectiveness: unknown but likely M-H

4. Support consumers to make healthier food and lifestyle choices.

4.1 Social marketing/consumer education

Nutrition knowledge and food skills have eroded in modern society as fewer people are producing their own food and more are choosing the convenience of prepared and/or packaged food to fit their busy schedules. Understanding what healthy food is, how to grow or buy it, how to prepare it and why eating healthy makes a difference is important in making healthy eating choices. The same is true in terms of learning and making choices about physical activity.

Educating all British Columbians, but particularly the younger ones, about preparing healthy food, healthy eating, physical activity and healthy weights will help consumers themselves advocate for change. A similar effect occurred when consumers became aware, through consumer education and social marketing, of the dangers of smoking and demanded that “no-smoking” areas be created. Then, as the dangers of second-hand smoke became apparent, consumers took the next step and demanded that smoking be banned in public places. While legislation helped make this a reality, the consumer movement set the stage. The same principles can apply to healthy eating and physical activity.

There are many social marketing/consumer education initiatives underway in BC upon which to build. Innovative ways to educate certain target populations (e.g., social media) need to be considered. These populations are not influenced or accessed through “traditional” social marketing/education activities.

The next logical steps would be to integrate the best of these initiatives into a comprehensive program, incorporate the program into the BC curriculum and require the use of the curriculum/program in all BC schools.

Examples of social marketing/consumer education initiatives:

Social marketing:

- ActNow BC

Consumer education (focus on schools):

- Action Schools! BC program, focusing on healthy eating and physical activity in schools
- Healthy Buddies, a peer-led health promotion program for the prevention of obesity and eating disorders in children in elementary school
- Lesson plans from the Healthy Eating and Physical Activity Learning Resource
- BC School Fruit and Vegetable program that give fresh snacks to elementary school children
- Farm to School Salad Bar that offers connections between local farmers and schools to serve fresh, healthy lunches
- Sip Smart! BC, which teaches kids about making healthy drink choices.

Recommendations	Players	Timeline	Cost & Effectiveness
4.1.1 Implement an inter-sectoral social marketing campaign to educate the public about preparing healthy food, healthy eating, physical activity and healthy weights, starting by coordinating the collective action of NGOs and industry.	Lead: PG Participants: All	Immed	Cost: varies Effectiveness: H (if done with other interventions)
4.1.2 Integrate successful school-based initiatives that focus on healthy eating and physical activity into a comprehensive program and integrate into the BC curriculum.	HAs, I, M, NGOs, PG, SD&S	Immed	Cost: M Effectiveness: H

4.2 Restrict advertising, sponsorship and marketing to children

Children spend many hours using a combination of various media, including television, DVDs, video games, the Internet, and cell phones. Exposure to advertising via these media affects children's choices about foods, beverages and sedentary pursuits. Advertising increases food purchase requests by children to parents, has an impact on children's product and brand preferences, and affects their consumption behaviour. More than half of television advertisements directed at children promote foods and beverages such as candy, fast food, snack foods, soft drinks, and sweetened breakfast cereals that

are high in calories and fat, and low in fiber and other essential nutrients. Young children are uniquely vulnerable to commercial promotion because they lack the skills to understand the difference between information and advertising[80].

There is evidence that voluntary restrictions (self-regulation) on advertising, sponsorship and marketing to children alone are not effective[81]. There is evidence, however, that a combination of mandatory and voluntary restrictions can be effective. Ideally such regulation would be implemented federally; however, in the absence of federal action, there is the potential to begin to implement BC-specific regulation.

Recommendations	Players	Timeline	Cost & Effectiveness
4.2.1 Implement policy and/or regulation to restrict advertising, sponsorship and marketing of less-healthy food and beverages that are directed at children.	I, M	Immed	Cost: M (potentially high to industry) Effectiveness: H

4.3 Point-of-purchase strategies, including making nutrition information in food service establishments visible

Food labelling is important to consumer decision-making and purchasing of food and beverages. Through the Food and Drugs Act, Health Canada regulates the labelling of most pre-packaged food and beverage products in Canada. Food service establishments, on the other hand, are not required to label their menu items.

Food service establishments fall under provincial jurisdiction. BC has an opportunity to lead the way in Canada by requiring food service establishment to make nutrition information visible to consumers. Ideally these changes would be made in consultation with other provinces. Provincial effort, if not coordinated nationally, could result in a patchwork of practices across different provinces and make it difficult for businesses to operate effectively and profitably.

Studies show that most consumers underestimate the number of calories in away-from-home foods and tend to make greater errors when menu items are high in calories or ordering from establishments that promote their menu items as healthy. Most consumers would like to see nutrition information at places where they go to eat. Menu labelling reduces consumers' intentions to purchase items high in calories. Requiring restaurants to provide point-of-purchase nutrition information could promote the introduction of healthier menu options[82].

Since 2008, New York City restaurants have been required to make calorie information available on menus or menu boards:

- 89% support this move;
- 90% stated the calorie counts were higher than they expected; and
- 82% said it impacted their ordering.

In July 2008, New York City required restaurants with standard menu items to make calorie information publicly available at the point of purchase by posting it on menus and menu boards, where consumers can see it when they order. A recent survey by a food research group Technomic, Inc. found that 89% of the public considered it a positive move, 90% reported that the calorie counts were higher than expected and 82% reported that the nutrition information on menus made an impact on their ordering (71% sought out lower calorie options and 51% no longer ordered certain items)[83].

In addition to food labelling, placing healthy food and beverage choices in preferred locations and eliminating less-healthy food choices at check-out counters also have the potential to impact consumer food and beverage choices.

Recommendations	Players	Timeline	Cost & Effectiveness
4.3.1 Implement regulation that requires food service establishments to make nutritional information including calorie and sodium content visible at the point of purchase to consumers on standard menu items.	PG, I	Immed	Cost: L (potentially high to industry) Effectiveness: H
4.3.2 Implement point-of-purchase strategies to promote the purchase of healthier food choices in grocery stores and food service establishments including: ■ Placing healthier food and beverage choices in preferred locations. ■ Eliminating less-healthy food choices at check-outs.	PG, I	LT	Cost: L (potentially high to industry) Effectiveness: M

5. Promote healthy weights during pregnancy and the early years.

5.1 Prenatal care and breastfeeding

Three important determinants of childhood obesity are (a) maternal weight before pregnancy; (b) weight gain during pregnancy; and (c) whether the baby was breast or formula fed.

Higher maternal weight before pregnancy increases a women's risk of gestational diabetes during pregnancy[84]. Babies born to mothers who had diabetes during pregnancy are at a higher risk of being overweight and having gestational and type 2 diabetes later in life[85]. The Growing Up Today Study of over 14,000 adolescents in the US reported that a 1 kg increment in birth weight in full-term infants was associated with a 50% increase in the risk of being overweight at ages 9 to 14 years[86].

Healthy weight is important before, during and after pregnancy:

- Higher maternal weight before pregnancy significantly increases a women's risk of gestational diabetes during pregnancy.
- Excess weight gain during pregnancy is associated with excess maternal weight retained after childbirth.
- Chances of obesity are 22% lower in children who are breastfed.

Excess weight gain during pregnancy is associated with excess maternal weight retained after childbirth[87,88,89]. One Canadian study reported that 52% of women gained more than the recommended weight during pregnancy[90]. This excess weight after childbirth is a health risk for the mother and sets the stage for a higher pre-pregnancy weight in future pregnancies. The positive news is that recent clinical trials indicate that weight gain can be modified by

prenatal counselling[91,92]; currently, however, only 30% of pregnant women receive counselling on how to achieve recommended weight goals during pregnancy[93,94].

Women who are overweight before pregnancy and/or who gain excess weight during pregnancy are at increased risk of complications during pregnancy and childbirth. These women have higher rates of spontaneous abortion, hypertensive disorders of pregnancy, diabetes and complications during labour and delivery. Women who are obese are more likely to require a caesarean section. These women require closer monitoring throughout the pregnancy, labour and post-partum periods.[95]

Children who are breastfed are at reduced risk of obesity[96]. Studies have found that the likelihood of obesity is 22% lower among children who were breastfed[97]. The same was observed in adolescents, suggesting that the obesity-reducing benefits of breastfeeding extend many years. The benefits of breastfeeding increase with duration. One study reported a reduction of 4% in the risk of becoming overweight for every month of breastfeeding[98]. Formula-fed infants gain weight more quickly than breastfed infants in the first year of life, and this may be because of the greater quantity of protein in infant formula[99].

Significant cultural, societal and structural shifts are necessary to help women achieve healthy maternal weights before and during pregnancy and to initiate and sustain breastfeeding. Support is needed for women in hospitals, communities, workplaces and at home.

Recommendations	Players	Timeline	Cost & Effectiveness
5.1.1 Strengthen the information provided in prenatal education on healthy eating, physical activity and healthy weights for mothers, babies and toddlers.	HAs, PG	LT	Cost: L Effectiveness: M
5.1.2 Develop services for the management of obesity in pregnancy and integrate with other maternity services.	HAs, PG, NGOs	LT	Cost: M Effectiveness: M

Recommendations	Players	Timeline	Cost & Effectiveness
5.1.3 Encourage initiation and sustainment of breastfeeding through initiatives such as: ■ Encouraging BC hospitals and public health units to achieve the relevant WHO/UNICEF Baby Friendly™ Initiative designation. ■ Making BC workplaces and communities more baby-friendly. ■ Strengthening home visiting programs to new mothers with a focus on supporting breastfeeding. ■ Developing and promoting guidelines which restrict the commercial promotion of breastmilk substitutes to health care providers as recommended in the International Code of Marketing of Breastmilk Substitutes. ■ Monitoring the provincial rates of exclusively breastfed babies.	HAs, I, NGOs, PG, Work	LT	Cost: H (some aspects easier to achieve) Effectiveness: H

5.2 Early years

Using CCHS 2004 measured BMI rates, 21% of children ages 2 to 5 were classified as overweight or obese (6% obese and 15% overweight). Research shows obese children as young as age 3 have elevated levels of inflammatory markers that have been linked to heart disease and other medical conditions that manifest later in life[100].

Children who are overweight as toddlers or preschoolers are more likely to be overweight or obese in early adolescence. One study reported that children who were overweight between ages 2 and 4½ were five times more likely to be overweight at age 12 when compared to children who were not overweight between ages 2 and 4½[101]. These statistics support the importance of programs for the education of parents, care givers, child care and pre-school teachers about healthy eating and activity patterns.

Recommendations	Players	Timeline	Cost & Effectiveness
5.2.1 Expand programs for parents, care givers, child care and pre-school teachers about healthy eating and physical activity for young children.	NGOs, PG	LT	Cost: L Effectiveness: M

6. Focus on the workplace.

6.1 Health promotion in the workplace

The workplace can have a significant impact on employee health, and can offer many opportunities to promote healthy living. Employers have a role to play in supporting their employees to make healthy choices which, in turn, will assist in the prevention and management of obesity and related chronic diseases.

There are many ways that employers can support health promotion at the workplace, including creating a supportive environment and developing programs for the prevention, early identification and management of chronic diseases. Examples of specific actions include making healthy options available in staff cafeterias and at meetings, supporting physical activity in the workplace (e.g., stair climbing contests), providing on-site fitness programs or credits, investing in facilities for cyclists (e.g. secure bike storage, showers), offering health checks (screening) and encouraging work hours that support physical activity and family meal times.

Benefits for employers of worksite-based health promotion programs include improved productivity, higher employee morale and retention, and reduced costs for sick leave. One study identified a return on investment of $1.17 per dollar spent with the implementation of an obesity management program.[102]

There are many effective programs and resources that exist in BC to help employers develop appropriate workplace health promotion programs and to make improvements to the obesogenic environment. Some of these have been developed by associations (e.g., boards of trade and chambers of commerce), some by non-profit associations (e.g., Canadian Cancer Society, Victorian Order of Nurses) and some by private corporations. These programs and resources will provide a foundation of knowledge and structures upon which to build.

Recommendations	Players	Timeline	Cost & Effectiveness
6.1.1 Make health promotion in the workplace a priority by: ■ Expanding programs that support healthy eating, physical activity and healthy weights in all provincial government and public sector workplaces. ■ Encouraging and educating employers about implementing programs that support healthy eating, physical activity, healthy weights and work-life balance.	NGOs, PG, Workplaces	LT	Cost: M Effectiveness: M
6.1.2 Develop a provincial program to recognize healthy workplaces.	NGOs, PG, Workplaces	LT	Cost: L Effectiveness: M

7. Care for those who are overweight and obese.

7.1 Continuum of overweight/obesity services

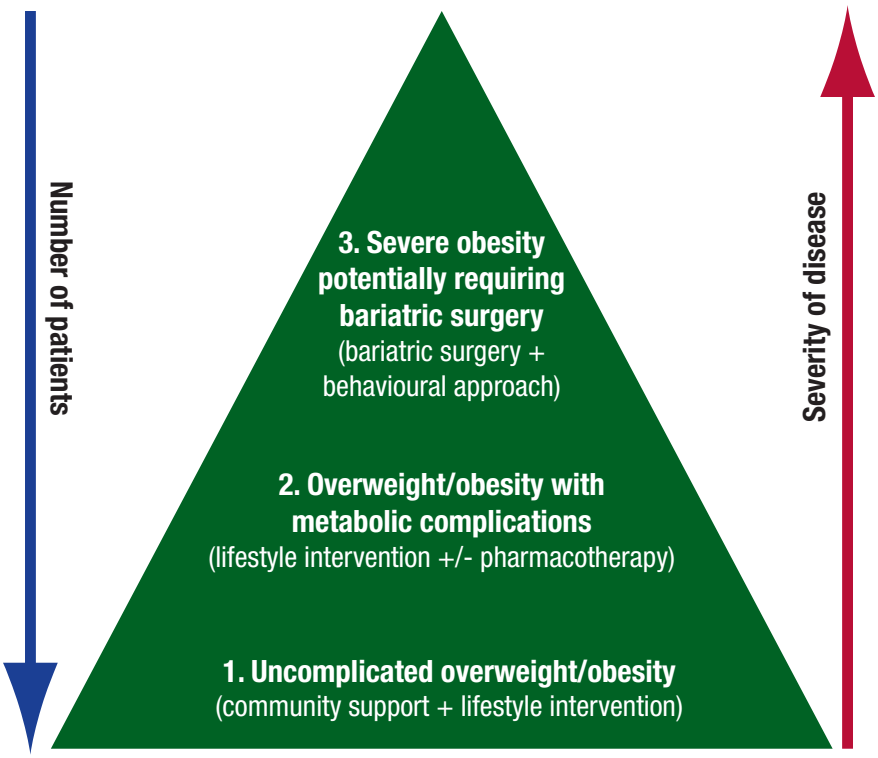
Prevention is potentially much more effective than treatment in reducing overweight/obesity at a population level. The evidence supporting successful and sustained treatment models for overweight/obesity is weak, although some promising exceptions are emerging.

The most convincing evidence for successful and sustained treatment of obesity is bariatric surgery, which is usually reserved for people who are morbidly obese (Body Mass Index [BMI] 40 kg/m^2 or higher). Studies show that bariatric surgery is a safe procedure and effective for long-term weight loss for moderately to morbidly obese adults and adolescents[103,104,105,106]. This weight loss, in turn, often leads to a reduction in the complications related to obesity, most notably type 2 diabetes[107] in adults and diabetes and cardiovascular risk factors in adolescents[108,109]. One randomized control study reported a 73% remission of type 2 diabetes post bariatric surgery compared to 13% in the conventional therapy group[110]. The costs of implementing a bariatric surgery program in Montreal were recovered within 3.5 years and thereafter a net savings resulting from decreased expenditures on diabetes and other complications of obesity[111]. A business case to determine the costs/benefits of a provincial bariatric surgery program for BC is under development (anticipated completion date is November 2010).

The evidence of successful intervention for people who are overweight or obese (but not morbidly obese) is less convincing. For this group, the most promising area is early recognition and management in primary care settings. New research shows the benefits of early recognition and intervention when babies and young children develop abnormal growth trajectories putting them at higher risk for overweight and obesity as older children, youth and adults[112,113, 114]. Childhood obesity has been noted to be under-recognized and under-treated by care providers[115].

Physician recognition and counselling, intensive team-based counselling (nurse, dietitian, exercise specialist and clinical psychologist) and/or pharmacotherapy and/or meal replacement programs are associated with modest but statistically significant decreases in weight; long-term sustainability of weight loss, however, is hard to achieve. Commercial weight loss programs have shown some success, although scientifically credible outcome evaluation has been minimal. Sustainability of the weight loss is also an issue with these programs.

Research on high intensity, family focused weight management programs for youth who are overweight/obese is starting to show some promising results. The MEND (Mind, Exercise, Nutrition, Do it!) Program, a multi-component community-based childhood obesity intervention program in the United Kingdom which involves the whole family and includes nutrition education, behaviour modification and promotion of physical activity, revealed significant between-group differences in BMI and waist circumference when participants were compared to a control group. Positive changes were also noted in cardiovascular fitness, physical activity, sedentary behaviours and self-esteem[116]. Early results also show a 15.7% reduction in obesity and a cost-effectiveness of £1671 per QALY (quality adjusted life year) gained[117].



In BC, the majority of clinical prevention and obesity management of people who are overweight or obese is done through family physicians and, more recently, primary health care teams. The newly emerging Divisions of Family Practice have the potential to further support this work as the Divisions identify gaps and develop solutions to address health care issues, such as obesity, in their local regions and communities. A significant challenge will be to create referral pathways and services within the primary care system to support people who are obese and overweight but do not have metabolic complications. Education of the primary health care team as well as working with the General Practice Services Committee (GPSC) to implement best practice guidelines and to develop a flexible alternative payment method for family physicians will be important in meeting this challenge. The Ministry of Health Services Guidelines and Protocols Advisory Committee (GPAC) has published evidence-based clinical guidelines for physicians that cover screening and intervention for obesity, physical activity and healthy eating[118].

There are no publicly-funded comprehensive treatment programs in BC for adults who are overweight or obese and have metabolic complications. Presently these people are managed through family physicians and an array of specialty clinics such as those for diabetes and cardio-vascular and renal diseases. Bariatric surgery is available for a small number of morbidly obese adults but access to publicly-funded bariatric surgery has declined in recent years.

There are two publicly-funded centres for the treatment of obesity in youth in BC, one in Vancouver and one in Prince George (Centre for Healthy Weights - Shapedown BC Program). The future of the Prince George program was on hold and at the time of writing this report, funding renewal had yet to be confirmed. These multidisciplinary programs are ten weeks in duration, involve the family and have broad inclusion criteria. Early data is showing promising outcomes, however, the maintenance of these outcomes has not yet been determined.

What is needed in BC is a continuum of care that addresses the needs of the population, from those who are overweight to those who are morbidly obese. Most of these services will be in primary care settings with referral available to specialized expertise as required.

Recommendations	Players	Timeline	Cost & Effectiveness
7.1.1 Implement a continuum of overweight/ obesity management services to address the needs of people who are overweight without complications to those who are overweight with complications or morbidly obese, and range from clinical prevention to bariatric surgery.	HAs, HPs, I, NGOs, PG, Work	LT	Cost: H Effectiveness: M
7.1.2 Update the GPAC guideline on Overweight, Obesity and Physical Inactivity.	PG, HPs	ST	Cost: L Effectiveness: L-M
7.1.3 Working with the Divisions of Family Practice and other existing primary care structures, implement team-based overweight/obesity prevention, early recognition and treatment programs in primary care settings using the GPAC guideline.	A, HAs, HPs, I, NGOs, PG, SD&S, PG	LT	Cost: L Effectiveness: L-M
7.1.4 Develop regional, community-based, inter-disciplinary weight management centres (physical or virtual) for children and adults who are overweight or obese and have metabolic complications. Centers will include intensive, interdisciplinary medical and surgical management and supportive counselling and behaviour management services.	HAs, HPs, I, NGOs, PG	LT	Cost: M Effectiveness: L-M
7.1.5 Develop a publicly-funded, provincially coordinated adult bariatric surgery program which is connected to the regional, community-based weight management centres and serves adults who are morbidly obese and have metabolic complications.	HAs, HPs, PG	LT	Cost: M Effectiveness: H
7.1.6 Pilot a publicly-funded pediatric bariatric surgery program for youth in BC.	HAs, HPs, PG	LT	Cost: M Effectiveness: unknown

8. Develop partnerships with the federal government and other provinces and territories.

8.1 Partnerships and collaboration

Partnerships and collaboration with the federal government are required to press for action in areas where BC cannot make the changes alone. Such action is required to implement the recommended changes to some of the food-related standards and regulations as these changes are under federal jurisdiction (e.g., reductions in the fat, sugar and sodium content of foods and beverages and food labelling on pre-packaged food and beverages).

BC may also benefit by collaborating with other provinces and the territories in areas that are under provincial jurisdiction but would benefit from consistency at a national level (e.g., advertising to children, nutrition information in food service establishments).

Recommendations	Players	Timeline	Cost & Effectiveness
8.1.1 Advocate for and work with the federal government and other provinces/territories to: ■ Set targets and identify plans to reduce the fat, sugar and sodium content of foods and beverages and a timeline for this to be achieved. ■ Set targets and plans to reduce portion and beverage sizes and a timeline for this to be achieved. ■ Develop national guidelines to clarify healthier and less-healthy food choices to support a social marketing and education strategy. ■ Identify ways to improve the Nutrition Facts table, including a standardized mechanism to quickly recognize healthier food and beverage choices on pre-packaged foods.	FG, PG, I	Leadership	Cost: L (potentially high to industry) Effectiveness: H (potentially)
8.1.2 Collaborate with other provinces and the territories in developing standards around advertising, sponsorship and marketing to children and providing nutrition information in food service establishments.	PG, I	Leadership	Cost: L Effectiveness: H

9. Monitor the progress and impact of the actions taken.

9.1 Evaluate the implementation and effectiveness of the actions taken.

Given the complexity of the challenge posed by obesity, the many organizations and players that need to be part of the solution and the limited evidence about the effectiveness of some of the interventions, it is important that a system of continuous improvement be incorporated into all change processes. Mechanisms need to be in place to monitor the implementation of the actions taken, the effectiveness of the processes implemented and their effect on obesity rates. This will require a comprehensive evaluation and monitoring program with a commitment to regular reporting on results.

Recommendations	Players	Timeline	Cost & Effectiveness
9.1.1 Develop and implement a plan to monitor progress on the implementation of the actions taken in the obesity reduction strategy in BC.	Lead: PG Participants: All	Leadership	Cost: M Effectiveness: H
9.1.2 Publish an annual report measuring progress in reducing overweight and obesity.	PG	Leadership	Cost: L Effectiveness: H
9.1.3 Incorporate the regular collection and analysis of quality and outcome data into all obesity reduction initiatives.	All	Leadership	Cost: M Effectiveness: H

9.2 Ongoing monitoring

Measurement is key to any change – “you can’t manage what you don’t measure.”

Overweight and obesity rates from the 2004 Canadian Community Health Survey (CCHS) are the most recent available that used measured heights and weights to calculate the BMI. Rates are only available for adults and children aged 12 and over.

CCHS rates for more recent years use *self-reported* heights and weights to calculate the BMI (for youth, the measures are usually provided by their caregiver rather than self-reported). People tend to overestimate their own heights and underestimate their weights, thus leading to lower rates of reported overweight and obesity.

Obesity and overweight rates using self-reported heights and weights to calculate the BMI are available for 2001, 2003 and 2005. In 2007, major changes were made to the survey design and data has been collected annually since that time. The survey only captures adults and children aged 12 and over. Individuals living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Forces, and residents of certain remote regions are also excluded from the survey.

Many jurisdictions have begun to address the lack of appropriate surveillance data by implementing health surveillance programs specific to children and youth. In British Columbia, the Health Assessment of School-Aged Children (HASAC) project was designed to help BC schools plan health improvement activity by collecting data on nutrition, physical activity, smoking behaviour, and self-perception of grade

six students. The Health Assessment was completed in 2007/2008 and 2008/2009. The 2008/2009 survey included a volunteer sample of 19 schools in total, 15 elementary schools and 4 middle schools from across British Columbia. The survey provided information on the consumption of vegetables, fruit, candy, baked sweets and frozen desserts and on the amounts of physical activity and screen/phone time per day. BMI calculations were completed based on measured height and weight. Using these data, 34% of males and 27% of females were overweight or obese.

To understand the growth of the obesity epidemic and evaluate efforts to reverse it, there is need for a program that regularly measures height and weight in adults and children across the province.

In addition to regular monitoring, analysis of quality or performance data is a vital part of program planning and implementation and should be incorporated into all new obesity reduction related initiatives. Data collection needs to be regular and routine and embedded into the planning and delivery structures of programs rather than one-off research studies.

Recommendations	Players	Timeline	Cost & Effectiveness
9.2.1 Develop a program to monitor obesity rates in BC which includes: ■ Biannual, province-wide, health-authority-level surveillance of health behaviours and measured height and weight for grades 6 and 10, using a sampling strategy that allows separate reporting of health behaviours and BMI for boys and girls. ■ Reports of biannual surveys of health behaviours and BMI provided to participating schools with reports aggregated to the school level (no individual reporting). ■ Biannual, province-wide surveillance of policies and activities supporting healthy eating and physical activity for selected schools, localities and health authorities (use same schools, localities and health authorities selected for the surveillance of students). ■ A toolkit for schools that are not selected for monitoring that allows them to conduct their own assessment of health behaviours and measured height and weight. ■ Regularly monitoring measured obesity rates in adults using an appropriate sampling strategy.	A, HAs, HPs, PG, SD&S	Immed	Cost: L-M Effectiveness: H

6.0 Moving forward

This report brings together the knowledge, expertise and collective wisdom of many stakeholders having an interest in reducing obesity in BC. Obesity is a complex issue and requires multifaceted solutions. Ideally all the recommendations in this report will need to be addressed but in practice not all can be done right away and a phased-in approach will be required. Considering the work to date, estimates of cost effectiveness and the BC context, the recommendations have been grouped as immediate, longer-term and leadership.

As obesity is more prevalent among vulnerable populations in BC (Aboriginal, rural and remote and socio-economically disadvantaged populations), a provincial plan should both address the needs of the entire population and give priority and targeted resources to these high risk groups.

Immediate actions:

1. BC government to take a leadership role in obesity reduction in BC by:
    a. Developing a coordinated, all-of-society and all-of government plan.
    b. Developing intersectoral mechanisms and processes involving government at all levels (federal, provincial, local, health authorities and school system), non-government organizations and private sector organizations to mobilize resources and take action on BC-specific obesity reduction initiatives.
    c. Giving priority to and targeting actions at populations most at-risk for obesity (Aboriginal, rural and remote and socio-economically disadvantaged populations).
2. Extend the *Nutritional Guidelines for Vending Machines in BC Public Buildings* to:
    a. All food service venues in BC Public Buildings; and
    b. Vending machines and food service venues in local government buildings.
3. Extend the *Guidelines for Food and Beverage Sales in BC Schools* to licensed child care, pre-school and after-school programs.
4. Phase-in enhanced treatment services for overweight and obese people, starting with bariatric surgery and better adherence to clinical guidelines on managing obesity in primary care.
5. Implement regulatory measures which:
    a. Tax less-healthy food and beverages starting with sugar-sweetened beverages;
    b. Restrict the advertising, sponsorship and marketing of less-healthy food and beverages that are targeted at children;
    c. Require food service establishments to make nutrition information visible to consumers at the point of service; and
    d. Align the price and quantity of sugar-sweetened beverages in food service establishments and prohibit free refills.

6. Through partnerships between governments, non-government organizations and the private sector, mobilize communities to:
    a. Create intersectoral healthy living/obesity reduction action plans for their community; and
    b. Adapt the EPODE (Europe) model for prevention of childhood obesity by building on the SCOPE BC project experience and expanding to other BC communities starting with those that are rural and remote.
7. Build on, coordinate and expand existing programs and initiatives which help licensed child care, pre-schools and schools adopt a comprehensive school-based health promotion approach, including the integration of food preparation skills, healthy eating and physical activity into the BC school curriculum.
8. Develop a program to monitor obesity rates in BC.

Longer-term actions:

1. Implement a social marketing/education campaign to promote healthy eating and physical activity.
2. Update programs and modify environments to support obesity reduction:
    a. Implement policies, practices and plans to improve the built environment and create new options for active transportation;
    b. Focus on hospitals, workplaces and communities to make them more breast-feeding friendly;
    c. Implement programs to reduce recreational screen time (television viewing and computer use); and
    d. Build on programs that improve access to healthy foods in rural and remote communities.
3. Make health promotion in the workplace a priority by implementing programs that support healthy eating, physical activity and healthy weights.

Leadership:

1. Consult, collaborate with and supporting Aboriginal communities and organizations in *their* development and implementation of an obesity reduction strategy.
2. Work with the federal government and the food and beverage industry to reduce the fat, sugar and sodium content of foods and portion sizes.

In summary, the BC government has an opportunity to take a strong leadership role in implementing a multi-sectoral, multi-strategy action plan to reduce rates of obesity and overweight in BC. Effective action could make BC the first jurisdiction to reverse this epidemic which would not only reduce rates of overweight and obesity but would also reduce the burden and costs of many common chronic diseases such as diabetes, heart disease and cancer and contribute to BC's economic productivity and environmental sustainability. Such success has been achieved in reducing tobacco use in BC and there is every reason to expect that the same principles can be applied to overweight and obesity with the same expectation of success.

Appendix 1: Approaches to Addressing Obesity in BC and Other Jurisdictions

Report	Summary of recommendations
BC Provincial Health Officer's Report, 2005 Food, Health and Well-being in BC Identifies actions for individuals, communities, businesses and governments to reduce obesity (and increase food security)	Individuals: eat a healthy diet; increase physical activity; & maintain healthy weights.
	Parents: Breastfeed babies; be a role model for children by adopting healthy eating habits and regular physical activity; & limit children's screen time.
	Schools: provide healthy snacks and meals in schools; ban unhealthy foods & drinks and replace with healthy ones; & make physical activity mandatory up to grade 12.
	Communities: promote healthy eating and healthy weights; encourage physical activity; provide affordable recreational facilities; develop policies which ensure access to healthy foods for all people; & encourage urban design that encourages active transportation.
	Industry: support community initiatives to promote healthy eating & physical activity; ensure sales, marketing and employment policies promote healthy eating & physical activity; support health promotion at the workplace; encourage baby-friendly practices and provide appropriate places for breastfeeding; stop advertising unhealthy foods to children; & eliminate trans fats.
	Health care professionals: promote healthy eating and healthy weights; educate patients to prevent and reduce obesity; & promote breastfeeding.
	Governments: commit to healthy eating and physical activity strategy; support ActNow; support adequate incomes; investigate ways to reduce the cost of food in lower-income communities; monitor & regulate marketing approaches adopted by the food industry; support the evaluation of healthy living programs; & support health promotion in the workplace.
	Identify and develop strategies to address gaps in the evidence and research on healthy eating, physical activity and other obesity-related topics.

Report	Summary of recommendations
Legislative Assembly of BC Report, 2006 A Strategy for Combatting Childhood Obesity and Physical Inactivity in BC Identifies actions for the provincial government to reduce obesity.	Create a provincial, multi-sectoral Nutrition and Exercise Council to coordinate obesity reduction related actions.
	Enhance the role for ActNow BC (increase physical activity and healthy diets; combat obesity).
	Continue to develop programs that educate children on healthy eating habits and to choose healthy meal options; expand the School Fruit & Vegetable Snack Program; & expand subsidized hot, nutritious school lunch programs.
	Place strict limitations on access to nutritionally-poor “not recommended” foods in public buildings.
	Remove the social services tax exemption on candy and confections, soft drinks and other unhealthy foods exempt from the PST; investigate feasibility of new junk food tax on non-nutritive foods and beverages.
	Work with federal government & industry to enhance labelling requirements.
	Encourage industry to reduce sugar, salt and fats in foods.
	Encourage industry to adopt stronger self-regulation criteria of food and beverage advertising to children.
	Encourage physical activity for all students K-12; expansion of programs such as ActionSchools! BC program.
	Expand joint-use agreements to maximize utilization of education and physical activity facilities.
	Promote safe walking routes to schools and discourage motor vehicle use.
	Actively promote and support breastfeeding; make workplaces more breastfeeding-friendly.
	Develop social marketing campaign to reinforce messages on physical activity and healthy nutrition.
	Publish an annual report measuring progress in improving diet and activity levels and reducing obesity.

Report	Summary of recommendations
BC Healthy Living Alliance Recommendations for Tackling Overweight and Obesity in BC: Submission to the BC Government	Whole-of-society approach.
	Lifestyle changes: support efforts of local governments to apply a healthy living lens to their Official Community Plans and to ensure the built environment is supportive of healthy eating and active living; support the development of comprehensive policies and strategies that reduce barriers to physical activity facilities and programming; invest in active transportation; take leadership role in promoting a culture of wellness in the workplace.
	Making the healthier food choice the easier choice: create national guidelines to define healthier food choices; restrict marketing of unhealthy food and beverages to children; introduce national standardized front-of-pack labelling; set targets and timelines to reduce sodium, fat and sugar content in foods; introduce mandatory nutrition labelling on all food service establishment menus; introduce a substantial tax on all sugar sweetened beverages; improve access to healthy foods in remote and rural communities; support local food production; social marketing campaign aimed at healthy living.
	Building skills and knowledge: introduce healthy living curriculum into schools.
	Collaboration: establish a dialogue table with industry and NGOs to encourage healthy living.

Report	Summary of recommendations
Institute of Medicine (IOM), 2009 Local Government Actions to Prevent Childhood Obesity Identifies actions related to food and physical activity.	Goal 1: Improve access to and consumption of healthy, safe and affordable foods (create incentive programs to attract grocery stores to underserved neighbourhoods, require menu labelling in chain restaurants; promote efforts to provide fruits and vegetables in a variety of settings such as farmers' markets and community gardens; mandate nutrition standards for foods and beverages available in government-run or regulated after-school programs, recreation centres, parks and child care facilities; encourage breastfeeding-friendly communities; & adopt building codes to require access to and maintenance of fresh drinking water fountains.
	Goal 2: Reduce access to and consumption of calorie-dense, nutrient-poor foods (implement a tax strategy to discourage consumption of foods & beverages that have minimal nutritional value such as sugar-sweetened beverages; land use & zoning policies that restrict fast food establishments near schools; eliminate advertising and marketing of calorie-dense, nutrient poor foods and beverages near school grounds; & create incentive and recognition programs to promote "candy-free" check out aisles).
	Goal 3: Raise awareness about healthy eating (develop media campaign to promote healthy eating; & develop counter-advertising media approaches against unhealthy products).
	Goal 4: Encourage physical activity (encourage walking and bicycling through improvements in the built environment; develop networks of safe sidewalks and street crossings that connect to schools, parks & other destinations; build new schools away from heavily trafficked roads; adopt community policing strategies to improve the safety of streets, implement a Safe Routes to School program; increase transit use through reduced fares and improved services; build parks and playgrounds close to residential areas; create after-school activity programs; establish joint-use of facilities agreements to maximize use of schools; institute regulatory policies mandating minimum play space, equipment and duration of play in preschool, after-school and child-care programs; develop worksite practices which increase physical activity; & create incentives for remote parking).
	Goal 5: Decrease sedentary behaviour (promote policies that reduce sedentary screen time in preschool and after-school programs).
	Goal 6: Raise awareness of the importance of increasing physical activity (develop a social marketing program that emphasizes the benefits of physical activity).

Report	Summary of recommendations
World Health Organization, 2009 Interventions on Diet and Physical Activity: What Works Identifies diet and physical activity interventions in 8 categories. 396 peer-reviewed diet and physical activity studies met the inclusion criteria.	Policy & environment: ■ Effective interventions: government regulatory policies to support a healthier composition of staple foods; environmental interventions targeting the built environment; policies that reduce barriers to physical activity; transport policies and policies to increase space for recreation; & point of decision prompts to encourage using the stairs. ■ Moderately effective interventions: pricing strategies (fiscal policies) and point of purchase prompts in grocery stores, vending machines, cafeterias and restaurants to support healthier choices; & multi-targeted approaches to encourage walking and cycling to school, healthier commuting and leisure activities.
	Mass media: ■ Effective interventions: mass media campaigns promoting physical activity. ■ Moderately effective interventions: intensive mass media campaigns using one simple message (e.g., increase fruits and vegetables); national “health brand” or logos to assist consumers to make healthy food choices; & LT intensive mass media campaigns to promote healthy diets.
	Schools: ■ Effective Interventions: high-intensity school-based interventions that focus on diet and/or physical activity and are comprehensive and multi-component (e.g., curriculum on diet and/or physical activity, supportive school environment, physical activity program, healthy food options; parental/family component). ■ Moderately effective interventions: focused approach, with supportive activities within the curriculum & formative assessment that addresses the needs of the school and cultural contexts.
	Workplaces: ■ Effective Interventions: multi-component programs promoting healthy dietary habits and/or physical activity that provide healthy food and beverages at the workplace, provide space for physical activity, involve workers in program planning, involve families, provide individual behaviour changes strategies and self-monitoring.

Report	Summary of recommendations
	Community: ■ Effective interventions: diet education programs that target high-risk groups and/or are multi-component; community development combines that focus on a common goal; & group based physical activity programs. ■ Moderately effective interventions: phone-in services for dietary advice, community-wide interventions (e.g., Healthy Village); programs that target low-income/low literacy populations and include diet education, computer/web-based interventions with interactive personalized feedback and target high-risk groups; supermarket tours; walking school buses.
	Primary health care: ■ Effective interventions: interventions targeting chronic groups (unhealthy life styles, brief interventions, link/coordinate with other stakeholders). ■ Moderately effective: cholesterol screening programs, weight loss programs using health professionals with personal or telephone/internet consultations over a period of at least 4 weeks and a self-help program that includes self-monitoring.
	Older adults: ■ Moderately effective interventions: physical activity in a group setting, home-based interventions in which older adults have increased access to fruit and vegetables using existing infrastructure.
	Religious settings: ■ Effective interventions: culturally appropriate and multi-component diet interventions that are planned and implemented in collaboration with religious leaders. ■ Moderately effective interventions: culturally appropriate interventions targeting weight loss, healthy dietary habits and increased physical activity.

Report	Summary of recommendations
Centres for Disease Control and Prevention (CDC), 2009 Recommended Community Strategies to Prevent Obesity in the US Identifies actions for local governments to reduce obesity; focus is on children	Increase availability and affordability of healthier food and beverage choices in public sector venues (polices on the types of food sold within government facilities, pricing strategies which promote the purchase of healthier food.
	Improve geographic availability of supermarkets in underserved areas.
	Provide incentives to food retailers to locate in &/or offer healthier food and beverages choices in underserved areas (e.g., tax benefits, loans, etc to cover start-up and investment costs for retailers, supportive zoning, etc).
	Improve availability of mechanisms for purchasing foods from farms (e.g., farmers' markets, farm stands, "pick your own" and farm to school initiatives).
	Incentives for the production, distribution and procurement of foods from local farms (e.g., grower cooperatives, revolving loan funds, building markets for local farm products).
	Restrict availability of less-healthy foods and beverages in public service venues (schools, after-school programs, regulated child care centres, community recreational facilities, city and county buildings).
	Institute smaller portion size options in public service venues (packaged and restaurant foods).
	Limit advertisement of less-healthy foods and beverages (especially to children).
	Discourage consumption of sugar-sweetened beverages reduce availability in schools and child care centres).
	Increase support for breastfeeding (policies and facilities to provide accommodation for breastfeeding in public settings and government workplaces).
	Increase physical activity (require PE in schools, increase opportunities for extracurricular physical activity, better access to outdoor recreational facilities, infrastructure to support bicycling & walking, improve access to public transportation).
	Reduce recreational screen time in public service venues (e.g., schools, day care centres, after-school programs).
	Zone for mixed-use development (land use policies that promote healthy living).
	Improve safety (traffic safety and places where people can be physically active).
	Establish community coalitions or partnerships to address obesity.

Report	Summary of recommendations
Centres for Disease Control and Prevention (CDC), accessed July 5, 2010 Division of Nutrition, PA and Obesity Overweight and Obesity (special section on website)	Individual healthy choices and healthy home environments (make healthier food choices, reduce TV time and be more physically active).
	Create healthy child care settings (implement approaches to increase physical activity, limit screen time, good nutrition and healthy sleep practices).
	Create healthy schools: create opportunities for children to learn about healthy behaviours; provide healthy food options; & require daily physical education.
	Create healthy work sites: implement wellness programs; encourage physical activity through group classes and stairwell programs; & create incentives for employees to participate.
	Mobilize the medical community: teach patients about the importance of good health; make connection between BMI and risk of disease; & refer to appropriate programs.
	Improve our communities: consider the geographic availability of supermarkets & access to outdoor recreational facilities; limit advertisement of less-healthy foods and beverages; & create infrastructures to support active transportation and improve the safety of neighbourhoods.

Report	Summary of recommendations
Obesity in Australia: A Need for Urgent Action, 2009 National Preventative Health Taskforce by the Obesity Working Group Identifies actions that will be required to address the obesity epidemic	Develop a national food strategy.
	Reshape the food supply towards lower risk products and encourage physical activity (review taxation system to enable access to healthier foods and active recreation and providing disincentives to consuming unhealthy foods, provide incentives to manufacturers to change their production processes to reduce the fat, salt or sugar content in order to maintain their market share, regulate the amount of fats, salt and sugar content in goods, subsidize transportation of fresh foods in rural and remote areas.
	Protect children and others from inappropriate marketing of unhealthy foods and beverages (curb inappropriate advertising).
	Improve public education and information (LT media advertising and public education campaigns to improve eating habits and enhance food labelling).
	Reshape urban environments towards healthy options (encourage school communities to support healthy living, implement comprehensive community-based interventions that encourage healthy lifestyles among all populations, encourage employers and workplaces to develop programs that support healthy eating and physical activity, introduce incentive schemes to encourage healthy behaviours and weight management).
	Strengthen and up skill primary health care workers and public health workforce to support people in making healthier choices.
	Have maternal and child health programs that target pregnant women and encourage breastfeeding.
	Close the gap for disadvantaged communities (tailored approaches for indigenous and low-income groups).
	Build the evidence base, monitor and evaluate effectiveness of actions.
Healthy Weight, Healthy Lives: A Cross-Government Strategy for England 2008	Children, healthy growth and healthy weight (identify at-risk families early; promote breastfeeding, promote healthy schools, cycling infrastructure).
	Promote healthier food choices (develop Healthy Food Code of Good Practice, promote appropriate planning regulations, review restrictions on advertising of unhealthy foods to children).
	Build physical activity into our lives (walking groups, work with entertainment technology industry etc).
	Create incentives for better health (work with employers to develop pilots for companies supporting healthy workplaces, offer personalized assessments and health/lifestyle advise, etc).
	Personalized advice and support (website, more funding for weight management services).

Appendix 2: Listing of those that Participated in the Development of Recommendations for an Obesity Reduction Strategy

We thank the many people and groups who provided input into the development of this report through the forums and working groups. Additional feedback was provided through a survey by those invited to but unable to attend the June 3 Forum, and others who provided comments and suggestions including individuals from BC Health Officers Council, Ministry of Child & Family Development, Union of BC Municipalities and the Chief Medical Health Officer for Nova Scotia (Dr. Robert Strang).

Obesity Reduction Task Force for BC

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Andrew Kmetic	Population & Public Health (PHSA)
Bill Mackie	BC Medical Association
Connie Coniglio	BC Mental Health & Addiction Services
David McLean	BC Cancer Agency
Deepthi Jayatilaka	Population & Public Health (PHSA)
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Eric Young	Ministry of Health Living and Sport
Jane McCarney	Population & Public Health (PHSA)
Janice MacDonald	Dieticians of Canada
Jean-Pierre Chanoine	BC Children's Hospital
Jennifer Bradbury	Childhood Obesity Foundation
John Millar (Chair)	Population & Public Health (PHSA)
Kristen Yarker-Edgar	Dieticians of Canada
Laurie Woodland	Ministry of Healthy Living & Sport
Leslie Varley	Aboriginal Health (PHSA)
Lydia Drasic	Population & Public Health (PHSA)
Lynn Wilcott	BC Centre for Disease Control
Mark Collison	Heart & Stroke Foundation
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Mary Collins	BC Healthy Living Alliance
Mary-Lou Matthews	Child Health BC
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Working Group on Food

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Justin Sherwood	Refreshments Canada
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Lynn Wilcott	BC Centre for Disease Control
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Marylyn Chiang	Union of BC Municipalities
Meghan Day (Chair)	Ministry of Healthy Living & Sport
Mike Gagel	BC School Trustees Association
Noelle Virtue	BC Healthy Living Alliance
Pam Christenson	Ministry of Housing & Social Development
Shannon Bradley	Public Health Agency of Canada
Sue Ross	Susan E. Ross & Associates
Suzanne Johnson	First Nations Health Council
Sydney Massey	BC Dairy Foundation

Working Group on Physical Activity

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Bev Gutray	Canadian Mental Health Association, BC Div
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Chani Joseph	Planning Institute of BC
Christine Glennie-Visser	Northern Health Authority
Darren Warburton	University of British Columbia
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Don Hunter	BC Recreation & Parks Association
Fionna Main	Canadian Cancer Society, BC/Yukon Div
Jami Brown	Fraser Health Authority
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Jean Thompson	Vancouver Coastal Health Authority
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Joyce Resin	Healthy Heart Society
Kathy Cassels	Directorate of Agencies for School Health BC
Lydia Drasic	Population & Public Health (PHSA)
Marilyn Payne	2010 Legacies Now
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Working Group on Treatment

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Jim Thorsteinson	BC College of Family Physicians
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Sharon Dean	Canada's Research Based Pharmaceutical Companies
Wilma Arruda	BC Medical Association

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Shazhan Amed	BC Children's Hospital

Participants at the June 3, 2010 Forum

Name	Details
Al Richmond	Union of BC Municipalities
Alan Callander	Ministry of Transportation & Infrastructure
Allen Langdon	Canadian Council of Grocery Distributors
Andy Dolberg	BC Agriculture Council
Andrew Kmetic	Population & Public Health (PHSA)
Anthony Van Heyningen	Refreshments Canada
Arlene Cristall	BC Children's Hospital
Arya Sharma	Canadian Obesity Network
Barb Kaminsky	Canadian Cancer Society, BC & Yukon Division
Bill Mackie	BC Medical Association
Bob Brunham	BC Centre for Disease Control
Brad Amson	Vancouver Island Health Authority
Brian Geary	Communications & Public Affairs (PHSA)
Brian O'Connor	Vancouver Coastal Health Authority
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Craig Sheather	YMCA of Greater Vancouver
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Elizabeth Brennan	Local Government Management Association
Eric Young	Ministry of Healthy Living & Sport
Evan Adams	Ministry of Healthy Living & Sport
Heather Morin	First Nations Health Council
Helena Swinkels	Fraser Health Authority
Jane Kellett	BC School Trustees Association
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Name	Details
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Mary Lou Matthews	Child Health BC
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Meghan Day	Ministry of Healthy Living & Sport
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Ron Wilson	BC Medical Association/College of Family Physicians
Rowena Rizzotti	Fraser Health Authority
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Suzanne Strutt	BC Recreation & Parks Association
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Ted Bruce	Vancouver Coastal Health Authority
Tim Shum	Fraser Health Authority
Tom Warshawski	Childhood Obesity Foundation
Trevor Hancock	Ministry of Healthy Living & Sport
Véronic Clair	Fraser Health Authority

Appendix 3: Alternate Viewpoints in Areas in which Consensus was Not Reached

In writing this report, consultations were held with all sectors which included government at all levels, non-government organizations, professional groups, academics and representatives of the food industry (see Appendix 2 for detailed listing of participants). On some policy topics there were significant differences of opinion.

The BC ORS Task Force carefully considered the alternate viewpoints, the best available evidence and expert opinion, cost effectiveness and the range of options for the BC context in finalizing the recommendations in this report. The rationale for each of the recommendations is included in the body of the report. The alternate viewpoint is provided in this Appendix.

Areas of differing opinion:

1. Adapting and implementing nutrition guidelines already in BC schools and some public buildings to other public buildings.
2. Implementing guidelines to restrict the sales of less-healthy food and beverages in areas surrounding schools.
3. Developing point-of-purchase strategies to promote the purchase of healthy food and beverage choices in grocery stores and food service establishments.

   Alternate Viewpoint:

   - Expansion of the current guidelines for vending machines to other sales channels would be unjust and unfair to consumers who wish to purchase a product that is negatively targeted under the guidelines. Such action would also excessively restrict commercial enterprise, possibly violate the Canadian Charter of Rights and Freedoms, and create an unlevel and anticompetitive playing field for those businesses operating a food service venue within a BC Public Building versus those businesses that may be literally in the very next building (or even in the same building but in an area leased to a third party providing non-government services).
   - Implementation of guidelines for food and beverage sales in geographic areas surrounding schools was seen as having the potential to lead to regulatory intervention and impacting which products can be sold in specific commercial areas.
   - Point-of-purchase strategies about product placement were not supported as they would infringe on the jurisdiction of private businesses.
4. Taxation as a means to reduce the consumption of less-healthy food and beverage choices.

   Alternate Viewpoint:

   - Obesity results from an imbalance in the “calories in” and “calories out” at the level of the individual.

- The focus of an obesity reduction strategy should be on making healthy food choices available and on educating consumers to make healthy food choices and eat a balanced diet. It is the over-consumption of food and beverages that are the root cause of obesity. This has been well documented in recent studies[119,120,121,122,123].
- The food sector has been working for the past few years on several fronts to provide consumers with healthy food choices and to educate them on how to make healthy food choices. Examples include the reformulations of thousands of products and support for grassroots consumer focused education programs to help make it easier for Canadians to make healthier food and beverage choices.
- Studies have shown that increasing taxes on less-healthy food and beverage choices has not reduced obesity rates[124,125]. To make the point, it was noted that US states that have a specific tax on soft drinks have some of the highest obesity prevalence rates in the US; also, that the sales of regular, caloric (non-diet) soft drinks dropped 21% between 1999 and 2008 in Canada, while adult and childhood obesity rates have reportedly risen during the same period (communication; Refreshments Canada, 2010).
- The National Preventative Health Taskforce[126] in Australia has called on the Australian government to conduct research into policies and tax incentives that would promote the production, access to and consumption of healthy food choices. The Taskforce noted that this was a complex issue and not a simple case of imposing a per unit tax. The relationship between costs and the consumption of particular products is complex and obesity is affected by lifestyle as well as inherited and social influences.
- Applying punitive taxes (over and above sales taxes) is not sound tax policy (as recently concluded by the Australian government), violates Canada's trade obligations under the North American Free Trade Association and the World Trade Organization, penalizes consumers who are of a healthy weight and, as demonstrated in US States that have implemented such punitive taxes (Maine, Arkansas and West Virginia), does not work.
- It is also noted that such a move unduly penalizes certain sectors (e.g., food service establishments) and smaller operators in the food industry. The latter creates an unfair playing field and is not supported by the food and beverage industry.

5. Making nutritional information available on menus in food service establishments.

Alternate Viewpoint:

- The food service sector has voluntarily taken a number of steps to provide customers with information about healthy food choices including:
  - Participation by chains in the Canadian Restaurant and Food Services Association's (CRFAs) Nutrition Information Program.
  - Reduction in trans-fat and sodium in several menu items.
  - Participation by many restaurants in the Heart and Stroke Foundation's Heath Check program (it was noted that BC has the highest number of restaurants participating in this program in Canada).

- Participation by the food industry in Health Canada's Trans-Fat Task Force and the Sodium Reduction Working Groups.
- The food service sector supports the on-site disclosure of nutrition information in a nationally consistent and readily accessible manner for standardized menu items prepared and assembled on-site at restaurants and food services establishments, where feasible (i.e., in establishments with a high degree of standardization).

6. Restrictions on advertisement, sponsorship and marketing to children.

Alternate Viewpoint:

- The food industry is involved in several initiatives that support children to make healthy dietary choices.
  - The Canadian Association of Broadcasters (CAB), a Canadian non-profit organization, administers a Broadcast Code for Advertising to Children in co-operation with the Advertising Standards Canada. It is available to the public on line and provides guidelines for responsible advertising and marketing to children and their families.
  - The Concerned Children's Advertisers (CCA) is leading several Canadian initiatives, including one called Long Live Kids. This initiative brings together industry, issue experts and government and focuses on the concept of balancing food and activity choices to achieve optimal weight and long-term good health with the child-friendly message of "eat smart, move more, be media wise". Focus on encouraging children to think critically about the messages they receive from media and making informed, healthy choices.
  - The Canadian Children's Food and Beverage Advertising Initiative (CCFBA or Children's Advertising Initiative) is a voluntary initiative in which 19 of Canada's leading food and beverage companies have agreed to shift their advertising and marketing emphasis to foods and beverages that are consistent with the principles of sound nutrition guidance, including those that are lower in total calories, fats, salts and added sugars and higher in nutrients that are significant to public health. To ensure the program is transparent and accountable, participants have asked Advertising Standards Canada to administer the Children's Advertising Initiative.
- Rather than banning advertising to children, it would be better to engage CCA to discuss national and/or BC specific issues related to advertising to children.
- It would be wrong to ban all advertising of food and beverages to children. Advertising can also be used to promote healthy living messages.
- Evidence indicates that ad bans do not help children achieve healthy weights. Since a prohibition on advertising went into effect in Quebec, the combined childhood overweight and obesity rate has more than doubled from 11.5% in 1981 to 23% in 2004. In fact, Quebec has the same rate of childhood obesity (7%) as British Columbia, where there is no ban in place. Alberta in fact has the lowest combined rates of overweight and obesity levels in Canada at 22% and there is no advertising ban in place in that province[127] (Statistics Canada, 2004).

References/Endnotes

1 *Select Standing Committee on Health: A strategy for combatting childhood obesity and physical inactivity in BC. (2006). Legislative Assembly of BC*, 2nd session, 38th parliament. www.leg.bc.ca/cmt/38thparl/session-2/health/reports/Rpt-Health-38-2-29Nov2006/Rpt-Health-38-2-29Nov2006-AppendixB.htm

2 *Healthier Choices in Vending Machines in BC Public Buildings Policy Paper.* (2007). www.lcs.gov.bc.ca/HealthierChoices/pdf/CompletePolicy.pdf

3 Solving the Problem of Childhood Obesity within a Generation. (2010). White House Task Force on Childhood Obesity Report to the President.

4 Hamm, M., & Bellows, A. (2003). Community food security and nutrition educators. *Journal of Nutrition Education*, 35(1), 37-43.

5 *Eating Well with Canada's Food Guide: A Resource for Educators and Communicators*; www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/pubs/res-educat-eng.pdf.

6 *Eating Well with Canada's Food Guide*; www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/pubs/res-educat-eng.pdf.

7 Health Canada. http://www.hc-sc.gc.ca/hl-vs/index-eng.php.

8 *Eating Well with Canada's Food Guide*; www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/pubs/res-educat-eng.pdf.

9 Swinburn B, Egger G, Raza F. (1999). Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med.* 29(6 Pt 1): 563–570.

10 World Health Organization. *Physical Activity.* http://www.who.int/dietphysicalactivity/pa/en/index.html.

11 Kotler, P. and N. Lee. (2008). *Social Marketing, Improving Quality of Life.* Thousand Oaks CA: Sage.

12 Minkler, M. and Wallterstein, N. (2002). *Introduction to community-based participatory research.* Community-based participatory research for health. Jossey-Bass.

13 Scharff, D.P. and Mathews, K. 2008. *Working with communities to translate research into practice.* J Public Health Manag Pract, 14(2): 94-8.

14 Smedley, B. and Syme, S.L. (2000). *Promoting health: intervention strategies from social and behavioral research.* Washington, DC: National Academy Press.

15 Green, L.W. and Kreuter, M.W. (2006). *Health Promotion Planning: an Educational and Ecological Approach.* Mountain View: Mayfield.

16 Engelhard, Carolyn et al. (2009). Reducing Obesity: Strategies from the Tobacco Wars, Stan Dorn Urban Institute, University of Virginia.

17 World Health Organization. (2006). *Obesity and Overweight*, Fact sheet No 311; accessed July 14, 2010; www.who.int/mediacentre/factsheets/fs311/en/index.html

18 Statistics Canada, *Obesity rates, by province and sex, household population aged 18 or older, Canada excluding territories* (2004). http://www.statcan.gc.ca/pub/82-620-m/2005001/article/adults-adultes/8060-eng.htm#4

19 Shields, Margot. Statistics Canada. Overweight Canadian children and adolescents. http://www.statcan.gc.ca/pub/82-620-m/2005001/article/child-enfant/8061-eng.htm

20 2004 Canadian Community Health Survey; http://www.statcan.gc.ca/pub/82-620-m/2005001/article/adults-adultes/8060-eng.htm#1.

21 2004 Canadian Community Health Survey; http://www.statcan.gc.ca/pub/82-620-m/2005001/c-g/child-enfant/4053584-eng.htm

22 Jung, RT (1997). Obesity as a Disease. *British Medical Bulletin*, 53(2), 307-321.

23 Amed, S., et al. (2010). Type 2 diabetes, medication-induced diabetes, and monogenic diabetes in Canadian children: a prospective national surveillance study. *Diabetes Care,* 33(4): p. 786-91.

24 *Canadian Community Health Survey, Cycle 2.2, Nutrition* (2004). http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/cchs_focus-volet_escc-eng.php

25 BC Nutrition Survey, *Report on Food Group Use*. (2004). http://www.health.gov.bc.ca/library/publications/year/2004/bcnutritionsurvey/fgreport.pdf

26 BC Nutrition Survey, *Report on Food Group Use.* (2004). http://www.health.gov.bc.ca/library/publications/year/2004/bcnutritionsurvey/fgreport.pdf

27 Statistics Canada. (2009). *Canadian Community Health Survey,* CANSIM annual data table 105-0501.

28 Statistics Canada. (2009). *Canadian Community Health Survey*, CANSIM annual data table 105-0501.

29 *Leisure-time physical activity, by age group and sex, household population aged 12 and over, Canada, provinces, territories, health regions (June 2005 boundaries) and peer groups, every 2 years* (CANSIM Table105-0433).

30 Select Standing Committee on Health. (2006). *A strategy for combatting childhood obesity and physical inactivity in BC report.* Legislative Assembly of BC. http://www.leg.bc.ca/cmt/38thparl/session-2/health/reports/Rpt-Health-38-2-29Nov2006/Rpt-Health-38-2-29Nov2006-AppendixB.htm

31 Colman, Ronald. (2010). *Cost of Obesity in BC.* GPI Atlantic. http://www.gpiatlantic.org/pdf/health/obesity/bc-obesity.pdf

32 BC Ministry of Health. http://www.leg.bc.ca/cmt/38thparl/session-2/health/reports/Rpt-Health-38-2-29Nov2006/Rpt-Health-38-2-29Nov2006-AppendixB.htm

33 BC Ministry of Health. http://www.leg.bc.ca/cmt/38thparl/session-2/health/reports/Rpt-Health-38-2-29Nov2006/Rpt-Health-38-2-29Nov2006-AppendixB.htm

34 Provincial Health Officers Report. (2007). *Pathways to Health and Healing – 2nd Report on the Health and Well-being of Aboriginal People in BC.* BC Ministry of Healthy Living and Sport.

35 Garriguet, D. (2008). Obesity and the eating habits of the Aboriginal population. *Statistics Canada Health Reports,* 19(1).

36 Public Health Agency of Canada. *Childhood Obesity and the Role of the Government of Canada.* available at: http://www.phac-aspc.gc.ca/ch-se/obesity/obesity- eng.php#ref

37 Health Canada. (2009). *A statistical profile on the health of First Nations in Canada: Determinants of Health*, 1999 to 2003.

38 Provincial Health Officers Report. (2007). *Pathways to Health and Healing – 2nd Report on the Health and Well-being of Aboriginal People in BC.* BC Ministry of Healthy Living and Sport.

39 Statistics Canada (2009). *Canadian Community Health Survey,* CANSIM annual data table 105-0501.

40 Sassi, F et al. (2009). The obesity epidemic: analysis of past and projected future trends in selected OECD countries. OECD Health Working Papers, http://www.oecd.org/dataoecd/38/2/44688774.pdf

41 Tjepkema, M. Adult obesity in Canada: measured height and weight. *Nutrition: Findings from the Canadian Community Health Survey.* Statistics Canada Cat No 82-620-MWE

42 Tjepkema, Michael. Nutrition: *Findings from the Canadian Community Health Survey – Adult Obesity in Canada: Measured height and weight.* Statistics Canada. Issue No 1.

43 Trends in adult obesity. *Health Reports.* Statistics Canada. 2006.

44 Overweight and obesity in Canada. Canadian Population Health Initiative. *Canadian Institute for health Information.* 2004.

45 Diane T. Finegood (2010). The Complex Systems Science of Obesity, *Handbook of the Social Science of Obesity.* Ed. J. Cawley, Oxford University Press.

46 Centers for Disease Control and Prevention. (2009). Recommended community strategies and measurements to prevent obesity in the United States, *MMWR, 58.*

47 Romon M, Lommez A, Tafflet M et al. (2009). Downward trends in the prevalence of childhood overweight in the setting of 12-year school- and community-based programmes. *Public Health Nutrition.*; 12(10): 1735-42.

48 Peneau S, et al. (2009). Prevalence of overweight in 6- to 15-year old children in central/western France from 1996 to 2006: trends toward stabilization. *Int J Obesity* (Lond), 33(4): 401-7.

49 Economos, CD et al. (2007). A community intervention reduces BMI z-score in children: Shape Up Somerville first year results.

50 Chomitz, VR et al. (2010). Healthy Living Cambridge Kids: a community-based participatory effort to promote healthy weight and fitness. *Obesity,* 18 Suppl 1: S45-53.

51 Aboriginal ActNow. http://www.aboriginalactnow.ca/m_5.asp.

52 Provincial Health Services Authority. (2007). *Creating a Healthier Built Environment in BC.* Vancouver, BC.

53 U.S.Department of Transportation Federal Highway Administration Office of Policy. (2009). *National Household Travel Survey.*

54 Whitaker, Katriina et al. (2010). Comparing maternal and paternal intergenerational transmission of obesity in a large population-based sample. *Am J Clin Nutri*, 91:1560-7.

55 Stewart-Brown S. (2006). *What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach?* Copenhagen. WHO Regional Office for Europe (Health Evidence Network report; http://www.euro.who.int/document/e88185.pdf,

56 Mark, Amy et al. (2006). Television viewing, computer use and total screen time in Canadian youth. *Paediatr Child Health.* 11(9): 595-599.

57 Canadian Institute for Health Information. (2008). *Do lifestyle behaviours really differ between overweight and non-overweight girls and boys?* http://www.cihi.ca/cihiweb/dispPage.jsp?cw_page=media_20091008_e

58 Active Healthy Kids Canada. Healthy Habits Start Earlier Than You Think. 2010. *The Active Healthy Kids Canada Report Card on Physical Activity for Children and Youth.* Toronto, ON. http://www.activehealthykids.ca/ReportCard/2010ReportCardOverview.aspx

59 Zimmerman F, Christakis D, Meltzoff A. (2007). Television and DVD/video viewing in children younger than 2 years. *Arch Pediatr Adolesc Med,* 161:473-479.

60 Zimmerman F, Christakis D, Meltzoff A. (2007). Television and DVD/video viewing in children younger than 2 years. *Arch Pediatr Adolesc Med,* 161:473-479.

61 Jordan, A. B., J. C. Hersey, J. A. McDivitt, and C. D. Heitzler. (2006). Reducing children's television-viewing time: A qualitative study of parents and their children. *Pediatrics* 118 (5): e1303-10.

62 Jordan, A. B., J. C. Hersey, J. A. McDivitt, and C. D. Heitzler. (2006). Reducing children's television-viewing time: A qualitative study of parents and their children. *Pediatrics* 118 (5): e1303-10.

63 Robinson, Thomas. (1999). Reducing Children's Television Viewing to Prevent Obesity. *JAMA,* 282: 1561-1567.

64 Dennison, B. A., T. J. Russo, P. A. Burdick, and P. L. Jenkins. (2004). An intervention to reduce television viewing by preschool children. *Archives of Pediatrics and Adolescent Medicine* 158:170-76.

65 BC Nutrition Survey: Report on Food Group Use (2004). Health Canada and the BC Ministry of Health Services.

66 Drenowski A., Specter S.E. (2004). Poverty and Obesity: The Role of Energy Density and Energy Costs. *American Journal of Clinical Nutrition*, 79(1), 6-16.

67 Drenowski, A., Darmon N. (2005). The Economics of Obesity: Dietary Energy Density and Energy Cost. *American Journal of Clinical Nutrition,* 82(supplement), 265S-273S.

68 French S.A. (2003 March). Pricing effects on food choices. *Nutrition,* 133(3), 841S-843S.

69 Burns, Cate et al. (2008). Longitudinal study of Consumer Price Index (CPI) trends in core and non-core foods in Australia. *Aust NZ Journ of Public Health,* 32(5):450-453.

70 Childhood Obesity Foundation. *Preventing Unhealthy Weights: A tax on sugar sweetened beverages as part of the solution* (no date provided).

71 Monsivais, Pablo et al. (2010). The rising disparity in the price of healthful foods: 2004–2008, Article in press Food Policy. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VCB-50H1HM5-1&_user=10&_coverDate=07%2F10%2F2010&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=976761b3d609cc04ad97cb9153a7a899

72 The Cost of Eating in BC (2009). Dietitians of Canada, BC Region. http://www.dietitians.ca/pdf/CostofEating2009_revJan10.pdf

73 Fletcher, J., Frisvold, D. and Tefft, N. (2010). Taxing Soft Drinks and Restricting Access to Vending Machines to Curb Child Obesity. *Health Affairs.* May 2010, 29:5.

74 Duffey, K. J., P. Gordon-Larsen, J. M. Shikany, D. Guilkey, D. R. Jacobs Jr, B. M. Popkin. (2010). Food Price and Diet Health Outcomes. *Archives of Internal Medicine* 170(5), 420-26.

75 Fletcher, J. M., D. Frisvold, N. Tefft. (2010). Taxing soft drinks and restricting access to vending machines to curb childhood obesity. *Health Affairs* 29 (5), 1-8.

76 Brownell, K. D., T. R. Frieden. (2009). Ounces of prevention-the public policy case for taxes on sugared beverages. *New England Journal of Medicine* 360(19), 1804-08.

77 French S.A. (2002). Pricing effects on food choices. Presented at the *American Society for Nutritional Sciences Conference* Sugar and Fat—From Genes to Culture," Experimental Biology Meeting, New Orleans, Louisiana.

78 Nnoaham, K.E., Sacks, G., Rayner, M., Mytton, O., Gray, A. (2009). Modelling income group differences in the health and economic impacts of targeted food taxes and subsidies. *International Journal of Epidemiology,* 38: 1324-1333.

79 Horgen, K.B., K. D. Brownell. (2002). Comparison of price change and Health Message Interventions in Promoting Healthy Food Choices. *Health Psychology* 21(5): 505-512.

80 Institute of Medicine. (2004). *Advertising, Marketing and the Media: Improving Messages.*

81 Center for Science in the Public Interest. (March 2010). *Report Card on Food-Marketing Policies: an analysis of food and entertainment company policies regarding food and beverage marketing to children.*

82 *Menu labeling; Does providing nutrition information at the point of purchase affect consumer behaviour? A research synthesis.* (2009). Robert Wood Johnson Foundation.

83 Technomic, Inc. (2009). *Executive summary, Update: Consumer reaction to calorie disclosure on menus/menu boards in New York City.* On-line survey conducted January 30 – February 3, 2010 (n=755).

84 Zhang C, Solomon CG, Manson JE, Hu FB. (2006). A prospective study of pregravid physical activity and sedentary behaviors in relation to the risk for gestational diabetes mellitus. *Arch Intern Med;*166:543–8.

85 Cedergren MI. Maternal morbid obesity and the risk of adverse pregnancy outcome. (2004). Obstet Gynecol, 103:219–24.

86 Gillman MW, Rifas-Siman SL, Berkey CS, Field AE, Colditz GA. (2003). Maternal gestational diabetes, and adolescent obesity. *Pediatrics,* 111:E221–6.

87 Institute of Medicine. (2009). *Weight Gain During Pregnancy: Reexamining the Guidelines.* Washington, DC: The National Academies Press.

88 Gunderson E.P. (2009). Childbearing and obesity in women: weight before, during, and after pregnancy. *Obstetrics & Gynecology Clinics of North America,* 36(2): 317-32.

89 Rooney B.L., Schauberger C.W., Mathiason M.A. (2005). Impact of perinatal weight change on long-term obesity and obesity-related illnesses. *Obstetrics & Gynecology,* 106(6):1349-56.

90 Crane JMG, White J, Murphy P, Burrage L, Hutchens D. (2009). The effect of gestational weight gain by body mass index on maternal and neonatal outcomes. *J Obstet Gynaecol,* 31:28–35.

91 Wolff S., Legarth J., Vangsgaard K., Toubro S., Astrup A.(2008). A randomized trial of the effects of dietary counseling on gestational weight gain and glucose metabolism in obese pregnant women. *International Journal of Obesity,* 32(3): 495-501.

92 Asbee S.M., Jenkins T.R., Butler J.R., White J., Elliot M., Rutledge A. (2009). Preventing excessive weight gain during pregnancy through dietary and lifestyle counseling: a randomized controlled trial. *Obstetrics & Gynecology,* 113(2 Pt 1), 305-12.

93 Cogswell M.E., Scanlon K.S., Fein S.B., Schieve L.A. (1999). Medically advised, mother's personal target, and actual weight gain during pregnancy. *Obstetrics & Gynecology,* 94(4), 616-22.

94 Stotland N.E., Haas J.S., Brawarsky P., Jackson R.A., Fuentes-Afflick E., Escobar G.J. (2005). Body mass index, provider advice, and target gestational weight gain. *Obstetrics & Gynecology,* 105(3), 633-8.

95 Society of Obestetrics and Gynaecology. (2010). Clinical Practice Guideline 239: *Obesity in Pregnancy.*

96 Owen C.G., Martin R.M., Whincup P.H., Davey Smith G., Cook D.G. (2005). Effect of infant feeding on the risk of obesity across the life course: a quantitative review of the published evidence. *Pediatrics,* 115: 1367-1377.

97 Arenz S., Ruckerl R., Koletzko B., Von Kries R. (2004). Breast-feeding and childhood obesity: a systematic review. *International Journal of Obesity and Related Metabolic Disorders,* 28: 1247-1256.

98 Harder T., Bergmann R., Kallischnigg G., Plagemann A. (2005). Duration of breastfeeding and risk of overweight: a meta-analysis. *American Journal of Epidemiology,* 162: 397-403.

99 Sidnell, A and Greenstreet, E, Infant nutrition – protein and its influence on growth rate. *Nutrition Bulletin,* 34(4): 395-400.

100 Skinner, AC et al. (2010). Multiple markers of inflammation and weight status: cross-seductional analyses throughout childhood. *Pediatrics.*

101 Nader, Philip et al. (2006). Identifying risk for obesity in early childhood. American Academy of Pediatrics, 118: e594-e601.

102 Baker, KM et al. (2008). Using a return-on-investment estimation model to evaluate outcomes from an obesity management worksite health promotion program. *J Occup Environ Med,* 50(9): 981-90.

103 Favretti, F et al. (2007). Laparscopic adjustable gastric banding in 1,791 consecutive obese patients: 12-year results. *Obesity Surgery,* 17(2): 168-75.

104 Picot, J et al. (2009). The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation. *Health Technol Assess,* 13(4): 1-190, 215-367.

105 Weiner, R et al. (2003). Outcome after laparoscopic adjustable gastric banding – 8 years experience. *Obes Surg,* 13(6): 965.

106 O'Brien, Paul et al. (2010). Laparoscopic adjustable gastric banding in severely obese adolescents: a randomized trial. JAMA, 303(6):519-526. http://jama.ama-assn.org/cgi/content/full/303/6/519

107 Picot, J et al. (2009). The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation. *Health Technol Assess,* 13(4): 1-190, 215-367.

108 Inge, Thomas et al. (2009). Reversal of Type 2 Diabetes Mellitus and improvements in cardiovascular risk factors after surgical weight loss in adolescents. *Pediatrics,* 123:214-22.

109 Inge, Thomas et al. (2009). Baseline BMI is a strong indicator of nadir BMI after adolescent gastric bypass, *Journal of Pediatrics,* 156 (1):106-108.

110 Dixon et al. 2008. Adjustable gastric banding and conventional therapy for type 2 diabetes: a randomized controlled trial. *JAMA.* 299(3): 316-323.

111 Cremieux, PY et al. (2008). A study on the economic impact of bariatric surgery. *Am J Manag Care,* 14(9): 589-90.

112 Singh A.S., Mulder C., Twisk J.W., et al.(2008). Tracking of childhood overweight into adulthood: a systematic review of the literature. *Obesity Reviews,* 9(5): 474-88.

113 Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med*; 37(13):869–873.

114 Serdula MK, Ivery D, Coates RJ, Freedman DS. Williamson DF. Byers T. (1993). Do obese children become obese adults? A review of the literature. *Prev Med,* 22:167–177.

115 O'Brien, Sarah, et al. (2004), Pediatrics, 14 (2): e154-e159.

116 Sacher, Paul et al. (2010). Randomized controlled trial of the MEND Program: a family-based community intervention for childhood obesity. *Obesity,* 18: 862-868.

117 York Health Economics Consortium. (2010).The social and economic value of the MEND7-13 program.

118 Ministry of Health Services General Protocols and Guidelines Committee. (2005). Overweight, obesity and physical inactivity.

119 Summerbell, C.D. et al. (July 2009). The association between diet and physical activity and subsequent excess weight gain and obesity assessed at 5 years of age or older: a systematic review of the epidemiological evidence. International Journal of Obesity. 33, supp 3.

120 Janssen I, et al. (2005). Comparison of overweight and obesity prevalence in school-aged youth from 34 countries and their relationship with physical activity and dietary patterns. Obesity Reviews, 6: 123 – 132.

121 Forshee et al. (2008). Sugar-sweetened beverages and body mass index in children and adolescents: a meta-analysis 1-4. *American Journal of Clinical Nutrition.*

122 Sun SZ and Empie MW. (2007). Lack of findings for the association between obesity risk and usual sugar-sweetened beverage consumption in adults – a primary analysis of databases of CSFII 1989-1991, CSFII 1994-1998, NHANES III and combined NHANES 199902001, Food and Chemical Toxicology.

123 Sacks FM et al. (2009). Comparison of weight-loss diets with different compositions of fat, protein and carbohydrates. New England Journal of Medicine. 360.0, 859-873.

124 Williams, R and Christ K. (2009). Taxing Sin, Mercatus on Policy, 55, 1-4.

125 Williams, R and Christ K. (2009). Taxing Sins: Are Excise Taxes Efficient? Mercatus on Policy, 25, 1-4.

126 National Preventative Health Taskforce (2009). Australia's Future Tax System, Final Report: Detailed Analysis accessed July 6, 2010. http://taxreview.treasury.gov.au/content/FinalReport.aspx?doc=html/Publications/Papers/

127 Statistics Canada, 2004 – *Obesity in Canada,* Provincial Rates.