ECONOMIC BENEFITS OF AN ADULT FITNESS TAX CREDIT

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ECONOMIC BENEFITS OF AN ADULT FITNESS TAX CREDIT

HIGHLIGHTS

- An adult tax credit could increase the number of physically active adult Canadians by almost 1 million people if only the federal government participates in implementing the credit. The number could increase by 1.5 million if both the federal and provincial governments participate.

- This would have a significant impact on health care costs. If only the federal government participates, the health care cost savings would reach $135 million in 2010, $286 million in 2011, gradually increasing to $692 million by the year 2029. If both the federal and provincial governments participate the health care savings would be $220 million in 2010, $465 million in 2011 and $1.1 billion by 2029.

- The proposed tax credit would obviously also reduce the personal income taxes collected by the federal and provincial governments if either or both levels participate. If the federal government only implements the tax credit total personal income taxes collected by both levels would decline by about $370 million in 2009 increasing gradually to $448 million in 2029. If both the federal and provincial governments participate total personal taxes collected by both levels would decline by $648 million in 2009 rising gradually to $767 million in 2029.

- The health care cost savings significantly outweigh the net personal tax losses incurred by the federal and provincial governments over time whether only the federal government participates or if both orders of government participate (see Exhibits S-1 and S-2).

- Over the projection period the cumulated net benefit in the case of federal participation only is $2.5 billion representing cumulated health care savings of $9.1 billion and cumulated net personal tax losses of $6.6 billion.

- The cumulated net benefit in the case of federal and provincial participation is $5.4 billion representing cumulated health care savings of $14.8 billion and cumulated net personal tax losses of $9.4 billion.

- The net benefits exceed the net costs in both cases of government participation starting in either 2011 (both) or 2012 (federal only) and expanding significantly in both cases each year thereafter.

- The adult fitness tax credit could be expected to reduce the likelihood that workers would miss work due to illnesses related to physical unfitness. The report shows that, in the case of federal participation only, personal income taxes collected as a result of less lost time would be higher by $41 million in 2010, $83 million in 2001, climbing to $118 million in 2029 due to a lowering of lost time. In the case of both federal and provincial participation the report shows that personal income taxes collected would be higher by $108 million in 2010, by $219 million in 2011 and by $312 million by 2029.

- The personal taxes recovered as a result of the improved rates of absenteeism and presenteeism would reduce the net personal income tax loss to $331 million per year by 2029 in the case of federal participation only and to $455 million per year in 2029 in the case of both federal and provincial participation.

- Research consistently shows that a physically active person is more likely to have better health outcomes than a non-active person. Regular physical activity is effective in the prevention of several chronic diseases, including cardiovascular disease, type 2 diabetes, cancer, hypertension, and osteoporosis.

- Physical activity is important in *primary* prevention (i.e. prevention of the diseases from developing), and *secondary* prevention (e.g. extending the life of those experiencing the disease/condition, and management of the condition).

- Different types of costs are associated with physical inactivity, such as medication, hospital stays, physician compensation, workers' compensation, and lost productivity. These costs are typically divided into direct costs (i.e. medical treatment of the disease) and indirect costs (typically lost productivity).

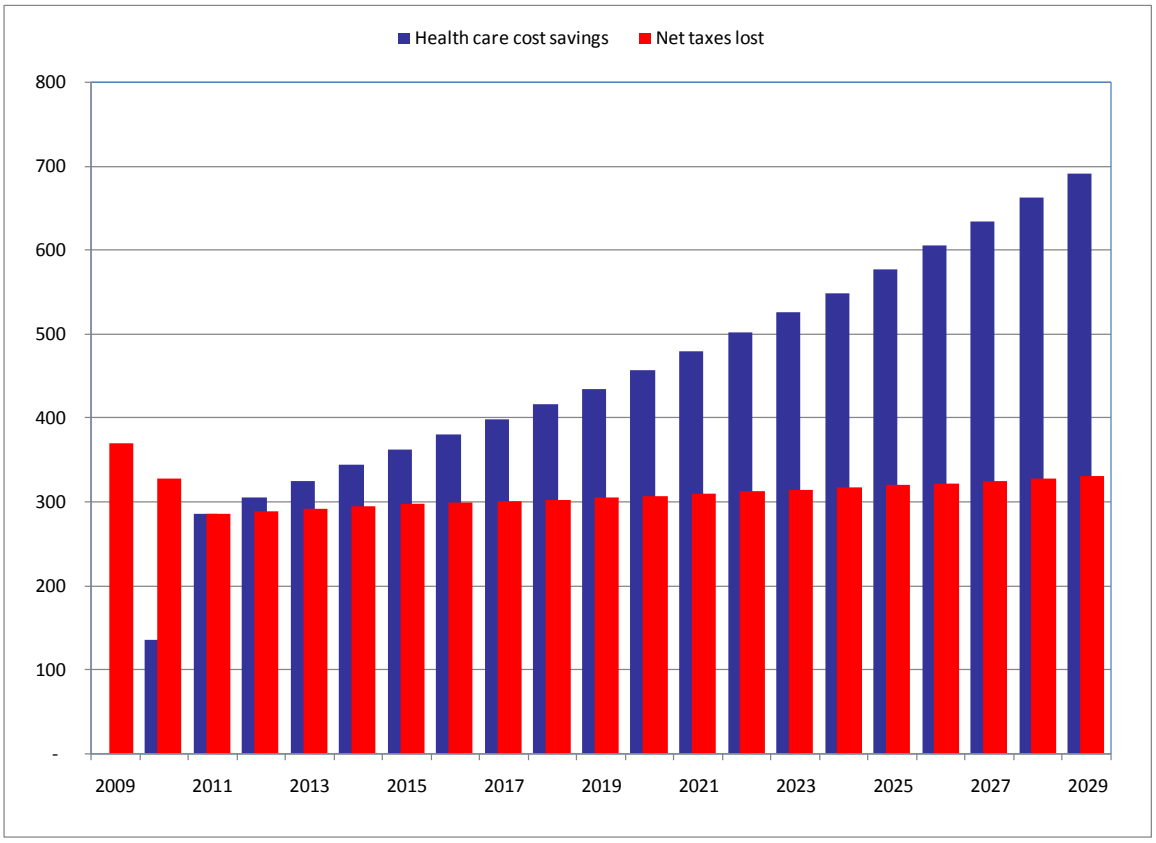
- Based on the literature review and on detailed projections of the Canadian population by age and gender the report develops projections over the next two decades of physical activity, obesity and health outcomes.

- Most of the growth in Canada's population by age over the next two decades will occur among those over the age of 50. The *life-cycle nature* of physical activity and obesity means the diseases and conditions that will increase the most in the decades ahead are those whose rates are highest among older persons. The report projects that by 2027 the total direct and indirect health costs associated with physical inactivity will be just over $20.6 billion in Canada, up from an estimated $7.3 billion in 2007.

- Males 15 to 24 and over the age of 55 are significantly more likely than females of the same age to be physically active. Rates of physical activity among females are equal to those of males only in the 25 to 54 year age groups, and at no age level are females more active than males. Both males and females exhibit similar *life-cycle* patterns in their levels of activity with physical activity at its highest when young, and dropping significantly beyond the age of 75 years.

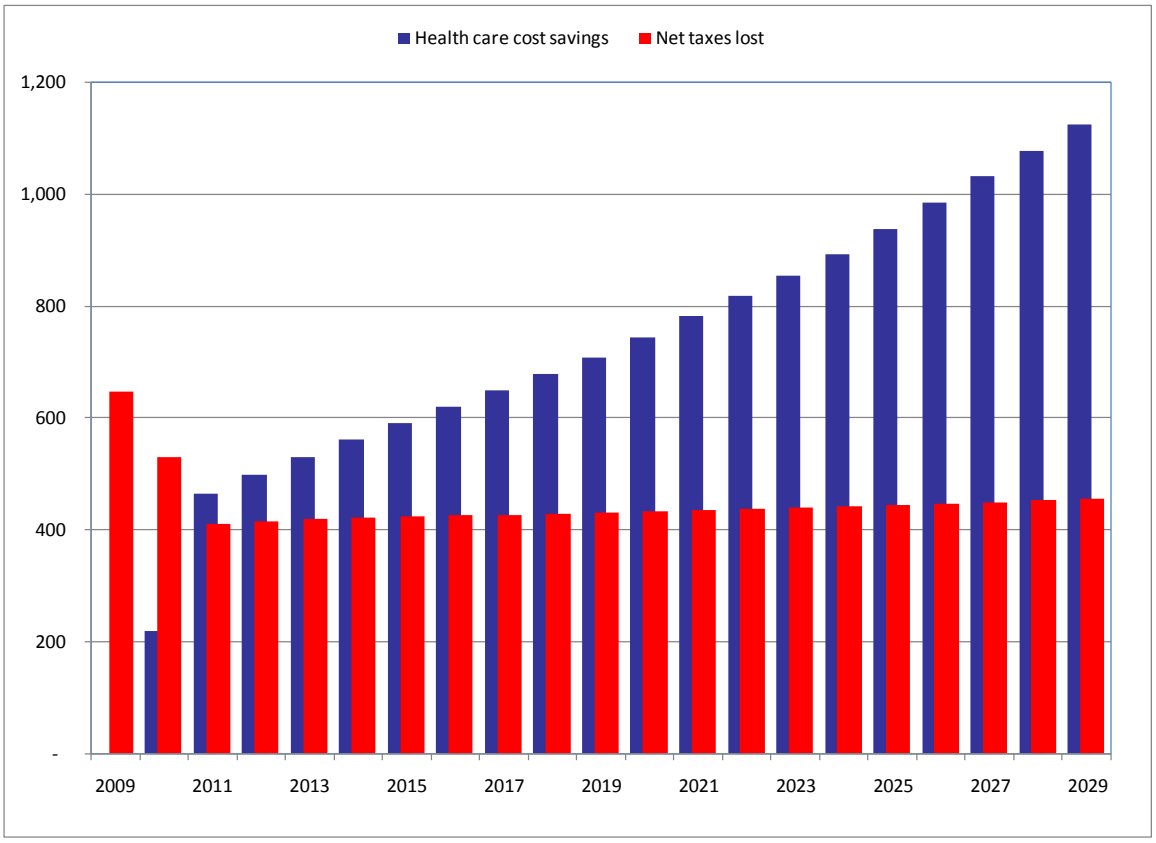
- Persistently low fertility rates and an aging population mean that the net natural change in population (births less deaths) is declining rapidly throughout Canada. Net immigration today accounts for the lion's share of Canada's annual gain in population and is projected to continue to do so over the next several decades. A lower proportion of immigrants to non-immigrants in Canada rate their health as very good or excellent for both men and women. Immigrants are less likely than non-immigrants to be classified as physically active or moderately active, and are more likely to report being physically inactive during their leisure time.

Exhibit S-1
Federal Participation Only
Health Care Cost Savings and Net Personal Tax Revenue Losses
2009 to 2029



Source: The Centre for Spatial Economics

Exhibit S-2
Federal and Provincial Participation
Health Care Cost Savings and Net Personal Tax Revenue Losses
2009 to 2029



Source: The Centre for Spatial Economics

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Without societal changes, a substantial and steadily rising population of adults will succumb to the medical complications of obesity; indeed, the medical burden of obesity already threatens to overwhelm health services. The spectrum of problems seen in both developing and developed countries is having so negative an impact that obesity should be regarded as today's principal neglected public health problem.

Obesity: Preventing and Managing the Global Epidemic
The World Health Organization (June 1997)

ABOUT THIS REPORT

There is growing awareness and growing concern that obesity is a major issue for policy makers in Canada and the United States. On January 1st of this year the Government of Canada's Children's Fitness Tax Credit went into effect. The program's initial intent is to encourage physical fitness program participation among Canadians under the age of 16. Its long term impact, however, will be to foster a generation of Canadians whose health and fitness profile improves on that of adult Canadians today. As this report later shows, for the most part, relatively few Canadians under the age of 35 are overweight or obese, whereas approximately half of Canadians in the 35-44 through the 65-74 age groups fall into that category.

The *Canadian Medical Association Journal* in 2006 published a thorough literature review on the issue of physical inactivity by Warburton et. al. The review emphatically stated that regular physical activity is effective in the prevention of several chronic diseases, including cardiovascular disease, type 2 diabetes, cancer, hypertension, and osteoporosis. It pointed out that physical activity is important in *primary* prevention (i.e. prevention of the diseases from developing), and *secondary* prevention (e.g. extending the life of those experiencing the disease/condition, and management of the condition).

The issue is gaining traction in the popular press as well. For example, on March 26th in 2007 Newsweek magazine in the US devoted most of that issue to exploring the topic of exercise, pointing out the various impacts and benefits of both moderate and vigorous physical activities.

Through a series of wide-ranging articles the issue pointed out that exercise is not only good for the body – for example, it has been known for some time that it lowers blood pressure, improves insulin sensitivity and raises one's aerobic capacity – but that researchers now believe it also makes people smarter, and that it may help people fight such dreaded afflictions as breast cancer and Alzheimer's disease.

This report was prepared by the Centre for Spatial Economics (C4SE) at the request of the Fitness Industry Council of Canada (FIC).[1] The report documents the costs to society of the rising lack of physical fitness among Canadians, projects the likely future costs of physical inactivity based on current trends and estimates the potential net economic benefits of establishing a national adult fitness tax credit.

Subsequent sections of this report review the following topics:

- The relationship between physical inactivity and health outcomes.
- The costs of physical inactivity.
- Projections of health outcomes to 2027.
- Projections of the costs of physical inactivity.
- The Children's Fitness Tax Credit.
- An Adult Fitness Tax Credit.
- Supporting Evidence.

[1] C4SE is an economic consulting firm based in Milton, Ontario that carries out customized economic assessments and impact studies on behalf of clients in both the private and public sectors right across Canada. FIC is the association representing fitness and health clubs across Canada. About 4.5 million Canadians are members of fitness and health clubs (or 15 percent of the population) and the country's 4,900 clubs generate annual revenues exceeding $2 billion dollars.

THE RELATIONSHIP BETWEEN PHYSICAL INACTVITY AND HEALTH OUTCOMES

The relationship between physical activity and health outcomes is well documented. The impact physical activity has on obesity (which in turn has an impact on health outcomes) is also the subject of much inquiry. While the relationships between activity, obesity and health are complex, most of the research and literature in this area supports the view that low levels of physical activity are generally associated with poor health outcomes.

This section of our report reviews the literature on physical inactivity, health outcomes and health care costs. The focus of the literature review was two-fold.

- First, current research was examined for the purpose of identifying specific negative health outcomes (i.e. diseases and conditions) associated with physical inactivity.

- Second, the review was conducted in order to establish estimates of direct and indirect costs associated with these negative outcomes.

The literature is fairly consistent with regards to the first purpose. That is, medical research is quite clear on the consequences of people being inactive. However, assigning specific costs associated with the diseases and outcomes is less clear. Most of the articles/reports that were studied were themselves reviews and summaries of numerous other clinical studies, experiments and surveys. In this respect, the results of this literature review represent a broad overview of the current state of research into the associations between physical inactivity, health outcomes, and healthcare costs.

Physical inactivity (or activity) is a difficult concept to measure for a few reasons. For example, activities differ in terms of the energy required to perform them and in the health benefits derived from them (such as, is the activity focused on aerobic benefits or muscle strength). Also, levels of physical activity among populations are typically measured through general social surveys, which can sometimes produce over-estimates of the extent to which people engage in various activities.

Nonetheless, it is generally accepted (and survey results consistently show) that a physically active person is more likely to have better health outcomes than a non-active person. One of the first major, comprehensive reports on the subject, by the US Surgeon General in 1996, made clear the connection between activity and physiological function. More specifically, the report (which summarized a large body of research on the topic) identified a number of diseases and conditions for which risks decreased when activity increased, including coronary heart disease, hypertension, colon cancer, and diabetes.

While the report noted some of the associated risks for certain types of activities for certain people (such as out of shape older people suddenly engaging in vigorous activity, leading to increased risk of heart attacks), it clearly asserted that some activity is better than none. The report noted that while studies have found that physical activity on its own can reduce risk, higher levels of physical activity are associated with lower levels of obesity, which can in turn reduce the risk of developing the identified conditions.

Frances (1996) identified how physically sedentary lifestyles (a commonplace trend among Canadians and Americans) is inversely related to coronary heart disease (CHD). Even moderate activity (such as vigorous 30-minute walks on most days of the week) below the level required for cardio respiratory fitness can reduce the incidence of CHD. The U.S. Centers for Disease Control and Prevention, in a 1993 publication which reviewed a large number of other studies, found that the epidemiological evidence confirmed the effectiveness of mild and moderate levels of physical activity (such as walking, yard work, etc.) in reducing the risk of coronary heart disease.

A study conducted using the *Canadian National Enhanced Cancer Surveillance System* (Mao, et. al., 2003) found a negative association, for both men and women, between physical activity and rectal cancer. That is, increased occupational and physical activity leads to slightly lower incidence of rectal cancer. However, they did find that regular physical activity tends to lead to lower obesity risks, and then indirectly to a reduced risk of rectal cancer. Darlington et. al. (2007) found that a "… significantly reduced risk [for developing prostate cancer] associated with strenuous recreational physical activity later in life (i.e., early 50s) and an effect of borderline significance for strenuous physical activity for those in their early 30s" (p. 151). However, they didn't find that moderate activity was associated with the risk of developing prostate cancer.

A recent review of the international literature (Baumann, 2003) confirmed that even moderate increases in physical activity lead to benefits with regards to a number of conditions, such as decreased Type 2 diabetes, reduced cardiovascular disease, colon and breast cancer prevention, and reduced likelihood of osteoporosis.

It is generally accepted that less active lifestyles lead to greater rates of obesity. For example, King et. al. (2001) examined a national, U.S. survey (the National Health and Nutrition Examination Survey) and found that higher levels of leisure-time activity – such as 3 or 4 weekly activities – are associated with lower levels of obesity, even after controlling for such factors as age, gender and income. Higher levels of obesity, in turn lead to negative health outcomes. For example, a 1999 study on physical activity, obesity and hypertension, (Fagard, 1999) found that even though proper diet was most effective controlling BMI in mostly overweight subjects, exercise combined with proper diet helped reduce BMI even more. Recent research by Luo et. al. (2007) confirmed the interplay between physical inactivity, obesity and chronic disease. In their study they point out that the rapidity by which obesity rates are increasing "…suggests that behavioural and environmental influences, rather than biological changes, have fuelled the epidemic" (p. 135). Specific diseases and conditions they identified as being associated with obesity include hypertension, breast cancer, colon cancer, coronary heart disease, and stroke.

As noted in the introduction to this report, a recent, and quite thorough, review of the literature in the *Canadian Medical Association Journal* (Warburton et. al., 2006) emphatically states that regular physical activity is effective in the prevention of several chronic diseases, including cardiovascular disease, type 2 diabetes, cancer, hypertension, and osteoporosis. They also summarize the biological mechanisms leading to positive health outcomes. The review also pointed out that physical activity is important in *primary* prevention (i.e. prevention of the diseases from developing), and *secondary* prevention (e.g. extending the life of those experiencing the disease/condition, and management of the condition).

While the review points out how *much* activity is necessary in order to realize health benefits, other research has identified that even moderate increases in activity (such as those activities equivalent to walking 3-4 hours per week) can improve the conditions of those suffering from the conditions and also prevent the condition from developing in the first place. They state that the current activity guidelines as recommended by Health Canada are sufficient to realize these benefits.

A recent report by Colman and Walker (2004) for the B.C. Ministry of Health summarizes how studies have illustrated the *biological pathways* (why physical activity helps prevent disease):

> *[P]hysical activity may help prevent cardiovascular disease by improving the balance between myocardial oxygen supply and demand. It may protect against cancer by increasing the proportion of free radical scavenging enzymes and circulating T and B lymphocytes, thus improving immune function, and by increasing gastrointestinal motility and decreasing the transit time of ingested food. Physical activity can protect against overweight and diabetes by reducing body fat, increasing the resting metabolic rate and the rate of glucose disposal, and improving cell insulin sensitivity. Regular exercise in childhood can protect against osteoporosis in old age by promoting the development of bone mass, and at older ages it can help maintain bone mineral density. (p. 5)*

Colman and Walker summarize the results of this field of study by identifying a number of diseases and conditions typically associated with physical inactivity including:

- heart disease
- stroke
- hypertension
- type 2 diabetes
- colon cancer
- breast cancer
- osteoporosis

In summary it is useful to quote Health Canada directly on what it tells the Canadian public regarding the benefits of physical activity:

> *Physical activity improves health and well-being. It reduces stress, strengthens the heart and lungs, increases energy levels, helps you maintain and achieve a healthy body weight and it improves your outlook on life. Research shows that physical inactivity can cause premature death, chronic disease and disability. Health Canada encourages Canadians to integrate physical activity into their everyday life; at home, at school, at work, at play and on the way ... that's active living! For children, regular physical activity is essential for healthy growth and development. For adults, it allows daily tasks to be accomplished with greater ease and comfort and with less fatigue. For seniors, weight-bearing physical activity reduces the rate of bone loss associated with osteoporosis and regular physical activity maintains strength and flexibility, balance and coordination and can help reduce the risk of falls. Regular physical activity prolongs independent living. Being physically active not only strengthens your body, it also makes you feel good about yourself.*

THE COSTS OF PHYSICAL INACTIVITY

There are different types of costs associated with physical inactivity, such as medication, hospital stays, physician compensation, workers' compensation, and lost productivity. The literature on this subject typically divides these costs into direct costs (i.e. medical treatment of the disease) and indirect costs (typically lost productivity).

Numerous studies point to the economic benefits of increased physical activity. For example, a U.S. panel study conducted from 1994 to 1997 (Martinson, et. al., 2003) found that even moderate increases in physical activity (from 0-1 to 3 or more times per week) among older subjects resulted in lower health care charges of approximately $2,000 compared to those who didn't increase their activity levels. Using results from the 1987 U.S. *National Medical Expenditures Survey* Pratt et. al. (2000) found that average direct medical costs were roughly $300 (1987 US$) lower for people who were regularly physically active[2] than those who were not. They then estimated that if all Americans regularly participated in physical activity a total of $76.6 billion (2000 US$) in direct medical costs would be saved. They also found that these results were consistent across all age groups, and not limited just to people over the age of 45.

The costs associated with being overweight or obese (for which the trend is generally increasing in North America) are also the subject of much study. One study (Finkelstein, et. al., 2003) estimated that the medical costs of being overweight or obese in the U.S. could have been as high as $78.5 billion in 1998 (which represented 9.1 percent of total U.S. medical expenditures at the time).

Wang et. al. (2004), in a study of approximately 25,000 people, estimated that a total possible savings of roughly 1.5 percent of the total health care costs could be realized if all obese, sedentary employees would adopt a physically active lifestyle – i.e. moderate physical activity of at least 1 to 2 times a week.

A more recent U.S. study (Anderson, 2005) conducted using data from a panel of 8,000 health plan members aged 40 and over found physical inactivity, overweight and obesity to be positively related. In addition, they found them also to be related to such conditions as cardiovascular disease, diabetes, degenerative joint disease and cancer, and they conclude that just fewer than 25 percent of health care charges were associated with inactivity, overweight and obesity.

A study conducted for the California Department of Health Services (Chenoweth, 2005) examined the direct and indirect costs (i.e. medical care, workers' compensation, and lost productivity) associated with physical inactivity, obesity and overweight. The estimated total cost in California attributed to inactivity alone was just over $13 billion (measured in $2000), which is more than the costs associated with obesity ($6.4 billion) and overweight ($2 billion). The Minnesota Department of Health (2002) recently concluded that the direct health care costs associated with conditions preventable by physical activity represent $100 for every person in the state. This estimate did not consider the indirect costs associated with lost productivity.

[2] By regular physical activity they meant people who engaged in either moderate or strenuous activity for at least 30 minutes, 3 times per week.

The U.S. Centers for Disease Control and Prevention, through their National Center for Chronic Disease Prevention and Health Promotion (2007), estimates the following with regards to physical inactivity and health costs:

- In 2000, health care costs associated with physical inactivity topped $76 billion.
- If 10 percent of adults began a regular walking program, $5.6 billion in heart disease costs could be saved.
- A sustained 10 percent weight loss will reduce an overweight person's lifetime medical costs by $2,200–$5,300 by lowering costs associated with hypertension, type 2 diabetes, heart disease, stroke, and high cholesterol.

A study conducted by Ohinmaa et. al. (2006) examined Albertan adults in the *2000 Canadian Community Health Survey* with a focus on identifying the increased health expenditures of those people exhibiting *risk* behaviours (smoking, inadequate nutrition and physical inactivity). While not specifically attributing costs to any one of these risk behaviours, they discovered that health care costs increase among those exhibiting one or more of these risk behaviours, and that this discrepancy increases with age.

Probably the most detailed efforts to quantify the economic costs associated with disease in Canada come from the three *Economic Burden of Illness in Canada* (EBIC) studies conducted since 1991 (Wigle, et. al., 1991; Moore, et. al. 1997; Health Canada, 2002). In these three detailed studies, which have become more methodologically sophisticated over time, attempts were made to assign specific dollar values to diseases. As pointed out above, costs were grouped into two types, direct and indirect.

Direct costs are classified as "… the value of goods and services for which payment was made and resources used in treatment, care, and rehabilitation related to illness or injury," (Health Canada, 2002; p. 1) and include five components:

- hospital care expenditures
- drug expenditures
- physician care expenditures
- expenditures for care in other institutions
- additional direct health expenditures (including other professionals, capital, public health, prepayment administration, health research, etc.)

Indirect costs, which are more difficult to measure, are defined as "…the value of economic output lost because of illness, injury-related work disability, or premature death." (Health Canada, 2002; p. 1). The three specific components are:

- The value of years of life lost due to premature death (mortality costs).
- The value of activity days lost due to short-term disability (morbidity costs due to short-term disability).

- The value of activity days lost due to long-term disability (morbidity costs due to long-term disability).

The direct and indirect costs are allocated to diagnostic categories (e.g. musculoskeletal, respiratory, cancer, injuries, etc.) by age group and sex. While the methodology is not above criticism (for example, the difficulty of assigning dollar values to days lost due to death), it does represent the best effort to date to assigning economic value to illness.

The EBIC procedure estimated the total cost of illness in Canada for the year 1993 to be roughly $157 billion (45.7 percent for direct costs, and 54.3 percent for indirect costs). The most recent study, which examined 1998 data, estimated the total cost to be just $159 billion (52.7 percent attributable to direct costs, and 47.3 percent to indirect costs).

The diagnostic categories for which total direct costs are highest (for 1998 data and excluding *unattributable* causes) were:

- cardiovascular diseases (8.1 percent)
- mental disorders (5.6 percent)
- digestive diseases (4.2 percent)
- respiratory diseases (4.1 percent)

The diagnostic categories for which total indirect costs are highest (for 1998 data and excluding *unattributable* causes) were:

- cardiovascular diseases (11.6 percent)
- musculoskeletal diseases (10.3 percent)
- cancer (8.9 percent)
- injuries (8.0 percent)

The Colman and Walker study for the B.C. Ministry of Health (2004) makes use of the cost estimates for the specific diagnostic categories as derived from the EBIC studies. It then parcels out the costs associated with the diseases and conditions that are related to physical inactivity. To apportion costs associated with physical inactivity they use a methodology developed by Katzmarzyk et. al. (2000). From the extensive epidemiological evidence they develop *relative risk* (RR) values for each disease, which represent the relative risk "…of developing a particular disease for a physically inactive person compared to an active person." (p. 11) More specifically:

> *The relative risk is determined by dividing the rate of the disease among sedentary people by the rate of disease among active people. For example, if sedentary people are twice as likely to develop heart disease, then the relative risk (RR) is 2. (p. 11)*

This RR measure is then combined with the percent of the population that is physically inactive to create a *population attributable risk* (PAR) factor, which represents the "… extent to which each disease is attributable to the risk factor." (p. 12). For their study, 38 percent of the population was physically inactive, as determined from the *2000/01 Canadian Community Health Survey*.

The final step in the process is to multiply the PAR by the EBIC estimated cost associated with the disease. This calculation results in an estimate of the dollar value of the direct and indirect costs for the specific disease/conditions associated with physical inactivity.

Using this methodology, for 1998 they estimated the total direct health care costs of physical inactivity in British Columbia to be $211 million ($2001), and indirect costs to be $362 million. They further estimate that if physical inactivity were decreased by 10 percent the B.C. economy would experience $49.4 million in annual saving, broken down as follows:

- Total direct health care costs - $18.3 million.
- Economic productivity gains (avoided early death and disability) - $31.1 million.

Katzmarzyk and Janssen further refined the work of Katzmarzyk et. al. (2000) in a 2004 study published in the *Canadian Journal of Applied Physiology*. Besides providing a very detailed review of the clinical and epidemiological evidence underlying the relative risk values for each disease and condition, they update their work in two ways:

- They apply the methodology to the Canadian population 12 years of age and older, and therefore use a value of 53.5 percent (as derived from the *Canadian Community Health Survey*) for physical inactivity.[3]
- The health costs for the diseases and conditions being examined were inflated from 1998 to 2001 dollars by a factor of 26.3 percent, which was calculated using the Canadian Health Expenditures Database.

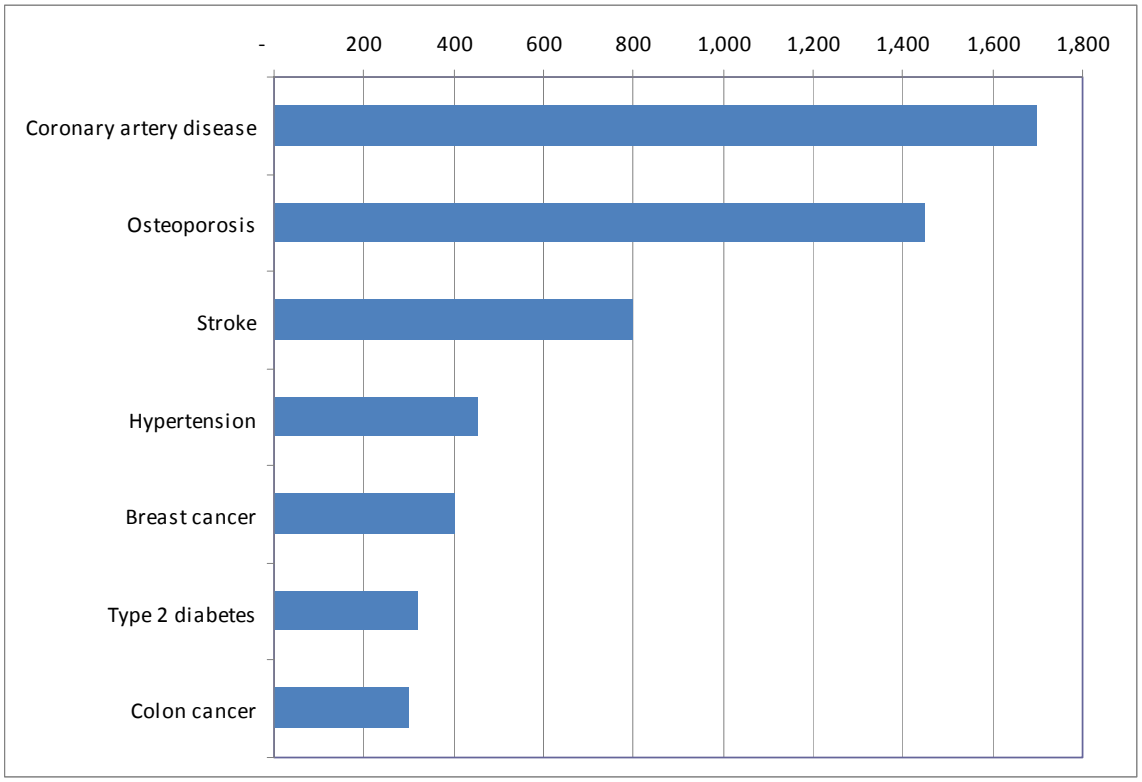
Using these updated values they estimate the total health care cost associated with physical inactivity to be $5.3 billion nation-wide. The specific costs for each of the 7 major chronic diseases are shown in Exhibit 1.

They admit that obesity is a confounding factor in this type of analysis in the sense that there is a relationship between physical inactivity and obesity.[4] In this sense, some of the cost attributed to inactivity may in fact be attributable to obesity. However, it is quite clear from their results that the costs associated with physical inactivity cannot be ignored.

[3] The 2000 study by Katzmarzyk et.al. examined the 18 and over population, and used a value of 62 percent, as derived from the *Physical Activity Monitor Survey*.

[4] In their analysis they also estimate the health care costs of obesity (using the same methodology) for 8 diseases, 5 of which are the same as those used in the analysis of inactivity.

Exhibit 1
Health Care Costs of Major Chronic Diseases Due to Physical Inactivity, Canada 2001 ($ Millions)



Source: Katzmarzyk and Janssen, 2004

PROJECTIONS OF HEALTH OUTCOMES TO 2027

Based on the literature review above and on C4SE's detailed projections of the Canadian population by age and gender this section of the report develops projections over the next two decades of physical activity, obesity and health outcomes.

Projected Population Change

Exhibit 2 shows the changes in the population aged 15 year and older in Canada over the 20-year period from 2007 to 2027. Two key observations can be made:

- The largest overall population growth will be seen in the 55 to 74 age groups from 2007-17, and in the 65 and over age group from 2017-27.
- There will be relatively little growth in the population aged less than 55 between 2007 and 2027.

Exhibit 2
Population Change by Major Age Group (Ages 15 and Over), Canada
2007-27 (000s)

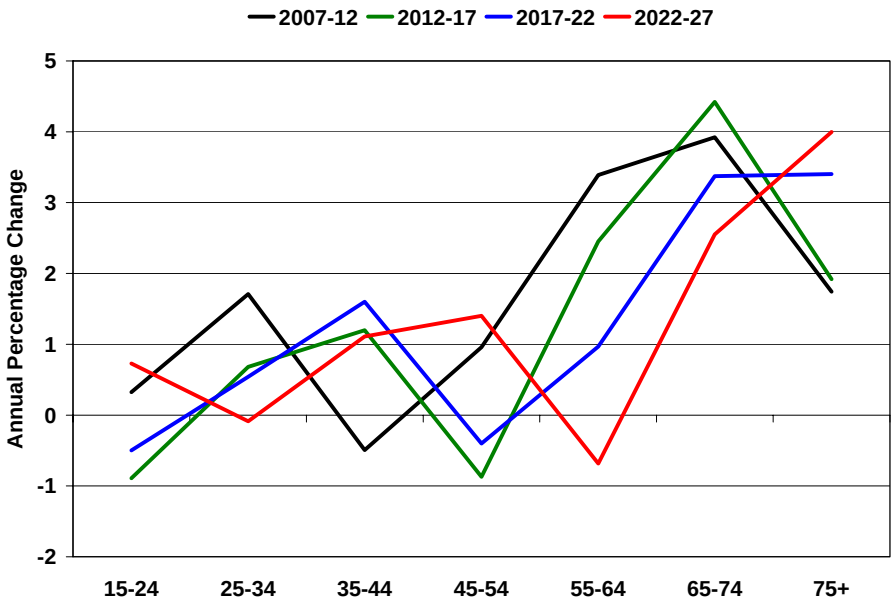
	2007-12	2012-17	2017-22	2022-27
15-24	71.8	-195.6	-105.7	154.1
25-34	404.9	171.9	140.6	-23.2
35-44	-121.8	299.1	427.1	318.1
45-54	254.0	-232.3	-103.2	368.6
55-64	695.7	583.7	252.7	-181.3
65-74	493.7	681.4	632.0	554.8
75+	188.7	227.2	456.5	641.6
15+	1,986.9	1,535.5	1,700.0	1,832.6

Source: Centre for Spatial Economics

For example, over the ten year period from 2007 to 2017 the population aged 55 and over will grow by almost 2.9 million people whereas the population aged 18-54 will grow by only about 0.7 million people for a total change of just over 3.5 million. Over the 20-year period from 2007 to 2027 the 55 and over population will grow by 5.2 million whereas the 18-54 population will grow by only 1.8 million for a total change of just over 7 million. As will be seen later in this report, these age-specific growth patterns will have important implications for the growth of physical inactivity related diseases and conditions.

Exhibit 3, which shows the annual percentage change by age group, confirms these results. The differences in the population growth rates for the age groups (along with the differential incidence rates for diseases) will have important implications for changing health outcomes.

Exhibit 3
Population Change by Major Age Group (Ages 15 and Over), Canada
2007-27 (Average Annual Percentage Change)



Source: Centre for Spatial Economics

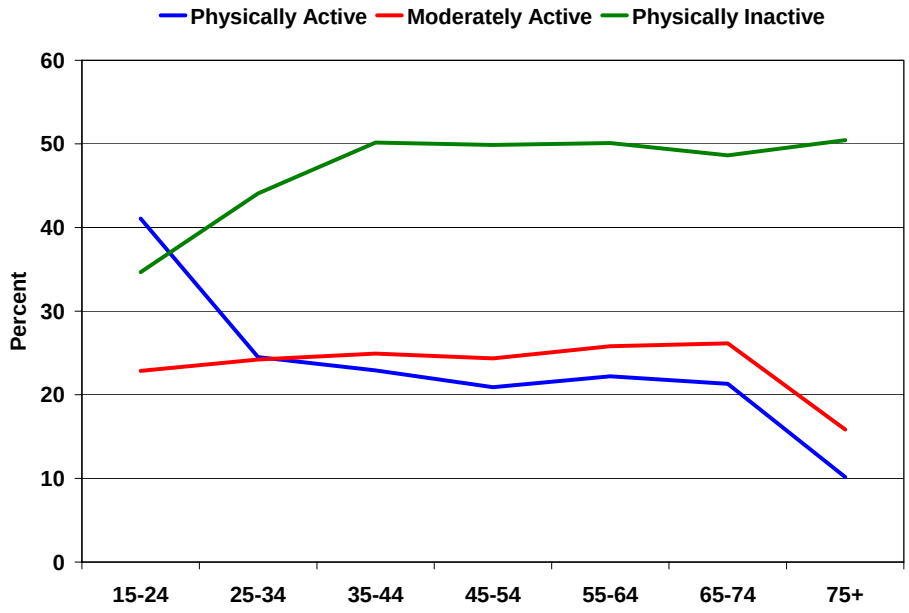
Physical Activity Rates by Major Age and Sex Groups

The *Canadian Community Health Survey* (CCHS), a biennial survey conducted by Statistics Canada, questions a large number of Canadians[5] on many issues associated with individuals' health status, nutritional habits, and physical activity levels.

One key section of the survey as it pertains to this study is a respondent's participation in leisure-time physical activities, such as swimming, aerobics, and gardening. Based on their answers, respondents are grouped into three categories – active, moderately active, and inactive.[6] Exhibit 4 shows that, except for the two youngest age groups (15-24 and 25-34), about one half of all Canadians are physically inactive.

Only the very youngest group could be considered active, with roughly 40 percent of them being so classified. One other notable conclusion is that the percentage of people who are physically active or moderately active declines significantly around the age of 70.

Exhibit 4
Levels of Physical Activity by Major Age Group (Ages 15 and Over), Canada 2005 (Percent)



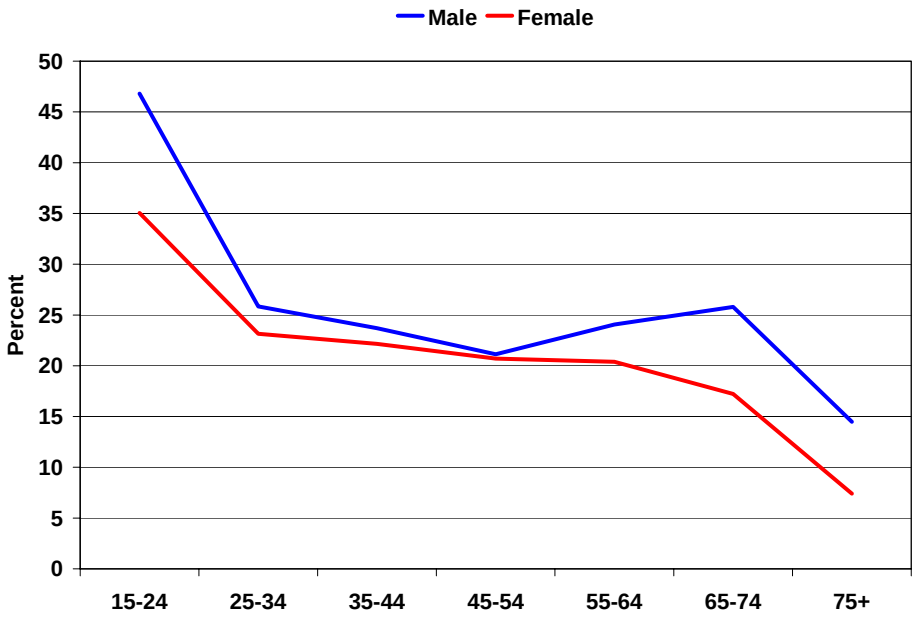
Source: Statistics Canada, *Canadian Community Health Survey*

[5] For the 2005 survey, which is used in this analysis, approximately 68,000 Canadians were interviewed.

[6] "Respondents are classified as active, moderately active or inactive based on an index of average daily physical activity over the past 3 months. For each leisure time physical activity engaged in by the respondent, an average daily energy expenditure is calculated by multiplying the number of times the activity was performed by the average duration of the activity by the energy cost (kilocalories per kilogram of body weight per hour) of the activity. The index is calculated as the sum of the average daily energy expenditures of all activities. Respondents are classified as follows: 3.0 kcal/kg/day or more = physically active; 1.5 to 2.9 kcal/kg/day = moderately active; less than 1.5 kcal/kg/day = inactive." Statistics Canada, http://www.statcan.ca/english/research/82-618-MIE/2006005/tables/t019.htm

Males 15 to 24 and over the age of 55 are significantly more likely than females of the same age to be physically active (Exhibit 5). Rates of physical activity among females are equal to those of males only in the 25 to 54 year age groups, and at no age level are females more active than males. Both males and females exhibit similar *life-cycle* patterns in their levels of activity with physical activity at its highest when young, and dropping significantly beyond the age of 75 years.

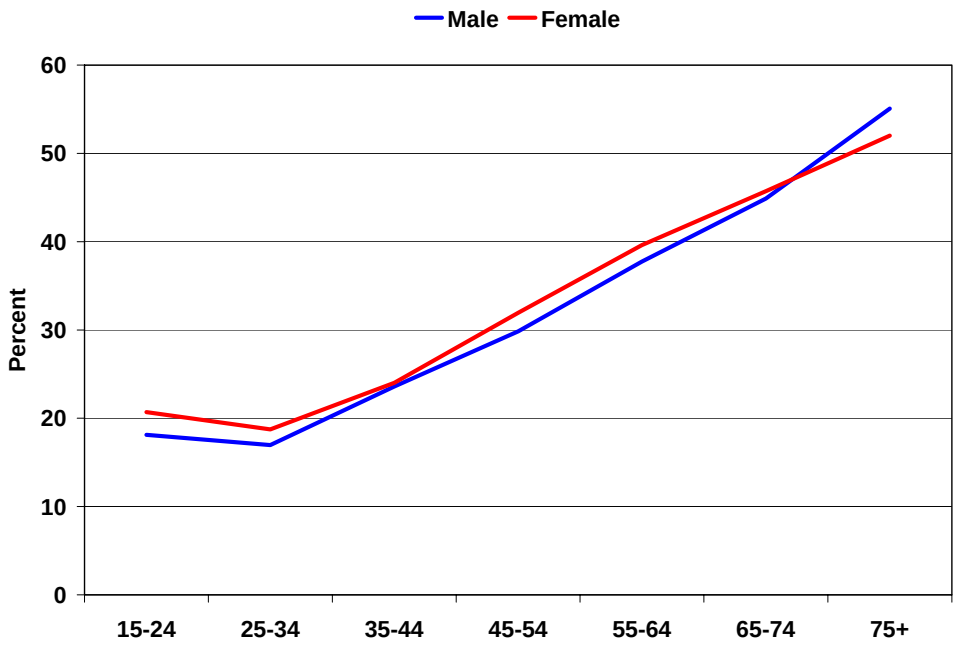
Exhibit 5
Physically Active Population by Major Age and Sex Groups (Ages 15 and Over), Canada 2005 (Percent)



Source: Statistics Canada, *Canadian Community Health Survey*

Respondents were also asked whether they faced any health-related limitations to their daily activities.[7] Exhibit 6 shows that activity limitations – like physical activity – exhibit a life-cycle pattern with limitations significantly and steadily increasing with age. There is very little difference between males and females when it comes to activity limitations.

Exhibit 6
Participation and Activity Limitation by Major Age and Sex Groups (Ages 15 and Over), Canada 2005 (Percent)



Source: Statistics Canada, *Canadian Community Health Survey*

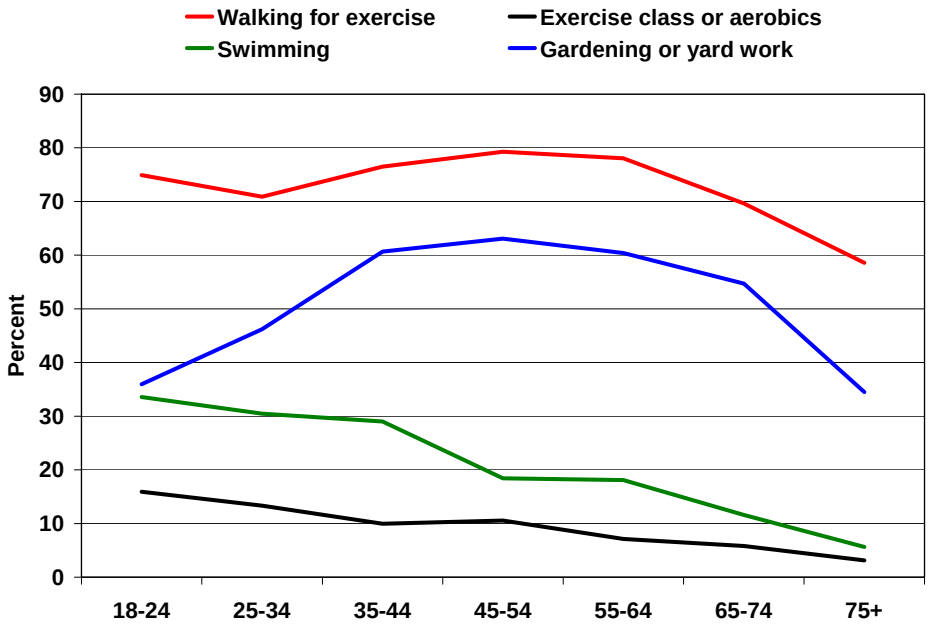
Persistently low fertility rates and an aging population mean that the net natural change in population (births less deaths) is declining rapidly throughout Canada. Net immigration today accounts for the lion's share of Canada's annual gain in population and is projected to continue to do so over the next several decades. According to the Canadian Fitness and Lifestyle Research Institute (2003) a lower proportion of immigrants to non-immigrants in Canada rate their health as very good or excellent for both men and women. Immigrants are less likely than non-immigrants to be classified as physically active or moderately active, and are more likely to report being physically inactive during their leisure time.

[7] Activity limitations are defined as those that prevented a person from participating in any type of daily activity (i.e. at work, school or home) because of a physical, mental or health condition that was expected to last longer than 6 months.

Age differences in activity levels can also be seen when it comes to the specific types of leisure-time activities in which Canadians participate. Exhibit 7 displays participation rates for various activities by age group, as derived from the *Joint Canada/United States Survey of Health* (JCUSH). The JCUSH asked respondents about their participation in various activities over a 3-month period. A number of pertinent comments can be made:

- Physically demanding activities (such as swimming and exercise classes) are less popular than activities that are less demanding (such as walking or gardening).
- The more physically demanding activities show different life-cycle patterns than do the less physically demanding activities.
- The more demanding activities seem to exhibit steadily declining participation rates as people age.
- For the less physically demanding activities participation rates peak among the middle age groups (around 45-54), and decline thereafter.

Exhibit 7
Participation in Various Activities by Major Age and Sex Group (ages 15 and Over), Canada 2003 (Percent)

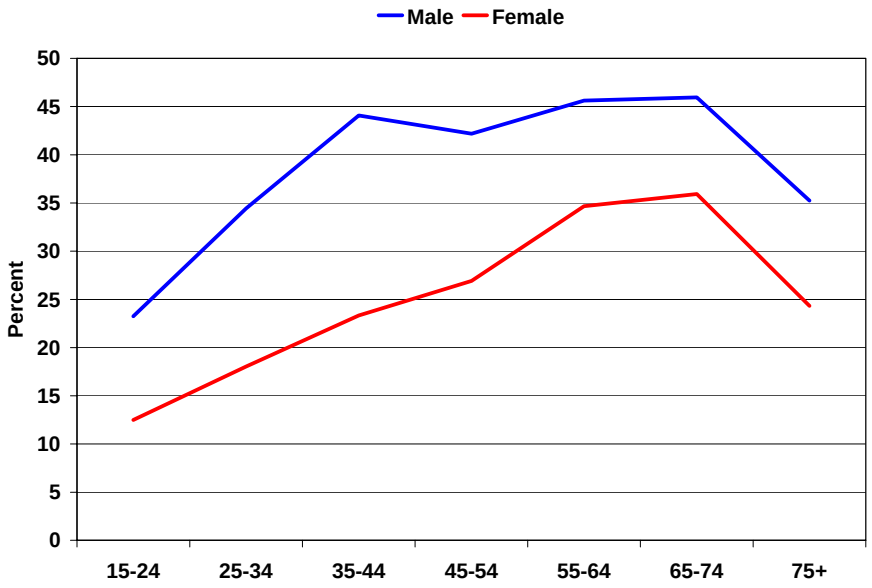


Source: Statistics Canada & U.S. Centers for Disease Control and Prevention, *Joint Canada/United States Survey of Health*

Obesity by Major Age and Sex Groups

The CCHS also provides indicators of obesity – namely, both self-reported and measured. The primary measure of obesity – Body Mass Index (BMI)[8] – is found to be correlated with various negative health outcomes, and is used to classify respondents into a number of categories, including overweight and obese. Exhibits 8 illustrates the percentage of the population that self-reports being overweight while Exhibit 9 (following page) illustrates the percentage of the population that self-reports being obese. While the relatively high levels of overweight and obesity are striking, what is also noticeable is how the BMI values change over the life-cycle. For the most part, relatively few Canadians under the age of 35 are overweight or obese, while approximately half of Canadians in the 35-44 through the 65-74 age groups are overweight or obese.

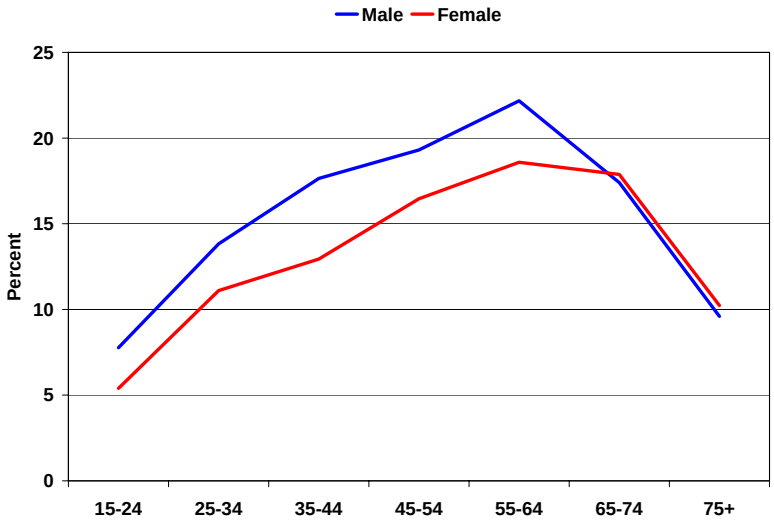
Exhibit 8
Overweight (Self-Reported) by Major Age and Sex Group (Aged 15 and Over), Canada 2005 (Percent)



Source: Statistics Canada, *Canadian Community Health Survey*

[8] The BMI is a measure of a person's weight in relation to their height. Adults are classified as overweight if their BMI value is between 25-29.9, and obese if their BMI value is above 30.

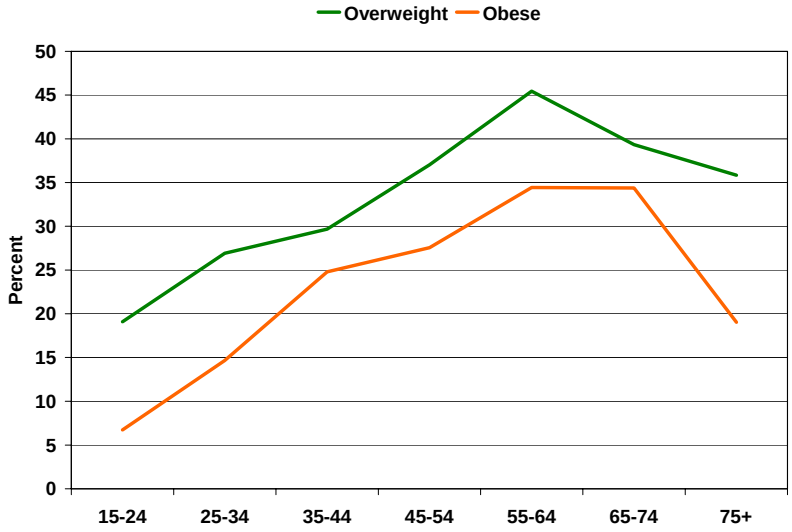
Exhibit 9
Obese (Self-Reported) by Major Age and Sex Group (Aged 15 and Over), Canada 2005 (Percent)



Source: Statistics Canada, *Canadian Community Health Survey*

Similar results are obtained when the BMI is based on *measured*[9] values (Exhibit 10), although overall levels are both slightly higher.

Exhibit 10
Overweight or Obese (Measured) by Major Age Group (Aged 15 and Over), Canada 2005 (Percent)



Source: Statistics Canada, *Canadian Community Health Survey*

[9] That is, interviewers directly measured a respondent's weight and height.

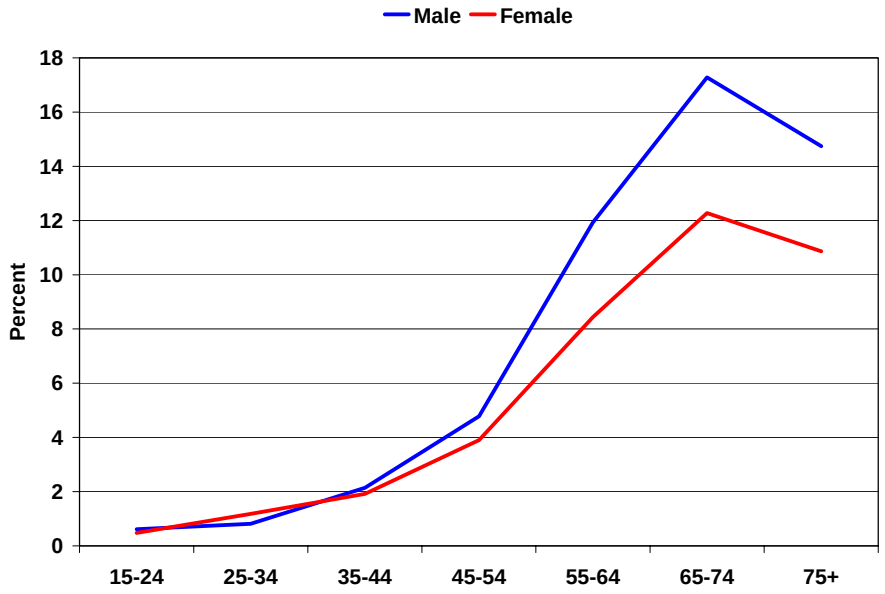
Disease Incidence Rates by Major Age and Sex Groups

Diabetes

Diabetes, and particularly Type 2 diabetes, is commonly identified as being associated with physical inactivity and being overweight. While there is no specific measure of the prevalence of Type 1 vs. Type 2 diabetes, it is generally accepted that roughly 90 percent of diabetes is Type 2.[10]

Exhibit 11 shows that the prevalence of diabetes increases dramatically around age 50, then declines slightly after age 75. Based on the CCHS, approximately 1.3 million Canadians aged 15 and over are diagnosed[11] with diabetes. If 90 percent of these Canadian suffer from Type 2, this translates into just under 1.2 million people.

Exhibit 11
Diabetes by Major Age and Sex Group (Aged 15 and Over), Canada
2005 (Percent)



Source: Statistics Canada, *Canadian Community Health Survey*

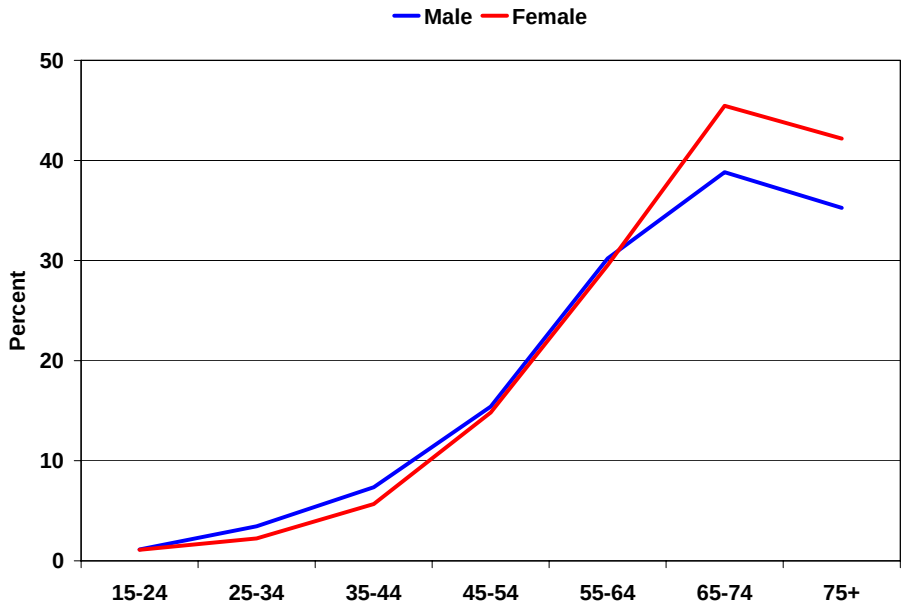
[10] Center for Chronic Disease Prevention and Control, Population and Public Health Branch, Health Canada, *Diabetes in Canada*, (2nd edition) 2002.

[11] Some people, and it is unclear how many, may have diabetes but have not be so diagnosed.

Hypertension
Hypertension, or high blood pressure, is also strongly related to age.

Exhibit 12 shows hypertension has an incidence pattern similar to that for diabetes. Of particular note is the fact that the incidence rate of hypertension increases the most between the ages of 45-54 and 55-64 (by roughly 15 percentage points)

Exhibit 12
Hypertension by Major Age and Sex Group (Aged 15 and Over), Canada 2005 (Percent)

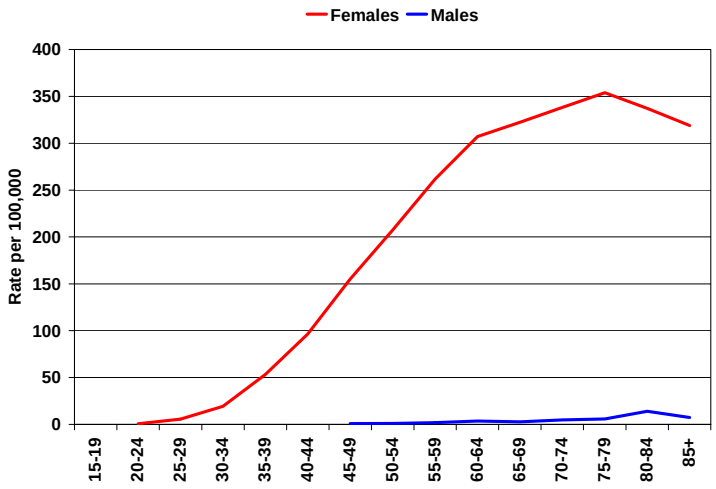


Source: Statistics Canada, *Canadian Community Health Survey*

Cancer

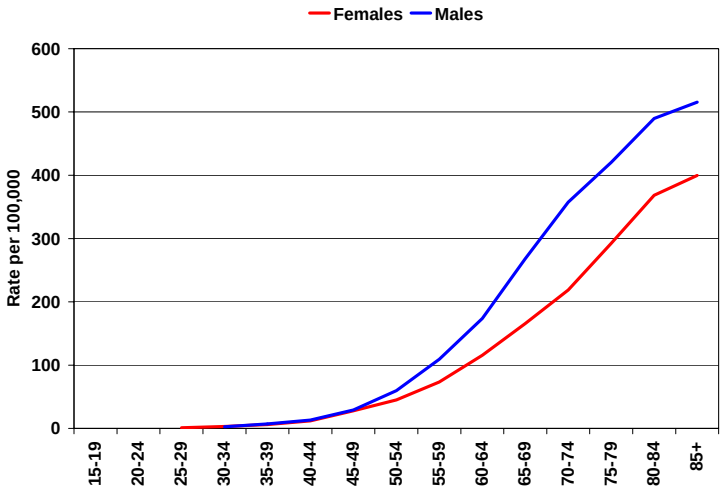
Breast and colon cancers are both associated with physical inactivity. Exhibits 12 and 13 display the incidence rates for these two types of cancer by major age and sex group. While both rates increase with age, the rates increase much earlier for breast cancer than for colon cancer.

Exhibit 13
Breast Cancer Incidence by Major Age and Sex Group (Aged 15 and Over), Canada 2003 (Rate per 100,000)



Source: Public Health Agency of Canada, Centre for Chronic Disease and Prevention Control

Exhibit 14
Colon Cancer Incidence by Major Age and Sex Group (Aged 15 and Over), Canada 2003 (Rate per 100,000)

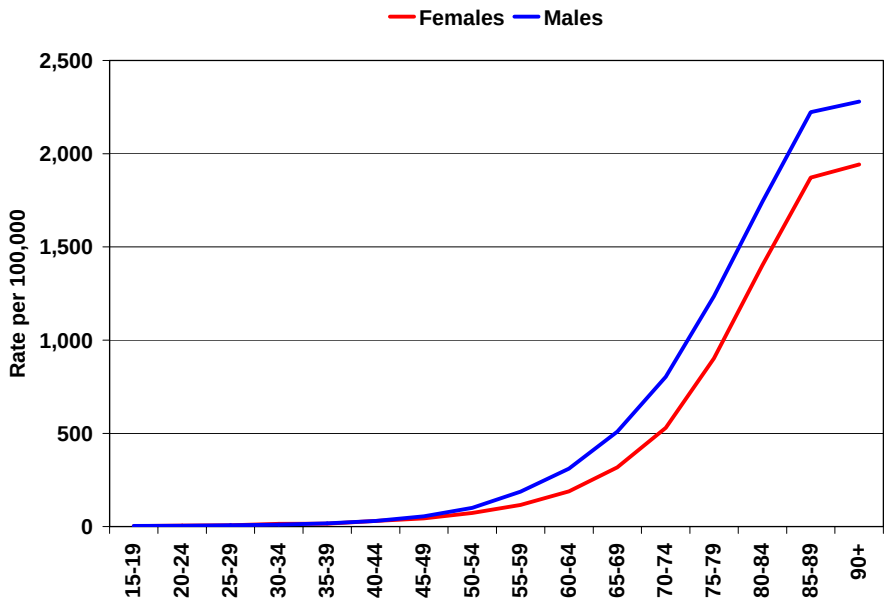


Source: Public Health Agency of Canada, Centre for Chronic Disease and Prevention Control

Stroke

For both males and females, the incidence rate for strokes dramatically increases around age 70 through to age 90 (Exhibit 15). While the rate continues to rise after age 90, it does not do so as dramatically.

Exhibit 15
Strokes[12] by Major Age and Sex Group (Aged 15 and Over), Canada 1999 (Rate per 100,000)



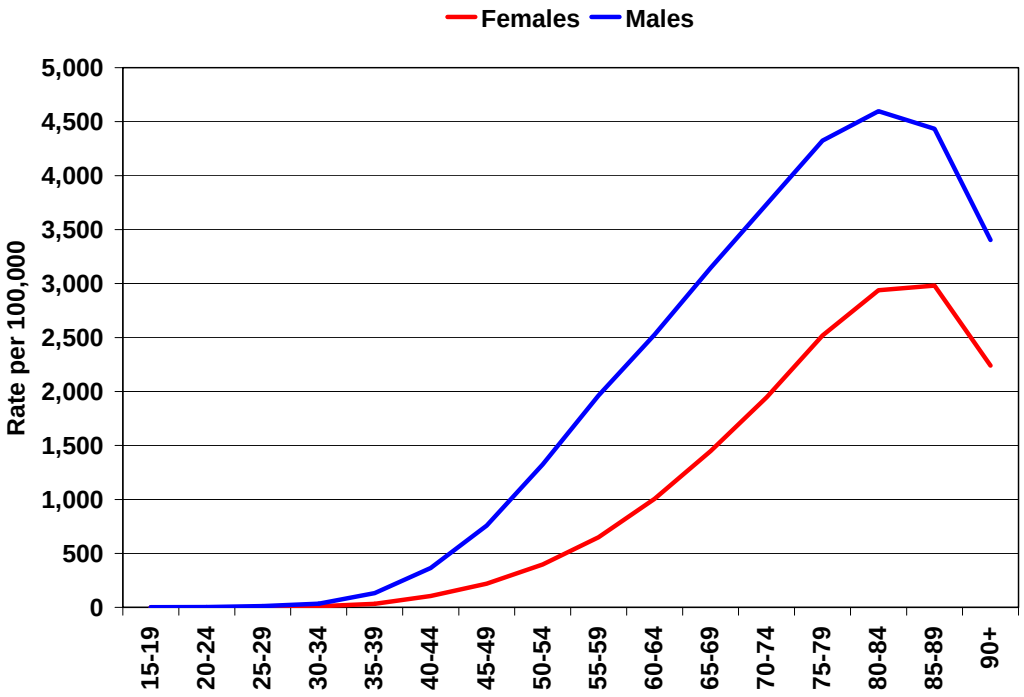
Source: Public Health Agency of Canada, Centre for Chronic Disease and Prevention Control

[12] There are no adequate measures for the incidence of cardiovascular diseases in Canada. The next best measure is *hospital separations*, which records the number of cases dealt with in hospitals. The inadequacy of this measure is that hospital separations do not uniquely identify individuals. That is, the total number of separations can, and does, include people who have experienced more than one incident.

Ischemic Heart Disease

Ischemic heart disease (IHD, also called coronary heart disease) refers to any condition in which "…heart muscle is damaged or works inefficiently because of an absence or relative deficiency of its blood supply",[13] and includes such outcomes as heart attacks and angina. Exhibit 16 shows that IHD is strongly related to age with IHD rates noticeably increasing around the age of 45.

Exhibit 16
Ischemic Heart Disease by Major Age and Sex Group (Aged 15 and Over), Canada 1999 (Rate per 100,000)



Source: Public Health Agency of Canada, Centre for Chronic Disease and Prevention Control

Rates of heart disease among females are well below those among males at all ages above 35 years. Yet heart disease is nevertheless the number one killer among both males and females. The number of deaths from heart disease and stroke is now virtually the same for women and men (36,823 among women and 37,004 among men in 2003 according to Statistics Canada).[14] Deaths due to cardiovascular disease account for a greater share of all deaths among females than males in every age group above 65 years.[15]

[13] Public Health Agency of Canada, Centre for Chronic Disease and Prevention Control, [http://dsol-smed.phac-aspc.gc.ca/dsol-smed/cvd/glossa_e.html]

[14] Heart and Stroke Foundation, [http://ww2.heartandstroke.ca/Page.asp?PageID=1975&ArticleID=5905&Src=heart&From=SubCategory]

[15] Public Health Agency of Canada, Heart disease info-sheet for seniors, [http://www.hc-sc.gc.ca/seniors-aines/pubs/info_sheets/heart_disease/heart_e.htm]

Projections of Diseases and Health Conditions

To this point this section of the report has documented the following:

- While the Canadian population will grow across most age groups over the next 20 years, most growth will occur among the adult age groups, in particular among those 55 to 74 from 2007-17, and among those 65 and over from 2017-27.

- Physical activity, while generally low overall, declines once a person reaches their mid-20s, and again around age 70.

- Being overweight or obese increases with age, at least until age 60, when rates begin to decline.

- Health outcomes (at least for the various diseases and conditions related to physical activity and obesity) are also strongly related to age.

As will be seen in the next section, the *life-cycle nature* of physical activity, obesity, and health outcome patterns will have important implications for the growth rates associated with the health outcomes. More specifically, the diseases and conditions that will increase the most are those whose rates are noticeably higher for those age groups where most population growth will occur. Disease and health condition projections were calculated on the basis of age-sex specific population changes, and age-sex specific incidence rates as summarized in the previous section. The projections assume that the incidence rates for diseases and conditions will not change over time.

Exhibit 17 displays the annual percentage growth rates for the diseases and conditions in 5 and 20-year intervals. A number of important conclusions can be made:

- First, the rate of growth for the population aged 15 years and older is lower than that of all identified diseases and conditions. The disease growth rates more closely approximate the pattern of growth for the 45 and over population. This illustrates how the change in the age profile of the Canadian population (which is becoming relatively older) has important implications for disease growth rates.

- Second, and related to the first conclusion, the highest overall growth rates are for those conditions where the incidence rates increase noticeably for the older age groups. More specifically, strokes, ischemic heart disease, and colon cancers all have incidence rates that significantly increase after age 50 (as opposed to a gradual increase over the life-cycle). The incidence of breast cancer begins to increase noticeably well before age 45, which explains why it does not have as high a growth rate.

- Third, while the incidence of all diseases and conditions will increase over the 20-year time period, the highest growth rates are during the first 10-year time period (2007-17) as opposed to the latter 10 years (2017-27). This mirrors the population growth rates, which are also highest in the first 10 years.

Exhibit 17
Projected Annual Growth Rates for Selected Health Conditions
Canada, Persons Aged 15 Years and Over, 2007-27 (Annual Average Percent Change)

	2007-12	2012-17	2017-22	2022-27	2007-27
Diabetes	2.48	2.26	1.99	1.67	2.10
High Blood Pressure	2.39	2.16	1.94	1.68	2.04
Stroke	2.58	2.48	2.68	2.81	2.64
Ischemic Heart Disease	2.59	2.40	2.32	2.13	2.36
Colon and Rectum Cancer	2.67	2.58	2.57	2.41	2.56
Breast Cancer	2.19	1.94	1.82	1.64	1.90
Obesity (Self-Reported)	1.61	1.25	1.14	1.00	1.25
Obesity (Measured)	1.72	1.45	1.30	1.11	1.39
Physical Inactivity	1.45	1.11	1.15	1.13	1.21
Population 15+	1.41	1.02	1.08	1.10	1.15
Population 45+	2.32	1.62	1.47	1.53	1.73

Source: The Centre for Spatial Economics

Exhibit 18 details the actual number of disease cases (in thousands) implied by the growth rate projections in Exhibit 17. With the exception of breast cancer, those conditions with the lowest growth rates have the highest number of projected cases. With respect to diabetes, if the 90 percent share for type 2 (as noted in the previous section) is applied to the total number of diabetes cases, there will be almost 1.9 million cases of Type 2 diabetes by 2027.

Exhibit 18
Projected Cases for Selected Health Conditions
Canada, Persons Aged 15 and Over, 2007-27 (000s)

	2007	2012	2017	2022	2027
Diabetes	1,386	1,567	1,752	1,933	2,100
High Blood Pressure	4,245	4,776	5,314	5,851	6,359
Stroke	55	63	71	81	93
Ischemic Heart Disease	230	261	294	330	366
Colon and Rectum Cancer	21	24	27	31	35
Breast Cancer	21	23	26	28	30
Obesity (Self-Reported)	3,955	4,284	4,559	4,826	5,072
Obesity (Measured)	6,154	6,700	7,200	7,681	8,116
Physically Inactive	12,744	13,692	14,470	15,320	16,204
Population 15+	27,418	29,405	30,940	32,640	34,473
Population 45+	13,442	15,074	16,334	17,572	18,956

Source: The Centre for Spatial Economics

PROJECTIONS OF THE COSTS OF PHYSICAL INACTIVITY

In our analysis below we employ the methodology found in Katzmarzyk and Janssen (2004) to project the health care costs associated with physical inactivity, based on the following projection assumptions:

- First, the physical inactivity rate used is 48.9 percent, which represents the percent of the population aged 15 years of age and older that is physically inactive (as determined from the 2005 *Canadian Community Health Survey*).

- Second, the initial health care costs for each of the 7 diseases are inflated by 48.5 percent. This represents the percentage increase in total health care costs between 2001 and 2007, as reported in *National Health Expenditure Trends, 1975-2006*.[16]

- Third, to reflect the increasing prevalence of the diseases due to the aging of the population, the annual growth rates for the 7 diseases are used to inflate the costs of treating these diseases. Assuming that total costs are a function of disease prevalence, and that the prevalence for all diseases will increase due to population aging, any cost projections must include this growth function.

- Fourth, we factor into the projections the annual growth rate for physical inactivity (1.21 percent), as developed in the previous section of this report. To the extent that physical activity and inactivity is partly *life-cycle* related, this will have an impact in the calculation of the PAR percent. The PAR percent will increase to reflect the increasing prevalence of inactivity due to the aging population.

- Finally, we factor into the projections an adjustment to reflect the fact that, over and above the factors cited above health care costs across all ages are rising per capita in real terms at an average annual rate of 2.7 percent.

[16] The 2005 and 2006 totals were estimated by the Canadian Institute for Health Information. For 2007 we projected the total cost based on the average annual percentage increase from 1998-2006 – 7.3 percent.

Exhibit 19 shows the initial PAR percent rates, health care costs, and 2007-2027 growth rates for the 7 diseases.

Exhibit 19
Health Care Cost Projections, Initial Projection Model Values

	PAR percent[17]	Health Care Costs, 2007 ($ millions)		Disease Growth Rates, 2007-27
		Direct	Indirect	(Annual percent)
Type 2 Diabetes[18]	21.1	1,189.1	874.1	2.10
High Blood Pressure	13.8	2,272.1	2,008.9	2.04
Stroke	24.3	2,511.7	2,165.5	2.64
Coronary Artery Disease	19.4	3,607.6	9,348.7	2.36
Colon Cancer	18.0	414.1	1,977.7	2.56
Breast Cancer	14.2	666.4	3,182.1	1.90
Osteoporosis[19]	24.0	1,502.7	7,792.2	3.02

Source: The Centre for Spatial Economics

[17] As reported in Katzmarzyk and Janssen (2004).

[18] The disease growth rate is for diabetes as a whole.

[19] For osteoporosis no incidence data was available. Instead, the growth rate is based on the projected deaths, using 2004 data for deaths due to osteoporosis.

Exhibit 20 summarizes the results of the projections at 5-year intervals. By 2027 the total direct and indirect health costs associated with physical inactivity will be just over $20.6 billion. Of these costs, $6.2 billion (or 30 percent) will be direct, while $14.4 billion (or 70 percent) will be indirect. As with the results obtained by Katzmarzyk and Janssen (2004), the cost associated with osteoporosis and coronary artery disease will be the highest, while they will be the lowest for colon cancer and Type 2 diabetes.

Exhibit 20
Projected Health Care Costs of Major Chronic Diseases Associated with Physical Inactivity Canada, 2007-27 ($2007 millions)

	2007	2012	2017	2022	2027
Total Direct Costs	**2,239.0**	**3,123.5**	**3,921.5**	**4,924.1**	**6,185.1**
Colon cancer	69.2	97.1	122.5	154.4	194.8
Type 2 diabetes	233.7	320.4	395.4	487.8	601.7
Breast cancer	87.8	119.2	145.7	177.9	217.2
Hypertension	290.8	397.6	489.1	601.6	740.2
Stroke	570.0	802.4	1,016.4	1,287.4	1,630.6
Osteoporosis	336.6	482.7	622.9	803.6	1,037.0
Coronary artery disease	651.0	904.1	1,129.6	1,411.3	1,763.6
Total Indirect Costs	**5,102.2**	**7,157.0**	**9,036.0**	**11,411.9**	**14,418.0**
Colon cancer	330.4	463.3	584.7	737.7	930.8
Type 2 diabetes	171.8	235.6	290.6	358.6	442.4
Breast cancer	419.1	569.1	695.2	849.2	1,037.6
Hypertension	257.1	351.5	432.4	531.9	654.4
Stroke	491.4	691.8	876.3	1,110.0	1,406.0
Osteoporosis	1,745.5	2,503.1	3,229.6	4,167.0	5,376.7
Coronary artery disease	1,686.9	2,342.6	2,927.2	3,657.4	4,570.1
Total Direct & Indirect Costs	**7,341.3**	**10,280.5**	**12,957.5**	**16,336.0**	**20,603.1**
Colon cancer	399.6	560.4	707.1	892.1	1,125.6
Type 2 diabetes	405.5	556.0	686.0	846.3	1,044.1
Breast cancer	506.8	688.3	840.9	1,027.2	1,254.9
Hypertension	547.9	749.2	921.6	1,133.5	1,394.6
Stroke	1,061.4	1,494.2	1,892.7	2,397.5	3,036.6
Osteoporosis	2,082.1	2,985.8	3,852.4	4,970.7	6,413.7
Coronary artery disease	2,337.8	3,246.7	4,056.7	5,068.8	6,333.6

THE CHILDREN'S FITNESS TAX CREDIT

On January 1, 2007 the federal government's Children's Fitness Tax Credit went into effect. The credit takes the form of a non-refundable tax credit on eligible amounts of up to $500 for each child under the age of 16 paid at any time during the year by parents to register a child in an eligible program of physical activity. As with most other non-refundable tax credits the credit is calculated by multiplying the eligible amount by the lowest marginal tax rate (15.5 percent in 2007).

Thus a parent enrolling one child in a fitness program that cost $750 is able to claim a tax credit equal to 15.5 percent on $500 (the maximum allowed for any one year for any one child), or a credit equal to $78.

This tax credit program can be expected to have an impact on direct and indirect health care costs over the long term. As the children of the parents who take advantage of this tax credit age into adulthood over the next several decades the share of the population that is physically active will increase. In other words, there will be a reduction in the share that is overweight and/or obese, and thus a reduction in both direct and indirect health care costs.

The following section of this report develops estimates of the costs and benefits of extending this maximum $500 fitness tax credit to the adult population of Canada.

AN ADULT FITNESS TAX CREDIT

The intent of the Child Tax Credit that went into effect January 1st, 2007 is to encourage physical fitness program participation among Canadians under the age of 16. The long term impact of the tax credit will be to foster a generation of Canadians whose health and fitness profile improves on that of adult Canadians today. It is also a tool that serves to prevent the onset of childhood obesity which studies show is on the rise. As this report has shown (Exhibit 10 on page 18), among Canadians 15 to 24 years of age less than 20 percent are overweight and only about 6 percent are obese. In sharp contrast, these shares increase to 30 percent overweight and 25 percent obese among people 35 to 44 years of age and to 45 percent overweight and 35 percent obese among those 55 to 64. The intent of an Adult Fitness Tax credit, therefore, would be to bring about, within a very short time span, an improvement in the proportion of the adult population that is physically fit. This outcome, in turn, and also within a very short time span, would have an impact on both the direct costs of physical inactivity (i.e. medical treatment of the diseases associated with inactivity) and on the indirect costs (the lost productivity). For the reasons outlined in this report this trend must be reversed.

This section of the report estimates:

- The impact of the proposed tax credit on the number of physically fit adults under the assumption that only the federal government participates and under the assumption that both the federal and provincial governments participate.
- The direct health care system cost reductions associated with the improvement in physical fitness induced by the tax credit.
- The indirect economic benefits derived from the improvement in physical fitness induced by the tax credit.
- The impacts of the proposed adult tax credit on the net financial position of the federal and provincial governments.

How an Adult Fitness Tax Credit Would Increase Physical Activity Participation

Consumers typically respond to a price decline for a given product or service by purchasing more of that product or service. From the point of view of consumers an adult fitness tax credit would reduce the cost of being involved in physically fit activities up to a maximum of $500 per year. Tax payers could claim the fees they pay for any and all kinds of physical fitness activities, be they fees paid to take aerobics classes at the local YMCA, to swim regularly at the community indoor pool, to play soccer or hockey in local leagues, or to take out a membership with a fitness facility. The tax credit would, in effect, reduce the "price" of physical activity participation.

This reduction in the average cost of physical activity participation would result in an increase in the number people choosing to participate in physical activities.[20] This, in turn, would increase the rates of physical activity among the adult population, reduce the share of adults who are overweight or obese, and ultimately reduce the health care costs among adults associated with their being overweight or obese.

[20] It might also increase the demand for such services from among those who are already participating in such activities. We ignore this impact in our analysis here.

In other words, the impact of an adult fitness tax credit is the same as the impact of the children's fitness tax credit. Both credits will increase the rate of physical activity participation. But the benefits of the adult tax credit could be expected to have a positive health impact almost immediately whereas the children's fitness tax credit is expected to have a positive health benefit only over the long term.

The Impact on the Number of Physically Fit Adults

The first step in developing all of the above estimates is to determine how many more physically fit people could reasonably be expected if an adult tax credit was to be implemented. Exhibit 4 on page 13 of this report illustrates the rates of participation of adult Canadians across the age spectrum for three categories:

- Those who are physically active
- Those who are moderately physically active
- Those who are physically inactive

The participation rates for those that are physically active (the first category only) applied to the known population of Canada by major age group suggest that 6.5 million out of 27.4 million Canadian adults fall into that category (or 24 percent). The participation rates for those that are moderately physically active (the second category only) suggest that an additional 5.7 million Canadian adults fall into that category (or 21 percent). Those who are physically active or moderately physically active participate in a wide range of activities covering the spectrum from walking and gardening through to cycling, swimming, aerobic and other fitness activities. In total 12.2 million adults are either physically active or moderately physically active, and they account for 45 percent of the total adult population.

We assume that the credit would be equal to the lowest marginal tax rate of 15 percent (starting in 2008) on all eligible fees. Of the 12.2 million physically active or moderately physically active Canadians we know that about 4.5 million use the facilities of fitness clubs, implying that the remaining 7.7 million physically active or moderately physically active adult Canadians participate in other activities.

We estimate that only about one third of this group of 7.7 million (or 2.5 million) pay fees of some sort that would be eligible for the tax credit, and we estimate they pay an average of $150 per year in eligible fees. We estimate that the 4.5 million people who are fitness facility participants spend about $400 per year on eligible fees. Thus about 7.0 million physically active or moderately physically active adult Canadians pay fees for the purpose of being physically active.

Evidence suggests (Nelson, 2001) that the price elasticity of demand for recreation services is equal to -0.9, meaning that the 15 percent decline in "price" of physical fitness would result in a 13.5 percent increase in the number of people who are physically fit. This suggests the number of people induced by the tax credit to engage in fee-paying physical activities would increase from 7.0 million people to 7.9 million.

If the provinces also chose to recognize the tax credit the effective decline in the "price" of physical fitness would be 24 percent. The provinces collected personal income taxes in 2006 equal to 62.8 percent of the federal income taxes collected. By recognizing the tax credit the provinces would therefore add another 9 percent to the decline in the average price of physical fitness (that is 62.8 percent of the lowest marginal tax rate of 15 percent). This would result in an increase in the number of fee-paying people engaged in physical activities from 7.0 million to 8.5 million.

The Impact on Health Care Costs

We assume the increased physical activity induced by the tax credit impacts the degree of physical fitness among participants with a lag. We assume one half of the new participants become fit in the second year of the tax credit and the other half in the third year.

The increase in the number of physically fit people reduces the direct and indirect costs of providing health care because the number of physically unfit Canadians declines (drawing on the data in Exhibit 20 on page 29 of this report). If only the federal government participates we estimate that these health care cost savings would reach $135 million in 2010, and $286 million in 2011, then gradually increase to $692 million by the year 2029. If both the federal and provincial governments participate we estimate the health care savings would be $220 million in 2010, $465 million in 2011 and $1.1 billion by 2029.

The Impact on Indirect Costs

More than 61 percent of the adult population of Canada is employed. The adult fitness tax credit is expected to increase the demand for fitness programs either by 945,000 if only the federal government participates or by 1,540,000 if both the federal and provincial governments participate. It might be expected, therefore, that 576,000 of these new program participants would be employed in the case of federal participation only, or 939,000 in the case of both federal and provincial participation.

Thus the adult fitness tax credit could be expected to reduce the likelihood that these workers would miss work due to illnesses related to physical unfitness than they would have been in the absence of the credit.

People with the illnesses highlighted in this report not only miss time from work because they don't feel well, but they also miss time visiting doctors, obtaining treatment and undergoing tests (all of which result in absenteeism). They are also not as productive on the job as healthy coworkers (a phenomenon increasingly referred to as "presenteeism"). Goetzal (2004) found the costs of presenteeism far outweigh those of absenteeism across a range of maladies. The literature review in this report provided ample evidence that lost time from work among overweight and obese individuals exceeds that of other workers.

Each day that an employer loses an employee means at least some unrecoverable production was lost that day. Even if a part-time replacement was brought in, the replacement's contribution to the employer that day in most cases likely fell short of the usual job holder's typical daily contribution. Thus any program that helps to reduce lost time from work improves the ability of corporations to remain competitive, sustaining their profitability and their ability to pay taxes, etc.

From the point of view of the individual job holders, time lost from work is costly only if they are on a contract (and thus do not get paid for sick days taken) or if they have exceeded their individual annual sick day allotment. About 15 percent of workers in Canada are self employed, and about 15 percent of job holders in Canada hold part time jobs. These are likely for the most part two different groups of workers. It is likely, therefore, that the portion of workers that would not get paid for sick days is somewhere between 15 and 30 percent. From the point of view of the government, time lost from work would reduce personal income tax revenues only in those cases where the worker was not paid for sick days.

It was pointed out above that the adult fitness tax credit would encourage new fitness participation among job holders. We would expect these physical activity participants would be taking advantage of the tax credit because they perceive themselves to be overweight or obese. In other words, we would expect the new employed participants to be workers that miss work more often than others and that are less productive on the job even when present. We would expect, therefore, that within two years the rates of both absenteeism and presenteeism among these new employed fitness participants would improve.

If we make the assumption that, due to the increase in physical activity participation among workers induced by the tax credit, the productive capacity of this group increases by only 2 percent, that increase in productivity would generate additional personal income tax revenues. Based on that assumption we estimate that, in the case of federal participation only, personal income taxes collected would be higher by $41 million in 2010, $83 million in 2001, climbing to $118 million in 2029. In the case of both federal and provincial participation we estimate personal income taxes collected would be higher by $108 million in 2010, by $219 million in 2011 and by $312 million by 2029.

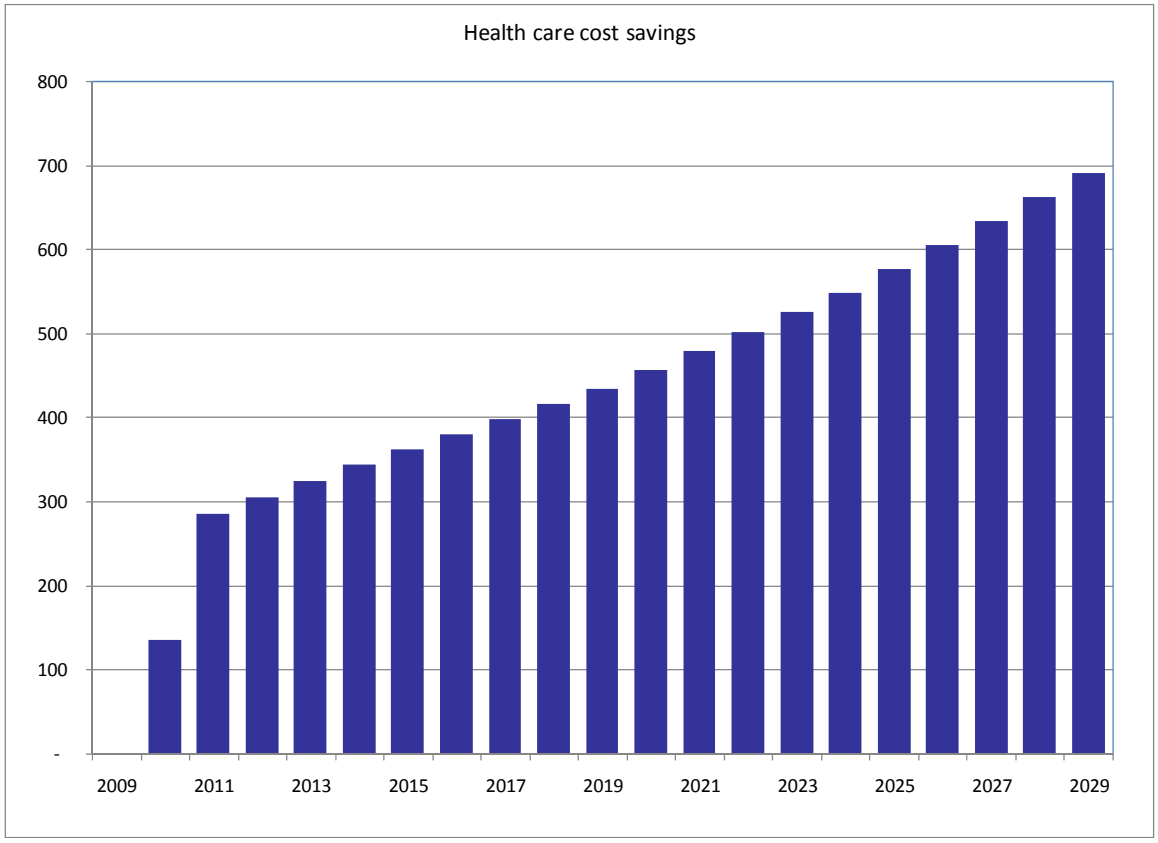
The Impact on Government Personal Tax Revenues

The proposed tax credit will obviously reduce the personal income taxes collected by the federal and provincial governments if either or both levels participate. If the federal government only implements the tax credit total personal income taxes collected by both levels would decline by about $370 million in 2009 increasing gradually to $448 million in 2029. If both the federal and provincial governments participate total personal taxes collected by both levels would decline by $648 million in 2009 rising gradually to $767 million in 2029. The personal taxes recovered as a result of the improved rates of absenteeism and presenteeism described above would reduce the net personal income tax loss to $331 million per year by 2029 in the case of federal participation only and to $455 million per year in 2029 in the case of both federal and provincial participation.

The Net Financial Impacts

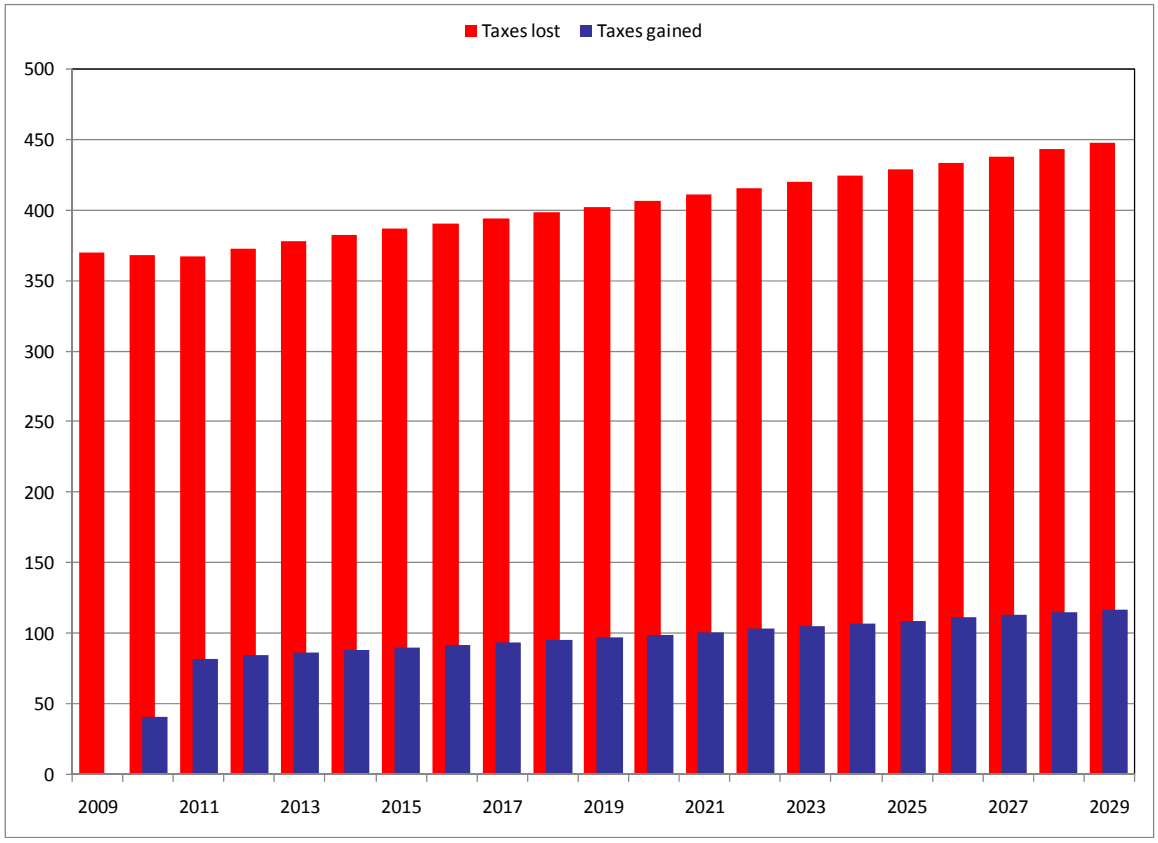
Exhibits 21 through 26 illustrate that the health care cost savings significantly outweigh the net personal tax losses incurred by the federal and provincial governments over time whether only the federal government participates or if both the federal and provincial governments participate. Over the projection period the cumulated net benefit in the case of federal participation only is $2.5 billion representing cumulated health care savings of $9.1 billion and cumulated net personal tax losses of $6.6 billion. The cumulated net benefit in the case of federal and provincial participation is $5.4 billion representing cumulated health care savings of $14.8 billion and cumulated net personal tax losses of $9.4 billion. Exhibits 23 and 26 both show that the net benefits exceed the net costs in both cases of government participation starting in either 2011 (both) or 2012 (federal only) and expanding significantly in both cases each year thereafter.

Exhibit 21
Federal Participation Only
Health Care Cost Savings
2009 to 2029



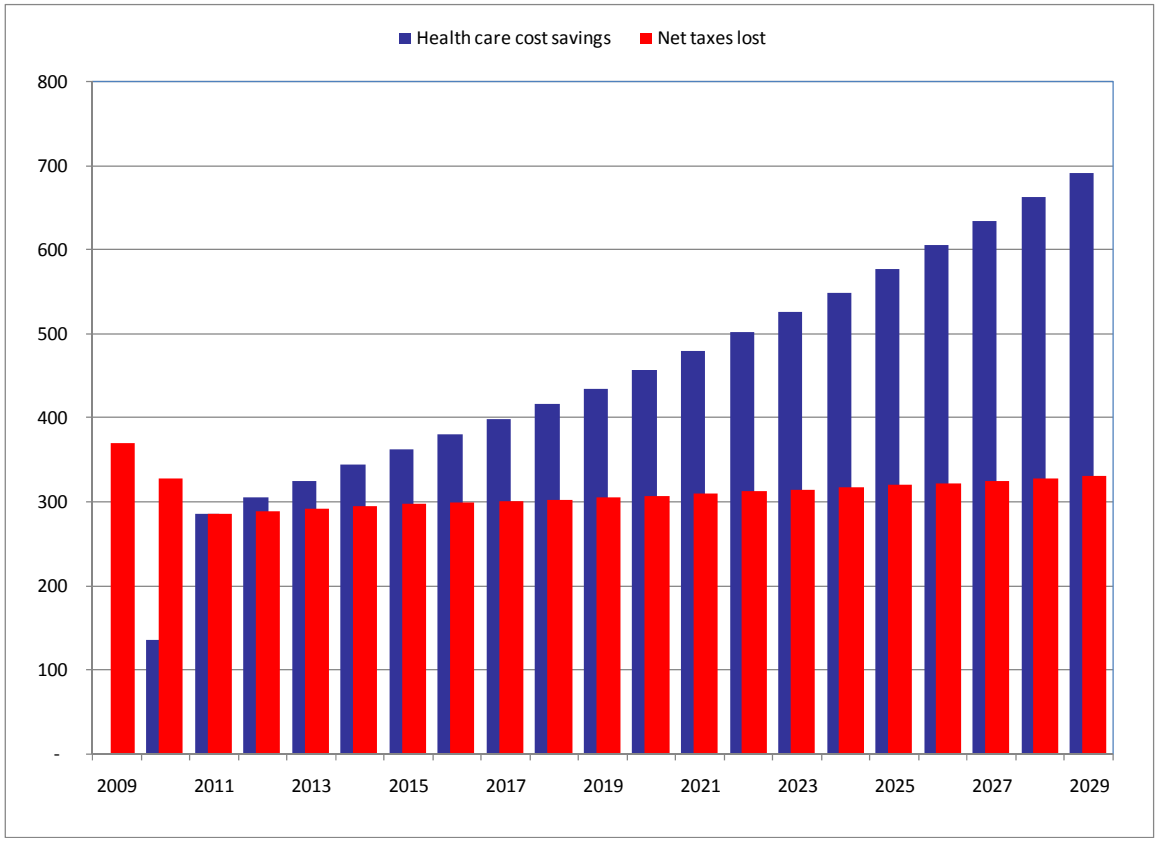
Source: The Centre for Spatial Economics

Exhibit 22
Federal Participation Only
Personal Tax Revenue Losses and Personal Tax Revenue Gains
2009 to 2029



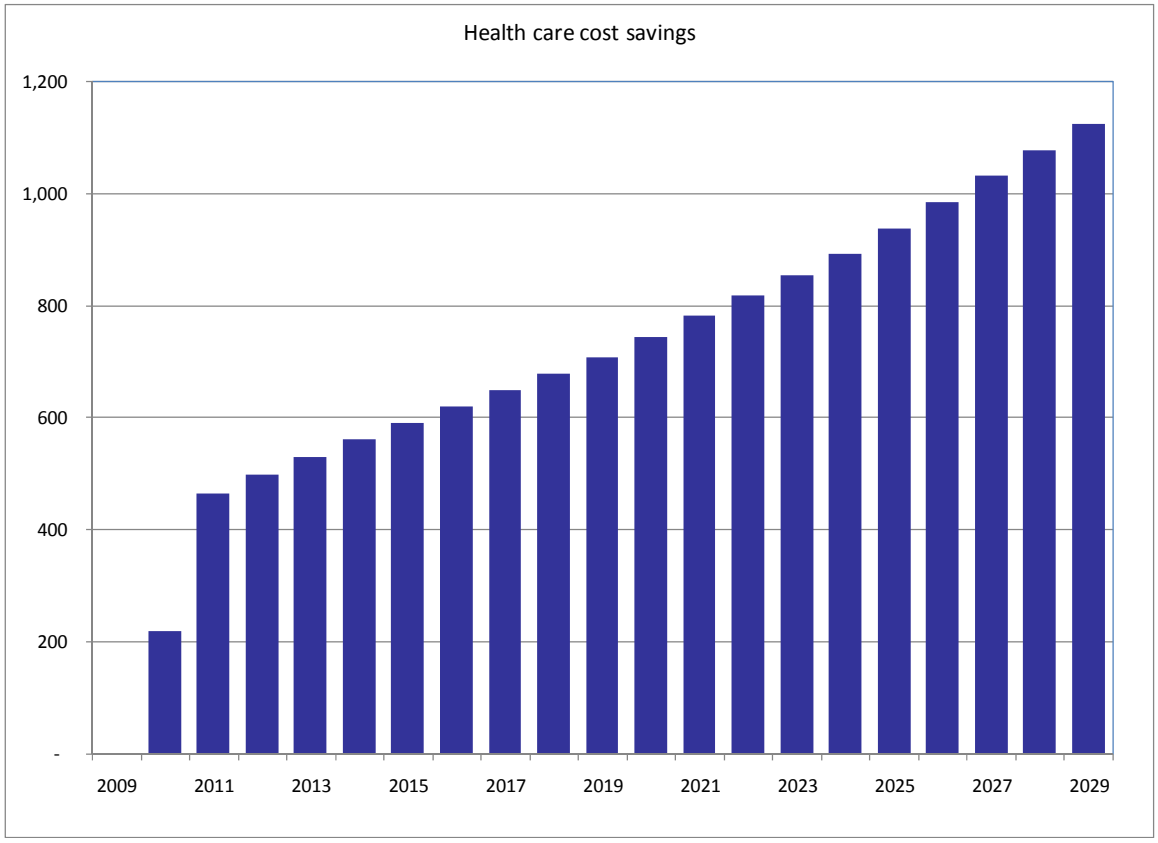
Source: The Centre for Spatial Economics

Exhibit 23
Federal Participation Only
Health Care Cost Savings and Net Personal Tax Revenue Losses
2009 to 2029



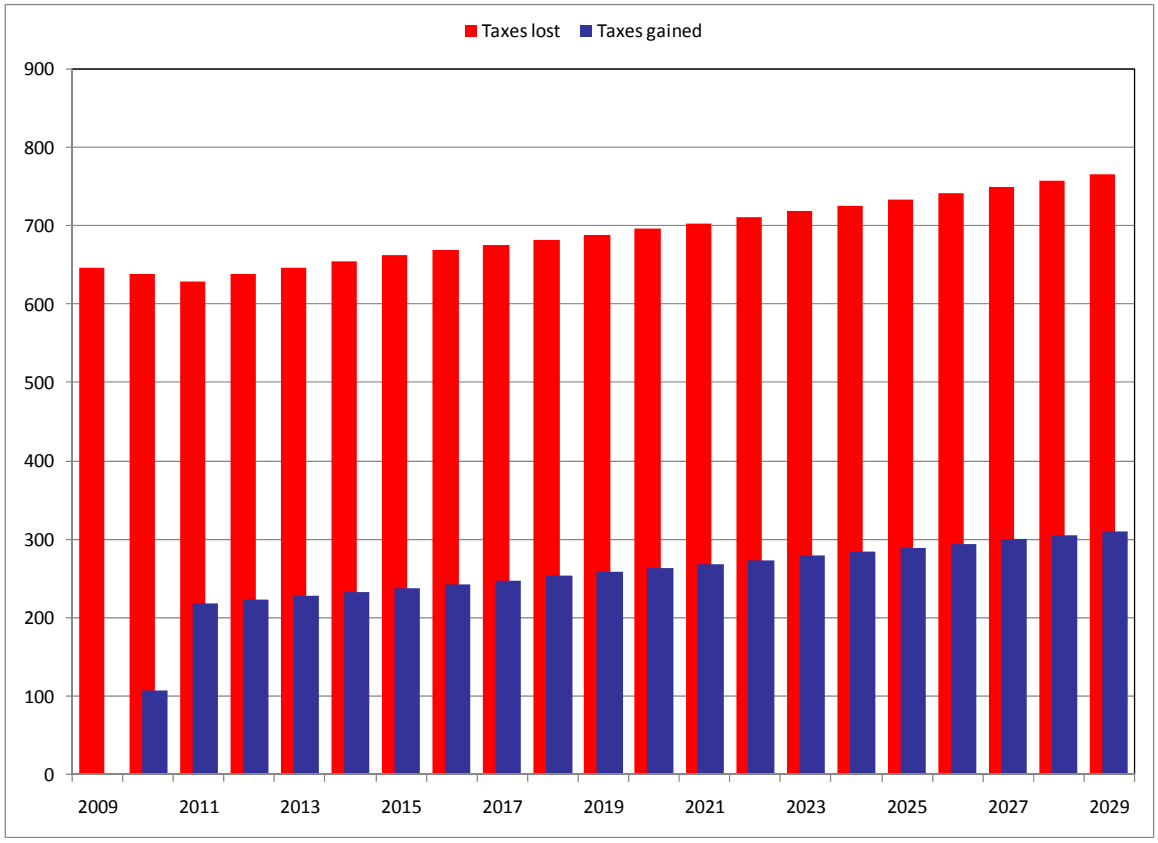
Source: The Centre for Spatial Economics

Exhibit 24
Federal and Provincial Participation
Health Care Cost Savings
2009 to 2029



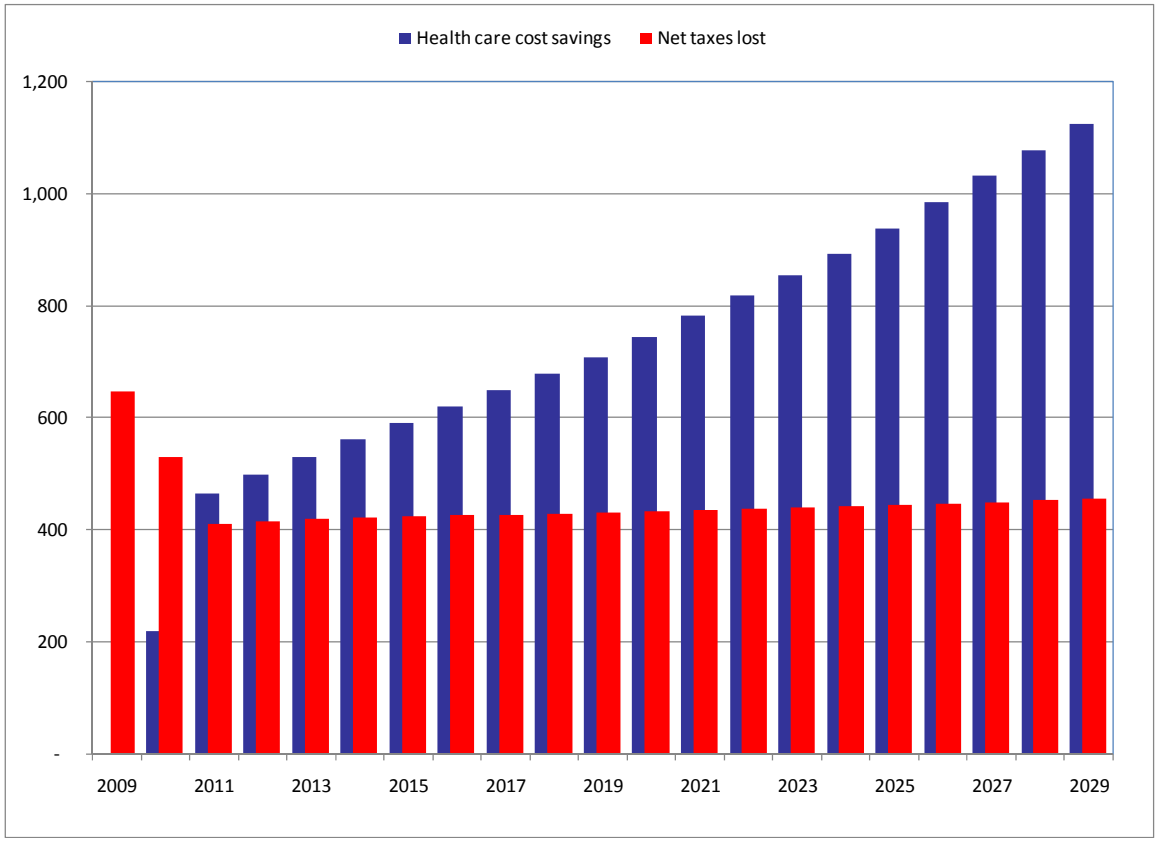
Source: The Centre for Spatial Economics

Exhibit 25
Federal and Provincial Participation
Personal Tax Revenue Losses and Personal Tax Revenue Gains
2009 to 2029



Source: The Centre for Spatial Economics

Exhibit 26
Federal and Provincial Participation
Health Care Cost Savings and Net Personal Tax Revenue Losses
2009 to 2029



Source: The Centre for Spatial Economics

SUPPORTING EVIDENCE

There is considerable evidence that financial incentives would pay big dividends when it comes to incenting individuals to get involved in physical fitness activities.

For example, Lauer (2006) cites a 2004 survey conducted for the International Health, Racquet and Sportsclub Association (IHRSA) by Ketchum Global Research Network which shows that Americans strongly support efforts by health-insurance providers, employers, and governments to promote physical fitness and a healthy lifestyle. While independent research sources have come to the conclusion that only one out of five people exercise on a regular basis, the IHRSA study found that:

- 77 percent of Americans would likely exercise if they paid a lower health-insurance premium.
- 70 percent believe patients should be reimbursed for physician-prescribed fitness programs.
- 82 percent would exercise regularly if their employer subsidized health club memberships.
- 61 percent believe that Congress should do more to promote physical activity and prevent obesity.

Lauer also cites a 2002 study conducted for IHRSA by American Sports Data, Inc. (ASD) which reveals that consumers have a clear sense of which subsidized benefits they would prefer. The following are the benefits they would like, ranked by order of preference.

- Full medical checkup
- Exercise classes
- A health club membership
- Nutritional counseling
- Smoking-cessation program
- Weight-control program (e.g., Weight Watchers)
- Medical care for sports/exercise injuries
- Other preventive care (e.g., chiropractic, massage therapy, etc.)
- Stress-reduction program (e.g., yoga, biofeedback, etc.)
- Home exercise equipment
- Nutritional supplements (e.g., vitamins/health foods) 12. Services of a personal trainer
- Fitness-monitoring devices (e.g., heart-rate monitor, pedometer, running log, etc.)
- Athletic footwear/apparel
- Home-exercise videos
- Special diet product

There is also evidence that employers are aware of the corporate benefits associated with a physically fit workforce. For example, the World Economic Forum recently pointed out that many companies are trying to reduce the cost of doing business by developing programs to decrease absenteeism, short and long term disability, work injuries and worker's compensation claims frequency and severity. Employers are accommodating ill and injured employees with alternate work that will allow them to remain at work while recovering from illness or disability thereby minimizing productivity loss.

An ever increasing number of employers are looking to workplace wellness programs to encourage employees to become healthier. Types of wellness programs offered are diet counseling, weight loss programs, healthy cafeteria food, exercise breaks, gym memberships, smoking cessation programs, hypertension clinics, and incentives for employees to participate in these initiatives. Increasingly companies are tackling the risk factors of chronic illness caused by an inactive lifestyle, and poor nutrition, leading to overweight and obesity.

As an example of corporate direct involvement, PepsiCo's HealthRoads program focuses on reducing the risks of chronic disease. Employees are paid $100 (US) to fill out a health risk appraisal that measures the risk factors for chronic disease, such as weight, diet and levels of physical activity, stress and blood pressure. About 90 percent of employees who completed the assessment were found to be at risk and were referred to a health coach. This program began in the US in 2004, expanded to Canada in 2005, then spread to Australia, Malaysia, the Philippines and Singapore in 2006.

Employees have been shown to be motivated to become physically fit by monetary and other rewards. For example, the Wellness Councils of America (WELCOA), which is dedicated to building and sustaining world-class corporate wellness programs, provides materials and aids to organizations to help them implement wellness programs. They advise that incentive programs – especially cash bonuses – are useful in attracting and maintaining participation by employees. They report that popular incentive prizes include:

- Incentive bonuses (cash) 56 percent
- Formal awards ceremony 37 percent
- A letter or visit from CEO 32 percent
- Gifts (material goods) 22 percent
- Time off 17 percent
- Company sponsored trip 12 percent

The Wellness Councils of America recently interviewed Larry Chapman, an internationally recognized expert and speaker on innovative health management interventions. He is a consultant and advisor to the United States Air Force, U.S. Army, Dept. of Veteran's Affairs, National Institutes of Health and Centres for Disease Control and Prevention. In an interview with WELCO he stated that "with working populations, usually a cash incentive will draw the highest participation. If the cash incentive can be in a tax advantaged form, it becomes even more powerful because you won't have to back out any of the normal taxes or government withholdings. Cash in a tax-advantaged form is a tremendous incentive to engage employees in wellness initiatives at the workplace."

CONCLUSIONS

An adult fitness tax credit could increase the number of physically active adult Canadians by a million people if only the federal government participates and by a million and a half if the provinces also participate. Either way the tax credit would significantly reduce health care costs and reduce the likelihood that workers would miss work due to illnesses related to physical unfitness. The tax credit would especially benefit females and immigrant Canadians as they participate less in physical fitness activities than males born in Canada. The economic benefits can be expected to grow each year throughout the projection period because of the cumulative benefits of increased physical activity on the well being of Canadians. Within just a few years the benefits significantly outweigh the loss of tax revenues associated with the tax credit whether only the federal government or both the federal and provincial governments participate.

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