THE RELATIONSHIP BETWEEN EDUCATION AND HEALTH IN CANADA: DIFFERENCE BETWEEN MEN AND WOMEN

by

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Abstract

The relationship between education and health has been examined by many studies. The purpose of this report is to use Logit model to examine the gradient of education on health, focusing on the difference between males and females using a cross-sectional CCHS data set collected by Statistic Canada. The Logit model tests the gradients of education on four health behaviors, as well as on five health outcomes. Results show that education has significant effect on most health behaviors and health outcomes. In most cases, the difference in the education-health gradient for men is significantly less steep than women.

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1. Introduction

There is no doubt that there is a strong relationship between education and health. Many studies have investigated this relationship over the past few decades. For example, Chatterji, Joo and Lahiri (2014) stated that "Based on data from National Health and Nutrition Examination Survey (NHANES) 1999–2012, the age-adjusted prevalence rates for diabetes, hypertension, and high cholesterol were 7.8%, 27.8%, and 26.1%, respectively, among adults aged 20 years and older with more than 12 years of education, and 13.5, 32.3, 26.8% respectively, among adults with less than 12 years of education" The prevalence rate of a disease is different in higher-educated people than it is in lower educated people. Many economists have investigated the relationship between education and health for a long time and health has been identified as one of the most important non-monetary returns on education. Higher education leads to better health behaviors and better overall health. According to Forbes (2010) "Increasing levels of education and reducing the incidence of chronic illness are likely to increase individuals' labor productivity, as reflected in their wages." Increased education leads to higher income, nicer neighborhoods, better access to healthcare, better access to healthy food, etc. which may also contribute to better health.

Gender difference is also a factor. Previous research has shown that the effect of

education on women's health is probably more significant than the effects on men's health. Orji, Vassileva and Mandryk (2013) stated that "males do not consider the relationship between one's dietary behavior and disease, while females do.". Dietary behavior is not the only differences between males and females; they also differ in other health-related behaviors such as smoking and drinking. Differences in heath behaviors imply separate effects on health outcomes. Furthermore, males and females differ in many social factors other than health behaviors, such as: income, level of education, and family allocation. These factors may also correlate to the health outcomes.

The objective of this report is to further investigate the relationship between education and health, and to conduct descriptive comparisons of the education gradient among men and women. This paper is divided into 5 parts. The first three parts are introduction, literature review and methodology. The fourth part includes both descriptive results and regression results. The conclusion and discussion will be given in the last part.

2. Literature review

In 2013, Chatterji, Joo and Lahiri used a probit model to examine the education gradient is negatively related to chronic illness. The authors considered the reporting rate of diagnosed disease, and undiagnosed (self-reported) disease separately, and correlated these rates with the education levels of the reporting individuals. This study follows a

similar method to calculate the probability of being diagnosed with a disease: they use the probit model, while I used the logit model. The author compares the education gradient in chronic disease for these different outcomes. In their study, they used different data sets in which there are not enough indicator variables to show whether people are diagnosed or not. Therefore, I used self-reported data on diseases.

Galama and Kippersluis (2015) considered two forms of human capital: health capital, and skill capital, and analyzed the differences and similarities between them. The relationship of health and education is complex because of the way they interact with each other. The investment in health can benefit education. For instance, if people are healthy they are more likely to have more time to spend on work or study. The investment in education raises the return to an investment in health capital.

As the previous two studies have indicated, education and health have an interactive relationship. Hansen and Strulik (2015) investigated the effects of health on level education attained. Increasing adult longevity causes an increase of enrollment in higher education. The authors then use a differences-in-differences estimation strategy to estimate the current effects of longevity on education in the US. They found the cardiovascular revolution led to an increase in adult life expectancy of about 2 years, causing higher education enrollment to increase by 7 percentage points.

In 2006, Culter and Lleras-Muney investigated how education relates to health. There is an obvious economic explanation, that is, education has a positive relationship

with income or occupational choice. They suggest that increasing levels of education lead to different thinking and decision-making patterns. The monetary value of the return to education in terms of health is perhaps half of the return to education on earnings, so policies that impact educational attainment could have a large effect on population health.

The correlation between education and health outcomes is strong, positive and well documented. Clark and Royer (2010) tried to analyze the difficulties to estimate the causal effects of education on health. The approach that they used explored the changes to British compulsory schooling laws that make significant differences in educational attainment and then analyzed the effect of changes in education on health. Their analysis confirms that these compulsory school law changes led to sharp increases in the number of years education completed. They confirmed that the 1947 change increased the earnings of affected men. In addition to effects of the policy change on education and earning, the policy has also impacted on mortality. The mortality of people from 20 and 44 are slightly affected by the policy change. However, for people aged from 45 and 69, the effect was not significant. They also estimate that both changes had small impacts on a wide range of health outcomes and health behaviors.

Endogeneity has been identified as an important problem that needs to be considered in the studies of relationship between education and health. Brunello and Schneeweis （2011） used an empirical approach that addresses the endogeneity of both education and behaviors of health. The data set is cross-country data that includes 12 European

countries and has information on education, behavior and outcomes of health. They focus on self-reported poor health. Their results show, one additional year of education reduces the self-report poor health rate by 7% for females and 3% for males. For the behavior of health, they find that the effects of education on smoking, drinking, exercising and eating a proper diet account for at most 23% to 45% of the entire effect of education on health.

Similarly to the study of Brunello and Sahneeweis（2011）, Arendt（2011）investigates the hypothesis that unobserved variables explain the correlation between health and education. They used panel data to figure out the endogeneity of education and unobserved heterogeneity in health. Heterogeneity of health and endogenity of education are estimated separately for men and women using self-reported health, body mass index, high blood pressure and smoking as health variables.

In the previous studies, the effect of education on health is different in developing countries and developed counties. In their study, Cutler and Lleras-Muney (2008) analyzed the effect by integrating two kinds of countries. They illustrate this approach by comparing the effects of education on various health and health behaviors around the world to generate hypotheses about why education is so often predictive of health.

The effects of education on health are not only indicated by individuals' perspective, but also by the public and changing government law. Kemptner, Jürges and Reinhold（2010）explored the effects of years of schooling on health and health related behavior in West Germany. From 1949 to 1969 there are several changes in compulsory schooling

laws. They found evidence that the effect of years of schooling on education is significant for men but not women. In addition, the causal effect of education is related to the likelihood of having weight problem for both men and women. It also has a relation to smoking behavior. Overall, they found significant non-monetary returns to education with respect to health.

In the article "The Effect of Education on Health: Cross-Country Evidence", Fonseca and Zheng (2010) used three surveys that include representative samples of people aged 50 and over from thirteen OECD countries. Through the IV-probit models, they found that more years of education lead to a lower probability of reporting poor health. To examine the causal relationship between education and health, they use the cross-country variation in compulsory schooling laws over time as instruments for years of education.

Cutler and Lleras-Muney (2011) examined the gradient of education on health. People with different level of education may experience different health outcomes. The reason for this is differences in health behaviors. The authors use a strategy to calculate how much each components account for the gradient. The components include income, cognitive ability, and social networks. After they completed their analysis they concluded that these components account for gradients of 30%, 30% and 10% respectively. However, the future value has no significant effect on the gradient.

In summary, many researchers have investigated the relationship between health and

education and they concluded that education has positive effect on health. This study adds to literature by focusing on the different effects of education on health between male and female and how the education-health gradient is changing after controlling for the health behaviors. The next section explains the methodology used for this study.

3. Methodology

3.1 Data and Variables

This study is based on the 2013 Canadian Community Health Survey (CCHS) carried out by Statistics Canada. The CCHS is a cross-sectional survey that collects information respecting health status, health care utilization and health determinants within Canada. The sample size used in the CCHS was 44900 individuals aged from 20 to 69. The data have been weighted to represent 23.4 million.

Two sets of dependent variables used in this study: health outcomes and health behaviors.

Health outcomes

Asthma, high blood pressure, diabetes, heart disease and cancer are dummy variables, if an individual has that specific disease the value of the variable is 1, and 0 otherwise. See the detail in the following table.

Health behaviors

In this study I group health behaviors into four main categories: type of smokers, type of drinkers, body mass index（BMI）, and daily fruit vegetable consumption.

There are three types of smokers: daily smokers, occasional smokers, and non-smokers. Similar to smokers, drinkers also fall into one of three categories: occasional drinkers (less than once a month), regular drinkers (once a month; 2 to 3 times a month; once a week; 2 to 3 times a week; 4 to 6 times a week; everyday), and non-drinkers.

Body mass index（BMI） was calculated using self-reported weight and height. BMI scores were grouped into the following four groups in accordance to the Canadian weight classification system: Underweight (<20.0 kg/m^2), normal weight (20.0-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2), and obese (>30.0).

Daily fruit and vegetable consumption is a variable indicating how many servings of fruit and vegetables people consume each day. Respondents are sorted into three different of groups: less than 5/day, 5-10/day, and more than 10/day. Table 1 contains a summary of the dependent variables.

Table1. List of dependent variables

Health Outcomes	
Asthma	1 if has asthma
High blood pressure	1 if has high blood pressure
Diabetes	1 if has diabetes
Heart disease	1 if has heart disease
Cancer	1 if has cancer

Health Behaviors	
Smoke	1 if daily smoker
Drink	1 if regular drinker
Little F&V consumption	1 if consumption less than 5/day
Obese	1 if obese

Independent variables

The main independent variable of interest in the following analysis is level of education. Level of education in respondents is sorted into the following groups: high school or lower, college, bachelors level, and above bachelors level.

Other variables considered include age, and gender. Age is divided into five groups: 20-29,30-39, 40-49,50-59 and 60-69.

The respondent's province or territory of residence has also been included as dummy variable.

Occupation is divided into three groups: white-collar workers, blue-collar workers, and not employed.

White-collar workers include those working in: Management Occupation; Business, Finance and Admin. OCC; Natural and Applied SC. and REL.OCC; Health Occupation; OCC.in Social SC./EDU. /GVT/RELIG.

Blue-collar workers those working in: OCC in Culture, Recreation and Sport; Sales and Service Occupations; Trades/Trans./EQU. Operator/REL.OCC.; Occupations Unique to Primary Industry; OCC. Unique to PROC./ MANUF./Utilities.

Marital Status considered include: married (now married, common-law), and

non-married (widowed, separated, divorced, single, never married)

Immigrant is a dummy variable indicating whether or not a person is an immigrant.

Urban and Rural Areas is also used as a dummy variable indicating where a respondent lives.

Culture/ Racial Origin is a dummy variable enumerated as follows: Aboriginal, White, South Asia, Chinese, Black, Filipino, Latin American, Arab, South East Asia, West Asia, Korea, Japanese, other, and Missing culture.

3.2 Empirical strategy

Logistic Regression Model

In order to examine the relationship between level of education and health, a logistic regression model is assembled as follows:

$$Y_{it} = X\boldsymbol{\beta} + \boldsymbol{\varepsilon_{it}}$$

The dependent variables, (Y_{it}) are categorical variables including health behavior variables and health outcome variables. X is a vector that includes socio-economic variables. ε is a random error that is assumed to be normally distributed.

Base on the equation, X consists of 4 groups used to estimate relationships between education and health and compare with difference between males and females. The sample size of the first group is total population restricted by age, while the second group adds an interaction variable to the model. The third group focuses on males, while the

fourth group focuses on females.

Health outcomes

To examine the effect of education on health outcomes, we run a number of logistic regressions.

Health outcomes with total population

$Y_i=\beta_0+\beta_1 age+\beta_2 male+\beta_3 eduacation+\beta_4 province+\beta_5 immigrant+$

$\beta_6 urban+\beta_7 married+\beta_8 racial\ origin+\varepsilon_i$ (1)

Where health outcomes are the variables such as: Asthma, high blood pressure, diabetes, heart disease and cancer, that indicate whether an individual has those diseases. In this equation the health outcome is added as an independent variable, age is used as the demographic variable, and education as the key variable in this model. As we described before, each level of education is an individual dummy variable: province is a set of dummy variables that includes all 10 provinces and 3 territories; Immigrant, Urban, and married are also used as dummy variables. Racial origin is a category variable that includes different ethnic group such as: Aboriginal, White, South Asia, Chinese, Black, Filipino, Latin American, Arab, South East Asia, West Asia, Korea, Japanese, Other, and Missing culture. Each of these groups is a dummy variable. This regression should estimate the interactive relationship between health outcomes and health behaviors.

Health outcomes with interaction

$Y_i = \beta_0+\beta_1 age+\beta_2 male+\beta_3 male*education+\beta_4 eduacation+\beta_5 province+\beta_6 immigrant+$

$\beta_7$urban+$\beta_8$married+$\beta_9$racial origin +ε_i (2)

In order to investigate whether there are gender effects at different education level, an interaction term between gender and education has been introduced to the following model, where male*education is the interaction variable.

Health outcomes for male

$Y_i = \beta_0$+$\beta_1$age +$\beta_2$eduacation+$\beta_3$province+$\beta_4$immigrant+

$\beta_5$urban+$\beta_6$married+$\beta_7$racial origin +ε_i (3)

The equation in this group is identical to that in the first group; however, we only focus on male respondents. This allows us to see the effects of education on health within males.

Health outcomes for female

$Y_i = \beta_0$+$\beta_1$age +$\beta_2$eduacation+$\beta_3$province+$\beta_4$immigrant+

$\beta_5$urban+$\beta_6$married+$\beta_7$racial origin +ε_i (4)

Similar to equation 3 this group is identical to the first group; however, we only focus on female respondents. This allows us to see the effects of education on health within females.

For the effects of education on health behavior, the strategy and methodology is same as used for health outcomes. It also considers the sample size of: total, interaction, male only, female only respectively. The equations and models are identical to equations 1-4 with only the dependent variable changed from health outcomes to health behaviors.

4. Results

4.1 Descriptive results

All the descriptive results are weighted in Stata with iweight option for means and fweight option for percentage. Statistic Canada requires summary statistics to be weighted in order for them to be publicly released.

Table 2. Health Outcomes, Health Behavior and Socioeconomic Characteristics, Male and Female			
	Total	**Males**	**Females**
	(%)	(%)	(%)
Health outcomes			
Asthma	7.550	6.510	8.590
High blood pressure	15.360	16.670	14.060
Diabetes	5.720	6.200	5.250
Heart disease	3.290	4.070	2.520
Cancer	1.420	1.180	1.650
Health behaviors			
Smoke			
Daily	16.650	18.860	14.450
Occasionally	5.530	6.450	4.630
Non smoke	77.380	74.290	80.430
Drink			
Regularly	64.420	72.780	56.120
Occasional	15.720	11.380	20.010
Non drink	18.240	14.120	22.320
Body mass index			
Underweight (<18.5)	2.520	1.020	4.010
Normal weight (18.5 to 24.9)	41.030	34.800	47.210
Overweight (25 to 29.9)	33.370	41.540	25.280
Obese (>=30)	18.510	20.450	16.580
Fruit and vegetables			

consumption			
Less than 5/day	57.370	64.230	50.570
5-10/day	34.840	28.870	40.740
More than 10/day	3.590	2.560	4.620
Socioeconomic Characteristics			
Level of education			
High school and lower	37.070	39.000	35.160
College	35.990	35.430	36.540
Bachelor	18.630	17.140	20.100
Above bachelor	8.310	8.430	8.200
Province			
Atlantic	6.750	6.580	6.910
Quebec	23.200	23.370	23.040
Ontario	38.810	38.420	39.200
Manitoba	3.320	3.330	3.310
Saskatchewan	2.820	2.870	2.770
Albert	11.400	11.780	11.030
British Columbia	13.390	13.340	13.440
Territories	0.320	0.320	0.310
Occupation			
White-collar worker	37.520	31.980	43.010
Blue-collar worker	33.650	43.470	23.910
Not employed	28.840	24.550	33.090

Table 2 describes percentages for each dependent variable and independent variable. We can also compare the difference in results between males and females. For health outcomes, there are 6.5% males suffering with asthma and 8.6% females with the same health problems, indicating that women are more likely to suffer from asthma. The incidence of high blood pressure is 15.4% overall, this is higher than the four other health problems. In addition to the high blood pressure, the percentages of diabetes, heart disease and cancer for males are all higher than those of females.

For health behavior, most people don't smoke, but do drink. 77.38% of all respondents identify as non-smokers, with more males identifying as daily; occasional smokers than females. The percentage of regular drinkers in the total population is 64.42% with more male drinkers than female. 72.8% male respondents are regular drinkers, about 16% more than female regular drinkers. For BMI, the percentage of males and females in the normal weight category is 34.8% and 47.2% respectively. About 62% males are overweight or obese, as opposed to about 42% of females. More than half of the total population consumes less than 5 servings of fruits and vegetables per day, with 12% more females consuming 5 to 10 serving fruits and vegetables per day than males. Very few people consume more than 10 servings of fruit and vegetables per day.

In addition to the statistics of dependent variables, Table 1 includes statistics of each independent variable such as: education, geography and occupation. For education, overall females obtain a higher level of education than males. 39% of males have achieved an education of high school or lower, about 4% higher than females in the same cohort. Moreover, more female have college and bachelor degrees than do males and the number for males and females who have achieved a degree of education higher than bachelors is almost identical. The geography variable shows the distribution of population among the provinces, with Ontario, Quebec and British Columbia having the largest population. The main male occupation is blue-collar jobs accounting for 43.5% of the population, about 20% higher than that of females. The main female occupation is white-collar jobs, accounting

for 43% of the total population. This indicates that males perform more physical work than females. This may affect their health behavior and outcomes.

Table 3 shows the percentage of smokers at each level of education. Overall, most people are non-smokers, with people holding a higher level of education being the least likely to smoke. The number of daily smokers significantly decreases with the increase in level of education. The percentage is declining from 24.4% to 4.4%. For occasional smokers, the percentage is also declining with the increase of education level.

Table 3. Smoking behaviors by education

	Daily	Occasional	Non smoking
Level of education	(%)	(%)	(%)
High school and lower	24.430	5.850	69.250
College	16.860	5.740	77.110
Bachelor	6.300	5.130	88.140
Above bachelor	4.200	4.140	90.670

Table 4 shows how often people drink at different levels of education. Generally, people who have a higher degree of education are more likely to drink with the percentage of non-drinkers declining with the increase in level of education. Moreover, there are 59% people with a high school diploma or lower, and 71% people with a bachelor's degree or higher who are regular drinkers.

Table 4. Drinking behaviors by education

	Regular drinker[1]	Occasional[2]	Non drinking
Level of education	(%)	(%)	(%)
High school and lower	59.180	17.440	21.500
College	65.980	16.680	15.780

[1] Regular drinker: once a month; 2 to 3 times a month; once a week; 2 to 3 times a week; 4 to 6 times a week; everyday

[2] Occasionally drinker: less than once a month

Bachelor	68.690	12.960	17.120
Above bachelor	71.390	10.010	16.850

Table 5 shows how often people consume fruits and vegetables by different level of education. For the consumption less than 5/day, people with above bachelor have the lowest rate, 48%. For the consumption 5-10/day, people with above bachelor have the highest rate, 44%. This indicates that people with a higher degree of education are more likely consume more fruits and vegetables per day.

Table 5. Fruit vegetable consumption by education

	Less than 5/day	5-10/day	More than 10/day
Level of education	(%)	(%)	(%)
High school and lower	61.920	28.810	3.090
College	57.690	35.480	3.620
Bachelor	51.630	41.200	4.330
Above bachelor	48.550	44.700	4.060

Table 6 shows the BMI by education. The percentage of people with above a bachelor degree under normal weight condition is higher than other levels of education. This indicates that people with higher education are more likely to fall within normal weight conditions.

Table 6. BMI by education

	Underweight	Normal weight	Overweight	Obese	Missing
Level of education	(%)	(%)	(%)	(%)	(%)
High school and lower	2.720	36.730	33.570	21.330	5.640
College	2.100	39.050	34.930	19.950	3.970
Bachelor	2.660	48.890	30.240	13.990	4.220
Above bachelor	3.130	51.160	32.740	9.790	3.170

Table 7 shows the result of five health outcomes and their difference between males and females by level of education, age, geography and occupation. With the improvement of education, the percentage of those suffering from asthma declines for both males and females. It is decreased from 7.6% to 3.8% for male and 9.6% to 4.7% for female. Moreover, there is no significant change in percentage between the five age groups for females with the percentage of suffers fluctuating around 8%. For males, the age group 60-69 is 3% less than the age group 20-29 to suffer from asthma. Furthermore, Manitoba has the highest percentage of males who have suffer from asthma, with the highest percentage of female asthma sufferers living in Atlantic Canada. For occupation, the percentage of asthma sufferers who use not employed is higher than those with white-collar and blue-collar jobs for both males and females.

The correlation between education and high blood pressure is more apparent in females than males. The percentage for female declines from 19.38% to 6.55%. It is clear that with the increase of education, people are more likely have problems with high blood pressure observable in the significant change in percentage of sufferers. Only 2.6% males age 20-29, suffer from high blood pressure however this increases to 41% for males aged 60-69. The change for female is massive as well. Moreover, one out of every five people in Atlantic Canada has high blood pressure, the highest percentage of all provinces. Furthermore, not employed people are 10% more likely to experience high blood pressure than white-collar or blue-collar workers.

The percentage of diabetes sufferers changed from 7.6% to 2.6% with an increase in level education in females but declined for males with the exception of those obtaining a bachelor's degree higher. Similar with high blood pressure, the change between different age groups is huge. There are only 0.61% males, age 20-29, suffering from diabetes with an increase to 15.9% for age group 60-69. Older people are much more likely to experience diabetes. The percentages for different province are very similar with all of about 6% for males and females. Again, not employed people have higher rates than white-collar workers and blue-collar workers for diabetes.

For heart disease, the percentages of males that between different levels of education have no significant change and they are all about 4%. However, the percentages of female are very different. It is 4.13% for female who have high school or lower degree and decreases to 0.89% for females with above a bachelor's degree. Furthermore, age is still a significant factor of heart disease for both males and females. There is a 13% difference in rate of diagnosis between the ages of 20-29 and 60-69 for males and a 6% difference for female in the same groups. Moreover, Atlantic Canada has the highest percentage for male sufferers 5.46%, and the highest percentage of female sufferers lives in Quebec 3.34%. For occupation, not employed people have the highest rate of heart disease.

The difference of percentages of cancer by education levels is small for both male and female. Moreover, older age people are more likely have cancer. The percentage is changes from 0.15% to 3.82% for males, when moving from 20-29 to 60-69 years old and 0.22% to

3.3% for females. Quebec has the highest rate of diagnosis among males at1.98% and Atlantic Canada has the highest rate among females at 2.85%. Not employed people experience a higher rate of diagnosis than white-collar and blue-collar people.

Overall the gradients of education have significant impact on most health outcomes. The percentage of asthma, high blood pressure and heart disease decrease in both male and female respondents as level of education increases. In addition, except for those holding education above a bachelor degree, the rates of diabetes and cancer decline for both males and females as education levels increase. Moreover, males are more likely to suffer from high blood pressure, diabetes and heart disease but less likely to suffer from asthma and cancer than female.

Table 7. Health Outcomes and Socioeconomic Characteristics										
	Asthma		**High blood pressure**		**Diabetes**		**Heart disease**		**Cancer**	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Socioeconomics characteristics	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Level of education										
High school and lower	7.610	9.610	18.110	19.380	7.300	7.620	4.470	4.130	1.430	2.030
College	6.550	9.540	16.520	13.860	5.920	5.080	4.050	1.890	1.280	1.740
Bachelor	5.210	6.610	14.800	8.180	3.970	2.490	3.120	1.540	0.500	1.020
Above Bachelor	3.880	4.770	14.400	6.550	6.770	2.640	4.240	0.890	1.010	1.120
Age group										
20-29	8.530	9.550	2.600	1.280	0.610	0.670	0.580	0.930	0.150	0.220
30-39	6.540	8.250	5.460	3.160	1.510	2.260	0.860	0.690	0.190	0.370
40-49	5.980	7.620	14.250	9.280	5.270	3.390	2.390	1.340	0.610	2.520
50-59	6.010	8.630	24.030	21.790	9.370	8.130	4.820	3.600	1.640	2.050
60-69	5.230	8.960	41.440	37.840	15.920	12.710	13.630	6.630	3.820	3.300
Province										
Atlantic	6.330	10.040	20.680	19.860	6.980	6.930	5.460	3.240	1.730	2.850
Quebec	6.530	9.280	14.860	14.350	7.030	5.130	4.670	3.340	1.980	1.110
Ontario	5.960	8.180	18.250	14.720	5.950	5.830	4.000	2.660	0.830	2.140
Manitoba	9.830	8.020	17.500	15.480	6.800	6.040	3.670	1.570	0.770	1.790
Saskatchewan	5.330	8.590	17.830	12.730	6.540	4.850	3.590	2.330	1.530	1.410
Albert	7.800	9.330	14.650	12.220	5.520	4.180	3.200	0.950	0.640	1.690
British Columbia	6.480	7.370	14.660	10.020	5.430	3.690	3.570	1.940	1.040	0.490

Territories	3.920	8.360	14.110	16.180	5.320	4.100	2.560	2.230	0.470	1.600
Occupation										
White-collar worker	6.080	7.590	14.350	10.070	5.010	3.400	2.550	1.440	0.600	1.530
Blue-collar worker	6.170	8.020	13.550	10.370	4.730	3.860	2.740	1.470	0.750	0.860
Not employed	7.660	10.300	25.210	21.900	10.340	8.660	8.420	4.690	2.690	2.370

4.2 Logistic Regression Results

4.2.1 Health Behaviors Regression Results

Odds ratio is a measurement to describe the relationship between exposure and outcome. It represents the probability that an outcome will occur given a particular exposure. Odds ratio is usually applied in the logit model. According to Szumilas, "When a logistic regression is calculated, the regression coefficient (b1) is the estimated increase in the log odds of the outcome per unit increase in the value of the exposure. In other words, the exponential function of the regression coefficient (eb1) is the odds ratio associated with a one-unit increase in the exposure". When the odds ratio is equal to one, exposure has no effect on the odds of a particular outcome. If it is greater than one, exposure is associated with higher odds of that same outcome. If it is less than one, exposure is associated with lower odds of the outcome.

Table 8 shows the regression result for daily smokers. For education, the odds ratio decreases from 0.62 to 0.16 with higher levels of education. This indicates that people with higher levels of education are less likely to smoke daily. For gender, the odds ratio in males is 1.25, this means that males are more likely to smoke daily as opposed to females. Moreover, married people are much less likely to smoke daily, based on the odds ratio of 0.55 among married people.

The second column shows the results that of considering the interaction between gender and education. The odds ratio of each independent variable doesn't change too much. The results of education and gender are still significant and similar. The odds ratios of interactions such as male*college, male*bachelor and male*above bachelor are 1.001, 1.307 and 1.47 respectively; however, the overall coefficient in the second column for each level of education is 0.623, 0.185 and 0.132 respectively. The gradient of the coefficient of male's interaction has a trend opposite that of the overall gradient. Thus, the gradient of education on smokers is less steep for males than it is for females.

For the result for male only and female only, the gradients of education are both significant. As the level of education improves, so does the coefficient 0.618 to 0.182 for male and 0.626 to 0.137 for female.

Table 8. Daily smoker								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.341	0.000	0.347	0.000	0.375	0.000	0.395	0.000
High school	Reference							
College	0.624	0.000	0.623	0.000	0.618	0.000	0.626	0.000
Bachelor	0.209	0.000	0.185	0.000	0.231	0.000	0.188	0.000
Above bachelor	0.160	0.000	0.132	0.000	0.182	0.000	0.137	0.000
Male	1.259	0.000	1.226	0.000				
Married	0.548	0.000	0.547	0.000	0.533	0.000	0.550	0.000
Male High school	Reference							
Male College			1.001	0.987				
Male Bachelor			1.307	0.010				
Male Above bachelor			1.469	0.029				
Observation	44900		44900		20305		24595	
R-square	0.083		0.083		0.073		0.092	

Notes: Full result of daily smoker in Appendix1.

Table 9 shows the regression result for drinking behavior. For age, the odds ratio is declining with the increase of age. This means that older people are less likely to drink regularly. For education, people with college, bachelor and above bachelor degrees are more likely to drink regularly. For gender, the odds ratio is 2.038 meaning that males are dramatically more likely to drink regularly than females. For ethnic origin variables, all treatment groups such as aboriginal, south Asian, Chinese and so on have a lower odds ratio than the reference group of white people. Therefore, white people are more likely to drink regularly.

The second column shows the result after adding interaction between gender and education. The odds ratio is almost identical to that of the first column. For the interaction variables, the odds ratio of male*college and male* bachelor is not significantly different than that of with the reference group.

For the result of male only, the gradient of education is upward and the coefficient of bachelor is most significant. For female only, the gradient is upward as well. Highly educated people are more likely drink regularly. The gradient of education is less steep for male than it for female.

Table 9. Regular drinker								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	1.442	0.000	1.423	0.000	3.415	0.000	1.313	0.000
Agegroup20-29	Reference							
Agegroup30-39	0.738	0.000	0.736	0.000	0.789	0.000	0.697	0.000
Agegroup40-49	0.721	0.000	0.721	0.000	0.612	0.000	0.798	0.000
Agegroup50-59	0.664	0.000	0.665	0.000	0.520	0.000	0.773	0.000
Agegroup60-69	0.543	0.000	0.544	0.000	0.465	0.000	0.589	0.000
High school	Reference							
College	1.424	0.000	1.443	0.000	1.379	0.000	1.461	0.000
Bachelor	2.136	0.000	2.117	0.000	2.093	0.000	2.208	0.000
Above bachelor	2.279	0.000	2.610	0.000	1.749	0.000	2.726	0.000
Male	2.038	0.000	2.091	0.000				
White	Reference							
Aboriginal	0.670	0.000	0.670	0.000	0.605	0.000	0.717	0.000
South Asian	0.240	0.000	0.241	0.000	0.251	0.000	0.218	0.000
Chinese	0.252	0.000	0.253	0.000	0.264	0.000	0.236	0.000
Black	0.331	0.000	0.332	0.000	0.329	0.000	0.322	0.000
Philippines	0.239	0.000	0.239	0.000	0.290	0.000	0.204	0.000
Latin America	0.685	0.001	0.686	0.001	0.670	0.026	0.688	0.016
Arab	0.182	0.000	0.181	0.000	0.141	0.000	0.230	0.000
South East Asia	0.345	0.000	0.346	0.000	0.406	0.000	0.293	0.000
West Asia	0.353	0.000	0.354	0.000	0.401	0.000	0.269	0.000
Korea	0.648	0.099	0.648	0.100	0.383	0.013	0.969	0.929
Japan	0.609	0.022	0.606	0.021	0.452	0.021	0.756	0.306
Other	0.458	0.000	0.456	0.000	0.398	0.000	0.508	0.000
Missing Culture	0.233	0.000	0.232	0.000	0.213	0.000	0.258	0.000
Male High school	Reference							
Male College			0.970	0.521				
Male Bachelor			1.038	0.579				
Male Above Bachelor			0.712	0.000				
Observation	44900		44900		20305		24595	
R-square	0.075		0.075		0.057		0.065	

Note: Full result of regular drinker in Appendix2.

Table 10 shows the result of fruit and vegetable consumption (less than 5/day). All age group coefficients are significant. For education, the odds ratio is decreased with the improvement of education level. This means more highly educated people are more likely consume more than 5 servings of fruit and vegetables per day. For gender, the odds ratio in males is 1.82 indicating that males are more likely to consume fruits and vegetables less than 5/day than females.

In the second column, the overall coefficients of education are 0.717,0.515 and 0.445 this shows that more highly educated people are less likely to eat fruit and vegetables less than five per day. The coefficients of male's interaction are 1.358,1.466 and 1.421. Therefore, the gradient of education and fruit consumption is less steep for males than it is for females. For the result of male only and female only, the gradients trend downward as well.

Table 10. Fruit and vegetable consumption (less than 5/day)

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	1.109	0.006	1.226	0.000	1.556	0.000	1.441	0.000
Agegroup20-29	Reference							
Agegroup30-39	1.165	0.000	1.168	0.000	1.333	0.000	1.042	0.378
Agegroup40-49	1.371	0.000	1.367	0.000	1.529	0.000	1.241	0.000
Agegroup50-59	1.317	0.000	1.310	0.000	1.599	0.000	1.109	0.015
Agegroup60-69	1.207	0.000	1.195	0.000	1.421	0.000	1.020	0.640
High school	Reference							
College	0.820	0.000	0.717	0.000	0.950	0.130	0.720	0.000
Bachelor	0.604	0.000	0.515	0.000	0.746	0.000	0.508	0.000
Above bachelor	0.521	0.000	0.445	0.000	0.614	0.000	0.443	0.000

Male	1.818	0.000	1.488	0.000				
Male High school	Reference							
Male College			1.358	0.000				
Male Bachelor			1.466	0.000				
Male Above bachelor			1.421	0.000				
Observation	44900		44900		20305		24595	
R-square	0.032		0.033		0.013		0.026	

Note: Full result of F&V consumption in Appendix3.

Table 11 shows the result of obese people. There is no significant change in the odds ratio between different age groups. For education, the odds ratio decreases from 0.9 to 0.45. This shows that people with higher levels of education are less likely be obese. For gender, the odds ratio in males is 1.16 indicating that males are at a greater risk of becoming obese than females. Furthermore, there is no significant effect on independent variables of urban and married. Again, the difference between the second column and first column is very small. The relationship for gender and education remains same.

The gradient of education on obesity is less steep for males, indicated by the overall coefficients of 0.858, 0.619, and 0.399. This shows that the likelihood of obesity declines with education. However, the men's interaction coefficients 1.119, 1.85 and 1.290 are above one, indicating an increase in obesity. For the result of male and female, the gradients of education on obesity both trend downward.

Table 11. Obese								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.188	0.000	0.197	0.000	0.205	0.000	0.208	0.000
Agegroup20-29	Reference							
Agegroup30-39	1.698	0.000	1.700	0.000	1.756	0.000	1.612	0.000
Agegroup40-49	1.922	0.000	1.919	0.000	1.880	0.000	1.909	0.000
Agegroup50-59	1.942	0.000	1.936	0.000	1.941	0.000	1.876	0.000
Agegroup60-69	1.977	0.000	1.968	0.000	1.830	0.000	1.991	0.000
High school	Reference							
College	0.907	0.000	0.858	0.000	0.935	0.069	0.865	0.000
Bachelor	0.668	0.000	0.619	0.000	0.711	0.000	0.630	0.000
Above bachelor	0.451	0.000	0.399	0.000	0.497	0.000	0.404	0.000
Male	1.164	0.000	1.078	0.033				
Urban	1.018	0.496	1.017	0.522	0.930	0.051	1.086	0.024
Married	1.009	0.701	1.006	0.796	1.249	0.000	0.846	0.000
Male High school	Reference							
Male College			1.119	0.027				
Male Bachelor			1.185	0.023				
Male Above bachelor			1.290	0.033				
Observation	44900		44900		20305		24560	
R-square	0.030		0.030		0.028		0.035	

Note: Full result of obese in Appendix4.

4.2.2 Health Outcomes Regression Results

Table 12A shows the odds ratio of people having asthma. For age, odds ratio shows a downward trend. For education, the odds ratio significantly decreases from 0.91 to 0.66 with the improved levels of education. People with a higher level of education are less likely suffers from asthma. For geographic variable, people who live in Alberta have a slightly higher odds ratio than the reference group (Ontario), with other provinces falling lower than Ontario. People living in the territories have the lowest risk of asthma, with an odds ratio of 0.61. Moreover, the odds ratio of immigrants is 0.63 indicating that immigrants have a lower risk of experiencing asthma than non-immigrants. People living in urban areas are more likely to have the disease than people live in rural areas. Finally, when considering different racial origins, aboriginal people have the highest odds ratio with 1.48. They have a greater risk of suffering from asthma than other groups of people.

The second column of table 12A, shows the similar regression, but considers the interaction of gender and education. The results of this column are identical with the result that we described above except the odds ratio for sex and education. For sex, the ratio of male is 0.67, and is roughly same as that seen without interaction. It still indicates that males are less likely to have asthma. For education, the difference in numbers compared with the first column is small. People with a higher level of education are less likely to have asthma. Furthermore, in the third and fourth columns, considering males

only, the odds ratio changed from 0.888 to 0.720 for college level to above bachelor degree. The gradient for males and females are both trending downward. The odds ratios for males and females are very similar, this means the relationship between asthma and education levels for both males and females are roughly equal. In addition, the odds ratios of interactions are all roughly equal to 1, this also indicates minimal difference between males and females. Therefore, the results that getting from two methods are consistent.

Table 12A. Asthma Regressions without Health Behavior Variables

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.157	0.000	0.156	0.000	0.109	0.000	0.149	0.000
Agegroup20-29	Reference							
Agegroup30-39	0.894	0.062	0.894	0.063	0.845	0.082	0.926	0.317
Agegroup40-49	0.932	0.239	0.932	0.238	0.870	0.145	0.976	0.755
Agegroup50-59	0.837	0.001	0.837	0.001	0.776	0.005	0.880	0.067
Agegroup60-69	0.834	0.001	0.834	0.001	0.738	0.001	0.900	0.123
High school	Reference							
College	0.908	0.013	0.928	0.125	0.888	0.059	0.926	0.121
Bachelor	0.785	0.000	0.781	0.000	0.811	0.030	0.782	0.000
Above bachelor	0.717	0.000	0.727	0.002	0.720	0.020	0.720	0.001
Male	0.658	0.000	0.671	0.000				
Ontario	Reference							
Atlantic	0.951	0.379	0.951	0.377	0.966	0.723	0.940	0.383
Quebec	0.914	0.073	0.914	0.073	0.922	0.328	0.910	0.133
Manitoba	0.891	0.149	0.891	0.148	1.016	0.901	0.819	0.053
Saskatchewan	0.777	0.002	0.777	0.002	0.915	0.496	0.700	0.001
Albert	1.005	0.929	1.006	0.922	1.195	0.064	0.896	0.174
British Columbia	0.891	0.059	0.891	0.059	0.905	0.323	0.885	0.109
Territory	0.612	0.000	0.612	0.000	0.489	0.001	0.695	0.014
Immigrant	0.627	0.000	0.627	0.000	0.600	0.000	0.641	0.000

Urban	1.100	0.017	1.100	0.018	1.074	0.275	1.114	0.035
Married	0.781	0.000	0.782	0.000	0.770	0.000	0.797	0.000
White	Reference							
Aboriginal	1.485	0.000	1.486	0.000	1.517	0.000	1.475	0.000
South Asian	1.029	0.846	1.028	0.853	1.194	0.438	0.927	0.704
Chinese	0.798	0.185	0.798	0.184	1.029	0.914	0.684	0.086
Black	0.848	0.345	0.847	0.343	0.976	0.932	0.783	0.267
Philippines	0.977	0.917	0.977	0.916	1.213	0.590	0.863	0.598
Latin America	0.734	0.227	0.733	0.225	0.554	0.203	0.853	0.604
Arab	1.041	0.881	1.041	0.881	0.656	0.415	1.320	0.374
South East Asia	0.412	0.022	0.412	0.022	0.487	0.225	0.370	0.052
West Asia	0.565	0.215	0.564	0.213	0.246	0.166	0.857	0.769
Korea	0.195	0.105	0.195	0.105	1.000		0.308	0.247
Japan	0.841	0.684	0.842	0.685	0.414	0.386	1.060	0.902
Other	0.806	0.395	0.806	0.397	0.800	0.570	0.809	0.524
Missing Culture	0.902	0.328	0.902	0.329	0.995	0.973	0.843	0.221
Male High school	Reference							
Male College			0.946	0.485				
Male Bachelor			1.022	0.847				
Male Above Bachelor			0.962	0.822				
Observation	44900		44900		20275		24595	
R-square	0.017		0.017		0.015		0.012	

Table 12B shows the result of asthma with health behavior variables. For smoking behavior, the odds ratio of occasional smokers and daily smokers experiencing asthma are 0.92 and 1.10 respectively. Daily smokers have the highest risk of experiencing asthma. For drinking behavior, the outcome is opposite that of smoking behavior. Occasional drinkers and regular drinkers have a lower odds ratio than non-drinker. For fruit and vegetable consumption, people who eat more than 5/day are less likely have asthma than people eat less than 5/day fruit. Finally, for BMI, obese people have a significantly higher odds ratio than people with normal weight. The odds ratio is 1.76 that indicating that obese people are much more likely to have asthma.

The third and fourth columns show the result of males and females only, separately. For both males and females the gradients of education on asthma with health behaviors variables trend downward. Males and females have almost identical odds of experiencing asthma at the same level of education. This result is consistent with the interaction because all the odds ratio of interaction variables are roughly1.

In addition, the gradient is slightly less steep after controlling for health behaviors.

This suggests that the differences in health behaviors between high and low educated people matter but do not have a terribly significant impact.

Table 12B. Asthma With Health Behaviors Variables

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.162	0.000	0.160	0.000	0.121	0.000	0.144	0.000
Agegroup20-29	Reference							
Agegroup30-39	0.825	0.001	0.824	0.001	0.809	0.031	0.845	0.030
Agegroup40-49	0.833	0.003	0.833	0.003	0.819	0.040	0.857	0.049
Agegroup50-59	0.743	0.000	0.743	0.000	0.719	0.000	0.770	0.000
Agegroup60-69	0.731	0.000	0.731	0.000	0.682	0.000	0.770	0.000
High school	Reference							
College	0.945	0.150	0.977	0.645	0.908	0.130	0.981	0.704
Bachelor	0.869	0.013	0.875	0.051	0.860	0.124	0.895	0.110
Above Bachelor	0.830	0.028	0.861	0.150	0.768	0.066	0.880	0.226
Male	0.635	0.000	0.660	0.000				
Ontario	Reference							
Atlantic	0.905	0.082	0.905	0.081	0.951	0.602	0.872	0.053
Quebec	0.955	0.359	0.955	0.362	0.948	0.522	0.961	0.531
Manitoba	0.869	0.081	0.868	0.079	1.006	0.964	0.795	0.027
Saskatchewan	0.758	0.001	0.757	0.001	0.912	0.480	0.676	0.000
Albert	1.003	0.966	1.004	0.955	1.195	0.064	0.898	0.183
British Columbia	0.931	0.243	0.931	0.245	0.926	0.452	0.939	0.416
Territory	0.609	0.000	0.609	0.000	0.485	0.001	0.683	0.011
Immigrant	0.633	0.000	0.633	0.000	0.605	0.000	0.644	0.000
Urban	1.098	0.020	1.098	0.020	1.072	0.284	1.111	0.040
Married	0.794	0.000	0.796	0.000	0.773	0.000	0.827	0.000

White	Reference							
Aboriginal	1.398	0.000	1.398	0.000	1.489	0.000	1.342	0.000
South Asian	1.000	0.998	0.998	0.992	1.162	0.515	0.897	0.589
Chinese	0.832	0.284	0.833	0.286	0.983	0.949	0.758	0.214
Black	0.809	0.226	0.807	0.222	0.952	0.863	0.736	0.167
Philippines	0.967	0.879	0.965	0.873	1.192	0.625	0.875	0.633
Latin America	0.743	0.246	0.742	0.243	0.551	0.199	0.875	0.667
Arab	0.944	0.828	0.943	0.827	0.594	0.316	1.211	0.543
South East Asia	0.417	0.024	0.416	0.024	0.480	0.216	0.382	0.061
West Asia	0.538	0.179	0.537	0.178	0.244	0.163	0.804	0.678
Korea	0.205	0.117	0.205	0.117	1.000		0.360	0.315
Japan	0.846	0.695	0.847	0.696	0.398	0.366	1.109	0.827
Other	0.791	0.357	0.792	0.360	0.798	0.567	0.807	0.521
Missing Culture	0.848	0.123	0.847	0.122	0.936	0.687	0.796	0.110
Nonsmoker	Reference							
Occasional smoker	0.920	0.322	0.919	0.315	0.864	0.265	0.949	0.637
Daily smoker	1.099	0.035	1.099	0.036	1.012	0.868	1.154	0.014
Nondrinker	Reference							
Occasional drinker	0.895	0.044	0.894	0.043	0.883	0.245	0.891	0.075
Regular drinker	0.800	0.000	0.800	0.000	0.855	0.041	0.778	0.000
F&V <5/day	Reference							
F&V 5-10/day	0.877	0.001	0.876	0.001	0.829	0.007	0.898	0.023
F&V >10/day	0.971	0.760	0.970	0.753	0.835	0.328	1.033	0.773
Underweight	1.093	0.477	1.093	0.474	2.266	0.000	0.907	0.519
Normal weight	Reference							

Overweight	1.240	0.000	1.242	0.000	1.090	0.213	1.317	0.000
Obese	1.764	0.000	1.766	0.000	1.307	0.000	2.070	0.000
Male High school	Reference							
Male College			0.916	0.269				
Male Bachelor			0.988	0.916				
Male Above BA			0.907	0.574				
Observation	44900		44900		20275		24595	
R-square	0.026		0.026		0.019		0.026	

In Table 13A, considering age group, shows that, compare to the reference group people, age 20 to 29, have a lower risk of high blood pressure than all other groups. The risk increases as people age. For example, in the age group 30 to 39 the odds ratio is 2.90 while in the 40 to 49 group the odds ratio increases to 7.48. The odds ratio of age group 50 to 59 increase to 17.89 and the odds ratio of the last age group, 60-69, is 36.35. This is significant increase when compared with other age groups. Education has significant effect on people with higher high blood pressure. The higher education levels the lower risk of experiencing high blood pressure. Compared to the reference group (high school education and lower), people at higher education levels have a lower risk of high blood pressure. Compare to females, males have a greater higher risk of high blood pressure. When considering province of residence, there is no significant difference between Manitoba, Saskatchewan, and Alberta when compared to the reference group of people in Ontario. People in Atlantic Canada experiencing a greater risk suffering from high blood pressure than those in Ontario. Residents of Quebec, British Columbia, and territories all have significantly lower risks. For immigrants, there is no difference in risk of high blood pressure between immigrants and non-immigrants. There is no significant difference between people living in urban and rural areas. Married people have a lower risk of have high blood pressure than do non-married people. For different kinds of racial origin, aboriginal, South Asia, Black, Philippines, Arab, and Japan all have a higher risk of high blood pressure than do White people.

When we include the interaction between gender and education, we can see that in the interaction terms are all are significant at 5% level. The odds ratio for the same education level is lower than that without interaction terms. Specifically, when compared to people with a high school education, college educated people have an odds ratio of 0.79, this is lower than when we don't include the interaction term. For bachelor and above bachelor, the odds ratio drops to 0.62 and 0.42 from 0.68 and 0.52 respectively.

For male only, the odds ratio significantly changes, from 0.912 to 0.618. For female only the change is obvious as well, with the improvement of education. At each level of education, the odds ratio for male is higher than it of female. In addition, the odds ratio of interaction for each education level is 1.175, 1.230 and 1.529 respectively. This also shows a lower education gradient for men.

Table 13A. High blood pressure Without Health Behaviors Variables

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.020	0.000	0.021	0.000	0.025	0.000	0.019	0.000
Agegroup20-29	Reference							
Agegroup30-39	2.896	0.000	2.901	0.000	3.132	0.000	2.579	0.000
Agegroup40-49	7.482	0.000	7.467	0.000	7.545	0.000	7.185	0.000
Agegroup50-59	17.887	0.000	17.826	0.000	16.243	0.000	19.212	0.000
Agegroup60-69	36.352	0.000	36.132	0.000	31.692	0.000	39.818	0.000
High school	Reference							
College	0.855	0.000	0.793	0.000	0.912	0.026	0.800	0.000
Bachelor	0.683	0.000	0.622	0.000	0.739	0.000	0.641	0.000
Above Bachelor	0.524	0.000	0.420	0.000	0.618	0.000	0.431	0.000
Male	1.220	0.000	1.096	0.017				
Ontario	Reference							
Atlantic	1.225	0.000	1.225	0.000	1.063	0.322	1.385	0.000
Quebec	0.880	0.001	0.880	0.001	0.838	0.001	0.925	0.133
Manitoba	0.996	0.951	0.999	0.984	0.939	0.464	1.059	0.480
Saskatchewan	0.984	0.788	0.988	0.832	0.964	0.667	1.010	0.901
Albert	0.995	0.912	0.994	0.901	0.978	0.743	1.015	0.825
British Columbia	0.713	0.000	0.714	0.000	0.779	0.000	0.658	0.000
Territory	0.781	0.009	0.780	0.008	0.807	0.096	0.752	0.041
Immigrant	1.066	0.166	1.063	0.180	1.077	0.267	1.064	0.327
Urban	1.045	0.124	1.044	0.137	1.012	0.764	1.061	0.146
Married	0.942	0.026	0.937	0.015	1.050	0.218	0.863	0.000

White	Reference							
Aboriginal	1.398	0.000	1.400	0.000	1.256	0.008	1.562	0.000
South Asian	1.226	0.080	1.224	0.082	1.158	0.368	1.284	0.135
Chinese	0.828	0.129	0.822	0.116	0.964	0.839	0.720	0.062
Black	1.729	0.000	1.734	0.000	1.477	0.035	1.914	0.000
Philippines	1.543	0.004	1.548	0.004	1.475	0.106	1.610	0.016
Latin America	0.798	0.254	0.800	0.259	0.483	0.023	1.200	0.478
Arab	1.333	0.176	1.331	0.178	1.340	0.297	1.260	0.479
South East Asia	0.971	0.888	0.970	0.885	1.021	0.942	0.901	0.744
West Asia	0.968	0.908	0.961	0.886	1.038	0.913	0.791	0.640
Korea	0.815	0.677	0.803	0.656	1.257	0.697	0.336	0.294
Japan	1.326	0.333	1.321	0.341	1.765	0.162	1.016	0.971
Other	0.795	0.232	0.793	0.229	0.721	0.220	0.864	0.601
Missing Culture	0.872	0.079	0.874	0.086	0.758	0.014	1.002	0.985
Male High school	Reference							
Male College			1.175	0.005				
Male Bachelor			1.230	0.013				
Male Above Bachelor			1.529	0.001				
Observation	44900		44900		20305		24595	
R-square	0.158		0.158		0.144		0.173	

Table 13B is the regression of high blood pressure after adding health behavior variables; compared to non-smokers, daily smokers are at a significantly increased risk of having high blood pressure. Compared to non-drinkers, occasional and regular drinkers have a lower risk of having high blood pressure. For daily fruits and vegetables consumption, people who eat more fruits and vegetables in a day will have a lower risk of having high blood pressure. For BMI, compared to normal weight people, obese people have a significantly higher odds ratio (3.8) than normal weight people to have high blood pressure.

The result for males and females is similar with the result from Table 13A. The odds ratios along the education gradient are decreasing for both males and females. However, the decrease is less for men. The odds ratio of interaction variables in the second column shows the same result.

The odds ratios of male*college, male*bachelor, male*above bachelor are 1.134, 1.198 and 1.406, respectively. It indicates that males are at a higher risk of having high blood pressure than females at the same level of education. Moreover, the odds ratios of the result with and without health behavior variables are similar, and both are significant. It means that, in this case, health behaviors are not a significant factor that affects the education gradient with respect to high blood pressure.

Table 13B. High Blood Pressure With Health Behaviors Variables

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.014	0.000	0.015	0.000	0.014	0.000	0.015	0.000
Agegroup20-29	Reference							
Agegroup30-39	2.467	0.000	2.471	0.000	2.640	0.000	2.234	0.000
Agegroup40-49	6.201	0.000	6.196	0.000	6.295	0.000	5.997	0.000
Agegroup50-59	15.233	0.000	15.211	0.000	13.926	0.000	16.556	0.000
Agegroup60-69	31.676	0.000	31.558	0.000	28.762	0.000	34.221	0.000
High school	Reference							
College	0.885	0.000	0.833	0.000	0.924	0.066	0.848	0.000
Bachelor	0.768	0.000	0.707	0.000	0.814	0.001	0.737	0.000
Above Bachelor	0.625	0.000	0.522	0.000	0.706	0.000	0.542	0.000
Male	1.123	0.000	1.030	0.465				
Ontario	Reference							
Atlantic	1.168	0.000	1.169	0.000	1.060	0.354	1.267	0.000
Quebec	0.947	0.157	0.945	0.147	0.898	0.052	0.995	0.919
Manitoba	0.963	0.532	0.966	0.563	0.911	0.292	1.016	0.849
Saskatchewan	0.943	0.331	0.945	0.353	0.933	0.430	0.955	0.585
Albert	0.978	0.644	0.977	0.642	0.948	0.451	1.005	0.938
British Columbia	0.762	0.000	0.763	0.000	0.824	0.004	0.708	0.000
Territory	0.788	0.013	0.786	0.013	0.831	0.158	0.734	0.030
Immigrant	1.119	0.018	1.117	0.020	1.153	0.039	1.088	0.199
Urban	1.047	0.117	1.046	0.126	1.024	0.579	1.062	0.146
Married	0.934	0.015	0.930	0.010	0.973	0.511	0.899	0.006

White	Reference							
Aboriginal	1.315	0.000	1.316	0.000	1.231	0.018	1.421	0.000
South Asian	1.339	0.014	1.340	0.014	1.395	0.043	1.262	0.174
Chinese	1.112	0.401	1.106	0.428	1.311	0.135	0.933	0.699
Black	1.666	0.000	1.671	0.000	1.577	0.016	1.711	0.001
Philippines	1.784	0.000	1.790	0.000	1.734	0.023	1.798	0.004
Latin America	0.821	0.326	0.824	0.334	0.496	0.030	1.254	0.388
Arab	1.288	0.238	1.286	0.242	1.303	0.350	1.248	0.504
South East Asia	1.124	0.583	1.125	0.579	1.212	0.498	0.998	0.994
West Asia	0.959	0.883	0.952	0.863	1.120	0.744	0.668	0.435
Korea	1.095	0.854	1.081	0.874	1.636	0.400	0.470	0.468
Japan	1.560	0.133	1.555	0.137	1.852	0.141	1.357	0.482
Other	0.790	0.231	0.788	0.227	0.722	0.226	0.847	0.567
Missing Culture	0.861	0.066	0.863	0.071	0.791	0.044	0.952	0.669
Nonsmoker	Reference							
Occasional smoker	0.947	0.449	0.947	0.452	0.932	0.481	0.951	0.634
Daily smoker	1.077	0.036	1.078	0.035	1.072	0.162	1.083	0.115
Nondrinker	Reference							
Occasional drinker	0.961	0.343	0.960	0.342	1.072	0.327	0.892	0.032
Regular drinker	0.849	0.000	0.851	0.000	0.972	0.581	0.756	0.000
F&V <5/DAY	Reference							
F&V 5-10/day	0.954	0.107	0.957	0.133	0.953	0.288	0.963	0.330
F&V >10/day	0.798	0.008	0.802	0.010	0.792	0.106	0.806	0.045
Underweight	0.697	0.010	0.694	0.010	0.799	0.432	0.663	0.012
Normal weight	Reference							

Overweight	1.803	0.000	1.797	0.000	1.828	0.000	1.764	0.000
Obese	3.804	0.000	3.797	0.000	4.035	0.000	3.555	0.000
Male High school	Reference							
Male College			1.134	0.031				
Male Bachelor			1.198	0.035				
Male Above BA			1.406	0.007				
Observation	44900		44900		20305		24595	
R-square	0.196		0.196		0.181		0.211	

Table 14A shows the result of diabetes without health behaviors. For age, the odds ratio increases significantly as people age. It changes from 2.98 for age group 30-39 to 25.86 for age group 60-69 indicating that older people have a higher risk of suffering from diabetes than do young people. For education, the odds ratios of people with college, bachelor and above bachelor degrees are all lower than the reference group of people who have only a high school education. This indicates that with improving of levels of education people are less likely to have diabetes. The difference between people with bachelor or above bachelor is very small. For geographic variables, only Atlantic Canada has a higher odds ratio than the reference group in Ontario. People living in the Territories have the lowest ratio with 0.61 when compared to people live in other provinces. Moreover, people living in urban areas have a higher risk of diabetes than do people living in rural areas. Married people are less likely has diabetes. Finally, for ethnic origin, white people have the lowest risk of diabetes compared to other ethnic groups of people, including as aboriginal, south Asian, Philippines and Arabic.

The second column of Table 14A, shows the results after adding the interaction of gender and education. The odds ratios between the first column and second column are very similar with only the number in gender and education are changed. For male, the odds ratio decreased from 1.24 to 1.16, indicating that males still have a higher risk of diabetes. For education, the numbers become smaller as well but the relation between education and diabetes remains same. The third and fourth columns of table 13A show

the results for males and females only. There are no surprising results when compare with the previous outcome that were described.

The odds ratio for diabetes decreases with an improvement in education for males only but remains the same for females. The odds ratio changed from 0.816 to 0.638 for males and from 0.717 to 0.4 for females indicating that the education gradient of diabetes is more significant for females. In addition, the overall coefficients of education in second column are 0.725, 0.521 and 0.411 showing downward trend gradient. The coefficients of men's interactions are 1.13, 1.037 and 1.159, all above one, and displaying an increasing risk.

Table 14A. Diabetes Without Health Behaviors

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.008	0.000	0.008	0.000	0.007	0.000	0.002	0.000
Agegroup20-29	Reference							
Agegroup30-39	2.975	0.000	2.982	0.000	2.732	0.000	3.145	0.000
Agegroup40-49	7.190	0.000	7.187	0.000	9.058	0.000	5.931	0.000
Agegroup50-59	13.537	0.000	13.516	0.000	17.508	0.000	10.848	0.000
Agegroup60-69	25.855	0.000	25.763	0.000	35.876	0.000	19.189	0.000
High school	Reference							
College	0.769	0.000	0.725	0.000	0.816	0.001	0.717	0.000
Bachelor	0.530	0.000	0.521	0.000	0.535	0.000	0.509	0.000
Above bachelor	0.534	0.000	0.411	0.000	0.638	0.000	0.400	0.000
Male	1.242	0.000	1.160	0.005				
Ontario	Reference							
Atlantic	1.066	0.283	1.067	0.275	0.951	0.576	1.165	0.058
Quebec	0.894	0.041	0.895	0.041	0.955	0.551	0.836	0.021
Manitoba	0.894	0.199	0.896	0.208	0.895	0.379	0.900	0.381
Saskatchewan	0.969	0.717	0.972	0.743	0.962	0.758	0.980	0.865
Albert	0.980	0.767	0.979	0.757	1.092	0.365	0.882	0.210
British Columbia	0.721	0.000	0.722	0.000	0.712	0.000	0.729	0.001
Territory	0.605	0.001	0.605	0.001	0.729	0.099	0.482	0.001
Immigrant	0.964	0.591	0.963	0.579	1.027	0.782	0.900	0.271
Urban	1.104	0.020	1.103	0.020	1.092	0.144	1.118	0.065
Married	0.868	0.000	0.864	0.000	0.906	0.084	0.813	0.000

White	Reference							
Aboriginal	1.985	0.000	1.984	0.000	1.881	0.000	2.062	0.000
South Asian	2.504	0.000	2.502	0.000	2.005	0.001	3.073	0.000
Chinese	1.024	0.897	1.019	0.920	1.075	0.790	0.994	0.983
Black	1.976	0.000	1.981	0.000	2.181	0.001	1.893	0.002
Philippines	2.798	0.000	2.794	0.000	2.751	0.001	2.848	0.000
Latin America	0.873	0.656	0.875	0.663	0.682	0.418	1.100	0.813
Arab	2.096	0.007	2.106	0.007	2.444	0.012	1.744	0.206
South East Asia	1.499	0.151	1.495	0.153	2.076	0.034	0.855	0.765
West Asia	1.292	0.523	1.288	0.528	1.751	0.211	0.504	0.501
Korea	2.363	0.109	2.335	0.114	3.748	0.044	1.093	0.931
Japan	3.127	0.000	3.133	0.000	1.453	0.547	5.008	0.000
Other	1.159	0.573	1.159	0.573	1.099	0.795	1.215	0.607
Missing Culture	0.912	0.424	0.914	0.435	0.797	0.174	1.040	0.806
Male High school	Reference							
Male College			1.130	0.136				
Male Bachelor			1.037	0.786				
Male Above bachelor			1.594	0.014				
Observation	44900		44900		20305		24595	
R-square	0.104		0.104		0.116		0.096	

Table 14B shows the result of diabetes with health behaviors. For smoking behavior, the difference of odds ratio between smoker and non-smoker is small. For drinking behavior, occasional drinkers and regular drinkers are less likely to have diabetes. For fruit and vegetable, eating more fruit and vegetables per day will result in a lower risk of experiencing the disease. For BMI, the odds ratio of obese is 4.448, this is much higher than that of normal weight individuals. Obese people have a higher risk to have diabetes.

Similarity to the results in Table 14A, the education-health gradient is less steep for males than it is for females. Moreover, the results, with health behaviors, are substantially less steep than the results without health behaviors. This suggests that health behaviors are a factor that relates to the gradient of education on diabetes.

Table 14B. Diabetes With Health Behaviors

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.007	0.000	0.007	0.000	0.006	0.000	0.010	0.000
Agegroup20-29	Reference							
Agegroup30-39	2.371	0.000	2.376	0.000	2.221	0.002	2.479	0.000
Agegroup40-49	5.540	0.000	5.541	0.000	7.201	0.000	4.532	0.000
Agegroup50-59	10.400	0.000	10.403	0.000	13.779	0.000	8.390	0.000
Agegroup60-69	19.586	0.000	19.567	0.000	28.962	0.000	14.028	0.000
High school	Reference							
College	0.831	0.000	0.804	0.000	0.849	0.007	0.813	0.001
Bachelor	0.657	0.000	0.663	0.000	0.622	0.000	0.671	0.000
Above bachelor	0.712	0.000	0.587	0.000	0.761	0.028	0.602	0.001
Male	1.287	0.000	1.240	0.000				
Ontario	Reference							
Atlantic	0.956	0.462	0.957	0.476	0.906	0.286	0.968	0.698
Quebec	1.015	0.798	1.014	0.799	1.067	0.411	0.952	0.545
Manitoba	0.841	0.053	0.843	0.056	0.843	0.183	0.850	0.190
Saskatchewan	0.915	0.311	0.916	0.320	0.931	0.570	0.896	0.372
Albert	0.949	0.465	0.949	0.460	1.057	0.577	0.859	0.142
British Columbia	0.795	0.001	0.796	0.001	0.763	0.006	0.829	0.052
Territory	0.605	0.001	0.606	0.001	0.757	0.154	0.458	0.001
Immigrant	1.012	0.863	1.011	0.873	1.121	0.248	0.882	0.211
Urban	1.106	0.021	1.107	0.020	1.093	0.145	1.121	0.068
Married	0.900	0.009	0.898	0.008	0.877	0.027	0.892	0.041

White	Reference							
Aboriginal	1.811	0.000	1.809	0.000	1.793	0.000	1.794	0.000
South Asian	2.487	0.000	2.489	0.000	2.213	0.000	2.726	0.000
Chinese	1.217	0.296	1.212	0.307	1.243	0.430	1.203	0.475
Black	1.714	0.001	1.717	0.001	2.148	0.002	1.489	0.065
Philippines	2.820	0.000	2.814	0.000	2.784	0.001	2.806	0.000
Latin America	0.871	0.658	0.874	0.663	0.681	0.420	1.126	0.772
Arab	1.659	0.071	1.665	0.069	1.941	0.067	1.508	0.359
South East Asia	1.574	0.113	1.576	0.112	2.292	0.017	0.842	0.747
West Asia	1.097	0.823	1.096	0.824	1.761	0.218	0.330	0.284
Korea	3.122	0.035	3.083	0.038	4.352	0.027	1.776	0.578
Japan	3.730	0.000	3.743	0.000	1.397	0.597	7.180	0.000
Other	1.078	0.779	1.076	0.784	1.037	0.921	1.075	0.856
Missing Culture	0.755	0.018	0.756	0.019	0.730	0.068	0.801	0.181
Nonsmoker	Reference							
Occasional smoker	0.879	0.247	0.880	0.252	0.779	0.115	0.992	0.957
Daily smoker	0.995	0.919	0.995	0.917	0.982	0.799	1.001	0.991
Nondrinker	Reference							
Occasional drinker	0.930	0.184	0.931	0.187	1.197	0.043	0.768	0.000
Regular drinker	0.472	0.000	0.473	0.000	0.613	0.000	0.368	0.000
F&V <5/day	Reference							
F&V 5-10/day	0.927	0.083	0.928	0.087	0.983	0.798	0.908	0.099
F&V >10/day	0.835	0.161	0.837	0.167	0.663	0.074	0.971	0.852
Underweight	0.638	0.067	0.637	0.066	0.708	0.459	0.624	0.103
Normal weight	Reference							

Overweight	1.752	0.000	1.748	0.000	1.651	0.000	1.821	0.000
Obese	4.448	0.000	4.441	0.000	3.872	0.000	4.976	0.000
Male High school	Reference							
Male College			1.070	0.419				
Male Bachelor			0.977	0.865				
Male Above BA			1.395	0.085				
Observation	44900		44900		20305		24595	
R-square	0.164		0.164		0.159		0.176	

Table 15A shows the result of heart disease without health behaviors. Again, age greatly impacts the risk of heart disease. The odds ratio increases from 1.11 to 14.47 with the increase of age, showing that older people have a much greater risk of heart disease than do their younger counterparts. For education, the odds ratio of people with college, bachelor and above bachelor degrees is lower than the reference group of people with a high school education only. The numbers decrease with the improvement of education levels. Similarity to other disease, people with higher education levels， are less likely experience heart disease. For gender, the odds ratio in males is 1.87 indicating that males have a higher risk of heart disease than female. For geographic variables, people living in Atlantic Canada and Quebec are more likely have heart disease as opposed to the reference group in Ontario. Other provinces have a lower odds ratio than Ontario. Moreover, immigrants have a lower risk of heart disease. People living in urban area are more likely have heart disease than people living in rural area. For racial region, the odds ratio of aboriginal people is 1.461 that indicating that they are more likely to have heart disease than white people.

The second column of Table 15A, shows the results after adding the interaction of gender and education. Similarity to the previous situation, the results are almost same in the first column with the exception of the odds ratio in gender and education. The odds ratios are getting smaller but the relationship between them and heart disease remains same. The overall coefficients of education are 0.741, 0.609 and 0.520 indicating that a

downward trending education-health gradient. The coefficients of men's interactions are 1.226, 1.192 and 1.351, indicating that the education gradient on health is less steep for males.

For the third and fourth column, the results for males and females only, do not change too much at all. The gradients of education on health are all downward for males and females.

Table 15A. Heart disease Without Health Behaviors

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.008	0.000	0.008	0.000	0.009	0.000	0.013	0.000
Agegroup20-29	Reference							
Agegroup30-39	1.113	0.554	1.113	0.551	1.323	0.283	0.959	0.868
Agegroup40-49	2.559	0.000	2.554	0.000	3.350	0.000	1.945	0.002
Agegroup50-59	6.054	0.000	6.036	0.000	8.447	0.000	4.114	0.000
Agegroup60-69	14.469	0.000	14.392	0.000	20.958	0.000	9.194	0.000
High school	Reference							
College	0.833	0.000	0.741	0.000	0.908	0.155	0.729	0.000
Bachelor	0.672	0.000	0.609	0.000	0.726	0.003	0.592	0.000
Above bachelor	0.627	0.000	0.520	0.001	0.690	0.009	0.506	0.001
Male	1.870	0.000	1.685	0.000				
Ontario	Reference							
Atlantic	1.007	0.923	1.007	0.929	0.992	0.935	1.023	0.842
Quebec	1.032	0.627	1.031	0.639	0.975	0.770	1.105	0.311
Manitoba	0.941	0.572	0.944	0.590	0.983	0.902	0.899	0.528
Saskatchewan	0.917	0.422	0.921	0.444	0.870	0.338	0.990	0.953
Albert	0.712	0.000	0.711	0.000	0.770	0.034	0.634	0.004
British Columbia	0.740	0.000	0.740	0.000	0.750	0.009	0.728	0.015
Territory	0.634	0.016	0.631	0.015	0.575	0.027	0.730	0.276
Immigrant	0.954	0.582	0.953	0.569	0.903	0.368	1.016	0.900
Urban	1.065	0.222	1.064	0.225	1.081	0.246	1.034	0.679
Married	0.850	0.001	0.846	0.001	0.921	0.206	0.740	0.000

White	Reference							
Aboriginal	1.461	0.000	1.461	0.000	1.541	0.001	1.348	0.051
South Asian	0.831	0.465	0.833	0.471	0.892	0.728	0.770	0.515
Chinese	0.747	0.261	0.743	0.253	0.846	0.626	0.638	0.261
Black	0.611	0.103	0.614	0.107	0.669	0.349	0.559	0.172
Philippines	0.521	0.158	0.524	0.162	0.216	0.131	0.778	0.631
Latin America	0.550	0.195	0.553	0.200	0.598	0.392	0.502	0.342
Arab	1.305	0.504	1.302	0.508	1.652	0.297	0.896	0.880
South East Asia	0.721	0.482	0.723	0.486	1.241	0.654	1.000	
West Asia	1.321	0.554	1.313	0.563	1.576	0.397	0.869	0.890
Korea	0.736	0.764	0.729	0.757	1.193	0.866	1.000	
Japan	2.164	0.079	2.143	0.083	1.134	0.866	3.559	0.020
Other	0.274	0.027	0.273	0.027	0.458	0.190	1.000	
Missing Culture	0.755	0.056	0.757	0.058	0.904	0.571	0.549	0.025
Male High school	Reference							
Male College			1.226	0.048				
Male Bachelor			1.192	0.277				
Male Above BA			1.351	0.211				
Observation	44900		44900		20305		24275	
R-square	0.112		0.112		0.118		0.089	

Table 15B shows the results of heart disease with health behaviors considered. For smoking behavior, daily smoker and occasional smoker have a higher risk of heart disease than do non-smokers. For BMI, the odds ratio of obese people is 1.86, this is significantly higher than normal weight individuals and means obese people will be more likely have heart disease.

The odds ratios of male*college, male*bachelor, male*above bachelor are 1.197, 1.146 and 1.244 respectively. This indicates that males have a higher risk of heart disease than females at the same level of education. In addition, the number of result with health behavior variables are smaller than the number of result without behavior, but the relation between male and female remains same. Overall, the difference of result is minimal between Table 15A(without health behaviors) and Table 15B (with health behaviors). The gradient of education on heart disease for the entire population is downward with the male gradient being a little less steep than the female. This indicates that the health behavior is not a driving significant effect on the education gradient.

Table 15B. Heart Disease With Health Behaviors

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.008	0.000	0.008	0.000	0.008	0.000	0.015	0.000
Agegroup20-29	Reference							
Agegroup30-39	0.995	0.979	0.996	0.983	1.175	0.537	0.858	0.542
Agegroup40-49	2.223	0.000	2.221	0.000	2.890	0.000	1.723	0.013
Agegroup50-59	5.254	0.000	5.250	0.000	7.294	0.000	3.658	0.000
Agegroup60-69	12.619	0.000	12.584	0.000	18.671	0.000	7.911	0.000
High school	Reference							
College	0.887	0.021	0.800	0.005	0.951	0.465	0.799	0.005
Bachelor	0.793	0.005	0.734	0.013	0.829	0.088	0.733	0.014
Above bachelor	0.753	0.015	0.658	0.035	0.792	0.106	0.662	0.039
Male	1.934	0.000	1.773	0.000				
Ontario	Reference							
Atlantic	0.951	0.498	0.951	0.498	0.968	0.741	0.912	0.417
Quebec	1.091	0.183	1.089	0.192	1.024	0.787	1.170	0.115
Manitoba	0.913	0.399	0.916	0.417	0.959	0.766	0.864	0.386
Saskatchewan	0.892	0.293	0.896	0.310	0.855	0.284	0.944	0.724
Albert	0.694	0.000	0.693	0.000	0.750	0.020	0.619	0.002
British Columbia	0.778	0.003	0.777	0.003	0.780	0.024	0.771	0.047
Territory	0.621	0.012	0.619	0.011	0.570	0.025	0.702	0.222
Immigrant	0.982	0.835	0.981	0.820	0.946	0.625	1.005	0.966
Urban	1.062	0.244	1.062	0.244	1.077	0.276	1.042	0.614
Married	0.907	0.047	0.903	0.039	0.961	0.550	0.807	0.004

White	Reference							
Aboriginal	1.343	0.003	1.344	0.003	1.445	0.005	1.205	0.226
South Asian	0.797	0.372	0.800	0.380	0.927	0.819	0.655	0.294
Chinese	0.740	0.251	0.738	0.246	0.892	0.740	0.580	0.177
Black	0.563	0.058	0.567	0.061	0.666	0.344	0.477	0.084
Philippines	0.479	0.111	0.482	0.115	0.211	0.126	0.652	0.416
Latin America	0.543	0.187	0.547	0.192	0.615	0.419	0.481	0.314
Arab	1.082	0.843	1.081	0.845	1.412	0.475	0.745	0.688
South East Asia	0.714	0.469	0.717	0.475	1.310	0.574	1.000	
West Asia	1.195	0.707	1.193	0.710	1.513	0.444	0.671	0.697
Korea	0.737	0.766	0.730	0.759	1.138	0.902	1.000	
Japan	2.099	0.094	2.080	0.098	1.035	0.963	3.767	0.015
Other	0.257	0.021	0.256	0.020	0.450	0.181	1.000	
Missing Culture	0.655	0.005	0.657	0.005	0.825	0.288	0.451	0.003
Nonsmoker	Reference							
Occasional smoker	1.235	0.081	1.237	0.079	1.073	0.673	1.479	0.026
Daily smoker	1.278	0.000	1.278	0.000	1.341	0.000	1.190	0.067
Nondrinker	Reference							
Occasional drinker	0.949	0.459	0.951	0.470	0.998	0.982	0.875	0.155
Regular drinker	0.611	0.000	0.612	0.000	0.709	0.000	0.495	0.000
F&V <5/day	Reference							
F&V 5-10/day	0.979	0.690	0.983	0.743	1.008	0.919	0.967	0.661
F&V >10/day	1.234	0.130	1.240	0.122	1.520	0.035	1.054	0.787
Underweight	1.424	0.072	1.421	0.074	1.189	0.649	1.472	0.094
Normal weight	Reference							

Overweight	1.296	0.000	1.292	0.000	1.281	0.002	1.316	0.002
Obese	1.858	0.000	1.855	0.000	1.907	0.000	1.758	0.000
Male High school	Reference							
Male College			1.197	0.084				
Male Bachelor			1.146	0.403				
Male Above BA			1.244	0.367				
Observation	44900		44900		20305		24275	
R-square	0.125		0.125		0.129		0.107	

Table 16A, indicates that with an increasing of age, the odds ratio of contracting cancer increases dramatically with significant results at the 1% or 5% level. Compared with the reference group (20-29), all other age groups have a higher risk of cancer. For example, in age group 30 to 39 the odds ratio is 1.30 and for those in the 40 to 49 age group the odds ratio decreases to 4.41. The odds ratio of age group 50 to 59 decrease to 9.14 and the odds ratio of last age group 60-69 is 16.36. Compared with reference group (high school and lower education), the odds ratio of college, bachelor, and above bachelor are 0.96, 0.73, and 1.01 respectively. This shows that people who have bachelor degree have a significantly lower risk of cancer than people who have high school and lower levels of education. The risk of cancer for males and females are roughly the same. For provinces, people living in Atlantic Canada, Quebec, Saskatchewan, Alberta, and the territories are more likely to have cancer. Immigrants have lower risk of cancer than do non-immigrants. People living in urban areas have a higher risk of cancer than do people live in rural areas. Married people are less likely to have cancer than do non-married people. For different racial origin, compare with the reference group (white), Korea people have the highest odds ratio with 2.05, indicating a higher risk of cancer.

When we include the interaction terms, the odds ratio for the education level is lower than without interaction terms but only the coefficient of bachelor is significant. Compared to people with high school education, college people have odds ratio of 0.90 that is lower than 0.95 achieved when we don't include the interaction term. For

education of bachelor and above bachelor, the odds ratio becomes 0.699 and 0.937 compared with 0.73 and 1.01 respectively. The men's interaction coefficients are above one but no significant change is noted compare to the overall coefficient indicating that the gradients for males and females are roughly same. In addition, for male and female only, the coefficient of each level of education for males is higher than females but the difference is not significant. This also shows that the gradient of education on cancer for male and female is very similar.

Table 16A. Cancer Without Health Behaviors

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.003	0.000	0.003	0.000	0.003	0.000	0.002	0.000
Agegroup20-29	Reference							
Agegroup30-39	1.294	0.411	1.295	0.410	1.223	0.651	1.356	0.493
Agegroup40-49	4.407	0.000	4.404	0.000	1.735	0.185	7.546	0.000
Agegroup50-59	9.143	0.000	9.126	0.000	6.781	0.000	11.580	0.000
Agegroup60-69	16.363	0.000	16.308	0.000	14.046	0.000	18.406	0.000
High school	Reference							
College	0.957	0.566	0.898	0.291	1.055	0.655	0.882	0.216
Bachelor	0.731	0.011	0.699	0.024	0.785	0.213	0.675	0.014
Above bachelor	1.010	0.948	0.937	0.758	1.091	0.697	0.919	0.690
Male	0.900	0.138	0.832	0.082				
Ontario	Reference							
Atlantic	1.319	0.010	1.319	0.010	1.047	0.795	1.510	0.002
Quebec	1.103	0.325	1.103	0.327	1.226	0.163	1.005	0.971
Manitoba	0.856	0.379	0.858	0.385	0.694	0.218	0.979	0.923
Saskatchewan	1.044	0.793	1.047	0.780	1.183	0.481	0.949	0.815
Albert	1.184	0.187	1.182	0.191	0.822	0.374	1.466	0.016
British Columbia	0.689	0.007	0.689	0.007	0.833	0.348	0.570	0.004
Territory	1.006	0.981	1.003	0.992	0.883	0.774	1.109	0.754
Immigrant	0.908	0.463	0.907	0.459	1.088	0.657	0.785	0.186
Urban	1.018	0.822	1.017	0.824	0.990	0.931	1.036	0.734
Married	0.959	0.569	0.956	0.540	1.035	0.771	0.880	0.179

White	Reference							
Aboriginal	1.100	0.561	1.100	0.558	0.602	0.125	1.441	0.055
South Asian	0.354	0.078	0.354	0.079	0.460	0.288	0.245	0.166
Chinese	0.664	0.337	0.662	0.334	1.000		1.239	0.627
Black	1.024	0.949	1.027	0.942	1.385	0.539	0.822	0.706
Philippines	1.802	0.146	1.808	0.143	1.406	0.646	2.239	0.100
Latin America	1.485	0.399	1.492	0.394	0.569	0.582	2.415	0.100
Arab	0.440	0.417	0.440	0.416	1.000		0.926	0.940
South East Asia	0.365	0.319	0.366	0.320	1.000		0.782	0.810
West Asia	0.713	0.739	0.710	0.736	1.000		2.058	0.483
Korea	2.045	0.484	2.037	0.486	1.000		4.569	0.144
Japan	0.795	0.820	0.791	0.817	1.786	0.574	1.000	
Other	0.260	0.181	0.259	0.180	1.000		0.549	0.554
Missing Culture	1.299	0.153	1.301	0.151	1.222	0.461	1.364	0.210
Male High school	Reference							
Male College			1.160	0.339				
Male Bachelor			1.116	0.659				
Male Above bachelor			1.183	0.580				
Observation	44900		44900		19460		24535	
R-square	0.075		0.075		0.085		0.076	

Note: In CCHS, the form of cancer is quite broad.

In Table 16B shows the result including the health behaviors variables. For smoking behavior, compared to non-smokers, daily smoker's risks are insignificantly with an odds ratio less than one. Compare with non-drinkers, regular drinkers are less likely to have cancer. For daily fruit and vegetable consumption, there's no significant effect. For BMI, underweighted people are more likely to have cancer, with an odds ratio of 1.67.

Compare with females, males have a higher odds ratio of cancer at different levels of education. The odds ratio for male*college, male*bachelor, and male*above bachelor are 1.15, 1.11, and 1.18 respectively. Moreover, there's no great difference between the result with and without health behaviors variable.

Compared with the results of Table 16A, the results of table 16B are not significantly different. The coefficient of bachelor is still obviously lower than other degree. The education gradient on cancer for males and females are still very similar. This indicates that the health behaviors are not driving significant effects on the educations gradients of cancer.

Table 16B. Cancer With Health Behaviors

	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Constant	0.003	0.000	0.004	0.000	0.004	0.000	0.003	0.000
Agegroup20-29	Reference							
Agegroup30-39	1.292	0.415	1.294	0.412	1.277	0.584	1.326	0.525
Agegroup40-49	4.421	0.000	4.419	0.000	1.815	0.154	7.426	0.000
Agegroup50-59	9.118	0.000	9.108	0.000	7.037	0.000	11.326	0.000
Agegroup60-69	16.100	0.000	16.060	0.000	14.444	0.000	17.552	0.000
High school	Reference							
College	0.984	0.834	0.927	0.460	1.087	0.486	0.908	0.349
Bachelor	0.765	0.033	0.733	0.054	0.807	0.278	0.704	0.033
Above bachelor	1.050	0.756	0.974	0.903	1.097	0.681	0.965	0.869
Male	0.948	0.473	0.881	0.239				
Ontario	Reference							
Atlantic	1.290	0.018	1.291	0.018	1.026	0.883	1.458	0.006
Quebec	1.124	0.245	1.123	0.248	1.231	0.157	1.033	0.812
Manitoba	0.843	0.335	0.845	0.342	0.695	0.221	0.968	0.882
Saskatchewan	1.038	0.820	1.041	0.806	1.197	0.452	0.933	0.759
Albert	1.179	0.198	1.178	0.201	0.830	0.399	1.460	0.017
British Columbia	0.692	0.008	0.692	0.008	0.821	0.313	0.581	0.006
Territory	0.995	0.985	0.993	0.978	0.871	0.749	1.102	0.769
Immigrant	0.903	0.443	0.903	0.440	1.074	0.710	0.771	0.160
Urban	1.018	0.821	1.017	0.823	0.976	0.838	1.036	0.736
Married	0.992	0.913	0.989	0.879	1.124	0.328	0.899	0.270

White	Reference							
Aboriginal	1.086	0.616	1.087	0.613	0.579	0.100	1.426	0.064
South Asian	0.321	0.055	0.321	0.055	0.408	0.221	0.226	0.143
Chinese	0.556	0.171	0.555	0.170	1.000		1.116	0.806
Black	0.971	0.938	0.975	0.946	1.312	0.609	0.761	0.602
Philippines	1.562	0.274	1.568	0.270	1.256	0.759	2.000	0.161
Latin America	1.420	0.456	1.426	0.451	0.527	0.534	2.350	0.112
Arab	0.396	0.359	0.395	0.359	1.000		0.879	0.900
South East Asia	0.329	0.272	0.329	0.272	1.000		0.718	0.746
West Asia	0.669	0.692	0.667	0.689	1.000		1.897	0.535
Korea	1.864	0.543	1.855	0.546	1.000		4.449	0.152
Japan	0.750	0.776	0.746	0.773	1.668	0.621	1.000	
Other	0.249	0.168	0.249	0.167	1.000		0.519	0.518
Missing Culture	1.162	0.421	1.164	0.415	1.084	0.772	1.223	0.424
Nonsmoker	Reference							
Occasional smoker	0.785	0.252	0.785	0.254	0.612	0.178	0.929	0.779
Daily smoker	0.960	0.665	0.960	0.671	1.091	0.525	0.845	0.205
Non drinker	Reference							
Occasion drinker	0.882	0.245	0.882	0.247	0.932	0.717	0.771	0.023
Regular drinker	0.753	0.001	0.754	0.001	0.753	0.038	0.864	0.268
F&V <5/day	Reference							
F&V 5-10/day	0.946	0.477	0.948	0.499	1.032	0.807	0.915	0.374
F&V >10/day	1.063	0.767	1.067	0.755	0.747	0.525	1.248	0.341
Underweight	1.658	0.030	1.655	0.030	3.463	0.001	1.255	0.457
Normal weight	Reference							

Overweight	0.839	0.037	0.837	0.035	0.734	0.014	0.911	0.414
Obese	0.963	0.682	0.962	0.670	0.679	0.009	1.206	0.103
Male High school	Reference							
Male College			1.150	0.370				
Male Bachelor			1.108	0.681				
Male Above BA			1.178	0.590				
Observation	44900		44900		19460		24535	
R-square	0.078		0.078		0.093		0.079	

5. Conclusion and discussions

This report examined the relation between education and health behaviors and the relation between education and health outcomes. For all health outcomes and health behaviors, with the exception of alcohol consumption, there was a pronounced negative education-health gradient. That is, more education was associated with a lower probability of having the health outcome or behavior. The prevalence of all health behaviors for male is higher than female. Except for regular drinking, education gradient are strongly negative. Moreover, women had a steeper gradient for smoking, drinking, little fruit and vegetables consumption, and obesity. This was similar to the case of health outcomes. For health outcomes except cancer, education gradient are strongly negative. Moreover, the gradient for high blood pressure, diabetes and heart disease was much more pronounced for women than for men, although men and women had roughly similar education-health gradients for asthma and cancer. In addition, education gradient does not change too much after control for health behaviors. The education gradient for health outcomes persists even after controlling for health behaviors. This suggests that indirect factors (income, nicer neighbor) may explain the education gradient more than learned behaviors. The summary of result is shown as below.

Table 17. Health Behaviours Results Summary			
	Overall Male/Female Dif	Education Gradient	Male/Female Difference in Education gradient
Daily Smoking	Males increased prevalence (26%)	Strongly negative	Less steep for males
Regular Drinker	Males increased prevalence (104%)	Strongly positive	Less steep for males
Little fruit & veg consumption	Males increased prevalence (82%)	Strongly negative	Less steep for males
Obesity	Males increased prevalence (16%)	Strongly negative	Less steep for males

Table 18. Health Outcomes Results Summary				
	Overall Male/Female Dif	Education Gradient	Male/Female Difference in Education gradient	Difference after controlling for behaviours
Asthma	Males decreased prevalence (34%)	Strongly negative	Equally steep	Slightly less steep
High Blood Pressure	Men increased prevalence (22%)	Strongly negative	Less steep for males	Slightly less steep
Diabetes	Men increased prevalence (24%)	Strongly negative	Less steep for males	Substantially less steep after behaviour controls
Heart Disease	Men increased prevalence (87%)	Strongly negative	(Slightly) less steep for males	Mostly the same
Cancer	Insignificant difference	No strong gradient (lower for bachelor's)	No difference	No obvious change

There are some possible reasons explanations why education matters for health. On the one hand, the direct effect is that health services are provided by education institution. For instance, many colleges and universities have in-campus hospital or health services.

They provide various treatments to help students keep their physical health and psychological health. On the other hand, there are some indirect effects of education that are related to health. One of indirect effects is improving health behavior. With higher level of education, people may have better skills to aid in collecting health information as opposed to those with a lower education level. They are better able to determine which behaviors are harmful for their health and understand how to keep themselves healthy. In addition, colleges and universities provide many lessons and health related activities such as nutrition and sex. Furthermore, another indirect effect of education is income. Income is highly correlated with education. People with higher level of education are more likely have higher income and then have more ability to have more heath service and goods.

Policy implications

There are large number studies that have suggested that education is a kind of investment for income, health, and life expectance. In terms of return on education for health, this study suggests that women have a higher return on education than man. Both males and females can really benefit from education. In addition, since the positive effects of education and high return on it, the government should continually develop education and make sure that people, especially women, continue in school.

Base on the highly positive relationship between education and health, the government has implied many policies in order to improve education. For example, the policy of compulsory schooling is implicated in many countries. “In 1999, New

Brunswick increased the age of compulsory schooling from 16 to18". Many economists have suggested that similar policies implemented in other countries have positive relation to life expectancy and health. The policy is related to people's social behavior as well. As teenagers if students stay on campus they are protected by the school, and are also less likely to smoke or drink than people who quit school early.

In addition to the policies on education, the government has other policy such as smoking commercials that directly related to people's behavior. According to Health Canada, Canada is the first country in the world to require that tobacco packages have picture based health warnings. They warn people of the harmful effects of smoking on health and encourage them to buy less tobacco.

Limitations

Because the data is one-year cross-sectional data from CCHS, we can only focus on the results at one time but cannot examine them over a changing time period. The causal effect between education and health cannot be proven as because in many cases we do not know the weather people participate in the behavior before or after the disease occurred. In addition, health behaviors change overtime. For example, we use current smoking status, but smoking affect cancer likely takes time. So the group we identified that current smokers includes those who just begin smoking and the group we identified non-smokers includes those people who recently quit smoking. Another example, we have concluded that people who have drinking behavior have a higher risk of disease;

however, we cannot say drinking is the direct factor that makes people contract disease because people may start drinking after contraction.

Self-reported data is another limitation. Compared with administrative data, self-reported data may have some biases. Self-reported data is normally collected by questionnaires and surveys. When people answer questions they may be embarrassed to give the exact answer to private questions. Furthermore, the answer may also be affected by the emotional state and status of the respondent. When people are feeling good, they are probably happy to answer any question, and if they are not, then the answer may be perfunctory. There is known bias with respect to self-measured BMI where individuals are likely to under reports. Even health outcomes are possibly biased if people do not remember or do not report their current status. These effects contribute to the bias of the data.

Causality affects both directions. My report is descriptive, correlation only, not causal. But is still interest to look difference relationship between men and women and how the relationship changes when control for health behaviors.

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Appendix:

Appendix1. Daily smoker								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Agegroup20-29	Reference							
Agegroup30-39	1.496	0.000	1.499	0.000	1.724	0.000	1.317	0.000
Agegroup40-49	1.753	0.000	1.751	0.000	1.902	0.000	1.642	0.000
Agegroup50-59	1.470	0.000	1.467	0.000	1.609	0.000	1.358	0.000
Agegroup60-69	0.916	0.038	0.913	0.031	1.046	0.465	0.814	0.000
Atlantic	1.038	0.371	1.038	0.376	1.137	0.033	0.953	0.416
Quebec	1.054	0.144	1.054	0.149	1.038	0.473	1.067	0.209
Manitoba	0.974	0.653	0.975	0.657	0.861	0.074	1.090	0.281
Saskatchewan	0.993	0.896	0.993	0.902	0.929	0.366	1.057	0.482
Albert	1.020	0.665	1.021	0.654	1.031	0.633	1.009	0.894
British Columbia	0.831	0.000	0.831	0.000	0.845	0.009	0.815	0.002
Territory	1.371	0.000	1.372	0.000	1.193	0.088	1.591	0.000
Immigrant	0.807	0.000	0.805	0.000	0.927	0.295	0.704	0.000
Urban	1.047	0.103	1.046	0.113	1.091	0.030	1.001	0.972
White	Reference							
Aboriginal	1.795	0.000	1.795	0.000	1.736	0.000	1.816	0.000
South Asian	0.304	0.000	0.303	0.000	0.435	0.000	0.136	0.000
Chinese	0.417	0.000	0.414	0.000	0.667	0.033	0.207	0.000

Black	0.416	0.000	0.416	0.000	0.499	0.001	0.343	0.000
Philippines	0.355	0.000	0.355	0.000	0.638	0.087	0.160	0.000
Latin America	0.333	0.000	0.333	0.000	0.301	0.000	0.375	0.003
Arab	0.843	0.403	0.843	0.404	0.971	0.908	0.647	0.222
South East Asia	0.362	0.000	0.360	0.000	0.449	0.019	0.262	0.004
West Asia	0.926	0.762	0.918	0.736	0.933	0.825	0.788	0.592
Korea	1.977	0.033	1.971	0.034	3.028	0.009	1.211	0.705
Japan	1.176	0.584	1.180	0.576	2.288	0.032	0.539	0.245
Other	1.091	0.591	1.094	0.579	1.082	0.710	1.107	0.683
Missing Culture	0.920	0.258	0.922	0.267	1.096	0.341	0.741	0.009
Observation	44900		44900		20305		24595	
R-square	0.083		0.083		0.073		0.092	

Appendix2. Regular drinker								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Ontario	Reference							
Atlantic	0.655	0.000	0.654	0.000	0.717	0.000	0.614	0.000
Quebec	1.393	0.000	1.393	0.000	1.281	0.000	1.470	0.000
Manitoba	0.885	0.009	0.885	0.009	0.885	0.095	0.884	0.044
Saskatchewan	0.925	0.097	0.925	0.096	0.909	0.195	0.934	0.265
Albert	0.933	0.065	0.933	0.066	0.933	0.235	0.936	0.183
British Columbia	1.173	0.000	1.172	0.000	1.089	0.126	1.239	0.000
Territory	0.920	0.203	0.919	0.195	0.813	0.031	1.019	0.832
Immigrant	0.811	0.000	0.812	0.000	0.970	0.603	0.722	0.000
Urban	1.025	0.296	1.025	0.290	0.924	0.034	1.088	0.007
Married	1.301	0.000	1.304	0.000	1.476	0.000	1.215	0.000
Observation	44900.000		44900.000		20305.000		24595.000	
R-square	0.075		0.075		0.057		0.065	

Appendix3. Fruit and vegetable consumption (less than 5/day)								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Ontario	Reference							
Atlantic	1.333	0.000	1.332	0.000	1.229	0.000	1.404	0.000
Quebec	0.718	0.000	0.716	0.027	0.748	0.000	0.691	0.000
Manitoba	1.103	0.031	1.106	0.367	0.987	0.853	1.207	0.002
Saskatchewan	0.956	0.319	0.960	0.000	0.912	0.178	0.998	0.979
Albert	0.851	0.000	0.850	0.000	0.922	0.130	0.799	0.000
British Columbia	0.822	0.000	0.822	0.076	0.831	0.000	0.815	0.000
Territory	1.125	0.063	1.119	0.092	1.134	0.182	1.118	0.193
Immigrant	0.947	0.122	0.942	0.003	0.861	0.005	1.009	0.857
Urban	1.073	0.002	1.070	0.000	1.074	0.036	1.062	0.047
Married	0.902	0.000	0.896	0.033	0.993	0.819	0.817	0.000
White	Reference							
Aboriginal	1.099	0.032	1.099	0.928	0.998	0.971	1.169	0.007
South Asian	0.995	0.946	0.993	0.000	0.978	0.840	1.022	0.829
Chinese	1.436	0.000	1.425	0.620	1.370	0.011	1.486	0.000
Black	1.041	0.641	1.044	0.142	1.103	0.478	0.999	0.990
Philippines	1.159	0.167	1.170	0.268	1.118	0.530	1.184	0.207
Latin America	0.878	0.244	0.883	0.812	1.023	0.891	0.781	0.112
Arab	1.034	0.802	1.032	0.688	0.788	0.209	1.343	0.108
South East Asia	1.055	0.682	1.054	0.831	1.073	0.715	1.057	0.755

West Asia	0.968	0.848	0.964	0.021	0.900	0.647	1.086	0.749
Korea	1.846	0.019	1.835	0.911	1.251	0.559	2.509	0.010
Japan	1.022	0.916	1.024	0.988	1.015	0.966	1.037	0.893
Other	1.001	0.993	0.998	0.000	0.946	0.747	1.058	0.741
Missing Culture	0.737	0.000	0.740	0.000	0.635	0.000	0.851	0.045
Observation	44900.000		44900.000		20305.000		24595.000	
R-square	0.032		0.033		0.013		0.026	

Appendix4. Obese								
	Total		With interaction		Male only		Female only	
	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z	Odds Ratio	P>z
Ontario	Reference							
Atlantic	1.157	0.000	1.156	0.000	1.014	0.805	1.285	0.000
Quebec	0.753	0.000	0.752	0.000	0.787	0.000	0.723	0.000
Manitoba	1.128	0.018	1.130	0.017	1.149	0.062	1.123	0.098
Saskatchewan	1.152	0.005	1.154	0.004	1.177	0.026	1.136	0.069
Albert	1.024	0.570	1.023	0.580	1.130	0.040	0.941	0.304
British Columbia	0.732	0.000	0.732	0.000	0.774	0.000	0.699	0.000
Territory	0.891	0.124	0.890	0.119	0.882	0.242	0.915	0.400
Immigrant	0.786	0.000	0.784	0.000	0.756	0.000	0.809	0.001
White	Reference							
Aboriginal	1.311	0.000	1.311	0.000	1.130	0.092	1.480	0.000
South Asian	0.551	0.000	0.550	0.000	0.486	0.000	0.623	0.004
Chinese	0.209	0.000	0.208	0.000	0.274	0.000	0.162	0.000
Black	0.984	0.883	0.985	0.889	0.826	0.280	1.085	0.561
Philippines	0.448	0.000	0.450	0.000	0.475	0.006	0.429	0.000
Latin America	0.874	0.376	0.876	0.384	0.836	0.413	0.919	0.693
Arab	1.128	0.485	1.128	0.485	1.478	0.079	0.795	0.415
South East Asia	0.528	0.002	0.527	0.002	0.680	0.162	0.395	0.005
West Asia	0.736	0.221	0.734	0.217	0.714	0.310	0.785	0.530
Korea	0.350	0.043	0.349	0.042	0.839	0.748	1.000	

Japan	0.536	0.064	0.536	0.064	0.494	0.187	0.582	0.214
Other	0.781	0.136	0.781	0.136	0.838	0.424	0.708	0.170
Missing Culture	0.804	0.003	0.806	0.003	0.807	0.032	0.796	0.029
Observation	44900.000		44900.000		20305.000		24560.000	
R-square	0.030		0.030		0.028		0.035	

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