Forecasting the 2025 Canadian Election By Regression Model: Potential Shift from Trudeau's Administration to the Conservatives!

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Nov 22, 2023

Introduction

Canadian elections hold immense significance because it is showcasing the core tenets of democracy and governance. In this electoral process, Canadians exercise their voting rights through a ballot for a single parliamentarian candidate locally in their province, shaping the composition of the Parliament and, consequently, the election outcome. While direct votes for the Canadian prime minister are not cast, the Parliament's composition is pivotal in determining the government formation and the prime minister's appointment (Elections step by step, 2023). The most recent federal election in Canada took place on September 20, 2021, resulting in the establishment of the 44th Parliament, with Justin Trudeau's Liberal Party clinched the majority of seats, securing a significant presence in the House of Commons (Past elections, 2023).

The primary concern for the voters revolve around 10 critical issues, including the cost of living, healthcare, climate change, post-pandemic recovery plans, Canada's economic future, taxes, poverty, housing, government deficit, and medical costs. According to a public opinion survey, dissatisfaction with the Trudeau government is widespread, with only 30% of respondents expressing satisfaction compared to 60% expressing dissatisfaction. When considering the best Prime Minister in the world, Trudeau ranks significantly behind Pierre Poilievre of the Tory Party from the UK, with 27% supporting Poilievre and 17% supporting Trudeau. Reasons for the desire for Trudeau to step down mainly revolve around concerns about affordability, the cost of living, housing availability, inflation, and public debt. Meanwhile, the Canadian national government recently unveiled an ambitious plan to admit 500,000 migrants annually by 2025, looking for nearly 1.5 million newcomers in Canada within the next three years (Canada's Immigration Levels Plan 2024-2026). Historically, the Liberal government's immigration strategy tends to be more permissive, offering broader entry routes compared to that of the Conservative Party. Consequently, a substantial backlog of pending immigration applications has accumulated. Based on historical patterns, if the Conservative Party returns to power in 2025 after a nine-year hiatus, the immigration policy overhaul initiated in 2008 might swiftly address the backlog. This could potentially lead to a decrease in immigrant numbers and certain immigration groups might be temporarily halted or even permanently discontinued. The Conservative Party of Canada underscores the belief that immigrants should actively contribute to the nation's economic prosperity. Hence, the party's immigration policy centers on attracting highly skilled and high-income immigrants to boost the economy. The Conservative aim is to promptly address Canadians' concerns regarding the current high cost of living, inflation, and housing issues, while striving to provide better job opportunities, safer communities, and affordable essentials such as food and gas (Nakhaie, 2006).

Hypothesis

Based on our analysis of past trends, government policies, and electoral procedures, our hypothesis will be aligning with the prevailing expectation that the Conservatives will emerge victorious in the 2025 election (Korzinsk, 2023). **We hypothesize that the Conservatives will likely secure the highest number of votes in the upcoming 2025 Canadian federal election, with the Liberals expected to follow**

closely in second place. Based on research, we observe that the vote-counting procedure in Canada plays a big role in deciding the winner because the voters are not directly voting for a specific prime minister candidate. Initially, all votes are tallied based on the first preference. If a candidate secures 50% of the vote, they win the election. If not, the candidate with the fewest votes is eliminated (Past elections, 2023). Subsequently, votes from supporters of the eliminated candidate are redistributed to their second-choice candidate. This iterative redistribution continues until one candidate receives 50% of the vote. Thus, we aim to forecast the election probabilities for the Conservative and Liberal parties and compare which is higher (Elections step by step, 2023).

The Terminology

We will fit three **binary logistic regression models** to predict **the probability of participants elected for the Conservative, Liberal, or the NDP**. Binary logistic regression is a statistical model specifically designed to forecast the likelihood of a binary outcome, where the variable in question has two possible results. In our case, these outcomes represent each observation's (individuals') probabilities of affiliating with the Conservative, Liberal, or NDP parties, each outcomes are predicted through separate logistic regression models with the response variables being "to vote for the corresponding party or not". The predictors used across these models are the same, which include age, sex, province, education, religion, and income before tax, and the variable "sex" will be removed after we do the AIC model testing. Further justification will be provided later in the model selection section. This regression method is particularly useful when there exists a non-linear relationship between independent and dependent variables, and especially in categorical dependent variable scenarios just like ours. Additionally, we will perform post-stratification in our analysis to enhance the accuracy. Post-stratification aids in refining precision estimates by ensuring that the sample is more representative of the entire population.

Census Data, Survey Data, and Variables of Interest

The provided census data, The General Social Survey(GSS), is from August 12th, 2022. We will adjust it appropriately to align with our survey dataset. The CES, Survey Data, is from the year 2023 and it contained more than 37000 participants(Canadian Election Study, 2023). We have adjusted both datasets, keeping the variables: age, sex, province, education, religion, and income before tax. Taking a census typically incurs higher costs and requires more time, as it necessitates contacting each person within the population. On the other hand, surveys tend to be more economical and faster, particularly when dealing with sizable populations, as information is gathered from a representative subset.

Age
   Age plays a great deal when it comes to voting participation, and a notable difference in voter turnout exists between younger and older age groups. In 2011, the participation rate among young voters was over 35 percentage points lower compared to individuals in the 65 to 74 age category Youth voting trends in Canada (Youth voting trends in Canada, 2023).

Sex
   There are relationships between sex and voting for Conservative and Liberty. This sheds light on an aspect often overlooked in the "modern gender gap" in Canada: while women are more inclined than men to vote for the NDP, they are also more likely to vote Conservative than NDP. The phenomenon can also be attributed to the "gender-generation gap" (Shorrocks, Reference Shorrocks 2018). The voting pattern of older women, who are more religious than their younger counterparts, leans toward the Conservative party, despite sharing the younger women's support for economic equality and state intervention. This implies that cohort replacement plays a role in explaining the evolution of the modern gender gap(Gidengil, 2022).

Province

In essence, voters in different provinces of the country differ in how they prioritize different factors in their decision-making. A significant discovery is that these variations cannot be attributed to differences in social composition. Individuals with similar social background characteristics exhibit distinct voting patterns based on their geographical location, and this divergence is attributed to variations in their decision-making process when casting their votes (Gidengil et al., Reference Gidengil, Blais, Nevitte and Nadeau 1999; Stephenson et al., Reference Stephenson, Lawlor, Cross, Blais and Gidengil 2019). In essence, voters in different regions of the country differ in how they prioritize different factors in their decision-making(Gidengil, 2022).

Education

The increasing level of education will have an increasing level of vote participation. The impact of education on voting, described as 'positive,' was considerably more pronounced among younger individuals (Factors associated with voting, 2015).

Religion

According to recent research conducted at the University of Waterloo, there is also a strong relationship between voter's religious beliefs and voting. Individuals in Canada who view religion as significant in their lives were discovered to have a higher likelihood of supporting the Conservative Party in the 2015 elections. The research also suggests that those with stronger religious beliefs generally hold more conventional moral perspectives, making them more inclined to back conservative candidates and parties that align with their values. (How religious beliefs affect voting behavior in Canada, 2023)

Income before tax

We have observed that there is a strong correlation between participants' income level and their tendency to vote for a certain party. Wastson and Arunachalam' research suggested that an extra £1,000 in annual income is associated with a increase of 2–3 percentage points in the likelihood of endorsing the Conservative party. This research underscores that income influences both political convictions and voting tendencies in a consistent manner(Watson & Arunachalam, 2016).

Data

Census data: The data were collected by the General Social Survey (GSS) between May and December 2022.

Survey data: The data were collected by the Canada Election Study 2021 online survey from August 17, 2021, to September 19, 2021.

Survey Dataset Cleaning

Age (age)
   `cps21_age` in the survey dataset reflects the age of respondents when they are taking the General Social Survey. No additional changes are needed. Rename it as the `age` variable to match the age variable in the census dataset.

Sex (sex)
   While navigating the survey dataset, `cps21_genderid` reveals 9474 men, 11370 women, 90 non-binary respondents, and 34 others. Since only a small portion of respondents chose non-binary and other gender options, a better approach would be to add these respondents to women and men proportionally. In this case, randomly sample males and females, with the proportion of women set at 0.5422 and the proportion of men at 0.4518.

Province (province)
   By comparing the province variable in the survey dataset with that in the census dataset, `cps21_province` in the survey dataset has three extra provinces, resulting in a mismatch between the two datasets. In this case, filter out the provinces of `Northwest Territories`, `Nunavut`, and `Yukon` in the survey dataset to ensure that the province names match in both datasets. Additionally, in the survey dataset, the provinces are labeled with numbers. To use this variable in the logistic regression model, convert the numeric labels into categorical labels.

Education (education)
   Since there are twelve levels of education in `cps21_education` in the survey dataset, to better analyze this variable, categorize these levels into three main groups. Specifically, categorize `No schooling`, `Some elementary school`, `Completed elementary school`, `Don't know/ Prefer not to answer` into `Limited Education`; categorize `Some secondary/ high school`, `Completed secondary/ high school`, `Some technical, community college, CEGEP, College Classique`, `Completed technical, community college, CEGEP, College Classique`, `Some university` into `Some Education`; categorize `Bachelor's degree`, `Master's degree`, `Professional degree or doctorate` into `Highly Educated`.

Religion (religion)
   `cps21_religion` in the survey dataset indicates whether the respondent has a religion or not. If the respondent selects `1`, they are categorized as atheists, and if they choose any number other than `1`, they are considered to have a religion. In this case, classify them into two groups. If they choose `1`, they belong to the `NO` group, and if they select any number other than `1`, they fall into the `YES` group.

Income Before Tax (income_before_tax)
   `cps21_income_number` in the survey dataset represents the total household income before taxes. Since it is a numerical variable, to better suit the logistic regression model, convert the numerical data into categorical data and separate the data into three groups. The first group, `Upper Middle Class to Wealthy`, includes incomes greater than or equal to `125000`. The second group, `Middle Class`, includes incomes greater than or equal to `50000` but less than `125000`. The third group, `Lower Middle Class to Poor`, includes incomes less than `50000`.

Vote for Liberal Party (vote_liberal)

cps21_votechoice records the party that the respondent would vote for. If the respondent selects 1, they would vote for the Liberal Party. To better fit the logistic regression model, categorize the data into two distinct values - 0 or 1. If the respondent selects 1, they would be categorized in the 1 group. If the respondent selects a number other than 1, they would be categorized in the 0 group.

Vote for Conservative Party (vote_conservative)

cps21_votechoice records the party that the respondent would vote for. If the respondent selects 2, they would vote for the Conservative Party. To better fit the logistic regression model, categorize the data into two distinct values - 0 or 1. If the respondent selects 2, they would be categorized in the 1 group. If the respondent selects a number other than 2, they would be categorized in the 0 group.

Vote for New Democratic Party (vote_ndp)

cps21_votechoice records the party that the respondent would vote for. If the respondent selects 3, they would vote for the New Democratic Party. To better fit the logistic regression model, categorize the data into two distinct values - 0 or 1. If the respondent selects 3, they would be categorized in the 1 group. If the respondent selects a number other than 3, they would be categorized in the 0 group.

Census Dataset Cleaning

Age (age)

Age in the census dataset is recorded as a floating-point number. To match the data with the age in the survey dataset, round age to the nearest integer.

Sex (sex)

Sex in the census dataset is recorded as Male or Female, which matches the survey dataset. No additional changes are needed.

Province (province)

Province in the census dataset is recorded as Quebec, Manitoba, Ontario, Alberta, Nova Scotia, British Columbia, Saskatchewan, Prince Edward Island, New Brunswick, and Newfoundland and Labrador, which matches the survey dataset. No additional changes are needed.

Education (education)

Education in the census dataset is recorded as eight different education levels, including missing values as one of the levels. To match the data with the education in the survey dataset, categorize these levels into three main groups. Specifically, categorize Less than high school diploma or its equivalent and missing values into Limited Education; categorize High school diploma or a high school equivalency certificate, Trade certificate or diploma, College, CEGEP, or other non-university certificate or diploma, University certificate or diploma below the bachelor's level into Some Education; categorize Bachelor's degree (e.g., B.A., B.Sc., LL.B.), University certificate, diploma, or degree above the bachelor's level into Highly Educated. In this case, the education variable in both the census dataset and the survey dataset would match.

Religion (religion)

In the census dataset, religion_has_affiliation records if the person selects the has a religious affiliation option, the Don't know option, the No religious affiliation option, or has missing values. To match the religion variable in the survey dataset, categorize these three categories into two groups. If the person selects the has a religious affiliation option, the Don't know option, or has missing values,

then they belong to the `YES` group; otherwise, they belong to the `NO` group. In this case, missing values are considered as a person having religion but refusing to answer for personal reasons.

Income Before Tax (income_before_tax)

  `Income_respondent` in the census dataset is recorded as 7 categories. To match this variable with the `income_before_tax` variable in the survey dataset, categorize these categories into three main groups. If the person's income are `Less than $25,000` or `$25,000 to $49,999`, then he/she belongs to `Lower Middle Class to Poor`. If the person's income are `$50,000 to $74,999`, `$75,000 to $99,999`, or `$100,000 to $ 124,999`, then he/she belongs to `Middle Class`. If the person's income is `$125,000 and more`, then he/she belongs to `Upper Middle Class to Wealthy`.

Description of important variables

- Age: the respondent's age
- Sex: the respondent's sex
- Province: the province where the respondent currently lives
- Education: the respondent's current education level
- Religion: the respondent's religious affiliation
- Income Before Tax: the respondent's current income class

Data Summary Measures

Table 1: Numerical Variables in Survey and Census Dataset

Variables	Min	first_quantile	Median	Mean	third_quatile	Max
Census Dataset Age	15	37	54	52.180	67	80
Survey Dataset Age	18	36	53	51.300	66	97
Survey Dataset Liberal Votes	0	0	0	0.267	1	1
Survey Dataset Conservative Votes	0	0	0	0.249	0	1
Survey Dataset NDP Votes	0	0	0	0.194	0	1

In Summary Table 1, the minimum age in the cleaned census dataset is 15, rendering some individuals ineligible to vote. The median age of the population is 54, with an average age of 52.180 and a maximum age of 80. In the cleaned survey dataset, the minimum age is 18, aligning with the minimum age for voting eligibility. The median age is 53, and the average age of voters is 51.3, with a maximum age of 97. Furthermore, in the cleaned survey dataset, we observe that the average Liberal votes are 0.267, the average Conservative votes are 0.249, and the average NDP votes are 0.194. Notably, the third quartile of votes for the Liberal party is 1, while the third quartile for the NDP and Conservative parties is 0.

Additionally, there are two summary tables in the appendix. They describe the frequency of categorical data in the cleaned survey dataset and the cleaned census dataset, respectively.

Data visualization

Plot.1 Age Distribution Comparison
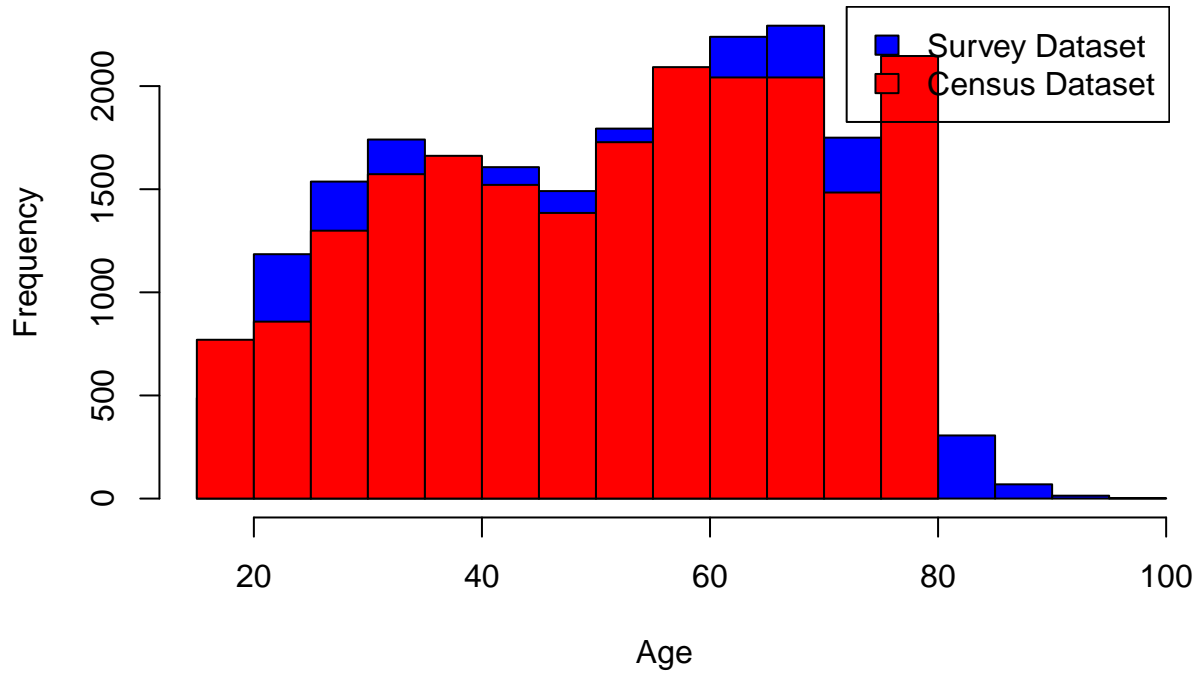
The blue bars in the plot represent the survey dataset, while the red bars represent the census dataset. The plot reveals that the survey dataset exhibits a higher frequency of both younger and older individuals. Additionally, there is a noticeable peak in the age range of 60-70 in the survey dataset, indicating that a significant proportion of respondents are in their seventies. In contrast, the census dataset shows a peak in the age range of 50-60, suggesting that the majority of individuals in the census are in their fifties.

Plot.2 Comparison of Province Variable
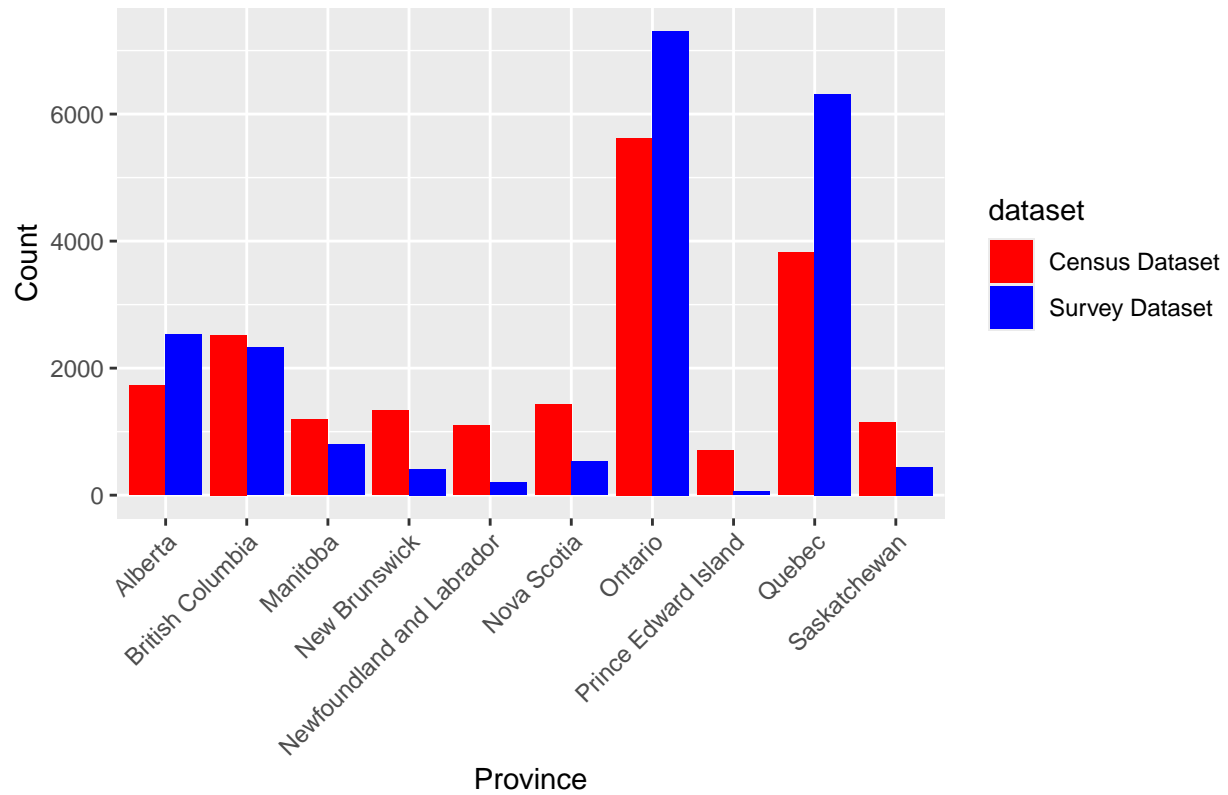
The bars are colored red for the census dataset and blue for the survey dataset. The plot indicates that the census dataset generally has a higher count for most provinces, except for Alberta, Ontario, and Quebec, where the survey dataset exhibits a higher count. This observation suggests differing geographic distributions between the survey dataset and the census dataset, potentially implying non-representativeness of the same population. Such disparities could impact the validity and reliability of the survey results.

Plot.3 Comparison of Education Levels
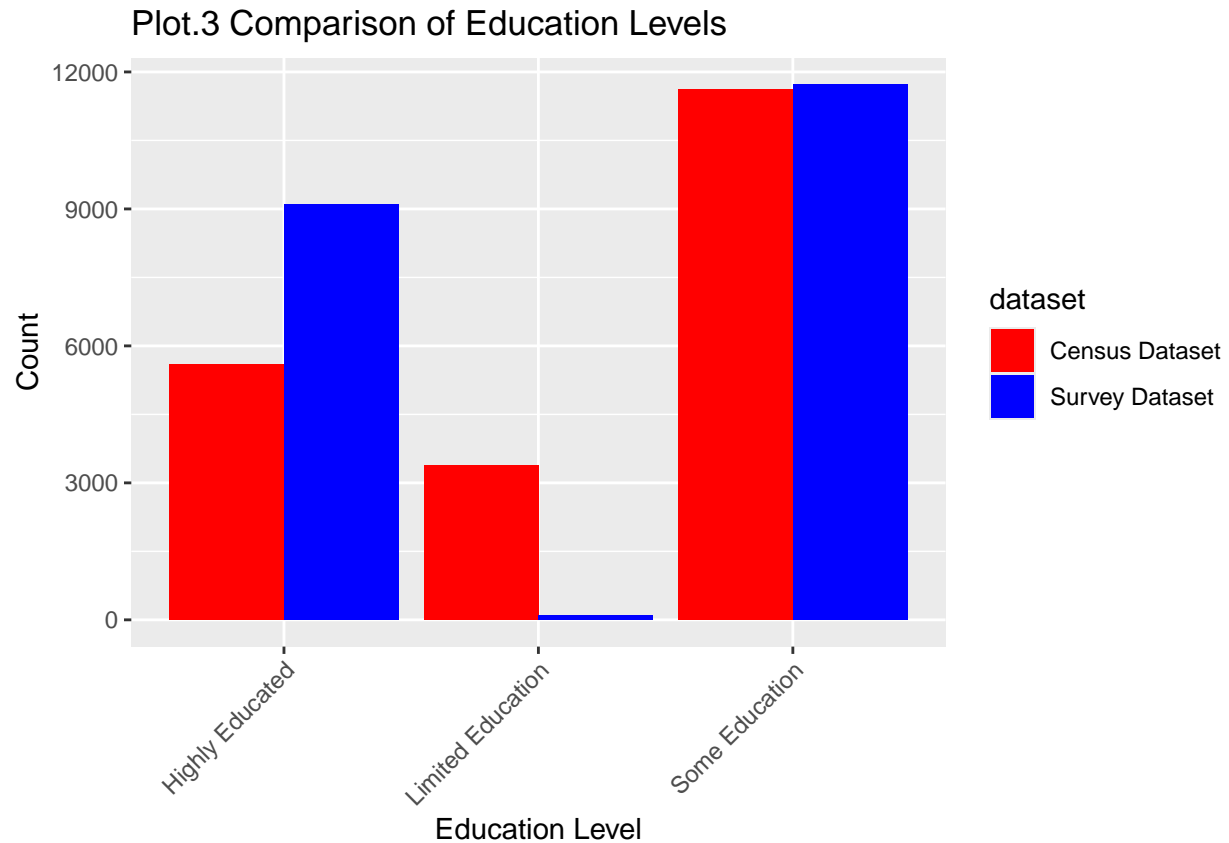
The bars are colored red for the census dataset and blue for the survey dataset. The plot illustrates that the census dataset exhibits a higher count for individuals with `Limited Education`, whereas the survey dataset demonstrates a higher count for those categorized as `Highly Educated` and `Some Education`. This observation suggests distinct education profiles between the survey dataset and the census dataset, potentially implying non-representativeness of the same population. Such disparities could impact the validity and reliability of the survey results.

Plot.4 Comparison of Religion
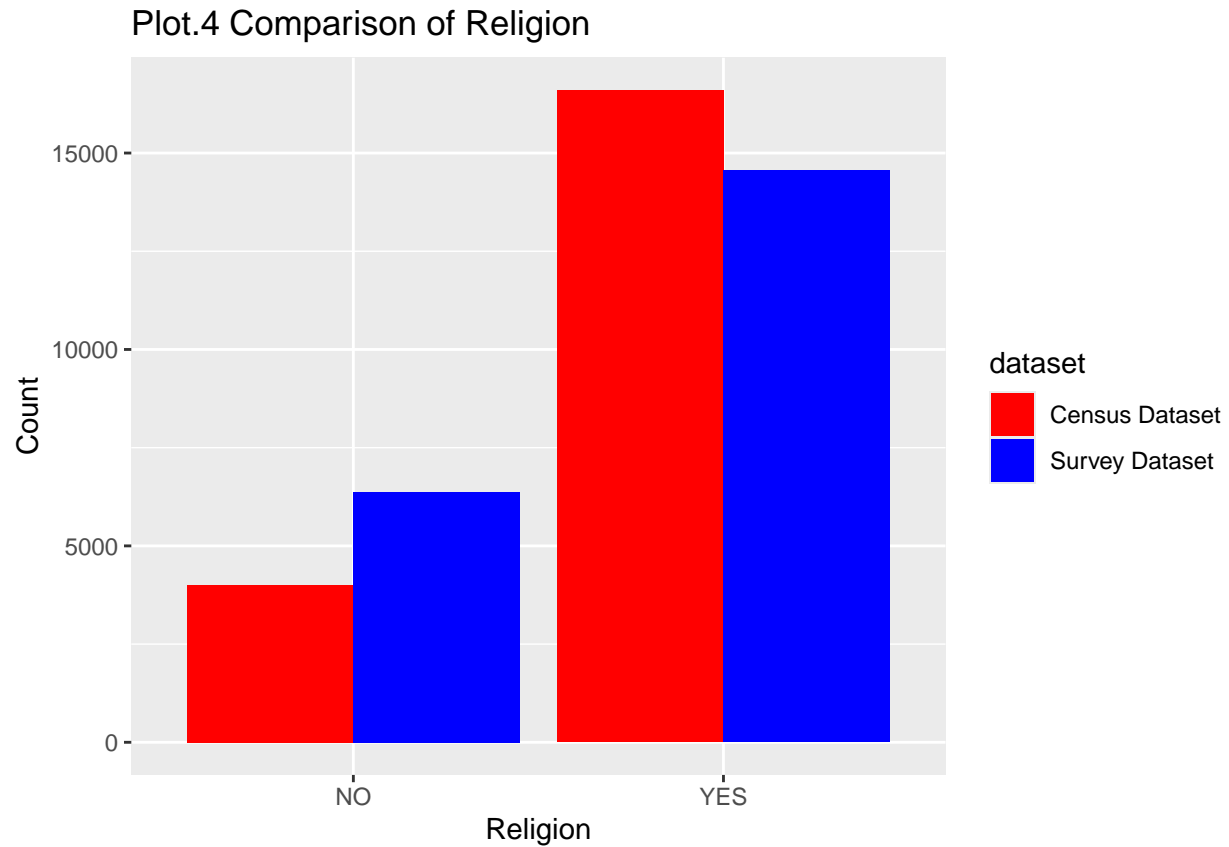
The bars are colored red for the census dataset and blue for the survey dataset. The plot indicates that in both datasets, there are more people who identify as religious than those who do not. However, the census dataset exhibits a much larger difference between the number of people identifying as religious and those who do not. This observation could suggest that the census dataset has a higher proportion of religious individuals than the survey dataset or that the census dataset has a larger sample size than the survey dataset, or possibly both scenarios.

Plot.5 Comparison of Income Before Tax
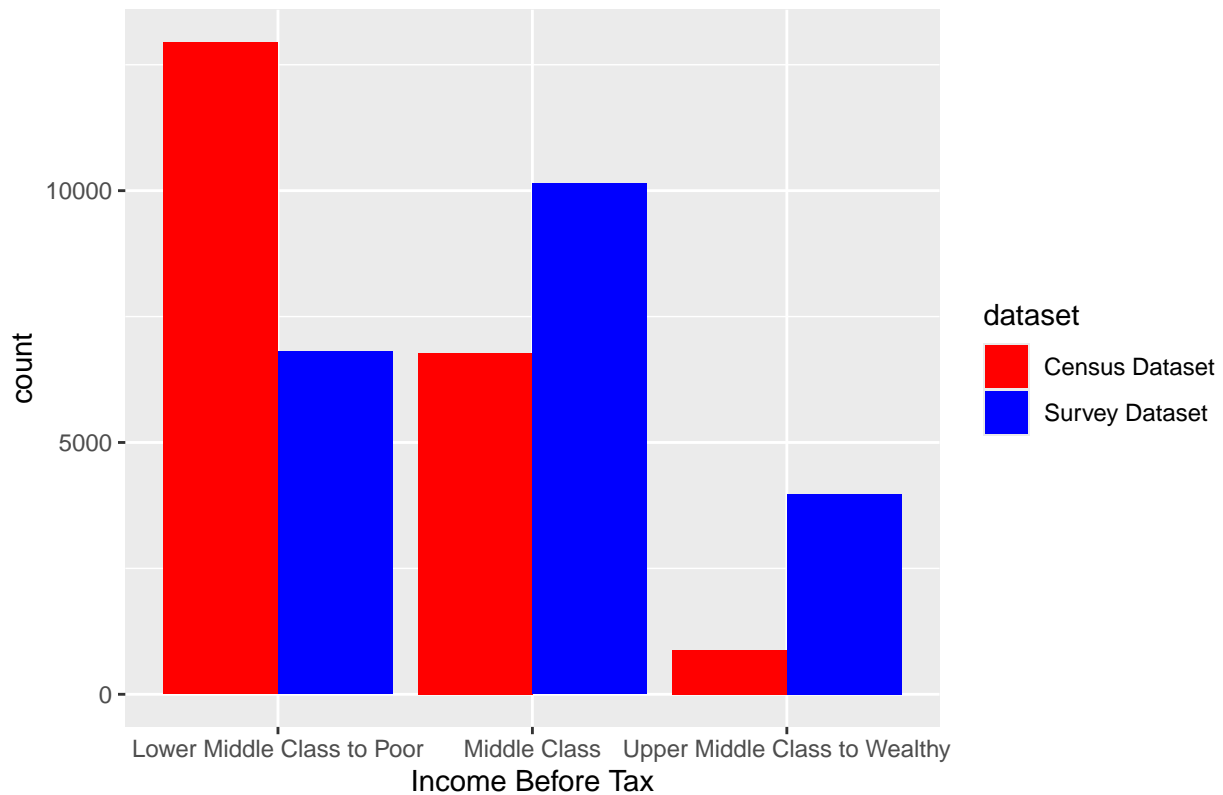
The census dataset is represented by red bars, and the survey dataset is represented by blue bars. The survey dataset has a higher count in all categories except for the `Lower Middle Class to Poor` category, where the census dataset has a higher count. The plot suggests that the survey dataset and the census dataset have different income profiles, which may indicate that they are not representative of the same population. This discrepancy could impact the validity and reliability of the survey results.

Plot.6 Comparison of Voting Preferences
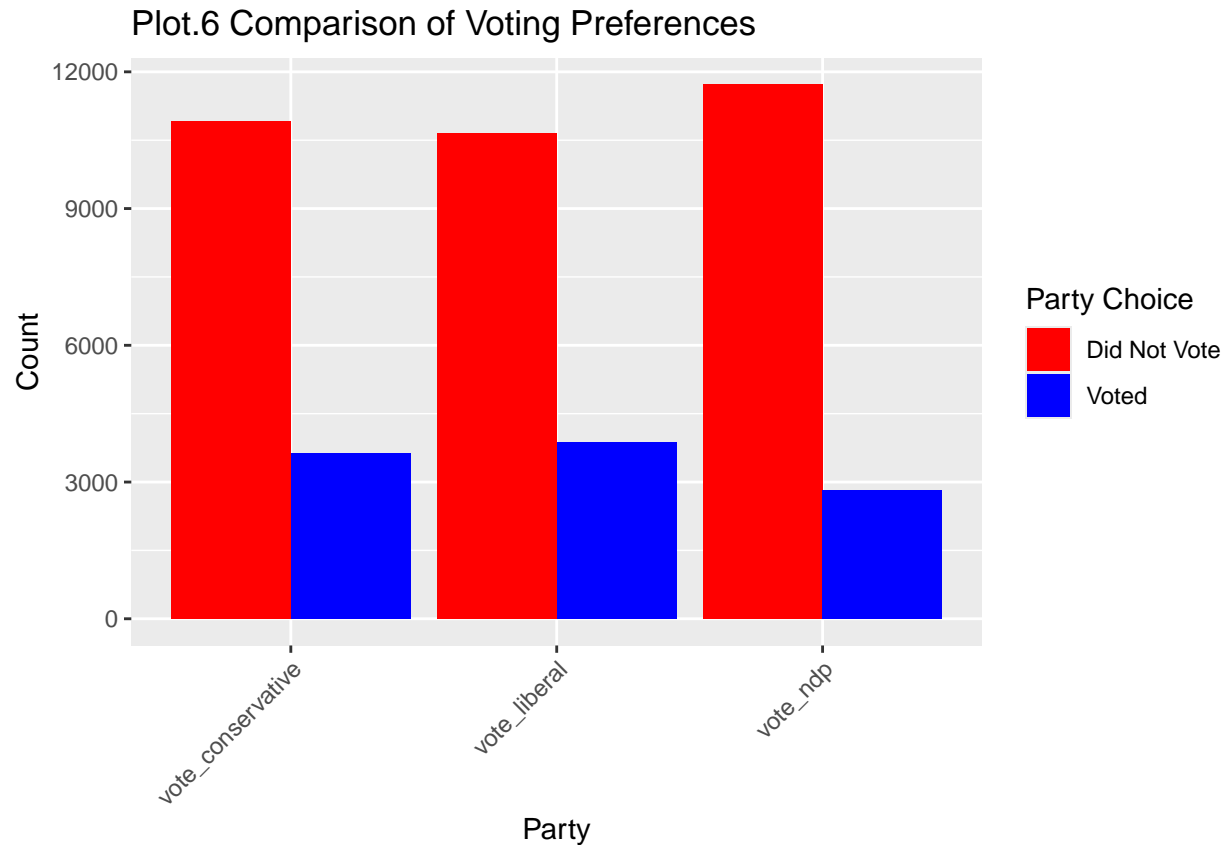
The graph depicts three pairs of bars, each representing a different political party: `Vote Conservative`, `Vote Liberal`, and `Vote NDP`. The bars are colored blue for those who voted and red for those who did not vote. The highest number of non-voters is associated with the `Vote NDP` party, with almost 12,000 votes. Conversely, the lowest number of votes is also observed for the `Vote NDP` party, with almost 3,000. The plot suggests that the NDP party is the least popular among voters, while the Liberal party is the most popular. The Conservative party falls somewhere in the middle, with about 3,500 votes. This graph is generated based on our cleaned survey dataset, and it is not aligning with our hypothesis, thus it is valuable to fit regression model and perform post-stratification on our data to examine the result. Additionally, the plot indicates a low level of voter turnout, as the red bars are significantly higher than the blue bars for all parties. This could suggest that a majority of people are not interested in voting.

Methods

Aimed at predicting the vote of the next Canadian federal election, statistical methods are useful tools, such as regression, variable selection, and poststratification. There are some missing variables in our data. We decided to keep them because they do not affect our model. There are 20921 observations before dropping missing values and only 14544 left if dropping. For the sake of data integrity and visibility, we keep missing values. We take three steps to create our model using the data. Firstly, we use logistic regression to fit the initial model. By fitting the relationship between the variable of voting for Liberal/Conservative/NDP and chosen explanatory variables, we get the desired model to predict the probability of voting for a political party. And we observe important parameters in the model such as coefficients and p values. After observing p values, we decided to use AIC stepwise selection to find out the final model which has minimized AIC. Finally, poststratification is used to estimate the proportion of voters who vote for Liberal or Conservative or NDP. We group the population by our predictors and calculate the proportion of voters for each political party.

Model Specifics

We will use three logistic regression models to model the probability of voting for the Liberal party, the conservative party and the NDP respectively. We did some research on factors affecting vote choice and then selected six predictors for modeling. The predictors are age, sex, province, education, religion and income before tax. Age is the only continuous variable, the remaining five are all categorical variables. Thus, our general model is the following.

$$log(\frac{p}{1-p}) = \beta_0 + \beta_1 x_{age} + \beta_2 x_{male} + \beta_3 x_{BC} + \beta_4 x_{MB} + \beta_5 x_{NB} + \beta_6 x_{NL}$$

$$+\beta_7 x_{NS} + \beta_8 x_{ON} + \beta_9 x_{PE} + \beta_{10} x_{QC} + \beta_{11} x_{SK} + \beta_{12} x_{religion} + \beta_{13} x_{mid} + \beta_{14} x_{upper}$$

p is the probability of voting for a party (liberal or conservative or NDP).

β_0 is the intercept, meaning the probability of voting when all predictors equal 0.

β_1 is the amount of change in log odds when age increases by 1 unit.

β_2 is the amount of change in log odds when the individual is male.

x_{male} equals 1 if the individual is male and 0 if she is female.

β_3 to β_{11} are the amount of change in log odds when the individual lives in a specific province.

x_{BC} equals 1 if the individual lives in British Columbia.

x_{MB} to x_{SK} mean the same thing as x_{BC} except the province has changed.

β_{12} is the amount of change in log odds when the individual has belief in religion.

$x_{religion}$ equals 1 if the individual has belief in religion and 0 if not.

β_{13} is the amount of change in log odds when the individual is middle class.

x_{mid} equals 1 if the individual is middle class and 0 if not.

β_{13} is the amount of change in log odds when the individual is upper middle class to wealthy.

x_{upper} equals 1 if the individual is upper middle class to wealthy and 0 if not.

Logistic regression is a powerful tool to analyze binary outcomes. It is a statistical model used to find the association between the binary response variable and some predictors which can be numerical or categorical. Logistic regression model predicts the likelihood of an event taking place by expressing the log odds as a linear combination of independent variables and the range of logistic regression is always bounded between 0 and 1(Belyadi & Haghighat, 2021). Our response variable is binary because it is only 0 or 1, and we

have numerical and categorical predictor variables. Moreover, we want to model the probability of voting. Therefore, we choose to use logistic regression.

There are four assumptions for logistic regression:

1. Binary outcome.

2. Linearity in the logit for continuous variables.

3. Absence of multicollinearity.

4. Lack of strongly influential outliers.

All assumptions are satisfied by our model. Firstly, the response variable is binary and there is linearity in the logit for the age variable. Secondly, all categorical variables are independent from each other. Obviously, an individual's living province does not affect his or her gender, level of education, religion, or income, nor is it affected by these variables. Similarly, religion, sex, education level and income do not influence each other as well. Lastly, outliers in categorical variables do not need to worry about and there is no strong outlier in our continuous variable 'age'.

Note that some p values of our model are greater than 0.05, which implies no statistical significance. Too many variables may be included in the model and statistical power may be low. This issue is also related to overfitting. Therefore, we should go over the process of variable selection. We will use AIC to stepwise select predictor variables (both forwards and backwards).

AIC is a mathematical method used to calculate the number that represents how well a model fits the data. Smaller AIC means better fitness. Stepwise variable selection is the process of either adding or subtracting a variable to the set of predictors in the model based on some pre-specified criteria. In our project, the criteria is AIC. Thus, we use R to stepwise select a final model which has the smallest AIC. After conducting stepwise selection based on AIC, the variable sex is eliminated from all three models. Thus, our final general model (after AIC) is the following.

$$log(\frac{p}{1-p}) = \beta_0 + \beta_1 x_{age} + \beta_2 x_{BC} + \beta_3 x_{MB} + \beta_4 x_{NB} + \beta_5 x_{NL}$$
$$+\beta_6 x_{NS} + \beta_7 x_{ON} + \beta_8 x_{PE} + \beta_9 x_{QC} + \beta_{10} x_{SK} + \beta_{11} x_{religion} + \beta_{12} x_{mid} + \beta_{13} x_{upper}$$

Post-Stratification

Poststratification is a statistical method designed to analyze data from a survey sample. It divides the population into subgroups based on certain characteristics. Each group is analyzed separately. After collecting data, researchers weigh the observations and calculate estimators in each group. Poststratification is particularly useful when observations differ significantly in some variables. For example, the variable province in our data is versatile among individuals. By taking these differences into account, it improves the precision and accuracy of the estimates. Poststratification usually obtains reliable and representative estimates for the population, so we use it to estimate the proportion of voters for each political party (Liberal, Conservative and NDP) in the next election. Besides, we want to see the difference between the original model and the model after AIC stepwise selection, so we calculated two $\hat{y}^{PS}$ for each party. For primary models, we group the population by six variables: age, sex, province, education, religion and income before tax. For AIC models, sex is removed. The following mathematical formula is used to calculate $\hat{y}^{PS}$.

$$\hat{y}^{PS} = \frac{\Sigma N_j \hat{y}_j}{\Sigma N_j}$$

$\hat{y}_j$ is the proportion of voting of each group.

N_j is the population size of each group.

Within each group, we calculate the proportion estimate. Then, we get the overall proportion of the original model and the overall proportion of the final model according to the formula.

Results

In this section, we will perform the results, estimated probability, obtained from post-stratification and the models. Below is the summary table of the AIC adjusted model for the Conservative Party. Please refer to appendix table7 and table8 for summary table of the Liberal Party and NDP.

Summary Table.2 for the Conservative Party:

term	estimate	std.error	statistic	p.value
(Intercept)	-2.0314872	0.0953529	-21.304933	0.0000000
age	0.0160068	0.0012120	13.206741	0.0000000
provinceBritish Columbia	-0.7462852	0.0781609	-9.548059	0.0000000
provinceManitoba	-0.4868762	0.1067655	-4.560238	0.0000051
provinceNew Brunswick	-1.2108695	0.1699954	-7.122954	0.0000000
provinceNewfoundland and Labrador	-1.0076935	0.2202352	-4.575534	0.0000048
provinceNova Scotia	-0.9745046	0.1428142	-6.823585	0.0000000
provinceOntario	-0.6108541	0.0593616	-10.290391	0.0000000
provincePrince Edward Island	-0.4409225	0.3442272	-1.280906	0.2002268
provinceQuebec	-1.3176959	0.0656312	-20.077291	0.0000000
provinceSaskatchewan	0.0669540	0.1279704	0.523199	0.6008358
educationLimited Education	0.4893733	0.2986415	1.638665	0.1012831
educationSome Education	0.3304044	0.0419582	7.874618	0.0000000
religionYES	0.4093473	0.0466821	8.768825	0.0000000
income_before_taxMiddle Class	0.4043371	0.0475336	8.506341	0.0000000
income_before_taxUpper Middle Class to Wealthy	0.6232340	0.0592133	10.525245	0.0000000

Table of Result

Table 3: The Hat of yPS For Each Party, Between Primary Model and Final Model

Party_Name	yPS_primary	yPS_AIC
Conservative	0.2500926	0.25015
Liberal	0.249088	0.2490973
NDP	0.2008171	0.2008212

Table.3 shows the estimates for each party. The estimated probability of individuals voting for the Conservative Party using our adjusted final model is around 0.25. This suggests that approximately 25% of individuals within the specified age, province, education, religion, and income groups are estimated to vote for the Conservative Party in the 2025 Canadian Election. Next, the estimated probability of individuals voting for the Liberal Party using the AIC adjusted model is around 0.24. Thus, based on our model, approximately 24.9% of individuals within the specified characteristics are estimated to vote for the Liberal Party. Lastly, the estimated probability of individuals voting for the NDP using the model is around 0.20. That is, around 20% of the individuals with the specified characteristics are estimated to vote for the NDP.

The 95% Confidence Interval

The problem of our prediction are obvious: we have resulted in very similar probabilities for the Conservative and Liberal Party. Thus, we must look at the **confidence interval** for the predicted probability. Confidence

intervals around predicted probabilities for our logistic regression model offer insights into the uncertainty associated with those predictions(Zach, 2022). A narrow confidence interval suggests our model is more precise and reliable when estimating the outcomes, and based on the model assumption, we are given more confidence about the estimation as well. Oppositely, a wider interval indicates more uncertainty about the predictions based on our model, and it may also result in less precision as well(Bevans, 2023). The 95% logistic regression confidence intervals we obtained for predicted probabilities at each individual observation provide a range within which the true probability of an event (such as belonging to a specific province, age...etc.) is likely to fall into. This interval captures the uncertainty in class probabilities(Zach, 2022).

Our confidence interval is calculated by the formula:

The 95% CI = Predicted Probability $\pm 1.96 \times \sqrt{\frac{\text{Predicted Probability} \times (1 - \text{Predicted Probability})}{\text{Number of Observations}}}$

Table 4: First 3 Confidence Interval for Conservative Party

age	province	education	religion	income_before_tax	cons_predictions	lwr	upr
15	Alberta	Limited Education	YES	Lower Middle Class to Poor	0.2905601	0.2779929	0.3031274
15	British Columbia	Limited Education	NO	Lower Middle Class to Poor	0.1142245	0.1054200	0.1230290
15	British Columbia	Limited Education	YES	Lower Middle Class to Poor	0.1626079	0.1523939	0.1728220

These intervals give us an estimate of the uncertainty around the predicted probabilities for each individual observation based on the logistic regression models. They indicate the range in which the true probability of an observation belonging to a specific class (Conservative or Liberal) is likely to fall, considering the model's uncertainty. For instance, Table.4 first row shows the prediction for an individual who is 15 years old, living in Alberta, with limited education, has religion, and belongs to the Lower-Middle-Class income group. Our model suggests the probability of this individual voting for the Conservative party is approximately 29.05%, and this prediction has a 95% confidence interval, thus the true probability could range from approximately 27.80% to 30.31%. This means that the actual probability of voting Conservative could be as low as about 27.80%, while the upper bound indicates a 95% likelihood that it could be as high as about 30.31%.

Table 5: First 3 Confidence Interval for Liberal Party

age	province	education	religion	income_before_tax	lib_predictions	lwr	upr
15	Alberta	Limited Education	YES	Lower Middle Class to Poor	0.0866070	0.0788218	0.0943922
15	British Columbia	Limited Education	NO	Lower Middle Class to Poor	0.1051397	0.0966493	0.1136300
15	British Columbia	Limited Education	YES	Lower Middle Class to Poor	0.1178985	0.1089721	0.1268249

Similarly, Table.5 first row suggests that for an individual who has the same background and characteristics(as previously explained in Table.3's individual), our model suggests the probability of him/her voting for the Liberal party is only approximately 8.7%. This prediction also comes with a 95% confidence interval, indicating that the true probability could range from around 7.9% to 9.4%.

In the above cases shown, the Liberal Party's narrower interval (7.9% to 9.4%) suggests higher reliability and more precision in the model's prediction compared to the Conservative Party's wider interval (27.80% to 30.31%), showing a higher uncertainty in predicting the Conservative votes based on the given characteristics specifically.

Conclusions

According to multiple researches, Canadian voters mainly focused on the top 5 issues: rising cost of living, housing, healthcare, economy, and environment, which is why the corresponding plans, measures and programs proposed by the parties in the election campaigns are also the focus of voters' attention. With this in mind, we found 5 polls for the 2025 election on the internet, and four of them showed that more votes support the Conservative Party over the Liberal Party, with very little difference, and the NDP only has very little support from the participants. Meanwhile, we observe from Barik's article that Canadians tend to believe the Conservative Party performed better when dealing with the top 5 issues(Barik, 2023). Therefore, our hypothesis for the 2025 Canadian Election is that **the Conservative Party will be slightly favoured in winning the election over the Liberal Party**.

For model selection, we chose several predictors from the census and survey dataset based on research and the concern of the top 5 issues, cleaned the data, and separated them into three datasets. Since we aimed to predict whether each voter with a complex social background would vote for a certain party or not, we decided to fit **three primarily logistic regression models**. Each model corresponds to either the Conservative Party, the Liberal Party, or the NDP. The models are fitted with the response variable being "to vote for this party", and each model predicts the probability of the individuals voting for the corresponding party. Next, we did the Akaike's Information Criteria test to get rid of unnecessary predictors and decided our predictors for the final models: age, province, religion, education, and income before tax.

Finally, we have performed post-stratification on our chosen predictors to calculate the appropriate probability for each party. This result suggests that after we perform model selection and post-stratification, the Conservative Party's predicted probability is 0.25015 that there is a 25% chance of winning the 2025 election, which has the highest probability of being voted. On the other hand, the Liberal Party's predicted probability is 0.24909, which has a 24.9% chance of winning the election; and only a 20% chance for the NDP. Thus, this result aligns with our prior prediction that the Conservative Party is slightly favoured to win the 2025 Canada Election over the Liberal Party, based on the provided census and survey data. The key result we found is similar to our previous researches. **While there will also be a relatively small group of voters supporting the NDP, the Conservative and Liberal Party will be the two major competitors for the 2025 Canadian Election, and the Conservatives will be slightly favoured by the voters.**

Reflection on Drawback of Current Study

An issue we noticed is around the age of the participants. As our data was established in 2021, some participants, who were younger than 18, did not have the right to vote will become eligible to vote next year in 2025. However, we also found out that even the youngest participants in our cleaned dataset are above the age of 15, making them eligible to vote in 2025. As a result, we chose not to remove the young participants and included everyone in both the census and survey datasets, considering that all of them will be eligible to vote next year. However, it's important to note their age in 2021 and the fact that they were not able to vote, as this might have heavily influenced their decision-making. Thus, in our future study, we must to be mindful of how age could have impacted our prediction model.

Improvement for Future Study

From this assignment, we found that predicting election outcomes is difficult due to the complex personal reasons guiding how people vote. Our study has shown that it's tough to predict perfectly because there's a lot of uncertainty and errors in understanding such private choices, especially when things like policies change all the time. While we can't expect a "perfect model" for the 2025 Canadian Election, it might help to include more predictors in future studies. Incorporating additional variables allows us to enhance the precision of our predictions and minimize the risk of losing meaningful predictors.

To summarize our study, we performed the binary logistic regression approach with post-stratification to predict the probability of participants voting for a specific party: Conservative, Liberal, or NDP. Our prediction involved forecasting the likelihood of each of the three party winning the upcoming 2025 Canadian Election using data from the 2021 Canadian Census and Survey. And most Importantly, our estimated results align with the majority of our research which suggesting that the Conservative Party is most likely to win, closely followed by the Liberal party. This prediction is based on the complex factors within the 5 variables of interests that we found vulnerable to include, based on our research on the top 10 concerns of current Canadians. Therefore, our prediction has significance as it supports Barik's latest report on recent Canadian polls, indicating that the Conservatives would be the winner in the 2025 Canadian Election (Barik, 2023).

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Appendix

All analysis for this report was programmed using `R version 4.0.2`.

Generative AI Statement

I used ChatGPT Version available on November 19, 2023. I used the tool to understand "How to generate proper plots for confidence interval in R?". I suggested me to plot with the package "ggplot2", and gave me an example code. I referenced to the provided code and generated my plots in appendix.

I used ChatGPT Version available on November 21, 2023. I used the tool to understand "Is confidence interval for all types of models the same in statistics?". It introduced the overall meaning of confidence interval and gave me example for a linear regression model. I then asked "Is it the same for regression model?", it tells me the slight difference between the two models, and I learned the difference and applied the logistic regression's meaning into my interpretation.

I used ChatGPT Version available on November 21, 2023. I used the tool to understand "How should I interpret confidence interval for logistic regression model?". It gave me a very long list of what should be considered when deaaling with confidence interval for logistic model. I applied the meaning of confidence interval it told me into my interpretation and combined with my context.

I used ChatGPT Version available on November 22, 2023. I encounter an error when knitting my rmd file into pdf, and the R markdown suggested that some problem occurred with my latex. I used the tool to understand "I have Latex in my file, what error could occur when generating rmd files into pdf in r?". It gave me a long list of what should I be aware of, for example, Escape Special Characters, Enclose Text in Math Mode, and etc. . . I revised my Latex notation based on its suggestion.

Plot.7 Predicted Probabilities for Conservative Party with Confidence Interval
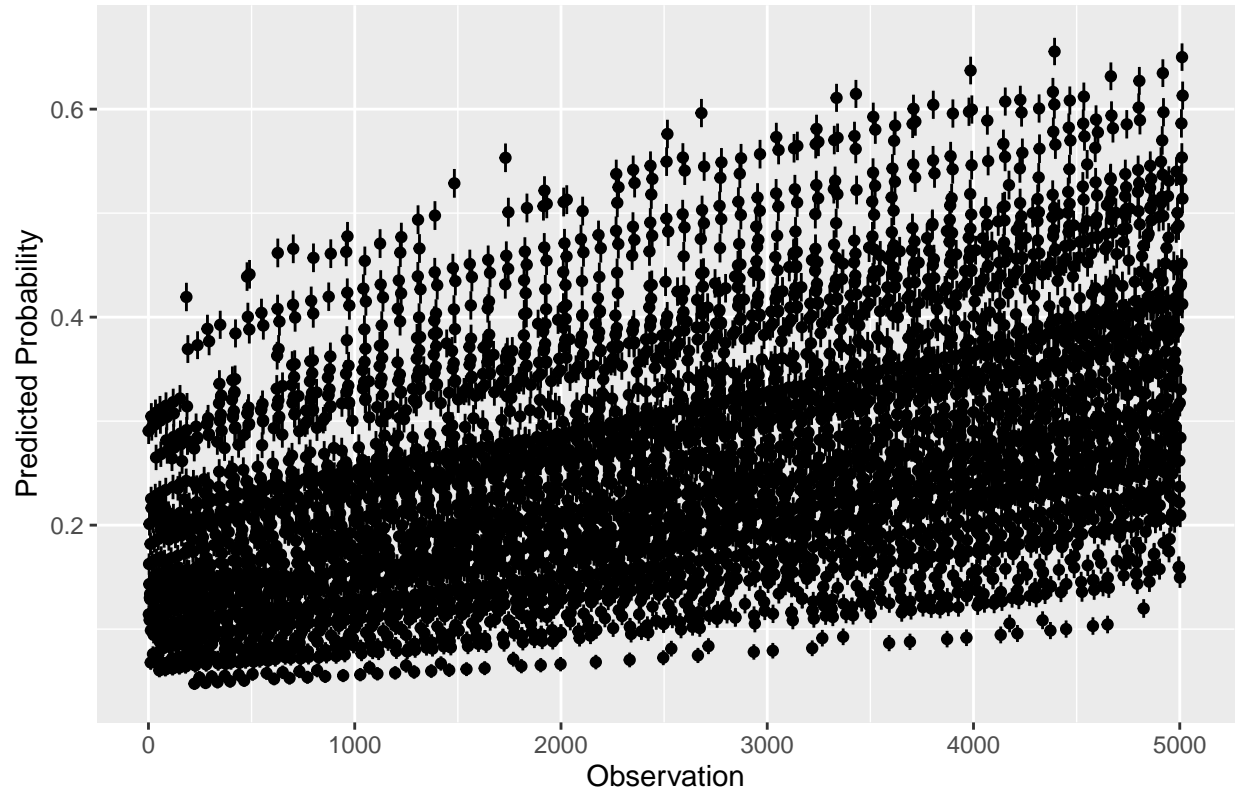
Plot.7 is a plot of Confidence Interval for all predicted probabilities, for the Conservative Party.

Plot.8 Predicted Probabilities for Liberal Party with Confidence Intervals
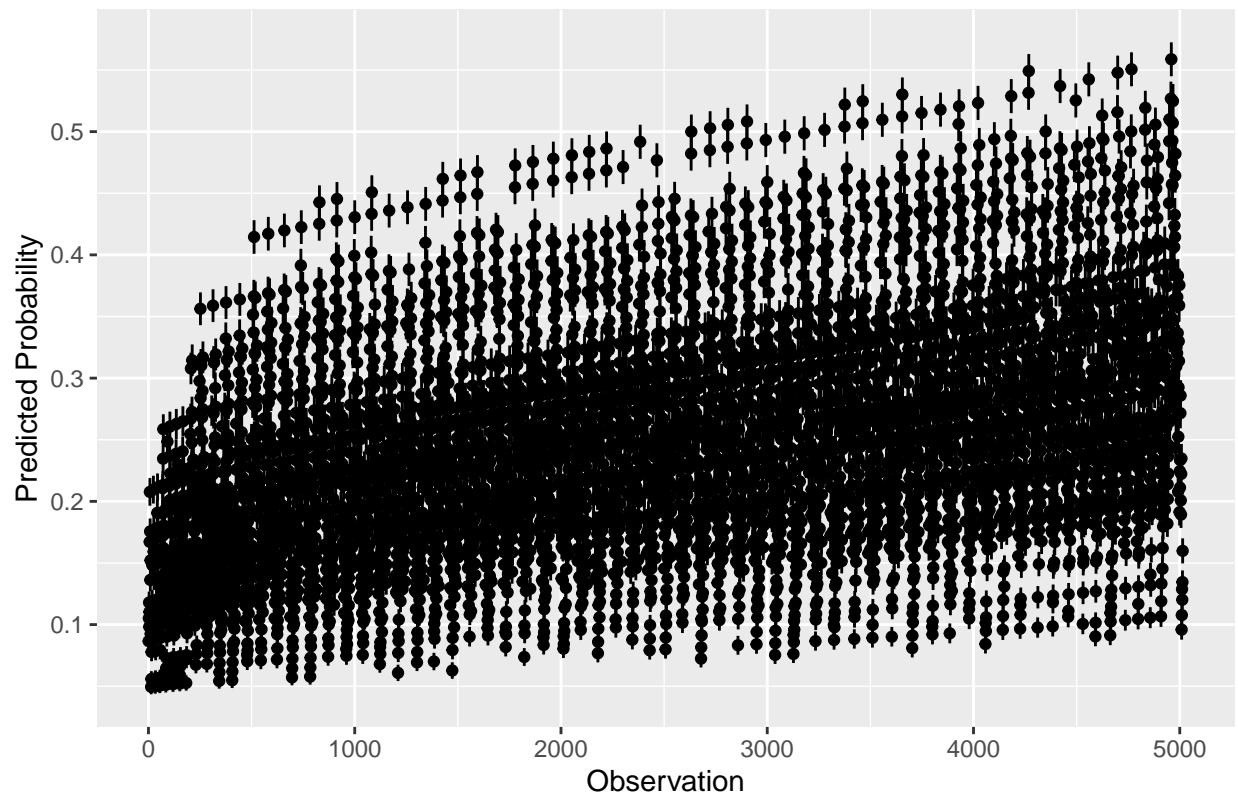
Plot.8 is a plot of Confidence Interval for all predicted probabilities, for the Liberal Party.

Table 6

term	estimate	std.error	statistic	p.value
(Intercept)	-1.9896550	0.0965374	-20.610201	0.0000000
age	0.0109689	0.0011576	9.475744	0.0000000
provinceBritish Columbia	0.3433018	0.0838919	4.092192	0.0000427
provinceManitoba	0.2680409	0.1165961	2.298885	0.0215115
provinceNew Brunswick	0.7498815	0.1429971	5.244034	0.0000002
provinceNewfoundland and Labrador	1.0169087	0.1869210	5.440312	0.0000001
provinceNova Scotia	0.8090848	0.1272483	6.358316	0.0000000
provinceOntario	0.6378607	0.0675341	9.445018	0.0000000
provincePrince Edward Island	0.3046685	0.3704104	0.822516	0.4107833
provinceQuebec	0.2011994	0.0706164	2.849188	0.0043831
provinceSaskatchewan	-0.4715103	0.1808809	-2.606744	0.0091408
educationLimited Education	-0.6595586	0.3250577	-2.029051	0.0424531
educationSome Education	-0.4070598	0.0395210	-10.299828	0.0000000
religionYES	0.1288946	0.0432031	2.983460	0.0028501
income_before_taxMiddle Class	0.2023178	0.0451534	4.480682	0.0000074
income_before_taxUpper Middle Class to Wealthy	0.2734494	0.0563647	4.851433	0.0000012

The above Table.6 is the summary table of the AIC adjusted model for Liberal Party

Table 7

term	estimate	std.error	statistic	p.value
(Intercept)	0.9354711	0.0986417	9.4835299	0.0000000
age	-0.0334053	0.0013466	-24.8071137	0.0000000
provinceBritish Columbia	0.3675476	0.0842356	4.3633311	0.0000128
provinceManitoba	0.1964830	0.1201892	1.6347810	0.1020950
provinceNew Brunswick	-0.1322464	0.1701319	-0.7773169	0.4369718
provinceNewfoundland and Labrador	0.1726464	0.2155036	0.8011300	0.4230564
provinceNova Scotia	0.2173871	0.1389030	1.5650283	0.1175763
provinceOntario	-0.0770940	0.0706410	-1.0913490	0.2751194
provincePrince Edward Island	-1.8312451	0.7362621	-2.4872190	0.0128746
provinceQuebec	-0.8642860	0.0779430	-11.0886880	0.0000000
provinceSaskatchewan	0.3082001	0.1455943	2.1168416	0.0342733
educationLimited Education	-0.5980112	0.3931027	-1.5212596	0.1281947
educationSome Education	-0.0048831	0.0458226	-0.1065660	0.9151333
religionYES	-0.5428047	0.0461018	-11.7740343	0.0000000
income_before_taxMiddle Class	-0.2478544	0.0497076	-4.9862520	0.0000006
income_before_taxUpper Middle Class to Wealthy	-0.5742703	0.0675145	-8.5058842	0.0000000

The above Table.7 is the summary table of the AIC adjusted model for the NDP.

Density plot

Plot.9 The Density Plot for Predicted Probabilities for Conservative
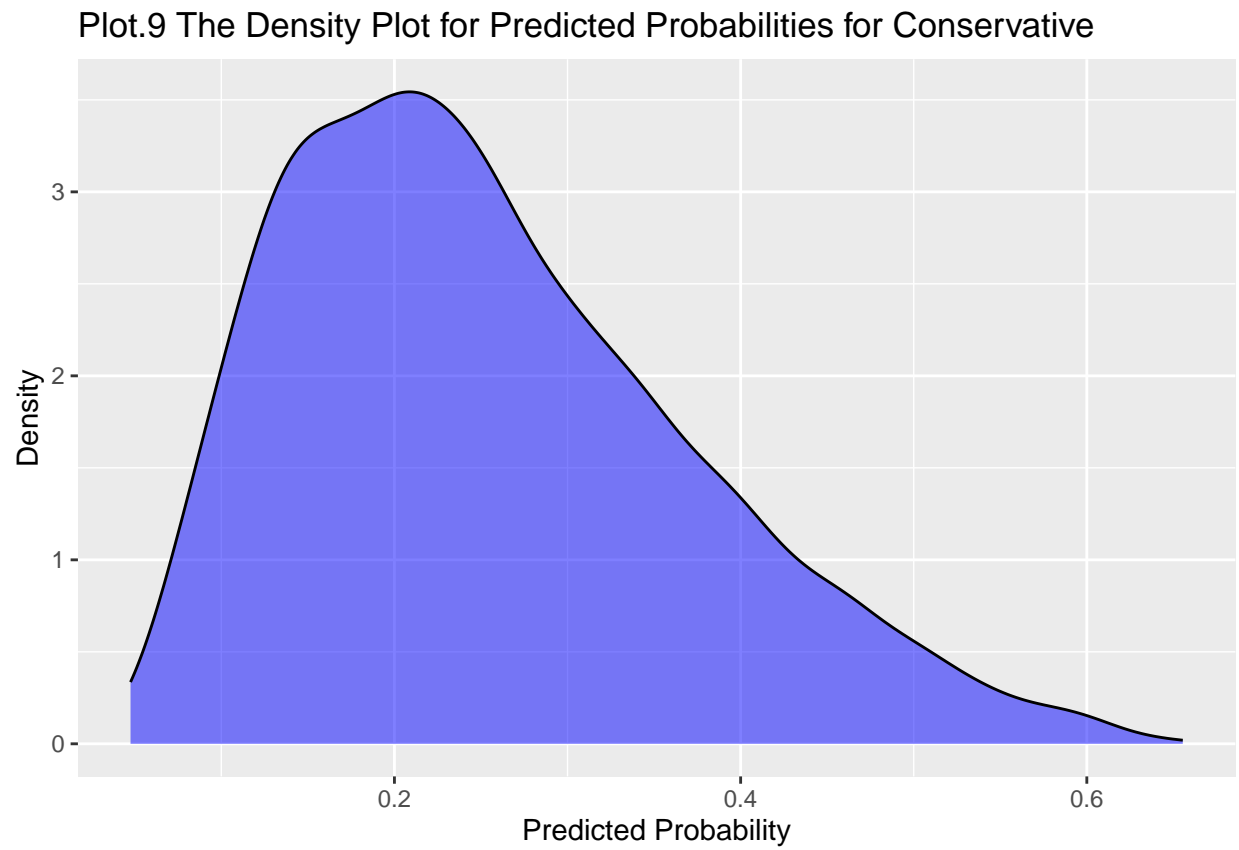
Plot.10 The Density Plot for Predicted Probabilities for Liberal
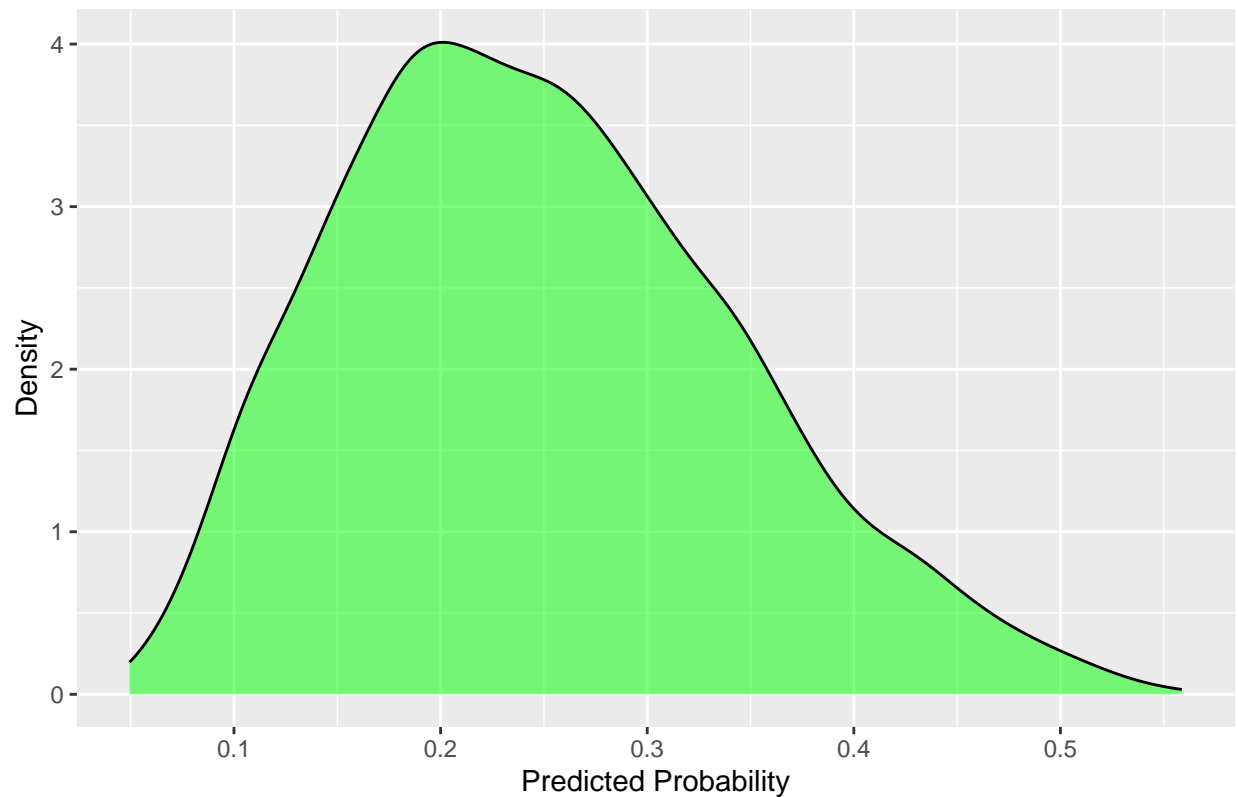
The above Figure 9 and 10 are density plots for Conservative and Liberal Party, they are the distribution of our predicted probabilities. While both distributions being slightly left skew, this means that both have majority of the predicted probabilities on the side closer to 0.2, and suggests that the model is more inclined to predict higher probabilities for both Conservative and Liberal parties. Also, the peak of the density plot for the Liberal party is about 4, which is higher compared to the Conservative party. This indicates that the model tends to predict a more concentrated range of higher probabilities for the Liberal party compared to the Conservative party. Lastly, there is an obvious overlap between the two distributions, this means that there is uncertainty(less confidence) in distinguishing between the predicted probabilities for Conservative and Liberal parties.

Table 8: Categorical Summary Table For the Survey Dataset

sex	province	education	religion	income_before_tax	Freq
Female	Alberta	Highly Educated	NO	Lower Middle Class to Poor	43
Male	Alberta	Highly Educated	NO	Lower Middle Class to Poor	23
Female	British Columbia	Highly Educated	NO	Lower Middle Class to Poor	38
Male	British Columbia	Highly Educated	NO	Lower Middle Class to Poor	37
Female	Manitoba	Highly Educated	NO	Lower Middle Class to Poor	9
Male	Manitoba	Highly Educated	NO	Lower Middle Class to Poor	6
Female	New Brunswick	Highly Educated	NO	Lower Middle Class to Poor	5
Male	New Brunswick	Highly Educated	NO	Lower Middle Class to Poor	10
Female	Newfoundland and Labrador	Highly Educated	NO	Lower Middle Class to Poor	1
Male	Newfoundland and Labrador	Highly Educated	NO	Lower Middle Class to Poor	3
Female	Nova Scotia	Highly Educated	NO	Lower Middle Class to Poor	8
Male	Nova Scotia	Highly Educated	NO	Lower Middle Class to Poor	12
Female	Ontario	Highly Educated	NO	Lower Middle Class to Poor	110
Male	Ontario	Highly Educated	NO	Lower Middle Class to Poor	96
Female	Prince Edward Island	Highly Educated	NO	Lower Middle Class to Poor	3
Male	Prince Edward Island	Highly Educated	NO	Lower Middle Class to Poor	0
Female	Quebec	Highly Educated	NO	Lower Middle Class to Poor	115
Male	Quebec	Highly Educated	NO	Lower Middle Class to Poor	96
Female	Saskatchewan	Highly Educated	NO	Lower Middle Class to Poor	2
Male	Saskatchewan	Highly Educated	NO	Lower Middle Class to Poor	6
Female	Alberta	Limited Education	NO	Lower Middle Class to Poor	1
Male	Alberta	Limited Education	NO	Lower Middle Class to Poor	0
Female	British Columbia	Limited Education	NO	Lower Middle Class to Poor	0
Male	British Columbia	Limited Education	NO	Lower Middle Class to Poor	1
Female	Manitoba	Limited Education	NO	Lower Middle Class to Poor	0
Male	Manitoba	Limited Education	NO	Lower Middle Class to Poor	0
Female	New Brunswick	Limited Education	NO	Lower Middle Class to Poor	1
Male	New Brunswick	Limited Education	NO	Lower Middle Class to Poor	0
Female	Newfoundland and Labrador	Limited Education	NO	Lower Middle Class to Poor	0
Male	Newfoundland and Labrador	Limited Education	NO	Lower Middle Class to Poor	0
Female	Nova Scotia	Limited Education	NO	Lower Middle Class to Poor	0
Male	Nova Scotia	Limited Education	NO	Lower Middle Class to Poor	1
Female	Ontario	Limited Education	NO	Lower Middle Class to Poor	2
Male	Ontario	Limited Education	NO	Lower Middle Class to Poor	4

sex	province	education	religion	income_before_tax	Freq
Female	Prince Edward Island	Limited Education	NO	Lower Middle Class to Poor	0
Male	Prince Edward Island	Limited Education	NO	Lower Middle Class to Poor	0
Female	Quebec	Limited Education	NO	Lower Middle Class to Poor	2
Male	Quebec	Limited Education	NO	Lower Middle Class to Poor	4
Female	Saskatchewan	Limited Education	NO	Lower Middle Class to Poor	0
Male	Saskatchewan	Limited Education	NO	Lower Middle Class to Poor	0
Female	Alberta	Some Education	NO	Lower Middle Class to Poor	88
Male	Alberta	Some Education	NO	Lower Middle Class to Poor	75
Female	British Columbia	Some Education	NO	Lower Middle Class to Poor	111
Male	British Columbia	Some Education	NO	Lower Middle Class to Poor	83
Female	Manitoba	Some Education	NO	Lower Middle Class to Poor	34
Male	Manitoba	Some Education	NO	Lower Middle Class to Poor	25
Female	New Brunswick	Some Education	NO	Lower Middle Class to Poor	17
Male	New Brunswick	Some Education	NO	Lower Middle Class to Poor	15
Female	Newfoundland and Labrador	Some Education	NO	Lower Middle Class to Poor	11
Male	Newfoundland and Labrador	Some Education	NO	Lower Middle Class to Poor	3
Female	Nova Scotia	Some Education	NO	Lower Middle Class to Poor	19
Male	Nova Scotia	Some Education	NO	Lower Middle Class to Poor	23
Female	Ontario	Some Education	NO	Lower Middle Class to Poor	198
Male	Ontario	Some Education	NO	Lower Middle Class to Poor	172
Female	Prince Edward Island	Some Education	NO	Lower Middle Class to Poor	2
Male	Prince Edward Island	Some Education	NO	Lower Middle Class to Poor	0
Female	Quebec	Some Education	NO	Lower Middle Class to Poor	243
Male	Quebec	Some Education	NO	Lower Middle Class to Poor	179
Female	Saskatchewan	Some Education	NO	Lower Middle Class to Poor	19
Male	Saskatchewan	Some Education	NO	Lower Middle Class to Poor	11
Female	Alberta	Highly Educated	YES	Lower Middle Class to Poor	89
Male	Alberta	Highly Educated	YES	Lower Middle Class to Poor	67
Female	British Columbia	Highly Educated	YES	Lower Middle Class to Poor	77
Male	British Columbia	Highly Educated	YES	Lower Middle Class to Poor	63
Female	Manitoba	Highly Educated	YES	Lower Middle Class to Poor	25
Male	Manitoba	Highly Educated	YES	Lower Middle Class to Poor	25
Female	New Brunswick	Highly Educated	YES	Lower Middle Class to Poor	20
Male	New Brunswick	Highly Educated	YES	Lower Middle Class to Poor	10
Female	Newfoundland and Labrador	Highly Educated	YES	Lower Middle Class to Poor	5
Male	Newfoundland and Labrador	Highly Educated	YES	Lower Middle Class to Poor	2
Female	Nova Scotia	Highly Educated	YES	Lower Middle Class to Poor	17
Male	Nova Scotia	Highly Educated	YES	Lower Middle Class to Poor	17
Female	Ontario	Highly Educated	YES	Lower Middle Class to Poor	313
Male	Ontario	Highly Educated	YES	Lower Middle Class to Poor	257
Female	Prince Edward Island	Highly Educated	YES	Lower Middle Class to Poor	2
Male	Prince Edward Island	Highly Educated	YES	Lower Middle Class to Poor	1

sex	province	education	religion	income_before_tax	Freq
Female	Quebec	Highly Educated	YES	Lower Middle Class to Poor	168
Male	Quebec	Highly Educated	YES	Lower Middle Class to Poor	174
Female	Saskatchewan	Highly Educated	YES	Lower Middle Class to Poor	11
Male	Saskatchewan	Highly Educated	YES	Lower Middle Class to Poor	11
Female	Alberta	Limited Education	YES	Lower Middle Class to Poor	2
Male	Alberta	Limited Education	YES	Lower Middle Class to Poor	2
Female	British Columbia	Limited Education	YES	Lower Middle Class to Poor	2
Male	British Columbia	Limited Education	YES	Lower Middle Class to Poor	3
Female	Manitoba	Limited Education	YES	Lower Middle Class to Poor	3
Male	Manitoba	Limited Education	YES	Lower Middle Class to Poor	2
Female	New Brunswick	Limited Education	YES	Lower Middle Class to Poor	3
Male	New Brunswick	Limited Education	YES	Lower Middle Class to Poor	0
Female	Newfoundland and Labrador	Limited Education	YES	Lower Middle Class to Poor	2
Male	Newfoundland and Labrador	Limited Education	YES	Lower Middle Class to Poor	1
Female	Nova Scotia	Limited Education	YES	Lower Middle Class to Poor	0
Male	Nova Scotia	Limited Education	YES	Lower Middle Class to Poor	1
Female	Ontario	Limited Education	YES	Lower Middle Class to Poor	11
Male	Ontario	Limited Education	YES	Lower Middle Class to Poor	6
Female	Prince Edward Island	Limited Education	YES	Lower Middle Class to Poor	0
Male	Prince Edward Island	Limited Education	YES	Lower Middle Class to Poor	0
Female	Quebec	Limited Education	YES	Lower Middle Class to Poor	10
Male	Quebec	Limited Education	YES	Lower Middle Class to Poor	10
Female	Saskatchewan	Limited Education	YES	Lower Middle Class to Poor	0
Male	Saskatchewan	Limited Education	YES	Lower Middle Class to Poor	0
Female	Alberta	Some Education	YES	Lower Middle Class to Poor	202
Male	Alberta	Some Education	YES	Lower Middle Class to Poor	179
Female	British Columbia	Some Education	YES	Lower Middle Class to Poor	167
Male	British Columbia	Some Education	YES	Lower Middle Class to Poor	177
Female	Manitoba	Some Education	YES	Lower Middle Class to Poor	95
Male	Manitoba	Some Education	YES	Lower Middle Class to Poor	63
Female	New Brunswick	Some Education	YES	Lower Middle Class to Poor	57
Male	New Brunswick	Some Education	YES	Lower Middle Class to Poor	42

sex	province	education	religion	income_before_tax	Freq
Female	Newfoundland and Labrador	Some Education	YES	Lower Middle Class to Poor	30
Male	Newfoundland and Labrador	Some Education	YES	Lower Middle Class to Poor	24
Female	Nova Scotia	Some Education	YES	Lower Middle Class to Poor	48
Male	Nova Scotia	Some Education	YES	Lower Middle Class to Poor	57
Female	Ontario	Some Education	YES	Lower Middle Class to Poor	612
Male	Ontario	Some Education	YES	Lower Middle Class to Poor	501
Female	Prince Edward Island	Some Education	YES	Lower Middle Class to Poor	13
Male	Prince Edward Island	Some Education	YES	Lower Middle Class to Poor	6
Female	Quebec	Some Education	YES	Lower Middle Class to Poor	589
Male	Quebec	Some Education	YES	Lower Middle Class to Poor	490
Female	Saskatchewan	Some Education	YES	Lower Middle Class to Poor	44
Male	Saskatchewan	Some Education	YES	Lower Middle Class to Poor	34
Female	Alberta	Highly Educated	NO	Middle Class	99
Male	Alberta	Highly Educated	NO	Middle Class	76
Female	British Columbia	Highly Educated	NO	Middle Class	131
Male	British Columbia	Highly Educated	NO	Middle Class	94
Female	Manitoba	Highly Educated	NO	Middle Class	23
Male	Manitoba	Highly Educated	NO	Middle Class	19
Female	New Brunswick	Highly Educated	NO	Middle Class	18
Male	New Brunswick	Highly Educated	NO	Middle Class	5
Female	Newfoundland and Labrador	Highly Educated	NO	Middle Class	5
Male	Newfoundland and Labrador	Highly Educated	NO	Middle Class	5
Female	Nova Scotia	Highly Educated	NO	Middle Class	24
Male	Nova Scotia	Highly Educated	NO	Middle Class	19
Female	Ontario	Highly Educated	NO	Middle Class	266
Male	Ontario	Highly Educated	NO	Middle Class	210
Female	Prince Edward Island	Highly Educated	NO	Middle Class	4
Male	Prince Edward Island	Highly Educated	NO	Middle Class	0
Female	Quebec	Highly Educated	NO	Middle Class	242
Male	Quebec	Highly Educated	NO	Middle Class	208
Female	Saskatchewan	Highly Educated	NO	Middle Class	9
Male	Saskatchewan	Highly Educated	NO	Middle Class	5
Female	Alberta	Limited Education	NO	Middle Class	0
Male	Alberta	Limited Education	NO	Middle Class	0
Female	British Columbia	Limited Education	NO	Middle Class	0
Male	British Columbia	Limited Education	NO	Middle Class	1
Female	Manitoba	Limited Education	NO	Middle Class	0
Male	Manitoba	Limited Education	NO	Middle Class	0
Female	New Brunswick	Limited Education	NO	Middle Class	0
Male	New Brunswick	Limited Education	NO	Middle Class	0

sex	province	education	religion	income_before_tax	Freq
Female	Newfoundland and Labrador	Limited Education	NO	Middle Class	0
Male	Newfoundland and Labrador	Limited Education	NO	Middle Class	0
Female	Nova Scotia	Limited Education	NO	Middle Class	0
Male	Nova Scotia	Limited Education	NO	Middle Class	0
Female	Ontario	Limited Education	NO	Middle Class	2
Male	Ontario	Limited Education	NO	Middle Class	0
Female	Prince Edward Island	Limited Education	NO	Middle Class	0
Male	Prince Edward Island	Limited Education	NO	Middle Class	0
Female	Quebec	Limited Education	NO	Middle Class	0
Male	Quebec	Limited Education	NO	Middle Class	2
Female	Saskatchewan	Limited Education	NO	Middle Class	0
Male	Saskatchewan	Limited Education	NO	Middle Class	0
Female	Alberta	Some Education	NO	Middle Class	107
Male	Alberta	Some Education	NO	Middle Class	80
Female	British Columbia	Some Education	NO	Middle Class	118
Male	British Columbia	Some Education	NO	Middle Class	102
Female	Manitoba	Some Education	NO	Middle Class	23
Male	Manitoba	Some Education	NO	Middle Class	25
Female	New Brunswick	Some Education	NO	Middle Class	12
Male	New Brunswick	Some Education	NO	Middle Class	12
Female	Newfoundland and Labrador	Some Education	NO	Middle Class	5
Male	Newfoundland and Labrador	Some Education	NO	Middle Class	6
Female	Nova Scotia	Some Education	NO	Middle Class	21
Male	Nova Scotia	Some Education	NO	Middle Class	21
Female	Ontario	Some Education	NO	Middle Class	255
Male	Ontario	Some Education	NO	Middle Class	189
Female	Prince Edward Island	Some Education	NO	Middle Class	3
Male	Prince Edward Island	Some Education	NO	Middle Class	1
Female	Quebec	Some Education	NO	Middle Class	334
Male	Quebec	Some Education	NO	Middle Class	260
Female	Saskatchewan	Some Education	NO	Middle Class	19
Male	Saskatchewan	Some Education	NO	Middle Class	22
Female	Alberta	Highly Educated	YES	Middle Class	209
Male	Alberta	Highly Educated	YES	Middle Class	168
Female	British Columbia	Highly Educated	YES	Middle Class	179
Male	British Columbia	Highly Educated	YES	Middle Class	157
Female	Manitoba	Highly Educated	YES	Middle Class	80
Male	Manitoba	Highly Educated	YES	Middle Class	59

sex	province	education	religion	income_before_tax	Freq
Female	New Brunswick	Highly Educated	YES	Middle Class	29
Male	New Brunswick	Highly Educated	YES	Middle Class	31
Female	Newfoundland and Labrador	Highly Educated	YES	Middle Class	14
Male	Newfoundland and Labrador	Highly Educated	YES	Middle Class	10
Female	Nova Scotia	Highly Educated	YES	Middle Class	39
Male	Nova Scotia	Highly Educated	YES	Middle Class	36
Female	Ontario	Highly Educated	YES	Middle Class	641
Male	Ontario	Highly Educated	YES	Middle Class	570
Female	Prince Edward Island	Highly Educated	YES	Middle Class	4
Male	Prince Edward Island	Highly Educated	YES	Middle Class	1
Female	Quebec	Highly Educated	YES	Middle Class	445
Male	Quebec	Highly Educated	YES	Middle Class	391
Female	Saskatchewan	Highly Educated	YES	Middle Class	31
Male	Saskatchewan	Highly Educated	YES	Middle Class	34
Female	Alberta	Limited Education	YES	Middle Class	1
Male	Alberta	Limited Education	YES	Middle Class	1
Female	British Columbia	Limited Education	YES	Middle Class	3
Male	British Columbia	Limited Education	YES	Middle Class	2
Female	Manitoba	Limited Education	YES	Middle Class	0
Male	Manitoba	Limited Education	YES	Middle Class	1
Female	New Brunswick	Limited Education	YES	Middle Class	0
Male	New Brunswick	Limited Education	YES	Middle Class	1
Female	Newfoundland and Labrador	Limited Education	YES	Middle Class	0
Male	Newfoundland and Labrador	Limited Education	YES	Middle Class	0
Female	Nova Scotia	Limited Education	YES	Middle Class	0
Male	Nova Scotia	Limited Education	YES	Middle Class	0
Female	Ontario	Limited Education	YES	Middle Class	4
Male	Ontario	Limited Education	YES	Middle Class	1
Female	Prince Edward Island	Limited Education	YES	Middle Class	0
Male	Prince Edward Island	Limited Education	YES	Middle Class	0
Female	Quebec	Limited Education	YES	Middle Class	2
Male	Quebec	Limited Education	YES	Middle Class	3

sex	province	education	religion	income_before_tax	Freq
Female	Saskatchewan	Limited Education	YES	Middle Class	0
Male	Saskatchewan	Limited Education	YES	Middle Class	0
Female	Alberta	Some Education	YES	Middle Class	266
Male	Alberta	Some Education	YES	Middle Class	222
Female	British Columbia	Some Education	YES	Middle Class	205
Male	British Columbia	Some Education	YES	Middle Class	170
Female	Manitoba	Some Education	YES	Middle Class	91
Male	Manitoba	Some Education	YES	Middle Class	81
Female	New Brunswick	Some Education	YES	Middle Class	45
Male	New Brunswick	Some Education	YES	Middle Class	41
Female	Newfoundland and Labrador	Some Education	YES	Middle Class	24
Male	Newfoundland and Labrador	Some Education	YES	Middle Class	19
Female	Nova Scotia	Some Education	YES	Middle Class	51
Male	Nova Scotia	Some Education	YES	Middle Class	43
Female	Ontario	Some Education	YES	Middle Class	737
Male	Ontario	Some Education	YES	Middle Class	615
Female	Prince Edward Island	Some Education	YES	Middle Class	7
Male	Prince Edward Island	Some Education	YES	Middle Class	6
Female	Quebec	Some Education	YES	Middle Class	601
Male	Quebec	Some Education	YES	Middle Class	578
Female	Saskatchewan	Some Education	YES	Middle Class	64
Male	Saskatchewan	Some Education	YES	Middle Class	45
Female	Alberta	Highly Educated	NO	Upper Middle Class to Wealthy	61
Male	Alberta	Highly Educated	NO	Upper Middle Class to Wealthy	48
Female	British Columbia	Highly Educated	NO	Upper Middle Class to Wealthy	58
Male	British Columbia	Highly Educated	NO	Upper Middle Class to Wealthy	44
Female	Manitoba	Highly Educated	NO	Upper Middle Class to Wealthy	9
Male	Manitoba	Highly Educated	NO	Upper Middle Class to Wealthy	9
Female	New Brunswick	Highly Educated	NO	Upper Middle Class to Wealthy	3
Male	New Brunswick	Highly Educated	NO	Upper Middle Class to Wealthy	3
Female	Newfoundland and Labrador	Highly Educated	NO	Upper Middle Class to Wealthy	3
Male	Newfoundland and Labrador	Highly Educated	NO	Upper Middle Class to Wealthy	1
Female	Nova Scotia	Highly Educated	NO	Upper Middle Class to Wealthy	8
Male	Nova Scotia	Highly Educated	NO	Upper Middle Class to Wealthy	12
Female	Ontario	Highly Educated	NO	Upper Middle Class to Wealthy	162

sex	province	education	religion	income_before_tax	Freq
Male	Ontario	Highly Educated	NO	Upper Middle Class to Wealthy	131
Female	Prince Edward Island	Highly Educated	NO	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Highly Educated	NO	Upper Middle Class to Wealthy	0
Female	Quebec	Highly Educated	NO	Upper Middle Class to Wealthy	161
Male	Quebec	Highly Educated	NO	Upper Middle Class to Wealthy	118
Female	Saskatchewan	Highly Educated	NO	Upper Middle Class to Wealthy	6
Male	Saskatchewan	Highly Educated	NO	Upper Middle Class to Wealthy	4
Female	Alberta	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Alberta	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	British Columbia	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	British Columbia	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Manitoba	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Manitoba	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	New Brunswick	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	New Brunswick	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Newfoundland and Labrador	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Newfoundland and Labrador	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Nova Scotia	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Nova Scotia	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Ontario	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Ontario	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Prince Edward Island	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Quebec	Limited Education	NO	Upper Middle Class to Wealthy	1
Male	Quebec	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Saskatchewan	Limited Education	NO	Upper Middle Class to Wealthy	0

sex	province	education	religion	income_before_tax	Freq
Male	Saskatchewan	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Alberta	Some Education	NO	Upper Middle Class to Wealthy	31
Male	Alberta	Some Education	NO	Upper Middle Class to Wealthy	34
Female	British Columbia	Some Education	NO	Upper Middle Class to Wealthy	31
Male	British Columbia	Some Education	NO	Upper Middle Class to Wealthy	24
Female	Manitoba	Some Education	NO	Upper Middle Class to Wealthy	6
Male	Manitoba	Some Education	NO	Upper Middle Class to Wealthy	8
Female	New Brunswick	Some Education	NO	Upper Middle Class to Wealthy	1
Male	New Brunswick	Some Education	NO	Upper Middle Class to Wealthy	3
Female	Newfoundland and Labrador	Some Education	NO	Upper Middle Class to Wealthy	1
Male	Newfoundland and Labrador	Some Education	NO	Upper Middle Class to Wealthy	2
Female	Nova Scotia	Some Education	NO	Upper Middle Class to Wealthy	4
Male	Nova Scotia	Some Education	NO	Upper Middle Class to Wealthy	4
Female	Ontario	Some Education	NO	Upper Middle Class to Wealthy	71
Male	Ontario	Some Education	NO	Upper Middle Class to Wealthy	63
Female	Prince Edward Island	Some Education	NO	Upper Middle Class to Wealthy	1
Male	Prince Edward Island	Some Education	NO	Upper Middle Class to Wealthy	0
Female	Quebec	Some Education	NO	Upper Middle Class to Wealthy	100
Male	Quebec	Some Education	NO	Upper Middle Class to Wealthy	80
Female	Saskatchewan	Some Education	NO	Upper Middle Class to Wealthy	6
Male	Saskatchewan	Some Education	NO	Upper Middle Class to Wealthy	6
Female	Alberta	Highly Educated	YES	Upper Middle Class to Wealthy	127
Male	Alberta	Highly Educated	YES	Upper Middle Class to Wealthy	99
Female	British Columbia	Highly Educated	YES	Upper Middle Class to Wealthy	81
Male	British Columbia	Highly Educated	YES	Upper Middle Class to Wealthy	75
Female	Manitoba	Highly Educated	YES	Upper Middle Class to Wealthy	21

sex	province	education	religion	income_before_tax	Freq
Male	Manitoba	Highly Educated	YES	Upper Middle Class to Wealthy	20
Female	New Brunswick	Highly Educated	YES	Upper Middle Class to Wealthy	8
Male	New Brunswick	Highly Educated	YES	Upper Middle Class to Wealthy	7
Female	Newfoundland and Labrador	Highly Educated	YES	Upper Middle Class to Wealthy	9
Male	Newfoundland and Labrador	Highly Educated	YES	Upper Middle Class to Wealthy	7
Female	Nova Scotia	Highly Educated	YES	Upper Middle Class to Wealthy	16
Male	Nova Scotia	Highly Educated	YES	Upper Middle Class to Wealthy	9
Female	Ontario	Highly Educated	YES	Upper Middle Class to Wealthy	414
Male	Ontario	Highly Educated	YES	Upper Middle Class to Wealthy	336
Female	Prince Edward Island	Highly Educated	YES	Upper Middle Class to Wealthy	2
Male	Prince Edward Island	Highly Educated	YES	Upper Middle Class to Wealthy	2
Female	Quebec	Highly Educated	YES	Upper Middle Class to Wealthy	213
Male	Quebec	Highly Educated	YES	Upper Middle Class to Wealthy	210
Female	Saskatchewan	Highly Educated	YES	Upper Middle Class to Wealthy	13
Male	Saskatchewan	Highly Educated	YES	Upper Middle Class to Wealthy	18
Female	Alberta	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Alberta	Limited Education	YES	Upper Middle Class to Wealthy	1
Female	British Columbia	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	British Columbia	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Manitoba	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Manitoba	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	New Brunswick	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	New Brunswick	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Newfoundland and Labrador	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Newfoundland and Labrador	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Nova Scotia	Limited Education	YES	Upper Middle Class to Wealthy	0

sex	province	education	religion	income_before_tax	Freq
Male	Nova Scotia	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Ontario	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Ontario	Limited Education	YES	Upper Middle Class to Wealthy	1
Female	Prince Edward Island	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Quebec	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Quebec	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Saskatchewan	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Saskatchewan	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Alberta	Some Education	YES	Upper Middle Class to Wealthy	78
Male	Alberta	Some Education	YES	Upper Middle Class to Wealthy	48
Female	British Columbia	Some Education	YES	Upper Middle Class to Wealthy	44
Male	British Columbia	Some Education	YES	Upper Middle Class to Wealthy	51
Female	Manitoba	Some Education	YES	Upper Middle Class to Wealthy	24
Male	Manitoba	Some Education	YES	Upper Middle Class to Wealthy	9
Female	New Brunswick	Some Education	YES	Upper Middle Class to Wealthy	7
Male	New Brunswick	Some Education	YES	Upper Middle Class to Wealthy	4
Female	Newfoundland and Labrador	Some Education	YES	Upper Middle Class to Wealthy	2
Male	Newfoundland and Labrador	Some Education	YES	Upper Middle Class to Wealthy	4
Female	Nova Scotia	Some Education	YES	Upper Middle Class to Wealthy	12
Male	Nova Scotia	Some Education	YES	Upper Middle Class to Wealthy	8
Female	Ontario	Some Education	YES	Upper Middle Class to Wealthy	192
Male	Ontario	Some Education	YES	Upper Middle Class to Wealthy	167
Female	Prince Edward Island	Some Education	YES	Upper Middle Class to Wealthy	1
Male	Prince Edward Island	Some Education	YES	Upper Middle Class to Wealthy	0
Female	Quebec	Some Education	YES	Upper Middle Class to Wealthy	167

sex	province	education	religion	income_before_tax	Freq
Male	Quebec	Some Education	YES	Upper Middle Class to Wealthy	121
Female	Saskatchewan	Some Education	YES	Upper Middle Class to Wealthy	16
Male	Saskatchewan	Some Education	YES	Upper Middle Class to Wealthy	10

Table 9: Categorical Summary Table For the Census Dataset

sex	province	education	religion	income_before_tax	Freq
Female	Alberta	Highly Educated	NO	Lower Middle Class to Poor	27
Male	Alberta	Highly Educated	NO	Lower Middle Class to Poor	19
Female	British Columbia	Highly Educated	NO	Lower Middle Class to Poor	59
Male	British Columbia	Highly Educated	NO	Lower Middle Class to Poor	47
Female	Manitoba	Highly Educated	NO	Lower Middle Class to Poor	14
Male	Manitoba	Highly Educated	NO	Lower Middle Class to Poor	10
Female	New Brunswick	Highly Educated	NO	Lower Middle Class to Poor	12
Male	New Brunswick	Highly Educated	NO	Lower Middle Class to Poor	12
Female	Newfoundland and Labrador	Highly Educated	NO	Lower Middle Class to Poor	11
Male	Newfoundland and Labrador	Highly Educated	NO	Lower Middle Class to Poor	7
Female	Nova Scotia	Highly Educated	NO	Lower Middle Class to Poor	19
Male	Nova Scotia	Highly Educated	NO	Lower Middle Class to Poor	22
Female	Ontario	Highly Educated	NO	Lower Middle Class to Poor	98
Male	Ontario	Highly Educated	NO	Lower Middle Class to Poor	81
Female	Prince Edward Island	Highly Educated	NO	Lower Middle Class to Poor	9
Male	Prince Edward Island	Highly Educated	NO	Lower Middle Class to Poor	9
Female	Quebec	Highly Educated	NO	Lower Middle Class to Poor	44
Male	Quebec	Highly Educated	NO	Lower Middle Class to Poor	26
Female	Saskatchewan	Highly Educated	NO	Lower Middle Class to Poor	7
Male	Saskatchewan	Highly Educated	NO	Lower Middle Class to Poor	8
Female	Alberta	Limited Education	NO	Lower Middle Class to Poor	11
Male	Alberta	Limited Education	NO	Lower Middle Class to Poor	22
Female	British Columbia	Limited Education	NO	Lower Middle Class to Poor	34
Male	British Columbia	Limited Education	NO	Lower Middle Class to Poor	47
Female	Manitoba	Limited Education	NO	Lower Middle Class to Poor	13
Male	Manitoba	Limited Education	NO	Lower Middle Class to Poor	12
Female	New Brunswick	Limited Education	NO	Lower Middle Class to Poor	9
Male	New Brunswick	Limited Education	NO	Lower Middle Class to Poor	7
Female	Newfoundland and Labrador	Limited Education	NO	Lower Middle Class to Poor	2
Male	Newfoundland and Labrador	Limited Education	NO	Lower Middle Class to Poor	4
Female	Nova Scotia	Limited Education	NO	Lower Middle Class to Poor	10
Male	Nova Scotia	Limited Education	NO	Lower Middle Class to Poor	18
Female	Ontario	Limited Education	NO	Lower Middle Class to Poor	45
Male	Ontario	Limited Education	NO	Lower Middle Class to Poor	47

sex	province	education	religion	income_before_tax	Freq
Female	Prince Edward Island	Limited Education	NO	Lower Middle Class to Poor	6
Male	Prince Edward Island	Limited Education	NO	Lower Middle Class to Poor	9
Female	Quebec	Limited Education	NO	Lower Middle Class to Poor	17
Male	Quebec	Limited Education	NO	Lower Middle Class to Poor	25
Female	Saskatchewan	Limited Education	NO	Lower Middle Class to Poor	17
Male	Saskatchewan	Limited Education	NO	Lower Middle Class to Poor	16
Female	Alberta	Some Education	NO	Lower Middle Class to Poor	100
Male	Alberta	Some Education	NO	Lower Middle Class to Poor	64
Female	British Columbia	Some Education	NO	Lower Middle Class to Poor	203
Male	British Columbia	Some Education	NO	Lower Middle Class to Poor	160
Female	Manitoba	Some Education	NO	Lower Middle Class to Poor	49
Male	Manitoba	Some Education	NO	Lower Middle Class to Poor	43
Female	New Brunswick	Some Education	NO	Lower Middle Class to Poor	40
Male	New Brunswick	Some Education	NO	Lower Middle Class to Poor	36
Female	Newfoundland and Labrador	Some Education	NO	Lower Middle Class to Poor	12
Male	Newfoundland and Labrador	Some Education	NO	Lower Middle Class to Poor	17
Female	Nova Scotia	Some Education	NO	Lower Middle Class to Poor	59
Male	Nova Scotia	Some Education	NO	Lower Middle Class to Poor	49
Female	Ontario	Some Education	NO	Lower Middle Class to Poor	199
Male	Ontario	Some Education	NO	Lower Middle Class to Poor	184
Female	Prince Edward Island	Some Education	NO	Lower Middle Class to Poor	16
Male	Prince Edward Island	Some Education	NO	Lower Middle Class to Poor	20
Female	Quebec	Some Education	NO	Lower Middle Class to Poor	69
Male	Quebec	Some Education	NO	Lower Middle Class to Poor	87
Female	Saskatchewan	Some Education	NO	Lower Middle Class to Poor	45
Male	Saskatchewan	Some Education	NO	Lower Middle Class to Poor	33
Female	Alberta	Highly Educated	YES	Lower Middle Class to Poor	72
Male	Alberta	Highly Educated	YES	Lower Middle Class to Poor	51
Female	British Columbia	Highly Educated	YES	Lower Middle Class to Poor	147
Male	British Columbia	Highly Educated	YES	Lower Middle Class to Poor	75
Female	Manitoba	Highly Educated	YES	Lower Middle Class to Poor	46
Male	Manitoba	Highly Educated	YES	Lower Middle Class to Poor	34
Female	New Brunswick	Highly Educated	YES	Lower Middle Class to Poor	48
Male	New Brunswick	Highly Educated	YES	Lower Middle Class to Poor	32
Female	Newfoundland and Labrador	Highly Educated	YES	Lower Middle Class to Poor	48
Male	Newfoundland and Labrador	Highly Educated	YES	Lower Middle Class to Poor	18
Female	Nova Scotia	Highly Educated	YES	Lower Middle Class to Poor	71
Male	Nova Scotia	Highly Educated	YES	Lower Middle Class to Poor	47
Female	Ontario	Highly Educated	YES	Lower Middle Class to Poor	337
Male	Ontario	Highly Educated	YES	Lower Middle Class to Poor	196
Female	Prince Edward Island	Highly Educated	YES	Lower Middle Class to Poor	35
Male	Prince Edward Island	Highly Educated	YES	Lower Middle Class to Poor	21

sex	province	education	religion	income_before_tax	Freq
Female	Quebec	Highly Educated	YES	Lower Middle Class to Poor	205
Male	Quebec	Highly Educated	YES	Lower Middle Class to Poor	157
Female	Saskatchewan	Highly Educated	YES	Lower Middle Class to Poor	47
Male	Saskatchewan	Highly Educated	YES	Lower Middle Class to Poor	27
Female	Alberta	Limited Education	YES	Lower Middle Class to Poor	80
Male	Alberta	Limited Education	YES	Lower Middle Class to Poor	59
Female	British Columbia	Limited Education	YES	Lower Middle Class to Poor	100
Male	British Columbia	Limited Education	YES	Lower Middle Class to Poor	80
Female	Manitoba	Limited Education	YES	Lower Middle Class to Poor	99
Male	Manitoba	Limited Education	YES	Lower Middle Class to Poor	79
Female	New Brunswick	Limited Education	YES	Lower Middle Class to Poor	123
Male	New Brunswick	Limited Education	YES	Lower Middle Class to Poor	93
Female	Newfoundland and Labrador	Limited Education	YES	Lower Middle Class to Poor	119
Male	Newfoundland and Labrador	Limited Education	YES	Lower Middle Class to Poor	92
Female	Nova Scotia	Limited Education	YES	Lower Middle Class to Poor	110
Male	Nova Scotia	Limited Education	YES	Lower Middle Class to Poor	80
Female	Ontario	Limited Education	YES	Lower Middle Class to Poor	311
Male	Ontario	Limited Education	YES	Lower Middle Class to Poor	225
Female	Prince Edward Island	Limited Education	YES	Lower Middle Class to Poor	54
Male	Prince Edward Island	Limited Education	YES	Lower Middle Class to Poor	46
Female	Quebec	Limited Education	YES	Lower Middle Class to Poor	378
Male	Quebec	Limited Education	YES	Lower Middle Class to Poor	294
Female	Saskatchewan	Limited Education	YES	Lower Middle Class to Poor	80
Male	Saskatchewan	Limited Education	YES	Lower Middle Class to Poor	61
Female	Alberta	Some Education	YES	Lower Middle Class to Poor	280
Male	Alberta	Some Education	YES	Lower Middle Class to Poor	155
Female	British Columbia	Some Education	YES	Lower Middle Class to Poor	374
Male	British Columbia	Some Education	YES	Lower Middle Class to Poor	205
Female	Manitoba	Some Education	YES	Lower Middle Class to Poor	225
Male	Manitoba	Some Education	YES	Lower Middle Class to Poor	143
Female	New Brunswick	Some Education	YES	Lower Middle Class to Poor	326
Male	New Brunswick	Some Education	YES	Lower Middle Class to Poor	170

sex	province	education	religion	income_before_tax	Freq
Female	Newfoundland and Labrador	Some Education	YES	Lower Middle Class to Poor	252
Male	Newfoundland and Labrador	Some Education	YES	Lower Middle Class to Poor	124
Female	Nova Scotia	Some Education	YES	Lower Middle Class to Poor	298
Male	Nova Scotia	Some Education	YES	Lower Middle Class to Poor	158
Female	Ontario	Some Education	YES	Lower Middle Class to Poor	1003
Male	Ontario	Some Education	YES	Lower Middle Class to Poor	558
Female	Prince Edward Island	Some Education	YES	Lower Middle Class to Poor	187
Male	Prince Edward Island	Some Education	YES	Lower Middle Class to Poor	73
Female	Quebec	Some Education	YES	Lower Middle Class to Poor	855
Male	Quebec	Some Education	YES	Lower Middle Class to Poor	499
Female	Saskatchewan	Some Education	YES	Lower Middle Class to Poor	239
Male	Saskatchewan	Some Education	YES	Lower Middle Class to Poor	147
Female	Alberta	Highly Educated	NO	Middle Class	37
Male	Alberta	Highly Educated	NO	Middle Class	34
Female	British Columbia	Highly Educated	NO	Middle Class	83
Male	British Columbia	Highly Educated	NO	Middle Class	66
Female	Manitoba	Highly Educated	NO	Middle Class	17
Male	Manitoba	Highly Educated	NO	Middle Class	14
Female	New Brunswick	Highly Educated	NO	Middle Class	14
Male	New Brunswick	Highly Educated	NO	Middle Class	20
Female	Newfoundland and Labrador	Highly Educated	NO	Middle Class	8
Male	Newfoundland and Labrador	Highly Educated	NO	Middle Class	9
Female	Nova Scotia	Highly Educated	NO	Middle Class	13
Male	Nova Scotia	Highly Educated	NO	Middle Class	31
Female	Ontario	Highly Educated	NO	Middle Class	107
Male	Ontario	Highly Educated	NO	Middle Class	108
Female	Prince Edward Island	Highly Educated	NO	Middle Class	3
Male	Prince Edward Island	Highly Educated	NO	Middle Class	5
Female	Quebec	Highly Educated	NO	Middle Class	33
Male	Quebec	Highly Educated	NO	Middle Class	36
Female	Saskatchewan	Highly Educated	NO	Middle Class	13
Male	Saskatchewan	Highly Educated	NO	Middle Class	15
Female	Alberta	Limited Education	NO	Middle Class	3
Male	Alberta	Limited Education	NO	Middle Class	4
Female	British Columbia	Limited Education	NO	Middle Class	7
Male	British Columbia	Limited Education	NO	Middle Class	8
Female	Manitoba	Limited Education	NO	Middle Class	1
Male	Manitoba	Limited Education	NO	Middle Class	3
Female	New Brunswick	Limited Education	NO	Middle Class	0
Male	New Brunswick	Limited Education	NO	Middle Class	1

sex	province	education	religion	income_before_tax	Freq
Female	Newfoundland and Labrador	Limited Education	NO	Middle Class	0
Male	Newfoundland and Labrador	Limited Education	NO	Middle Class	0
Female	Nova Scotia	Limited Education	NO	Middle Class	0
Male	Nova Scotia	Limited Education	NO	Middle Class	3
Female	Ontario	Limited Education	NO	Middle Class	5
Male	Ontario	Limited Education	NO	Middle Class	13
Female	Prince Edward Island	Limited Education	NO	Middle Class	0
Male	Prince Edward Island	Limited Education	NO	Middle Class	1
Female	Quebec	Limited Education	NO	Middle Class	2
Male	Quebec	Limited Education	NO	Middle Class	1
Female	Saskatchewan	Limited Education	NO	Middle Class	1
Male	Saskatchewan	Limited Education	NO	Middle Class	5
Female	Alberta	Some Education	NO	Middle Class	40
Male	Alberta	Some Education	NO	Middle Class	70
Female	British Columbia	Some Education	NO	Middle Class	64
Male	British Columbia	Some Education	NO	Middle Class	118
Female	Manitoba	Some Education	NO	Middle Class	17
Male	Manitoba	Some Education	NO	Middle Class	23
Female	New Brunswick	Some Education	NO	Middle Class	10
Male	New Brunswick	Some Education	NO	Middle Class	14
Female	Newfoundland and Labrador	Some Education	NO	Middle Class	4
Male	Newfoundland and Labrador	Some Education	NO	Middle Class	12
Female	Nova Scotia	Some Education	NO	Middle Class	13
Male	Nova Scotia	Some Education	NO	Middle Class	35
Female	Ontario	Some Education	NO	Middle Class	68
Male	Ontario	Some Education	NO	Middle Class	106
Female	Prince Edward Island	Some Education	NO	Middle Class	3
Male	Prince Edward Island	Some Education	NO	Middle Class	10
Female	Quebec	Some Education	NO	Middle Class	14
Male	Quebec	Some Education	NO	Middle Class	36
Female	Saskatchewan	Some Education	NO	Middle Class	14
Male	Saskatchewan	Some Education	NO	Middle Class	42
Female	Alberta	Highly Educated	YES	Middle Class	100
Male	Alberta	Highly Educated	YES	Middle Class	71
Female	British Columbia	Highly Educated	YES	Middle Class	119
Male	British Columbia	Highly Educated	YES	Middle Class	107
Female	Manitoba	Highly Educated	YES	Middle Class	60
Male	Manitoba	Highly Educated	YES	Middle Class	52

sex	province	education	religion	income_before_tax	Freq
Female	New Brunswick	Highly Educated	YES	Middle Class	84
Male	New Brunswick	Highly Educated	YES	Middle Class	53
Female	Newfoundland and Labrador	Highly Educated	YES	Middle Class	66
Male	Newfoundland and Labrador	Highly Educated	YES	Middle Class	39
Female	Nova Scotia	Highly Educated	YES	Middle Class	87
Male	Nova Scotia	Highly Educated	YES	Middle Class	68
Female	Ontario	Highly Educated	YES	Middle Class	405
Male	Ontario	Highly Educated	YES	Middle Class	307
Female	Prince Edward Island	Highly Educated	YES	Middle Class	42
Male	Prince Edward Island	Highly Educated	YES	Middle Class	25
Female	Quebec	Highly Educated	YES	Middle Class	211
Male	Quebec	Highly Educated	YES	Middle Class	173
Female	Saskatchewan	Highly Educated	YES	Middle Class	52
Male	Saskatchewan	Highly Educated	YES	Middle Class	39
Female	Alberta	Limited Education	YES	Middle Class	9
Male	Alberta	Limited Education	YES	Middle Class	16
Female	British Columbia	Limited Education	YES	Middle Class	8
Male	British Columbia	Limited Education	YES	Middle Class	22
Female	Manitoba	Limited Education	YES	Middle Class	13
Male	Manitoba	Limited Education	YES	Middle Class	23
Female	New Brunswick	Limited Education	YES	Middle Class	2
Male	New Brunswick	Limited Education	YES	Middle Class	18
Female	Newfoundland and Labrador	Limited Education	YES	Middle Class	9
Male	Newfoundland and Labrador	Limited Education	YES	Middle Class	20
Female	Nova Scotia	Limited Education	YES	Middle Class	4
Male	Nova Scotia	Limited Education	YES	Middle Class	18
Female	Ontario	Limited Education	YES	Middle Class	31
Male	Ontario	Limited Education	YES	Middle Class	54
Female	Prince Edward Island	Limited Education	YES	Middle Class	2
Male	Prince Edward Island	Limited Education	YES	Middle Class	7
Female	Quebec	Limited Education	YES	Middle Class	21
Male	Quebec	Limited Education	YES	Middle Class	37

sex	province	education	religion	income_before_tax	Freq
Female	Saskatchewan	Limited Education	YES	Middle Class	7
Male	Saskatchewan	Limited Education	YES	Middle Class	17
Female	Alberta	Some Education	YES	Middle Class	132
Male	Alberta	Some Education	YES	Middle Class	142
Female	British Columbia	Some Education	YES	Middle Class	110
Male	British Columbia	Some Education	YES	Middle Class	152
Female	Manitoba	Some Education	YES	Middle Class	74
Male	Manitoba	Some Education	YES	Middle Class	101
Female	New Brunswick	Some Education	YES	Middle Class	74
Male	New Brunswick	Some Education	YES	Middle Class	106
Female	Newfoundland and Labrador	Some Education	YES	Middle Class	62
Male	Newfoundland and Labrador	Some Education	YES	Middle Class	108
Female	Nova Scotia	Some Education	YES	Middle Class	63
Male	Nova Scotia	Some Education	YES	Middle Class	108
Female	Ontario	Some Education	YES	Middle Class	376
Male	Ontario	Some Education	YES	Middle Class	453
Female	Prince Edward Island	Some Education	YES	Middle Class	55
Male	Prince Edward Island	Some Education	YES	Middle Class	58
Female	Quebec	Some Education	YES	Middle Class	200
Male	Quebec	Some Education	YES	Middle Class	291
Female	Saskatchewan	Some Education	YES	Middle Class	70
Male	Saskatchewan	Some Education	YES	Middle Class	102
Female	Alberta	Highly Educated	NO	Upper Middle Class to Wealthy	3
Male	Alberta	Highly Educated	NO	Upper Middle Class to Wealthy	8
Female	British Columbia	Highly Educated	NO	Upper Middle Class to Wealthy	12
Male	British Columbia	Highly Educated	NO	Upper Middle Class to Wealthy	20
Female	Manitoba	Highly Educated	NO	Upper Middle Class to Wealthy	0
Male	Manitoba	Highly Educated	NO	Upper Middle Class to Wealthy	3
Female	New Brunswick	Highly Educated	NO	Upper Middle Class to Wealthy	0
Male	New Brunswick	Highly Educated	NO	Upper Middle Class to Wealthy	2
Female	Newfoundland and Labrador	Highly Educated	NO	Upper Middle Class to Wealthy	0
Male	Newfoundland and Labrador	Highly Educated	NO	Upper Middle Class to Wealthy	2
Female	Nova Scotia	Highly Educated	NO	Upper Middle Class to Wealthy	2
Male	Nova Scotia	Highly Educated	NO	Upper Middle Class to Wealthy	3
Female	Ontario	Highly Educated	NO	Upper Middle Class to Wealthy	11

sex	province	education	religion	income_before_tax	Freq
Male	Ontario	Highly Educated	NO	Upper Middle Class to Wealthy	29
Female	Prince Edward Island	Highly Educated	NO	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Highly Educated	NO	Upper Middle Class to Wealthy	1
Female	Quebec	Highly Educated	NO	Upper Middle Class to Wealthy	1
Male	Quebec	Highly Educated	NO	Upper Middle Class to Wealthy	4
Female	Saskatchewan	Highly Educated	NO	Upper Middle Class to Wealthy	1
Male	Saskatchewan	Highly Educated	NO	Upper Middle Class to Wealthy	4
Female	Alberta	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Alberta	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	British Columbia	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	British Columbia	Limited Education	NO	Upper Middle Class to Wealthy	1
Female	Manitoba	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Manitoba	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	New Brunswick	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	New Brunswick	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Newfoundland and Labrador	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Newfoundland and Labrador	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Nova Scotia	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Nova Scotia	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Ontario	Limited Education	NO	Upper Middle Class to Wealthy	1
Male	Ontario	Limited Education	NO	Upper Middle Class to Wealthy	3
Female	Prince Edward Island	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Quebec	Limited Education	NO	Upper Middle Class to Wealthy	0
Male	Quebec	Limited Education	NO	Upper Middle Class to Wealthy	0
Female	Saskatchewan	Limited Education	NO	Upper Middle Class to Wealthy	0

sex	province	education	religion	income_before_tax	Freq
Male	Saskatchewan	Limited Education	NO	Upper Middle Class to Wealthy	1
Female	Alberta	Some Education	NO	Upper Middle Class to Wealthy	3
Male	Alberta	Some Education	NO	Upper Middle Class to Wealthy	18
Female	British Columbia	Some Education	NO	Upper Middle Class to Wealthy	3
Male	British Columbia	Some Education	NO	Upper Middle Class to Wealthy	9
Female	Manitoba	Some Education	NO	Upper Middle Class to Wealthy	0
Male	Manitoba	Some Education	NO	Upper Middle Class to Wealthy	1
Female	New Brunswick	Some Education	NO	Upper Middle Class to Wealthy	0
Male	New Brunswick	Some Education	NO	Upper Middle Class to Wealthy	0
Female	Newfoundland and Labrador	Some Education	NO	Upper Middle Class to Wealthy	0
Male	Newfoundland and Labrador	Some Education	NO	Upper Middle Class to Wealthy	1
Female	Nova Scotia	Some Education	NO	Upper Middle Class to Wealthy	2
Male	Nova Scotia	Some Education	NO	Upper Middle Class to Wealthy	0
Female	Ontario	Some Education	NO	Upper Middle Class to Wealthy	3
Male	Ontario	Some Education	NO	Upper Middle Class to Wealthy	11
Female	Prince Edward Island	Some Education	NO	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Some Education	NO	Upper Middle Class to Wealthy	0
Female	Quebec	Some Education	NO	Upper Middle Class to Wealthy	0
Male	Quebec	Some Education	NO	Upper Middle Class to Wealthy	3
Female	Saskatchewan	Some Education	NO	Upper Middle Class to Wealthy	0
Male	Saskatchewan	Some Education	NO	Upper Middle Class to Wealthy	6
Female	Alberta	Highly Educated	YES	Upper Middle Class to Wealthy	11
Male	Alberta	Highly Educated	YES	Upper Middle Class to Wealthy	33
Female	British Columbia	Highly Educated	YES	Upper Middle Class to Wealthy	14
Male	British Columbia	Highly Educated	YES	Upper Middle Class to Wealthy	28
Female	Manitoba	Highly Educated	YES	Upper Middle Class to Wealthy	8

sex	province	education	religion	income_before_tax	Freq
Male	Manitoba	Highly Educated	YES	Upper Middle Class to Wealthy	5
Female	New Brunswick	Highly Educated	YES	Upper Middle Class to Wealthy	6
Male	New Brunswick	Highly Educated	YES	Upper Middle Class to Wealthy	13
Female	Newfoundland and Labrador	Highly Educated	YES	Upper Middle Class to Wealthy	9
Male	Newfoundland and Labrador	Highly Educated	YES	Upper Middle Class to Wealthy	16
Female	Nova Scotia	Highly Educated	YES	Upper Middle Class to Wealthy	7
Male	Nova Scotia	Highly Educated	YES	Upper Middle Class to Wealthy	13
Female	Ontario	Highly Educated	YES	Upper Middle Class to Wealthy	57
Male	Ontario	Highly Educated	YES	Upper Middle Class to Wealthy	103
Female	Prince Edward Island	Highly Educated	YES	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Highly Educated	YES	Upper Middle Class to Wealthy	5
Female	Quebec	Highly Educated	YES	Upper Middle Class to Wealthy	11
Male	Quebec	Highly Educated	YES	Upper Middle Class to Wealthy	53
Female	Saskatchewan	Highly Educated	YES	Upper Middle Class to Wealthy	3
Male	Saskatchewan	Highly Educated	YES	Upper Middle Class to Wealthy	14
Female	Alberta	Limited Education	YES	Upper Middle Class to Wealthy	3
Male	Alberta	Limited Education	YES	Upper Middle Class to Wealthy	3
Female	British Columbia	Limited Education	YES	Upper Middle Class to Wealthy	3
Male	British Columbia	Limited Education	YES	Upper Middle Class to Wealthy	1
Female	Manitoba	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Manitoba	Limited Education	YES	Upper Middle Class to Wealthy	2
Female	New Brunswick	Limited Education	YES	Upper Middle Class to Wealthy	1
Male	New Brunswick	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Newfoundland and Labrador	Limited Education	YES	Upper Middle Class to Wealthy	1
Male	Newfoundland and Labrador	Limited Education	YES	Upper Middle Class to Wealthy	2
Female	Nova Scotia	Limited Education	YES	Upper Middle Class to Wealthy	0

sex	province	education	religion	income_before_tax	Freq
Male	Nova Scotia	Limited Education	YES	Upper Middle Class to Wealthy	4
Female	Ontario	Limited Education	YES	Upper Middle Class to Wealthy	2
Male	Ontario	Limited Education	YES	Upper Middle Class to Wealthy	13
Female	Prince Edward Island	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Prince Edward Island	Limited Education	YES	Upper Middle Class to Wealthy	0
Female	Quebec	Limited Education	YES	Upper Middle Class to Wealthy	3
Male	Quebec	Limited Education	YES	Upper Middle Class to Wealthy	1
Female	Saskatchewan	Limited Education	YES	Upper Middle Class to Wealthy	0
Male	Saskatchewan	Limited Education	YES	Upper Middle Class to Wealthy	2
Female	Alberta	Some Education	YES	Upper Middle Class to Wealthy	9
Male	Alberta	Some Education	YES	Upper Middle Class to Wealthy	39
Female	British Columbia	Some Education	YES	Upper Middle Class to Wealthy	12
Male	British Columbia	Some Education	YES	Upper Middle Class to Wealthy	24
Female	Manitoba	Some Education	YES	Upper Middle Class to Wealthy	3
Male	Manitoba	Some Education	YES	Upper Middle Class to Wealthy	5
Female	New Brunswick	Some Education	YES	Upper Middle Class to Wealthy	3
Male	New Brunswick	Some Education	YES	Upper Middle Class to Wealthy	8
Female	Newfoundland and Labrador	Some Education	YES	Upper Middle Class to Wealthy	6
Male	Newfoundland and Labrador	Some Education	YES	Upper Middle Class to Wealthy	14
Female	Nova Scotia	Some Education	YES	Upper Middle Class to Wealthy	4
Male	Nova Scotia	Some Education	YES	Upper Middle Class to Wealthy	6
Female	Ontario	Some Education	YES	Upper Middle Class to Wealthy	23
Male	Ontario	Some Education	YES	Upper Middle Class to Wealthy	48
Female	Prince Edward Island	Some Education	YES	Upper Middle Class to Wealthy	2
Male	Prince Edward Island	Some Education	YES	Upper Middle Class to Wealthy	4
Female	Quebec	Some Education	YES	Upper Middle Class to Wealthy	11

sex	province	education	religion	income_before_tax	Freq
Male	Quebec	Some Education	YES	Upper Middle Class to Wealthy	24
Female	Saskatchewan	Some Education	YES	Upper Middle Class to Wealthy	2
Male	Saskatchewan	Some Education	YES	Upper Middle Class to Wealthy	16