TORONTO STAFF REPORT

September 2, 2004

To: Board of Health

From: Dr. Barbara Yaffe, Acting Medical Officer of Health

Subject: Ontario Nutrition and Cancer Prevention Survey – Toronto Results

Purpose:

This report focusses on the findings of the Ontario Nutrition and Cancer Prevention Survey of the Toronto population and highlights the findings related to vegetable and fruit consumption, Body Mass Index (BMI) and physical activity levels.

Financial Implications and Impact Statement:

There are no financial implications resulting from the adoption of this report.

Recommendations:

It is recommended that:

(1) the Board of Health request the Ministry of Health and Long-Term Care to develop a comprehensive strategy focusing on healthy eating and the promotion of vegetable and fruit consumption, healthy weights and physical activity, consistent with World Health Organization principles, comparable to the scope of the Ontario Tobacco Strategy, and including sufficient resources; and

(2) the Board of Health request Health Canada to develop a comprehensive strategy for the promotion of vegetable and fruit consumption, healthy weights and physical activity in Canada, consistent with World Health Organization principles and with sufficient resources; and

(3) the appropriate City Officials be authorized and directed to take the necessary action to give effect thereto.

Background:

A recent US study on leading causes of mortality has shown that poor diet and physical inactivity may soon overtake tobacco as the leading cause of death [1]. The World Health Organization has identified the goal of increasing fruit and vegetable consumption as an essential part of efforts to reduce the growing global burden of chronic disease [2].

This report focuses on the findings for the Toronto population from the Ontario Nutrition and Cancer Prevention Survey (ONCPS) and highlights those findings related to vegetable and fruit consumption, Body Mass Index (BMI), and physical activity levels. Cancer Care Ontario (CCO) released the initial findings of the survey of the Ontario population in December 2003.

Comments:

The importance of optimal nutrient intake and physical activity in reducing rates of disease and death from chronic diseases has been well established [2]. It has been estimated that between 30% and 40% of all cases of cancer are preventable by feasible and appropriate diets and by physical activity and the maintenance of appropriate body weight [3]. Health authorities are interested in monitoring vegetable and fruit intake, BMI and physical activity in the population to more fully understand health and disease and thus to improve the health of the population through public health action.

Health Canada provides guidelines for dietary intake, healthy weights and physical activity. Canada's Food Guide to Healthy Eating recommends five to 10 servings of vegetables and fruits every day. The recommendation for a healthy weight is a BMI of 18.5-24.9 kg/m^2. Health Canada recommends that adults 18-64 years of age accumulate at least 60 minutes (daily) of light physical activity, or 30 to 60 minutes of moderate activity four days per week, or 20 to 30 minutes of vigorous activity four days per week.

The mandate of Toronto Public Health includes health promotion and disease prevention. The 1997 provincial Mandatory Health Programs and Services Guidelines [4] requires local Boards of Health to work to reduce premature mortality and morbidity from preventable chronic diseases. Objectives include: increase to 75% the proportion of the population age four and older consuming five or more servings of vegetables and fruit daily by the year 2010; increase to 40% the proportion of all adults who include at least 30 minutes of accumulated, moderate physical activity on most if not all days of the week by the year 2010; and slow the decline in the proportion of adults ages 20-64 with healthy weight by the year 2010. Toronto Public Health promotes vegetable and fruit consumption, healthy weights and physical activity through a range of programs and services directed at people in a variety of settings.

Toronto Public Health collaborated with Cancer Care Ontario and others in undertaking the ONCPS to obtain population-level estimates of vegetable and fruit consumption in adults. The survey included variables such as attitudes and beliefs related to fruit and vegetable consumption, food security, BMI, physical activity and smoking behaviour.

While some Toronto data on physical activity levels and weight exist, there was no current information on vegetable and fruit intake for residents of the City of Toronto, nor was there any current provincial data. This survey was intended to provide Toronto specific Toronto specific baseline data on vegetable and fruit consumption to inform the development of future public health programs and services.

Methods:

The questionnaire was developed by CCO in consultation with the ONCPS Steering Committee. Survey questions were based on existing validated questions where possible and underwent peer review. A nine question screener of various vegetables and fruits, including juices, was used to calculate vegetable and fruit consumption. BMI was calculated using reported height and weight. Frequency and duration of work and leisure physical activity were used to calculate physical activity levels.

A random digit dial survey method was used to collect the data for the ONCPS. The survey was offered to respondents in English, French, Chinese, Vietnamese and Portuguese as a means of encouraging participation among Toronto's ethnically diverse population. In addition, Toronto Public Health collaborated with CCO to conduct a calibration study, which compared the survey instrument used to measure vegetable and fruit consumption to a different method of dietary assessment (repeat 24-hour recalls).

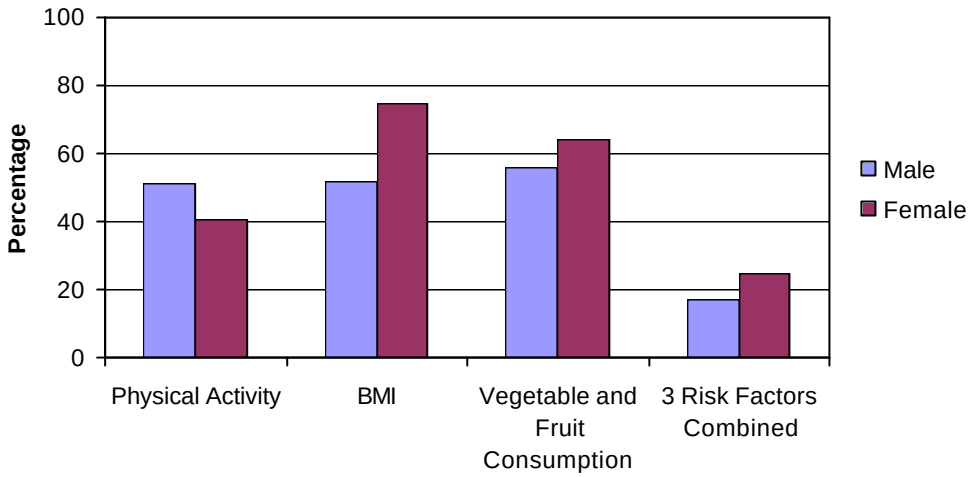
Survey Results:

The sample of Toronto adults age 18-64 years who participated in the ONCPS survey was 965. This total represented a response rate of 60%. Although several languages were offered, 97% of respondents completed the survey in English. Based on a comparison with current socio-demographic data, the sample appears to over-represent university-educated and higher-income households. The sample is representative of the Toronto population for those born in Canada and those born outside of Canada. Because of differences in how respondents self-reported, the representativeness of the sample could not be completely analyzed by ethnicity or by language most often spoken at home. Caution must be used in interpreting the results for these characteristics.

Statistical analysis was done for medians, frequencies and statistical significance. This report highlights statistically significant differences, or those not likely to be by chance alone. A complete summary of the findings can be found in Attachment 1.

Based on the findings of this study, only 17% of Toronto men and 25% of Toronto women met all three of Health Canada's recommended guidelines for vegetable and fruit consumption, healthy weights and physical activity, as a combined set of risk factors.

Figure 1: Percentage of Toronto Adults Meeting Recommendations for Physical Activity, Body Weight, Vegetable and Fruit Intake and Three Factors Combined



Vegetable and Fruit Consumption:

The median frequency of vegetable and fruit consumption for Toronto adults was 6.3 servings per day. This is an over-estimate of "true intake" based on comparison with 24-hour recalls in the calibration study. Approximately four out of ten Toronto men and one-third of Toronto women reported not meeting the minimum recommended five servings of vegetables and fruit per day. Other factors (beside gender) associated with vegetable and fruit consumption include education, income, ethnicity, physical activity, and self-perceived health status. For example, a greater proportion of those respondents above the low income cut off (LICO), a measure of income adequacy that takes into account household size and degree of urbanization, reported consuming five or more servings of vegetables and fruit per day than those below the LICO. Reported vegetable and fruit consumption rose generally with income level. Those respondents who had not completed high school had lower levels of consumption than those who completed high school or higher levels of education. Those of European and "Canadian plus" (including English, Irish, Scottish, Australian and New Zealand - groupings created by Statistics Canada) ethnicity had higher levels of consumption than those of other ethnic groups. Given the limitations of the collection and the classifying of ethnicity, caution must be used in interpreting results. Higher levels of consumption of fruit and vegetables were associated with higher levels of physical activity and higher self-perceived health status.

Toronto men reported a median of 5.6 servings per day. Men with European ethnicity reported consuming higher amounts than those of other ethnic groups. Those without a high school education reported consuming fewer servings per day than those who completed high school. Households with two adults tended to have higher levels of consumption. Men who reported higher levels of self-perceived health status reported more vegetable and fruit consumption.

Toronto women reported a median of 6.8 servings per day. Those of European and "Canadian plus" ethnicity reported higher levels of consumption than those of other ethnic groups. Increases in vegetable and fruit consumption were associated with increases in physical activity levels. Similar to men, those reporting higher perceived health status levels reported more vegetable and fruit consumption. As household income increased for women, so did vegetable and fruit consumption. Women who reported obesity consumed fewer servings than those reporting healthy or overweight BMIs.

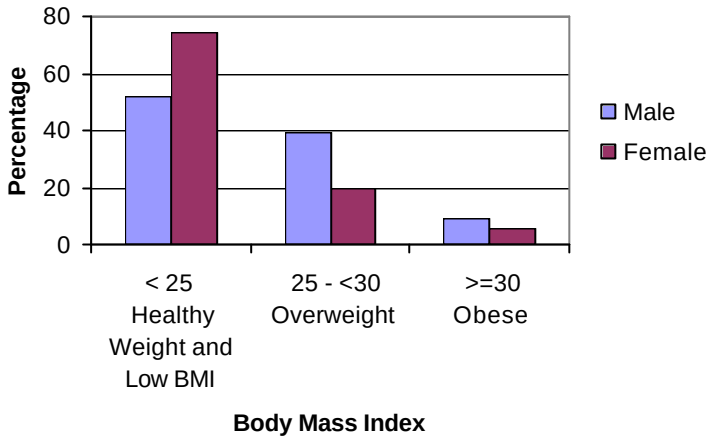
Body Mass:

The survey results show that over 35% of Toronto adults are above a healthy weight (reported BMI=25). Approximately 7% reported a BMI over 30 or in the obese category. Almost half of Toronto men (48%), and about one-quarter of Toronto women (26%) were above a healthy weight. Approximately 9% of Toronto men and 6% of Toronto women reported obesity. The percentage of adults above a healthy weight increased with age. A higher percentage of those completing university reported a healthy body weight than those not completing university. Compared to other ethnic groups, a higher percentage of adults of Asian ethnicity reported lower levels of overweight and obesity. Being in Canada less than 10 years was associated with lower BMI than those immigrants who have been here longer. Those reporting higher health status levels reported lower levels of overweight and obesity.

Among the Toronto male population, increases in BMI were associated with increasing age. Men of Asian ethnicity had lower BMIs than those of other ethnic groups. Being in Canada less than 10 years was associated with lower BMI than those immigrants who have been here longer. Respondents reporting higher health status levels reported lower levels of overweight and obesity.

Increasing age was also associated with increases in BMI among the Toronto female population. Those women not completing high school had higher levels of obesity than those with higher levels of education and those completing university had the highest level of healthy BMIs. Similar to men, women reporting higher health status levels reported lower levels of overweight and obesity.

Figure 2: BMI by Gender Among Toronto Adults



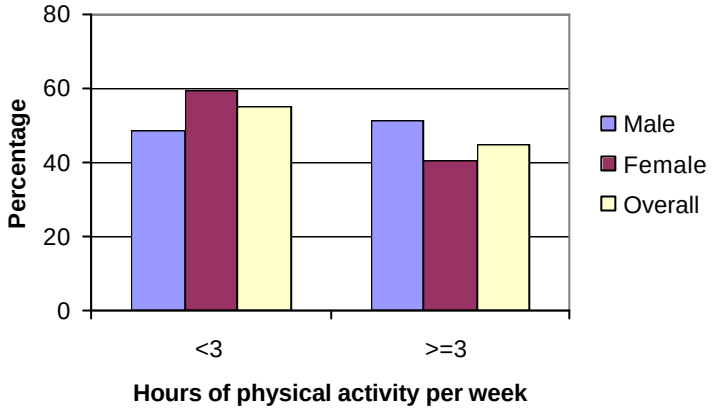
Physical Activity Levels:

To reduce risk of chronic disease, health agencies recommend 30-45 minutes of physical activity on most days of the week. For purposes of interpreting the survey results, a minimum of three hours of physical activity per week was chosen to represent this recommendation. Toronto adults reported a median 2.3 hours of physical activity per week. Over half (55%) were not active three hours per week, and about 22% reported not being active even for one hour per week. In Toronto, 49% of men and 60% of women participating in this survey did not meet the minimum level of activity recommended. Physical activity levels were highest among those 18-34 years, but those 50-64 years reported higher levels than those 35-49 years. Those respondents who had some post-secondary education, but not a university degree, reported higher levels of activity. Respondents reporting a household income of over $30,000 but less than $50,000 had lower levels of activity than other income levels. Respondents of Asian ethnicity reported lower levels than all other ethnic groups. Those born in Canada had higher levels of activity, and activity levels increased with length of time in Canada among immigrants. Higher perceived health status was associated with higher levels of physical activity. Interestingly, there was no significant association between physical activity level and BMI.

Physical activity levels were higher among younger men and levelled off after 35 years of age. Those men without a high school education, or who had completed university, had lower levels of physical activity. Men of Asian ethnicity had lower levels of physical activity than those of other ethnic groups. Those born in Canada had higher levels of activity those born outside of Canada.

Higher perceived health status was associated with higher physical activity levels for women. Similar to men, women born in Canada had higher levels of physical activity than those born elsewhere.

Figure 3: Physical Activity Levels by Gender Among Toronto Adults



Food Security:

Food security has been defined in Canada's Action Plan for Food Security: "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle" [5]. Household food security is of concern to public health because of the documented association with poor diet quality and poor overall health. Among the respondents, more than one in ten (11%) Toronto adults can be identified as food insecure. Significantly more Toronto men (13.8%) than women (8.1%) are food insecure. It is likely that this represents an underestimation of the true prevalence of food insecurity in Toronto, given the sample characteristics and survey methodology. A lower household income was associated with higher levels of food insecurity and those below the LICO were more likely to experience food insecurity. Food insecurity was associated with single-parent household. Those of African, Caribbean and Asian ethnicity experienced higher levels of food insecurity, as well as those born outside of Canada. There was no association between BMI or vegetable and fruit consumption and food insecurity.

Discussion of Results:

The results of the ONCPS in Toronto provide new and rich data on the status of vegetable and fruit consumption, BMI and physical activity levels. The analysis presented in this report will be used in consultations with the relevant program staff to enable Toronto Public Health to strategicaly and effectively target and deliver its programs. As with all surveys, there are limitations. Telephone surveys exclude households that do not have telephones and are most likely to exclude homeless people and people without telephone service. The results of a self-report survey such as this are also limited by participant recall and the length of the recall period, some variability in consumption of certain foods or physical activity over time, and the impulse of respondents who "want to give the right answer".

For some survey items there were only a small number of observations. This may result in unstable estimates of the true underlying percent or rate. In such cases, responses were combined to create categories of sufficient cell size to conduct statistical analysis. For example, self-

defined primary-ethnicity was broadly categorized such that Asian includes all of South and Southeast Asia. For some questions, the phenomenon under observation was rare, so the number of observations was small. There are also questions for which there was a high rate of non-response or missing responses. For example, over 20% of the respondents did not answer the questions on household income. There were also a number of factors for which the representativeness of the sample was skewed (e.g., education) so that the number of survey participants in one category (e.g., less than high school education) was small. In the above cases caution must be used in interpreting the results.

Promoting Good Nutrition, Healthy Weight and Physical Activity:

The World Health Organization's Global Strategy on Diet, Physical Activity and Health [6] makes recommendations for populations and individuals to reduce the risk of "non-communicable diseases" by achieving energy balance and maintaining a healthy weight, increasing consumption of fruit and vegetables and engaging in adequate levels of physical activity throughout life. The WHO Global Strategy sets out guiding principles that are recommended for the development of national and regional action plans, and calls for these plans to be:

(1) based on the best available scientific research and evidence
(2) comprehensive, by incorporating both policies and action and addressing all major causes of non-communicable diseases together
(3) multisectoral and take a long-term perspective
(4) multidisciplinary and participatory
(5) consistent with the principles contained in the Ottawa Charter for Health Promotion (1986) and confirmed in subsequent conferences on health promotion
(6) recognize the complex interactions between personal choices, social norms and economic and environmental factors.

Toronto Public Health New Initiatives:

Recently, Toronto Public Health has developed two initiatives to promote vegetable and fruit intake and healthy weights. "Invite Us Along!" is a program that encourages mothers aged 25-49 years, and other key influencers of children's and families' eating habits, to increase the variety and amount of vegetables and fruit they eat and serve to their families. This program includes social marketing, education and skill development, policy development, and environmental support and partnership development. The "Invite Us Along!" program is currently working with Community Health Centres to reach low-income women through the Take 5 program. The Healthy Weights initiative focuses on raising awareness among Toronto residents of three key messages: "Be active, Eat well, Be yourself." The intended audiences for this initiative include children, youth, and women 20-55 years of age. Secondary audiences include teachers, childcare providers, recreation workers, Toronto Public Health staff and other health professionals. These programs are in their initial stages. While representing exciting initiatives with tremendous potential, they lack sufficient intensity and reach for a city with Toronto's size and diversity.

Research has clearly shown that increases in funding for tobacco control result in reduced tobacco use. As similar research has not been conducted on physical activity and nutrition promotion, the U.S. Centers for Disease Control and Prevention suggest using the tobacco control guidelines to establish funding recommendations. When these funding guidelines are applied to Toronto, they represent an investment of $8-$15 million at the local level for environmental support, mass communication and community development for comprehensive physical activity and nutrition promotion. Additional funding would be required for behavioural change programs for individuals.

Given the importance of vegetable and fruit consumption, maintaining a healthy body weight and physical activity for the health and well being of Toronto residents, Toronto Public Health is continuing to analyze and interpret the results of the ONCPS survey. The following objectives will be considered in developing a comprehensive nutrition strategy for Toronto:

(1) set a goal of increasing the proportion of the population that achieve the minimum levels of vegetable and fruit consumption, physical activity and maintain a healthy weight to 50% of Toronto adults by 2010;

(2) enhance evidence-based programming that targets the three risk factors of inadequate fruit and vegetable consumption, physical inactivity and unhealthy weight;

(3) tailor nutrition and physical activity programming to specific populations of interest; and

(4) participate in collaborative programme evaluation to better understand most effective strategies to achieve desired results.

Conclusions:

This report highlights the findings of the ONCPS survey in Toronto. In Toronto only 17% of men and 25% of women meet the recommendations for vegetable and fruit consumption, healthy body weight and physical activity. To address this significant health concern, Toronto Public Health recommends that the Board of Health request the Ministry of Health and Long-Term Care to develop a comprehensive strategy focusing on the promotion of vegetables and fruit, healthy weights and physical activity in Ontario. It also recommends that the Board of Health request Health Canada to develop a comprehensive strategy for the promotion of vegetables and fruit, healthy weights and physical activity in Canada.

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List of Attachments:

Attachment 1: Toronto Results of the Ontario Nutrition Cancer Prevention Survey (August 2004)

References:

(1) Mokdad A, Marks J, Stroup D, Gerberding J. (2004). Actual causes of death in the United States, 2000. JAMA, 291,1238-1245.

(2) World Health Organization. (2003). Diet, nutrition and the prevention of chronic diseases: Report of a joint WHO/FAO expert consultation. (WHO Technical Report Series, No. 916) Geneva.

(3) World Cancer Research Fund/American Institute of Cancer Research. (1997). Food, Nutrition and the Prevention of Cancer: a Global Perspective. Washington, DC: American Institute of Cancer Research.

(4) Ontario Ministry of Health. (1997). Mandatory Health Programs and Services Guidelines. Toronto, ON.

(5) Agriculture and Agri-Food Canada. (1998). Canada's Action Plan for Food Security. A Response to the World Food Summit. Ottawa, ON.

(6) World Health Organization. (2004). Global Strategy on Diet Physical Activity and Health. Geneva: Author. Retrieved on July 16, 2004 from http://www.who.int/gb/ebwha/pdf_files/WHA57/A57_R17-en.pdf

Attachment 1

Toronto Results of the Ontario Nutrition and Cancer Prevention Survey

August 11, 2004

Table of Contents

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Executive Summary

For the majority of people who do not smoke cigarettes, dietary choices and physical activity are the most important modifiable determinants of cancer risk. Cancer Care Ontario (CCO) recognized the need for surveillance data on vegetable and fruit consumption in Ontario as a cornerstone for cancer prevention. As a result, CCO initiated the development of the Ontario Nutrition and Cancer Prevention Survey (ONCPS). The objectives of the ONCPS were:

- To estimate the prevalence of vegetable and fruit consumption among adults across the province of Ontario, including vulnerable subgroups of the population
- To determine the distribution of body size
- To determine knowledge, attitudes, and beliefs with respect to cancer, vegetable and fruit consumption, and the relationship between them
- To identify barriers and supports to vegetable and fruit consumption (e.g., food availability, food security)
- To examine socio-demographic variables in relation to vegetable and fruit consumption
- To examine health status and other health-related behaviours such as smoking and physical activity in relation to vegetable and fruit consumption and weight control

Toronto Public Health was invited to participate on the Steering Committee for the ONCPS, along with a number of other organizations. Toronto Public Health contributed resources, both human and financial, to the project. Through Toronto Public Health's contribution the sample size for Toronto was substantially increased, and the survey was translated into Chinese (both Mandarin and Cantonese), Portuguese and Vietnamese languages. In addition, Toronto's contribution supported a calibration study that compared the method used to assess vegetable and fruit consumption on the ONCPS (a modified food frequency or screener) to another method of dietary assessment more commonly used (24-hour recalls). The calibration study was important in interpreting the results of the survey and comparing it to other surveys.

Ontario adults, age 18 to 64 years, were included in the ONCPS. The final sample size for Ontario was 3,183, which included 965 Toronto adults. The response rate for Ontario was 63% and for Toronto it was 60%. Ninety-seven percent of the Toronto surveys were completed in English; 2.4% were completed in Chinese (Mandarin or Chinese), and 0.11% were completed in Portuguese and French. Compared to the 2001 Census data, the Toronto ONCPS sample is representative of the general population of adults in Toronto with respect to gender and age. However, the sample over-represents Toronto adults with a university level education and over-represents adults from households with a reported income over $80,000 per year while under-representing those under $29,999, compared to the 2001 Census data.

- The median frequency of vegetable and fruit consumption for Toronto adults was 6.3 servings per day. Based on the reported servings consumed per day, 44% of Toronto men and 36% of women were not meeting the minimum recommended 5 servings of vegetables and fruit per day. This represents a conservative estimate or an under-estimate of the proportion of Toronto adults not meeting minimum recommendations based on the findings of the calibration study. Other factors, besides gender, associated with vegetable and fruit consumption include education, income, ethnicity, physical activity, and self-perceived health status. A greater proportion of those respondents above the low income cut off (LICO), a measure of income adequacy that takes into account household size and degree of urbanization, reported that they consumed 5 or more servings of vegetables and fruit per day than those below the LICO. Reported vegetable and fruit consumption rose with income

level. Those not completing high school had lower levels of consumption than those completing high school and higher levels of education. Those of European, and British (including Canadian and Australian) ethnicity had higher levels of consumption than those of other ethnic groups. Increases in consumption were associated with higher levels of physical activity and higher self-perceived health status.

- Toronto men reported a median of 5.6 servings per day. Men with European ethnicity reported consuming higher amounts than those of other ethnic groups. Those without a high school education consume fewer servings per day than those who have completed high school. For household type those with 2 adults had higher levels of consumption. Men who reported higher levels of self-perceived health status consumed more vegetables and fruit.
- Toronto women reported a median of 6.8 servings per day. Those of European, and British (including Canadian and Australian) ethnicity reported higher levels of consumption than those of other ethnic groups. Increases in vegetable and fruit consumption were associated with increases in physical activity levels. Similar to men, those reporting higher perceived health status levels consumed more vegetable and fruit. As household income increased for women so did vegetable and fruit consumption. Women who were obese consumed fewer servings than those reporting healthy or overweight BMIs.
- Over 35% of Toronto adults are above a healthy weight (reported BMI=25). Approximately 7% reported a BMI over 30 or in the obese category. Approximately 1% of Toronto men and 7% of Toronto women are below a healthy weight (BMI<18.5). Almost half of Toronto adult men (48%) and about one-quarter of Toronto women (26%) were above a healthy weight. Approximately 9% of Toronto men and 6% of Toronto women are obese. The percentage of adults above a healthy weight increased with age. A higher percentage of those completing university reported a healthy body weight than those not completing university. Compared to other ethnic groups, a higher percentage of adults of Asian ethnicity reported lower levels of overweight and obesity. Being in Canada less than 10 years was associated with lower BMI than those immigrants who have been here longer. Those reporting higher health status levels reported lower levels of overweight and obesity. It appears that the Toronto population may have slightly lower rates of obesity and overweight than the Ontario population as a whole. However, this may be due to the effect of ethnicity since 26% of the Toronto population identified themselves to be of Asian or South East Asian ethnicity and the prevalence of overweight and obesity was significantly lower among this group than others. Considering that this data is based on self-reports of height and weight, it may be that the prevalence of obesity and overweight in Toronto is actually higher than reported in this study.
- Among Toronto men increases in BMI were associated with increasing age. Men of Asian ethnicity had lower BMIs than those of other ethnic groups. Being in Canada less than 10 years was associated with lower BMI than those immigrants who have been here longer. Respondents reporting higher health status levels reported lower levels of overweight and obesity.
- Increasing age was associated with increases in BMI among Toronto women. Those women not completing high school had higher levels of obesity than those completing high school or higher levels of education and those completing university had the highest level of healthy BMIs. Similar to men, women reporting higher health status levels reported lower levels of overweight and obesity.
- Toronto adults reported a median 2.3 hours of physical activity per week. Over half (55%) were not active 3 hours per week. As well, about 22% were not even active 1 hours per week. In Toronto, 49% of men and 60% of women participating in this survey did not meet the minimum. Physical activity levels were highest among those 18-34 years but interestingly, those 50-64 years reported higher levels than those 35-49 years. Those

respondents who had some post-secondary education, but not a university degree reported higher levels of activity. Respondents reporting a household income of over $30,000 but less than $50,000 had lower levels of activity than other income levels. Respondents of Asian primary ethnicity reported lower levels than all other ethnic groups. Those born in Canada had higher levels of activity and activity levels increased with length of time in Canada among immigrants. Higher perceived health status was associated with higher levels of physical activity. Interestingly there was no significant association between physical activity level and BMI.

- Physical activity levels were higher among younger men and levelled off after 35 years of age. Those men without a high school education or who had completed university had lower levels of physical activity. Men of Asian primary ethnicity had lower levels of physical activity than those of other ethnic groups. Those born in Canada had higher levels of activity those born outside of Canada.
- Higher perceived health status was associated with higher physical activity levels for women. Similar to men, women born in Canada had higher levels of physical activity than those born elsewhere.
- Only 17% of Toronto men and 25% of Toronto women met the three recommendations for physical activity, healthy body weight and vegetable and fruit intake. This is alarming considering that it has been estimated between 30% and 40% of all cases of cancer may be prevented if adults met the three recommendations for vegetable and fruit intake, physical activity and the maintenance of a healthy body weight.
- About 11% of Toronto adults, or more than one in ten Toronto adults were identified as food insecure. Significantly more Toronto men (13.8%) than women (8.1%) were identified as food insecure ($p<.01$). It is likely that this represents an underestimation of the true prevalence of food insecurity in Toronto given the sample characteristics and the survey methodology that excluded individuals without telephone service. A lower household income was associated with higher levels of food insecurity and those below the LICO were more likely to experience food insecurity. Food insecurity was associated with single-parent households. Those of African, Caribbean and Asian ethnicity experienced higher levels of food insecurity as well as those born outside of Canada. There was no association between BMI or vegetable and fruit consumption and food insecurity.

The results of this survey highlight the need for Toronto Public Health to enhance programming to address healthy eating promotion and the promotion of healthy body weights with emphasis on the promotion of vegetables and fruit for Toronto adults and men in particular. In addition, public health programming to address physical activity among Toronto adults, particularly women, should be enhanced. A cultural shift in healthy eating and physical activity is required similar to what has occurred with respect to tobacco control over the past 25 years. In order to effect this magnitude of change in the population, multi-level, multi-sectoral approaches are required.

Background

In Canada, over two-thirds of total deaths result from four main clusters of chronic disease – cardiovascular, diabetes, cancer and respiratory illness – and more than half of Canadians (16 million people) live with chronic illness (Advisory Committee on Population Health, 2002). A recent analysis of leading causes of death in the US has shown that tobacco remains the leading cause of mortality, however, poor diet and physical inactivity may soon overtake tobacco as the leading cause of death (Mokdad, Marks, Stroup & Gerberding, 2004). In fact, obesity and overweight have been referred to as "the new tobacco" as prevalence rates increase in Canada (Heart and Stroke Foundation of Canada, 2004).

The importance of proper nutrition and physical activity in reducing rates of disease and death from chronic diseases has been well established. Unhealthy eating, overweight and physical inactivity contribute to certain cancers, cardiovascular diseases, type 2 diabetes and osteoporosis. The World Health Organization has developed a population-wide, prevention-based strategy to reduce the growing global burden of chronic diseases, including cancer and cardiovascular diseases (World Health Organization [WHO], 2003). Reducing tobacco use, increasing fruit and vegetable consumption and increasing physical activity are foundations of the strategy.

For the majority of people who do not smoke cigarettes, dietary choices and physical activity are the most important modifiable determinants of cancer risk (Byers et al., 2002). Estimates are that diets containing substantial and varied amounts of vegetables and fruits will prevent 20% or more of all cases of cancer. Furthermore, between 30% and 40% of all cases of cancer are preventable by feasible and appropriate diets, by physical activity and maintenance of appropriate body weight (World Cancer Research Fund/American Institute of Cancer Research, 1997). According to *World Health Report 2002*, low fruit and vegetable intake is estimated to cause about 31% of ischaemic heart disease and 11% of stroke world wide (WHO, 2002).

Current recommendations

Health Canada provides guidelines regarding dietary intake, healthy weights and physical activity. *Canada's Food Guide to Health Eating* recommends that Canadians eat 5 to 10 servings of vegetables and fruits every day, with emphasis on variety and choosing dark green, and orange vegetables and fruit more often. Vegetables and fruits are complex foods, containing more than 100 potentially beneficial vitamins, minerals, fibre, and other substances that may help prevent cancer. It is not clear what components of vegetables and fruits are most protective against diseases such as cancer. Until more is known about specific food components, the best advice is to eat five or more servings of a variety of vegetables and fruits every day in their various forms: fresh, frozen, canned, dried, and juiced (Byers, et al. 2002).

A healthy body weight is defined by the Body Mass Index (BMI). The body mass index (BMI) includes both height and weight and is significantly correlated with total body fat. It is an indicator of health risk associated with underweight, overweight and obesity. The waist circumference, recently incorporated into the body weight classification system, is positively correlated with abdominal fat and is an independent indicator of health risk associated with abdominal obesity. Health Canada recommends that adults (excludes pregnant and breastfeeding women) maintain a body weight within a healthy range as defined by a BMI of 18.5-24.9 kg/m^2.

Canada's Physical Activity Guide to Healthy Active Living provides guidelines to help Canadians make decisions about physical activity. It recommends that adults, 18-64, accumulate at least

60 minutes (daily) of light physical activity, or 30 to 60 minutes of moderate activity 4 days per week, or vigorous activity 20 to 30 minutes on 4 days of the week. Three types of physical activity should be incorporated, namely endurance, flexibility and strength activities.

Toronto Public Health's Mandate

The 1997 Mandatory Health Programs and Services Guidelines (Ontario Ministry of Health, 1997) set out by the Ontario Minister of Health and Long-Term Care mandates Boards of Health to reduce premature mortality and morbidity from preventable chronic diseases. The supporting behavioural objectives include:

- Increase to 75% the proportion of the population age four and older consuming five or more servings of vegetables and fruit daily by the year 2010.
- Increase to 40% the proportion of all adults who include at least 30 minutes of accumulated, moderate physical activity on most if not all days of the week by the year 2010
- Slow the decrease in the proportion of adults ages 20-64 with healthy weight by the year 2010

In Toronto, ischemic heart disease is the leading cause of death for both males and females and contributes to about a fifth of the total number of deaths. The second leading cause of death for Toronto men is lung cancer while for women it is stroke. Stroke is a close third leading cause of death for men while lung cancer is third for women. In Toronto, 3 types of cancer account for at least 50% of the new cancer cases in each sex: prostate, lung and colorectal cancers in men and breast, lung and colorectal cancer in women.

Toronto Public Health promotes vegetable and fruit consumption, healthy weights and physical activity through various but limited programs and services, directed at people in a variety of settings. While some Toronto data on physical activity levels and weight exist, there is no current information on vegetable and fruit intake for residents of the City of Toronto, nor is there any current provincial data. This survey was intended to provide baseline data on vegetable and fruit consumption and to inform the development of future public health programs and services.

Objectives of the Ontario Nutrition and Cancer Prevention Survey (ONCPS)

Cancer Care Ontario (CCO) recognized the need for surveillance data on vegetable and fruit consumption in Ontario as a cornerstone for cancer prevention. As a result, CCO initiated the development of the Ontario Nutrition and Cancer Prevention Survey (ONCPS). The purpose of the survey was to acquire baseline vegetable and fruit consumption and other relevant data to serve as a framework for developing and evaluating nutrition-related interventions designed to reduce the risk of cancer in Ontario adults.

The specific objectives of the ONCPS were:

- To estimate the prevalence of vegetable and fruit consumption among adults across the province of Ontario, including vulnerable subgroups of the population
- To determine the distribution of body size
- To determine knowledge, attitudes, and beliefs with respect to cancer, vegetable and fruit consumption, and the relationship between them
- To ascertain intentions to increase vegetable and fruit consumption
- To learn about behaviours related to food acquisition and preparation
- To identify barriers and supports to vegetable and fruit consumption (e.g., food availability, food security)

- To examine socio-demographic variables in relation to vegetable and fruit consumption
- To examine health status and other health-related behaviours such as smoking and physical activity in relation to vegetable and fruit consumption and weight control

Toronto Public Health's collaboration with Cancer Care Ontario
Toronto Public Health was invited to participate on the Steering Committee for the ONCPS, along with a number of other organizations including the Department of Nutrition at Ryerson Polytechnic University, the Ontario Ministry of Health and Long Term Care and York University's Institute for Social Research. The role of the Steering Committee was to provide advice on the development of the survey instrument and the project in general.

Toronto Public Health contributed resources, both human and financial, to the project. Through Toronto Public Health's contribution the sample size for Toronto was substantially increased so that there would be enough Toronto participants to generate Toronto-specific results. In addition, the survey was translated into Chinese (both Mandarin and Cantonese), Portuguese and Vietnamese since these are the languages most commonly spoken in Toronto when neither French or English are spoken at home. The translation of the survey was done in order to facilitate a greater level of participation within the City of Toronto among households that do not speak English or French. Lastly, Toronto's contribution supported a calibration study that compared the method used to assess vegetable and fruit consumption on the ONCPS to another method of dietary assessment more commonly used, 24-hour recalls (see Appendix B for a description of the calibration study).

Sampling Method
Random Digit Dialling (RDD) was utilized to identify a random sample of Ontario households. This method is advantageous since it ensures inclusion of individuals with unlisted telephone numbers and those who have recently moved. Stratified random sampling was used based on a combination of telephone area codes and postal codes to generate data based on Cancer Care Regions (CCOR), of which there are 8 in the province and the City of Toronto (contained in Central East region).

One adult, aged 18 to 64 years, was selected from each household for inclusion in the survey. In households with more than one eligible adult, the adult with the next birthday in the household was selected to participate in the survey. This selection method is less intrusive than other methods of ensuring a random selection. The survey was restricted to adults under 65 years of age because it is among those age groups that cancer prevention interventions have their greatest lifetime impact on cancer risk. The study was limited to adults because it was recognized that the inclusion of children would require a different study method and interventions.

In order to ensure that the sample was representative of the target population, at least 14 attempts by telephone were made to each household selected, with about two thirds of the calls being made in the evening or on weekends. Almost 17% of the interviews were completed the first time the interviewer called, about two-thirds were completed with six attempts or less. Eight percent needed 16 attempts or more to complete the interview (Elsbett- Koeppen & Northrup, 2002). Households that refused to participate in the survey were contacted a second time in an attempt to convert them into participants. Interviews were completed in 11.5% of households that refused to participate when first contacted.

Data Collection
CCO contracted the Institute for Social Research (ISR) at York University to undertake the data collection. ISR has been in existence since 1965 and has as its purpose the promotion, undertaking and critical evaluation of applied social research.

Data was collected by telephone interview, using a Computer Assisted Telephone Interviewing (CATI) system. Interviews were conducted on the ISR premises using workstations equipped with personal computers and linked through local area network. Questions were read from video display terminals and respondents' answers were entered directly into the CATI system computer. Interviews were conducted in English, French, Chinese, Portuguese and Vietnamese according the preference of the respondent. ISR supervisors monitored interviews in progress to ensure the quality of the data.

New households were selected about the same time each month and contact was initiated over a 12-month period from June 2001 to June 2002 with about equal numbers of interviews each month. This was to control for the seasonal and between-month differences in eating behaviours.

Questionnaire
The questionnaire was developed by CCO in consultation with the ONCPS Steering Committee. The final questionnaire is attached in Appendix A. The questionnaire was designed to require no more than 20-25 minutes to administer. Survey questions were based on existing validated questions where possible. The questionnaire was sent out to public health, academic and nutrition communities for peer review.

The questionnaire was pilot tested in English by 100 subjects. Subjects were selected using the same method as for the survey itself. The questionnaire was revised as required based on analysis from the pilot test. The final questionnaire was translated into French, Chinese, Portuguese, and Vietnamese.

Ethical Issues
Survey respondents were informed that they could terminate the interview at any time, and that they may refuse to answer any question. Interviewers were trained to administer the questionnaire and scripts were developed to assist them in answering any questions asked by participants. The interviewers were instructed to provide the name and telephone number of the principle investigator at CCO if they wished to verify the authenticity of the survey.

The questionnaire data was kept confidential and password-protected. No names or other unique identifiers were collected. Participants were asked general demographic questions as part of the survey. Respondents were told that all results were to be reported in aggregate so that no individual could ever be identified.

The study received ethics approval from the University of Toronto, York University and by Toronto Public Health.

Data Analysis
Data was weighted by household size based on the probability of an adult member of the household being selected for an interview. In a household with only one adult, the person has a 100% chance of being selected, in a household with two adults a person has a 50% chance of being selected, and in a household with three adults each person has a 33% chance of being

selected. This method of weighting the data compensates for unequal probabilities of selection (Elsbett- Koeppen & Northrup, 2002).

All data was analyzed using SAS version 8.0. Basic descriptive statistics were initially performed on the unweighted data. Outliers were determined based on the results of the calibration study. Any observations over 20 servings of vegetables and fruits per day were reassigned a value of 20 since there were no respondents in the calibration study reporting consumption of more than 18 servings of vegetables and fruits per day. This is similar to the method used for the Canadian Community Health Survey (CCHS) vegetable and fruit consumption data where values greater than three standard deviations from the mean were capped and reassigned to that value (Perez, 2002a).

Limitations

One limitation of a telephone survey is that it excludes households that do not have telephones. Thus, this study is likely to exclude homeless people in Toronto and people without telephone service.

As a completely voluntary survey, many more respondents were asked to participate than actually did. The extent to which the participants in the survey are representative of the general population in Toronto can be determined by comparing the demographics of the survey participants to the Census data (see below). However, we do not know if there were differences in behavioural characteristics of interest, e.g. vegetable and fruit consumption, physical activity, between responders and non-responders.

For some survey items there were a small number of observations that may result in unstable estimates of the true underlying percent or rate. For some questions, the phenomenon under observation was rare, so the number of observations was small (e.g., food insecurity with hunger). There are also questions for which there was a high rate of non-response or missing responses. For example, over 20% of the respondents did not answer the questions on household income. There were also a number of factors for which the representativeness of the sample was skewed (e.g., education) so that the number of survey participants in one category (e.g., less than high school education) was small. Estimates based on a random sample, such as this one, are subject to error due to sampling variability. The random variation may be substantial when the measure, such as the percent, has a small number of events or observations. Rates or percentages based on small numbers may fluctuate from year to year, or differ considerably from place to place, even when there is no meaningful difference (Washington State Department of Health).

Because the sample size for the Ontario results of the ONCPS was over 3,000, CCO was able to report vegetable and fruit intake in three categories (i.e., 0-2 servings per day; >2-<5 servings per day; 5+ servings per day). The Toronto sample size and small numbers of observations for certain variables limited the categories for analysis compared to what was used for Ontario. The categories of analysis for vegetable and fruit intake for the Toronto results are <5 servings per day and ≥5 servings per day.

In addition, the results of a self-report survey such as this one are limited by participant recall, length of the recall period, variability in consumption of certain foods or physical activity over time and social desirability.

Results

Sample Population

Ontario adults, age 18 to 64 years, were included in the ONCPS. The final sample size for Ontario was 3,183, which included 965 Toronto adults. The response rate for Ontario was 63% and for Toronto it was 60% (Elsbett- Koeppen & Northrup, 2002). A response rate of approximately 65% has been typical with rates dropping in recent years (Canadian Fitness and Life Research Institute [CFLRI], 2000). The Ontario sampling was distributed across the CCOR regions, with less populated regions being oversampled. Ninety-seven percent of the surveys were completed in English; 2.4% were completed in Chinese, and 0.11% were completed in Portuguese and French.

Toronto Sample Description

More women (54%) participated in the Toronto ONCPS than men. There was a smaller proportion (20%) of older participants 50-64 years of age. There was a higher portion of university educated participants (44%) compared with participants with less than high school (7%), high school (21%) and some post-secondary education (28%). Approximately 21% did not report their household income, which limits the generalizability of the results of this survey. When considering income levels all results should be interpreted with extreme caution. One measure used to assess income is Statistics Canada's Low Income Cut-Off (LICO) that takes into account household size, degree of urbanization and reported income (Statistics Canada, 2004b). In this survey, annual household income could have been reported as a specific number, or within an income range provided (see Appendix A). Because an exact number is required in order to calculate the LICO, the mid-point of the income range was used when a respondent reported their household income by range. Therefore, the possibility of misclassification exists and thus, the actual LICO rate among those reporting income may be 1% higher or lower than the 23% presented. Therefore, the possibility of misclassification exists and thus, the actual LICO rate among those reporting income may be 1% higher or lower than the 23% presented. Several items on the survey asked about ethnicity, country of origin and primary language spoken in the home. English was the primary household language for 69% of participants and 48% of respondents were born in Canada. The characteristics of the Toronto sample are displayed in Appendix D, Table 1.

Compared to the 2001 Census data, the Toronto ONCPS sample is representative of the general population of adults in Toronto with respect to gender and age. However, the sample appears to over-represent Toronto adults with a university level education and under-represent Toronto adults who have not completed high school or some post-secondary education. The sample over-represents adults from households with a reported income over $80,000 per year while under-representing those under $29,999, compared to the 2001 Census data. The sample is representative of LICO levels for Toronto.

The representativeness of the sample for household language, ethnicity and country of birth was addressed through a number of survey items. The sample is representative for country of birth, recent immigrant (<5 years) and those living in Canada for more than 16 years. It appears to under-represent Toronto adults from households where the primary language is English and those immigrating between 1991 and 1995 and over-represent those immigrating between 1986 and 1990. Respondents were asked to identify to what ethnic or cultural group they belong. The responses were grouped according Statistics Canada 2001 ethnic groupings (Statistics Canada, 2002b). If the primary household language was not English it could not be compared to 2001 Census data due to differences in reporting methods and questions.

The Toronto sample of the ONCPS appears to have significantly over-represented those living in households with 3 or more persons and under-represented those in single person households. Available Census data reports number in household but not numbers of adults and children. Due to these differences in reporting methods it is not possible to compare this sample to the 2001 Census data for single parent households. This is an important variable when considering poverty and income levels.

Vegetable and Fruit Intake

Vegetable and fruit intake has been identified as a core nutrition-related indicator or determinant of health and nutrition status in Canada's national nutrition agenda for action (Health Canada, 1996). Therefore, public health authorities have a desire to monitor vegetable and fruit intake in the population and for studying relationships between diet and disease. At this time, there is little Canadian information on vegetable and fruit consumption in the population.

Assessing Vegetable and Fruit Intake

Because of the costs and challenges involved in assessing vegetable and fruit intake, researchers have developed short questionnaires or "screeners" in place of longer dietary assessment methods. The development of these vegetable and fruit screeners has been done primarily in the US, and they have been used in large population-based health surveys such as the Behavioural Risk Factor Surveillance Survey (BRFSS). The BRFSS asks respondents how often they usually eat or drink fruit, or fruit juice, etc. The Canadian Community Health Survey (CCHS) has incorporated these same questions into the core content of the survey. The US National Institute of Health's Eating at America's Table Study questionnaire asked respondents how often they ate fruit and vegetables, but also added questions asking about how much respondents usually ate (or drank) each time they consumed a particular item (e.g., lettuce salad). The ONCPS screener was adapted from others and is provided in Table 2.

Table 2: The Ontario Nutrition and Cancer Prevention Survey (ONCPS) Vegetable and Fruit Screener

Please think about the foods you have eaten over the past month including foods and beverages that were part of meals and snacks, at home and away from home.

Over the past month, how many times per day, per week, or per month did you eat/drink:

- French fries, hash browns or poutine?
- Other potatoes, such as baked potatoes, boiled potatoes, mashed potatoes, or potato salad?
- Lettuce salads with or without other vegetables in them?
- 100% vegetable juices like tomato or V-8?
- Other vegetables including raw, cooked canned or frozen?
- Soups made mostly with vegetables?
- Tomato sauces with foods such as spaghetti or pasta?
- Fresh frozen or canned fruit?
- 100% fruit juices?

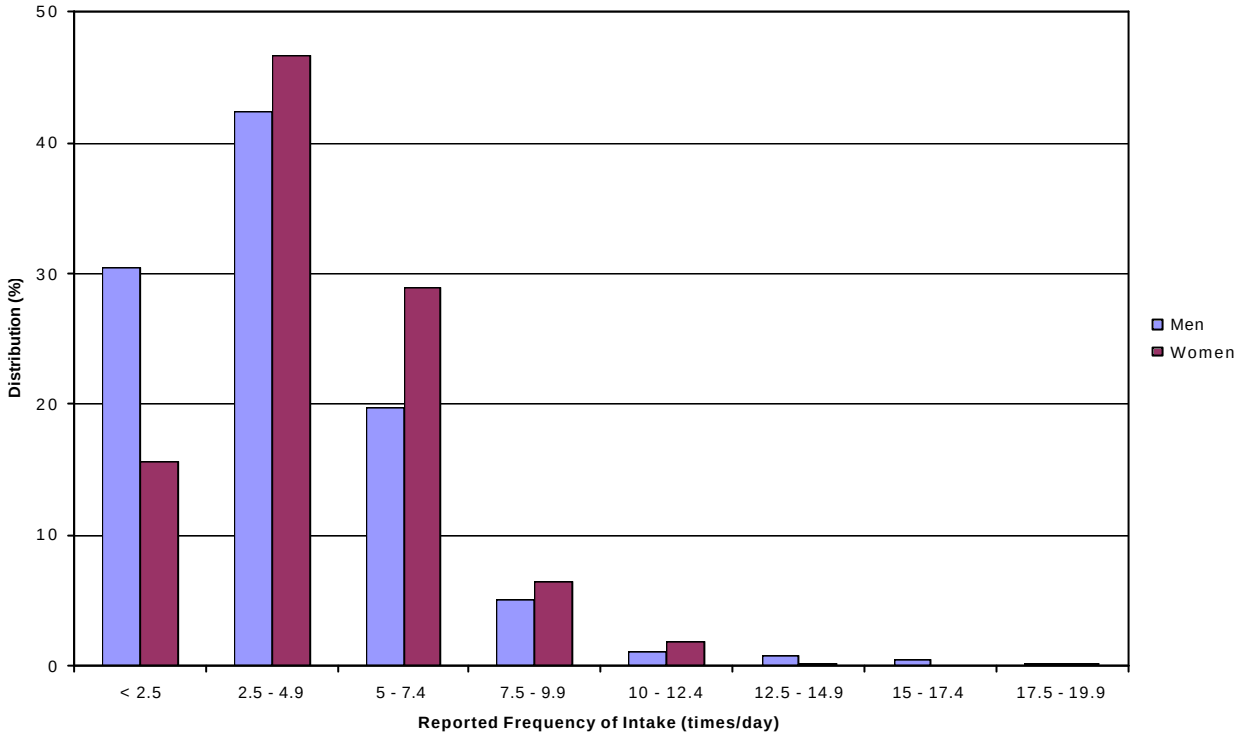
For each item consumed:
If one portion of [food item] is about ½ cup, each time you ate [food item] how many portions did you normally eat?

Results

There was a significant difference in the median frequency of vegetable and fruit consumption between men and women; for men the median was 3.5 times per day and for women it was 4.4 times per day ($p<.001$). Figure 1 illustrates the distribution of the reported frequency of vegetable and fruit consumption for Toronto men and women. In addition, 73% of Toronto men and 62% of women in Toronto reported eating vegetables and fruit less than five times per day. These findings are similar to the findings reported by Cancer Care Ontario (CCO) for the province; 75% of Ontario men and 64% of women ate vegetables and fruit less than 5 times per day (Cancer Care Ontario [CCO], 2003). Based on the calibration study, the frequency of consumption under-estimates "true intake" (based on comparison with 24-hour recalls) since

serving size was not taken into account (see Appendix B). See tables 3-6, Appendix D for a complete summary of vegetable and fruit intake.

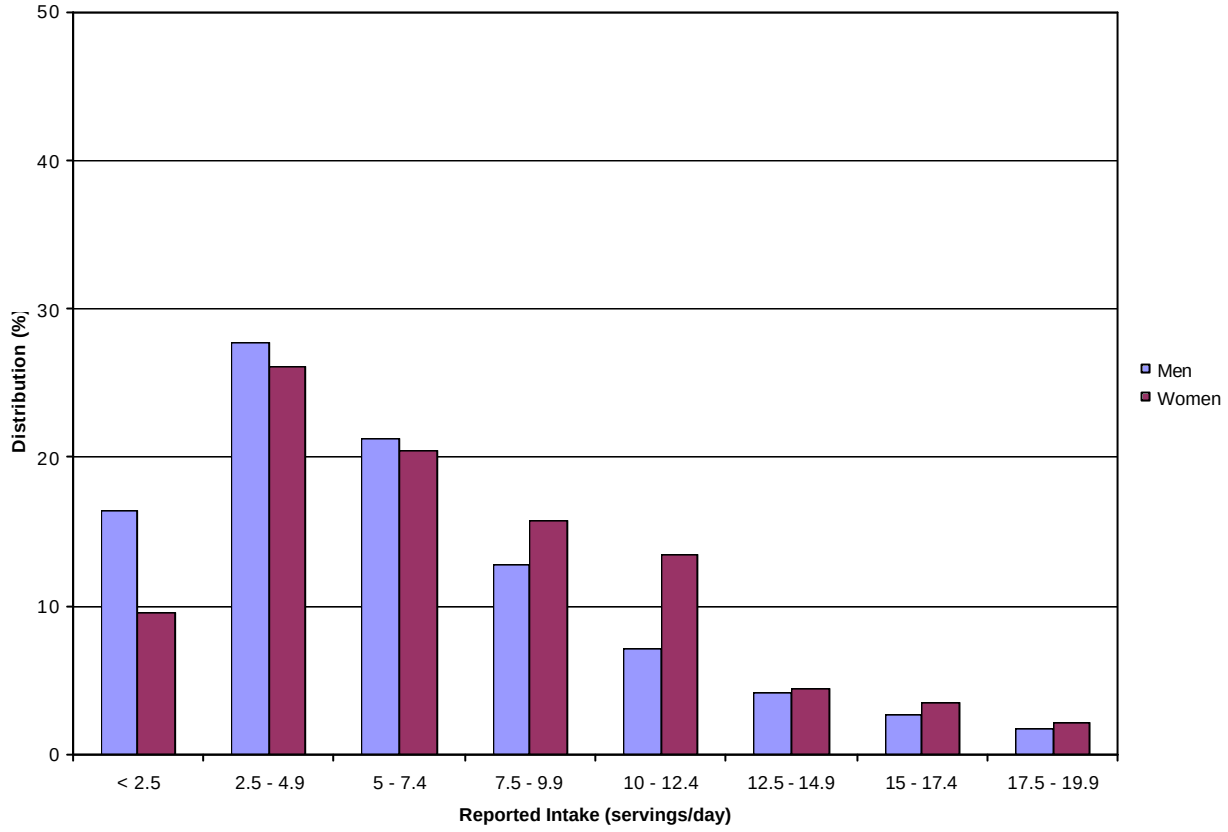
Figure 1: Frequency of Vegetable & Fruit Consumption Among Toronto Adults



These findings are similar to the findings reported from the CCHS, a national survey of adults 20 to 65 years of age that includes questions on the frequency of vegetable and fruit intake. Based on data collected from September 2000 to February 2001, it was reported that women consume vegetables and fruit more often than men. The average frequency of vegetable and fruit consumption was 4.2 times per day for men and 4.9 times per day for women (Perez, 2002a).

When asked about number of servings (or portions) consumed each time a vegetable or fruit was eaten, men reported a median intake of 5.6 servings per day, and women reported a median intake of 6.8 servings per day. Figure 2 illustrates the distribution of reported intake of vegetables and fruit among Toronto men and women in reported servings per day. Women reported eating significantly more vegetables and fruit than men ($p<.01$). Based on the reported servings consumed per day, 44% of Toronto men and 36% of women were not meeting the minimum recommended 5 servings of vegetables and fruit per day, which represents a conservative estimate based on the findings of the calibration study. For Ontario, the reported median intake was 5.4 and 6.3 servings per day for men and women, respectively. Similar to findings in Toronto, about 45% of Ontario men and 36% of Ontario women failed to meet the minimum recommendation of 5 servings of vegetables and fruit per day and women ate significantly more vegetables and fruit than men (CCO, 2003).

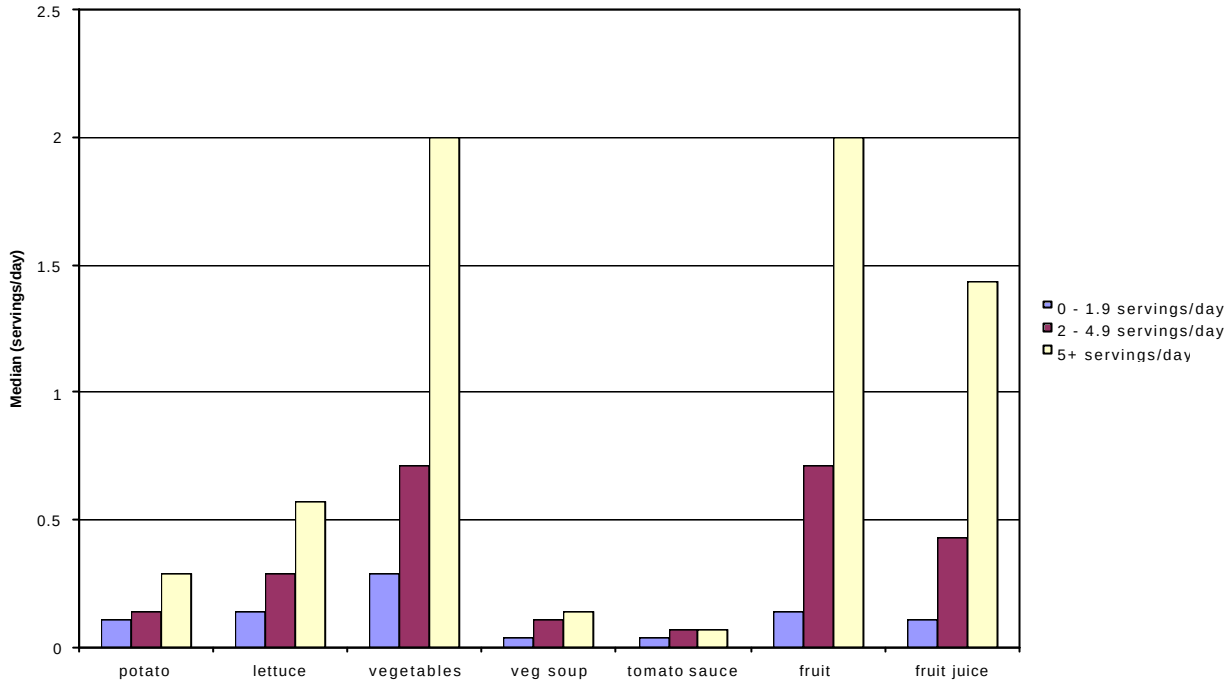
Figure 2: Vegetable & Fruit Intake Among Toronto Adults



The difference between the reported frequency of vegetable and fruit consumption (times/day) and the reported intake of vegetable and fruit consumption (servings/day) is evident by comparing Figure 1 and Figure 2. The reported frequency of consumption (times/day) yields lower estimates because it does not take into account serving size. The distribution for reported vegetable and fruit intake (servings/day) is shifted to the right (Figure 2) because the estimates are higher. In addition, the distribution for vegetable and fruit intake (servings/day) has a longer tail or is more skewed to the right. This is consistent with the findings of the calibration study (Appendix B) where a higher variability was observed for estimates of vegetable and fruit intake (servings/day) than in frequency of consumption (times/day) estimates. One explanation for this variability is that people have difficulty estimating serving size, and this is supported in the literature. Research has shown that individuals have difficulty in estimating portion sizes of foods, both when examining displayed foods and when reporting about foods previously consumed (Thompson & Byers, 1994).

When fruit and vegetable intake was analyzed by source of intake (see Figure 3) fruit and fruit juice were consumed more often by those people who reported eating vegetables and fruit more than 5 times a day compared to those people who reported eating vegetables and fruit less than 5 times per day. When serving size was taken into account, it appeared that there was a greater difference between fruit, vegetable and fruit juice consumption among those people who reported consuming more than 5 servings of vegetables and fruit per day compared to those consuming less than 5 servings per day.

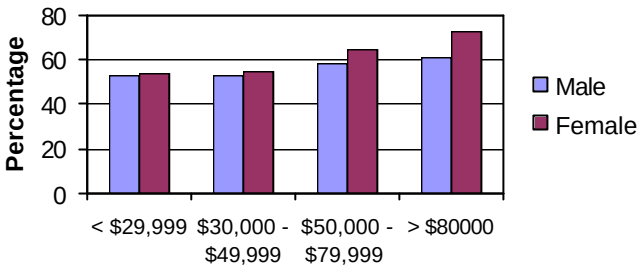
Figure 3: Reported Vegetable and Fruit Intake by Source



There was a significant difference found between respondents below the LICO and those above the LICO for men and women combined ($p<.05$), with a greater proportion of those respondents above the LICO reporting that they consumed 5 or more servings of vegetables and fruit per day. However, when men and women were analyzed separately, there was no significant difference found, although there was a consistent trend (i.e. a greater proportion of those above the LICO reported consuming 5 or more servings of vegetables and fruit per day than those below the LICO).

When income was analyzed by category (Figure 4), it was found to be significant ($p<.05$) for men and women combined. Generally, as income increased so did the proportion of respondents who reported consuming vegetables and fruit 5 or more times per day and 5 or more servings per day. However, when men and women were analyzed separately, income was significant for men only for the reported frequency of consumption (times/day), and only for the reported intake (servings/day) for women ($p<.05$). About 29% of Toronto men from households with reported earnings under $29,000 per year reported consuming vegetables and fruit five or more times per day, compared with 39% of men from households with reported earnings over $80,000 per year. Similarly, about 54% of Toronto women from households with reported earnings under $29,000 per year reported consuming five or more servings of vegetables and fruit per day, compared with 73% of women from households with reported earnings over $80,000 per year. However, these results must be interpreted with caution because over 20% of the Toronto sample did not report their income.

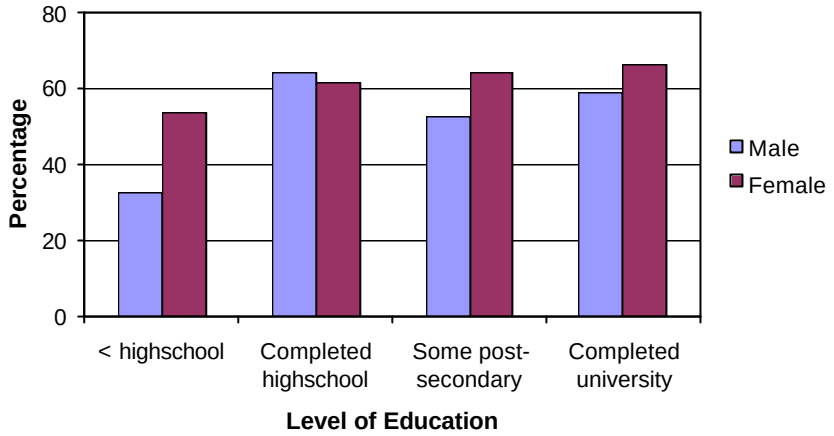
Figure 4: Intake of Vegetable and Fruit (>5 servings/day) by Income Among Toronto Adults



CCO found a difference in vegetable and fruit intake for Ontario adults by income, with adults in lower income households eating fewer servings of vegetables and fruit per day than adults in higher income households. The results of CCHS also indicated that there was a significant difference in the frequency of vegetable and fruit intake by income category. As income increased, so did the mean frequency of consumption of vegetables and fruit. However, the way in which income was categorized and analyzed was different from the CCO report of the ONCPS and the CCHS. The ONCPS and the CCHS reports used a method of categorizing income based on household size; whereas, in this analysis the LICO was used as measure of low income because it takes into account household size as well as degree of urbanization and is updated regularly. The Toronto report also reports income by category so that comparison of the sample characteristics to the Census data was possible.

Education was also found to be significantly associated with vegetable and fruit intake, both for men and women combined and for men's reported intake of servings of vegetables and fruit ($p<.05$). About 67% of those Toronto men who had not completed high school reported consuming less than 5 servings of vegetables and fruit per day, compared with only 41% of those with a university level of education. However, the trend was not linear. Education level was not found to be significantly associated with vegetable and fruit intake for women. Results of the ONCPS indicate that Ontario adults with the lowest educational levels were the least likely to meet the recommendation to eat 5 or more servings of vegetables and fruit per day and that this was true for both sexes. About 57% of Ontario men and 49% of Ontario women with less than a high school education reported eating less than five servings of vegetables and fruit per day. The results from the first six months of the CCHS indicate that men and women with post secondary graduation consumed vegetables and fruit significantly more frequently than men and women with less education.

Figure 5: Intake of Vegetables and Fruit (>5 servings/day) by Education Level Among Toronto Adults



Primary ethnicity was also found to be associated with vegetable and fruit intake (servings/day), for both men and women (see Appendix C for primary ethnicity categorization). It appeared that a greater proportion of those respondents who identified their primary ethnicity as European or Canadian (including British, Australian or New Zealand) reported consuming 5 or more servings of vegetables and fruit per day than other ethnic groups. However, this must be interpreted with extreme caution, since the way in which people report ethnicity differs, and because of the small numbers in some ethnic groups they were combined into very broad categories (see glossary). Furthermore, there is some evidence that dietary surveys may be answered differently by different ethnic groups (Paisley, Greenberg & Haines; Stram et al., 2000).

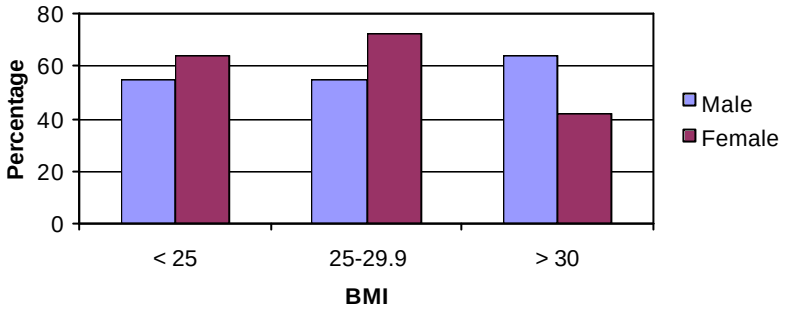
Being born in Canada was not found to be associated with vegetables and fruit intake, nor was years in Canada. Whereas, among Ontario adults, there were differences found between length of stay in Canada. Ontario men who immigrated to Canada less than 20 years ago were less likely to consume the recommended 5 or more servings of vegetables and fruit per day than men who had been in Canada more than 20 years or men who were born in North America. Ontario women who immigrated to Canada more than 20 years ago were more likely to eat the recommended number of 5 or more servings of vegetables and fruit per day compared to women who immigrated less than 20 years ago or who were born in North America.

For men, household type was also associated with intake of vegetables and fruit. It appeared that Toronto men living in households with two adults and children under 18 years of age were more likely to consume 5 or more servings of vegetables and fruit per day compared to men living alone. The results indicate that 70% of men living in households with two adults and children under 18 years of age were consuming 5 or more servings of vegetables and fruit per day, compared with only 54% of single men. Household type was not found to be significant for women. These results are consistent with Ontario findings. Ontario single adults were more likely to be consuming 0-2 servings of vegetables and fruit per day than adults from other household types.

Body mass index (BMI), was found to be associated with vegetable and fruit intake for women only ($p<.05$). Approximately 36% of women in a healthy weight range consumed less than 5 servings per day compared with 58% in the obese weight range (BMI≥30). However, these

results must be interpreted with caution because of the small number of women in the obese category. Ontario results of the ONCPS indicated that Ontarians who were overweight or obese were the most likely to eat fewer than 5 servings of vegetables and fruit per day. About 50% of Ontario men and 47% of Ontario women who were obese reported consuming less than 5 servings of vegetables and fruit per day. Similarly, the findings from the CCHS indicate that men and women who are obese consumed vegetables and fruit significantly less frequently than those in a healthy weight range.

Figure 6: Intake of Vegetables and Fruit (>5 servings/day) by BMI Among Toronto Adults



There was also a significant association between physical activity and vegetable and fruit intake among Toronto men and women. The proportion of respondents who reported higher levels of physical activity (three or more hours per week) also reported consuming significantly more servings of vegetables and fruit than those respondents who were less active. Similarly, CCO reported that Ontario adults who were the least active were the most likely to have less than recommended vegetable and fruit intake. It has been noted in other studies that the frequency of vegetable and fruit intake was associated with other health-related behaviours (Perez, 2002a), and that greater energy needs may partially explain more frequent vegetable and fruit consumption for physically active people. However, this cannot be determined since complete dietary intake information is not available.

Smoking was not found to be associated with vegetable and fruit intake for Toronto men and women. This finding differs from Ontario findings and results of the CCHS. Ontario men and women who were current smokers tended to consume less vegetables and fruit than others. Similarly, results of the CCHS indicate that current smokers reported consuming vegetables and fruit less often than non-smokers or occasional smokers. One possible explanation for this difference in the findings for Toronto may be the potential confounding effect of immigration status. The findings of the CCHS indicate that smoking is consistently less prevalent among immigrants than among their Canadian-born counterparts (Perez, 2002b).

Perceived health status was found to be associated with intake. Respondents who reported they were in excellent or very good health also reported consuming vegetables and fruit more often and in greater quantity than those respondents who reported their health as good, fair or poor. This association was consistent for both men and women. CCO did not find a significant association between self-reported health status and consumption of vegetables and fruit; however, the findings reported for the CCHS did indicate a significant difference. The difference for men was not linear, but for women there was a linear association that indicated women who

reported excellent or very good health were more likely to consume vegetables and fruit more often (Perez, 2002a).

Limitations

There are a number of limitations that must be considered when interpreting the results. Neither measure of vegetable and fruit intake on the ONCPS i.e., frequency of consumption (times/day) nor servings/day is an accurate measure of absolute intake. Therefore, it is best used to look at associations between various demographic and attitudinal factors and to monitor trends over time. Also, the questions used on the ONCPS to measure vegetable and fruit intake differ from those used on other surveys so comparisons across surveys are difficult.

In addition, this study is subject to the inherent weakness of all self-reported data. It has been reported in the literature that under-reporting of overall energy intake (or total calories) is pervasive in 24-hour recalls (Tran, Johnson, Soultanakis & Matthews, 2000). This may be due in part to 'social desirability' which may encourage study subjects to under-report energy intake. This same bias may operate differently for vegetable and fruit intake where higher intake may be viewed as more socially desirable, although this is difficult to confirm due to a lack of studies on this subject.

Body Weight

The increasing prevalence of overweight and obesity in Canada has been identified as the fastest growing but potentially reversible epidemic of our times (Di Ruggiero, Frank, Moloughney, 2004). This growing epidemic has been documented in the literature. The overall national prevalence of obesity has more than doubled over the period of 1985-1998, from 5.6% to 14.8% (Katzmarzyk, 2002). In Ontario, the rate of obesity based on the 2000/01 Canadian Community Health Survey was 15% (Statistics Canada, 2002a)

Weight-related health risks have been identified primarily in association with overweight and obesity. These risks include health problems such as type 2 diabetes, dyslipidemia, hypertension, coronary heart disease, gallbladder disease, obstructive sleep apnea, and certain cancers (Health Canada, 2003a). There is a significant cost, both in human and economic terms, associated with these obesity-related health risks. The direct cost of obesity in Canada in 1997 was estimated to be over $1.8 billion, or 2.4% of total health care expenditures for all diseases in Canada that year (Birmingham, Muller, Palepu, Spinelli & Anis, 1999). Recently, it was estimated that overweight and obesity accounted for approximately 57,000 deaths in Canada over the past 15 years (Katzmarzyk & Ardern, 2004).

The relationship between obesity and overall cancer and site-specific cancers has been described in the literature. There is convincing evidence of the increased risk associated with obesity and endometrial cancer, and probable or possible evidence for the association between obesity and cancers of the kidney, breast (in postmenopausal women), colon, rectum and gallbladder (World Cancer Research Fund/American Institute for Cancer Research, 1997). A recent large, population-based Canadian study provided further evidence that obesity increases the risk of overall cancer, as well as a number of site specific cancers such as kidney, colon, rectum, breast (in postmenopausal women), pancreas, ovary and prostate cancers (Pan, Johnson, Ugnat, Wen & Mao, 2004).

Overweight and obesity are the result of a complex interplay between genetics and environmental factors. The dramatic increase in obesity at a population level confirms the critical role of environmental influences. Attitudinal and behavioural factors are determinants of food choices at the individual level, but certain trends have conditioned individual choice. These trends include the amount of food available, especially convenience food, increasing portion sizes, the availability and consumption of soft drinks and fruit juices, the volume of television food advertising and food consumption outside the home. Societal trends influencing physical activity that have been identified include the habitual use of cars, the inadequacy of public transportation systems, the lack of urban design features such as sidewalks, walking trails and cycling routes, remote controlled television sets, and the increase in home computer use. Furthermore, a number of problematic cultural trends have been identified that have contributed to the increasing prevalence of overweight and obesity. These include mechanization and design features that decrease opportunities for physical activity; family life and parenting leading to a decrease in shared family meals; the ubiquity of food products and their diversity; the lag in nutrition advice from emphasis on nutrient inadequacy to moderation; and female body image standards changing the culture surrounding eating (Kumanyika, 2001).

The BMI is an index of weight to height (kg/m^2) and is considered to be the most useful indicator of health risks associated with both overweight and underweight. The Canadian body weight classification associated with BMI is described in Table 7.

Table 7: Health risk classification associated with BMI for adults 18 years and older (not for use with pregnant and lactating women)

Classification	BMI (kg/m^2)
Underweight	< 18.5
Healthy Weight	18.5 – 24.9
Obese	
Class I	30.0 – 34.9
Class II	25.0 – 39.9
Class III	≥ 40.0

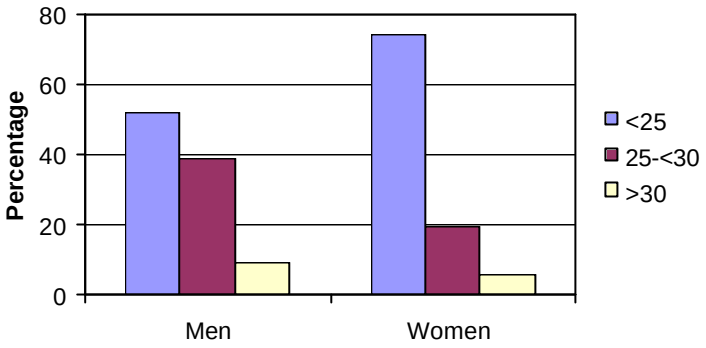
Results

Significantly more Toronto men than women were obese. Approximately 9% (or 39 men) of Toronto men and 6% (or 30 women) of women sampled reported a BMI over 30 or in the obese category ($p<.001$). In addition, 39% of Toronto men and about 20% of Toronto women were overweight (BMI 25-29.9). See tables 8 and 9, Appendix D for a complete summary of BMI data.

Significantly more Ontario men than women were obese. About 15% of Ontario men and 9% of Ontario women were obese (BMI ≥30). (CCO, 2003). The gender difference persisted with respect to overweight. Results indicate that 47% of Ontario men and 25% of Ontario women were overweight (CCO, 2003).

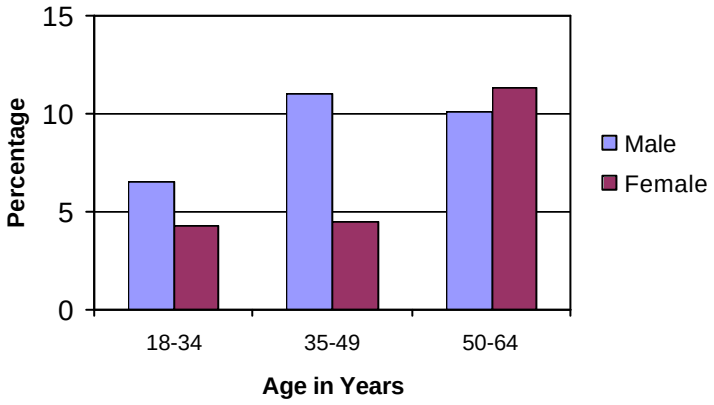
These results indicate that the Toronto population may have slightly lower rates of obesity and overweight than the Ontario population as a whole. Almost half of Toronto adult men (48%), and about one-quarter of Toronto women (26%) were above a healthy weight (reported BMI ≥25). This compares to about 62% of Ontario men and 34% of Ontario women with a reported BMI≥ 25 (CCO, 2003). The results of the 2003 Canadian Community Health Survey (CCHS) indicated that 57% of Canadian men and 40% of Canadian women 18 years of age and older were overweight or obese for the year 2003. The results for Ontario are the same as those for Canada. In Toronto, 45% of men and 37% of women reported being overweight or obese (Statistics Canada, 2004a). The reported overweight and obesity rates of ONCPS and CCHS are similar for Toronto men but there is an 11% difference for women. Possible explanations include an increase in the prevalence of overweight and obesity between 2001 and 2003, differences in participants (i.e., representativeness of the sample), and differences in the bias of self-reports of weight and height.

Figure 7: BMI by Gender Among Toronto Adults



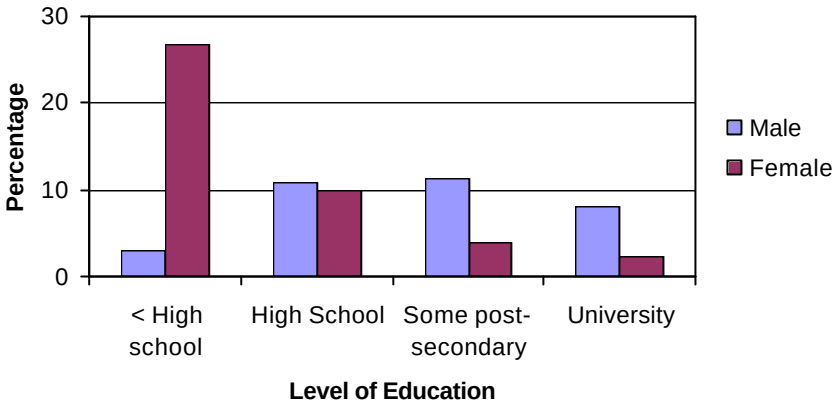
Age was found to be a significant factor associated with body weight for both men ($p<.05$) and women ($p<.001$). As age increases, the proportion of men and women above a healthy weight (BMI $\geq$ 25) steadily increases. For men, 38% of the 18-34 year olds were overweight or obese, and this rose to about 55% for men 35-49 years of age and 50-64 years of age. The association between age and body weight was even more striking for women. The proportion of Toronto women above a healthy weight range was 18.6% for the 18-34 year age group, 23.2% for the 35-49 year age group, and 42.9% for the 50-64 year age group. However, approximately 10% of Toronto women surveyed did not report their body weight. Similarly, age was a significant factor associated with body weight among Ontario adults.

Figure 8: Obesity by Age Among Toronto Adults



Education was only found to be associated with body weight for women ($p<.001$). As level of education increased, the proportion of Toronto women above a healthy weight range decreased. About 32% of women who had completed high school were above a healthy weight range compared to 15% of women who had completed university. For men, the trend appears to be somewhat similar, but it was not significant. Education was found to be a significant factor for both men and women in Ontario, with a consistent trend (i.e., as education level increases, the proportion of women above a healthy weight range decreases) reported for women but not for men.

Figure 9: Obesity by Education Among Toronto Adults



There was no significant association between body weight and low income, as measured by the LICO, among Toronto adults. Similarly, household income when analyzed by category, was not found to be associated with BMI for Toronto adults. However, the high non-response rate for income, the low number of survey respondents in the low income category, and the small numbers of obese survey respondents limit the generalizability of these results. CCO also reported that income was not associated with obesity and overweight for Ontario men and women, but this was based on a more complex method of statistical analysis (multivariate analysis). The results of the 2000-2001 CCHS indicated that for men, rates of obesity increased with increasing income level, but for women the opposite was true. Women in the high income level group were less likely to be overweight and obese than lower income women (Canadian Institute for Health Information, 2004).

Figure 10: BMI by Income Among Toronto Men

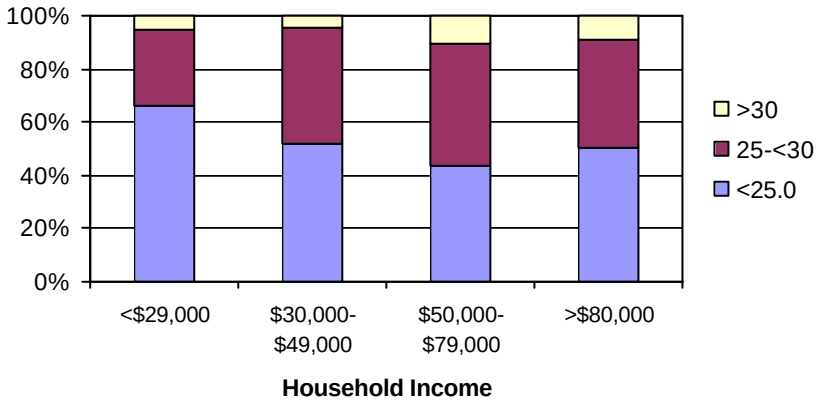
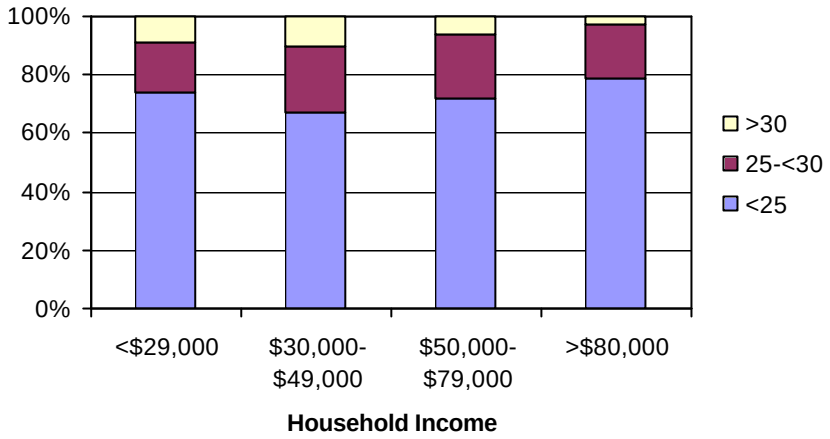


Figure 11: BMI by Income Among Toronto Women



Years lived in Canada was found to be significant for men but not for women ($p<.05$). Toronto men who had lived in Canada for less than 10 years appeared to be less likely to be overweight or obese than other men. While non-significant, a similar trend was observed for Toronto women. This is especially interesting given that the "healthy immigrant effect" has been observed in Canada.

Ethnicity was found to be significantly associated with body weight for Toronto men ($p<.001$) but not for women. It appeared that those respondents who identified their primary ethnicity as Asian or South East Asian were much less likely to be overweight or obese than those respondents who identified themselves from other ethnic or cultural groups. Only about 26% of Asian male respondents were above a healthy body weight compared with 55% of respondents who identified themselves to be of Canadian, British, Australian or New Zealand ethnicity. However, these results must be interpreted with caution since the way in which people report ethnicity differs, and because of the small numbers in some ethnic groups they were combined into very broad categories. Furthermore, the BMI has limitations and may not be a sensitive indicator for some individuals. Groups for whom the body weight classification system may have some limitations include young adults who have not attained full growth, adults who have a naturally very lean body build or who have a very muscular body build, adults over 65 years of age, and certain ethnic or racial groups (Health Canada, 2003). About 26% of the Toronto population surveyed identified themselves as Asian and this may partially explain why a smaller proportion of the Toronto population appeared to be overweight or obese compared with the rest of Ontario. For women, ethnicity was not found to be significantly associated with body weight; however, the trend was similar to that observed for men. Cancer Care Ontario reported similar findings, but found that ethnicity was significant for both men and women.

Self perceived health status was also a significant factor found to be associated with body weight for both men and women in Toronto ($p<.05$). A lower proportion of respondents who reported their health status to be excellent were overweight or obese, compared to those respondents who reported their health as fair (very few respondents reported their health as poor). For men, 41% of those reported to be in excellent health were above a healthy weight range compared to about 57% who reported their health to be only fair. Only 16.7% of Toronto women who reported their health was excellent were overweight or obese, compared to about 31% of those who reported their health was fair.

Physical activity was not found to be associated with overweight or obesity for Toronto men and women. CCO reported that physical activity is a predictor of body weight for Ontario women but not men; they found that as activity level increased the proportion of those women overweight or obese decreased based on a multivariate analysis. Similarly, results from the CCHS indicate that being obese was related to lower levels of physical activity (CFLRI, 2004).

Smoking was found to be associated with body weight among the entire sample but not when men and women were analyzed separately. This finding is similar to the Ontario data that indicates that former smokers tend to be more likely to be overweight or obese (CCO unpublished). The findings of the CCHS indicate that smoking is consistently less prevalent among immigrants than among their Canadian-born counterparts (Perez, 2002b).

Limitations

The ONCPS relied on self-reported height and weight measures. Since people tend to report taller than actual height and lower than actual weight, especially at higher weights, the ONCPS is likely an underestimation of the prevalence of overweight and obesity (Stewart, Jackson, Ford & Beaglehole, 1987). The PEI Nutrition Survey compared actual measures of height and weight to self-reported data and found that obesity rates in measured data were double those of self-report data (MacLellan, Taylor, Van Til & Sweet, 2004).

In addition, although the BMI is considered to be the most useful indicator of health risks associated with both overweight and underweight, it does not distinguish between different patterns of body weight distribution. Research has shown that excess fat in the abdominal area is associated with increased risk to health and therefore the new Health Canada weight classification system takes into account waist circumference. The ONCPS did not include a measure of waist circumference so the excess risk associated with abdominal adiposity cannot be determined from the survey. The Ontario Food Survey included measured waist circumference. It was reported that although a higher proportion of men reported BMI values greater than 25, a higher proportion of women than men fell into the higher risk category of excess waist circumference. The authors of the report recommended that the assessment of risk based on BMI and waist circumference be further explored in future population health surveys (Mendelson, Tarasuk, Chappell, Brown & Anderson, June 2003).

Physical Activity

Physical activity has been identified as an important modifiable risk factor for a number of chronic diseases. There is convincing evidence that physical activity can decrease the risk of developing cardiovascular disease, type 2 diabetes, colon cancer and osteoporosis. The evidence is probable for breast cancer. Physical activity is an important determinate of body weight by contributing to the energy expenditure part of the weight equation (balance of energy intake and energy expenditure). It is also an important modifier of mortality and morbidity related to overweight and obesity. (WHO, 2003). Although activity levels reported amongst Canadians are increasing, a majority of Canadians are still classified as inactive or sedentary. Consequently many Canadians face the unnecessary risk of early death, disease and acute and chronic health problems due to inactivity (Slack & Gucciardi, 2002).

There is also an economic burden associated with physical inactivity. It has been estimated that a 10% increase in the proportion of Canadians who are physically active could save $150 million annually in health care costs for coronary heart disease, stroke, type 2 diabetes, colon cancer, breast cancer and osteoporosis. Researchers calculate that 2.5% of total direct health costs in Canada ($2.1 billion) and 21000 premature deaths were attributable to physical inactivity in 1999 (Katzymark, Gledhill & Shephard, 2000).

The proportion of 'sufficiently' physically active Canadian adults increased from 21% in 1981 to 41% in 2000 (Craig, Russell, Cameron & Bauman, 2004). The 2003 Canadian Community Health Survey based on reported leisure time physical activity found that 47.3% of Ontarians were considered physically inactive, while in Toronto the prevalence of inactivity was 53.3% (Statistics Canada, 2004a).

Health Canada recommends that adults 18-64 years of age meet the following levels of physical activity to achieve health benefits:

- 60 minutes of light activity, or
- 30 – 60 minutes of moderate activity, or
- 20 – 30 minutes of vigorous activity.

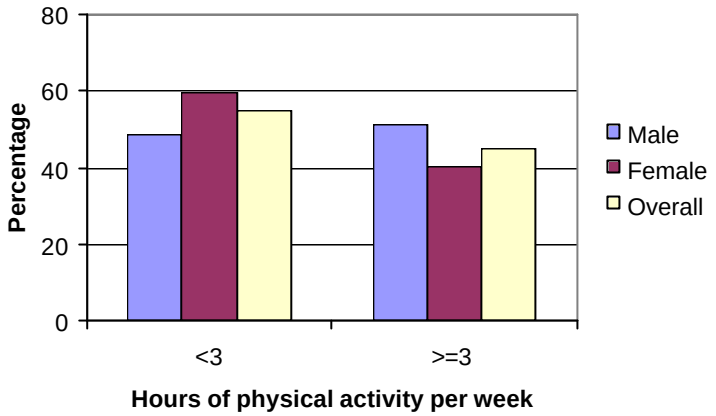
This translates into a minimum of 3 hours of moderate-vigorous activity weekly or ideally, 5 or more hours per week.

The ONCPS asked respondents to consider physical activities or exercises that they do during a normal day, including at work, at school, doing chores and in leisure time. Respondents were asked how many days in a week they exercise or participate for 10 minutes or more in activities that increase breathing or heart rate and for how long they do these types of activities in a typical day.

Results

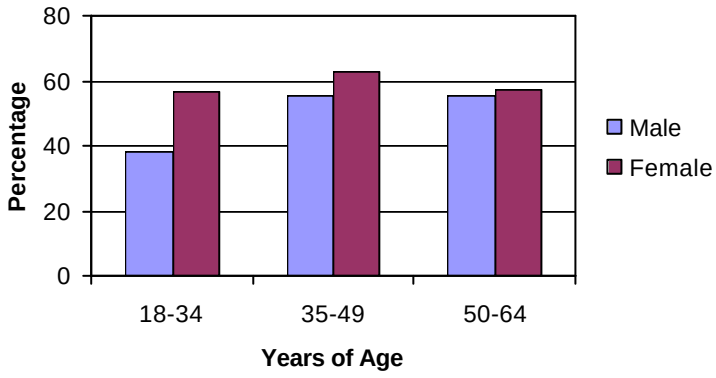
In Toronto, 49% of men and 60% of women did not meet the minimum recommendation of 3 hours of physical activity per week. The difference between men and women is significant ($p<.001$). In Ontario, 43% of men and 53% of women were physically inactive (i.e. less than 3 hours per week) (CCO unpublished). The differences observed between men and women and between Toronto and Ontario are consistent with other surveys (Craig, Russell, Cameron & Bauman, 2004). About 21% of Toronto adults were not active for even one hour per week. In the Ontario the rate was 20% (CCO unpublished). See Tables 10 and 11, Appendix D for a complete summary of the physical activity results.

Figure 12: Physical Activity Levels by Gender Among Toronto Adults



Across all age groups men were more active than women although this difference was least pronounced in the 50-64 year olds. The proportion of respondents that were inactive (<3 hours of physical activity/week) varied significantly for men by age group (p<.01) but not for women. It appears that men 18-34 are more active than those 35 and older. The difference in activity levels was also significant in the Ontario data but the levels showed more of a linear gradient with activity levels decreasing with age (CCO unpublished).

Figure 13: Physical Inactivity (<3 hours/week) by Age Among Toronto Adults

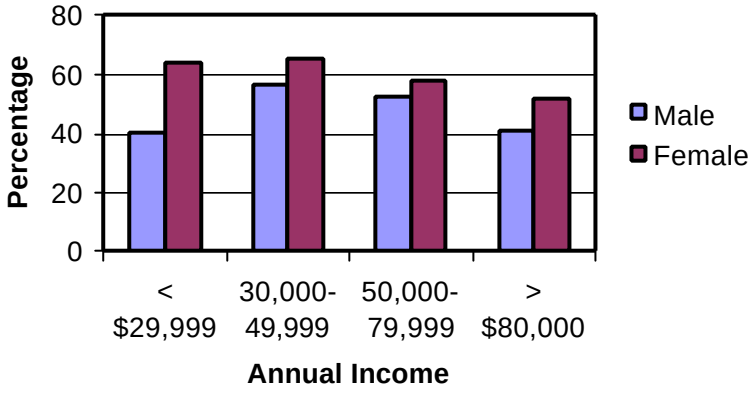


The proportion of Toronto men who were inactive (<3 hours of physical activity per week) varied significantly with level of education (p<.01) but this was not the case for Toronto women. This trend was not linear. The percentage of university educated Toronto men who did not achieve 3 hours or more of weekly physical activity (56%) and men who did not complete high school (57%) appears signifcantly higher than those who had completed high school (42%) or completed some post-secondary education, including college programs (36%). Among men in

Ontario, those with a university level education were the least active (CCO unpublished). This finding is inconsistent with other surveys where there is a relationship between increasing levels of activity with increasing levels of education (CFLRI, 2004a). It would be important to compare the results of this survey with surveys that consider both leisure and and work related activity (e.g. RRFSS) versus simply leisure time (e.g. CCHS). The ONCPS did not ask a question about occupation so it is difficult to interpret the findings in light of occupation.

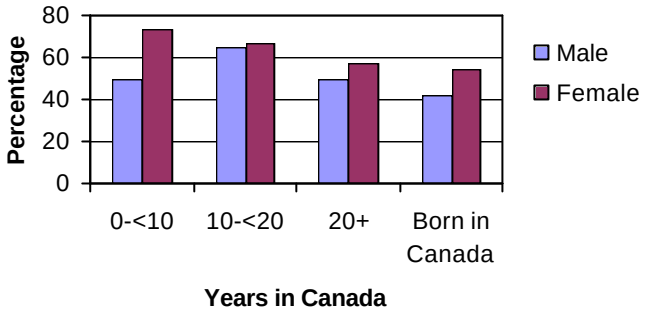
Income was significantly associated with levels of physical activity for Toronto adults ($p<.05$). However, the nature of the association is inconsistent with other surveys which have shown that physical activity levels increase with increasing income (Craig, Russell, Cameron & Bauman, 2004). Toronto men in the middle income range ($30,000-49,999) were the least active. The association was not significant when controlling for gender. It is important to note that 20% of the respondents did not report income levels and the sample overrepresents the highest income levels and underrepresents the lowest levels. This association requires further exploration. Income was found to be significantly associated with physical activity for Ontario women, but not for Ontario men. Again those in the middle income range were the least active followed by the upper-middle range (CCO unpublished).

Figure 14: Physical Inactivity (<3 hours/week) by Income Among Toronto Adults



Whether or not a respondent was born in Canada was found to be significantly associated with levels of activity($p<.001$). It was also significant for both Toronto men ($p<.05$) and women ($p<.05$) when analyzed separately. For women there is a clear gradient with inactivity levels decreasing with length of time in Canada. However, as can be seen in Figure 15 the distribution is different for men. Both the Ontario ONCPS data (CCO unpublished) and the CCHS found that immigrant men and women were less active than those born in Canada. In the CCHS there was no clear pattern of convergence, i.e. the level of activity for immigrants did not come closer to that of Canadians with increase in time since immigration (Perez, 2002b).

Figure 15: Physical Inactivity (<3 hours/week) by Years in Canada AmongToronto Adults



Primary ethnicity was found to be associated with levels of physical activity for men and women combined ($p<.01$) and men ($p<.05$) but not for women. Those who reported belonging to Canadian or European ethnic groups were more active than other groups. Of note is that for both men and women, those reporting their primary ethnicity as South and Southeast Asian, were less active. South and Southeast Asian men reported an average of 1.5 hours of physical activity per week compared with 3.3 hours for Canadians (including British) and 3.5 hours for Europeans. While the difference was not as dramatic for Toronto women, this same trend was observed. Other studies have also identified differences in physical activity levels among various ethnic groups (Seefeldt, Malina & Clark, 2002). It may be that South and Southeast Asians are less active but it may be that the survey questions do not account for cultural differences in interpretation of physical activity. The assessment of physical activity has generally been determined from instruments designed for men who reside in Western cultures (Seefeldt, Malina & Clark, 2002). These findings must be interpreted with caution, as 14% of the respondents did not report their ethnic group, people report ethnicity differently and because of the small numbers in some ethnic groups they were combined into very broad categories.

Limitations

As responses are based on self-reports they are subject to recall error. Current evidence supports a conclusion that young people and adults overestimate their physical activity, particularly vigorous intensity activities (Craig, Russell, Cameron & Bauman, 2004; Sallis & Saelens, 2000). In surveys such as this, where the focus is not physical activity but health, respondents were more likely to underreport levels of physical activity (CFLRI, 1996).

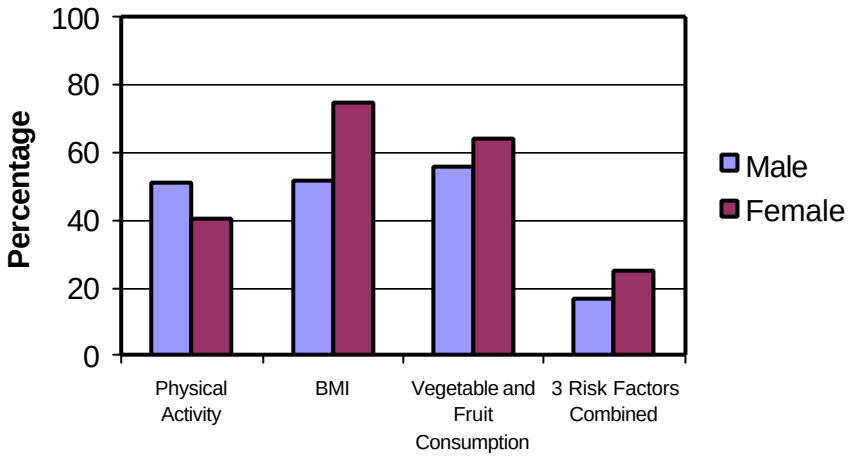
The nature of physical activity (intensity, type) was not assessed thus it is difficult to comment on the quality of the physical activity. The questions were asked such that reported activity could be either moderate or vigorous activity. In the interpretation it was assumed that activity was moderate which may underestimate actual levels of physical activity.

The inclusion of all types of physical activity (i.e. including leisure and work) may provide a more accurate level of physical activity rates than those surveys that only measure leisure time activity. However as the survey did not ask respondents their occupation it is not possible to interpret differences in light of occupation.

Three Risk Factors Combined

It has been estimated that between 30% and 40% of all cases of cancer are preventable by feasible and appropriate diets and by physical activity and the maintenance of appropriate body weight (World Cancer Research Fund/American Institute of Cancer Research, 1997). Only 17% of Toronto men and 25% of Toronto women met the three recommendations for physical activity, healthy body weight and vegetable and fruit intake. Similarly, Cancer Care Ontario (2003) reported that only 14% of Ontario men and 22% of Ontario women met the three recommendations.

Figure 16: Percentage of Toronto Adults Meeting Recommendations for Physical Activity, Body Weight, Vegetable and Fruit Consumption and the Three Factors Combined



Food Security

Food security has been defined in Canada's Action Plan for Food Security. "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle" (Agriculture and Agri-Food Canada, 1998). Food insecurity can be considered at the level of the individual, household, community, region or nation. The ONCPS attempted to measure household food security only.

Household food security is of concern to public health authorities given the documented association with poor diet quality and poor overall health. A study of Toronto women in families seeking charitable food assistance found that women in food insecure households with hunger reported lower intakes of vegetables and fruit, grain products and milk products than the minimum recommendations in Canada's Food Guide to Healthy Eating (Tarasuk, 2001). Individuals from food-insufficient households were more likely to rate their health as fair or poor and were significantly more likely to report having heart disease, diabetes, high blood pressure and food allergies based on analysis of data collected in the 1996/97 National Population Health Survey (Vozoris & Tarasuk, 2003).

Food insecurity is a complex, multidimensional phenomenon that varies through a continuum of successive stages as the condition becomes more severe (Bickel, Nord, Price, Hamilton & Cook, 2000). The USDA Food Security Core Module (FSCM) is a validated 18-item module that is used on surveys to provide a variety of indicators that capture the various combinations of food conditions, experiences and behaviours that, as a group, characterize each stage of food insecurity. A shorter version of the module, the 6-item subset, is used in circumstances where survey time is limited and has been shown to approximate closely the three main categories of the food security status measure, i.e., "food secure", "food insecure without hunger" and "food insecure with hunger". However, this measure is limited since it does not capture the more severe range of food insecurity where children's hunger and more severe adult hunger occur (Bickel et al., 2000).

While the FSCM has been used extensively in the US to obtain prevalence estimates, it has not been used extensively in Canada. The 1998/99 National Population Health Survey (NPHS) asked 3 questions about food insecurity and respondents were considered to be food insecure if they responded affirmatively to any of the questions. Respondents were asked to consider the last 12 months for themselves or anyone in their household. Specifically, they were asked whether they worry that there would not be enough food, and whether or not they eat the quality, variety or quantity of food they wanted because of lack of money. The estimated prevalence of food insecurity in Canada based on these questions was over 10% (Che & Chen, 2001).

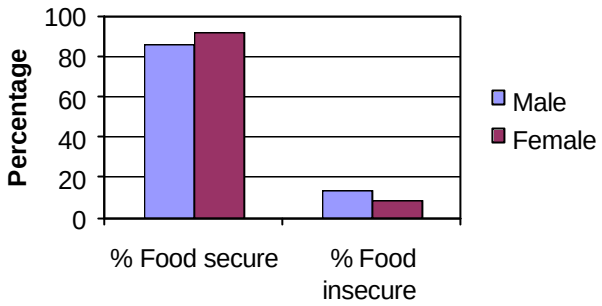
There have been no studies to date that have attempted to estimate household food insecurity in Toronto. The ONCPS attempted to estimate household food insecurity through the use of a 6-item sub-set of the larger 18-item USDA Food Security Core Module (FSCM)(See Appendix A).

Results

About 11% of Toronto respondents, or more than one in ten Toronto adults, were identified as food insecure. Significantly more Toronto men (13.8%) than women (8.1%) reported experiencing household food insecurity ($p<.05$). Similarly, 11.4% of Ontarians were identified as food insecure, although the pattern reported by Ontario men and women differed from

Toronto. More Ontario women reported being food insecure by household (12.6%) compared with Ontario men (10.1%) (CCO unpublished).

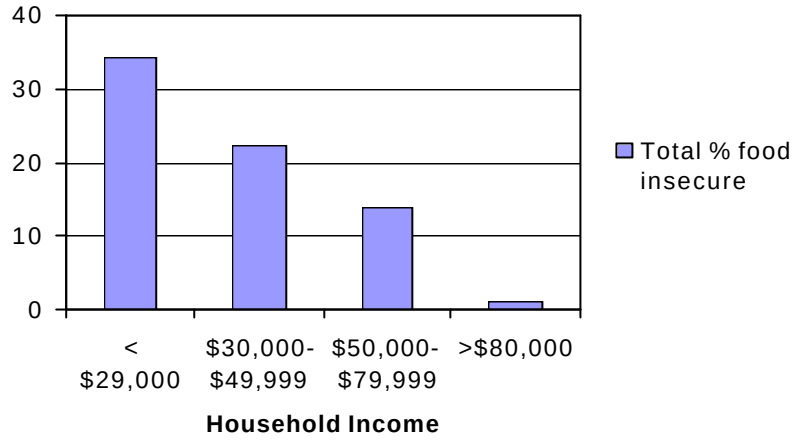
Figure 17: Toronto Household Food Security Reported by Gender



The proportion of Toronto adults that experienced food insecurity with hunger was 2%, or about 17 people out of the sample of 915. In the Ontario sample, 2.5% of adults were identified as food insecure with hunger (CCO, unpublished). See Table12, Appendix D for a complete summary of the food security results.

Income was strongly associated with food insecurity. Significantly more Toronto adults from households with incomes below the LICO identified themselves as food insecure ($p<.001$) compared to Toronto adults from households with incomes above the LICO. The difference in prevalence in food insecurity between those falling below the LICO and those above was dramatic. About 24% of Toronto adults from households below the LICO were food insecure compared with about 7% of adults from households above the LICO. When income was analyzed by category, it was also highly significant ($p<.001$). Those households with income levels less than $29,000 per year were significantly more likely to be food insecure than households with higher incomes. About 28% of households with incomes less than $29,000 per year experienced food insecurity, compared to the overall prevalence of 11% of Toronto households. However, these results must be interpreted with caution because of the high non-response rate to this item and the generalizability of the survey population.

Figure 18: Household Food Insecurity by Income among Toronto Adults



About 10% of Toronto adults reported experiencing household insecurity despite their reported household income of between $50,000 and $79,999 per year. This may be due to the instrument used to measure food insecurity. It has been noted that the instrument measures annual household food security and is static, so it does not reflect unexpected changes in circumstances, variations in household decisions about how to handle competing demands for limited resources, and geographic patterns of relative costs and availability of other basic necessities, such as housing (Bickel et al., 2000).

Similarly the results of ONCPS for Ontario indicate that income was strongly associated with food insecurity. Over one-quarter of Ontario adults (27.5%) who reported the lowest household incomes in Ontario experienced food insecurity, compared with 11.4% for the Ontario population as a whole. This is consistent with the results of the 1998/99 National Population Health Survey which found the odds that people in low-income households would report experiencing food insecurity in the past year was about 8 times higher than for upper-middle/high-income households (Che & Chen, 2001). Although the way in which income was analyzed in both the Ontario results of the ONCPS and the 1998/99 National Population Health Survey differed from the method that was used for the Toronto analysis, there is consistency in the strong association found between income and food insecurity.

Household type was found to be significantly associated with household food insecurity for Toronto adults ($p<.05$). The proportion of respondents in food insecure households was highest for single parent households with children under 18 years of age; however, there were so few respondents in this category that estimates of prevalence are unstable. It appeared that household food insecurity was higher in single person households than in other household types. About 18% of Toronto adults in single person households were identified as food insecure compared to 11% overall. Ontario results of the ONCPS indicate that about one-quarter of single parent households were food insecure, and 15% of single-person households were food insecure (CCO, unpublished). Canadian data has indicated food insecurity is associated with lone-mother families (Che & Chen, 2001). It has also been noted that indicators of household food insecurity appear to track other major indicators of poverty in Canada such as welfare and single parenthood (Vozoris & Tarasuk, 2003).

Birth place was found to be associated with household food insecurity ($p<.01$). Toronto adults born outside of Canada were more likely to be food insecure than those born in Canada. The

prevalence of food insecurity among foreign-born Toronto adults was 13.4% compared to 8% for Canadian-born Toronto adults. Furthermore, it appeared that as length of stay in Canada increased, so did the prevalence of food security. About 18% of Toronto adults born outside of Canada who had been in Canada for less than 10 years were food insecure, compared with 7% of foreign-born adults who had been in Canada for 20 years of more. The Ontario results indicate that foreign-born Ontario adults who had been in Canada for greater than 20 years have a lower prevalence of food insecurity than those who had been in Canada for less than 20 years (CCO, unpublished). These results differ from results based on the 1998/99 National Population Health Survey which indicated that the overall prevalence of food insecurity did not significantly differ between recent immigrants (those who came to Canada within the past 10 years) and the Canadian–born population (Che & Chen, 2001).

For Toronto adults, primary ethnicity was associated with food insecurity ($p<.05$). However, these results must be interpreted with caution since the categories for ethnicity were extremely broad, and there was a high rate of non-response. It appeared that there was a greater proportion of food insecure Toronto adults among those who indicated that their primary ethnicity was African or Caribbean (22%) or Asian (16%), compared to those who identified themselves as Canadian (10%) or European (6%). However, the number of respondents who indicated that they were of African or Caribbean ethnicity was small (45) so these results must be interpreted with caution and should be explored in future studies.

There was a significant association between smoking and food insecurity among Toronto adults ($p<.05$). Current smokers were more likely to be food insecure. The proportion of current smokers who were food insecure was 17% compared with 9% of Toronto adults who never smoked and 9% for former smokers. Similarly, CCO reported that Ontario adults who currently smoke are more likely to be food insecure (CCO, unpublished).

There was an association with the perception that good quality vegetables and fruit are not available and food insecurity ($p<.001$). A greater proportion of Toronto men and women who agreed with the statement, “good quality vegetables and fruit are not available” were food insecure. In addition, the perception that fruit and vegetables are too expensive was found to be significantly associated with food security among Toronto adults ($p<.01$ and $p<.001$ for fruits and vegetables, respectively). One US study found that the local food environment is associated with meeting dietary recommendations for vegetable and fruit intake for Black Americans living primarily in North Carolina and Mississippi. However, the interaction between race and the local food environment limits the generalizability of these results. Furthermore, the lack of information about transportation and information on people’s shopping habits in the study limited the interpretation of results. While the findings of the ONCPS are interesting regarding the availability of good quality fruits and vegetables in Toronto, further exploration of this is required.

Age was not found to be significantly associated with food insecurity for Toronto adults. However, it appeared that the prevalence of food insecurity was much greater in younger adults 18-34 years of age and 35-49 years of age, compared with adults 50-64 years of age. Age was associated with food insecurity among Ontario adults. Households with adults under the age of 35 had the highest prevalence of food insecurity compared with those adults 50-64 years of age (CCO unpublished). This finding is consistent with results reported based on the 1998/99 National Population Health Survey data, although the way in which food security was measured differed (Che & Chen, 2001).

Education was not significantly associated with food insecurity for Toronto adults. However, 17% of Toronto adults with less than a high school education indicated that they were food insecure, compared to 8% of university educated Toronto adults. The results for Ontario indicate that as education level increases, the prevalence of food insecurity decreases (CCO, unpublished).

There did not appear to be a significant association between food insecurity and vegetable and fruit intake. However, it appeared that Toronto adults who were consuming less than 5 servings a day of vegetables and fruit were more likely to be food insecure (13%) compared with Toronto adults who consumed 5 ore more vegetable and fruit servings per day (9%).

Body weight was not found to be significantly associated with food insecurity among Toronto adults. However, 18% of Toronto adults who were obese (BMI≥30) were identified as food insecure, compared to 10% of Toronto adults within a healthy weight range (BMI<25). In contrast, CCO found an association between body weight and food security among Ontario adults (CCO, unpublished). An analysis of the 1996/97 National Population Health Survey did not find a significant association between food insufficiency and body weight (Vozoris & Tarasuk, 2003). In the US, food insecurity was found to be associated with overweight status for women but not for men in a nationally representative sample (Townsend, Peerson, Love, Achterberg & Murphy, 2001). Differences in findings may be due to differences in study methodologies and measures, and the effect of potentially confounding variables.

Limitations

Similar to the limitations noted in the estimates based on NPHS data, this study is likely to underestimate prevalence since it is household-based and excludes homeless people and people without telephone service among whom food insecurity may be high. In addition, the Toronto sample was comprised of a greater proportion of people with a university education and a higher income than Toronto as a whole, and this again may result in an under estimation of the true prevalence of food insecurity in Toronto. Also, rates calculated from small numbers may be unstable and must be interpreted with caution. It is difficult to compare these findings with those reported in other studies such as the NPHS because different measures of food security were used. It should also be noted that because this data is cross-sectional, associations between variables can only be described, but causality cannot be inferred.

Recommendations for Toronto Public Health

The World Health Organization's Global Strategy on Diet, Physical Activity and Health (WHO, 2004) makes recommendations for populations and individuals to reduce the risk of non-communicable diseases by achieving energy balance and maintaining a healthy weight, increasing consumption of fruit and vegetables and engaging in adequate levels of physical activity throughout life. The Global Strategy sets out guiding principles that are recommended for the development of national and regional action plans. To be effective strategies need to be:

- based on the best available scientific research and evidence
- comprehensive, incorporating both policies and action and addressing all major causes of non-communicable diseases together
- multisectoral and take a long-term perspective
- multidisciplinary and participatory
- consistent with the principles contained in the Ottawa Charter for Health Promotion and confirmed in subsequent conferences on health promotion
- recognize the complex interactions between personal choices, social norms and economic and environmental factors.

It is important for Toronto Public Health to use these recommendations when determining priorities and developing programs. Furthermore, it is important that these recommendations be adopted by both provincial and federal governments in the development of comprehensive nutrition, physical activity and obesity prevention strategies.

See Appendix E for a brief summary of TPH's current programming that addresses healthy weight, vegetable and fruit promotion and physical activity promotion. Given limited resources decisions have had to be made for priority programs and targets. The current programming will have limited impact. The results of this survey highlight the need for Toronto Public Health to enhance programming to address healthy weights and healthy eating promotion, with emphasis on the promotion of vegetables and fruit for Toronto adults and men in particular. In addition, public health programming to address physical activity among Toronto adults, particularly women, should be enhanced. A cultural shift in healthy eating and physical activity is required similar to what has occurred with respect to tobacco control over the past 25 years. In order to effect this magnitude of change in the population, multi-level, multi-sectoral approaches are required.

Increased funding to healthy eating and physical activity promotion is required to bring about a shift similar to tobacco. Research has clearly shown that increases in funding for tobacco control result in reduced tobacco use. Research shows that $4.00-$6.00 per K-12 student and $2.63-$5.30 per capita for marketing, community development, and environmental support are required at the local level to implement effective comprehensive tobacco programming. Additional funding is required for behavioural change programs and research and surveillance. As no similar research has been done related to physical activity and nutrition promotion the CDC suggests using the tobacco guidelines to establish funding recommendations. This represents $7.9-$15.1 million for marketing, community development and environmental support in Toronto. Further funding would be required for behavioural change programs for individuals. Presently Toronto Public Health is spending approximately 4 million dollars ($1.66 per capita) in its Chronic Disease Prevention program targeting physical activity, healthy eating and healthy weights.

Given the importance of vegetable and fruit consumption, maintaining a healthy body weight and physical activity for the health of residents of Toronto it is important that TPH target and

adequately resource programs to address these risk factors. To be effective programming needs to follow the principles set out by the WHO.

In addition Toronto Public Health can contribute to an increase in vegetable and fruit consumption, physical activity levels and the percentage of Toronto residents maintaining a healthy weight by:

- the Board of Health requesting the Ontario Ministry of Health and Long-Term Care to develop a comprehensive strategy focussing on healthy eating and the promotion of vegetables and fruit, healthy weights and physical activity, consistent with World Health Organization principles, comparable to the scope of the Ontario Tobacco Strategy, and including sufficient resources; and

- the Board of Health requesting Health Canada to develop a comprehensive strategy for the promotion of vegetables and fruit, healthy weights and physical activity in Canada, consistent with World Health Organization principles and with sufficient resources.

APPENDIX A

Ontario Nutrition and Cancer Prevention Survey (ONCPS)

Annotated Questionnaire

INTERVIEWER: Enter respondent's gender please

- ❑ Male
- ❑ Female
- ❑ Don't know

Health Status Indicators

To start, some questions about your health.

1. In general, compared to other people your age, would you say your health is excellent, very good, good, fair or poor?

   - ❑ Excellent
   - ❑ Very good
   - ❑ Good
   - ❑ Fair
   - ❑ Poor

2. Have you ever been told by a doctor or other health professional that you have:

   - ❑ Diabetes
   - ❑ Heart disease
   - ❑ High cholesterol
   - ❑ Hypertension or high blood pressure
   - ❑ Diverticulitis or bowel disease (e.g., Crohns, inflammatory bowel disease, ulcerative colitis, celiac disease)
   - ❑ Kidney disease

Fruits/Vegetables Knowledge and Beliefs

3. For yourself, how many servings of fruits and vegetables do you think you need to eat every day to stay healthy?

   - ❑ None
   - ❑ _____ servings per day

4. How many servings of fruits and vegetables do you think government and health agencies recommend that adults eat every day?

   - ❑ None
   - ❑ _____ servings per day

Food Frequency Questions

5. Over the past month, how many times per day, per week or per month did you eat French fries, fried potatoes, hash browns or poutine?

   - ❑ _____ times per DAY
   - ❑ _____ times per WEEK
   - ❑ _____ times per MONTH

6. If one portion of French fries, fried potatoes, hash browns or poutine is about ½ cup, each time you ate these, how many PORTIONS did you usually eat?

   _____ portion(s)

7. So just to confirm, when you ate French fries, fried potatoes, hash browns or poutine you typically had _____ cup(s) each time.

   - ❑ Yes
   - ❑ No

8. Over the past month, how many times per day, per week or per month did you eat other potatoes, such as baked potatoes, boiled potatoes, mashed potatoes or potato salad?

   - ❑ _____ times per DAY
   - ❑ _____ times per WEEK
   - ❑ _____ times per MONTH

9. If one potion of potatoes is about ½ cup, each time you ate potatoes, how many PORTIONS did you usually eat?

   _____ portion(s)

10. So just to confirm, when you ate potatoes, you typically had _____ cup(s) each time.

    - ❑ Yes
    - ❑ No

11. Over the past month, how many times per day, per week or per month did you have lettuce salads with or without other vegetables in them?

    - ❑ _____ times per DAY
    - ❑ _____ times per WEEK
    - ❑ _____ times per MONTH

12. If one portion of salad is about ½ cup, each time you ate salad, how many PORTIONS did you usually eat?

    _____ portion(s)

13. So just to confirm, when you had salads made with lettuce, you typically had _____ cup(s) each time.

    - ❑ Yes
    - ❑ No

14. Over the past month, how many times per day, per week or per month did you drink 100% VEGETABLE juices like tomato or V-8?

    - ❑ _____ times per DAY
    - ❑ _____ times per WEEK
    - ❑ _____ times per MONTH

15. A portion of vegetable juice is ½ cup. Each time you drank vegetable juice, how many PORTIONS did you usually have?

    _____ portion(s)

16. So just to confirm, when you drank 100% VEGETABLE juice, you typically had _____ cup(s) each time.

    - ❑ Yes
    - ❑ No

17. Not counting the 100% vegetable juice, salads, or potatoes that you told me about, over the past month, how many times per day, per week or per month did you eat any other vegetables including raw, cooked, canned or frozen?

    - ❑ _____ times per DAY
    - ❑ _____ times per WEEK
    - ❑ _____ times per MONTH

18. If a portion of these vegetables is about ½ cup, each time you ate these vegetables, how many PORTIONS did you usually eat?

    _____ portion(s)

19. So just to confirm, when you had other vegetables, you typically had _____ cup(s) each time.

    - ❑ Yes
    - ❑ No

20. Over the past month, how many times per day, per week or per month did you eat soups made mostly with vegetables?

    - ❑ _____ times per DAY
    - ❑ _____ times per WEEK
    - ❑ _____ times per MONTH

21. If a portion is about ½ cup, each time you ate soup, how many PORTIONS did you usually eat?

    _____ portion(s)

22. So just to confirm, when you ate soup, you typically had _____ cup(s) each time.

    - ❑ Yes
    - ❑ No

23. Not counting ketchup, over the past month, how many times per day, per week or per month did you EAT TOMATO SUACES with foods, such as spaghetti or pasta?

    - ❑ _____ times per DAY
    - ❑ _____ times per WEEK
    - ❑ _____ times per MONTH

24. If a portion of tomato sauce is about ½ cup, each time you ate tomato sauce, how many PORTIONS did you usually eat?

    _____ portion(s)

25. So just to confirm, when you ate tomato sauce, you typically had _____ cup(s) each time.

    - ❑ Yes
    - ❑ No

26. Now I would like to ask about fruit. Not counting juices, over the past month, how many times per day, per week or per month did you eat fresh, frozen or canned fruit?

- ❑ _____ times per DAY
- ❑ _____ times per WEEK
- ❑ _____ times per MONTH

27. If one portion of fruit is one medium piece of fruit, or about ½ cup cut up, how many PORTIONS of fruit did you usually eat?

_____ portion(s)

28. So just to confirm, when you ate fruit, you typically had _____ cup(s) each time.

- ❑ Yes
- ❑ No

The next question is about 100% fruit juices like orange, apple, grapefruit, mango, or grape juice. One hundred percent juices do NOT include fruit drinks with added sugar like Fruit Punches, Drinks, Cocktails, Splashes or Sport Drinks.

29. Over the past month, how many times per day, per week or per month did you drink 100% fruit juices?

- ❑ _____ times per DAY
- ❑ _____ times per WEEK
- ❑ _____ times per MONTH

30. A portion of fruit juice is ½ cup. Each time you drank fruit juice, how many PORTIONS did you usually have?

_____ portion(s)

31. So just to confirm, when you drank 100% fruit juice, you typically had _____ cup(s) each time.

- ❑ Yes
- ❑ No

Psycho-Social Indicators: Stages of Change

32. About how long have you been eating your current amount of fruit and/or vegetables: would you say less than one month, one to three months, four to six months, or longer than six months?

    - ❑ Less than one month
    - ❑ one to three months
    - ❑ four to six months
    - ❑ Longer than six months

33. Are you seriously thinking about eating more fruit and vegetables starting sometime in the next six months?

    - ❑ Yes (go to next question)
    - ❑ No (skip next two questions)

34. During the next month, are you planning to eat more fruit and vegetables?

    - ❑ Yes
    - ❑ No (skip next question)

35. On a scale from 0 to 10, where 0 means that you are not at all confident and 10 means that you are totally confident, how confident are you that you will eat more fruits and vegetables in the next month?

    _____ (enter number [0 – 10])

Knowledge, Attitudes and Beliefs – Fruit

People eat fruit for different reasons. Please tell me if each of the following reasons are very important, somewhat important, or not important to why you personally eat fruit.

36. Eating fruit makes you feel better: is this very important, somewhat important, or not important to why you eat fruit?

    - ❑ Very important
    - ❑ Somewhat important
    - ❑ Not important

37. Eating fruit helps you control your weight: is this very important, somewhat important, or not important to why you eat fruit?

    - ❑ Very important
    - ❑ Somewhat important
    - ❑ Not important

38. Eating fruit has been part of your diet since childhood: is this very important, somewhat important, or not important to why you eat fruit?

- ❑ Very important
- ❑ Somewhat important
- ❑ Not important

For each of the following, please tell me if you agree, neither agree nor disagree, or disagree.

39. Fruit is too expensive

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

40. Fruit spoils too quickly.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

41. Concern about pesticides prevents you from eating more fruit.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

42. Preparing fruit takes too much time and planning.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

43. There is not enough information about how to prepare fruit.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

44. There is not enough information about how to store fruit.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

45. Concern about genetically modified foods prevents you from eating more fruit.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

Knowledge, Attitudes and Beliefs – Vegetables

Now please think about VEGETABLES.

46. Eating vegetables makes you feel better: would you say this is very important, somewhat important, or not important to why you eat vegetables?

- ❑ Very important
- ❑ Somewhat important
- ❑ Not important

47. Eating vegetables helps you control your weight: is this very important, somewhat important, or not important to why you eat vegetables?

- ❑ Very important
- ❑ Somewhat important
- ❑ Not important

48. Eating vegetables has been part of your diet since childhood: is this very important, somewhat important, or not important to why you eat vegetables?

- ❑ Very important
- ❑ Somewhat important
- ❑ Not important

For each of the following, please tell me if you agree, neither agree nor disagree, or disagree.

49. Vegetables are too expensive.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

50. Vegetables spoil too quickly.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

51. Concern about pesticides prevents you from eating more vegetables

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

52. Preparing vegetables takes too much time and planning.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

53. There is not enough information about how to prepare vegetables.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

54. There is not enough information about how to store vegetables.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

55. A concern about genetically modified foods prevents you from eating more vegetables.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

Now please think about both fruits AND vegetables.

56. Eating fruits and vegetables helps you stay healthy: is this very important, somewhat important, or not important to why you eat fruits and vegetables?

- ❑ Very important
- ❑ Somewhat important
- ❑ Not important

57. Eating fruits and vegetables helps you prevent cancer: is this very important, somewhat important, or not important to why you eat fruits and vegetables?

- ❑ Very important
- ❑ Somewhat important
- ❑ Not important

58. Most fruits and vegetables taste good: do you agree, neither agree nor disagree, or disagree?

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

59. Good quality fruits and vegetables are not available where you shop or get food.

- ❑ Agree
- ❑ Neither agree nor disagree
- ❑ Disagree

Attitudes and Beliefs: Disease risk perception

60. In your opinion, what are the five most important causes of cancer?

- ❑ Alcohol/drinking
- ❑ Medications
- ❑ Dietary factors
- ❑ Mental health/stress
- ❑ Occupational exposures/work
- ❑ Overweight, obesity, overeating
- ❑ Radiation, including x-rays, nuclear energy, etc.
- ❑ Environmental risks (specify)
- ❑ Reproductive factors
- ❑ Genetics/family history/hereditary
- ❑ Smoking/tobacco/second-hand smoke
- ❑ Infections
- ❑ Socio-economic reasons
- ❑ Lack of physical activity/exercise
- ❑ Sunlight/sunburn/UV
- ❑ Luck or chance
- ❑ Other (specify)

61. Which of these do you feel is the most important?

(See above list)

62. In general, do you think cancer may be related to what people eat? (only ask if diet not mentioned as one of the five most important causes of cancer)

- ❑ Yes
- ❑ No

63. What about you PERSONALLY – do you think that what YOU eat affects YOUR chances of whether or not you get cancer?

- ❑ Yes
- ❑ No

64. Do you think that this link is strong, moderate or weak?

- ❑ Strong
- ❑ Moderate
- ❑ Weak

65. Compared to other people your age, how likely are you to develop cancer in your lifetime: would you say much more likely, more likely, about the same, less likely, or much less likely than other people your age?

- ❑ Much more likely
- ❑ More likely
- ❑ About the same
- ❑ Less likely
- ❑ Much less likely
- ❑ Has cancer

66. What percentage of people in Ontario do you think will develop cancer during their lifetime?

_____ (enter number)

Physical Activity and Smoking

Please think about physical activities or exercises that you do during your normal day, including at work, at school, doing chores and in your leisure time.

67. On how many days, in a usual week, do you exercise or participate for ten minutes or more in activities that increase your breathing or make your heart beat faster?

_____ days per week

68. For how long do you do these types of activities in a typical day?

- ❑ _____ hour(s)
- ❑ _____ minute(s)

Next, questions about smoking.

69. At the present time, do you smoke CIGARETTES daily, occasionally, or not at all?

- ❑ Daily
- ❑ Occasionally
- ❑ Not at all

70. Have you smoked at least 100 cigarettes in your life?

- ❑ Yes
- ❑ No

71. How long ago was it that you last smoke cigarettes? Was it less than one week ago, more than one week but less than one month ago, one to six months ago, seven to 11 months ago, one to five years ago, or more than five years ago?

- ❑ Less than one week ago
- ❑ More than one week but less than one month ago
- ❑ One to six months ago
- ❑ Seven to 11 months ago
- ❑ One to five years ago
- ❑ More than five years ago

Height and Weight

A few more questions about you.

72. How tall are you without shoes?

73. How much do you weigh?

Food Security

74. INCLUDING YOURSELF, how many people live in your household?

Number of people: _____

75. How many are children under 18?

- ❑ No children under 18
- ❑ Number of children under 18: _____

Sometimes people cannot afford to eat the food they would like to eat. The next questions are about the food eaten in your household in the last 12 months and whether you were able to afford the food you need. I'm going to read you two statements that some people have made about their food situation. Please tell me whether the statement was OFTEN, SOMETIMES, or NEVER true for you in the last 12 months.

76. The first statement is "The food that I/we bought just didn't last, and I/we didn't have money to get more." Was that often, sometimes, or never true for you in the last 12 months?

- ❑ Often true
- ❑ Sometimes true
- ❑ Never true

77. How often did this happen: almost every month, some months but not every month, or in only one or two months?

- ❑ Almost every month
- ❑ Some months but not every month
- ❑ Only one or two months

78. I/we couldn't afford to eat balanced meals: was that often, sometimes, or never true for you in the last 12 months?

- ❑ Often true
- ❑ Sometimes true
- ❑ Never true

79. How often did this happen: almost every month, some months but not every month, or in only one or two months?

- ❑ Almost every month
- ❑ Some months but not every month
- ❑ Only one or two months

80. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?

- ❑ Yes
- ❑ No

81. How often did this happen: almost every month, some months but not every month, or in only one or two months?

- ❑ Almost every month
- ❑ Some months but not every month
- ❑ Only one or two months

82. In the last 12 months, did you personally ever eat less than you felt you should because there wasn't enough money to buy food?

- ❑ Yes
- ❑ No

83. In the last 12 months, were you personally ever hungry but didn't eat because you couldn't afford enough food?

- ❑ Yes
- ❑ No

Socio-Demographic Indicators

84. In what year were you born?

85. And in what month was that?

86. In what country were you born?

87. For how many years have you lived in Canada?

- ❑ Less than one year
- ❑ Number of years: _____

88. To what ethnic or cultural group do you belong? (allow multiple responses)

89. What language do you speak MOST OFTEN at home?

90. What is the highest level of education you have obtained?

- ❑ No formal schooling
- ❑ Some elementary school
- ❑ Completed elementary school
- ❑ Some high school/junior high
- ❑ Completed high school
- ❑ Some community college
- ❑ Some technical school (College Classique, CEGEP)
- ❑ Completed community college
- ❑ Completed technical school (College Classique, CEGEP)
- ❑ Some university
- ❑ Completed Bachelor's (incl. BA in Arts, Science, professional degrees, Engineering, Nursing, etc.)
- ❑ Completed Masters or Ph.D. (incl. professions such as M.D.)

91. Could you please tell me how much income you and other members of your household received in the year ending December 31, 2000, before taxes? Please include income from all sources, such as savings, pensions, rent, as well as wages.

    To the nearest thousand dollars, what was your TOTAL HOUSEHOLD INCOME?

92. We don't need the exact amount; could you tell me which of these broad categories it falls into?

- ❑ Less than $10,000
- ❑ Between $10,000 and $20,000 ($19,999.99)
- ❑ Between $20,000 and $30,000 ($29,999.99)
- ❑ Between $30,000 and $40,000 ($39,999.99)
- ❑ Between $40,000 and $50,000 ($49,999.99)
- ❑ Between $50,000 and $60,000 ($59,999.99)
- ❑ Between $60,000 and $70,000 ($69,999.99)
- ❑ Between $70,000 and $80,000 ($79,999.99)
- ❑ Between $80,000 and $90,000 ($89,999.99)
- ❑ Between $90,000 and $100,000 ($99,999.99)
- ❑ More than $100,000

APPENDIX B

Calibration Study of the ONCPS

It is important for any new method of dietary assessment to be validated or calibrated against established methods. Calibration studies are used to compare (or calibrate) how one method of dietary assessment compares to a reference method. Whereas, validation studies yield information about how well a new method measures what it is intended to measure, implying that there is a 'gold standard' available to establish the true intake such as the doubly labelled water technique (Thompson & Byers, 1994). Many calibration studies of fruit and vegetable screeners have been undertaken in the US, but there have been no studies reported from Canada, despite the increased interest in vegetable and fruit intake in the population (Health Canada, 1996) and inclusion of vegetable and fruit intake questions on the Canadian Community Health Survey (CCHS).

Toronto Public Health, Cancer Care Ontario and researchers from McGill University conducted a calibration study on the ONCPS screener to compare it to another standard method of assessing vegetable and fruit intake. The ONCPS vegetable and fruit screener was compared to three repeat 24-hour recalls conducted by telephone among 184 adults from Toronto and the surrounding areas. Participants were sent a package containing a letter describing the study and a set of disposable food models to assist them in estimating serving sizes.

The results indicated that the ONCPS frequency of consumption (times per day) underestimated the servings of vegetables and fruits consumed for both men and women compared to the 24-hour recalls (median frequency of consumption on ONCPS was 3.7, median servings per day on 24-hour recalls was 5.0). Therefore, if the reported frequency of consumption (times/day) is used as a measure, the proportion of the survey sample meeting the minimum recommendation of 5 servings of vegetables and fruit per day will be underestimated. This results in an overestimation of the prevalence of the population at risk of cancer and other chronic disease due to consumption below recommended guidelines.

The results for the reported number of servings per day indicate that the ONCPS over-estimated consumption (median servings per day was 6.5 compared to 5.0 as measured by the 24-hour recalls). This means that if the reported intake (in servings per day) of vegetables and fruit is used as a measure, the proportion of the survey sample meeting the minimum recommendation of 5 servings of vegetables and fruit per day will be overestimated. This results in a conservative estimate or underestimation of the prevalence of the population at risk of cancer and other chronic disease due to vegetable and fruit consumption below recommended guidelines.

Means and medians of reported frequency of consumption of vegetables and fruit and reported number of servings of vegetable and fruit consumed as determined by three repeat 24-hour recalls and the ONCPS vegetable and fruit screener among Toronto-area adults (n=178).

	Total (n=178)		Men (n=85)		Women (n=93)	
	Mean (SD)	**Median**	**Mean (SD)**	**Median**	**Mean (SD)**	**Median**
ONCPS frequency of consumption (times/day)	3.81 (1.66)	3.74	3.64 (1.73)	3.43	3.97 (1.60)	3.86
Number of servings based on 3 repeat 24-hour recall	5.44 (3.05)	5.02	5.30 (3.19)	4.79	5.56 (2.94)	5.22
ONCPS number of servings consumed	6.83 (3.31)	6.50	6.68 (3.46)	6.45	6.98 (3.19)	6.57

These findings regarding the frequency of consumption questions are similar to others that have been reported in the literature (Field et al., 1998). It has been noted that the US Behavioral Risk Factor Surveillance System (BRFSS) estimates of vegetable and fruit consumption are lower than those of 24-hour recalls/record, which include fruit and vegetable intake from mixed foods. Also because the frequency (in times/day) was estimated rather than the number of servings, the BRFSS tends to underestimate the proportion of adults meeting 5-A-Day guidelines. (Li et al., 2000).

It is recognized that all measurement contains bias. Bias has been defined as "deviation of results or inferences from the truth" (Margetts & Nelson, 2000). Underestimation of self-reported behaviour on surveys is not unique to nutrition and is found in other self-reported health behaviour surveys. For example, Canadian tobacco sales data and cigarette consumption data provided by surveys provide different views on consumption, each with its strengths and weaknesses. Since smokers inevitably under-report tobacco consumption, consumption numbers tend to be lower than cigarette sales reported for the same time period. (Health Canada, 2003b). The difference between self-reported consumption figures and sales figures has been as much as 30%. However, since under-reporting is consistent for both men and women, and among all age groups, some year-to-year comparisons can be made with a degree of accuracy. Given that there is no gold standard for dietary intake measurement (Willett, 1998), it is important that we understand the bias and the trend of the bias. Reports of vegetable and fruit intake based on the US BRFSS underestimate absolute intake, but observed trends over time are likely to reflect real changes in intake, assuming that biases in self-report remain constant over time (Li et al., 2000).

APPENDIX C

Glossary

Body mass index (BMI)
A measure of body weight adjusted for height, calculated as weight in kilograms/(height in metres squared). Generally categorized as underweight, healthy, overweight or obese.

Educational level
Less than high school includes anyone whom did not graduate from high school. *Completed high school* refers to high school graduates, without any post-secondary training. *Some post-secondary* includes individuals who had some community college, technical school or university, or had completed community college or technical school. *Completed university* refers to people holding at least a bachelor's degree.

Ethnicity
The responses were grouped according Statistics Canada 2001 ethnic groupings (Statistics Canada, 2002). *African and Caribbean* includes African, Black and Caribbean. *Asian* includes south and southeast Asian. *Canadian plus* includes Canadian, British, English, Scottish, Irish, Australian and New Zealand. *European* includes southern, eastern, and northern Europe, Baltic and Scandinavia.

LICO
The LICO defines a low-income household as one that spends 20 percentage points or more than the average family spends on shelter, food and clothing. This measure takes into account household size, degree of urbanization and reported income and is updated annually (Statistics Canada, 2004b).

Median
The value of a variable for which 50% of the respondents have a lower value and 50% a higher value.

Physical activity hours per week
The product of the number of days per week respondents did 10 minutes or more of physical activity that increased breathing or made the heart beat faster and the amount of time per day. Those with no days on which they did at least 10 minutes of activity were classified in the *<1 hour/week* group. Activity that increases breathing or heart rates is considered to be of moderate to vigorous intensity.

Smoking
A *current smoker* was defined as anyone who had smoked at least 100 cigarettes in their lifetime and had had a cigarette within the last month, while those who had not had a cigarette in the last month but had smoked at least 100 cigarettes were considered *former smokers*. *Non-smokers* were defined as those respondents who had not smoked 100 cigarettes in their lifetime. (Adlaf & Ialomiteanu, 2002).

Statistical significance of percentages
Differences were evaluated using chi-square tests of global significance. A p value of less than 0.5 is considered statistically significant, meaning that 95% of the time the observed differences are not due to chance.

24-hour total diet recall
A method of determining food intake over a 24-hour period. Often used as a “gold standard” for evaluating other methods of assessing food intake, it consists of an interview wherein a list of all food and beverage items, and their amounts, eaten over a recent 24-hour period is elicited by a interviewer.

Vegetable and fruit servings per day
The sum of the number of servings of each food item consumed each day (see ONCPS vegetable and fruit intake question). Fried potato products were excluded. A serving is 1/2 cup of potatoes, other vegetables, soups, fruit or juices or 1 cup of salad or tomato sauce.

Appendix D – Data Tables

Table 1: Characteristics of Toronto Population

Characteristics	Total (n= 965) (%)	Men (n=440) N/C (%)	Women (n=525) N/C (%)
Gender		46	54
Age Group			
18-34 years	40	43	38
35-49 years	40	40	40
50-64 years	20	18	22
Education			
< High school	7.0 ↓	8	6
High school	21 ↑	18	23
Some post-secondary	28 ↓	29	28
Completed university	44 ↑	45	44
Income (21% data missing)			
<$29,999	20 ↓		
$30,000-$49,999	21		
$50,000-$79,999	24		
≥$80,000	35 ↑		
LICO N/C (21% data missing)			
< LICO	23	21	25
> LICO	77	79	75
Household Type N/C			
Single	11	12	11
Single with children <18	16	15	18
2 adults, no children	25	29	24
2 adults, with children <18	10	11	10
Multiple adults no children	22	26	21
Other	30	41	31
Number in Household			
1 person	11 ↓		
2 persons	27		
3 persons	20 ↑		
4-5 persons	34 ↑		
6 or more persons	7 ↑		

Characteristics	Total (n= 965) (%)	Men (n=440) N/C (%)	Women (n=525) N/C (%)
Primary Ethnic Group N/C (14% data missing)			
Canadian, British	38	37	39
Asian	26	28	25
Southern European	13	14	13
African, Caribbean	6	6	6
Northern European	4	4	4
Baltic and E. European	4	4	4
French	3	3	4
Jewish	2	2	2
Arab & West Asian	0.4	1	0
Central & South American	0	0	0
Other	3	3	3
Language spoken most often at home			
English	69 ↓	67	71
Chinese N/C	8	8	8
Spanish N/C	1	1	2
Portuguese N/C	1	1	1
Italian N/C	1	0	2
French N/C	1	0	1
Vietnamese N/C	1	1	0
Other N/C	18	22	15
Birthplace			
Canada	48	48	48
China	4	5	4
U.K.	3	3	3
Philippines	3	3	3
Hong Kong	3	3	3
Jamaica	2	2	3
India	3	3	3
U.S.	2	2	2
Italy	2	1	3
Sri Lanka	2	2	1
Guyana	2	2	2
Other	26	26	25
Years in Canada			
<5 years	20	23	18
5-<10 years	14 ↑	17	13
10-<15 years	20 ↑	22	19
15-<20 years	10	8	12
≥20 years	36	32	39

Characteristics	Total (n= 965) (%)	Men (n=440) N/C (%)	Women (n=525) N/C (%)
BMI			
<18.5	4	1	7
18.5-24.9	60 ↑	51	68
25.0-29.0	29	39	20
≥30	7	9	6
Number of Chronic Conditions N/C			
0	78	79	78
1	16	16	16
2+	6	5	7
Specific conditions N/C			
Diabetes	4	3	4
Heart disease	2	2	1
High Cholesterol	11	11	11
Hypertension	11	11	11
Bowel Disease	3	2	4
Kidney Disease	1	1	1
Smoking Status N/C			
Never	59	52	64
Current	21	24	18
Former	21	23	18
Self-reported health N/C			
Excellent	22	21	23
Very Good	34	36	32
Good	35	34	35
Fair	8	7	8
Poor	2	2	1

N/C Unable to compare to 2001 Census data
↓ under-representation compared to 2001 Census data
↑ over-representation compared to 2001 Census

Table 3: Reported intake of vegetables and fruit (Times/Day) by Toronto Men 18-64 years of age[1]

	Weighted N	Median (95% CI)	<5 times/day (%)	[3] 5 times/day (%)
Gender* **				
Men	421	3.5 (3.2,3.7)	72.8	27.2
Women	495	4.4 (4.2,4.5)	62.3	37.7
Age group				
18-34 years	178	3.4 (3.0,3.7)	68.1	31.9
35-49 years	162	3.5 (3.3,3.8)	76.9	23.1
50-64 years	71	3.4 (2.9,3.9)	74.3	25.7
Education				
< High school	33	2.6 (1.7,3.4)	79.1	20.9
High school	76	3.6 (2.9,4.2)	68.2	31.8
Some post-secondary	124	3.4 (3.0,3.7)	77.0	23.0
Completed university	181	3.6 (3.3,3.9)	70.3	29.7
Income **				
<$29,999	59	3.6 (3.0,4.3)	70.6	29.4
$30,000-$49,999	62	3.1 (2.7,3.5)	86.5	13.5
$50,000-$79,999	78	3.2 (2.7,3.6)	76.6	23.4
≥$80,000	141	3.8 (3.4,4.2)	63.5	36.5
NOTE: 23% of data are missing				
LICO				
< LICO	69	3.1(2.4,3.7)	74.3	25.7
> LICO	270	3.5 (3.3,3.8)	71.3	28.6
NOTE: 23% of data are missing				
Household Type				
Single	46	3.0 (2.7,3.3)	81.9	18.1
Single with children <18	5	-	-	-
2 adults, no children	112	3.7 (3.3,4.0)	70.2	29.8
2 adults, with children <18	41	4.2 (3.5,4.9)	61.4	38.5
Multiple adults no children	100	3.5 (2.9,4.0)	68.3	31.7
Other	116	3.1 (2.8,3.5)	79.6	20.4
Ethnicity				
African + Caribbean	21	2.3 (1.5,3.0)	88.1	11.9
Asian	91	3.1 (2.7,3.5)	78.9	21.1
Canadian +	135	3.5 (3.1,3.8)	69.4	30.5
European	79	4.0 (3.5,4.5)	66.9	33.1
Other	23	3.8 (2.8,4.7)	74.5	25.5
Missing	90			

	Weighted N	Median (95% CI)	<5 times/day (%)	[3] 5 times/day (%)
Birthplace				
Canadian-born	210		70.4	29.5
Foreign-born	211		75.2	24.8
Years in Canada				
<10 years	74		69.3	30.7
10-<20 years	67		83.1	16.9
≥20 years	66		75.9	24.1
BMI				
<25	211	3.5 (3.1,3.8)	68.9	31.1
25.0-29.9	164	3.4 (3.1,3.7)	77.1	22.9
≥30	38	3.5 (2.7,4.3)	70.5	29.5
Physical Activity**				
<3 hours per week	197		79.7	20.3
≥3 hours per week	217		66.1	33.9
Smoking Status				
Never	222		76.8	23.2
Current	104		65.9	34.1
Former	92		70.0	29.9
Self perceived health status*				
Excellent	90	4.0 (3.3,4.6)	63.2	36.8
Very good	156	3.5 (3.2,3.9)	71.0	29.0
Good	137	2.9 (2.7,3.2)	80.5	19.5
Fair	29	3.8 (3.1,4.5)	77.6	22.4
Poor	8	3.9 (3.2,4.6)	81.2	18.7

[1] n=421 men
* p<.05; ** p<.01; ***p<.001
shaded cells contain < 30 observations

Table 4: Reported intake of vegetables and fruit (Times/Day) by Toronto Women 18-64 years of age[1]

	Weighted N	Median (95% CI)	<5 times/day (%)	[3] 5 times/day (%)
Gender* **				
Men	421	3.5 (3.2,3.7)	72.8	27.2
Women	495	4.4 (4.2,4.5)	62.3	37.7
Age group*				
18-34 years	185	3.9 (3.6,4.2)	69.1	30.9
35-49 years	188	4.9 (4.6,5.2)	54.1	45.9
50-64 years	99	4.5 (4.1,4.8)	62.0	38.0
Education				
< High school	26	3.9 (2.9,4.8)	71.1	28.8
High school	111	4.3 (3.8,4.7)	65.3	34.7
Some post-secondary	143	4.4 (4.0,4.7)	62.3	37.7
Completed university	215	4.5 (4.2,4.8)	59.9	40.1
Income				
<$29,999	68	4.1 (3.6,4.7)	72.5	27.5
$30,000-$49,999	81	4.3 (3.9,4.8)	67.9	32.1
$50,000-$79,999	96	4.4 (3.9,4.8)	59.3	40.7
≥$80,000	132	4.7 (4.3,5.1)	57.8	42.2
NOTE: 28% of data are missing				
LICO				
<LICO	88	4.3 (3.9,4.7)	70.2	29.8
>LICO	290	4.4 (4.2,4.7)	60.8	39.2
NOTE: 28% of data are missing				
Household Type				
Single	57	4.4 (4.0,4.8)	63.5	36.5
Single with children <18	12	4.1 (3.2,5.1)	79.2	20.8
2 adults, no children	117	4.1 (3.8,4.5)	65.5	34.4
2 adults, with children <18	51	5.1 (4.5,5.8)	48.1	51.9
Multiple adults no children	98	4.0 (3.5,4.5)	66.2	33.8
Other	160	4.6 (4.2,5.0)	60.5	39.5
Ethnicity				
African, Caribbean	24	3.4 (2.3,4.4)	67.3	32.6
Asian	102	3.9 (3.4,4.3)	70.9	29.1
Canadian, British, Australian	173	4.8 (4.5,5.1)	60.3	39.7
European	93	4.9 (4.4,5.4)	52.1	47.9
Other	27	4.7 (4.2,5.2)	65.4	34.5
Missing	106			

	Weighted N	Median (95% CI)	<5 times/day (%)	[3] 5 times/day (%)
Birthplace				
Canadian-born	246		60.5	39.5
Foreign-born	249		64.1	35.9
Years in Canada				
<10 years	74		60.7	39.3
10-<20 years	78		61.4	38.6
≥20 years	92		67.4	32.6
BMI				
<25	347	4.5 (4.2,4.7)	62.5	37.5
25.0-29.9	90	4.3 (3.8,4.9)	59.0	41.0
≥30	27	3.9 (3.0,4.7)	74.5	25.4
NOTE: 11% of data are missing				
Physical Activity				
<3 hours per week	286		65.2	34.8
≥3 hours per week	193		57.9	42.1
Smoking Status				
Never	314		63.5	36.5
Current	86		67.2	32.8
Former	90		52.7	47.2
Self perceived health status*				
Excellent	110	5.0 (4.7,5.4)	49.1	50.9
Very good	163	4.1 (3.8,4.5)	64.8	35.1
Good	171	4.3 (3.9,4.6)	64.7	35.3
Fair	42	3.4 (2.8,4.0)	74.1	25.9
Poor	7	4.9 (3.0,6.8)	66.7	33.3

[1] n=495 women

* p<.05; ** p<.01; ***p<.001

shaded cells contain < 30 observations

Table 5: Reported intake of vegetables and fruit (Servings/Day) by Toronto Men 18-64 years of age[1]

	Weighted N	Median (95% CI)	<5 servings/day (%)	[3] 5 servings/day (%)
Gender**				
Men	421	5.6 (5.1,6.1)	44.1	55.9
Women	494	6.8 (6.4,7.2)	35.7	64.3
Age Group				
18-34 years	178	5.7 (4.9,6.4)	41.0	59.0
35-49 years	162	6.0 (5.2,6.8)	44.4	55.6
50-64 years	71	4.9 (3.9,5.8)	52.1	47.9
Education*				
< High school	33	3.5 (0.6,6.4)	67.2	32.8
High school	76	5.7 (4.2,7.1)	35.7	64.3
Some post-secondary	124	5.3 (4.6,6.0)	47.2	52.8
Completed university	181	5.9 (5.2,6.6)	40.9	59.1
Income				
<$29,999	59	5.4 (3.9,6.9)	47.1	52.9
$30,000-$49,999	62	5.9 (4.8,6.9)	46.8	53.2
$50,000-$79,999	78	5.3 (4.0,6.6)	41.8	58.2
≥$80,000	141	6.2 (5.4,7.0)	39.3	60.7
NOTE: 19% of data are missing				
LICO				
<LICO	69	5.6 (3.8,7.3)	48.6	51.4
>LICO	270	5.9 (5.3,6.5)	41.1	58.9
NOTE: 19% of data are missing				
Household Type*				
Single	46	5.7 (4.9,6.5)	45.7	54.3
Single with children <18	5	-	-	-
2 adults, no children	112	6.2 (5.1,7.3)	35.5	64.5
2 adults, with children <18	41	6.9 (5.4,8.3)	30.1	69.9
Multiple adults no children	100	5.1 (4.1,6.1)	45.5	54.5
Other	116	4.6 (3.7,5.5)	54.0	46.0
Ethnicity**				
African, Caribbean	21	3.6 (2.1,5.2)	66.7	33.3
Asian	91	4.5 (3.5,5.5)	57.3	42.7
Canadian, British, Australian	135	5.5 (4.7,6.2)	46.2	53.8
European	79	6.9 (5.9,7.9)	29.4	70.6
Other	23	6.3 (4.0,8.6)	40.4	59.6
NOTE: 15% of data missing				

	Weighted N	Median (95% CI)	<5 servings/day (%)	[3] 5 servings/day (%)
Birthplace				
Canadian-born	189	5.9 (5.2,6.6)	38.9	61.1
Foreign-born	200	5.1(4.4,5.9)	47.5	52.5
Years in Canada				
<10 years	68	5.6 (4.0,7.1)	45.3	54.7
10-<20 years	57	4.9 (3.7,6.0)	52.2	47.8
≥20 years	65	5.5 (4.3,6.7)	45.8	54.2
BMI				
<25	211	5.5 (4.8,6.2)	44.9	55.1
25.0-29.9	164	5.6 (4.7,6.4)	44.9	55.1
≥30	38	6.8 (4.5,9.0)	35.9	64.1
Physical Activity				
<3 hours per week	197	5.3 (4.7,5.9)	48.1	51.9
≥3 hours per week	217	6.2 (5.4,6.9)	39.2	60.8
Smoking Status				
Never	212	5.3 (4.6,5.9)	45.8	54.2
Current	90	6.3 (5.2,7.5)	40.4	59.6
Former	84	6.4 (5.4,7.5)	38.6	61.4
Self perceived health status*				
Excellent	90	6.6 (5.5,7.8)	36.3	63.7
Very good	156	5.9 (5.0,6.7)	38.5	61.5
Good	137	4.8 (4.1,5.5)	52.7	47.3
Fair	29	4.8 (2.7,6.8)	55.2	44.8
Poor	8	-	-	-

[1]n= 421
p<.05; ** p<.01; ***p<.001
shaded cells contain < 30 observations

Table 6: Reported intake of vegetables and fruit (Servings/Day) by Toronto Women 18-64 years of age[1]

	Weighted N	Median (95% CI)	<5 servings/day (%)	[3] 5 servings/day (%)
Gender**				
Men	421	5.6 (5.1,6.1)	44.1	55.9
Women	494	6.8 (6.4,7.2)	35.7	64.3
Age Group				
18-34 years	185	6.6 (5.9,7.4)	39.2	60.8
35-49 years	188	7.6 (6.9,8.4)	33.3	66.7
50-64 years	99	6.8 (6.0,7.7)	33.0	67.0
Education				
< High school	26	5.3 (4.1,6.4)	46.1	53.8
High school	111	6.8 (5.8,7.7)	38.2	61.8
Some post-secondary	141	6.7 (5.9,7.5)	35.7	64.3
Completed university	215	7.3 (6.6,7.9)	33.3	66.7
Income*				
<$29,999	68	5.8 (4.8,6.7)	45.6	54.3
$30,000-$49,999	80	6.0 (5.0,7.0)	45.1	54.9
$50,000-$79,999	96	6.7 (5.7,7.7)	35.6	64.4
≥$80,000	132	6.9 (6.1,7.8)	27.2	72.8
NOTE: 24% of data are missing				
LICO (p=.057)				
<LICO	86	5.8 (4.9,6.6)	45.1	54.9
>LICO	290	6.7 (6.1,7.3)	33.9	66.1
NOTE: 24% of data are missing				
Household Type				
Single	57	7.2 (5.7,8.6)	33.0	67.0
Single with children <18	12	5.1 (2.8,7.5)	45.8	54.2
2 adults, no children	117	6.6 (5.8,7.3)	34.0	66.0
2 adults, with children <18	51	7.4 (5.9,8.8)	31.7	68.3
Multiple adults no children	98	6.7 (5.2,8.2)	39.9	60.1
Other	158	7.0 (6.1,7.9)	35.8	64.2
Ethnicity**				
African, Caribbean	24	6.4 (4.1,8.8)	51.0	49.0
Asian	102	5.6 (4.4,6.8)	49.0	51.0
Canadian, British, Australian	173	7.3 (6.6,8.0)	30.9	69.1
European	91	6.9 (5.8,7.9)	29.2	70.8
Other	27	7.9 (6.3,9.5)	21.8	78.2
NOTE: 13% of data missing				

	Weighted N	Median (95% CI)	<5 servings/day (%)	[3] 5 servings/day (%)
Birthplace				
Canadian-born	224	6.9 (6.3,7.4)	29.8	70.1
Foreign-born	231	6.6 (6.0,7.3)	37.7	62.3
Years in Canada				
<10 years	61	6.6 (5.4,7.9)	41.1	58.9
10-<20 years	69	6.2 (4.9,7.5)	36.7	63.3
≥20 years	94	7.1 (6.0,8.1)	36.1	63.9
BMI*				
<25	346	6.8 (6.2,7.3)	6.2	63.8
25.0-29.9	90	7.3 (6.4,8.2)	27.9	72.1
≥30	27	4.8 (3.7,5.9)	58.2	41.8
Physical Activity**				
<3 hours per week	285	6.6 (6.0,7.2)	40.2	59.8
≥3 hours per week	193	7.7 (7.0,8.3)	27.8	72.2
Smoking Status				
Never	291	6.7 (6.2,7.3)	35.3	64.7
Current	75	6.3 (5.2,7.5)	36.2	63.8
Former	84	7.4 (6.4,8.4)	26.3	73.7
Self perceived health status**				
Excellent	110	8.3 (7.5,9.0)	21.2	78.8
Very good	163	6.2 (5.5,7.0)	38.8	61.2
Good	169	6.4 (5.7,7.2)	38.8	61.2
Fair	42	6.0 (3.8,8.2)	47.1	52.9
Poor	7	-	-	-

[1]n=494
p<.05; ** p<.01; ***p<.001
shaded cells contain < 30 observations

Table 8: Prevalence of underweight & healthy weight, overweight and obesity among Toronto men

Variable	Weighted N	% Underweight[1] + Healthy Weight (BMI <25)	% Overweight (BMI= 25 -29.9)	% Obese (BMI ≥30)
Gender* **				
Men	432	51.8	39.2	9.0
Women	492	74.6	19.5	5.9
Age Group*				
18-34 years	182	62.0	31.5	6.5
35-49 years	170	44.5	44.5	11.0
50-64	73	45.0	45.0	10.1
Education				
< High school	34	57.3	39.7	2.9
High school	77	42.0	47.1	10.8
Some post-secondary	123	50.4	38.4	11.2
Completed university	190	55.4	36.5	8.0
Missing	15			
Household Income				
<$29,999	64	66.1	28.5	5.4
$30,000-$49,999	62	51.6	43.6	4.8
$50,000-$79,999	81	43.9	45.7	10.4
≥$80,000	148	50.2	40.8	9.0
NOTE: 19% of data missing				
LICO				
<LICO	75	61.6	34.4	4.0
>LICO	280	49.3	41.7	9.0
NOTE: 19% of data missing				
Household Type				
Single	46	50.5	45.2	4.3
Single with children <18	5	18.2	45.4	36.4
2 adults, no children	114	51.3	38.8	9.9
2 adults, with children <18	42	54.1	42.4	3.5
Multiple adults no children	103	60.3	29.7	10.0
Other	121	46.1	44.1	9.8

Variable	Weighted N	% Underweight[1] + Healthy Weight (BMI <25)	% Overweight (BMI= 25 -29.9)	% Obese (BMI ≥30)
Ethnicity* **				
African, Caribbean	21	14.3	61.9	23.8
Asian	102	73.9	22.2	3.9
Canadian, British, Australian	136	45.1	42.6	12.4
European	78	39.9	50.0	10.1
Other	23	66.0	19.1	14.9
Don't know/refused/ missing	80			
NOTE: 17% of data are missing				
Birthplace				
Canadian-born	210	46.9	41.8	11.3
Foreign-born	222	56.3	36.7	6.9
Years in Canada*				
<10 years	88	68.2	29.6	2.2
10-<20 years	65	43.9	45.4	10.6
≥20 years	65	53.0	37.1	9.8
Physical Activity				
<3 hours per week	205	54	37	9
≥3 hours per week	219	50	41	9
Smoking Status				
Never	224	54.4	37.2	8.4
Current	104	55.4	34.1	10.4
Former	101	43.4	47.2	9.3
Self-perceived health status*				
Excellent	93	58.2	38.6	3.2
Very good	155	52.6	38.2	9.2
Good	146	48.7	42.2	9.1
Fair	30	43.3	38.3	18.3
Poor	6	38.5	15.4	46.1

[1] Approximately 1% of men reported BMI's < 18.5 (underweight)
*p<.05; **p<.01; ***p<.001
shading denotes cell sizes with < 30 observations

Table 9: Prevalence of underweight & healthy weight, overweight and obesity among Toronto women

Variable	Weighted N	% Underweight[1] + Healthy Weight (BMI <25)	Overweight (BMI= 25 -29.9)	% Obese (BMI ≥30)
Gender* **				
Men	432	51.8	39.2	9.0
Women	492	74.6	19.5	5.9
Age Group* **				
18-34 years	183	81.3	14.3	4.3
35-49 years	185	76.8	18.7	4.5
50-64 years	105	57.1	31.6	11.3
Missing	52			
Education* **				
< High school	28	60.7	12.5	26.8
High school	104	68.3	21.8	10.0
Some post-secondary	140	66.8	29.3	3.9
Completed university	219	84.7	13.1	2.3
Missing	35			
Household Income				
<$29,999	73	74.3	16.9	8.8
$30,000-$49,999	85	67.1	22.5	10.4
$50,000-$79,999	96	72.2	21.7	6.2
≥$80,000	131	78.6	18.4	3.0
NOTE: 27% of data missing				
LICO				
< LICO	93	71.4	20.6	7.9
> LICO	292	74.3	19.6	6.1
NOTE: 27% of data missing				
Household Type				
Single	57	68.7	25.2	6.1
Single with children <18	14	51.7	34.5	13.8
2 adults, no children	119	76.3	17.4	6.2
2 adults, with children <18	50	70.3	23.8	5.9
Multiple adults no children	99	76.0	16.0	8.0
Other	153	78.1	18.4	3.5
Chi-square may not be valid due to small cell size				

Variable	Weighted N	% Underweight[1] + Healthy Weight (BMI <25)	Overweight (BMI= 25 -29.9)	% Obese (BMI ≥30)
Ethnicity				
African, Caribbean	28	71.4	19.6	8.9
Asian	104	84.8	12.9	2.4
Canadian, British, Australian	168	72.1	20.9	7.1
European	91	66.3	26.6	7.1
Other	27	79.6	16.7	3.7
Don't know/refused/ missing	108			
NOTE:18% of data are missing				
Birthplace				
Canadian-born	249	78.4	17.5	4.1
Foreign-born	242	70.9	21.4	7.7
Years in Canada				
<10 years	74	79.5	15.2	5.3
10-<20 years	75	72.4	22.4	5.3
≥20 years	95	65.8	23.8	10.5
Physical Activity				
<3 hours per week	279	72	21	7
≥3 hours per week	195	80	16	4
Smoking Status				
Never	314	76.3	18.7	5.0
Current	91	69.0	23.4	7.6
Former	83	73.2	19.0	7.7
Self-perceived health status*				
Excellent	106	83.3	14.4	2.3
Very good	161	75.2	18.4	6.4
Good	174	71.1	22.1	6.8
Fair	41	69.1	22.6	8.3
Poor	5	54.6	45.5	0

[1] Approximately 7% of women reported BMI's < 18.5 (underweight)
*p<.05; **p<.01; ***p<.001
shading denotes cell sizes with < 30 observations

Table 10: Physical Activity Levels among Toronto Men

Variables	Weighted N	Median Hours Activity/Week (95% CI)	<3 hr/wk (%)	≥3 hr/wk (%)
Overall	938	2.3 (2.1, 2.5)	55	45
Gender* **				
Men	432	3 (2.6, 3.4)	49	51
Women	505	2 (1.8, 2.2)	60	40
Age Group **				
18-34 years	183	3.5 (2.9, 4.0)	38	62
35-49 years	168	2.3 (1.8, 2.8)	55	45
50-64 years	73	2.3 (1.4, 3.2)	55	45
Education **				
< High school	35	2.0 (0, 5.2)	57	43
High school	76	4.0 (2.8, 5.2)	42	58
Some post-secondary	123	3.5 (2.8, 4.2)	36	64
Completed university	193	2.3 (1.9, 2.6)	56	44
Income				
<$29,999	63	3.5 (2.2, 4.8)	41	59
$30,000-$49,999	62	2.3 (1.5, 3.2)	57	43
$50,000-$79,999	79	2.5 (1.8, 3.2)	53	47
≥$80,000	147	3.3 (2.7, 3.9)	41	59
20% of income data missing				
LICO				
<LICO	74	2.9 (1.7, 4.1)	52	48
>LICO	277	3.0 (2.5, 3.4)	45	55
Household Type				
Single	47	3.5 (2.8, 4.2)	45	55
Single with children <18	5	4.5 (0, 11.5)	46	55
2 adults, no children	113	3.0 (2.4, 3.6)	48	52
2 adults, with children <18	42	3.0 (2.4, 3.6)	47	53
Multiple adults no children	102	3.0 (1.8, 4.2)	47	53
Other	124	2.3 (1.5, 3.1)	52	48
Ethnicity*				
African, Caribbean	20	6.0 (3.4, 8.6)	43	58
Asian	100	1.5 (0.9, 2.1)	61	39
Canadian, British, Australian	134	3.3 (2.8, 3.9)	44	56
European	80	3.5 (2.9, 4.1)	38	62
Other	23	3.0 (1.1, 4.9)	49	51

Variables	Weighted N	Median Hours Activity/Week (95% CI)	<3 hr/wk (%)	³3 hr/wk (%)
Birthplace*				
Canadian-born	209	3.5 (2.9, 4.1)	42	58
Foreign-born	223	2.0 (1.5, 2.5)	54	46
Years in Canada				
<10 years	88	3.0 (2.1, 3.9)	49	51
10-<20 years	65	1.5 (0.8, 2.2)	65	35
≥20 years	66	3.0 (2.2, 3.8)	49	51
BMI				
<25	220	2.5 (2.0, 3.0)	50	50
25.0-29.9	165	3.0 (2.4, 3.6)	45	55
≥30	39	2.8 (1.4, 4.3)	50	50
Smoking Status				
Never	225	2.9 (2.5, 3.3)	50	50
Current	105	3.3 (1.9, 4.8)	43	57
Former	99	2.5 (1.8, 3.2)	51	49
Self-Perceived Health Status				
Excellent	92	3.3 (2.6, 4.0)	40	60
Very Good	158	3.0 (2.3, 3.7)	47	53
Good	145	2.5 (1.9, 3.0)	53	47
Fair	30	1.5 (-1.9, 4.9)	58	42
Poor	6	1.8 (-3.4, 6.9)	62	38

*p<.05; **p<.01; ***p<.001
shading denotes cell sizes with < 30 observations

Table 11: Physical Activity Levels among Toronto Women

Variables	Weighted N	Median Hours Activity/Week (95% CI)	<3 hr/wk (%)	³3 hr/wk (%)
Age group				
18-34 years	184	2.3 (1.9, 2.8)	57	43
35-49 years	193	2.0 (1.7), 2.3)	63	37
50-64 years	108	2.3 (1.8, 2.9)	57	43
Education				
< High school	30	3 (0, 6.1)	48	52
High school	115	1.5 (1.1, 1.9)	67	33
Some post-secondary	139	2.3 (1.8, 2.8)	57	43
Completed university	221	2 (1.7, 2.3)	59	41
Income				
<$29,999	76	1.6 (1.1, 2.2)	64	36
$30,000-$49,999	85	2.0 (1.6, 2.4)	65	35
$50,000-$79,999	93	2.5 (1.9, 3.1)	58	42
≥$80,000	131	2.5 (1.9, 3.1)	52	48
27% of income data missing				
LICO				
<LICO	95	1.8 (1.2, 2.2)	63	37
>LICO	290	2.3 (2.0, 2.7)	57	43
Household Type				
Single	57	2.9 (2.4, 3.5)	51	49
Single with children <18	14	2.6 (0.6, 4.6)	54	46
2 adults, no children	119	2.9 (2.4, 3.4)	53	47
2 adults, with children <18	52	2.0 (1.4, 2.6)	55	45
Multiple adults no children	104	1.7 (1.2, 2.2)	68	32
Other	159	1.8 (1.4, 2.1)	65	35
Ethnicity				
African, Caribbean	27	2.3 (1.5, 3.0)	59	41
Asian	104	1.5 (1.0, 2.0)	68	32
Canadian, British, Australian	175	2.5 (2.1, 2.9)	53	47
European	95	2.0 (1.4, 2.6)	62	38
Other	28	2.9 (1.2, 4.6)	50	50
Birthplace*				
Canadian-born	245	2.5 (2.2, 2.8)	54	46
Foreign-born	260	1.8 (1.5, 2.0)	65	35

Variables	Weighted N	Median Hours Activity/Week (95% CI)	<3 hr/wk (%)	³3 hr/wk (%)
Years in Canada				
<10 years	79	1.5 (1.0, 2.0)	73	27
10-<20 years	78	2.0 (1.4, 2.6)	66	34
≥20 years	98	2.3 (1.8, 2.9)	57	43
BMI				
<25	355	2.3 (2.0, 2.7)	56	44
25.0-29.9	91	1.8 (1.4, 2.1)	65	35
≥30	28	1.7 (1.0, 2.3)	74	26
Smoking Status				
Never	321	2.0 (1.8, 2.4)	63	37
Current	90	2.6 (1.9, 3.4)	53	47
Former	88	2.5 (1.9, 3.1)	55	45
Self-Perceived Health Status* **				
Excellent	112	3.0 (2.4, 3.6)	43	57
Very Good	163	2.0 (1.6, 2.4)	60	40
Good	176	1.5 (1.2, 1.8)	67	33
Fair	43	1.5 (0.4, 2.6)	68	32
Poor	7	1.2 (0.8, 1.5)	80	20

*p<.05; **p<.01; ***p<.001
shading denotes cell sizes with < 30 observations

Table 12: Household food security in relation to selected variables for Toronto Adults

Variables	Weighted N	% Food secure	% Food insecure without hunger	% Food insecure with hunger
Total	915	89.3	8.8	1.9
Gender*				
Men	421	86.2	11.5	2.3
Women	494	91.9	6.5	1.6
Age Group				
18 – 34 years	363	88.2	9.1	2.7
35 – 49 years	350	87.3	11.0	1.7
50 – 64 years	170	95.1	3.8	1.2
Education				
< High school	59	83.2	12.6	4.2
High school	187	88.1	9.8	2.1
Some post-secondary	266	86.8	9.8	3.3
Completed university	396	92.1	7.2	0.6
Income***				
<$29,999	127	72.4	23.3	4.3
$30,000-$49,999	142	82.6	14.9	2.4
$50,000-$79,999	174	90.3	6.0	3.7
≥$80,000	273	98.9	0.9	0.2
NOTE: 22% of data missing				
LICO***				
<LICO	155	75.6	21.6	2.9
>LICO	560	92.6	5.4	2.0
NOTE: 22% of data missing				
Household Type*				
Single	103	82.3	14.3	3.3
Single with children <18	17	77.1	20.0	2.9
2 adults, no children	230	92.5	4.1	3.4
2 adults, with children <18	92	90.4	7.5	2.1
Multiple adults no children	197	89.0	10.2	0.7
Other	274	89.7	9.3	0.9
Ethnicity*				
African, Caribbean	45	78.0	17.6	4.4
Asian	193	83.9	15.1	1.0
Canadian, British, Australian	308	90.4	7.4	2.2
European	170	93.9	4.6	1.4
Other	50	93.1	2.9	3.9
Don't know/ refused/missing	147			
Birth Place**				
Canadian-born	457	92.0	5.7	2.3
Foreign-born	458	86.5	11.8	1.6

Variables	Weighted N	% Food secure	% Food insecure without hunger	% Food insecure with hunger
Years in Canada				
<10 years	147	82.1	16.5	1.3
10-<20 years	145	84.0	13.6	2.4
≥20 years	166	92.6	6.2	1.2
BMI				
<25	557	89.6	8.8	1.6
25.0-29.9	254	90.1	7.2	2.7
≥30	66	81.9	15.0	3.0
Vegetable and Fruit Intake (servings/day)				
<5 servings per day	321	86.9	10.0	3.1
≥5 servings per day	524	91.3	7.4	1.2
Good quality vegetables and Fruit not available* **				
Agree	120	69.7	23.8	6.6
Neither agree/disagree	51	89.3	8.7	1.9
Disagree	735	92.5	6.3	1.2
Fruit is too expensive**				
Agree	249	83.5	12.5	4.0
Neither agree/disagree	111	92.4	6.7	0.9
Disagree	544	91.2	7.5	1.3
Vegetables are too expensive* **				
Agree	214	80.9	15.0	4.1
Neither agree/disagree	90	91.8	6.6	1.6
Disagree	601	91.9	6.9	1.2
Smoking*				
Never	536	90.6	8.2	1.2
Current	190	83.4	11.9	4.7
Former	181	91.3	7.4	1.4
Self Reported Health Status				
Excellent	199	91.6	7.2	1.2
Very Good	319	88.2	9.7	2.0
Good	306	88.2	9.5	2.3
Fair	71	88.8	8.4	2.8
Poor	15	100.0	0	0

N=421

*p<.05; **p<.01; ***p<.001

shading denotes cell sizes with < 30 observations

Appendix E – Current Toronto Public Health Initiatives

Toronto Public Health is currently involved in the promotion of vegetable and fruit consumption, maintenance of a healthy weight and physical activity to adults. Together these initiatives represent a multi-pronged, multi-strategy approach. The programs under the auspices of Healthy Lifestyles, specifically nutrition, physical activity and heart health. There are currently two initiatives that primarily focus on vegetable and fruit consumption (Invite Us Along!) and healthy weights (Healthy Weights). Physical activity promotion programming to adults is currently under development.

Healthy Weights
This initiative is a comprehensive program to enable people in Toronto to attain and maintain a healthy weight by increasing self-esteem, being active and eating in a healthy way. Currently, this program involves three main projects that aim to increase the knowledge and understanding of healthy weights messages and behaviours. Key messages come from the *Healthy Measures* tool kit for health professionals that was developed by the Nutrition Resource Centre in partnership with Toronto Public Health and Cancer Care Ontario.

The *Healthy Measures Communication Campaign* refocuses attention on new healthier *measures* or steps that women can take to improve their health. It invites women to adopt new ways to measure health by focusing on being physically active, eating well, and building a healthier self-esteem rather than relying on the scale as the sole measure. The campaign includes the distribution of information packages to women, transit shelter posters and advertising in various publications.

The *Healthy Weights Education Initiative* focuses on raising awareness around the issues of healthy weights, and ultimately influencing the messages that Toronto Public Health and Children's Services staff use with the communities they serve. Workshops and the integration of healthy weights messages into orientations will support staff in incorporating these messages into their work.

The *Healthy Weights - Children and Youth Initiative* focuses on raising awareness of the positive behaviours that promote healthy weights in children and youth. Activities include a display in schools, supporting a web-based teacher education project and working with Parks and Recreation on their coaching initiative.

Invite Us Along! Vegetables and Fruit Promotion Campaign
This program encourages mothers aged 25-49 years and other key influencers of children's and families' eating habits to increase the variety and amount of vegetables and fruit they eat and serve to their families. The ***Invite Us Along!*** program includes social marketing, education and skill development, policy development, environmental support and partnership development. Some highlights of the program are:

A health communication campaign including a web site with articles, tips and recipes, a poster with tear-off sheets, and a series of newsletters that share creative and practical ways to encourage adults and kids to eat more vegetables and fruit.

Delivery of the provincial education and skill building program, 'Take Five: 5 to 10 a day…your way!' in partnership with four Toronto area Community Health Centres.

Development of a point-of-purchase program in partnership with a Toronto grocery store chain. This program provides produce information and recipes through posters, recipe cards, web site and the weekly store flyer.

Appendix F – References

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