ARE CANADIANS WILLING TO USE THE PRIVATE PROVISION OF NUTRITION INFORMATION WHILE GROCERY SHOPPING?

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By

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Abstract

Through the delivery of an online survey to a general population sample of Canadians (n=242) who are primary grocery shoppers and are from Alberta, British Columbia and Saskatchewan, this thesis elicits consumer responses about their use of four sources of nutrition information, namely: the longstanding and mandated Canadian Nutrition Facts table (NFT); the Canadian version of the Guiding Stars nutritional navigation program; in-store nutrition experts hired by private retailers; and, the UK's widely recognized traffic light label that is not currently seen in the Canadian food retail market. Canadians are demanding improved nutrition information while purchasing groceries but may realize time and search costs in accessing this information, therefore, this thesis investigates whether consumers benefit from the private provision of nutrition information and their willingness to use these additional sources of nutrition information.

The sources of nutrition information investigated are delivered at the point of decision making, can act as a heuristic and/or source of education, and intend on helping consumers make healthy and informed shopping choices with low time costs. The examples of the private provision of nutrition information examined in this thesis may compete with the mandated NFT. The NFT is recommended by the Government of Canada (GOC) as a primary mode of nutrition guidance. The GOC, private retailers, and other parties recognize that the NFT has limitations in the ability to help shoppers with their nutrition needs, giving potential incentives for individuals to use other sources of nutrition information. The objectives of this thesis include examining how willing individuals are to use the private provision of nutrition information in relation to the NFT, understanding factors impacting the decision to use the Guiding Stars and traffic light label, understanding the extent to which the privately provided food labels may substitute for the mandated NFT, and, stimulating discussion around the use of privately hired in-store nutrition experts with implications for the GOC, private retailers, and food producers.

Analysis of survey results through descriptive statistics and ordered probit econometrics models measuring willingness to use the Guiding Stars and traffic light label reveal a number of interesting results. The average respondent more positively viewed the traffic light label and NFT in relation to the Guiding Stars and nutrition experts. The traffic light label in combination with the NFT is the most preferred combination of nutrition information examined, whereas the

likelihood of adopting the Guiding Stars, either on its own or in combination with the NFT, is lower. Results show that more respondents knew about the traffic light label than the Guiding Stars prior to the survey, and even though more than half (n=148) of respondents shop where the Guiding Stars is installed only about 12% of respondents had noticed the Guiding Stars. Interestingly, respondents who reported having seen the Guiding Stars before the survey were less likely to be willing to use it.

This thesis outlines a set of most and least influential factors impacting the willingness to use the traffic light label and the Guiding Stars, with hopes of improving the understanding of how to provide Canadians with useful nutrition information and to explore the role of privately provided nutrition signals in this regard. Ultimately, the results of this thesis suggest that the traffic light label is a candidate for providing Canadians with an additional source of nutrition information in the future. Given that individuals are heterogeneous in their nutrition needs and wants, the Guiding Stars and in-store nutrition experts may also add benefit for Canadians trying to make informed shopping decisions. Because the nature of information provision between food labels and in-person discussion with a nutrition expert are inherently different, focus of the results are on the relationship between the food labels.

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Chapter 1. Introduction

1.1 Background and Rationale

Canada's food retail market is encountering a shift in the framing of nutrition information presented to consumers while grocery shopping. More specifically, to assist Canadians with making healthy and informed shopping choices, private retailers and the Government of Canada (GOC) are attempting to improve the accessibility and quality of nutrition information available at the point of decision-making (GOC, 2015a; Guiding Stars, 2012; Figure 1-2, App. A). The GOC (2015a) is currently in the last phase of updating its regulations for the mandated Nutrition Facts table (NFT) and ingredients list on prepackaged food labels to "reflect the latest science and eating habits of Canadians". Consequently, the emphasis of this thesis is on examining the private provision of nutrition information that is presented to shoppers in the aisles of a grocery store through two interventions, which are:

- A storewide nutritional navigation program called the Guiding Stars® (Guiding Stars). The Guiding Stars relays information to consumers through signs in the aisles of grocery stores to inform shoppers about the Guiding Stars program. The Guiding Stars also utilizes shelf tag labels by placing a 1, 2, or 3-star rating on product shelves to suggest the relative nutrient density of a food product in a specific category. More stars imply a higher nutritional value relative to one that has fewer stars. (Guiding Stars, 2012).
- Nutrition experts, namely dietitians, located within a grocery store, can be approached in-person to ask nutrition related questions (Figure 1-2, Appendix A).

Because the nature of information provision between food labels and in-person discussion are inherently different, the focus of this study is primarily on food labels. The two interventions found in the Canadian food retail market have a distinct relationship with the Government of Canada's Food Guide (CFG), the Canadian Nutrient File (CNF), and the NFT and ingredient list. Ultimately, the Guiding Stars and hired nutrition experts aim to help Canadians make healthy and informed nutrition choices in alignment with Health Canada's recommendations. The Guiding Stars calculates its star ratings with nutrition information from the ingredient list and Nutrition Facts table for a prepackaged food product, as well from the Canadian Nutrient File database for products without the nutrition facts table and ingredients list (Guiding Stars, 2012). Nutrition experts are trained to offer a range of advice, including about food labels. Important is

whether the two interventions substitute for the NFT as both can act as a decision-making shortcut and/or a source of education while shopping.

An additional source of nutrition information is also examined in this thesis. The traffic light label is a voluntary front-of-package nutrition label that started in UK grocery stores (EUFIC, 2015) and is another example of the private provision of nutrition information, but is provided by food manufacturers rather than private retailers. This nutrition information has comparable aims to the other nutrition information examined. A large difference between the traffic light label and Guiding Stars, besides being a front-of-package label instead of a shelf-tag label, respectively, is that the traffic light label discloses its nutrition information on a different hierarchical scale. In this case, the Guiding Stars rates food products on their nutrient density, while the traffic light label identifies low, medium or high amounts of calories, sugar, salt, fat and saturated fat in a prepackaged product. The traffic light label uses green, yellow or red circles to signal low, medium and high amounts of the food's specific ingredients and calories respectively. Even though the Guiding Stars debits foods for having added sugar and salt and high-fat contents, it credits foods based on the amount of vitamins, minerals and other product elements (Guiding Stars, 2012), which results in consumers having relative nutritional ratings rather than specific product information.

Since many Canadians place a strong value on the health impacts of a product, nutrition information that is customizable, about health-related benefits and/or specific attribute information of foods may benefit shoppers (BDC, 2013). In the case of this thesis the Guiding Stars signal a product's level of healthfulness, the traffic light label signals specific information about ingredients linked to diet-related disease, nutrition experts are flexible in the advice offered, and the NFT is the control source of nutrition information due to its longstanding position as the primary source of nutrition information in the Canadian food retail market and the regulatory requirement that certain prepackaged food products be labelled with a NFT. Through administering an online survey to a sample of Canadians, this thesis examines how willing individuals are to use the private provision of nutrition information in relation to using the NFT, factors impacting the decision to use the Guiding Stars and traffic light label, and the extent to which the privately provided food labels substitute for the mandated NFT, with implications for the Government of Canada, private retailers, and food producers.

1.2 Research Objectives and Methods

Two major changes to the Canadian food retail market have been noted, specifically: the federal government is proposing to change the mandatory and regulated nutrition facts panels and ingredients lists on food labels, while private retailers have installed two different forms of nutrition information interventions, either on their own or as a combined service. The main objective to this research is to explore how Canadian consumers respond to the private provision of nutrition information, in the form of the Guiding Stars system and the traffic light label individually and in the presence of the mandated Nutrition Facts table. Questions of interest include: which types (frames) of nutrition information are preferred and why; and, whether privately provided nutrition information substitutes for mandated nutrition labelling. The secondary objective is stimulating discussion around the hiring of nutrition experts by private retailers, and understanding whether or not they are likely to be accessed for advice, which may include assistance with using the NFT, Guiding Stars and traffic light label.

The examination of the set objectives uses primary data collected from an online survey conducted in November-December 2016 to a representative general population sample from western Canada. The survey explores responses to different frames (public or private) of nutrition information and socio-demographic and psychographic factors explaining those responses. Data analysis uses the ordered probit and logit econometrics models to estimate factors impacting whether consumers are likely to use the Guiding Stars and traffic light label, and also uses descriptive statistics to better understand characteristics and behaviours of the general population sample of Canadians surveyed. Section 1.3 introduces behavioural economics used for understanding impacts of adding the private provision of nutrition information to a grocery store, Section 1.4 introduces the primary data collection process and the econometrics models used for analyzing data, and Section 1.5 gives an outline for the remainder of this thesis.

1.3 Behavioural Economics

Behavioural economic theory is about "developing economic analyses for real people in the real world (Altman, pp. 9, 2012a)"; it places a strong emphasis on understanding how an individual’s decisions are made and what impacts their decision-making behaviour. Insights from behavioural economic theory are used to examine the effects of adding education and heuristics

to a context that already has an abundance of information (Chapter 3, Section 2), just like the Canadian food retail market is experiencing. Empirical applications and past literature that studied the Guiding Stars, the traffic light label and NFT are also examined to gain more insight about each source of nutrition information (Chapter 3, Section 3). While focus in this thesis is on the addition of food labels to a decision-making environment, much of the information can also apply to adding in-person nutrition information.

Two leading behavioural economic theories "heuristics and biases" by Kahneman and Tversky, and "bounded rationality" originally introduced by Simon are examined and used to understand different insights into the effectiveness of improving education and heuristics for consumers (Chapter 3, Section 2, Part 3 & 4). Under the theory of: “errors-and biases”, individuals are prone to irrational decision-making outcomes so they may receive little benefit from the addition or improvement of education in a context with an abundance of information and other signals to process, but can receive benefit from improving the quality of heuristics, more specifically when receiving guidance towards it. The concept of “bounded rationality and satisficing” suggest that individuals have bounded rationality, where the capacity for undertaking more complicated tasks increases and past mistakes are updated and improved, so they may benefit from improving the quality of education and heuristics in an environment with an abundance of available choices. Therefore, rather than establish an *a priori* hypothesis as to which source of nutrition information is most beneficial to Canadians, this thesis instead examines which information source(s) is(are) most preferred by a sample population of Canadians from the NFT, traffic light and Guiding Stars labelling systems, whether the most preferred source (or sources) is acting as a heuristic or a source of education, and whether more education about the sources are needed before they would be used. In the case of this thesis:

- The NFT (and ingredients lists) is the primary source of nutrition guidance recommended by the Government of Canada, but no guidance towards how to use this information is available to consumers while shopping.
- The Guiding Stars information system is only found while shopping at Loblaws locations in Canada, is delivered storewide with education about the program, and guidance towards using it is also available to consumers while shopping.

- The delivery of the traffic light label in the UK is voluntary, is not found with education about the program, and there is no guidance regarding how to use this information available to consumers while shopping.

1.4 Survey & Econometrics Methodology

Since the goal of each source of nutrition information is to assist Canadians with making informed shopping decisions, the most beneficial source of nutrition information is seen as the one with the widest likelihood of adoption. An ordered probit and logit econometrics model is used to understand factors influencing the likelihood of using the Guiding Stars and traffic light label. Understanding the factors that influence willingness to use nutrition information systems such as the traffic light label and Guiding Stars is important to understanding how to cater to the specific nutrition needs of Canadians now and in the future.

To collect primary data for this thesis, an online survey instrument was administered to a demographically representative general population sample of Canadians, based on age, who are primary grocery shoppers from Alberta, British Columbia and Saskatchewan. The survey instrument is found in Appendix B and includes 9 main sections of questions, which are: an initial screening section for consent to participate, primary grocery shoppers, and to ensure quotas (province and age) are filled; shopping behaviours; use of nutrition information; traffic light label; Guiding Stars; nutrition information preference; nutrition information scale questions; health status and behaviours; and, demographics. The survey was designed by the author and recruitment of the general population sample was done by the Social Science Research Lab at the University of Saskatchewan through Probit, a commissioned third-party vendor catering to survey administration for academic and professional research. The survey is used to collect primary data for understanding socio-demographic characteristics of the sample population, their shopping behaviours and behaviour regarding the use of nutrition information in general and with respect to specific sources of nutrition information examined. In addition to presenting descriptive statistics, the primary data collected is important for estimating factors impacting the likelihood of using the Guiding Stars and traffic light label, which are examined using the ordered probit and logit econometrics models. A detailed discussion of the survey design is provided in Chapter 4.

Ordered probit and logit econometrics models are used to understand incentives or lack-thereof behind using the Guiding Stars and traffic light label, and determining if any characteristics of the survey sample cause an individual to have a higher or lower likelihood of accessing either source. An ordered probit/logit model is broadly used for dependent variables with ordered outcomes, such as in this thesis (Greene, 2012; Katchova, 2013). These ordered models are used when their parallel regression assumption is not violated, and this assumption is tested using Stata 15's econometrics software, which determines if an alternative model such as the generalized ordered probit/logit model is needed. Given that results of the ordered probit and logit models are relatively similar, and the fact that logit models include heavier tails in their distribution, only results of the ordered probit model is discussed in detail while results of the ordered logit model are presented for comparison. Marginal effects are used to understand the magnitudes of any significant impacts on the likelihood of using the Guiding Stars and traffic light label. A detailed discussion of this analysis is provided in Chapter 5

1.5 Thesis Outline

The start of this chapter introduced how the framing of nutrition information presented to Canadians is changing, where new nutrition information is being shared with shoppers in the aisles of stores. Chapter 2 provides background information about the private and public provision of nutrition information outlined in this chapter, and then discusses how each examined source of nutrition information relates to the Government of Canada's Food Guide, Canadian Nutrient File and mandated Nutrition Facts table. Chapter 2 discusses why Canadians may benefit from the private provision of nutrition information, in relation to only having access the GOC's recommended sources of nutrition information guidance. Chapter 3 outlines behavioural economic literature and past empirical studies to understand impacts of adding the NFT, Guiding Stars, traffic light label, and to lesser extent nutrition experts to a shopping environment. In addition, Chapter 3 looks at factors that may affect the likelihood of using the Guiding Stars and traffic light label. Ultimately, Chapters 1-3 are used to describe background information and relevant literature to this thesis, which are also used in designing the online survey instrument used to collect primary data.

The remaining three chapters are dedicated towards presenting and discussing results from the online survey instrument. Chapter 4 explains the design of the online survey instrument and

recruitment of respondents. Chapter 4 also presents descriptive statistics of the survey sample demographics, before presenting descriptive statistics of key survey questions, which range from learning about the survey sample's shopping behaviours, use of nutrition information in general and under different decision-making contexts, and health status and behaviours. Chapter 5 presents results of the probit and logit econometrics models, which look at factors impacting the willingness to use the Guiding Stars and traffic light label. Chapter 6 provides a summary of the results and discusses conclusions about the objectives outlined earlier in this chapter. In addition, this last chapter details limitations of this study and makes suggestions for future research to better understand the impacts of adding the Guiding Stars, traffic light label and nutrition experts to the Canadian food retail market.

Chapter 2. Background: Nutrition Information

2.1 Introduction

Chapter 2 provides background information about the public and private provision of nutrition information discussed in Chapter 1, and it details potential reasons as to why Canadians may be likely to use the private provision of nutrition information. Ultimately, focus is on describing the four sources of nutrition information under examination, which are the Guiding Stars (shelf tag label), the traffic light label (front-of-package label), the Nutrition Facts table (back-of-package label), and nutrition experts (in-person). Each of these four sources of nutrition information is presented at the point of decision-making, and is intended to assist shoppers with making healthy and informed shopping choices, as well as act as an educational service and/or a decision-making heuristic. Furthermore, the delivery of the Guiding Stars and nutrition experts are through an in-store intervention, while the traffic light label and NFT are not since they are found on the packaging of a food rather than in-between the consumer and the product. Of the four sources of nutrition information examined, the Guiding Stars and nutrition experts are found storewide and can be used by consumers for both prepackaged and non-prepackaged foods, while, the traffic light label and NFT are only provided on prepackaged food products.

Chapter 2 is comprised of this introduction, four main sections, and a conclusion. The next section looks at why Canadian consumers may benefit from the private provision of nutrition information (Section 2.2). The following section provides details about three parts of the GOC's nutrition information system that intends to help Canadians select healthy food products (Section 2.3), which are: Canada’s Food Guide (Section 2.3.1), mandated portions of a Canadian food label (the NFT and ingredients list) (Section 2.3.2), and the Canadian Nutrition File (Section 2.3.3). Section 2.4 goes into detail about the two nutrition information interventions: the Guiding Stars and in-store nutrition experts. Section 2.5 describes the traffic light label system, which is not currently found in Canada's food retail market. The conclusion of Chapter 2 summarizes the relationships between the NFT, Guiding Stars, traffic light label and nutrition experts.

2.2 Canadians Demand Additional Nutrition Information

The communication of nutrition information with Canadians has moved into the aisles of grocery stores, giving shoppers more signals to process in an already demanding and information dense environment. As was stated in Chapter 1, some private food retailers have installed two forms of a nutrition information intervention to help consumers streamline their learning about and selection of healthy foods. Furthermore, the GOC is updating nutrition information found on the Nutrition Facts table and ingredients list to help Canadians select healthy prepackaged products. The GOC recognizes that the current version of the NFT and ingredients list causes difficulty for shoppers learning about and comparing nutrition information between prepackaged food choices (GOC, 2014a). Therefore, Canadians may benefit from the private provision of nutrition information examined in this thesis, which can compete with the mandated nutrition information on food labels (Guiding Stars, 2015a).

Seeking and learning information comes with time costs; therefore, finding sources of nutrition information that are trustworthy, easily accessible and straightforward to adapt and implement into decision-making may facilitate the selection of healthy food products, and may result in time-saving and/or other benefits while shopping for groceries (Altman, 2012a). Since there can be a lot of noise in the retail grocery market, a quality source of information that can be found at the time of product selection may provide protection from making uninformed decisions. In this case, misinformation can lead to the misallocation of an individual's time, effort, money, and it can potentially affect their overall health by resulting in less than optimal nutrition decisions. Since there is a lot of information about a given food's nutrition found while shopping, individuals must carefully select where to glean the knowledge they are demanding. Even though the proposed changes to the mandated portions of food labels include ideas to improve the framing of its nutrition information, until they are updated there may be incentives for shoppers to access alternative sources of nutrition information, like the Guiding Stars, traffic light label, and nutrition experts for making healthy and informed shopping choices.

A study by the Business Development Bank of Canada (BDC) (2013) outlined several health-related trends Canadians are following, which have combined into a state of 'health mania'. The momentum towards healthy living has resulted in an "overwhelming majority of consumers looking for products and services that complement and facilitate a healthier lifestyle"

(BDC, pp. 14, 2013); this trend is very apparent in Canadians that are over the age of 65, making them a population range of interest to this study. In addition, the increase of consumer awareness towards their health has altered the demand for food products by so much that the market supply is changing to meet consumers' healthy eating preferences (BDC, 2013). More specifically, Canadians are seeking more foods from healthy product categories, like fresh produce, wanting more natural and organic products, and are looking for foods with specific nutrients and health-related attributes. A relevant conclusion of the BDC consumer study to this thesis is that Canadians are becoming more knowledgeable about their nutrition, and, as a result, businesses should be communicating "health-related benefits of products or research-backed results that link the product's ingredients to health benefits" (BDC, pp. 35, 2013).

While Canadians are increasing attention towards improving their nutrition, the study by the BDC (2013) also illustrated that they are seeking custom nutrition products, as well as help to improve their shopping behaviour, and are willing to pay a premium for healthy products; further, they are using the Internet to learn information before shopping. Although consumers may pay a premium for healthy products, there have been lingering effects of the recession from 2007-08 that caused Canadians to look for high product value at the lowest possible cost (BDC, 2013). Deloitte and the Research and Economic Analysis team at the BDC undertook this study on consumer behaviour trends. An online survey was distributed in August 2013 to 1,023 Canadians and was conducted by Ipsos, a market research firm (BDC, 2013). The study recognizes its results may suffer from social desirability bias, so results are represented as a trend rather than absolute statistics. In the end, Canadians have a stake in learning about food products they purchase and the current version of the GOC's mandated NFT and ingredients list leaves room for consumers to want to access additional nutrition information to select healthy food products.

2.3 GOC's Nutrition Information Sharing System

This section of Chapter 2 discusses background information about three interrelated components of the Government of Canada’s (GOC’s) nutrition information sharing system overseen by Health Canada: Canada's Food Guide (CFG)(Section 2.3.1), the mandated portions of a food label (Section 2.3.2), and the Canadian Nutrient File (CNF) (Section 2.3.3).

2.3.1 Canada's Food Guide

Canada's Food Guide (CFG) is a public service that aims to provide Canadians with access to a range of free nutrition knowledge; this service is available on Health Canada's website or in a more condensed print form. The Food Guide recommends that Canadians use the Nutrition Facts table and list of ingredients (Section 2.3.2), on prepackaged products, to learn about these foods, and to use the Canadian Nutrient File (CNF) to learn about the single ingredient food products, like fruits and vegetables, that generally are not labelled with nutrition information (Section 3.2.3). More specifically, Health Canada (pp. 2-3, 2014a) states that:

> "Canada's Food Guide defines and promotes healthy eating for Canadians. It describes [the] amount of food [that] people need and what type of food is part of a healthy eating pattern. The eating pattern in Canada's Food Guide includes foods from each of the four food groups – vegetables and fruits, grain products, milk and alternatives, meat and alternatives. ... The Food Guide encourages people to choose a variety of foods from each of the four food groups and to include a specific amount and type of oils and fats; it also encourages people to choose foods lower in fat, sugar, and salt."

The Food Guide was first established by the GOC in 1942, and, even though it has faced many changes over time, its theme has always been "guiding [the] food selection and promoting the nutritional health of Canadians" (Health Canada, 2007a). The Food Guide provides a great deal of information about healthy eating, like planning and preparing healthy and balanced meals, shopping for healthy food, using food labels to optimize decision-making, and meeting daily nutrition requirements (Health Canada, 2007b). Ultimately, the Food Guide is a "basic education tool that is designed to help people follow a healthy diet" (Health Canada, 2007a).

While Canada's Food Guide was created to help Canadians understand how to make healthy food choices and how to construct a balanced meal plan, the nutrition information is also for use by nutritionists, dietitians, and other health professionals in advising Canadians on how to improve their dietary choices (Dietitians of Canada, 2016). Ultimately, the Food Guide "translates the science of nutrient requirements into a practical pattern of food choices, incorporating variety and flexibility [into designing meal plans]" (Health Canada, 2007a). Therefore, if an individual has specific dietary requirements, then they may require additional

nutrition information about constructing an optimal nutrition plan. To help Canadians better understand how to use the Food Guide, it includes examples of (Health Canada, 2007b): how to use food labels to select healthy products; quick and simple meal ideas; healthy and nutritious snacks; healthy eating options to consider when dining away from home; etc.

Table 2.1 illustrates the Food Guide's recommendations on the amount of food the average Canadian should consume daily, based on their age, gender and a normal amount of physical activity. The Food Guide recommends that individuals undertake a minimum amount of physical activity per week (Health Canada, 2011a-2011b), and if an individual's level of physical activity is above the suggested amount, then they are advised to consume extra Food Guide servings from each of the four food groups (Health Canada, 2007c). Canada's Food Guide has recommendations regarding how much of a given food product is considered a food group serving, how many servings of each food group should be consumed daily, and how to make wise and healthy food choices when selecting food products from each food group (Health Canada, 2007c-e). Additionally, the Food Guide's nutrition information package includes methods and examples to calculate the number of food guide servings in a meal to help ensure Canadians are getting their necessary food requirements daily (Health Canada, 2014b). Furthermore, it is recommended that individuals access the Food Guide Servings Tracker, a free online product that is for keeping a record of an individual's daily intake of each food group, to ensure nutrition requirements are met over time (Health Canada, 2010).

Table 2.1: The recommended number of Food Guide servings per day for Canadians.

	Children			Teens		Adults			
	2-3	4-8	9-13	14-18 Years		19-50 Years		51+ Years	
	Girls and Boys			Female	Male	Female	Male	Female	Male
Vegetables and Fruit	4	5	6	7	8	7-8	8-10	7	7
Grain Products	3	4	6	6	7	6-7	8	6	7
Milk and Alternatives	2	2	3-4	3-4	3-4	2	2	3	3
Meat and Alternatives	1	1	1-2	2	3	2	3	2	3

For example:

If you are a 35 year old woman you should aim to have:

- 7-8 vegetables and fruit
- 6-7 grain products
- 2 milk and alternatives
- 2 meat and alternatives
- 30 - 45 mL (2 to 3 Tbsp) of unsaturated oils and fats

Source: Health Canada, 2007c

2.3.2 Mandated Nutrition Information (the NFT and Ingredients List)

In general, “food labels [are] one of the most important tools Canadian consumers can use to make informed choices about healthy and safe foods” (GOC, 2014a). Food labels provide a specific function in the retail marketplace, namely, transferring information from firms to consumers (GOC, 2015b). Therefore, food labels are for “promoting a product and communicating information about that product from sellers to buyers” (GOC, 2015b). CFG (Section 2.3.1) and Health Canada (2012) recommends Canadians use the mandated NFT and ingredients list on a prepackaged food product's label to compare it to other products and learn about its nutrition values and contents. Furthermore, Health Canada (2012) recommends accessing the NFT and ingredients list over other nutrition information on a food label, as the two mandated sources of nutrition information give the full understanding of a product, while other nutrition information highlights specific product attributes and health related benefits.

Regulations that made nutrition labelling mandatory on most food labels were introduced in 2002, and by 2007 the Nutrition Facts table (NFT) and the list of ingredients became compulsory for most prepackaged food products in Canada (GOC, 2015c). This mandated nutrition information intends to help Canadians select healthy food products that align with their nutrition preferences and dietary needs (GOC, 2015b; Health Canada, 2012). Furthermore, all information found on a food label must be trustworthy and adhere to Canada’s Food and Drug Act (GOC, 2015b), which prohibits any labelling that is “false, misleading or deceptive to consumers”. The Consumer Packaging and Labelling Act (GOC, 2015b) oversee the nutrition information found on a food label in Canada, which has the following objectives:

- “Providing a uniform method of labelling and packaging consumer goods, and overcoming confusion of different requirements under other legislation.”
- “Requiring full and factual label information from which consumers can make an informed choice in the marketplace.”
- “Preventing misrepresentation and deception in packaging and food labelling.”
- “Requiring the use of metric units of measurement and bilingual labelling.”

2.3.2.1 Mandated Portions of a Food Label

The responsibility for Canadian food label requirements lies between two federal departments, Health Canada and the Canadian Food Inspection Agency (CFIA) (GOC, 2015b).

Ultimately, Canadian food label requirements have three primary functions, which are (GOC, 2015b):

- "Providing basic product information, such as its: common name, ingredients list, net quality, durable life date, name and address of the manufacturer, dealer or importer, and in some cases, grade/quality and country of origin".
- "Specifying health, safety, and nutrition information, such as allergen information; nutrition information like the quantities of fats, proteins, carbohydrates, vitamins, and minerals present per serving of stated size of the food; specific information on products for special dietary use; and, instructions for safe storage and handling".
- "Acting as a vehicle for food marketing, promotion, and advertising, via label vignettes, promotional information, and label claims, such as low-fat, cholesterol-free, high source of fibre, a product of Canada, natural, organic, no preservatives added, and so on".

The above list suggests how there are many areas of product information found on a food label, some of which are mandatory while others are voluntary. A prepackaged food product includes the following mandatory elements (GOC, 2014b): the principal display panel, containing the common name and net quantity of the product; the date marking or best before date; the name and address of the company; country of origin claims; the nutrition facts table; the list of ingredients; allergen declarations. This thesis only focuses on the Nutrition Facts table. Other information like the ingredients list, production methods, location, allergen declarations and gluten sources, and specific product attributes, do signal nutrition information to consumers but are outside the scope of this study.

2.3.2.2 Food Products without the NFT

There are specific food products in the Canadian food retail market that do not need an NFT on their label. The food products that are exempt from this mandatory nutrition labelling requirement are (GOC, 2015d):

- "Fresh fruit and vegetables, raw meat and poultry, raw seafood, one-bite confections that are individually sold, milk sold in refillable glass containers, individual servings of food meant to be eaten immediately, and foods prepared or processed in-store like bakery items and salads".
- "Beverages with an alcohol content over 0.5%".

- "Foods, prepared, processed and sold at a roadside stand, craft show, flea market, fair, farmer's market, sugar bush".
- "Items that contain few nutrients, such as coffee, tea, vinegar, and spices".
- "Restaurants and food service businesses do not need to give an individual a nutrition facts table".

2.3.2.3 Example of the Current NFT, Ingredients List, and a Health/Nutrition Claim

Figure 2.1 comes from the Government of Canada (2012). This figure is used to help consumers better understand some of the main elements of the mandated food label, like specific parts of the Nutrition Facts table and ingredients list. Figure 2.1 is marked to illustrate six important parts of the food label, which are (GOC, 2012):

1. Nutrition Facts table
2. Specific amount or net weight of food
3. Percentage daily value figures
4. Calories and core nutrients
5. Nutrition Claims (the only voluntary piece of information in this example)
6. List of Ingredients

Figure 2.1: The NFT, ingredients list, and a nutrition claim on a prepackaged food product.

Source: GOC, 2012

The Nutrition Facts table (labelled as 1 on Figure 2.1) on a food label contains an abundance of information (GOC, 2012). First, the NFT has product information for a specific quantity of food (2), represented in a familiar measure, which does not necessarily represent a serving size. It also reveals the amount of a nutrient in relation to the percentage Daily Value recommended (3). Further, it contains specific nutrition information about the calories and core nutrients within a serving size (4). In this case, 13 core nutrients are mandatory to report on a food label (4), while others can still be provided (GOC, 2012); the 13 mandated nutrients on a prepackaged label are: fat, saturated fat, trans fat, cholesterol, sodium, carbohydrate, fibre, sugars, protein, vitamin A, vitamin C, calcium, and iron. Nutrition claims (5), which are voluntary sources of nutrition information, presented off the NFT and ingredients list, are outside the scope of this study. The list of ingredients (6), like the Nutrition Facts table, is mandatory on prepackaged food products and used by a consumer to understand more about the exact product contents (GOC, 2012).

2.3.2.4 Proposed Updates to Food Labels

The Government of Canada acknowledges that food labels, in general, contain a surplus of nutrition information, which can make them confusing to understand and difficult to use (GOC, 2014a). Although, the design of the NFT is for Canadians to be able to (Health Canada, 2012): "easily compare foods; to look for foods with more or less of a specific nutrient; to select foods for special diets; to make informed food choices", to better assist Canadians in selecting healthy food products, the GOC is currently updating Canadian food label regulations to "reflect the latest science and eating habits of Canadians" (GOC, 2015a). At the time of completing this thesis, updates have not been released nor has a firm date for their release been set. The regulation updates aim to make it easier for consumers to understand and access nutrition information placed on the Nutrition Facts table and the list of ingredients (GOC, 2015a). Ultimately, these revisions intend to help Canadians spend less time and effort when comparing relative food products and making healthy choices in relation to the current version of the NFT and ingredients list (GOC, 2015a).

The GOC has engaged in a public consultation regarding improvements to the Nutrition Facts table and ingredients list found on food labels (GOC, 2015a). Figures 2.2 and 2.3, as well as Table 2.2, are used to illustrate the proposed food label changes (GOC, 2015a); each point

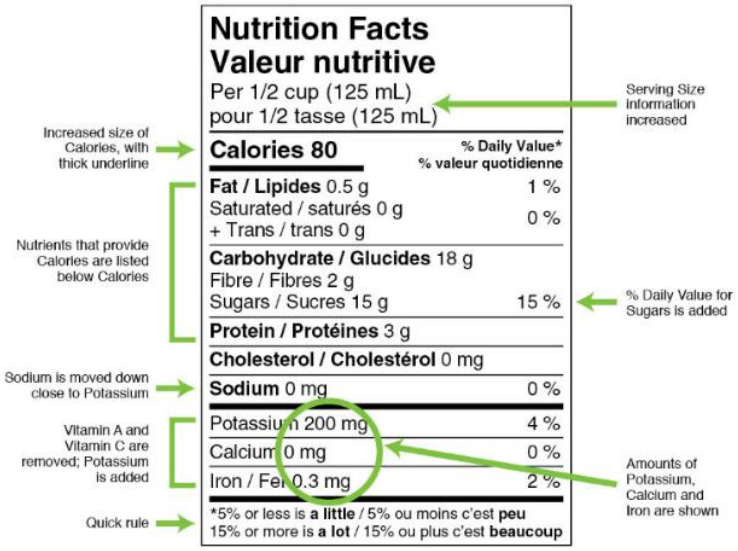
made in Table 2.2 is used to discuss parts of Figure 2.2 and 2.3 (GOC, 2015a). In summary, the proposed changes are: regulate serving sizes to be consistent; alter the order of ingredients in the NFT and list of ingredients to help consumers more easily find information; have more detailed nutrition information so a consumer can better understand signals about a product; include other modifications that help Canadians make more informed shopping choices with less of a time cost than the previous NFT and ingredients could permit.

Table 2.2: Proposed improvements to the Nutrition Facts table and the list of ingredients.

Details about the changes to the Nutrition Facts table (Figure 2.2)	**Details about the changes to the ingredients list (Figure 2.3)**
Serving sizes may be regulated to make them "consistent and realistic". This proposed change is to make it "easier for Canadians to compare similar foods", to choose products that better align with their preferences, and to make "informed food choices". Changes have been made to the order of and to the ingredients on the nutrition facts table.	"Sugars will be grouped together in the list of ingredients" to better "help consumers see how much added sugars are included compared to other ingredients". Changes to the list of ingredients will "help consumers identify unfamiliar sources of sugars, such as fancy molasses, malted barley, fruit juice concentrate, etc.".
"It will be easier to find information on serving sizes and calories"; information will be made to stand out more to make an individual more aware of its presence.	"Food colours will be identified by their common name in the list of ingredients".
Footnotes are proposed to be added to the "bottom of the nutrition facts table to explain how to use percent daily value (% DV) figures". This is an improvement in the quality of information and it gives consumers extra product information to better know "how much of a nutrient a serving of food contains".	The "ingredient list and information on allergens will be easier to find and read".
The labelling of sugars will be improved, as "a new daily value percentage (DV%) for sugars will tell Canadians whether a food has a little or a lot of sugars".	"Bullet points are used to better separate ingredients in the ingredients list".

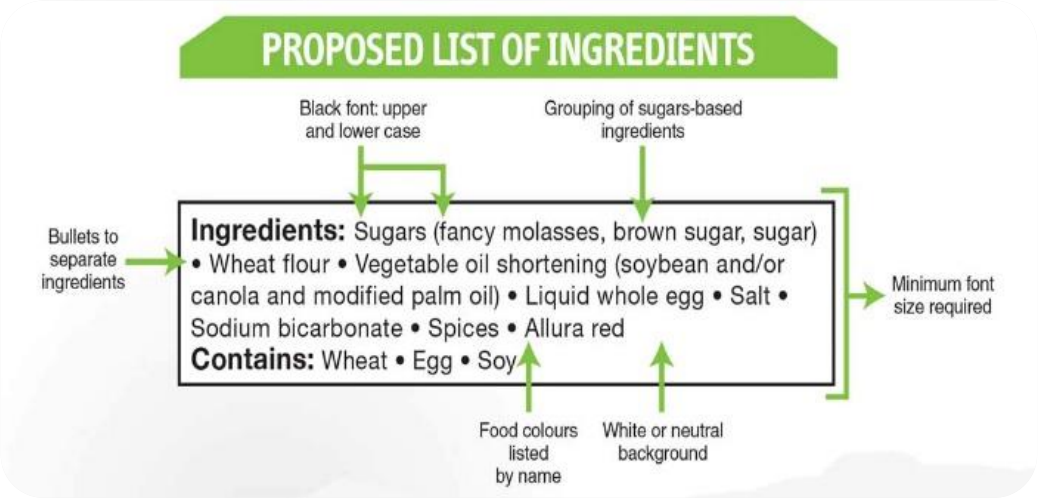
Source: GOC, 2015a

Figure 2.2: Proposed NFT with labels of proposed changes.



Source: GOC, 2015a

Figure 2.3: Proposed ingredients list with labels of proposed changes.



Source: GOC, 2015a

2.3.3 The Canadian Nutrient File (CNF)

The CNF is a public service that aims to help Canadians "make informed food choices through an understanding of the nutrient content of the foods [they] eat" (Nutrient Research Division, pp. 10, 2010). Ultimately, the CNF is a standard reference for the nutrition composition of regularly consumed foods in Canada (Health Canada, 2014a). Furthermore, this source of nutrition information, recommended for use by Canadians by the CFG, is a nutrition information

database for food products not having an NFT on their food label. More specifically, "the classification of foods in the CNF according to Canada's Food Guide was developed as a surveillance tool to assess the food intakes of Canadians relative to Food Guide guidance" (Health Canada, pp. 2, 2014a). Even though the design of the CNF is for anyone to access, a lot of the knowledge it encompasses is for health professionals (Health Canada, 2016). Brand-specific product information in this database is limited as the resource focuses on nutrition information for select common mixed dishes and a variety of single-ingredient products, like fruits, vegetables, nuts, fish and meat products, etc. (Nutrition Research Division, 2010). Ultimately, the CNF is a tool that is important for "setting policies, standards and regulations, risk assessment studies and food consumption surveys" (Health Canada, pp. 2, 2014a).

A large portion of the CNF's database comes from the United States Department of Agriculture (USDA) Nutrient Database for Standard Reference, with "modification for Canadian levels of fortification and regulatory standards, along with the addition of Canadian only foods or Canadian commodity data, as well as where appropriate, some brand name foods" (Nutrition Research Division, pp. 3, 2010). All nutrient data in the CNF relates to 100g servings of a food to keep information standardized, making it easier for end users to understand (Health Canada, 2016). The fixed serving size of 100g does not necessarily align with nutrition information found in Canada's Food Guide or nutrition information found on food labels. Additionally, the exact nutrient composition of a product, like an apple, is not found because the nutrition profile of each item may vary; consequently, only average amounts of nutrients in foods are indicated (Nutrition Research Division, 2010). The CNF can be accessed in two different ways:

- The online version of the CNF is a database that "contains information for 5690 foods with up to 152 nutrients for 100g of the edible portion of the food" (Health Canada, 2016).
- The written version of the CNF shares much less nutrition information about a food product than the online version does, as the book only contains up to 19 nutrients about for 1100 foods by household measures (Health Canada, 2016).

2.4 The Private Provision of Nutrition Information

This section of Chapter 2 discusses background information about the private provision of nutrition information to Canadians while shopping for groceries, and it discusses how each of the two interventions relates to the GOC's nutrition information outlined in Section 2.3. Two forms of nutrition information interventions currently available in Canada and examined in this thesis are: a nutritional navigation program called the Guiding Stars (Section 2.4.1); and, in-store nutrition experts (Section 2.4.2).

2.4.1 Intervention A: The Guiding Stars

2.4.1.1 Introduction

The Guiding Stars in-store nutritional navigation program relays information about a food product's nutrient density to consumers via star ratings on shelf tag labels. In general, more stars mean a food has a higher relative nutrient density; a description of the 4-tier star rating system is provided in Section 2.4.1.2. The Guiding Stars accesses nutrition information from the Nutrition Facts table for rating prepackaged food products, nutrition information from the CNF for rating non-prepackaged foods, and aligns its star ratings with Health Canada's nutrition recommendations (Guiding Stars, 2014a). Further, the star ratings are only relative for comparing foods in the same product category, like fruits and vegetables or ready-to-eat breakfast cereals. The Guiding Stars claims itself as the first storewide nutrition guidance system since shoppers can see the star ratings in grocery store aisles for both prepackaged and non-prepackaged products (Guiding Stars, 2014a).

Information to educate shoppers about how to use the Guiding Stars is provided in the aisles of a grocery store. An individual can also be educated about the navigation program on the Guiding Stars website (www.guidingstars.ca). Online shoppers are also able to find Guiding Stars ratings on food products, although the frame of the nutrition information changes. Online shoppers see the calculation of why a product earns a specific nutrient density rating while in-store shoppers only see the star symbols. Since the focus of this thesis is on an in-store grocery shopping context, detailed discussion about the online frame of the Guiding Stars is outside the scope of research.

The Guiding Stars claim that its information service "takes the guesswork out of shopping for nutritious foods by eliminating the need to compare every item in the store, saving the

consumer time and responding to the consumer imperative for convenience and simplicity" (Guiding Stars, 2014a). Ultimately, the Guiding Stars design is intended to reduce a consumer's search costs when seeking healthy foods, no matter if the product already contains nutrition information on its label. In Canada, the Guiding Stars program has an exclusive arrangement with Loblaw Companies Limited (Guiding Stars, 2014a), but in the USA, the Guiding Stars program is offered by a variety of retailers. The ever-expanding Guiding Stars (2014a) database of food products included over 60,000 items sold in Canada during 2014. More specifically, the Guiding Stars (2014a) system is described as, "an objective program and is not influenced by price, brand, or manufacturer". While this source of nutrition information may be impartial to price, brand, and manufacturer, Loblaws can be seen to incentivize shoppers, through earning PC Points, to purchase foods marked healthy by the star ratings and they are also responsible for labelling the Guiding Stars ratings on their food products.

2.4.1.2 How Food Products are Rated

The Guiding Stars uses a scientific and evidence-based algorithm to calculate its nutrition guidance (star ratings). This thesis does not provide extensive detail about the navigation program's algorithm because it is beyond the scope of the economic interpretation of the nutrition information sharing mechanism. The details of the patented algorithm are available here: http://guidingstars.ca/science/

Ultimately, the Guiding Stars translates detailed nutrition information about a food product into a four tier star-based system that shoppers can use to select healthy food products in line with the GOC's nutrition information sharing system (Guiding Stars, 2015a; Figure 2.4). Star ratings base themselves on the nutritional quality of a food product per 100 calories (Guiding Stars, 2014a); therefore, the rating system is to be consistent as its measurement does not base itself on packaging and serving size variations (Guiding Stars, 2014a), a feature that current food labels do not have. The nutritional navigation program rates food products against a strict standard, per category of products, instead of food products competing against one another (Guiding Stars, 2015b). The star-based system assigns each item a 0, 1, 2, or 3-star rating, where 3 stars signal the highest and no star signals the lowest nutrition density rating (Guiding Stars, 2015a); therefore, the Guiding Stars rates food products on a positive scale, where increasing stars relates to increasing nutrient density.

Figure 2.4: The Guiding Stars 0, 1, 2, 3 rating system.

Source: Guiding Stars, 2015a

Figure 2.4 shows the complete food rating shelf-tag labelling system presented to shoppers in the aisles of a retail location. A limitation of this nutritional navigation program is that a product without stars means that the product has either not been rated or the item does not meet the nutrition requirements of having a star (Guiding Stars, 2014a; 2015a). Therefore, there is no way for a consumer to differentiate whether a product was given a rating or if it does not meet the nutrition requirements of having a star. Having both of these very different signals bundled together may create confusion and misinformation for consumers trying to use the Guiding Stars. An important observation is that the installation of the Guiding Stars navigation program is not necessarily consistent across all locations within a city or between provinces; for example, consumers may be presented with different products that are labelled, or see a different positioning of education about the program within the store at a given location.

Ultimately, the objective of the Guiding Stars' algorithm is to rate foods on a balance of credits and debits per food category. Essentially products earn 0, 1, 2, or 3 stars and those with "more stars means a food has more vitamins, minerals, dietary fibre, whole grains, and omega-3 fatty acids and less saturated fat, trans fat, added sodium and added sugars" (Guiding Stars, 2015b). Table 2.3 illustrates the list of debits and credits used to rate a food product; each food product category has its own equation that determines the star rating for foods within it.

Table 2.3: Credits and debits for Guiding Stars ratings.

Credits	Debits
Vitamins	Saturated Fat
Minerals	*Trans* Fat
Dietary Fibre	Added Sodium
Whole Grains	Added Sugar
Omega-3 Fatty Acids	

Source: Guiding Stars, 2015b

2.4.1.3 What Food Products are Not Rated

As with the NFT and list of ingredients, there are specific food products that are exempt from the Guiding Stars nutritional navigation program, which are (Guiding Stars, 2014a):

- "Foods containing less than 5 calories per serving, like water, coffee, tea, and spices".
- "Infant formula, medical foods, dietary supplements, and alcohol".
- "Store prepared items as the recipes can vary from day to day due to product availability; sushi, hot deli, pre-made salads and bakery items".

2.4.1.4 Presentation of Education and Star Ratings to Consumers while Shopping

The Guiding Stars presents its nutrition information to consumers through an intervention. The presentation of this intervention is in grocery stores at the point of decision-making, which means that shoppers either process or ignore its recommendations. This nutritional navigation program is static by nature, meaning that a product's nutrient density rating only changes when updates to the algorithm or nutrition information of a food product occur. Ultimately, the Guiding Stars is intended to be a basic source of nutrition information, like Canada's Food Guide, and able to be accessed and understood by anyone. Therefore, like the Food Guide, the Guiding Stars may not be applicable to some Canadians, such as those with specific dietary/nutrition needs.

Figures 2.5-2.10 show how the Guiding Stars program is presented to consumers at a Loblaws food retail store. The figures also illustrate how the navigation program provides consumers with general and specific nutritional advice, as well as signals how the navigation program works. Ultimately, the Guiding Stars, through its star ratings, gives a consumer the ability to compare the nutrient density across two products in the same category or it provides nutrition information about a given product. The focus of the Guiding Stars program is positioned by the company as facilitating the purchase of healthy foods by providing consumers

with accessible, easy to understand and trustworthy nutrition information at the point of product selection (Guiding Stars, 2014a).

Figure 2.5: Guiding Stars nutrition database displayed at storefront.

Source: Author, November 11, 2015

Figure 2.6: In-store signage explaining the Guiding Stars program.

Source: Author, November 11, 2015

Figure 2.7: In-store signage explaining the Guiding Stars program.

Source: Author, November 11, 2015

Figure 2.8: In-store signage explaining the Guiding Stars program.

Source: Author, November 11, 2015

Figure 2.9: In-store signage explaining the Guiding Stars program.

Source: Author, November 11, 2015

Figure 2.10: Star ratings of similar products.

Source: Author, April 9, 2015

Figures 2.5-2.10 showed how consumers encounter the Guiding Stars program while shopping for groceries. Figure 2.5 shows that a shopper can access a nutrition database of products rated, and be informed about the Guiding Stars navigation program when walking into a store that features this program. Figures 2.6 and 2.7 show signage that shoppers encounter with education about using the Guiding Stars. Furthermore, Figures 2.6 and 2.7 show food products are given a rating between 0 and 3 stars, where 3 stars (no stars) is the highest (lowest) nutrient density rating available. Figures 2.8 and 2.9 contain education in addition to general statements that encourage healthy food choices from a specific food group; general nutritional statements about healthy eating are generic advertising for healthy food. Figure 2.10 shows the delivery of nutrient density ratings through shelf tags. These images also show how similar foods can be rated differently.

To conclude, Figures 2.5-2.10 show:

- A shopper is educated about how to use the navigation program, sometimes while being given additional general nutrition advice, through signs in store aisles with food products, including the storefront; therefore, this intervention can push a lot of information or noise towards consumers by delivering signals throughout a store and consumers must have incentive to read and understand the information presented to them.
- A nutrition information database for single-ingredient food products is at the storefront; this nutrition information is similar to the book version of the CNF and gives shoppers the opportunity to learn content information of foods that have no NFT or ingredients list.
- The design of the star ratings is intended to be a time-saving tool that helps consumer's select healthy foods, or more specifically, food products that contain high nutrient densities; therefore, this source of information is more of a heuristic than a source of education.
- The nutrient density ratings of two different food products in the same category of food product are comparable, which results in shoppers not needing to read food labels nor having to understand any procedure behind comparisons; therefore, this supports the notion that this source of nutrition information acts foremost as a heuristic, since the calculation to understand each rating is not available.

- The design of the star ratings can educate shoppers about the relative healthfulness of a food product, and can suggest what potential differences to look for in the NFT when comparing food products; therefore, being educated about a product is secondary to the heuristic properties of the nutrition information.

An additional factor to consider about the Guiding Stars is each store participating in the program is responsible for its own labeling of star ratings and installation of education about the program. Therefore, even though the program should be congruent across retail locations, this may not necessarily be the case. In addition, the online shopping context shows the calculation of star ratings for each food, but not in the store, suggesting that the context greatly influences the presentation and quantity of nutrition information given to shoppers.

2.4.1.5 Relationship with the GOC's Nutrition Information

A "Scientific Advisory Panel of experts in the fields of nutrition science, food science, and public health" (Guiding Stars, pp. 1, 2014a) developed the nutritional navigation program. The Guiding Stars algorithm is dependent on the dietary standards and nutrition recommendations produced by the GOC. Furthermore, its star ratings are calculated using the nutrition information found on a prepackaged food product's NFT and ingredients list, as well in the CNF's database, for products without an NFT and ingredients list. The two quotes below provide specific details about the Guiding Stars relationship with the GOC's nutrition information sharing system:

> "… Based on national and international dietary recommendations and aligns with Canadian regulations as established by Health Canada (i.e. The Food Guide) and implemented by the Canadian Food Inspection Agency (CFIA). The Guiding Stars program evaluates the nutrient content of foods using nutrition data gleaned from the Nutrition Facts table and the ingredients list on product packaging. For products that do not have food labels, such as fresh produce and meats, nutrition data is obtained from the CNF database" (Guiding Stars, pp. 1, 2012).

> "... Consistent with Health Canada's food labeling policy, [so] nutrients are only included in the Guiding Stars algorithm if a significant scientific consensus regarding health promotion and/or an association with reduced risk of chronic disease has been documented, and when recommendations or

authoritative statements have been established by a key scientific body" (Guiding Stars, pp.1, 2014a).

In regards to the proposed updates to the NFT and ingredients list, the Guiding Stars Scientific Advisory Panel took part in discussions surrounding the GOC's upcoming food label regulation changes (Guiding Stars, 2014a). The Guiding Stars (pp. 1, 2014a) Advisory Panel stated: "we believe that the proposed changes will assist consumers in understanding and assessing the information provided in the nutrition facts table to better facilitate informed food choices". Since the Guiding Stars and the mandated nutrition information found on food labels are related, any updates to food labels or their protocol would mean the Guiding Stars suggestions might also need updating.

2.4.2 Intervention B: In-store Nutrition Experts

Select private retailers are hiring in-store nutrition experts to assist Canadians with selecting healthy food products and learning about their nutrition. These experts are trained to answer custom nutrition related questions in either a complex or basic manner, making them flexible in the advice they give. In the case of this thesis, nutrition experts hired by private retailers can be broken down into two broad groups:

- Dietitians, a term protected by Canadian law, are registered health professionals bound by a provincial association and have the training to help individuals with the improvement of their health, by using the scientific and practical knowledge and skills relating to food and nutrition gained during their schooling and internship (Dietitians of Canada, 2015). These individuals have met or exceeded the nationally set (Dietitians of Canada, 2015):
    - Educational requirements, which is earning a Bachelor's degree in food and nutrition from an accredited university program by the Partnership for Dietetic Education and Practice.
    - Proficiency standards, which are meeting supervised practical training requirements, set by the regulating body.
- Other nutrition experts could for example be individuals who have not met the requirements to be called a Dietitian, but were accredited by another external organization to share nutrition expertise with others; therefore, they are professionals that can help individuals with the improvement of their health, by using the knowledge and

skills they have gained during their specific educational and practical settings that relate to food and nutrition.

The main difference between alternative nutrition experts and dietitians, in the context of this thesis, is that dietitians have the training to be fluent with the GOC's nutrition information system, while alternative experts may not. On the other hand, alternative nutrition experts may have training and expertise that dietitians do not have. Dietitians are individuals who can legally use the titles of Registered Dietitian (R.D.), Professional Dietitian (P.Dt.), or Dietitian (D.Pt.) (Dietitians of Canada, 2015). They are registered with Provincial Regulatory Bodies, have been educated in a Bachelor's degree in food and nutrition, which includes knowledge about Health Canada's information sharing system (Dietitians of Canada, 2015). Other nutrition experts have titles according to their certificating body; for example, the Canadian School of Natural Nutrition certifies some of the Wellbeing Counselors at Sobeys (LinkedIn, 2015). Individuals who are going through the education requirements to be a dietitian are taught to break down scientific research into relevant applications to help other individuals reach their nutrition goals (Dietitians of Canada, 2014). Those going through the education requirements to be another form of nutrition expert can share their alternative expertise with individuals when trying to help them reach nutrition needs. In the end, all nutrition professionals have certification to a specific standard and are able to provide others with nutrition advice, while being held accountable for their actions. Specific to this thesis is how Loblaw's hires dietitians to work at some of their retail locations, while also presenting the Guiding Stars to consumers, which means dietitians can be accessed to understand the installed nutritional navigation program and how to use it; the same notion applies for the traffic light label, where nutrition experts may also be installed where food labels are present.

Dietitians and other nutrition experts can provide their clients with a diverse range of help surrounding their nutrition. Interpreting food labels or selecting healthy food products, in general, can be a timely process, and nutrition experts hired by private retailers can mitigate excess time costs. This implies that nutrition experts should understand updates to the mandated portions of food labels when they arise, since shoppers may ask about them. Ultimately, nutrition experts can reduce a consumer's search costs of selecting healthy food products or can answer custom nutrition related questions by acting as a source of education or as a decision-making heuristic.

2.5 The Traffic Light Label

This section of Chapter 2 focuses on background information about the traffic light label, which is not currently available in Canada. Therefore, there is no concrete relationship between the traffic light label and the GOC's nutrition information sharing system, although its primary function is repositioning specific information from the Nutrition Facts table to the front of a prepackaged food product and then adding colour to it to signal content amounts. The traffic light label is included in the investigation of this thesis as it has similar aims to the Guiding Stars nutrition navigation program. In the context of this thesis, the traffic light label is a potential substitute source of nutrition information for the Guiding Stars when considering prepackaged food products. No examples of the Guiding Stars and the traffic light label as a combined nutrition information service were apparent when starting this study.

Shoppers can find the traffic light label on the front of a prepackaged food product, including beverages. This nutrition information label is voluntary, where a food manufacturer determines whether to include the traffic light label on its packaging. The traffic light label was introduced in UK grocery stores, although it has since been adopted in other EU countries and in other areas of the world like South Korea and Thailand (EUFIC, 2015). South Korea is the first nation to consider making this label mandatory, while other nations, like the USA, are still considering adopting it on a voluntary basis for manufactures to label their products. At this point in time, even though this nutrition label format is of interest to many nations' governments, it is not available in Canada nor is it scheduled to be included in Canada's upcoming mandated nutrition information changes; therefore, if it were to appear in the Canadian private food retail market, it would be supplied on a voluntary basis.

The traffic light label shares specific product attribute information about calories, sugar, salt and fat content to help shoppers more easily identify food products and beverages with different amounts of these ingredients. While overconsumption of the specific ingredients can be linked to diet-related disease, the traffic light label does not suggest whether a product is healthy or unhealthy; therefore, the purpose of this label is to help individuals find a balance of food choices and to be mindful when filling their shopping basket (Food Standards Agency, 2007). The traffic light label places green, yellow or red circles around the nutrition information to signal low, medium and high amounts of the prepackaged product's calories and ingredients,

respectively. The red, yellow and green ingredient ratings shared on the front of a prepackaged product depend on whether the product is food or a beverage. Figure 2.11 shows a traffic light label from the front of a prepackaged food product. Figures 2.12 and 2.13 reveal how the ingredient ratings (green, yellow, and red) are determined for both prepackaged food products and beverages respectively. To be consistent, the traffic light label bases their ratings on 100g serving sizes for food products and 100 ml serving sizes for beverages.

Figure 2.11: Traffic Light Label Example.

Source: Food Standards Agency, 2007

Figure 2.12: Traffic Light Label Ratings for Food Products.

Text	LOW[8]	MEDIUM	HIGH	
Colour code	Green	Amber	Red	
			>25% of RIs	>30% of RIs
Fat	≤ 3.0g/100g	> 3.0g to ≤ 17.5g/100g	> 17.5g/100g	> 21g/portion
Saturates	≤ 1.5g/100g	> 1.5g to ≤ 5.0g/100g	> 5.0g/100g	> 6.0g/portion
(Total) Sugars	≤ 5.0g/100g	> 5.0g to ≤ 22.5g /100g	> 22.5g/100g	> 27g/portion
Salt	≤ 0.3g/100g	> 0.3g to ≤ 1.5g/100g	>1.5g/100g	>1.8g/portion

Source: Government of UK et al., 2016

Figure 2.13: Traffic Light Label Ratings for Beverages.

Text	LOW[9]	MEDIUM	HIGH	
Colour code	Green	Amber	Red	
			>12.5% of RIs	>15% of RIs
Fat	≤ 1.5g/100ml	> 1.5g to ≤ 8.75g/100ml	> 8.75g/100ml	>10.5g/portion
Saturates	≤ 0.75g/100ml	> 0.75g to ≤ 2.5g/100ml	> 2.5g/100ml	> 3g/portion
(Total) Sugars	≤ 2.5g/100ml	> 2.5g to ≤ 11.25g/100ml	> 11.25g/100ml	> 13.5g/portion
Salt	≤ 0.3g/100ml	>0.3g to ≤0.75g/100ml	> 0.75g/100ml	> 0.9g/portion

Source: Government of UK et al., 2016

Typically, there is no information in store to educate shoppers about how to use the traffic light label while purchasing groceries. While prepackaged food product ratings have a different standard than beverages, shoppers may not have this information. Furthermore, consumers must guess as to whether the traffic light label is for comparing food products across an entire grocery store or only within specific product categories. Online references, such as the "Guide to creating a front of pack (FOP) nutrition label for pre-packed products sold through retail outlets" by the Government of UK et al. (2016) can be used to fully educate oneself about this source of nutrition information. In summary, the traffic light label is a basic source of nutrition information like the Guiding Stars, but bases its ratings on specific ingredient information rather than aggregate nutritional ratings. Therefore, while this is a source of nutrition information intended for all shoppers, its ratings may not be applicable to everyone, such as those with specific dietary/nutrition needs.

2.6 Conclusion

The four sources of nutrition information investigated in this thesis, all of which aim to provide shoppers with highly accessible, easy to understand and trustworthy nutrition information at the point of decision-making were discussed in Chapter 2. Furthermore, the connection between each of the four sources of nutrition information and the GOC's nutrition information sharing system were outlined; the later includes: Canada's Food Guide, the Canadian Nutrient File (CNF) and the mandated portions of a food label, namely the Nutrition Facts Table (NFT). This conclusion of Chapter 2 discusses the connection between each of the four sources of nutrition information under investigation, which are the Guiding Stars (shelf tag label), nutrition experts (in person), the traffic light label (front of package label) and the Nutrition Facts table (back of package label).

Through Canada's Food Guide, the GOC recommends that Canadians use the Nutrition Facts table (NFT) as a primary means to learn about and select prepackaged food products. Since the NFT has been mandatory for about a decade, shoppers should be familiar with its location on the back of a prepackaged food product and have had time to be educated about how to use it. The current version of the NFT was noted to have issues in the quality and effectiveness of communication, which are the main reasons for it currently being updated. Ultimately, the NFT intends to educate shoppers about a prepackaged food product and each individual piece of

nutrition information on the NFT may also act as a heuristic. The remaining three sources of nutrition information may compete with the NFT, depending on a shopper's goals and the context of their decision making.

Private retailers like Loblaws and Sobeys are hiring nutrition experts to assist Canadians with their food choices. This source of nutrition information is customizable, as shoppers can seek answers for their unique needs and preferences. In the case of this thesis, dietitians are the primary nutrition expert of interest. Dietitians are educated to be fluent with the GOC's nutrition information sharing system; they are trained to be proficient in helping others with their nutrition needs, making them capable of being a source of education or a heuristic, depending on the nature of the question they are answering. Since dietitians are versatile in the help they give to shoppers, they may act as a substitute to the NFT. Like the Guiding Stars, nutrition experts are found in the aisles of grocery stores and are located between the product and the consumer. Even though both the Guiding Stars and traffic light label may be in use alongside dietitians, this thesis does not study the relationship between nutrition experts and food labels.

The Guiding Stars nutritional navigation program was released in Canada in 2012, making it a relatively new source of nutrition information for consumers to access. As discussed, the star ratings are calculated using nutrition information found on the NFT and ingredients list of a prepackaged food product or in the CNF when a food product does not have nutrition information on its label. Therefore, this shelf tag label is considered in two primary contexts, which are for food products without a NFT, like fruits and vegetables, and with a NFT. Since dietitians and the Guiding Stars may be in place in the same store, the nutrition experts can be accessed to learn how to properly use the star rating system. Furthermore, shoppers can find education about the newly installed star system scattered on shelves and in aisles of a participating grocery store. While the Guiding Stars can be regarded as a source of nutrition education, its primary function is helping shoppers make healthy and informed choices with less of a time cost than the NFT permits; therefore, this source of nutrition information may take the form of a heuristic and may act as a substitute to the NFT.

The traffic light label is a front-of-package nutrition label that is not found in Canada. The traffic light label's food and beverage ratings are calculated using a formula approved by the UK government. Furthermore, the calorie, sugar, salt and fat contents found on the traffic light label

are derived from the NFT of a prepackaged food product. While the Guiding Stars shelf tag label is storewide, the traffic light label is limited to prepackaged food products; although, in the case of this thesis, the Guiding Stars and traffic light label can be considered as substitutes for both foods with and without mandated nutrition information. Shoppers are unable to find education about the traffic light label while shopping, unlike the Guiding Stars system. While the traffic light label can be regarded as a source of nutrition education, its framing of nutrition information on the front of a product may help shoppers make healthy and informed choices with less of a time cost than the NFT permits; therefore, like the Guiding Stars, this source of nutrition information may act as a heuristic and as a substitute to the NFT.

Chapter 3. Literature Review

3.1 Introduction

Chapter 3 draws upon insights from behavioural economic theory to examine the impacts of adding education and heuristics to a context that already has an abundance of information. The chapter also examines empirical applications and past literature that studied the Guiding Stars, the traffic light label and NFT to gain more insight about each source of nutrition information. While the focus of this chapter is on the addition of food labels to a decision-making environment, much of the information can also apply to adding in-person nutrition information. Nutrition experts that are being hired by private food retailers are a recent addition to the Canadian food retail market, and this thesis aims to stimulate discussion around the topic of adding in-person interventions to a shopping environment.

This chapter has four main sections including this introduction. The next two sections explore behavioural economic theory (Section 3.2) and empirical applications (Section 3.3) to provide additional insight about the Guiding Stars, traffic light label, NFT and nutrition experts. Behavioural economic theory and past studies or empirical applications are also used to design parts of the survey instrument needed for collecting primary data in this thesis. The chapter ends with a concluding section (Section 3.4).

3.2 Insights from Behavioural Economics

3.2.1 Introduction

The context under investigation in this thesis is nutrition information presented to a grocery shopper in an environment that already has an abundance of nutrition information, other information, as well as other sources of stimuli to process. The context can be broken down into two categories, where food products have or do not have a NFT on their label. Furthermore, each category can be broken down into subcategories or groups of like food products, such as ready to eat cereals, bread products, fruits and vegetables. The willingness to use each of the four sources of nutrition information examined (NFT, Guiding Stars, traffic light labels and hired nutrition experts), by a general sample population of Canadians, are elicited through a survey instrument; therefore, primary data collected in this thesis suggests which source of nutrition information is perceived to be most beneficial. All sources of nutrition information examined intend to facilitate

a shopper's ability to select healthy food products and make informed shopping choices, however, there are many factors that can affect the adoption of a given source of information, like trust and other heuristics.

Each of the four sources of nutrition information examined in this thesis can act as a decision-making heuristic and/or a source of education. The Guiding Stars, nutrition experts, and the traffic light label are designed to reduce the effort needed to make decisions and increase the ability to make more informed shopping choices. Since Canadians are heterogeneous in their needs and wants from a source of nutrition information, and given that there is already a large amount of nutrition and other information to process while shopping, we might expect different sources of nutrition information to appeal in different ways to consumers

Behavioural and conventional economic theories have different views on human behaviour, and each theory suggests different impacts of adding new frames of information to a given context. The remainder of Section 3.2 starts by contrasting behavioural and conventional economic theories (Section 3.2.2), where a rationale is made for using behavioural economic theory in this thesis. Framing is then defined under a behavioural economics lens (Section 3.2.2). Next, two leading behavioural economic theories "heuristics and biases" by Kahneman and Tversky, and "bounded rationality" originally introduced by Simon are described (Section 3.2.3). Each of the two behavioural economic theories offer different insights into the effectiveness of improving education and heuristics for consumers; therefore, both theories are explored to understand how each source of nutrition information may impact a shopper's decision making behaviour. A brief comparison of the two behavioural economic theories (Section3.2.4) concludes the section.

Morris Altman's *Behavioural Economics for Dummies* book (2012a) is a main resource used for the behavioural economics discussion in this section. This resource presents a broad range of behavioural economic topics, which can be applied to this study. Altman's book serves as a starting point for much of the behavioural economic research done in this thesis. For example, even though the two leading behavioural economic theories are outlined in *Behavioural Economics for Dummies*, much of the insights gained about them were from papers published by the original authors, Simon and Kahneman-Tversky.

3.2.2 Conventional vs Behavioural Economics

This part of Section 3.2 defines framing after a discussion about why behavioural economics is used to understand the behaviour of shoppers and how shifting the framing of nutrition information may impact an individual's decision-making. Rational decision-making behaviour for an individual has a different face under behavioural than conventional economic theory, as behavioural economics focuses on many factors beyond conventional economic incentives (Altman, pp. 10-11, 2012a). Behavioural economic theory places strong emphasis on understanding how an individual's decisions are made and what affects a given individual's decision-making behaviour, such as psychological, sociological, and institutional factors (Altman, pp. 10-11, 2012a).

The preceding discussion about conventional economic theory is based primarily on Altman (2012a), who has outlined a set of rigid assumptions about an individual's characteristics and behaviour, which are described through the *Homo Economicus* actor (Altman, pp. 27-35, 2012a). Behavioural economic theory allows for the relaxation of the assumptions from its counterpart's hypothesis about an individual's behaviours and characteristics (Altman, pp. 1, 2012a). *Homo Economicus* implies that all individuals share similar behavioural characteristics and preferences, yielding a rigid outlook on how people act (Altman, pp. 27-35, 2012a). Conversely, since behavioural economic theory allows for the relaxation of assumptions about the *Homo Economicus* actor, individuals can be described as heterogeneous in behaviour and preferences. The *Homo Economicus* actor is described by the following 9 assumptions (Altman, pp. 27-35, 2012a):

1. People's preferences are stable and consistent.
2. People are solitary decision makers.
3. How people form preferences doesn't matter.
4. People have the same preferences.
5. People are all maximizers.
6. People have perfect knowledge.
7. People have unbounded computational capabilities.
8. People have willpower.
9. People are capable of acting upon their preferences.

Under the conventional economic assumptions outlined above, it is clear that people have the capacity, willpower, preferences, framework and ideal environment (perfect information) to make optimal and rational decisions. Therefore, improving nutrition education or heuristics will yield minimal benefit to an individual's decision-making, as they are already capable of maximizing their well-being. In the case of this thesis, Canadians were noted to be demanding additional nutrition information to help their selection of healthy food products while shopping, and these individuals were recognized to have varying food preferences, characteristics, budgets, and decision making-behaviours, along with other factors that may alter their outlook on the nutrition information investigated in this thesis (Section 2.2). Health Canada acknowledges that food labels in general, as well as the Nutrition Facts table and list of ingredients, contain an abundance of nutrition information to process which can be difficult to decipher and use (Section 2.3.2). Since a product's packaging often contains additional symbols and signals for shoppers to learn about and use to make healthy food choices, a shopping context contains a vast amount of nutrition information for shoppers to process. Behavioural economics is used to gain a more complete understanding about how shoppers are impacted by increased information sharing and how they may respond to the outlined changes in the framing of nutrition information found while shopping for groceries.

In economics, framing is recognized as the way "options and opportunities are presented" (Altman, pp. 132, 2012a). Behavioural economics acknowledges that individuals "are affected by how choice options are framed", and "the context within which people make decisions affects how they view choices" (Altman, pp. 132, 2012a). While a frame of information can help individuals make more informed decisions, "frames can [also] be misleading and send false signals" (Altman, pp. 134, 2012a), causing individuals to make errors and biases in judgement. Information that is presented in a "positive light" is often trusted (Altman, pp. 312, 2012a), and each source of nutrition information investigated in this thesis aims to help individuals make more informed decisions than they were previously able to. The framing of each source of nutrition information examined in this thesis is different, and each frame was described in previous chapters. Two contexts of decision making were also outlined at the start of Chapter 3; while both contexts have a lot of information for shoppers to process, each contains different amounts and types of information:

1. Food products not containing a NFT on their label are generally single ingredient food products, like fresh produce. Nutrition information such as the NFT and ingredients list is not a mandatory requirement for these food products, but other information is required (Section 2.3.2). Furthermore, consumers may be confronted with credence attribute labels on these products, such as organic production methods.
2. Food products containing a NFT on their label as a mandatory requirement, such as prepackaged food products. In addition to the required NFT, these products also contain an abundance of other information on their labels (Section 2.3.2). Prepackaged food products contain a higher density of information and nutrition information in relation to food products marked in the first context, which can result in higher competition for a consumer's attention.

3.2.3 Simon's and Kahneman-Tversky's Behavioural Economic Theories

3.2.3.1 Simon's Behavioural Economic Theory: Bounded Rationality and Satisficing

Bounded rationality suggests that an individual faces some level of constraint when it comes to making optimal decisions (Simon, 1990). More specifically, people are not unlimited in brain power and capacity to handle all environmental stimuli faced during decision-making tasks. Under Simon's theory, people do not behave irrationally, but rather they have "bounded rationality" (Simon, 1990). Therefore, individuals are thought to have limited capacities to make decisions, and decisions are made in unstable environments resulting in errors of judgement (Simon, 1990; Altman, 2012a). Simon's (1987, pp. 266-267) definition of bounded rationality is noted below:

> "The term 'bounded rationality' is used to designate rational choice that takes into account the cognitive limitations of the decision-maker, limitations of both knowledge and computational capacity… Theories of bounded rationality, then, are theories of decision-making and choice that assume that the decision-maker wishes to attain goals, and uses his or her mind as well as possible to that end."

Satisficing suggests an individual uses decision-making shortcuts (heuristics) in their behaviour, as they face a threshold in the amount of information and other signals that can be processed during a given task (Simon, 1990). Therefore, satisficing itself is a decision-making

heuristic, where an individual does the best they can under a given circumstance by “recognizing cues that evoke a solution” (Simon, pp. 11, 1990); "because of the limits on [an individual's] computing speeds and power, intelligent systems must use approximate methods to handle most tasks, [meaning their] rationality is bounded" (Simon, pp. 6, 1990). Satisficing is more clearly defined by Simon as "using experience to construct an expectation of how good a solution we might reasonably achieve, and halting search as soon as a solution is reached that meets the expectation" (Simon, pp. 9, 1990). While individuals can make mistakes under this theory of decision-making behaviour, they are able to correct for errors in judgement through gaining experience and through other forms of learning. Errors in judgement resulting from the decision-making environment can also be corrected for, by either improving the context of decision-making or by understanding which heuristics lead to optimal outcomes.

Ultimately, as one's ability to satisfice increases, so does their ability to yield optimal decision making outcomes. However, satisficing may result in outcomes that supersede, meet, or are less than what is recognized as optimal by conventional economic theory (Todd and Gigerenzer, 2003). In the case of this thesis, satisficing may lead individuals to process or ignore a given source of nutrition information. Since there is already an abundance of general information and nutrition information for Canadians to access while grocery shopping, any added nutrition information can go unnoticed. Simon suggests that "when a great space of possibilities is to be explored, search becomes very selective, [and] it is then guided by various rules of thumb, or heuristics, some of which are specific to particular tasks, but some which are more general" (Simon, pp. 9, 1990). These insights suggest that the result of a selective search may result in Canadians:

- Continuing sole use of the NFT when it comes to learning about and selecting prepackaged food products because they already use this source of nutrition information and are familiar with it.
- Switching to using a simpler heuristic/source of education such as the Guiding Stars or traffic light label if they do not make use of or understand the NFT.

3.2.3.3 Kahneman-Tversky's Behavioural Economic Theory

Kahneman-Tversky's "heuristics-and-biases" behavioural economic theory suggests that an individual is "hardwired" to behave in a certain way (Tversky-Kahneman, 1974). In this case, behaviour is being driven by decision-making shortcuts and is often considered as irrational; therefore, errors-and-biases are known to result from heuristically driven actions (Tversky-Kahneman, 1974). Errors-and-biases do not only result because people themselves are incapable of making rational outcomes, but also because the environment itself is affected by institutions and other agents that impact the quality of decision-making (Altman, 2012a). Since individuals are hardwired in their behaviour, which includes their ability to select the best heuristic or source of education, the quality of an outcome is by chance. Insights from this theory suggest that individuals would need to be guided towards the best heuristic or source of nutrition information in order to maximize their welfare.

Kahneman-Tversky's theory of errors-and-biases results in individuals needing quality heuristics/education to improve their decision-making behaviour, in combination with guidance to select the highest quality heuristic/education. Thus, the private provision of nutrition information investigated only has a potential of being selected by an individual given that there are a number of other heuristics and sources of education to be accessed. Important is how the GOC recommends that Canadians use the NFT (and ingredients list) above all other sources of nutrition information to learn about and select food products; although, this guidance is not directly available to individuals when grocery shopping. While the two interventions (Guiding Stars and nutrition experts) and the traffic light label are designed to be highly accessible and guide consumers towards healthy eating, the framing of the nutrition information and other heuristics, like trust, may mean consumers do not use these types of nutrition information even when available. Therefore, of interest to this study is understanding which source(s) of nutrition information is (are) most preferred by different consumers and why.

3.2.4 Comparison of the Behavioural Economic Theories

Behavioural economics is referenced to understand the impacts of changing the framing of nutrition information presented to grocery shoppers at the point of decision-making. Table 3.1 provides a summary of the two behavioural economic theories examined in Section 3.2.3. Simon's theory suggests that the quality of decision making increases or the errors in decision-

making are reduced when the boundary of an individual's rationality increases, and this can be achieved through improving education and the quality of heuristics. On the other hand, Kahneman-Tversky's behavioural economics theory suggests that individuals are hardwired and prone to making errors-and-biases unless guided towards the best heuristic; therefore, adding information to an environment that is already information dense may make decision-making less stable and more complicated, unless trustworthy guidance is given to select the highest quality heuristic. It is expected that Canadians are heterogeneous in their needs and preferences for nutrition information and their nutrition, and neither the Guiding Stars nor traffic light label are advocated as a primary source of nutrition information by the Government of Canada; therefore, this thesis will examine which source of nutrition information is perceived as most effective by a sample of Canadians in general and under different contexts of decision making.

Table 3.1: Simon and Kahneman-Tversky's ideas on rational behaviour.

	Kahneman-Tversky (1974) "Errors-and-biases"	**Simon (1990) "Satisficing"**
Theory Explanation	"People rely on a limited number of heuristic principles, which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors". Therefore: • Education can have little impact decision-making. • Improving the quality of a heuristic can impact decision-making.	"Human rational behaviour is shaped by a scissors whose two blades are the structure of task environments and the computational capabilities of the actor. In tasks of any complexity, knowledge and strategies do not allow the expert to find an optimal solution, but only to find approximations that are far better than those available to "native" (or naive) intelligence". Therefore: • Education can impact decision-making. • Improving the quality of a heuristic can impact decision-making.

Table 3.2 compares key assumptions from each behavioural economic theory related to decision-making, information and heuristics. The information found in Table 3.2 is derived from Altman's (2012b) publication, *Implications of Behavioural Economics for Financial Literacy and Public Policy*. This article summarizes and compares the two behavioural economic theories in general and when trying to explain whether there is a potential of increasing the financial literacy rate of individuals through improving financial education. While the specific information about improving financial education is not relevant to this thesis, the general discussion about improving heuristics and education to improve decision-making outcomes is relevant. In the case

of this thesis, the private provision of nutrition information and the traffic light label can be accessed as a source of education or as a heuristic to improve the ability to select healthy food products while shopping; therefore, these sources of nutrition information have the ability to impact nutrition literacy. Conclusions that Altman (2012b) makes that are relevant to this thesis are:

- Improving heuristics and education need not benefit an individual when the decision-making environment, institutions in place, and communication levels between consumers and firms are less than optimal.
- An abundance of information in a given context may impact the adoption rate of a recently added source of information to the context; therefore, even if additional information is beneficial, it may not be adopted due to factors that are external to the information itself.
- The importance of trust when accessing a heuristic or source of education is high.
- The accessibility and ease of use of a heuristic or source of education is important when adopting it, especially in the case of an environment with many sources of stimuli, including other heuristics and sources of education.

Table 3.2: Simon and Kahneman-Tversky's decision-making assumptions

Kahneman-Tversky "Errors-and-biases"	Simon "Satisficing"
The benchmark for rationality in decision-making is based on conventional economic theory and focuses upon calculating behaviour.	Conventional benchmarks for rational or intelligent decisions are often rejected.
It is possible for the decision-making to be less than ideal.	A major source of decision-making errors is a less than ideal institutional environment.
Individuals tend to make irrational, error-prone decisions, which they eventually regret. Errors-and-biases in decision-making are wired into the brain architecture. Decision-making shortcuts are regarded as typically error-prone.	Individuals are assumed to make rational decisions as a result of how the brain is wired and the decision-making environment. Individuals can make decision-making errors and these can lead to decisions that are subject to regret. Decision-making shortcuts are rational more often than not, even when they contravene conventional economic benchmarks.
Education can sometimes improve decision-making.	Education can have important effects on decision-making.
Individuals are easily fooled and deceived by how questions are framed and often reverse their preferred decisions with inconsequential changes in how questions or options are framed.	Individuals are not easily fooled, but they can be misled.
Some success predicted for improvements in the decision-making environment, less for the improvements to education**.**	Decision-making can be improved by improving the decision-making environment and through improvement to education.
Government intervention in decision making is often thought to be the best-practice route to take for ideal choices to be made. Some success predicted for improvements in the decision-making environment, less for improvements to education.	Government plays an important role in establishing an ideal institutional environment and by providing education required for ideal choices to be executed Government should not intervene in individual choices unless these choices can be shown to cause harm to others.

Source: Altman, pp. 3, 2012b

No matter which behavioural economic theory is considered, trust is a powerful decision-making heuristic that individuals can use to limit their search costs (Altman, p. 320, 2012a). In the case of this thesis, the level of trust one has for a source of information is also a heuristic that determines whether an individual accesses a specific source of nutrition information while grocery shopping. "Contemporary evidence shows that most people start off trusting another party in a transaction, unless they suspect something is fishy" (Altman, pp. 320, 2012a). Furthermore, "if people can't employ the trust heuristic, the cost of decision making increases dramatically" (Altman, pp. 320, 2012a). Therefore, trust for nutrition information plays a strong role in the willingness to use each source investigated in this thesis, especially since a shopping environment contains a lot of information to process.

To conclude, the quality of decision-making is improved through the introduction of high quality heuristics under both behavioural economic theories, and is improved when individuals can access improved sources of knowledge under Simon's behavioural economic theory or are guided towards quality sources of knowledge under Kahneman-Tversky's economic theory. Given that healthy eating is subjective and that Canadians are heterogeneous in their needs and wants for nutrition information, this thesis explores whether Canadians are willing to use each source of nutrition information examined. Since private food retailers control a given shopping environment, and a government mandates the nutrition information found on a food product's label and makes recommendations for healthy eating, understanding consumer preferences for different frames and sources of nutrition information can help these parties understand how to meet the nutrition information needs and preferences of Canadians.

3.3 Insights from Empirical Applications

3.3.1 Introduction

Empirical applications and past literature that have studied the Guiding Stars, the traffic light label and NFT, as well as their impacts on a consumer's decision-making are explored in this section. At the time of this research, to this author's knowledge, there were no studies outlining the effects of nutrition experts on a grocery shopper's decision-making. Some of the literature in this section is used to design parts of the survey instrument needed for collecting primary data in this thesis. Further, some survey methodologies from past studies that are examined are used in the survey design and will help with the econometric analysis of the data. In Section 3.2, behavioural economic theory was referenced to understand the potential impacts of adding additional frames of nutrition information, all of which intend to guide and assist Canadians towards making more informed food purchases, for individuals to access while grocery shopping (Section 3.2). In Section 3.3, literature is used to understand the specific impacts of individuals having access to the Guiding Stars (Section 3.3.2), the traffic light label (Section 3.3.3), and other sources of nutrition information (Section 3.3.4) while grocery shopping.

3.3.2 Guiding Stars

Two interrelated studies about the Guiding Stars and the impacts it has on consumer decision-making while grocery shopping were examined. Both studies aim to quantify the effects

of installing the Guiding Stars using the same secondary point-of-sale data from ready-to-eat cereals purchased at the Hannaford supermarket chain in the United States. Furthermore, both studies recognize the Guiding Stars as a means to help shoppers select healthy food choices determined by this program by using it as a heuristic in their decision-making. The first study by Sutherland et al. (2010), "Guiding Stars: the effect of a nutrition navigation program on consumer purchases at the supermarket" was published in the *American Journal of Clinical Nutrition* , and suggests that the installation of the Guiding Stars program had significant impacts on the demand for ready-to-eat cereal products, where consumers began purchasing more products earning star ratings over time. The second study by Rahkovsky et al. (2013), another US based study, "Effects of the Guiding Stars Program on purchases of ready-to-eat cereals with different nutritional attributes" was published in *Food Policy* and suggests that the Guiding Stars nutritional navigation program, which uses a shelf-tag nutrition label, has "significantly increased the demand for cereals that [the Guiding Stars] considers more nutritious at the expense of cereals that [Guiding Stars] considers less nutritious" (p. 100). The second study was conducted to confirm conclusions of the first study, and both studies show that the Guiding Stars may impact a shopper's choices as "this type of information may help consumers select products that are more nutritious in terms of [the Guiding Stars] star rating" (pp. 107). The methodologies in these two studies are not directly relevant to this thesis as neither included a survey instrument in their analysis; rather they used primary point-of-sale data and the Rotterdam demand model to examine decision-making behaviour of respondents in order to come to their conclusions about effects of the Guiding Stars on sales of ready-to-eat cereals.

Ultimately, the introduction of the Guiding Stars was shown by both studies to affect the demand for ready-to-eat cereals in a specific retail chain, but no other food products were under examination. This thesis seeks to understand whether consumers are willing to use the Guiding Stars in general or in regards to specific product categories when other nutrition information is also available. Even though these two studies suggest that consumer choices were impacted by the installation of the Guiding Stars, these results may only suggest a correlation between the installation of the nutritional navigation program and the selection of healthy cereal products. For example, if Americans started trending towards healthier eating or paying more attention to their food choices around the same time as the installation of the Guiding Stars in retail stores, the effects may not be causal and may relate to the changing preferences of shoppers. These studies

are unable to determine whether effects of the installation of the Guiding Stars were causal or correlated due to only referencing point-of-sale data and not including a survey component or another way of eliciting this information; ultimately, a shock in the consumption patterns of consumers was noted and further research, such as this thesis, may be valuable in determining whether consumers in fact make use of the Guiding Stars while shopping.

A major difference between this thesis and the two past empirical applications is the method of data collection. Rather than using point-of-sale data, this thesis surveys a sample of Canadians to specifically ask if they are willing use the Guiding Stars as a source of nutrition information while making food choices. In addition, those being surveyed have the opportunity to signal if their most preferred source of nutrition information is the Guiding Stars under different contexts of decision-making. The Guiding Stars website references the Rahkovsky et al (2013) study to claim that their nutrition information has been confirmed to assist shoppers with making healthy food choices, even though there may be no direct proof that shoppers were actually accessing it while deciding on the foods they purchased. An important conclusion the Rahkovsky et al. (2013) study made is that socioeconomic factors are likely to be important to healthy eating choices, as individuals with higher incomes are expected to be more likely to choose nutritious cereals identified by the Guiding Stars. Sutherland et al. (2010) states that future studies should incorporate household demographic and purchasing habits to better understand characteristics linked to use of this nutrition information. This thesis investigates the impacts of income, household demographic and purchasing habits on the willingness to use each source of nutrition information under investigation.

3.3.3 Traffic Light Label

A great deal of research about the traffic light label and the impacts it has on consumer decision-making while making food choices is available. Past studies highlighting the traffic light label are not limited to looking at this source of nutrition information in a grocery shopping environment, but also include use of a similar heuristic/source of education in other contexts, such as financial products. Of particular relevance to this thesis are two different empirical applications on the traffic light label at the point of product selection, which includes looking at its effects when individuals are selecting food products outside of the grocery store.

The first study by Sonnenberg et al. (2013), "A traffic light food labeling intervention increases consumer awareness of health and healthy choices at the point-of-purchase", was published in *Preventative Medicine* and examined whether the traffic light label as an intervention in a hospital cafeteria setting increases a consumer's ability to make informed food choices. The hospital setting was in Boston, Massachusetts, and the traffic light label is not common in the US food retail market; therefore, respondents of this study may have similarities in the level of understanding about the traffic light label in comparison to the general population sample of Canadians surveyed in this thesis. In the case of the empirical application, the traffic light label used was created by staff nutritionists at the hospital and it rates a food product's aggregate nutritional value on a 3-tier scale, where red signals "there is a better choice in amber or green", amber signals "consume less often", and green signals "consume often". In addition, the label could be found on the cafeteria menu, the shelf tag or directly on the product, education about the traffic light label was accessible, and a dietitian was available to discuss the program with those seeking advice. The results of this experimental study that uses survey and point-of-sale data suggests the traffic light label had positive impacts on a consumer's food purchasing behaviour in terms of selecting healthy food products in a cafeteria setting. It should be noted that the traffic light label created for this experiment is more comparable to the Guiding Stars (aggregate nutritional rating) than the specific ingredient information shoppers receive from the UK traffic light label. Due to the hybrid nature of the label between the Guiding Stars and traffic light label, the results of the Sonnenberg et al. (2013) study may suggest evidence that both the Guiding Stars and traffic light label would positively impact a shopper's choice selection under similar conditions. It is not evident whether changes in consumption would remain long after the intervention was removed, nor if a healthy eating theme in the hospital cafeteria (dietitians, new labels, etc.) was responsible for increased healthy food purchases.

Results of Sonnenberg et al (2013) found the installation of the traffic light label to increase the frequency that individuals look at nutrition information while making food choices, and to increase their "awareness of the healthfulness of food and beverages at the point-of-purchase" (Sonnenberg et al., 2013). A limitation to this study is that it does not measure impacts of the placement of nutrition information on a shopper's purchase behaviour nor does it discuss impacts of adding a dietitian in situ to assist shoppers with their learning. Since the traffic light label could be replaced by the Guiding Stars and possibly other nutrition information in this context, it

is important to understand which source of nutrition knowledge consumers prefer to learn from, as further benefits on an individual's health could be realized through implementing the best possible heuristic/source of education. The Sonnenberg et al. (2013) study also recognized that consumers made healthier food choices when noticing the traffic light labels, and not all shoppers realized changes to the cafeteria so it may not have impacted their decision-making; therefore, finding the most preferred frame and source of nutrition information by shoppers may further increase the awareness of their health and the foods they buy, especially in a context where many sources of nutrition information may be present.

Important to this thesis is the survey instrument used in the Sonnenberg et al. (2013) study, which collects primary data from before and after the installation of the traffic light label to understand the behaviour of individuals purchasing food. Point-of-sale data was matched with respondents and used to determine the frequency of items labelled with each traffic light signal. The survey collected demographics, factors important to making nutrition choices (taste, price, health/nutrition, convenience, other), determined whether those surveyed noticed the additional nutrition information (traffic light label) at the point of product selection, asked whether nutrition information is considered when making food choices and how often respondents purchase food that is healthy. Factors important to making food choices that were outlined in the Sonnenberg et al. (2013) study are used in the survey design of this thesis to help better understand a shopper's preferences for nutrition information and their shopping behaviour. In the case of the Sonnenberg et al. (2013) study, the most important factor impacting a consumers' food choices are health/nutrition, suggesting the provision of reliable information on health/nutrition outcomes should be important. Furthermore, Sonnenberg et al. (2013) found that the importance of healthy nutrition to an individual and the perceived quality of an individual's nutrition impacted the selection of healthy food products; therefore, these factors may also play a role in the adoption of the nutrition information investigated in this thesis.

The second study by Borgmeier and Westenhoefer (2009), "Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study" was published in *BMC Public Health*. This study interviewed 420 respondents to examine how different food labels impact a consumer's ability to select healthy food products, and to understand how each label impacts their daily food choices when grocery shopping. Data were analyzed using "chi square tests for categorical variables", through one way ANOVAs for

continuous variables, and through two way ANOVAs for determining whether demographics and other factors like education have significant effects. Research focused on four different nutrition labels, which were a "healthy choice" tick, the traffic light label, a monochrome Guideline Daily Amount (GDA) label, and a coloured GDA label, as well as a control of using "no label". Evidence from this study suggests that subjects who have "no label" were able to identify the least correct number of healthy food products, determined by a group of dietitians, when selecting the healthiest food choice between 28 pairs of food products. In addition, those who used the traffic light label were able to identify the most correct number of healthy food products. While the traffic light label performs significantly better than using no labels and performs better than using the other labels, beneficial effects are moderate relative to the other sources of nutrition information, suggesting that the Guiding Stars may also have had similar impacts on choice selection. These results suggest the importance of shoppers having a quality nutrition label, further indicating the importance of supplying shoppers with the framing of nutrition information they are likely to use. There was no supporting evidence that "the various signpost formats affected the different subject groups differently, [nor] an influence of educational status on the number of correct decisions, [although] women in comparison to men and normal weight subjects in comparison to overweight subjects had a higher number of correct decisions" (Borgmier and Westenhoefer, pp. 18, 2009).

The Borgmeier and Westenhoefer (2009) study also investigated how each label impacts the ability to make healthy food choices for daily consumption. While evidence suggests that the traffic light label helps shoppers identify the "healthier" food from a pair of products, no significant effects were determined between the five experimental conditions when it came to purchasing food for daily consumption. Results from this part of the experiment suggested that an individual intakes higher amounts of fat, saturated fat, sugar and sodium in relation to the national government recommendations no matter which label or if no label were used. Ultimately, what this research indicates is that while shoppers may be better able to select healthy food products with specific labels, their average food consumption behaviour does not significantly change. Therefore, shoppers may need more information than found on nutrition labels in order to optimize their health, as selecting healthy food products suggests little about whether average nutrition requirements are met on a daily basis. The Borgmeier and Westenhoefer (2009) study claims there to be little evidence that the food labels under

investigation are effective in the prevention of diet related disease and obesity. Like the Borgmeier and Westenhoefer (2009) study, this thesis will look at whether factors such as an individual's Body Mass Index (BMI), level of education and other demographic/socio-economic influences their preferences for nutrition information. Even though individuals in the Borgmeier and Westenhoefer (2009) study overestimated the amount of food they are required to intake on a daily basis, there is evidence that simplifying decision-making while shopping may assist individuals with making more informed food choices.

3.3.4 Other Studies

Two additional studies are examined in this part of Chapter 3. The first study investigates impacts of reducing search costs for nutrition information on consumers selecting healthy food products. The second study examines whether the ability to access customizable nutrition information at the point of product selection impacts a consumer's food choices.

The first study by Chen by et al. (2015), "Information Cost and Consumer Choices of Healthy Foods" was published in the *American Journal of Agricultural Economics*, and it examined the effects of reducing search costs for a US consumer selecting healthy breakfast cereals. This US study recognizes that the Nutrition Facts table on a product alone has not been an effective instrument in helping consumers to make informed shopping decisions due to high search and time costs, which are also reasons for the Government of Canada currently updating its NFT (Section 2.3). The main objective of this study was to determine whether the addition of a front of package nutrition label, which shares no new nutrition information about the product beyond the information already available in the Nutrition Facts table, reduces consumer search costs and results in individuals making more informed food purchases. This study makes use of a secondary dataset from 130,000 household purchases from 2006-08 that are matched with nutritional information, advertising and labelling, and a random coefficient mixed logit model to determine whether reducing information costs effects the healthfulness of products consumers choose. The dataset includes information from a number of sources and includes close to three million observations of real food purchases across 22 brands of cereal, and other factors used to understand the population, like demographics. Ultimately, front of package food labels were successful in helping consumers make more informed shopping choices, especially for consumers that have lower levels of education and live in smaller households. The results of this

study suggest that the framing of the private provision of nutrition information investigated in this thesis may further reduce search costs and positively impact a shopper's ability to select healthy food products. This thesis focuses on determining which source of nutrition information is most valued by Canadians in general and under different decision making contexts that go beyond ready to eat cereals, and does not specifically consider how the location of nutrition information on a package impacts a impacts a consumer's choices.

While conclusions of the Chen by et al. (2015) study are relevant to this thesis, the data collection and analytical methods are less applicable, since no survey instrument was used. Nevertheless, demographics and socioeconomic factors important to the Chen by et al. (2015) study, like education, household size and income, are also important to the data collection in this thesis. An important consideration that the Chen et al. (2015) study lends to this thesis is how the front of package nutrition labels examined did not present any new information about the product with individuals, but simply presented existing information in a different format. Therefore, the Chen by et al. (2015) study cannot provide direct insights into a shelf labelling program like the Guiding Stars, which uses its own nutritional rating system. While the Guiding Stars intends to reduce consumer search costs by providing healthfulness ratings on shelf tag labels, it shares new nutrition information with shoppers who may therefore require additional education to use and understand the Guiding Stars, potentially nullifying time saving benefits of the information.

The second study by Balcombe et al. (2015), "Information Customization and Food Choice" examined the effectiveness of the customization of nutrition information to consumers while they purchase groceries by using a hypothetical discrete choice experiment that determines the willingness of consumers to pay for customized sources of nutrition information. This study notes that, while consumers know how to use nutrition information on food labels, it is unclear how often the latter are actually used while shopping due to the high amounts of information and other stimuli to process in a given shopping environment. In the study individuals are presented with customizable nutrition information through a hypothetical service that can share nutrition information about a specific product or "aggregate nutritional information to consumers for their entire shopping basket, rather than for each individual product" (pp.57). This discrete choice experiment surveyed respondents and asked them to rank attributes (appearance, diet alert, allergy alert, nutritional label format, price) outlined in the experiment to better understand their impacts on food choices. A mixed logit model was used to examine the dataset and Bayesian

methods were used to estimate the models and determine whether a new hypothetical customizable service would benefit consumers. The premise is that customizable nutrition information can potentially reduce the cognitive burden of dealing with excess information and other stimuli while trying to make informed nutrition choices. Conclusions of this study signal that consumers are willing to pay for the hypothetical source of customizable nutrition information that best meets their needs, which is not necessarily the same as the nutrition information that is already found while grocery shopping or on a prepackaged food product. The Balcombe et al. (2015) study advocates the importance of meeting consumer needs and preferences for nutrition information, which may be heterogeneous by nature, rather than providing them with basic labels that are intended to be accessed by anyone. The evidence of consumers being willing to pay for custom nutrition information may suggest an incentive for shoppers to access nutrition experts to answer their custom related nutrition questions. Further, there is incentive to better understand what consumers want from nutrition labels on food products to better meet the needs of a given population.

Ultimately, the Balcombe et al. (2015) study identifies that custom nutrition information through smart technology may reduce the need for shoppers to rely on heuristics that cause them to make errors-and-biases while shopping. The Balcombe et al. (2015) study's discrete choice experiment and mixed logit econometrics models estimate an individual's willingness to pay for the customizable nutrition information. Meanwhile, this thesis uses an ordered probit model to estimate the willingness to use a given source of nutrition information. The Balcombe et al. (2015) study considers different types of nutrition information, such as allergy declarations, dietary and other nutrition information that are outside the scope of this thesis. The main contribution of the Balcombe et al. (2015) study for the context of this thesis is understanding whether consumers value custom nutrition information at the point of product selection when other sources of nutrition information are available.

3.4 Conclusion

Simon and Kahneman-Tversky's behavioural economic theories and past empirical applications were outlined in previous parts of Chapter 3 to primarily understand impacts of adding the Guiding Stars and traffic light label to the Canadian private food retail market. When it comes to hired nutrition experts by private food retailers, this thesis aims to stimulate more discussion around this relatively new nutrition information intervention. Furthermore, because accessing nutrition experts and food labels are inherently different, more focus is on the substitutability of the Guiding Stars and traffic light label. Empirical applications about the Guiding Stars and traffic light label all suggested positive impacts on consumer shopping decisions when it comes to selecting healthy food products. Ultimately, this study seeks to gain insight about which source of nutrition information is most likely to be used by different segments of the Canadian population, without hypothesizing which consumers will benefit more due to their heterogeneous preferences and nutrition needs.

Simon's theory of bounded rationality suggests that individuals learn about the foods they purchase over time, and will improve their nutrition literacy to a point where they can satisfice in selecting products that meet their nutrition needs and preferences. Under Simon's theory of bounded rationality, individuals may make errors in judgement during a decision-making, but fix them over time through experience and other methods of learning. On the other hand, Kahneman-Tversky's theory of errors and biases suggests that consumers need some form of paternalism in order to select the best quality source of nutrition information available to them to learn about the foods they purchase. While the theory of errors and biases suggests guidance to select the best source of nutrition information and shopping basket, there is no form of paternalism directing Canadians to either end leaving their decision-making up to chance. Under both behavioural economic theories, it is recognized that consumers are presented with an abundance of nutrition information, information and other stimuli to process while shopping, which may ultimately impact their ability to select healthy foods and use the recommended nutrition information by the Government of Canada. The primary dataset collected for this thesis is used to investigate which source of nutrition information is most preferred by the sample population of Canadians, while looking at factors impacting their decision to use the Guiding Stars and traffic light label and is discussed in the next chapter.

Chapter 4. Survey Instrument and Descriptive Statistics Results

4.1 Introduction

Chapter 4 explains the data collection process and design of the online survey instrument and reports descriptive statistics from the survey. The online survey instrument was administered in November-December 2016 to a demographically representative general population sample of Canadians, based on age, who are primary grocery shoppers from Alberta, British Columbia and Saskatchewan. The chapter summarizes survey results about: socio-demographic characteristics of the sample population (Section 4.2); shopping behaviours of the sample population (Section 4.3); behaviour regarding use of nutrition information in general and with respect to specific sources of nutrition information, focusing on the Nutrition Facts table (Section 4.4); specific questions regarding the traffic light label and Guiding Stars, including their likelihood of use (Section 4.5); preferences towards using the Guiding Stars, traffic light label, and Nutrition Facts table under different decision-making contexts (Section 4.6); understanding the level of trust and ease of use of the four sources of nutrition information examined, as well as the most trusted sources of nutrition information to the sample (Section 4.7); and, health status and behavioural questions (Section 4.8). The summary (Section 4.9) is used to commence discussion needed to answer the research objectives outlined in Chapter 1.

Background information (Chapter 2), behavioural economic literature and past empirical applications / studies (Chapter 3) outlined in this thesis were referenced for designing parts of the survey instrument. The online survey instrument was designed with the Qualtrics' survey platform software and was administered via the Social Science Research Laboratories (SSRL) at the University of Saskatchewan (see Section 1 of Appendix B for a copy of the survey instrument)[1]. Recruitment of the general population sample by the SSRL occurred through Probit, a commissioned third-party vendor catering to survey administration for academic and professional research. Respondents were not compensated for filling out the questionnaire and the target sample size was 276. Survey respondents had to be above 18 years old, and were screened to ensure they are responsible for at least 50% of food purchases in their household. Survey respondent quotas were set by age (18-24, 25-34, 35-44, 45-54, 55-64, 65+) and province

[1] This study was granted behavioural ethics approval on September 8, 2016 (University of Saskatchewan Behavioural Research Ethics Board BEH #16-296)

(AB, BC, SK) to ensure that a demographically representative general population sample of Canadians is investigated[2,3].

The online survey instrument was pre-tested on paper and then online in September and October with about 10 individuals each to determine if any changes were needed. Paper drafts and the online version of the survey were tested with primary grocery shoppers from one of the three provinces of interest, some of which have past experience with designing surveys. Minor changes to the survey were made throughout the pre-testing phases to ensure it was well understood, designed and able to answer the study objectives. Before the full launch of the survey, a soft-launch was used to ensure data was being recorded correctly. The full launch of the survey was administered to 369 respondents from the Probit panel, included a final demographically representative dataset of 242 respondents by age range (25-34, 35-44, 45-54, 55-65, 65+) and province (Alberta, British Columbia, Saskatchewan). While 369 individuals initially entered the online survey, 9 did not consent to participate, 30 were not primary grocery shoppers, and a number of respondents were unable to participate due to quotas already being filled. In addition, 284 individuals answered all responses up to the last section of demographic questions in the survey (Appendix B, Section 1), 257 responses were completed in full, and the data-cleaning process left the final dataset with 242 complete observations. The data cleaning process ensured that respondents: entered a year of birth at the end of the survey that matches the age range specified at the start of the questionnaire (quota question); correctly identified the total number of individuals in their household was more than the individuals under the age of 18; filled in a response for height that was above 0 feet or 0 cm, a response for weight that was over 0 pounds or 0 kilograms, and if filled in for both feet/cm and pounds/kilograms the numbers recorded were equal; and, did not streamline their answers or repeat the same answer for blocks of questions throughout the survey.

The survey instrument (Appendix B) includes 9 main sections, which are: an initial screening section for consent to participate, primary grocery shoppers, and to ensure quotas (province and age) are filled; shopping behaviours; use of nutrition information; traffic light label; Guiding Stars; nutrition information preference; nutrition information scale questions; health status and behaviours; and, demographics. The remainder of this section describes the

[2] A limitation of using Probit for the administration of the survey instrument was that their panel of respondents could not fill the 18-24-year-old quota.
[3] Appendix C shows Statistics Canada data used to calculate quotas for the administration of the online survey instrument.

formats of questions used in the online survey, which are important to understanding descriptive statistics presented in this chapter and econometrics results found in Chapter 5.

Ranking questions asked respondents to rank their top 3 choices of shopping attributes and most trusted sources of nutrition information from a given list of alternatives. The list of choices was randomized for each respondent in both instances to ensure the sample was not exposed to a static list of potential answers. Cohen (2009) indicates that this form of question is straightforward for those filling out a survey, while acknowledging that adding attributes to a given list to rank makes the question more complicated and time consuming. In the case of this thesis, to increase the ease and decrease the time needed to answer ranking questions, a limited list of choices were used and respondents were asked for their top three rankings rather than asking for the entire list of choices to be ranked. Further, to allow for more accurate results, each ranking question included an open-ended 'other' response.

A variety of multiple-choice questions were included for obtaining more precise responses to questions such as demographics, shopping behaviours, and preferences for nutrition information under different decision-making contexts. Selection based questions that ask respondents to select one or more options as an answer, such as when answering for which food retailers are most often shopped at, were also included. Selection based and some multiple-choice based questions included open-ended responses to allow for more inclusive answers. A limitation of multiple choice, selection and ranking based styles of questions is that true and/or exact answers may not be submitted, due to a limited number of selections being available or potential motives causing a bias in responses. Those filling out the survey knew their answers were submitted with anonymity, hopefully helping to yield accurate results.

Questions that asked for responses on a 7-point Likert-scale were a primary component in the data collection process for this thesis. There were many questions asking respondents to mark their level of agreement/disagreement with a statement. Also, there were a number of questions asking respondents to indicate a response by using other scales, such as: likelihood (likely/unlikely), frequency of use (never/always), level of knowledge/importance (not at all/extremely), level of trust (no trust/ trust completely), and level of ease (not easy/extremely easy). Cohen (2009), discussed how responses for all categories on a Likert-Scale may be labelled or how endpoints or anchors may only be labelled, yielding a number of different ways

to obtain a response using this method of data collection. Survey respondents may view a particular Likert-Scale differently than one another, meaning ratings and distances between ratings are not necessarily seen as congruent across a sample population. Since rating scales are subjective, different conclusions may be found when analyzing them as an interval and ordinal scale. When it comes to rating scales, Finn and Louviere (pp. 12, 1992) warn that, "interpreting exactly what rating data means can be difficult, key [attributes] are measured with single-item scales of unknown reliability and validity, [and] opinions are not measured in relation to other [attributes] that compete for the same resources"; therefore, while "some individuals might be truly very concerned about many issues, such responses provide inadequate discrimination to help [researchers] determine real priorities" (Finn & Louviere, pp. 12, 1992), as ranking lists cannot be fully inclusive and trade-offs between given attributes cannot be fully understood. A limitation to using Likert-Scale questions in a survey is that every respondent may have a different interpretation of the levels of responses available. In other words, because no specific meanings were described nor labels were used for all answer categories, every respondent may have a different interpretation of the levels of responses available.

The likelihood of using the Guiding Stars, traffic light label and nutrition experts, and the frequency of using the Nutrition Facts table are elicited. The likelihood/frequency of using a given source of nutrition information is central to this thesis because consumers do not face a monetary cost when accessing any of the four sources of nutrition information examined. While consumers do face time costs, like search and educational costs, when accessing the private or public provision of nutrition information, focus is on examining the willingness to use a given source of nutrition information rather than investigating how much Canadians are willing to pay for the information. Ultimately, this thesis asks the survey sample population to determine how likely they are to use (how frequently they use) the Guiding Stars, traffic light label, and hired nutrition experts (and NFT), on a scale of 1-7, where 1 is extremely unlikely (never), 4 is neither likely nor unlikely (unmarked in the case of the NFT) and 7 is extremely likely (always).

4.2 Socio-demographic Characteristics of Survey Population

The discussion of results in this section relates to questions from the last segment of the online survey (Appendix B, Section 8 - Demographics), which enquired about: year of birth, gender, how many other individuals and how many children live with the respondents, the

highest level of education completed, approximate yearly household income before taxes, and height and weight to calculate Body Mass Indexed (BMI) values.

A final total sample size of 242 completed survey responses of primary Canadian grocery shoppers aged 25-92 years old from Alberta, British Columbia and Saskatchewan makes up the final data set for this thesis (Table 4.1). The survey sample is relatively demographically represented by province and age, where 43.39% of respondents were from Alberta, 42.98% were from British Columbia, and 13.64% were from Saskatchewan (Figure 4.1); Stats Canada CANSIM Table 051-0001, found in Appendix C shows Alberta with 41.88% of the three province's total population, British Columbia with 46.79%, and Saskatchewan with 11.33%. Figure 4.2 shows the age distribution of the sample, revealing close to an even spread of respondents per age group, with slightly more respondents between ages 25-34 and slightly less between ages 55-64. The average age of respondents was roughly 50 years old.

Table 4.1: Descriptive statistics of the sample population's age.

Statistics for Age	
Mean	50
Minimum	25
Maximum	92

Figure 4.1: Percentage of the sample population from Alberta, British Columbia, and Saskatchewan.

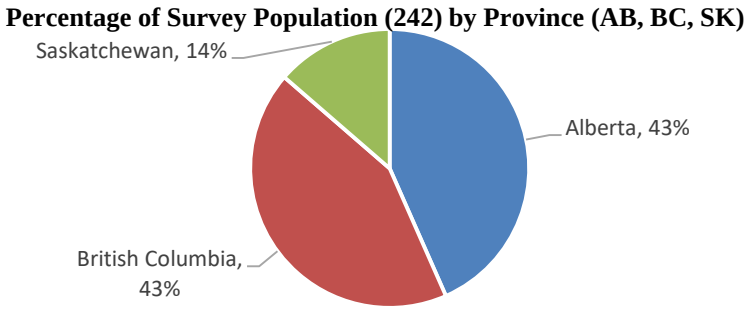
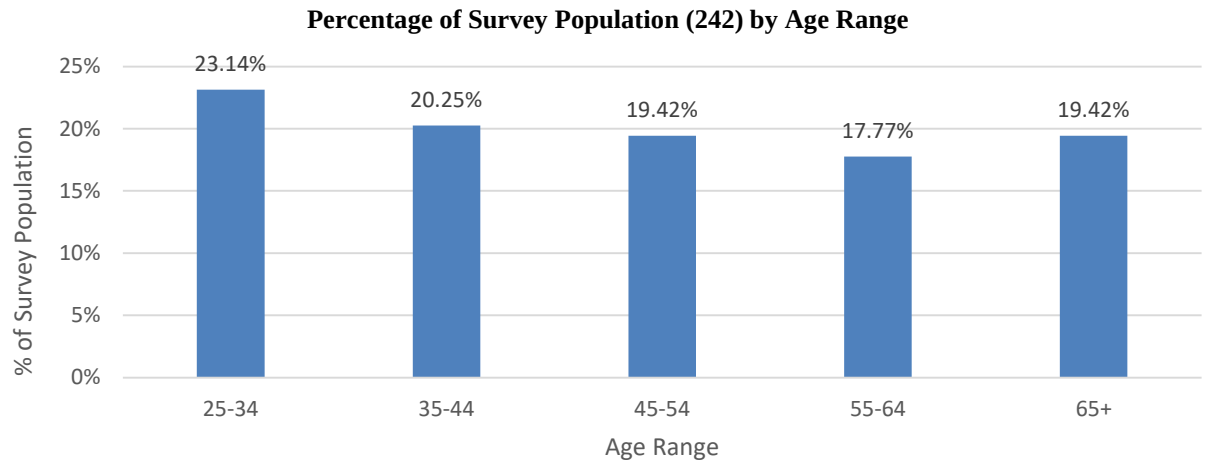


Figure 4.2: Percentage of the sample population by age range (25-34, 35-44, 45-54, 55-64, 65+).



The online survey was distributed relatively evenly amongst males (46.28%) and females (53.72%) (Figure 4.3). Per secondary data in CANSIM Table 051-0001 (Appendix C), the three provinces of interest in 2016 had roughly 50% males to 50% females; therefore, the sample population data in this thesis closely represents the general population of Canadians from Alberta, British Columbia, and Saskatchewan by gender. With respect to household composition, about 24% of the sample population lives on their own, 37% live with one other person, and, when adding the remaining subgroups together, 39% live with two or more people (Figure 4.4). Furthermore, the majority (about 68%) of those surveyed have no children, about 14% of respondents have one child, 11% have two children, and 7% have more than three children, making the dataset skewed towards respondents having no children (68%) versus those with children (32%) (Figure 4.5).

Figure 4.3: Percentage of survey population by gender.

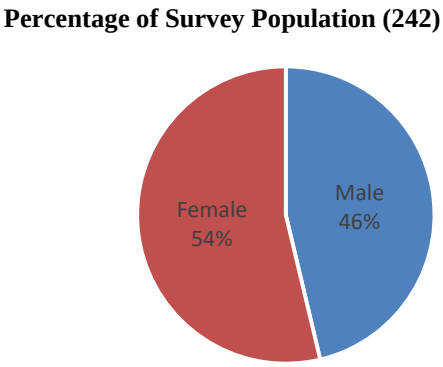


Figure 4.4: Percentage of survey population by number of people per household (1, 2, 3, 4, 5+).

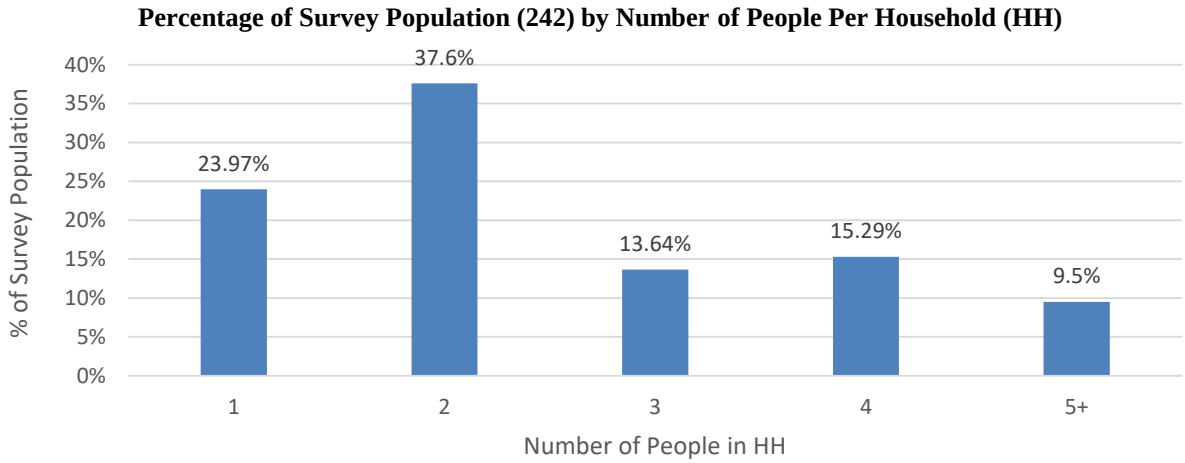
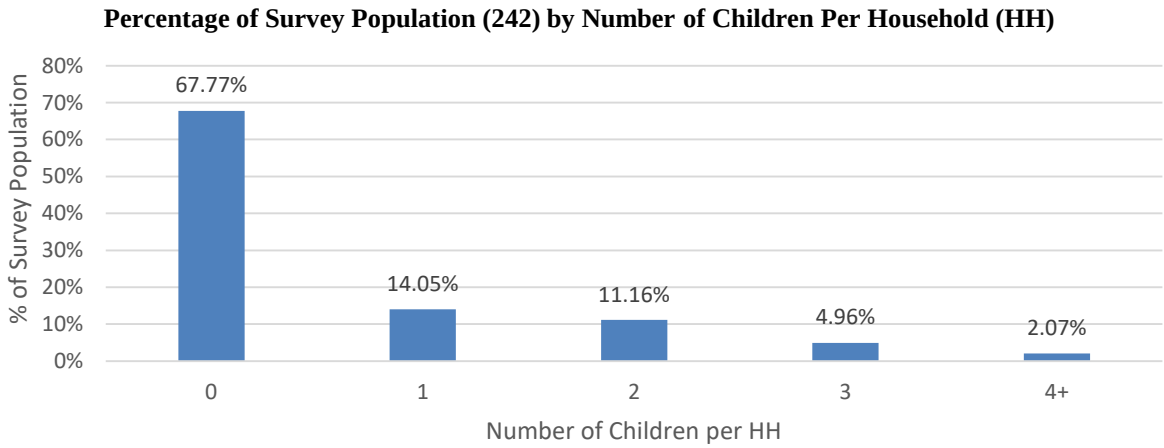
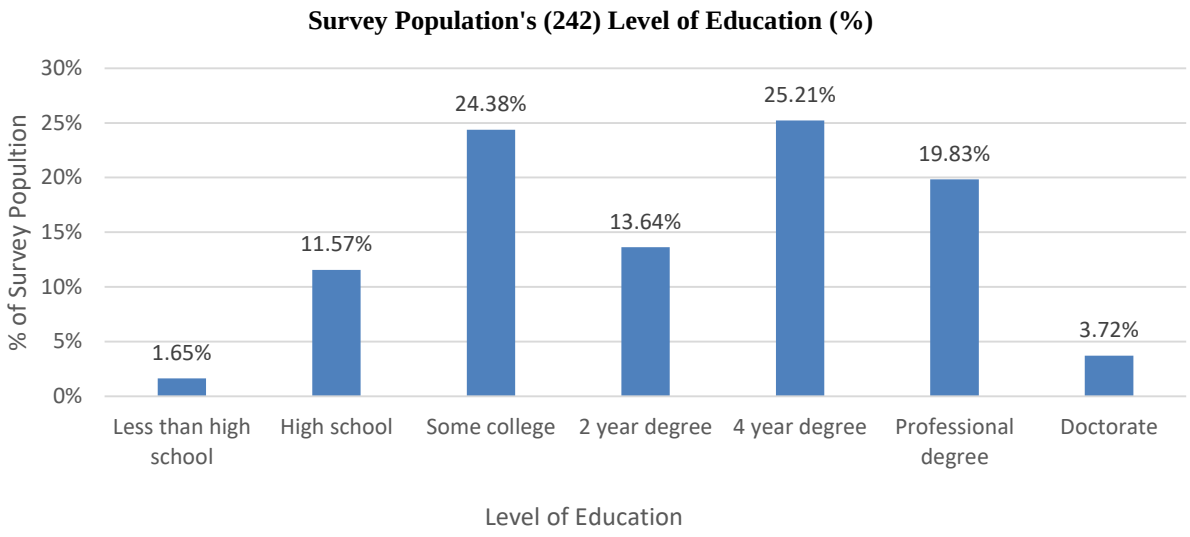


Figure 4.5: Percentage of survey population by number of children per household (0, 1, 2, 3, 4+).



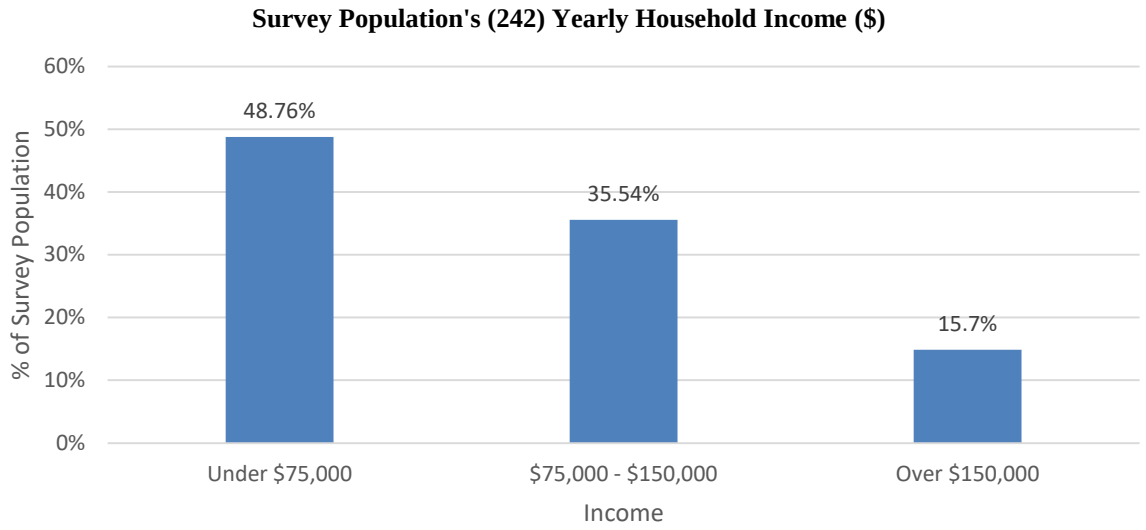
The survey population is relatively well educated, as shown in Figure 4.6, which is to be expected in online surveys. The majority of respondents indicated they completed high school and a large portion of these individuals furthered their education after high school. More specifically, only 1.65% (4 responses) of respondents did not complete their high school diploma, 11.57% (28 responses) graduated from high school, 24.38% (59 responses) have some university/college education, 38.85% (94 responses) graduated university/college with a degree, 19.83% (48 responses) have a professional degree and 3.72% (9 responses) completed their doctorate (Figure 4.6). Those with undergraduate degrees and higher levels of education are slightly over-represented, and those with high school and lower are under-represented.

Figure 4.6: Percentage of survey population by level of education.



A limitation of the survey was the elicitation of household income. The survey question asking respondents about their household income before taxes was missing a bracket of income (between $75,000 and $100,000); therefore, responses were pooled into three main categories, where income was less than $75,000, between $75,000-$150,000, and over $150,000. Ultimately, about half of survey respondents (49% or 118 responses) earn less than $75,000 per year, 36% (86 responses) earn between $75,000-150,000 per year, and 15% (36 responses) earn over $150,000 (Figure 4.7).

Figure 4.7: Percentage of survey population by level of yearly household income before taxes.

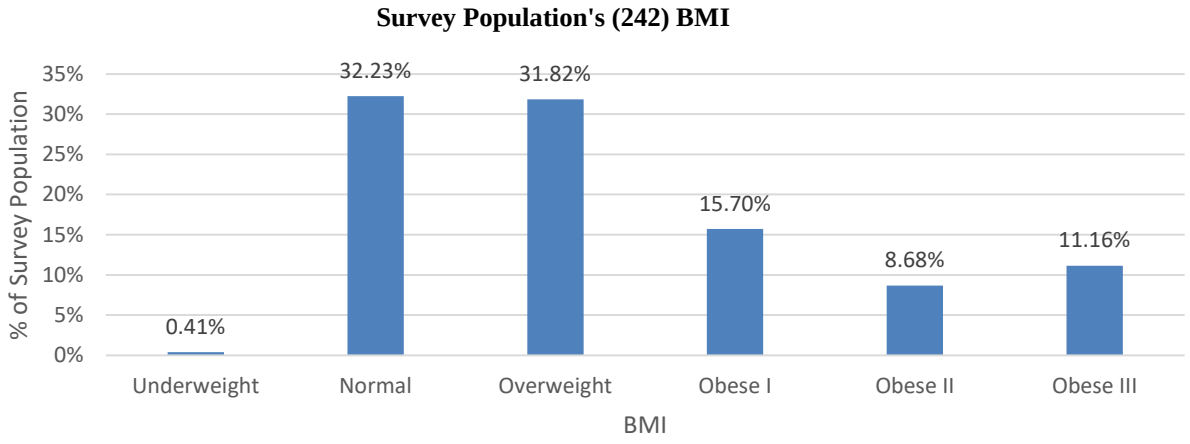


The last detail of interest in this section is body mass index (BMI), a less accurate, but highly convenient, substitute for measuring an individual's level of body fat (kg/m^2). This statistic is calculated from an individual's self-reported height (kilograms or pounds) and weight (meters or centimeters) and is used to suggest whether an individual is underweight, has a normal bodyweight, is overweight or obese to varying degrees. Body mass index readings are used to help individuals understand if they are at a higher risk for health/diet related diseases, which may impact an individual's nutritional choices and need for accessing nutrition information on food products. The survey population only has one respondent (0.04%) with an underweight BMI reading, and the remainder of the population were relatively evenly distributed across individuals with BMI readings of normal weight (32% or 78 responses), overweight (32% or 77 responses), and obese (36% or 86 responses) (Figure 4.8). Statistics Canada CANSIM Table 117-0005, found in Appendix D, shows the distribution of the Canadian household population by adult (18-79 years old) BMI, which were not self-reported and are measured[4], where less than 2% of Canadians are rated as underweight, 34.2% are normal weight, 36% are overweight, and 28.1% fall into the three obese categories. Therefore, both the survey sample population and the Canadian population have low percentages of individuals that are underweight, the percentage of Canadians who are normal weight are relatively close to the survey population's results, and the

[4] Statistics Canada, Catalogue 82-003 indicates that self-reported BMI measures are often biased, where males and females over-report their height, and males over-report and females under-report their weight, leading to potential biases in the self-reported BMI results in this study.

percentage of Canadians who are overweight and obese are slightly different than the sample population, but in general the sample population is reasonably representative in BMI.

Figure 4.8: Percentage of survey population by different ranges of the Body Mass Index (BMI).



4.3 Shopping Behaviours Characteristics of Survey Population

The discussion of results in this section derives from questions in the first segment of the online survey (Appendix B, Section 1 – Shopping Behaviours). Shopping behaviour questions provide more information about the sample population and whether any general trends are evident among respondents. Questions about shopping frequency, amount of time spent shopping, and other specific details about an individual's shopping trip are asked, along with specific questions about the use of nutrition information and important factors to grocery shopping.

The survey sample has distinct shopping behaviours. About half of respondents purchase groceries more than once per week and about another third shop at least once per week (Table 4.2). Furthermore, only 8 respondents indicated that they shopped daily and two suggested they shop around once per month (Table 4.2), meaning that majority of respondents are frequent grocery shoppers and are being exposed to a variety of nutrition information signals while doing so. In more detail, 91% of Canadians surveyed spend more than 15 minutes per shopping trip, where about 40% of the total population are spending between 15-30 minutes and about 40% are spending between 30 minutes and one-hour purchasing groceries (Table 4.2); therefore, not only are respondents shopping frequently, but are spending reasonable amounts of time in a grocery

store environment. Over half of the population sample often or always plans a grocery list before shopping; about 30% sometimes plan their food purchases beforehand, and seldom are food purchases bought without an idea of what is going into the shopping basket (Table 4.2). Furthermore, about 74% of the sample population's food purchases follow a diet/nutrition plan to some extent, about 6% rigidly follow a diet/nutrition plan, and about 20% do not follow a diet/nutrition plan (Table 4.2). Ultimately, this sample population consists of experienced Canadian shoppers who play a strong role in the purchasing of groceries for their household and have ample exposure to different methods of nutrition information sharing while grocery shopping. Further, to some extent they plan their shopping trip ahead of time, and to some extent follow nutrition/dietary advice for selecting foods in their shopping basket. A summary of the response frequencies for survey questions about the shopping behaviours discussed above are found in Table 4.2.

Table 4.2: Summary of response frequencies for survey questions about shopping behaviours.

Shopping Behaviours	**Response Frequencies (%)**					
Shopping Frequency	Daily	2-6 times/week	1 time/week	2-3 times/month	1 time/month	Less than 1 time/month
	3.31%	47.11%	36.36%	12.40%	.83%	0%
Shopping Time/Trip	15 min or less	16-30 min	31 min – 1 hour	1 hour – 1.5 hours	Over 1.5 hours	
	9.09%	39.26%	41.74%	7.44%	2.28%	
Planned Grocery List Frequency	Never	Rarely	Sometimes	Often	Always	
	3.31%	9.09%	28.1%	35.12%	24.38%	
Food Purchases Following Diet/Nutrition Plan	I don't know	None	A little	Moderate amount	A lot	A great deal
	1.24%	20.25%	26.03%	26.86%	19.83%	5.79%

Respondents were given a list of factors {healthy/nutritious, convenience, taste, product origin, price, organic, brand, other (open ended response)} that may be important to their food choices while grocery shopping, and were asked to rank their top three most important factors from the list. Results of this question are found in Figures 4.9 and 4.10 and suggest that the sample population share similarities in their preferences for the most important shopping factors. Each of the 8 factors have a possibility of being ranked in the top 3 by each respondent, and the tallies for each time a factor was ranked within the top 3 are found in Figure 4.9. Figure 4.9 shows a clear distinction that price (ranked 1st with 191 top 3 rankings), healthy/nutritious (ranked 2nd with 184 top 3 rankings) and taste (ranked 3rd with 143 top 3 rankings) are the top 3

most important factors to the survey population by a large margin. Furthermore, Figure 4.10 shows a breakdown for the number of times each of the 8 factors were ranked 1st, 2nd or 3rd. Price was ranked as the most important factor the most number of times, followed by healthy/nutritious and taste while all other factors were far less frequently identified as the most important factor when grocery shopping. The results for the most important factors when grocery shopping align with results from the BDC (2013) study (Chapter 2, Section 2.2) suggesting Canadians are trying to select healthy and nutritious foods within their food preferences while being conscious of their expenditures.

Figure 4.9: Most important shopping factors, marked by frequency of each factor being ranked top 3 by survey respondents.

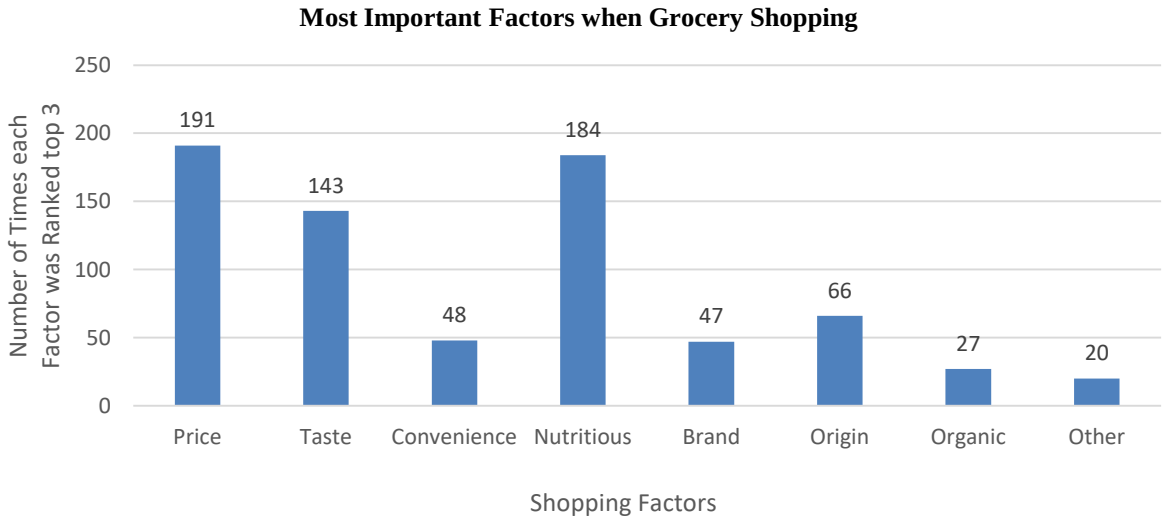
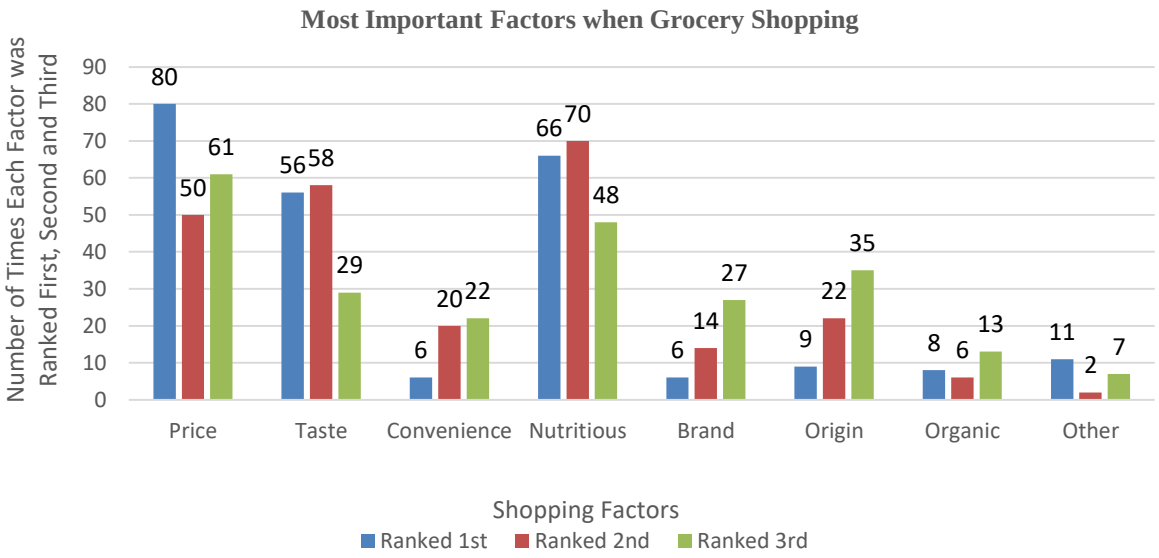


Figure 4.10: Most important shopping factors, shown by the frequency of each factor being ranked first, second and third by survey respondents.



Survey respondents were asked what private food retailers they most often shop at, and are noted to most frequently purchase groceries at three locations above all others, which are Costco, Safeway, and Superstore (Table 4.3). Each food retailer has its own mix of nutrition information that it shares with shoppers. The specific food retail chain of interest to this thesis is Loblaws, as they own exclusive licensing rights to install the Guiding Stars nutritional navigation program in Canada. In the survey questionnaire, Superstore, Box, Extra Foods, Independent, Loblaws, and No Frills are all part of the Loblaws food retail chain; therefore, each of these private retailers has a high potential of sharing the Guiding Stars with shoppers, as the program was launched nationwide in 2014 (Guiding Stars, 2014b). Of the sample population, 148 respondents or 61% of the sample population have shopped at a location where the Guiding Stars is more than likely to be installed. There were 53 respondents who acknowledged shopping at alternative food retailers to the list provided, some of which are known to provide their shoppers with access to nutrition experts, such as in-store dietitians or alternative experts.

Table 4.3: Most frequently shopped at private food retailers by the sample population.

Top 3 Private Food Retailers by Number of Respondents		
Rank 1	Rank 2	Rank 3
Costco (118)	Superstore (107)	Safeway (97)

The last section of shopping behaviour questions asked survey respondents to indicate the extent to which they agree or disagree with 7 statements on a scale of 1-7, where 1 = strongly disagree, 4 = neutral, and 7 = strongly agree (see Table 4.4). About 57% of the sample population disagreed that it is "complex to understand how to select healthy food products while grocery shopping", while 14% were neutral about this statement and about 29% agreed with it. A large segment of the survey sample felt similarly about the statement, "it takes too much time to select healthy food products", where over 27% of the sample population strongly disagreed and over 70% of the population disagreed with the statement. Again, there was a higher level of disagreement (45.9%) in relation to agreement (32.2%) amongst individuals "looking for ways to save time for selecting healthy food products", although some respondents (21.9%) also had a relatively neutral stance about the statement. When asked whether "comparing nutrition information between food products takes too much time", again more respondents disagreed (45.9%) than agreed (29%) with the statement, and a large portion were found to take a relatively neutral (17.4%) stance on the question. Respondents agreed (55%) much more than disagreed (25.7%) that they "have the nutrition information they need to select the food products they want to purchase", even though about 20% of the sample population were neutral regarding the statement. About 53% of the sample population agree that they "trust the nutrition information found on a pre-packaged product", while only 28.1% of the population disagrees with the statement. While there is an abundance of nutrition information to process while shopping, the majority of respondents disagree (66.2%) that they are "overloaded with nutrition information while grocery shopping".

Table 4.4: Summary of response frequencies for agree/disagree survey questions about shopping behaviours; where SD (1) = strongly disagree, SA (7) = strongly agree, and (4) = neither agree nor disagree.

Survey Questions	Agree / disagree response frequencies (%)						
	SD (1)	(2)	(3)	(4)	(5)	(6)	SA (7)
It is complex to understand how to select healthy food products while grocery shopping.	20.66%	23.55%	13.22%	14.05%	19.01%	6.61%	2.89%
It takes too much time to select healthy food products while grocery shopping.	27.69%	28.51%	16.94%	13.22%	7.85%	4.13%	1.65%
I am looking for ways to save time when it comes to selecting healthy food products while grocery shopping.	12.81%	21.49%	11.57%	21.90%	16.53%	9.09%	6.61%
Comparing nutrition information between food products takes too much time.	16.12%	19.01%	18.60%	17.36%	14.88%	8.68%	5.37%
I have the nutrition information I need to select the food products I want to purchase while grocery shopping.	5.79%	5.37%	14.46%	19.42%	23.55%	20.66%	10.74%
I tend to trust the nutrition information found on a pre-packaged food product.	10.33%	7.85%	9.92%	19.01%	25.21%	21.07%	6.61%
I am overloaded with nutrition information while grocery shopping.	17.77%	26.86%	21.49%	19.01%	8.68%	2.89%	3.31%

To summarize the previous paragraph and data in Table 4.4, results of the agree/disagree questions reveal that much of the survey population feel they have a strong grasp on understanding how to select healthy food products while grocery shopping, in an environment that shares an abundance of nutrition information with them. While there is already a lot of nutrition information to process while grocery shopping, and many respondents signal they have the necessary nutrition information needed to select food products aligning with their preferences, more nutrition information could be beneficial to understanding how to optimize a shopping basket. The sample population signals that the amount of time needed to select healthy food products is not overbearing nor overly demanding, and time saving methods are not necessarily what they are seeking. Furthermore, there is a relatively high level of trust for nutrition information found on pre-packaged products, which may translate to trust for the private provision of nutrition information delivered to Canadians at the point of product selection and on a product's packaging. Ultimately, while more nutrition information is sought, the fact that many respondents already have the nutrition information they need suggests additional nutrition information faces stiff competition for consumer attention.

4.4 Use of Nutrition Information

The discussion in this section focuses on questions in the second segment of the online survey (Appendix B, Section 2 – Use of Nutrition Information). The nutrition information section of the online survey was comprised of: (a) general questions about the respondents' use of nutrition information while shopping; (b) specific questions about their use of the Nutrition Facts table (control source of nutrition information); and, (c) specific questions as to whether or not they are likely to use a traffic light label, the Guiding Stars, and nutrition experts (dietitians, nutritionists, etc.) if available. Understanding whether the Nutrition Facts table is used, how it is used, whether it is understood, and how its adoption compares to the likelihood of using the other sources of nutrition information examined in the preceding sections is important to understanding whether the private provision of nutrition information is beneficial to Canadians, and whether it substitutes for mandated nutrition information on pre-packaged food products.

Two questions in the nutrition information section of the survey asked respondents about the frequency with which they used nutrition information in general and the Nutrition Facts table, see Table 4.5. The first question in Table 4.5, which came first in the survey, asks respondents how often they use nutrition information when selecting food products and beverages. Meanwhile, the second question specifically asks how often respondents use the Nutrition Facts table while grocery shopping. Each of the two questions asked respondents to rate their frequency of use on a scale of 1-7, where 1 = never, and 7 = always.

From the first question about using "nutrition information when purchasing foods/beverages", it appears that the survey population exhibits a stronger preference towards more often using nutrition information (60.3%) than not often using it (21.5%), are about twice as likely to always (10.7%) than never (5.4%) use nutrition information available to them, and has 18.2% of individuals only sometimes (middle response) using nutrition information available to them. When it comes to the Nutrition Facts table, three times more respondents indicated they always use it (15.3%) than never use it (5.0%), about 13.2% sometimes use it, and over three times are using it more often (66.5%) than less often (20.3%). Ultimately, there is a high number of survey respondents indicating that they make use of nutrition information available to them while grocery shopping, and a stronger preference towards using the NFT in relation to nutrition information in general. There is only a relatively small number of respondents never accessing

the NFT nor using nutrition information available to them, suggesting that the sample population is experienced at using the nutrition information available while grocery shopping. In Chapter 2 it was noted that Health Canada recommends using the NFT above other sources of nutrition information available on prepackaged food products, and the results show that respondents have a marginally stronger preference for the NFT in relation to general nutrition information.

Table 4.5: How often does the survey sample use nutrition information in general and the Nutrition Facts table when purchasing groceries?

Survey Questions	**Response Frequencies (%)**						
	Never (1)	(2)	(3)	(4)	(5)	(6)	Always (7)
How often do you use nutrition information when purchasing foods/beverages?	5.37%	6.61%	9.50%	18.18%	26.03%	23.55%	10.74%
How often do you use the Nutrition Facts table while grocery shopping?	4.96%	8.26%	7.02%	13.22%	24.79%	26.45%	15.29%

Respondents were specifically asked about their knowledge of the NFT and the importance of the NFT when it comes to choosing food products, and the results are summarized in Table 4.6. Both questions about the knowledge and importance of the NFT were answered on a scale of 1-7, where 1 = not at all, and 7 = extremely. Ultimately, the majority of respondents suggest they have a strong knowledgebase regarding the NFT, with only 0.8% of the sample indicating they have no knowledge about this source of nutrition information (response of 1) and less than 10% indicating they have less than a neutral level of knowledge (response of 1-3). The level of importance of the NFT to respondents has a similar skew in the response pattern. About 75% rate the importance of the NFT when choosing food products above neutral (response of 5-7), with 16.1% indicating that it is extremely important. These results suggest that many survey respondents are comfortable with using the NFT and find benefits from using it as a source of nutrition information for selecting food products.

Table 4.6: Determining how knowledgeable the survey population is about the NFT, and how important the NFT is to their decision-making while shopping.

Survey Questions							
	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How knowledgeable are you about the Nutrition Facts table?	0.83%	3.31%	3.72%	17.77%	30.99%	31.82%	11.57%
How important is the Nutrition Facts table when choosing food products?	2.48%	4.96%	5.37%	12.81%	30.58%	27.69%	16.12%

A question in this section of the survey was meant to investigate which parts of the Nutrition Facts table is used by the sample population. The purpose of this question was to understand the relevance of nutrition information also signalled by the traffic light label in relation to other nutrition information available on the NFT. Table 4.7 shows that 50 respondents claim to use all information found on the NFT, only 5 do not use the NFT at all, and how coincidentally the three most important parts of the NFT to the survey population were sodium, sugar, and calories, all of which are signalled by the traffic light label on the front of a pre-packaged food product. This suggests that the traffic light label captures the nutrition signals that appear to be particularly relevant to consumers.

Table 4.7: Commonly used parts of the Nutrition Facts table, where a "*" denotes top 3 ranked parts of the NFT by respondents.

Commonly used sections of the NFT								
All Information	Total Fat	Saturated Fat	Trans Fat	Sodium*	Carbohydrates	Sugar*	Calories*	Do not use the NFT
50	70	58	61	119	45	127	106	5

Respondents were presented with a series of statements about the Nutrition Facts table and asked to state their level of agreement/disagreement on a 7 point scale where 1 = strongly disagree, 4 = neutral, and 7 = strongly agree (Table 4.8). About three-quarters (75.2%) of the sample population disagreed that they "find the NFT difficult to understand", while 13.2% were neutral about this statement and about 11.6% agreed with it, further suggesting that majority of this sample have a strong perceived knowledgebase about the NFT. A large level of disagreement is also seen with the statements "it takes too much time to use the NFT to learn about a food product" and "it takes too much time to use the NFT to compare food products". The survey sample had mixed feelings about the NFT being an all-inclusive source of nutrition information, where more respondents strongly disagreed (12.8%) and disagreed to some extent (44.6%), compared to those strongly agreeing (5.4%) and agreeing to some extent (35.1%) that the "NFT provides all the nutrition information needed to select the pre-packaged food products [wanted] to [be] purchased"; in addition, more responses were neutral to this question (20.2%) relative to the other statements about the nutrition facts table. Finally, the majority of the survey sample signals that a "NFT for non-pre-packaged food products" would be useful to them, where over half of the sample agreed (53.2%), 16.9% were neutral, and less than 30% disagreed. The results for this last question are important because they signal Canadians may need more

nutrition information, especially for products where none-to-little is currently found (single ingredient food products, like fruits and vegetables), as most nutrition information available while shopping is only on pre-packaged food products (Chapter 2, Section 2.3).

Table 4.8: Summary of response frequencies for agree/disagree survey questions about the Nutrition Facts table; where SD (1) = strongly disagree, SA (7) = strongly agree, and (4) = neither agree nor disagree.

Survey Questions	**Agree / disagree response frequencies (%)**						
	SD (1)	(2)	(3)	(4)	(5)	(6)	SA (7)
I find the Nutrition Facts table difficult to understand.	31.40%	28.51%	15.29%	13.22%	8.26%	2.07%	1.24%
It takes too much time to use the Nutrition Facts table to learn about a food product.	27.69%	26.86%	17.77%	14.05%	8.26%	2.48%	2.89%
It takes too much time to use the Nutrition Facts table to compare food products.	22.73%	23.14%	14.88%	15.29%	12.40%	7.85%	3.72%
The Nutrition Facts table provides all the nutrition information needed to select the pre-packaged food products I want to purchase.	12.81%	13.22%	18.60%	20.25%	16.94%	12.81%	5.37%
A Nutrition Facts table for non-pre-packaged food products, like fruits, vegetables, bulk products, etc., would be useful to me.	10.74%	11.98%	7.02%	16.94%	20.25%	16.12%	16.94%

The last set of descriptive statistics of this section focus on how likely respondents are to use three different sources of nutrition information while shopping, and all results are found in Table 4.9. Each of the three questions asked respondents to rate their likelihood of use on a scale of 1-7, where 1 = extremely unlikely, 4 = neither likely nor unlikely, and 7 = extremely likely. The three different sources of nutrition information are a generic description of the Guiding Stars, a generic description of the traffic light label, and whether they would access nutrition experts for free consultation in a grocery store. The likelihood of using the generic description of the Guiding Stars and traffic light label was included in the survey to see if respondents prefer the idea of each nutrition information sharing tool in comparison to the actual instruments found while grocery shopping. Ultimately, respondents indicated they are more likely to use the generic description of the traffic light label relative to the Guiding Stars, and are more likely to use both nutrition labels in comparison to nutrition experts while grocery shopping. The generic description of the Guiding Stars (question 1, Table 4.9) had 19% of respondents extremely likely to use this source of nutrition information while shopping, in comparison to 25.6% of the population for the traffic light label and 9.5% for nutrition experts. Furthermore, the generic

description of the Guiding Stars saw 66.5% of respondents expressing a positive likelihood of using this source of nutrition information, whereas the traffic light label saw 74.4% and nutrition experts only saw 38% of the population sample capturing this response. A large portion of the population sample was neutral to using nutrition experts (21.5%) and the generic version of the Guiding Stars (19.5%) while shopping, in comparison to the generic version of the traffic light label (14%). These data suggest a slight preference for the traffic light label relative to the Guiding Stars and a stronger preference for either of those two information formats to in-store consultation of nutrition experts.

Table 4.9: Summary of response frequencies for survey questions about the likelihood of using sources of nutrition information; where EU (1) = extremely unlikely, EL (7) = extremely likely, and (4) = neither likely nor unlikely.

Survey Questions	**Likelihood response frequencies (%)**						
	EU (1)	(2)	(3)	(4)	(5)	(6)	EL (7)
If there was a nutrition label that rates a food product based on its level of healthiness, how likely would you be to use it while grocery shopping.	6.20%	3.72%	4.13%	19.42%	24.79%	22.73%	19.01%
If there was a nutrition level that shows whether a food product has high, medium or low levels of fats, sat, and sugar, how likely would you be to use it while grocery shopping?	2.07%	6.20%	3.31%	14.05%	21.49%	27.27%	25.62%
If a nutrition expert (dietitian, nutritionist, etc.) was made available for free consultation in a grocery store, how likely would you be to see advice from them while grocery shopping?	16.53%	14.88%	9.09%	21.49%	16.94%	11.57%	9.50%

4.5 Traffic Light Label and Guiding Stars

The discussion of results in this section comes from questions in the third and fourth segments of the survey (Appendix B - Sections 3 & 4). The traffic light label and Guiding Stars sections of the survey follow a similar template of questions to those posed about the Nutrition Facts table (Appendix B – Section 2), which allows for a comparison in the conclusion of this thesis. These two sections of the online survey were randomized, where 48.7% of the final dataset of respondents saw the traffic light label section first and 51.3% saw the Guiding Stars section first. Randomization was used to control for ordering effects in the subsequent regression analysis in Chapter 5. Respondents were asked: whether they have seen each source of nutrition information before, questions about their likelihood of using each of the two sources of nutrition

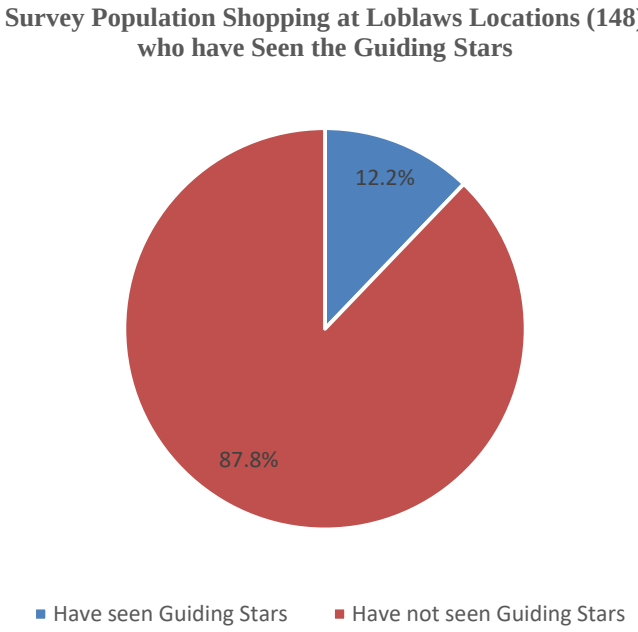
information while shopping; specific questions about the two sources of nutrition information that are similar to those asked about the Nutrition Facts table; questions important to understanding the likelihood of using the traffic light label and Guiding Stars while selecting food products while grocery shopping.

Both the traffic light label and the Guiding Stars are relatively new sources of nutrition information to the survey sample. Roughly 85% of respondents reported not having seen the traffic light label and about 91% have not seen the Guiding Stars before (Table 4.10). The traffic light label is not found in Canada, and the Guiding Stars are only found in Loblaws locations across Canada. Over half of the survey sample (148 respondents) noted themselves to shop primarily at Loblaws locations (Section 4.4). More specifically, of the 148 respondents whose primary grocery store is a Loblaws chain location, only 18 respondents or 12.2% have noticed the Guiding Stars before (Figure 4.11), suggesting much of the sample has not seen the Guiding Stars while more than likely being exposed to it. These results suggest that the Guiding Stars is ignored or does not compete well for shoppers' attention against other available sources of information. Both behavioural economic theories outlined in Chapter 3, Section 3.2.3-3.2.4, suggested that individuals use a stop rule when choosing to use information or heuristics, meaning that this additional source may also be overlooked or regarded as noise rather than ignored.

Table 4.10: Proportion of the survey population previously exposed to the Guiding Stars and traffic light label.

Have you seen the following sources of nutrition information before?	Response Frequencies		
	Yes	No	I don't know
Traffic Light Label	14.05%	78.93%	7.02%
Guiding Stars	8.68%	82.64%	8.68%

Figure 4.11: Of the survey population that shops at Loblaws private food retail locations, how many have seen the Guiding Stars?

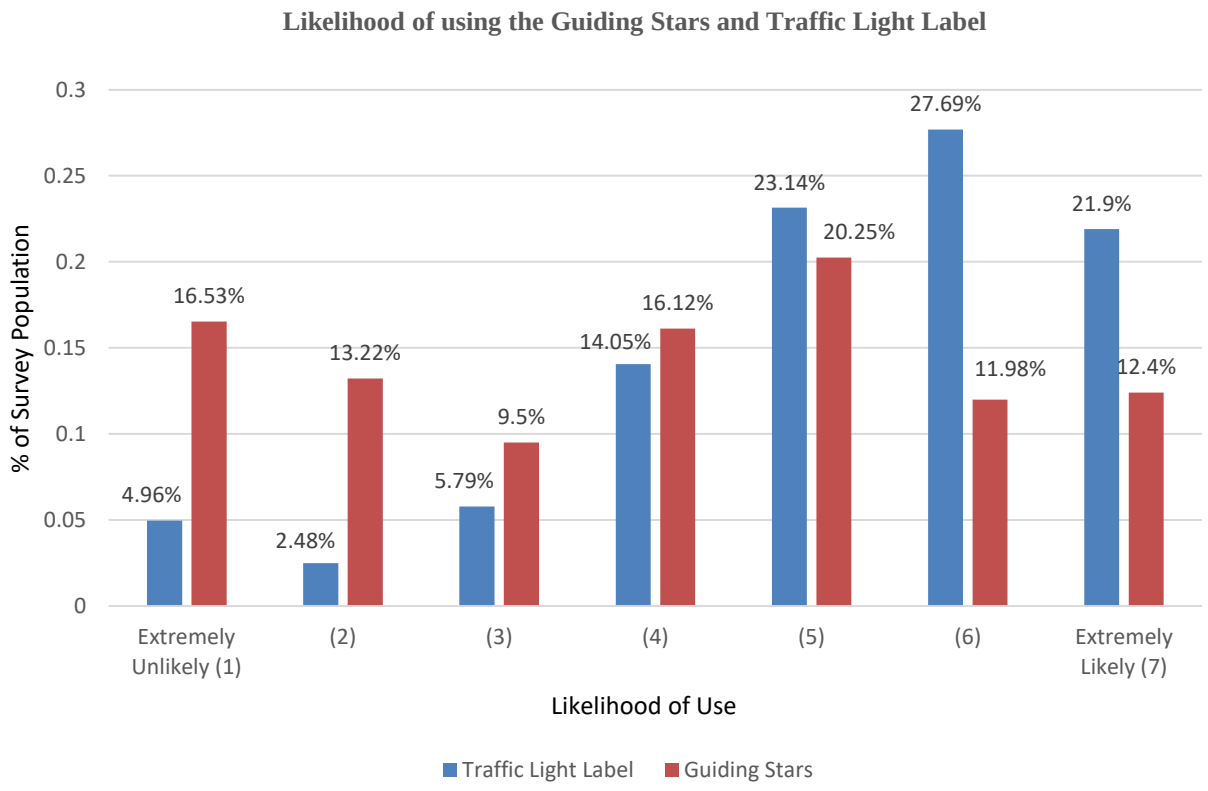


Respondents were asked to indicate their likelihood of using the Guiding Stars and traffic light label on a scale of 1-7, where 1 = extremely unlikely, 4 = neither likely nor unlikely, and 7 = extremely likely, and results for both are found in Figure 4.12. Before asking respondents whether they were likely to use each source of nutrition information, a summary of information about each source was provided. In a real-life shopping context, education about the traffic light label would not be available. Furthermore, the details about the Guiding Stars were more extensive than what would be found while grocery shopping. The descriptions of the two nutrition information systems were designed to provide basic information on how the system works and the role of an independent party in designing the information and its basis in scientific guidelines; while explanations were given, it cannot be known whether respondents understood the descriptions of the traffic light label and Guiding Stars. Also important was the length of description about each nutrition label, since the details about the Guiding Stars were much lengthier than the traffic light label. Respondents needed to confirm that they had read the

information about the traffic light label and Guiding Stars before proceeding to the likelihood question.

The data in Figure 4.12 shows respondents indicated a stronger preference towards using the traffic light label than the Guiding Stars. Three times more respondents marked themselves as being very unlikely to use the Guiding Stars (16.5%) versus the traffic light label (5.0%), and three times more of the sample population also showed some level of being unlikely to use the Guiding Stars (39.2%) than the traffic light label (13.3%). In both cases, close to 15% of the sample population were neutral to using each source of nutrition information. There was a much larger population of the sample who were likely to use the traffic light label (72.7%) compared to the Guiding Stars (44.4%), and almost twice as many respondents expressed they were extremely likely to use the traffic light label (21.9%) than the Guiding Stars (12.4%). A comparison of the likelihood of using these two sources of nutrition information, in relation to the Nutrition Facts table and nutrition experts, is provided in the summary to this chapter.

Figure 4.12: Comparing proportions of the sample population's response to their likelihood of using the Guiding Stars versus the traffic light label.



In each section of the survey, respondents were asked if either the Guiding Stars or traffic light label led to better understanding nutrition information on the NFT, their knowledge about each source of nutrition information, and the importance each of the two sources of nutrition information has on their product selection while shopping (Table 4.11).

The data in Table 4.11 show a distinct difference between perceptions of whether the Guiding Stars or the traffic light label would improve understanding of the NFT, using a Likert scale from 1-7, where 1 = not at all, and 7 = very much so. In this case, three times more respondents indicated a 7 (very much so) response for the traffic light label (16.1%) in relation to the Guiding Stars (5.0%), about 3 times more respondents indicated a 1 (not at all) response for the Guiding Stars (23.5%) than the traffic light label (8.3%), and 62% of respondents indicated a response of 4 and higher for the traffic light label in relation to 28.5% for the Guiding Stars. The responses to this question could benefit the Government of Canada in understanding how to customize the Nutrition Facts table to be more usable by Canadians; for example, by determining whether a hybrid label that adds the traffic light label signals to the existing back-of-package nutrition information (NFT, list of ingredients, …) could increase the extent to which shoppers make use of the mandated nutrition information, or if adding the traffic light label on the front of a package positively impacts shoppers' ability to use existing nutrition information on the back of a product's packaging. Receptivity to the Guiding Stars as a complementary information signal was far weaker, with over 50% of the sample population indicating a response of 1-3 for the Guiding Stars, compared with 21.9% for the traffic light label.

Table 4.11: Frequencies of responses: whether the Guiding Stars and traffic light label would allow respondents to better understand nutrition information on the Nutrition Facts table.

Survey Questions	**Response Frequencies**						
	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Very much so (7)
Would the Traffic Light Label allow you to better understand the nutrition information on the NFT?	8.26%	7.44%	6.20%	16.12%	25.21%	20.66%	16.12%
Would the Guiding Stars allow you to better understand the nutrition information on the NFT?	23.55%	16.12%	13.64%	18.18%	13.22%	10.33%	4.96%

Respondents were asked how knowledgeable they were about the Guiding Stars and the traffic light label, and how important these sources of nutrition information would be to their decision-making while grocery shopping. Questions about the knowledge and importance of the two sources of nutrition information were answered on a scale of 1-7, where 1 = not at all and 7 = extremely. Results from these two questions are in Table 4.12. The majority of respondents suggest they do not have a strong knowledge base regarding either source of nutrition information, with 24% of the survey population signalling no knowledge about the traffic light label and 30.1% no knowledge about the Guiding Stars, while 52.1% of the sample signalled a response of 1-3 for the traffic light label (little to no knowledge) versus 61.1% of the sample for their knowledge of the Guiding Stars. Furthermore, only about 2% consider themselves to have an extremely high knowledge base of either source of nutrition information. The response frequencies show a slightly higher knowledgebase for the traffic light label than the Guiding Stars. Many respondents agree that the traffic light label would be more important to their decision making than the Guiding Stars. Over double the number of respondents feel the traffic light label would be extremely important to their decision making (10.3%) compared to the Guiding Stars (4.1%). Furthermore, 61.1% of the survey population responded with an answer of 4-7 for importance, versus only 35.5% for the Guiding Stars.

Table 4.12: Determining how knowledgeable the survey population is about the Guiding Stars and traffic light label, and how important both would be their decision-making while shopping.

Survey Questions	**Response Frequencies**						
	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How knowledgeable are you about the Traffic Light Label?	23.97%	15.29%	12.81%	19.83%	16.53%	9.50%	2.07%
How knowledgeable are you about the Guiding Stars?	30.17%	16.53%	14.46%	16.53%	11.98%	8.68%	1.65%
How important would the Traffic Light Label be to you when choosing food products?	7.02%	4.55%	9.09%	17.77%	27.27%	23.97%	10.33%
How important would the Guiding Stars be to you when choosing food products?	20.25%	15.7%	9.50%	19.01%	19.83%	11.57%	4.13%

A series of statements were presented to survey respondents about the Guiding Stars and traffic light label, some of which mirrored those about the NFT discussed earlier; these statements and responses to them are found in Tables 4.13 (traffic light label) and 4.14 (Guiding

Stars). When it comes to whether the sample needs more information about the traffic light label before using it, responses lean towards disagreement. On the other hand, the Guiding Stars elicited a different pattern of responses, with a higher proportion of respondents indicating that they would need additional information about this nutritional navigation program before it is adopted. In addition, the perceived difficulty of using each source of nutrition information varies, where the traffic light label is seen as slightly less challenging than the Guiding Stars. These responses suggest that more education about the Guiding Stars is desired than the traffic light label for individuals to firmly decide whether they would use each source of nutrition information. In general, these results suggest that the delivery of the education about each source of nutrition information should be carefully designed, especially since they already face an influx of nutrition information and other stimuli at the point of product selection.

To summarize other information from Tables 4.13 and 4.14, survey respondents on average indicate that: both sources of nutrition information will reduce the time needed to *learn about* a food product, while more of the sample agrees and strongly agrees that the traffic light label saves time in relation to the Guiding Stars' ability to do so; that both sources of nutrition information will reduce the time needed to *compare* food products, while more of the sample agrees to some extent and strongly agrees that the traffic light label would save time relative to the Guiding Stars; the majority of respondents agreed that the traffic light label would provide them with the necessary nutrition information to select pre-packaged food products, while many suggested the Guiding Stars may not; the traffic light label improves respondents' abilities to select healthy pre-packaged food products, more so than was the case for the Guiding Stars; and, the traffic light label is seen as more beneficial for selecting healthy non-pre-packaged food products than the Guiding Stars is, even though it is not typically used on non-prepackaged items.

Table 4.13: Summary of response frequencies for agree/disagree survey questions about the traffic light label; where SD (1) = strongly disagree, SA (7) = strongly agree, and (4) = neither agree nor disagree.

Survey Questions	Agree / disagree response frequencies (%)						
	SD (1)	(2)	(3)	(4)	(5)	(6)	SA (7)
I need more information about the traffic light label before I would use it.	16.53%	16.53%	14.05%	21.07%	13.64%	10.74%	7.44%
I would find the traffic light label difficult to use.	36.78%	32.64%	14.05%	10.33%	2.48%	2.89%	0.83%
The traffic light label would reduce the time I need to learn about a food product.	4.96%	4.96%	12.40%	16.12%	28.51%	20.66%	12.40%
The traffic light label would reduce the time I need to compare food products.	4.96%	6.61%	7.02%	19.01%	26.03%	22.31%	14.05%
The traffic light label would provide me with the nutrition information I need to select the pre-packaged food products I want to purchase.	7.44%	4.96%	12.40%	16.53%	28.10%	20.66%	9.92%
The traffic light label would improve my ability to select the healthy pre-packaged food products that I want to purchase.	7.44%	4.96%	4.55%	20.66%	23.97%	23.55%	14.88%
If the traffic light label were available for non-pre-packaged food products, like fruits, vegetables, bulk products, etc., it would improve my ability to select the healthy foods I want to purchase.	9.92%	5.37%	6.61%	20.66%	21.07%	20.25%	16.12%

Table 4.14: Summary of response frequencies for agree/disagree survey questions about the Guiding Stars; where SD (1) = strongly disagree, SA (7) = strongly agree, and (4) = neither agree nor disagree.

Survey Questions	Agree / disagree response frequencies (%)						
	SD (1)	(2)	(3)	(4)	(5)	(6)	SA (7)
I need more information about the star symbols before I would use them.	9.50%	12.81%	7.85%	15.70%	18.60%	18.18%	17.36%
I would find the star symbols difficult to use.	26.86%	26.86%	13.64%	16.94%	9.92%	2.07%	3.72%
The star symbols would reduce the time I need to learn about a food product.	11.57%	9.92%	12.40%	21.49%	25.62%	14.46%	4.55%
The star symbols would reduce the time I need to compare food products.	10.74%	8.26%	10.33%	22.73%	22.31%	19.42%	6.20%
The star symbols would provide me with the nutrition information I need to select the food products I want to purchase.	23.14%	15.29%	16.12%	19.42%	14.46%	8.26%	3.31%
The star symbols would improve my ability to select the healthy pre-packaged food products that I want to purchase.	17.77%	11.57%	11.16%	19.01%	21.9%	14.88%	3.72%
The star symbols would improve my ability to select the healthy non-pre-packaged food products that I want to purchase, like fresh fruits, vegetables, bulk products, etc.	19.42%	10.33%	7.44%	21.07%	20.25%	15.7%	5.79%

4.6 Nutrition Information Preference

The discussion of results in this section comes from questions in the fifth segment of the online survey (Appendix B, Section 5– Nutrition Information Preference). This part of the online survey asked respondents for their attitudes towards different sources / combinations of sources of nutrition information, when it comes to selecting six specific categories of food products. The product categories or contexts of decision making under investigation were beverages, bread products, yogurt products, cereal products, meat and pre-packaged vegetables. These six different subcategories of food products are all prepackaged food products to keep the decision-making environment as real as possible, where the traffic light label and Guiding Stars are potential substitutes for one another (Chapter 1-3). The sources of nutrition information available to choose from were the Nutrition Facts table, Guiding Stars, traffic light label, a combination of the Guiding Stars and the NFT, and a combination of the traffic light label and the NFT. Responses are summarized in Table 4.15 at the end of this section.

The traffic light label in combination with the NFT always elicited the strongest positive response from the sample population, where over 50% of the sample chose it in four decision-making contexts (beverages, bread, yogurt and cereal), and over 40% of the sample chose it in the remaining two contexts.

Beyond the traffic light label being the most preferred source of nutrition information by the survey population, a few other important observations arise from this data: using no nutrition information was second most preferred to the traffic light label combined with the NFT, by a large margin, in two out of six instances - meat and prepackaged vegetables - which are food categories that are single rather than multi-ingredient foods, are less processed than the other categories investigated, and are where purchase decisions may also be influenced by other important attributes like taste, organic, appearance, etc. that go beyond needing a specific nutrition rating or making the most healthy/nutrient dense choice available. The Nutrition Facts table alone was the second most preferred source of nutrition information in four out of six instances, in combination with the traffic light label in one instance (beverages). The Guiding Stars alone was the least preferred option in five out of six instances and was the second least preferred in the other decision-making context. While some respondents did signal a preference

to using the Guiding Stars in combination with the NFT, many more signalled a preference for using the traffic light label with the NFT instead.

The results of this section of the survey clearly show a stronger preference for the traffic light label over the Guiding Stars and it shows relatively low total support for the Guiding Stars when the other sources of nutrition information are available to be used. Furthermore, it appears that the traffic light label and Nutrition Facts table would most often be used together, and the same argument can be made with the Guiding Stars, except when it comes to meat products. Neither the traffic light label nor the Guiding Stars are as popular as independent sources of nutrition information in comparison to being delivered in combination with the NFT, suggesting they may not be considered as all-inclusive sources of nutrition information. Evidence also suggests that the NFT is positively evaluated by the survey respondents, and is unlikely to be displaced by the alternative sources of nutrition information, given that "I would not use any of these types of nutrition information" was seldom selected.

Table 4.15: Percentages of total respondents selecting a given source, a combination of sources, or none of the available nutrition information, under six different decision-making contexts.

Sources of Nutrition Information	**Decision-Making Contexts**					
	Beverages	Bread	Yogurt	Cereal	Meat	Prepackaged Vegetables
NFT alone	14.46%	13.22%	14.46%	13.64%	9.50%	10.33%
Guiding Stars & NFT	8.26%	10.33%	10.33%	11.16%	8.68%	12.81%
Traffic Light Label & NFT	53.72%	56.20%	56.20%	57.02%	40.91%	43.80%
Guiding Stars alone	3.72%	4.96%	2.89%	4.55%	9.09%	8.68%
Traffic Light Label alone	14.46%	9.92%	7.02%	7.85%	11.57%	9.92%
None	5.37%	5.37%	9.09%	5.79%	20.25%	14.46%

4.7 Nutrition Information Scale Questions

The discussion in this section draws upon questions in the sixth segment of the online survey (Appendix B, Section 6 – Nutrition Information Scale Questions). The nutrition information section asked respondents to rate their level of trust for the Guiding Stars, Nutrition Facts table, traffic light label, and nutrition experts hired by private retailers on a scale of 1-7 (1 = no trust, 7 = trust completely), as well indicate how easy each of the sources of nutrition information are to use on a scale of 1-7 (1 = not easy, 7 = extremely easy). The results are presented in Figures 4.13 and 4.14. Respondents were also asked to rank the top three most trusted sources of nutrition

information from a list, which was randomized for each respondent: friends/family, doctor, internet, dietitian/nutritionist, food manufactures, 3rd party, food retailers, government, other (please specify).

The Nutrition Facts table was the most trusted source of nutrition information examined, with the largest proportion of responses at the high level of trust end of the scale. It is clear the Guiding Stars is a relatively less trusted source of nutrition information examined between the four sources, with higher levels of low trust and lower levels of high trust. While nutrition experts are relatively trusted by the respondents, slightly more individuals marked a low level of trust in relation to the NFT and traffic light label; many more respondents expressed a low level of trust for Guiding Stars than nutrition experts. It is not as clear as to whether the traffic light label or nutrition experts are trusted more than one another; what is evident is that respondents tended towards a reasonably high level of trust in these two sources of nutrition information, in relation to the Guiding Stars.

When it comes to the ease of use for each of the four sources of nutrition information examined, all sources of nutrition information were seen as relatively easy to use. While all sources are not expressed to be overly difficult, the traffic light label is seen to be the easiest to use by a margin, and the Guiding Stars and nutrition experts had the most respondents suggesting they are considered as the least easy to use.

Figure 4.13: Level of trust for the Guiding Stars, Nutrition Facts table, traffic light label, hired nutrition experts by private retailers on a scale of 1-7, where 1 = no trust, and 7 = trust completely.

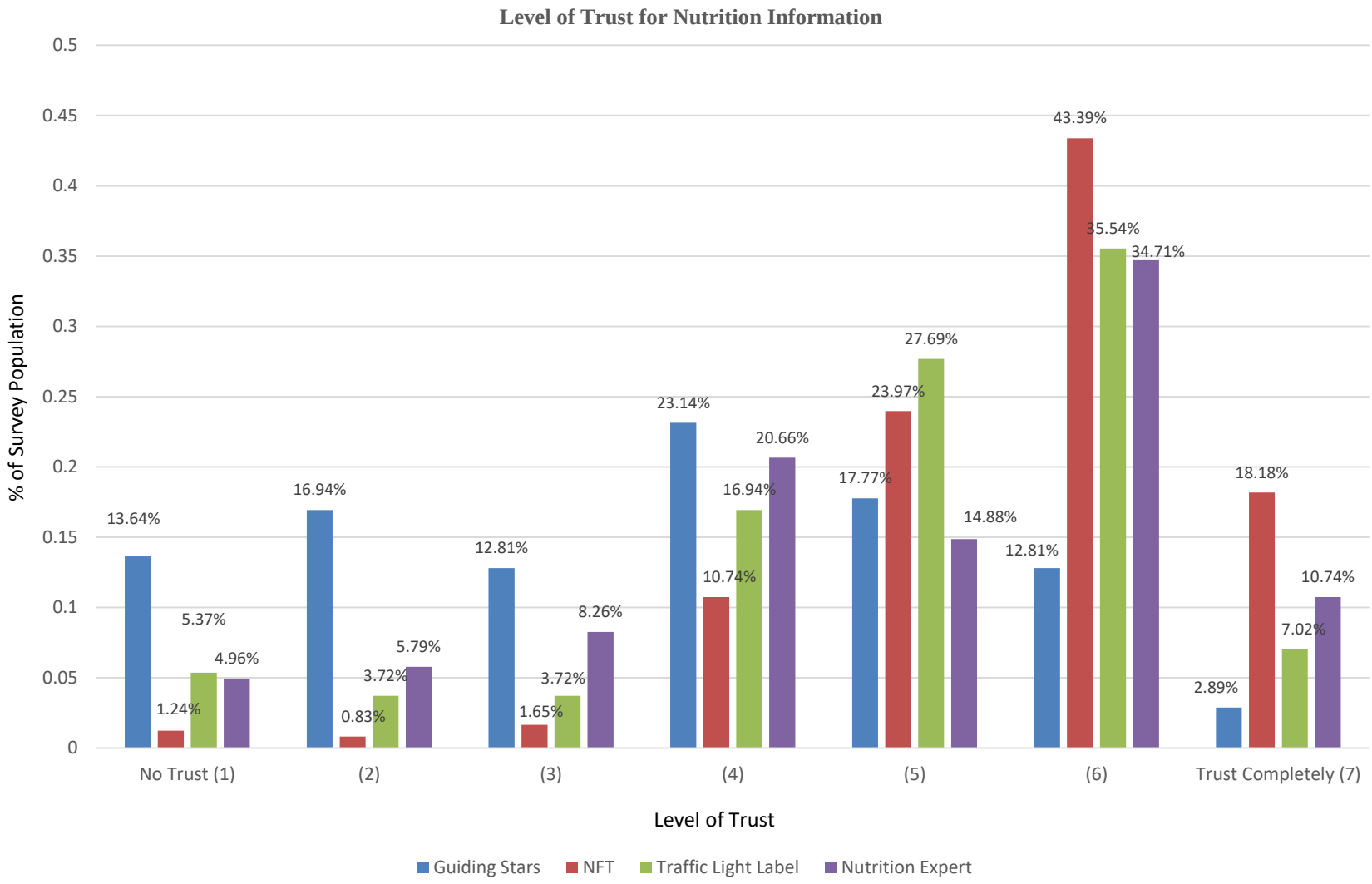
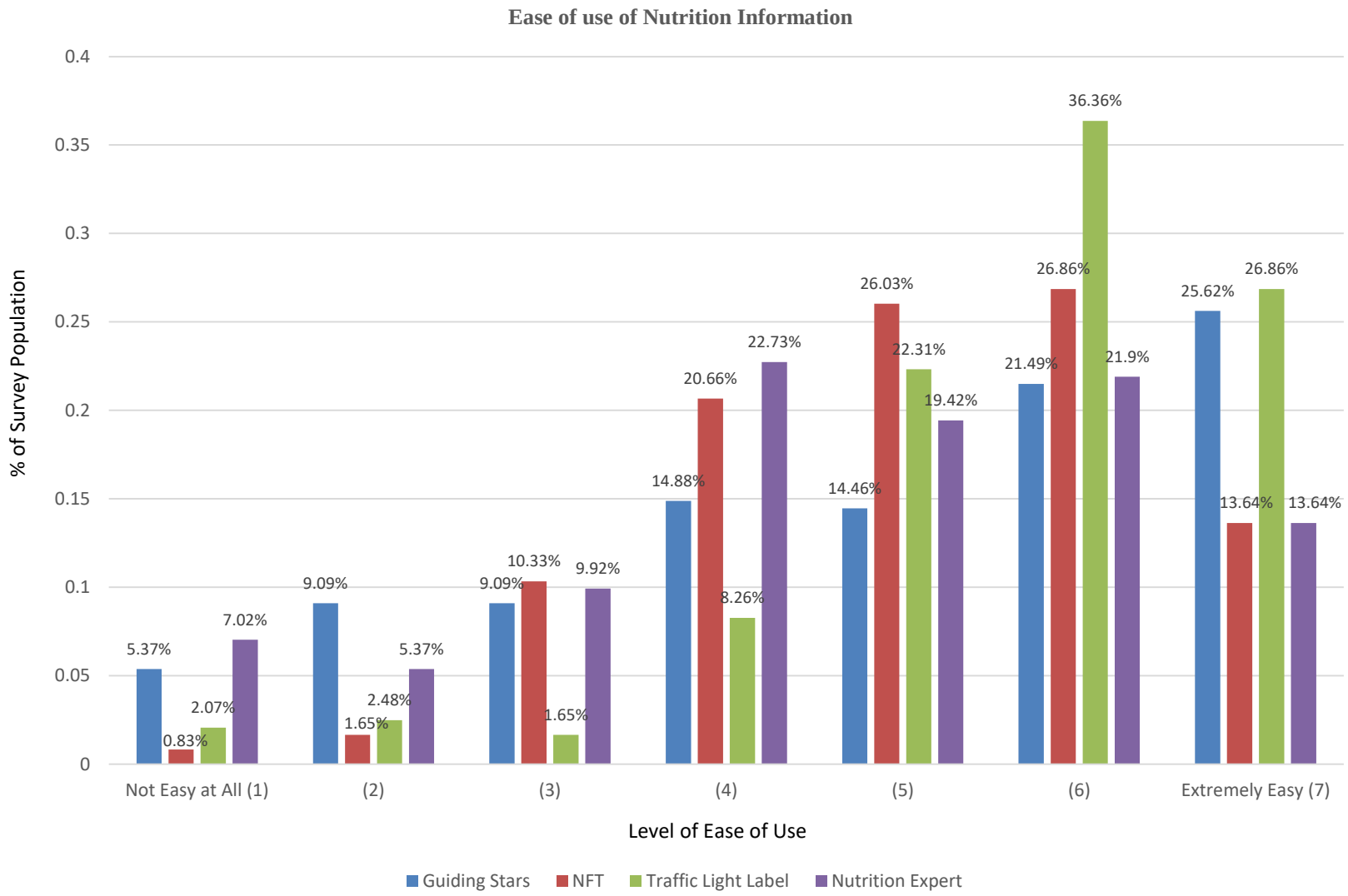


Figure 4.14: Ease of use ratings for the Guiding Stars, Nutrition Facts table, traffic light label, hired nutrition experts by private retailers on a scale of 1-7, where 1 = no trust, and 7 = trust completely.



Respondents were given a list of sources of nutrition information {friends/family, doctor, internet, dietitian/nutritionist, food manufactures, 3rd party, food retailers, government, other (open ended response)}, and were asked to rank their top three most trusted sources of nutrition information from the list. Responses to this question are summarized in Figure 4.15 which shows the extent to which each of the sources of nutrition information rank in the top 3.

Figure 4.15: Most trusted sources of nutrition information, shown by the frequency of each factor being ranked first, second and third by survey respondents.

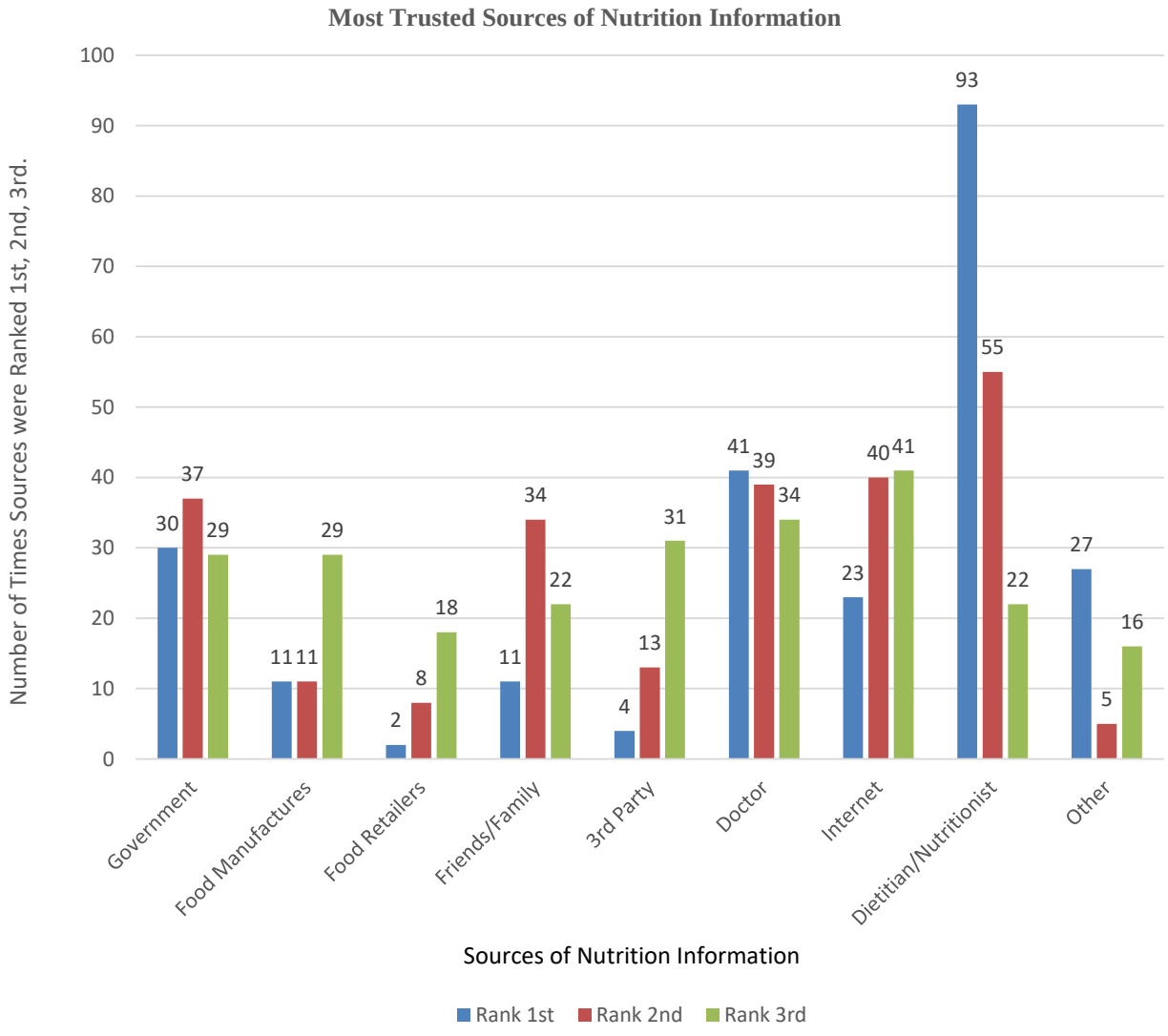


Figure 4.15 shows a clear distinction that dietitians (ranked 1st with 170 top 3 rankings), doctors (ranked 2nd with 114 top 3 rankings) and the Internet (ranked 3rd with 104 top 3 rankings) are the top 3 most trusted sources of nutrition information to this sample of Canadians. Internet and government, as most trusted sources of nutrition information, are nearly tied for third

position, while the next closest response was friends/family. One limitation of these statistics is they cannot reveal what specific nutrition information consumers are accessing from dietitians, doctors and the Internet, given that each of these three sources can share a plethora of advice. While 'other' as a selection was not the most selected, it was still found in the top 3 rankings for some individuals, suggesting that the list given to respondents was not as inclusive as it could have been. In addition, the government was still relatively important to many in the sample population, and the least trusted sources of nutrition information were food retailers and manufacturers, suggesting a reason as to why the Guiding Stars was the least trusted source of nutrition information of the four sources examined.

4.8 Health Status and Behaviours

The discussion in this last section comes from questions in the seventh segment of the online survey (Appendix B, Section 7 – Health Status and Behaviours), which asked respondents about their general level of health, quality of nutrition choices, how important nutrition is to their overall health, how knowledgeable respondents are about their nutrition, and a set of health locus of control questions.

Respondents answered questions about their perceived general level of health and the quality of nutrition very similarly, see Table 4.16. In both questions, respondents were asked to answer by using a scale of 1-5, where 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent. The majority of respondents felt that their health and the quality of their nutrition were good to very good, with very few respondents regarding their general health and nutrition as poor. One thing to keep in mind with these questions is that respondents self-assessed their health and nutrition quality, which does not actually measure whether they were indeed living healthy lifestyles or making quality nutrition choices. Empirical applications in Chapter 3 suggested that individuals often overestimate their own abilities regarding their nutrition, and often consume more than healthy amounts of ingredients like sodium in their diet.

Respondents were asked about how important their nutrition is to their overall health and how knowledgeable they are about their nutrition, on a scale of 1-7, where 1 = not at all, and 7 = extremely. Table 4.17 shows that about a majority (about 60% of respondents) answered with a response of 4 or higher, and of these about 35% answered that nutrition is extremely important to

their health. Furthermore, less than two percent of the population felt that nutrition was not important to their health. Similar findings were seen for the perceived knowledge of nutrition, except a higher frequency of respondents marked answers for responses 5-7 (about 80% of the sample). While more respondents indicated they are comfortable with their knowledge about their nutrition, only 13.6% of respondents indicated that they were extremely knowledgeable about it. The results from this section of the thesis support the BDC (2013) study suggesting that consumers are trending towards healthy living and are learning more about the nutrition they need in order to balance their lifestyle.

Table 4.16: Percentages of total respondents indicating whether their health and the quality of their nutrition are poor, fair, good, very good or excellent.

Survey Questions	**Response frequencies (%)**				
	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
In general, would you say your health is ___?	1.24%	9.09%	39.25%	40.50%	9.92%
In general, would you say the quality of your nutrition is ___?	2.07%	14.88%	37.6%	39.26%	6.20%

Table 4.17: Percentages of total respondents indicating the importance of their nutrition to their health and how knowledgeable they are about their nutrition.

Survey Questions	**Response Frequencies %**						
	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How important is your nutrition to your overall health?	0.83%	0.83%	1.65%	7.02%	21.07%	33.88%	34.71%
How knowledgeable are you about your nutrition?	0.83%	2.07%	5.37%	10.74%	32.64%	34.71%	13.64%

Health locus of control questions were borrowed from the German translation of the Multidimensional Health Locus of Control Scale (MHLC) developed by Wallston et al. (1978). The scale used is based on three dimensions of questions with three questions in each dimension. The first dimension deals with an internal locus of control (ILOC), which refers to how responsible individuals feel about their health and is captured in the first three questions listed in Table 4.18. The second dimension regards powerful others locus of control (PLOC), an external locus of control, which is about understanding how individuals feel about the influence of healthcare professionals for their personal health (the next set of three questions in Table 4.18). Finally, another external locus of control is used to address how respondents feel about chance playing a role in their health (CLOC), which is captured by the final three questions in Table

4.18. The Wallston et al. (1978) paper uses 5 point agree/disagree scales to quantify the extent of the internal and both external locus of control, by measuring the extent to which individuals agree or disagree with the three sets of three questions. To keep consistent with the other agree/disagree questions in the online survey, responses were based on a 7-point scale. Since the purpose of each dimension (section of three questions) is to understand whether an individual has a high or low score, indicating a measure of locus of control, an average for each dimension was calculated for every individual and used in the subsequent regression analysis found in Chapter 5. Table 4.18 presents the frequency data, rather than the averages.

A high score in any dimension suggests a higher importance of this locus of control. A study by Helmer et al. (2012), which used the same multidimensional health locus of control scale, noted that a high score in an ILOC was associated with a higher importance of healthy nutrition. High scores in PLOC and CLOC are associated with a lower probability of paying attention to healthy nutrition, however, results across studies using these scales are inconsistent, where larger samples found the expected associations while small samples did not always see the expected associations (Helmer et al., 2012). From Table 4.18 it can be seen that the average respondent has a relatively high inner locus of control, low professional locus of control (external locus dimension 1), and a low chance locus of control.

Table 4.18: Respondents internal and external health locus of control (percentage of respondents).

Survey Questions	**Agree / Disagree Response Frequencies (%)**						
	SD (1)	(2)	(3)	(4)	(5)	(6)	SA (7)
The main thing which affects my health is what I myself do.	0%	1.65%	2.07%	10.74%	20.25%	35.95%	29.34%
I am in control of my health.	1.24%	0.83%	3.72%	5.37%	11.16%	33.88%	43.80%
If I get sick, it is my own behaviour which determines how soon I get well again.	0.83%	0.83%	2.48%	9.50%	22.73%	37.60%	26.03%
Regarding my health, I can only do what my doctor tells me what to do.	1.65%	4.55%	6.20%	13.64%	24.79%	31.40%	17.77%
Having regular contact with my physician is the best way for me to avoid illness.	17.77%	21.90%	17.36%	21.90%	14.46%	4.96%	1.65%
Health professionals control my health.	45.45%	28.51%	11.98%	9.09%	3.72%	1.24%	0%
My good health is largely a matter of good fortune.	26.45%	14.88%	14.46%	20.66%	12.40%	7.85%	3.31%
Luck plays a big part in determining how soon I will recover from illness.	36.78%	22.73%	15.29%	13.64%	6.61%	4.13%	0.83%
If it's meant to be, I will stay healthy.	40.08%	18.18%	9.92%	15.70%	9.50%	2.89%	3.72%7

4.9 Conclusions

The descriptive statistics discussed in Chapter 4 illustrate that the sample of Canadians (n=242) from Alberta, British Columbia and Saskatchewan surveyed in this thesis are most willing to use the traffic light label, relative to the Nutrition Facts table (NFT), Guiding Stars, and nutrition experts. Results also show that the Guiding Stars and nutrition experts were both less preferred by the sample population than the NFT. In addition, when having the opportunity to use either the NFT, Guiding Stars and traffic light label alone, or the NFT with either the Guiding Stars and traffic light label, under different decision making contexts (when selecting beverages, bread products, yogurt products, ready to eat cereal products, meat products and prepackaged vegetable products) survey respondents always had a strong preference towards using the traffic light label with the NFT. This result, along with other information in the chapter, supports a non-substitutable relationship between the public and private provision of nutrition information, even though some respondents still chose one of the three sources of nutrition information as their sole or as a primary preferred source of nutrition advice.

Canadians surveyed appeared to be relatively well educated in general, and on average indicated that the NFT posed them with little difficulty and it provided them with information needed to make informed decisions. This appears to differ from the general belief that the NFT was difficult to use to learn about and compare prepackaged food products, a motivation for the upcoming changes to it and the mandated list of ingredients. While the sample population consisted of primarily and experienced grocery shoppers, many had not seen the Guiding Stars before, even those who primary shop where this source of nutrition information is delivered. Furthermore, more respondents knew about the traffic light label than the Guiding Stars, an issue for the nutritional navigation program that has been used in Canada for around 5 years. Ultimately, to more effectively share nutrition information with Canadians, who are heterogeneous in their nutrition needs and preferences, private retailers, the GOC and other agents need more information about the population they are trying to assist. The next chapter uses regression analysis to examine specific factors affecting the likelihood of using the Guiding Stars and traffic light label to better understand who is most and least likely to adopt these sources of nutrition information.

Chapter 5. Methodology and Econometrics Results

5.1 Introduction

Chapter 5 reports econometrics results of the ordered probit and logit models used to estimate factors impacting the likelihood of using the Guiding Stars and traffic light label. A main objective of this thesis is to examine how the general population sample of Canadians responds to the private provision of nutrition information, as well as to understand factors impacting their decision-making. Therefore, Chapter 5 examines socio-demographic, psychographic and other important factors explaining the likelihood of the sample population using the Guiding Stars and traffic light label by utilizing ordered probit and logit econometrics models.

Consumers do not face any monetary cost to access the Guiding Stars or the traffic light label, hence, focus is on the willingness to use each source rather than examining how much Canadians are willing to pay for having access. Factors impacting this choice are important for private retailers, the government of Canada, food manufacturers and others to understand, as they look for ways to improve nutrition literacy in Canada and help consumers select healthy food products and make informed decisions.

This Chapter is organized into five sections including this introduction and a conclusion. Section 5.2 outlines the model specification of the ordered probit and logit models used in this thesis. Because the ordered probit and logit models produced similar results, Section 5.3 only discusses results of the ordered probit models and Appendix E includes results of the ordered logit models. The ordered logit models have fewer results that are statistically significant relative to the probit model, and those that are significant in the ordered logistic models were found in their probit counterparts. Section 5.4 includes variations to the initial model used to determine whether "TrustGS/TrustTLL" and "GSDifficult/TLL/Difficult" are capturing some of the significance from other explanatory variables, and it includes four separate regressions for the removed variables to provide insights into what types of consumers find the Guiding Stars and traffic light label difficult to use or are more likely to trust these signals. Section 5.5 concludes the chapter.

An ordered probit/logit model is broadly used for dependent variables with ordered outcomes, such as rating systems, rankings, grades, etc. (Greene, 2012; Katchova, 2013), making

them both a candidate model for this thesis. Individuals filling out the online survey indicate their willingness to use each private provision of nutrition information by answering for a single outcome. Therefore, in the case of this thesis, each survey respondent chooses a response to their willingness to use a specific source of nutrition information that is based on a set of ordered choices (1, 2, …, J), with a lower limit of 1 and an upper limit of J. Further, the order of responses are of the nature of a rating and not a specified measure, where "2" is greater than "1" and "J" is greater than "J-1". In addition, the difference between "2" and "1" and "J" and "J-1" are not necessarily equal when it comes to the willingness to use a particular source of nutrition information due to the nature of the dependent variable being ordinal and not a specific qualitative measure (Katchova, 2013; Greene, 2012). Ultimately, the survey instrument asked respondents to indicate their likelihood of using the Guiding Stars on a 7-point scale (J=7), which can be translated into a 3-point scale by combining responses 1 and 2 (very unlikely), 3-5 (somewhat likely/unlikely), and 6 and 7 (very likely); the purpose is to differentiate those who are indicating a strong level of adoption from those who are somewhat and not very likely to use the Guiding Stars and traffic light label.

The ordered probit and logit models have more than two categories or J alternatives in the dependent variable that are mutually exclusive and collectively exhaustive, and "will have one set of coefficients with (J-1) intercepts … and J sets of marginal effects" (Katchova, pp. 4, 2013). The ordered dependent variable, y* (Katchova, 2013; Greene 2012), in both cases depends on K observable variables x_k, where k=1, …, K, and is "built around a latent regression" (Greene, pp. 787, 2012):

$$y^* = x'\beta + \varepsilon \quad (1.1)$$

Where y^* is unobserved and is determined by observed factors *x's* (1 to k), and unobserved factors (ε) that are normally distributed for probit models, while logit models have a logistic distribution. In both models, what is observed is:

$$y = 1 \text{ if } y^* \leq \mu_1 (= 0); \quad (1.2)$$
$$y = 2 \text{ if } 0 < y^* \leq \mu_2;$$
$$\dots$$
$$y = J \text{ if } \mu_{J-1} \leq y^*$$

Where μ's are unknown parameters to be estimated with β (Greene, 2012), y is observed in J categories and has one set of coefficients with (J-1) intercepts (Katchova, 2013). The ordered

probit has a normal cumulative distribution function of the errors, while the ordered logit uses a standard logistic c.d.f. (Katchova, 2013 & Moore, 2013)[5,6]. Therefore, the following probabilities can be calculated:

$$\text{Prob}(y = 0|x) = \phi(-x'\beta), \quad (1.3)$$

$$\text{Prob}(y = 1|x) = \phi(\mu_1 - x'\beta) - \phi(-x'\beta)$$

$$\text{Prob}(y = 2|x) = \phi(\mu_2 - x'\beta) - \phi(\mu_1 - x'\beta),$$

$$\dots$$

$$\text{Prob}(y = J|x) = 1 - \phi(\mu_{J-1} - x'\beta)$$

Where all probabilities will be positive when:

$$0 < \mu_1 < \mu_2 < \dots < \mu_{J-1} \quad (1.4)$$

This extension of the probit/logit model from the binary version allows for the "log-likelihood function and its derivatives [to] be obtained readily" (Greene, pp. 788), where the probit/logit model also has J sets of marginal effects (Katchova, 2013). Furthermore, "the partial effects of the regressors x on the probabilities are not equal to the coefficients" (Greene, pp.788, 2012), and coefficients magnitudes in the ordered probit/logit model are not to be interpreted, although the "sign of parameters show whether the latent variable y* increases with the regressor" (Katchova, pp. 5, 2013). With three categories, "the model thus has only one unknown threshold parameter, [where] the probabilities are (Greene, pp. 788, 2012)":

$$\text{Prob}(y = 0|x) = 1 - \phi(x'\beta), \quad (1.5)$$

$$\text{Prob}(y = 1|x) = \phi(\mu - x'\beta) - \phi(-x'\beta),$$

$$\text{Prob}(y = 2|x) = 1 - \phi(\mu - x'\beta).$$

The marginal effects of changes in the regressors are (Greene 789):

$$\delta\ \text{Prob}(y = 0|x) / \delta x = -\phi(-x'\beta)\,\beta, \quad (1.6)$$

$$\delta\ \text{Prob}(y = 1|x) / \delta x = [\phi(-x'\beta) - \phi(\mu - x'\beta)]\,\beta,$$

$$\delta\ \text{Prob}(y = 2|x) / \delta x = \phi(\mu - x'\beta)\beta.$$

Katchova (2013), notes that the marginal effects of each variable on the different alternatives sum up to zero, and the interpretation of the marginal effects is described as each unit increase in

[5] The logistic c.d.f. is similar to the normal c.d.f, where it has heavier tails, but is known to give similar results (Greene, 2012; Moore, 2013).

[6] Standard normal distribution of errors: $\Phi^{-1}(p_i) = \sum_{k=0}^{k=n} \beta_k x_{ik}$; Standard logistic distribution of errors: $\ln\left(\frac{p_i}{(1-p_i)}\right) = \sum_{k=0}^{k=n} \beta_k x_{ik}$; Author: Moore, 2013

an independent variable changes the probability of selecting alternative J by the marginal effect expressed as a percent.

5.2 Model Specification

The ordered probit and logit models that investigate factors affecting the willingness to use the traffic light label and Guiding Stars, respectively, are as follows:

$$\text{Likelihood of Use (Traffic Light Label)}_i = \text{TLLLikelihood3}_i = \beta 0 + \beta 1\ \text{NFTUse}_i + \beta 2\ \text{NFTDifficult}_i + \beta 3\ \text{NFTAll}_i + \beta 4\ \text{NFTCalories}_i + \beta 5\ \text{NFTTotalFat}_i + \beta 6\ \text{NFTSaturatedFat}_i + \beta 7\ \text{NFTSugar}_i + \beta 8\ \text{NFTSodium}_i + \beta 9\ \text{TLLExposure}_i + \beta 10\ \text{TLLMoreEducation}_i + \beta 11\ \text{TLLDifficult}_i + \beta 12\ \text{TrustTLL}_i + \beta 13\ \text{HealthNutritious123}_i + \beta 14\ \text{Complex2SHFP}_i + \beta 15\ \text{NutritionKnowledge}_i + \beta 16\ \text{NutritionQuality}_i + \beta 17\ \text{Nutrition2Health}_i + \beta 18\ \text{AverageILOC}_i + \beta 19\ \text{AveragePLOC}_i + \beta 20\ \text{AverageCLOC}_i + \beta 21\ \text{Gender}_i + \beta 22\ \text{HH18}_i + \beta 22\ \text{i.Education}_i + \beta 23\ \text{z.Income}_i + \beta 24\ \text{z.Province}_i + \beta 25\ \text{z.Age}_i + \beta 26\ \text{TLLGSRandom}_i + \varepsilon_i$$

$$\text{Likelihood of Use (GuidingStars)}_i = \text{GSLikelihood3}_i = \beta 0 + \beta 1\ \text{NFTUse}_i + \beta 2\ \text{NFTDifficult}_i + \beta 3\ \text{NFTAll}_i + \beta 4\ \text{NFTCalories}_i + \beta 5\ \text{NFTTotalFat}_i + \beta 6\ \text{NFTSaturatedFat}_i + \beta 7\ \text{NFTSugar}_i + \beta 8\ \text{NFTSodium}_i + \beta 9\ \text{GSExposure}_i + \beta 10\ \text{GSMoreEducation}_i + \beta 11\ \text{GSDifficult}_i + \beta 12\ \text{TrustGS}_i + \beta 13\ \text{HealthNutritious123}_i + \beta 14\ \text{Complex2SHFP}_i + \beta 15\ \text{NutritionKnowledge}_i + \beta 16\ \text{NutritionQuality}_i + \beta 17\ \text{Nutrition2Health}_i + \beta 18\ \text{AverageILOC}_i + \beta 19\ \text{AveragePLOC}_i + \beta 20\ \text{AverageCLOC}_i + \beta 21\ \text{Gender}_i + \beta 22\ \text{HH18}_i + \beta 22\ \text{z.Education}_i + \beta 23\ \text{z.Income}_i + \beta 24\ \text{z.Province}_i + \beta 25\ \text{z.Age}_i + \beta 26\ \text{TLLGSRandom}_i + \varepsilon_i$$

Where: i = individual, z. = factor variable (based on a number of dummy variables) and ε_i = random error that is normally distributed for probit models and logistically distributed for logit models and all variables are defined in Table 5.1.

Both of the above equations are used for the ordered probit and logit models, where the likelihood of using the Guiding Stars and traffic light label are represented using each econometrics model. The dependent variables are based on the likelihood of using the Guiding Stars (GSLikelihood3_i) or traffic light label (TLLLikelihood3_i) with 3 categories (J=3), which are very unlikely, somewhat likely/unlikely, and very likely (Table 5.1). Therefore, there are two intercepts, one set of coefficients and three sets of marginal effects for the probit model. The explanatory variables are included on the basis that they are observable and deemed to be potentially important factors explaining the willingness to use the Guiding Stars and traffic light

label. While all of the independent variables have already been discussed in the descriptive statistic results in Chapter 4, an explanation of each variable is included in Table 5.1.

Specific questions about the Nutrition Facts table (NFT) were included in the econometrics models. The frequency of using the NFT was included to determine if any relationship existed between using the NTF and the two sources of nutrition information. Whether survey respondents agreed or disagreed that the NFT is difficult to use was included to determine if this factor impacts willingness to use the Guiding Stars or traffic light label. The Government of Canada recognizes that the NFT is difficult to use and this factor may be important to determining if the traffic light label or Guiding Stars substitutes for the NFT. Whether respondents use the specific nutrition information that is contained on the traffic light label or all nutrition information found on the NFT was included in the regressions in order to understand the importance of each factor. Since there were only five respondents who selected that they do not use any of the NFT and this variable was not statistically significant, when included in both regressions, the "do not use" category was not included in the final models.

Similar questions about the Guiding Stars and traffic light label were also included in the final regression models. In this case, questions about the Guiding Stars (traffic light label) were only included in the econometrics model looking at the willingness to use the Guiding Stars (traffic light label). Variables included: whether respondents had previously ever seen each source of nutrition information, whether respondents agreed or disagreed if more education about each source of nutrition information is needed before actually using the information, the level of trust for each source of nutrition information, and, whether respondents agreed or disagreed if each source of nutrition information would be difficult to use. While other questions about each source of nutrition information were asked in the online survey, they were designed for discussion in the descriptive statistics results found in Chapter 4.

Table 5.1: Definitions of variables used in regression analyses.

Dependent Variables	
$GSLikelihood3_i$, $TLLLikelihood3_i$	Based on answers to the statement: "How likely would you be to use the Guiding Stars (traffic light label) while grocery shopping?" on a 1-7 frequency scale (extremely unlikely – extremely likely), which was translated into a 3-point scale (very unlikely = 1, somewhat likely/unlikely = 2, very likely = 3).
Nutrition Facts table (NFT) Related Variables	
$NFTUse_i$	Based on answers to the statement: "How often do you use the NFT while grocery shopping?" on a 1-7 frequency scale (never – always).
$NFTDifficult_i$	Based on answers to the statement: "I find the NFT difficult to understand." on a 1-7 agree/disagree scale.
$NFTAll_i$	Binary variables based on the question asking what nutrition information on the NFT is the most frequently used, and which nutrition information is found on the traffic light label, where 1 = used, 0 = not used
$NFTCalories_i$	
$NFTTotalFat_i$	
$NFTSaturatedFat_i$	
$NFTSugar_i$	
$NFTSodium_i$	
Guiding Stars and Traffic Light Label Related Variables	
$GSExposure_i$, $TLLExposure_i$	Binary answers to the question: "Have you ever seen this source of nutrition information?" where, Yes = 0; No / I don't know = 1
$GSMoreEducation_i$, $TLLMoreEducation_i$	Based on answers to the statement: "I need more information about the Guiding Stars(traffic light label) before I would use it" on a 1-7 agree/disagree scale.
$GSDifficult_i$, $TLLDifficult_i$	Based on answers to the statement: "I would find the ___ difficult to use." on a 1-7 agree/disagree scale.
$TrustGS_i$, $TrustTLL_i$	Based on answers to the statement: "Please indicate the extent to which you would trust the following sources of nutrition information on a scale of 1 to 7; where 1 = no trust and 7 = trust completely".
Shopping Behaviours, Health Status and Behaviours Related Variables	
$HealthyNutritiousRank123_i$	Binary variable based on whether respondents indicated healthy/nutritious as a top 3 most important factor while shopping, where 1 = top 3, 0 = not top 3.
$Complex2SHFP_i$	Based on answers to the statement: "It is complex to understand how to select healthy food products while grocery shopping" on a 1-7 agree/disagree scale.
$NutritionKnowledge_i$	Based on answers to the statement: "How knowledgeable are you about your nutrition?" on a 1-7 scale (not at all – extremely).
$NutritionQuality_i$	Based on answers to the statement: "In general, would you say the quality of your nutrition is __?" where potential answers are: poor, fair, good, very good, and excellent.
$Nutrition2Health_i$	Based on answers to the statement: "How important is your nutrition to your overall health?" on a 1-7 scale (not at all – extremely).
Health Locus of Control Related Variables	
Average $ILOC_i$	Internal locus of control: Based on average values from the following 7-point scale agree/disagree questions: "The main thing which affects my health is what I myself do"; "I am in control of my health"; "If I get sick, it is my own behaviour which determines how soon I get well again."
Average $PLOC_i$	Powerful others locus of control: Based on average values from the following 7-point scale agree/disagree questions: "Regarding my health, I can only do what my doctor tells me what to do."; "Having regular contact with my physician is the best way for me to avoid illness."; "Health professionals control my health."
Average $CLOC_i$	Chance locus of control: Based on average values from the following 7-point scale agree/disagree questions: "My good health is largely a matter of good fortune."; Luck plays a big part in determining how soon I will recover from illness."; "If it's mean to be, I will stay healthy."
Demographics Related Variables	
$Gender_i$	Binary variable based on whether respondents are male (=0) or female (=1).
$HH18_i$	Binary variable based on whether respondents indicated they have no children in their household (=0) or have children (=1).
$Education_i$	Based on a multiple choice question asking respondents to select their highest attained level of education, where six sets of dummy variables, one each for high school, some college, 2 year degree, 4 year degree, professional degree and doctorate (1 = selected, 0 = not selected), and the omitted category is less than high school.
$Income_i$	Based on a multiple choice question asking respondents to select their income range before taxes, where two sets of dummy variables are defined, one each for ranges $75001-$150000 and $150000+ (1 = from the specified income bracket, 0 = not from the specified income bracket), and the omitted category is $0-$75,000.
$Province_i$	Based on a multiple choice question asking respondents to select their location, where two sets of dummy variables are defined, one each for British Columbia and Saskatchewan (1 = from the specified province, 0 = not from the specified province), with Alberta as the omitted category.
$AgeQuota_i$	Based on a multiple choice question asking respondents to select their age range where four sets of dummy variables are defined, one each for ranges 35-44, 45-54, 55-64, and 65+ (1 = from the specified age range, 0 = not from the specified age range), and 25-34 as the omitted category.
Other Related Variables	
$TLLGSRandom_i$	Binary variable based on whether respondents saw questions about the traffic light label (=0) or the Guiding Stars (=1) first.

Survey respondents were asked to indicate important factors in their decision making when it comes to grocery shopping, and whether they indicated if healthy/nutritious was a top 3 factor was included in the regression based on insights from past empirical applications. In addition, whether respondents agreed or disagreed if it is complex to shop for healthy food products, their perceived level of nutrition knowledge, their perceived quality of nutrition, whether they agreed or disagreed if nutrition is important to their health, and health locus of control questions were also included, based on information in the literature review from Chapter 3.

A number of demographic factors were included as explanatory variables, such as gender, whether children are present in the household, level of education, household income before taxes, province and age. Body mass index (BMI) was initially included in both models and was insignificant for both; hence, it was not included in the final econometrics models. While the number of people living in a household was included in the online survey and discussed in the descriptive statistics section, it was not included in the final econometrics models because this information is not expected to be particularly relevant in understanding the likelihood of using the Guiding Stars or traffic light label.

Both ordered probit and logit models for the likelihood of using the Guiding Stars and traffic light label are run with Stata 15's statistical software package, and screenshots of original regression results are found in Appendix E. Since both the ordered probit and logit econometrics models produced similar results, focus in this chapter is on interpreting the data from the ordered probit model. Fewer variables in the ordered logistic models were statistically significant, and all variables that were statistically significant in the ordered logistic models were also significant in the ordered probit models. The logit model was needed for testing the proportional odds assumption in Stata 15, which is about "re-expressing the categorical variable in terms of a number of binary variables based on internal cut points in the ordinal scale, … [where estimates from the] binary models can be pooled to provide just 1 set of β estimates", ultimately showing the only difference between the binary models roots from intercept terms (Brant, 2004). More simply, the proportional odds assumption indicates whether " the coefficients that describe the relationship between, say the lowest versus all higher categories of the response variable are the same as those that describe the relationship between the next lowest category and all higher categories, etc. (UCLA, 2017). When the proportional odds assumption is violated, a generalized

ordered model may be run rather than an ordered model. The proportional odds assumption tests in Stata were run via the ‘Brant test’ and ‘omodel’ function.

5.3 Ordered Probit Model Results

Summarized regression outputs from the ordered probit models for the traffic light label and Guiding Stars respectively are found in Table 5.2 and Table 5.3, where column 1 of each table lists the independent variables, column 2 gives the magnitude of the coefficients, column 3 gives the standard error and column 4 gives the p-value and level of significance for each variable. In both cases, as can be seen in Appendix E, the ordered logit models pass the proportional odds tests, suggesting the proportional odds assumption is not violated and the current econometric models perform well given the final dataset. Coefficient estimates from the ordered probit regressions are presented in Table 5.2 and Table 5.3.

In Tables 5.2 and 5.3, it can be seen that the traffic light label has 8 statistically significant variables and the Guiding Stars has 13 statistically significant variables. While the magnitudes of the coefficients cannot be interpreted, the signs of the coefficients can, where (Katchova, 2013) states that: a “-” coefficient signals a higher chance of being in the very unlikely category of using one of the two given sources of nutrition information; and a “+” coefficient signals a higher chance of being in the very likely category of using one of the two gives sources of nutrition information.

Table 5.2: Summary of ordered probit regression results from STATA 15 for willingness to use the traffic light label.

Traffic Light Label (n = 242, Pseudo R^2 = 0.3407, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	**0.188191**	**0.075304**	**0.012****
NFTDifficult	0.094022	0.0721	0.192
NFTAll	0.204663	0.384552	0.595
NFTcalories	-0.00191	0.217194	0.993
NFTTotalFat	-0.02724	0.236611	0.908
NFTSaturatedFat	-0.05363	0.252627	0.832
NFTSugar	0.186167	0.240293	0.438
NFTSodium	0.128192	0.219011	0.558
TLLExposure	0.446972	0.273285	0.102
TLLMoreEducation	0.042955	0.061587	0.486
TLLDifficult	**-0.4089**	**0.085066**	**0*****
TrustTLL	**0.356315**	**0.069645**	**0*****
HealthyNutritiousRank123	-0.35474	0.248405	0.153
Complex2SHFP	0.028811	0.062825	0.647
NutritionKnowledge	**0.191891**	**0.107831**	**0.075***
NutritionQuality	**-0.28986**	**0.142536**	**0.042****
Nutrition2Health	0.144478	0.106742	0.176
AverageILOC	-0.04889	0.097256	0.615
AveragePLOC	-0.02803	0.090216	0.756
AverageCLOC	0.038792	0.078369	0.621
Gender	-0.09231	0.196454	0.638
HH18	-0.38672	0.242092	0.11
Education (High School)	0.220465	0.753988	0.77
Education (College)	0.049478	0.731853	0.946
Education (2 year degree)	0.220563	0.760355	0.772
Education (4 year degree)	0.394527	0.750701	0.599
Education (Professional)	0.629498	0.755859	0.405
Education (Doctorate)	**-1.64813**	**0.945489**	**0.081***
Income(75k-150k)	-0.00027	0.221873	0.999
Income(150k+)	**0.684366**	**0.336228**	**0.042****
BritishColumbia	-0.15761	0.203204	0.438
Saskatchewan	0.208344	0.301415	0.489
Age(35-44)	-0.33515	0.287696	0.244
Age(45-54)	-0.34682	0.285611	0.225
Age(55-64)	0.066262	0.313941	0.833
Age(65+)	-0.09331	0.317584	0.769
TLLGSRandom	**-0.37218**	**0.196387**	**0.058***
Where; * p<0.1; ** p<0.05; *** p<0.01			

Table 5.3: Summary of ordered probit regression results from STATA 15 for willingness to use the Guiding Stars.

Guiding Stars (n = 242, Pseudo R^2 = 0.3590, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Variable	Coefficient
NFTUse	0.01987	0.071636	0.781
NFTDifficult	**0.151548**	**0.066629**	**0.023****
NFTAll	**0.621635**	**0.370512**	**0.093***
NFTcalories	0.237811	0.214565	0.268
NFTTotalFat	-0.17292	0.224109	0.44
NFTSaturatedFat	0.102468	0.239251	0.668
NFTSugar	-0.16105	0.235874	0.495
NFTSodium	**0.547746**	**0.218822**	**0.012****
GSExposure	**-0.91279**	**0.336137**	**0.007*****
GSMoreEducation	-0.02008	0.05384	0.709
GSDifficult	**-0.25135**	**0.065779**	**0*****
TrustGS	**0.410131**	**0.066858**	**0*****
HealthyNutritiousRank123	0.22104	0.24796	0.373
Complex2SHFP	**0.10782**	**0.058612**	**0.066***
NutritionKnowledge	0.001947	0.108595	0.986
NutritionQuality	0.037997	0.128696	0.768
Nutrition2Health	**0.198324**	**0.113328**	**0.08***
AverageILOC	-0.02377	0.08643	0.783
AveragePLOC	0.105127	0.082804	0.204
AverageCLOC	0.048967	0.072332	0.498
Gender	0.051577	0.189696	0.786
HH18	-0.3268	0.235596	0.165
Education (High School)	-0.11802	0.646549	0.855
Education (College)	-0.49377	0.631293	0.434
Education (2 year degree)	-0.12688	0.655368	0.846
Education (4 year degree)	-0.34976	0.643164	0.587
Education (Professional)	0.447902	0.639721	0.484
Education (Doctorate)	-1.19897	0.848766	0.158
Income(75k-150k)	**0.458622**	**0.21387**	**0.032****
Income(150k+)	0.422956	0.304059	0.164
BritishColumbia	0.159841	0.192269	0.406
Saskatchewan	**0.491614**	**0.290521**	**0.091***
Age(35-44)	**0.574974**	**0.286662**	**0.045****
Age(45-54)	0.18855	0.281972	0.504
Age(55-64)	0.351536	0.295337	0.234
Age(65+)	**0.665561**	**0.312402**	**0.033****
TLLGSRandom	**0.789088**	**0.197983**	**0*****
where; * p<0.1; ** p<0.05; *** p<0.01			

When it comes to the traffic light label and the Guiding Stars ordered probit regression results, both models found that the perceived level of difficulty in using either the Guiding Stars or traffic light label had statistically significant results in a negative direction. These results are consistent with the earlier behavioural economic discussion where it was noted that ease of use of information is important, especially when other sources are also readily available. Furthermore, both the regressions show that the level of trust of both the Guiding Stars of traffic light label was positive and statistically significant. The behavioural economics discussion in Chapter 3 suggested that trust is an important heuristic in decision-making. The only other variable in both regressions that was statistically significant was the randomizer variable that captures whether respondents saw the Guiding Stars or traffic light label first in the online questionnaire. In the case of the Guiding Stars regression there was a positive sign, and in the case of the traffic light label regression there was a negative sign. This variable controls for any ordering effects.

The fact that the traffic light label has less statistically significant variables in relation to the Guiding Stars potentially roots from the distribution for the likelihood of its use, where the majority of respondents indicated they were somewhat likely and very likely to use it. In the case of the Guiding Stars, the distribution for its likelihood of use was more scattered across responses, with a skew towards respondents being less likely to use it. A skewed distribution in the likelihood of use for a given source of nutrition information by a survey sample suggests the distribution of responses may already capture a lot of the variability in explanatory factors. Therefore, a source of nutrition information with a strong likelihood of use, in this case the traffic light label, already captures individuals with a broad range of characteristics and may have fewer significant variables explaining likelihood of use. While there may be more significant factors impacting the Guiding Stars in relation to the traffic light label, and only a couple of similar variables between the two sources of nutrition information were significant, each significant factor is a result of responses in the dataset and warrants equal attention. In the case of the traffic light label, there were also two explanatory variables which were within 1% of being significant. While no other factors were very close to being significant in the Guiding Stars regression, having a larger sample size could have produced clearer results in both regressions.

Table 5.2 and Table 5.3 include a Pseudo R^2 value, which is not the same as R^2 found in an OLS regression (UCLA, 2011). Since there are a number of different methods to calculating

Pseudo R^2, interpreting this number requires caution; although, the magnitude of Pseudo R^2 still signals whether a model has a better fit than another (UCLA, 2011), and both regression results contain very similar Pseudo R^2 values. The Guiding Stars had a value of 0.3590 compared to the 0.3407 for the traffic light label. Since the values of the Pseudo R^2 values are not to be interpreted like those in an OLS regression, the conclusion is both models: fit the data similarly well, could benefit from a larger sample size and/or the inclusion of other factors that better explain the likelihood of using the nutrition information.

Marginal effects allow for the evaluation of the magnitude of an explanatory variable's impact on the dependent variable. Marginal effects of the statistically significant variables outlined in Tables 5.2 and 5.3 are provided in Tables 5.4-5.6, followed by a discussion of these effects. Marginal effects outputs from Stata 15 are found in Appendix E. Table 5.4 shows the marginal effects for the dependent variable category that captures respondents who are unlikely to use the two sources of nutrition information. Table 5.5 shows marginal effects for the somewhat likely to use responses, and Table 5.6 shows marginal effects for the very likely to use category.

Table 5.4: Ordered probit model marginal effects for individuals who are very unlikely to use each source of nutrition information.

Guiding Stars		Traffic Light Label	
Variable	Dy/dx	Variable	Dy/dx
NFTDifficult	-0.0409(**)	NFTUse	-0.0053(*)
NFTAll	-0.1407(**)	TLLDifficult	0.0116(**)
NFTSodium	-0.1468(**)	TrustTLL	-0.0101(**)
GSExposure	0.1675(***)	NutritionKnowledge	-0.0054
GSDifficult	0.0678(***)	NutritionQuality	-0.0082
TrustGS	-0.1107(***)	Education (Doctorate)	0.2287
Complex2SHFP	-0.0291(*)	Income(150k+)	-0.0122(**)
Nutrition2Health	-0.0535(*)	TLLGSRandom	0.0107
Income(75k-150k)	-0.1163(**)		
Saskatchewan	-0.1116(**)		
Age(35-44)	-0.1316(**)		
Age(65+)	-0.1474(***)		
TLLGSRandom	-0.2134(***)		

Table 5.5: Ordered probit model marginal effects for individuals who are somewhat likely to use each source of nutrition information.

Guiding Stars		Traffic Light Label	
Variable	Dy/dx	Variable	Dy/dx
NFTDifficult	0.0111	NFTUse	-0.0696(**)
NFTAll	-0.0085	TLLDifficult	0.1512(***)
NFTSodium	0.0382	TrustTLL	-0.1318(***)
GSExposure	0.0909	NutritionKnowledge	-0.0710(*)
GSDifficult	-0.0185(*)	NutritionQuality	0.1072(**)
TrustGS	0.0302(*)	Education (Doctorate)	0.2204
Complex2SHFP	0.0079	Income(150k+)	-0.2519(**)
Nutrition2Health	0.0146	TLLGSRandom	0.1367 (**)
Income(75k-150k)	0.0189		
Saskatchewan	-0.0059		
Age(35-44)	-0.0048		
Age(65+)	-0.0156		
TLLGSRandom	0.0587(*)		

Table 5.6: Ordered probit model marginal effects for individuals who are very likely to use each source of nutrition information.

Guiding Stars		Traffic Light Label	
Variable	Dy/dx	Variable	Dy/dx
NFTDifficult	0.0297(**)	NFTUse	0.0749(**)
NFTAll	0.1491	TLLDifficult	-0.1628(***)
NFTSodium	0.109(**)	TrustTLL	0.1418(***)
GSExposure	-0.2584(**)	NutritionKnowledge	0.0764(*)
GSDifficult	-0.0493(***)	NutritionQuality	-0.1154(**)
TrustGS	0.0805(***)	Education (Doctorate)	-0.4492(***)
Complex2SHFP	0.0212(*)	Income(150k+)	0.2641(**)
Nutrition2Health	0.0389(*)	TLLGSRandom	-0.1474(*)
Income(75k-150k)	0.097(**)		
Saskatchewan	0.1175		
Age(35-44)	0.1364(*)		
Age(65+)	0.1630(*)		
TLLGSRandom	0.1547(***)		

The interpretation of the marginal effects is as follows:

- In the case of Table 5.4, whether binary or based on a scale, increasing an independent variable by one unit suggests respondents are “dy/dx”% likely to be in the “very unlikely to use” category.
- In the case of Table 5.5, …, increasing an independent variable by one unit suggests respondents are “dy/dx”% likely to be in the “somewhat likely to use” category.
- In the case of Table 5.6, …, increasing an independent variable by one unit suggests respondents are “dy/dx”% likely to be in the “very likely to use” category.

5.3.1 Marginal effects for the 'very unlikely to use' categories.

Table 5.4 shows that all marginal effects for the Guiding Stars were statistically significant, while only four out of eight variables in the traffic light label marginal effects were statistically significant. In terms of the traffic light label, all statistically significant marginal effects were extremely small in magnitude (around 1%) and three of the four were negative, suggesting that there were no strong factors causing individuals to be very unlikely to use this source of nutrition information. These results are not unexpected given the strong preference for using this source of nutrition information by the majority of the sample. Results in Tables 5.5 and 5.6 show much larger marginal effects that will be close in absolute magnitude, meaning that if the factors had an impact it was likely to be in the direction of pushing individuals to somewhat use or be more inclined to use the traffic light label.

A more detailed look at the Guiding Stars marginal effects in Table 5.4 is needed as many of the results show stronger impacts. All results in Table 5.5 show much smaller marginal effects, meaning that the majority of strong impacts either cause individuals to be very likely or unlikely to use the Guiding Stars. These results make sense as respondents were relatively evenly spread in terms of their stated willingness to use this source of nutrition information.

In table 5.4 'NFTDifficult', 'Complex2SHFP', and 'Nutrition2Health' all had marginal effects that were negative and between about 3-5% in size; therefore, individuals who thought the NFT is progressively more difficult to use, believe it is progressively more complex to shop for healthy foods, and those who progressively see nutrition as being important to their health are increasingly more likely to use the Guiding Stars. Major factors to consider are that few respondents felt the NFT is overly difficult to use or felt it is complex to shop for healthy food products. On the other hand, the majority of respondents felt strongly about their health, suggesting these individuals tend to be either in the somewhat likely or likely to use the Guiding Stars categories. One other marginal effect that had a relatively small impact, but in a positive direction was 'GSDifficult', suggesting that those who felt the Guiding Stars was progressively more difficult to use were less likely to use this source of nutrition information; although, the majority of respondents signalled that the Guiding Stars are not overly difficult to use.

There were eight binary variables in the marginal effects results for the Guiding Stars, and seven had a negative value, with only one exhibiting a positive value. 'GSExposure' was the

only positive marginal effect, where those who have seen the Guiding Stars are about 16.75% more likely to be found in the *less* likely to use the Guiding Stars category. While not many individuals have seen the Guiding Stars before, this statistic is important because it suggests that those who have been exposed to the Guiding Stars are less likely to use them and may suggest that the Guiding Stars program is failing to convince people of its usefulness, individuals being exposed to it may not trust it, or more education may be needed about it; further discussion of this result is provided in Chapter 6. Six of the seven negative marginal effects showed values of about 11-15%, suggesting that those who use all of the NFT, pay attention to sodium on the NFT, have an income between $75,000 to $150,000 compared to those earning under $75,000, were from Saskatchewan relative to Alberta, and are between the ages of 35-44 or above 65 relative to those between 25-34 are less likely to be found in the "very unlikely to use" category. The randomizer variable suggests that those who saw the Guiding Stars first in the online survey were also about 21% less likely to be found in this category, the statistic with the largest marginal impact; therefore, ordering effects can be isolated so that other coefficients remain unbiased by any ordering effects.

Trust in the Guiding Stars (traffic light label) is expected to be one of the most important factors in determining its likelihood of use. While the marginal effects are relatively strong for the Guiding Stars (about -11%), showing that higher levels of trust in the information signal reduces the likelihood of being in this category, the marginal effects for the traffic light label are much smaller in magnitude (about -1%). Few responses suggested a complete or very high level of trust for the Guiding Stars.

5.3.2 Marginal effects for the 'somewhat likely to use' categories.

Table 5.5 shows that only 3 marginal effects for the Guiding Stars were statistically significant, while all of the variables in the traffic light label marginal effects were statistically significant. An important factor to consider is that the sum of marginal effects across the three categories must equal to 1. In the case of the Guiding Stars, when comparing the absolute magnitude of the marginal effects in Table 5.5 in relation to those discussed in Table 5.4, the marginal effects in this category are much smaller, suggesting that majority of the strength of the impacts are found in the very likely and very unlikely to use categories. Important is the statistically significant variables showing how those who have a higher level of trust for the

Guiding Stars are about 3% more likely per unit increase in trust to be in this category (compared to 11% less likely in Table 5.4). Those who thought the Guiding Stars is difficult to use are 1.85% less likely per unit increase in difficulty to be in this category (compared to 6.7% in Table 5.4), and those who saw the Guiding Stars questions before the traffic light label are 5.87% more likely to be in this category. In all three cases the direction of the marginal effects in this category are opposite of those in Table 5.4.

When it comes to the marginal effects for the traffic light label in Table 5.5, all values are much larger in magnitude in relation to those in Table 5.4. Furthermore, of the eight variables in Table 5.5, seven have the same signs of those in Table 5.4, suggesting that the corresponding marginal effects in the very likely to use category will be slightly larger in absolute magnitude than those found in Table 5.5. Ultimately, those who more frequently use the NFT are 6.96% less likely per unit increase in the frequency of use to be found in this category. Those who thought the traffic light label is increasingly difficult to use are 15.12% more likely per unit increase in difficulty to be in this category, a result worth noting because even if the traffic light label is seen as difficult to use many respondents are still somewhat likely to use it for guidance. Those who show an increased level of trust in the traffic light label are 13.18% less likely per unit increase in trust to be in this category, and since many trusted this source of nutrition information it is somewhat likely to be adopted into decision-making. Those who feel they have a higher level of nutrition knowledge are 7.1% less likely per unit increase in perceived knowledge to be in this category, an important result as those who feel they are literate in nutrition knowledge still believe that this source of nutrition information benefits them. Respondents who feel they have a higher nutrition quality are 10.72% more likely per unit increase in perceived nutrition quality to be in this category, potentially suggesting they are already comfortable selecting foods within their healthy eating preferences. Those who have a Doctorate level of education in relation to those without a high school education are 22.04% more likely to be in this category, although very few respondents have this level of education, potentially leading to inflated marginal effects. Those with an income of over $150,000 before taxes in relation to those below $75,000 are 25.19% less likely to be in this category. Those who saw the Guiding Stars first in the survey are 13.67% more likely to be in this category.

5.3.3 Marginal effects for the 'very likely to use' categories.

Table 5.6 shows that all marginal effects for the traffic light label were statistically significant and only two of the marginal effects for the Guiding Stars are not statistically significant. When it comes to the traffic light label, the marginal effects in the very likely to use category were similar in absolute magnitude and opposite in direction to those in the somewhat likely to use category. Ultimately, those that are progressively more inclined to use the NFT are also more likely to use the traffic light label, supporting a potentially complementary relationship between these two sources of nutrition information. Those that find the traffic light label increasingly difficult to use are 16.28% less likely per unit increase in difficulty to be in this category, but many respondents signalled this source of nutrition is easy to use. As individuals feel they are more knowledgeable about their nutrition they are 7.64% more likely to use the traffic light label, but on the other hand those that feel they have a higher quality of nutrition are 10.72% less likely to be in this category. Those few respondents who have completed a Doctorate are almost 45% less likely to be in this category, who have earned over $150,00 per year are 26.41% more likely to be in this category, and those who saw the Guiding Stars first in the survey are 14.74% less likely to be in this category.

Marginal effects for the Guiding Stars suggest that individuals signalling the NFT as difficult to use are only 2.97% more inclined to be 'very likely' to use the Guiding Stars, although not many individuals signalled this source of nutrition information as being difficult to use. Individuals who use sodium information on a NFT are 10.9% more likely to be "very likely" users of the Guiding Stars, a result that the provider of the Guiding Stars program may want to consider since they have potential to signal whether a product earns 0 stars based on the fact they have too much added sodium. Those that were exposed to the Guiding Stars before the survey are 25.84% less likely to be heavy users of the Guiding Stars, a potential major implication if this is how typical Canadians respond to this source of nutrition information. Those that view the Guiding Stars as more difficult to use are 4.93% less likely to be included in this category, marking the importance of properly delivering education about the stars ratings. Individuals who are more trusting of the Guiding Stars are 8.05% more likely to be included in this category, and trust of this source of nutrition information ranged quite widely across the survey sample. When individuals feel it is more complex to select healthy food products they are 2.12% more likely to use the Guiding Stars, so as individuals keep learning about their nutrition they may need the

Guiding Stars less. Those who view nutrition as important to their health are 3.89% more likely to use the Guiding Stars. Finally, respondents making between $75,000 to $150,000 per year are 9.7% more likely to use the Guiding Stars in relation to those making under $75,000.Respondents between the ages of 35-44 and over 65 relative to those between the ages of 25-34 are more 13.6% and 16.3% more likely to use the Guiding Stars. Respondents seeing the Guiding Stars first in the online survey were 15.47% more likely to be included in this category, suggesting that the order of information is has a strong impact on the expressed likelihood of using the nutritional navigation program, an effect which is isolated by the inclusion of this variable in the regression.

5.4 Model Variations

Additional models were run to determine whether specific variables were capturing some of the significance of other explanatory variables, and to see if there were any insights into the types of consumers who are likely to find the Guiding Stars and traffic light label difficult to use or are likely to trust these signals. Section 5.4.1 investigates the ordered probit regression models for the likelihood of using the Guiding Stars and traffic light label when being run without explanatory variables “GSDifficult (TLLDifficult)” and “TrustGS (TrustTLL)”, the purpose being to determine whether these variables are capturing some of the significance from other explanatory variables and therefore any impacts on other independent variables from removing these variables. Section 5.4.2 investigates four additional ordered probit regressions using GSDifficult (TLLDiffiuclt) and TrustGS (Trust TLL) to provide insights into what types of consumers find the Guiding Stars and traffic light label difficult to use or are more likely to trust these signals.

5.4.1 Modified Ordered Probit Model Results

The ordered probit regression models for the likelihood of using the Guiding Stars and traffic light label that are found in Section 5.2 were run without explanatory variables “GSDifficult (TLLDifficult)” and “TrustGS (TrustTLL)”. Both of these explanatory variables for each source of nutrition information had p-values of 0 in each regression as seen in Section 5.3, and the purpose of rerunning the models is to determine whether these variables are capturing some of the significance from other explanatory variables and therefore any impacts on other

independent variables from removing these variables. Important to note was the Pseudo R^2 was reduced from 0.3407 to 0.1925 in the case of the traffic light label after the two variables were removed, the Pseudo R^2 was reduced from 0.3590 to 0.2212 in the case of the Guiding Stars, and both models had 11 statistically significant variables. Furthermore, both modified regression models were also tested with the "omodel" and "Brant" test to ensure they passed the proportional odds assumption, which they did.

More specifically, as can be seen in Table 5.4 after removing "TLLDifficult" and "TrustTLL" from the traffic light label regression, "NutritionKnowledge" is no longer statistically significant, while "TLLExposure", "TLLMoreEducation", "HealthyNutritiousRank123", "Nutrition2Health", "HH18", and "BritishColumbia" are now statistically significant, where the coefficient signs of all these variables, except "TLLMoreEducation" did not change from the original regression results. The new preliminary evidence, without looking at marginal effects, suggests that respondents who have seen the traffic light label before are more inclined to use it and respondents needing more education about the traffic light label are less inclined to adopt it. The results also show that respondents who ranked healthy/nutritious as an important attribute are less likely to use the traffic light label, as are respondents who feel they have a relatively high quality of nutrition, those with children, and those located in British Columbia. Finally, the revised model suggests that those who feel more strongly about the link between nutrition and their health are more likely to adopt this source of nutrition information.

In the case of the Guiding Stars, Table 5.5 shows that after removing "GSDifficult" and "TrustGS" from the regression, "NFTAll", "NFTSodium" and "Saskatchewan" are no longer statistically significant, while "GSMoreEducation", "NutritionKnowledge", and "AgeG4" (those in the age range of 55-64) are now statistically significant, where the coefficient signs of all these variables, except "NutritionKnowledge" did not change from the original regression. The new preliminary evidence, without looking at the marginal effects, suggests that respondents needing more education about the Guiding Stars before using it are less inclined to adopt it, while those who feel they have a higher quality of nutrition are also less likely to adopt it. Respondents between the ages of 55-64 exhibit a higher chance of being very likely to use the Guiding Stars.

To conclude, in both regressions without explanatory variables for trust (TrustGS / TrustTLL) and difficulty (GSDifficult / TLLDifficult), the independent variable for respondents wanting more education (GSMoreEducation / TLLMoreEducation) became statistically significant and had a negative coefficient. Also, both regressions saw "Nutrition2Health" as statistically significant with a positive coefficient, which was only significant in the Guiding Stars regression previously, indicating a potential similar effect of this factor on both sources of nutrition information. Two main contrasts between each regression can also be seen, where those seeing the traffic light label before the survey were more inclined to use this source of nutrition information, while those seeing the Guiding Stars beforehand were less inclined to use it; and none of the statistically significant demographic variables (Age, Province, Income, Education, HH18, and Gender) were similar between the two regressions.

Table 5.4: Summary of modified ordered probit regression results from STATA 15 for willingness to use the traffic light label.

Modified Traffic Light Label (n = 242, Pseudo R^2 = 0.1925, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	**0.220431**	**0.070053**	**0.002*****
NFTDifficult	0.025057	0.064895	0.699
NFTAll	0.421794	0.354314	0.234
NFTcalories	0.114064	0.202613	0.573
NFTTotalFat	-0.06574	0.217603	0.763
NFTSaturatedFat	0.089098	0.231539	0.7
NFTSugar	0.351438	0.223099	0.115
NFTSodium	0.007094	0.203588	0.972
TLLExposure	**0.697649**	**0.256674**	**0.007*****
TLLMoreEducation	**-0.13226**	**0.051358**	**0.01****
HealthyNutritiousRank123	**-0.45842**	**0.232489**	**0.049****
Complex2SHFP	0.045812	0.05806	0.43
NutritionKnowledge	0.04779	0.099562	0.631
NutritionQuality	**-0.2536**	**0.133453**	**0.057***
Nutrition2Health	**0.205006**	**0.099095**	**0.039****
AverageILOC	-0.04915	0.08975	0.584
AveragePLOC	-0.01542	0.082566	0.852
AverageCLOC	0.011037	0.072389	0.879
Gender	0.107196	0.180521	0.553
HH18	**-0.39409**	**0.223298**	**0.078***
Education (High School)	0.252728	0.722971	0.727
Education (College)	0.070628	0.70115	0.92
Education (2 year degree)	-0.00276	0.724062	0.997
Education (4 year degree)	0.224118	0.716362	0.754
Education (Professional)	0.689611	0.72398	0.341
Education (Doctorate)	**-2.14005**	**0.871811**	**0.014****
Income(75k-150k)	0.100689	0.203207	0.62
Income(150k+)	**0.615659**	**0.302158**	**0.042****
BritishColumbia	**-0.36464**	**0.187684**	**0.052***
Saskatchewan	0.308734	0.280177	0.27
Age(35-44)	-0.18607	0.264791	0.482
Age(45-54)	-0.18926	0.265113	0.475
Age(55-64)	-0.01003	0.286155	0.972
Age(65+)	0.13524	0.2949	0.647
TLLGSRandom	**-0.34667**	**0.180967**	**0.055***
Where; * p<0.1; ** p<0.05; *** p<0.01			

Table 5.5: Summary of modified ordered probit regression results from STATA 15 for willingness to use the Guiding Stars.

Modified Guiding Stars (n = 242, Pseudo R^2 = 0.2212, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	-0.01678	0.066083	0.8
NFTDifficult	**0.153977**	**0.061057**	**0.012****
NFTAll	0.426631	0.344885	0.216
NFTcalories	0.284851	0.199689	0.154
NFTTotalFat	-0.10091	0.207368	0.627
NFTSaturatedFat	0.123926	0.220937	0.575
NFTSugar	-0.09048	0.21933	0.68
NFTSodium	0.229311	0.197035	0.245
GSExposure	**-0.73007**	**0.313805**	**0.02****
GSMoreEducation	**-0.12427**	**0.047437**	**0.009*****
HealthyNutritiousRank123	-0.11954	0.224152	0.594
Complex2SHFP	**0.101814**	**0.054207**	**0.06***
NutritionKnowledge	**-0.16765**	**0.097839**	**0.087***
NutritionQuality	0.010659	0.120762	0.93
Nutrition2Health	**0.41742**	**0.103078**	**0*****
AverageILOC	-0.07779	0.080441	0.334
AveragePLOC	0.101784	0.076713	0.185
AverageCLOC	-0.00752	0.067304	0.911
Gender	0.238383	0.175796	0.175
HH18	0.045705	0.210508	0.828
Education (High School)	0.233739	0.637393	0.714
Education (College)	-0.24338	0.62377	0.696
Education (2 year degree)	-0.28579	0.64192	0.656
Education (4 year degree)	-0.11275	0.634618	0.859
Education (Professional)	0.49996	0.633048	0.43
Education (Doctorate)	-0.66444	0.792355	0.402
Income(75k-150k)	**0.417293**	**0.197706**	**0.035****
Income(150k+)	0.356583	0.280542	0.204
BritishColumbia	0.04168	0.177653	0.815
Saskatchewan	0.422037	0.264788	0.111
Age(35-44)	**0.498632**	**0.263998**	**0.059***
Age(45-54)	0.383328	0.25919	0.139
Age(55-64)	**0.520317**	**0.270665**	**0.055***
Age(65+)	**1.153312**	**0.285192**	**0*****
TLLGSRandom	**1.020395**	**0.180023**	**0*****
Where; * p<0.1; ** p<0.05; *** p<0.01			

5.4.2 Ordered Probit Results for Trust and Difficulty

Results from four additional ordered probit regressions are found in this section to examine what types of consumers are likely to find the Guiding Stars and traffic light label difficult to use or are likely to trust these signals. In the preceding section, original ordered probit regression models that examined the willingness to use the Guiding Stars and traffic light label were run without explanatory variables "GSDifficult (TLLDifficult)" and "TrustGS (TrustTLL)", which changed some of the statistically significant factors found in each regression. The purpose of this section is to outline results from running a separate ordered probit regression for "GSDifficult", "TLLDifficult", "TrustGS", and "TrustTLL", using the same independent variables found in the modified ordered probit models (Section 5.4.1).

The dependent variables in this section are based on a 7-tier scale or 7 categories (J alternatives), where: 1 suggests a low levels of trust for a given source of nutrition information ("TrustGS/TrustTLL"), or suggests that respondents strongly disagree that the given source of nutrition information is difficult to use ("GSDifficult/TLLDifficult"); 4 suggests a neutral response in either model; and, 7 suggests a high level of trust for a given source of nutrition information, or suggests that respondents strongly agree that the given source of nutrition information is difficult to use. Therefore J=7 in this section, indicating there are 6 (J-1) intercepts and 7 (J) levels of marginal effects for each of the four regressions. No marginal effects or tests determining whether the proportional odds assumption was passed were run. Discussion focuses on the statistically significant variables and the direction of their sign, where:

- A "-" coefficient in the "TrustGS" ("TrustTLL") regression signals a higher chance of respondents being less likely to trust the Guiding Stars (traffic light label).
- A "+" coefficient in the "TrustGS" ("TrustTLL") regression signals a higher chance of respondents being more likely to trust the Guiding Stars (traffic light label).
- A "-" coefficient in the "GSDifficult" ("TLLDifficult") regression signals that respondents are more likely to disagree that the Guiding Stars (traffic light label) is difficult to be used.
- A "+" coefficient in the "GSDifficult" ("TLLDifficult") regression signals that respondents are more likely to agree that the Guiding Stars (traffic light label) is difficult to be used.

The Pseudo R^2 values for each regression were all lower in relation to the models run in this chapter. Table 5.6 shows the Psuedo R^2 values for each of the four regressions and Tables 5.7-5.10 at the end of this section show a summary of results from the four regressions.

Table 5.6: Psuedo R^2 values for each ordered probit regression run in Section 5.4

	Dependent Variable			
Pseudo R^2	"TrustGS" (Table G.2)	"TrustTLL" (Table G.3)	"GSDifficult" (Table G.4)	"TLLDifficult" (Table G.5)
	0.1097	0.0766	0.0966	0.1425

Table 5.7 shows results from the regression on the level of trust for the Guiding Stars, which has 12 statistically significant variables, including a randomized factor that indicates whether respondents saw the Guiding Stars first or not in the online survey. Respondents who were female, had children, and who were over the age of 45 in relation to those between ages 25-34 are more likely to have trust the Guiding Stars. Those individuals expressing higher levels of an inner locus of control for health are less likely to trust the Guiding Stars, while those who perceive a stronger linkage between their nutrition and health are more likely to trust the star ratings. The inner locus of control variable suggest that those who feel they are more in control of their health are less likely to trust this source of nutrition information. Given that locus of control variables did not affect willingness to use the Guiding Stars in the previous econometrics models, and that the level of trust one has for a given source of information is a strong decision heuristic, further research is needed on the nuances of the relationship between health locus of control and the Guiding Stars. Those expressing higher levels of nutrition knowledge appear to be less trusting in the Guiding Stars, in addition to respondents who specifically examine sodium content on the Nutrition Facts table, and those indicating that nutritious/healthy food is a top factor when grocery shopping. Lastly, those needing more education about the Guiding Stars before using it exhibit a lower probability of trusting this source of nutrition information. Ultimately, while specific demographics potentially influence trust in the Guiding Stars, results also show that as individuals become more literate in nutrition and knowledgeable about their nutrition needs tend to show lower levels of trust the Guiding Stars and are less likely to use it.

In the regression that examined whether the sample population is likely to use the Guiding Stars, "NFTsodium" was statistically significant with a positive coefficient. "NFTSodium" was not significant in the modified regression, but in Table 5.7 it is statistically significant in a

negative direction. Therefore, more research is needed into understanding differences in the relationship between the sodium content and the level of trust in, and likelihood of using, the Guiding Stars. It is important to note that the "Nutrition2Health" coefficient was positive in all three regressions, but was only statistically significant in the modified Guiding Stars regression and in Table 5.7. While "HealthyNutritiousRank123" was shown to be statistically significant in Table 5.7, it was not statistically significant in the original or modified Guiding Stars regression results. Since trust and likelihood of use are expected to be related, a larger sample size in future research may help clarify these results. In both the modified regression and in the results in Table 5.7, "NutritionKnowledge" was negative, supporting the notion that low levels of trust are consistent with lower levels of adoption of a given source of information. More research into the relationship "NutritionKnowedge" and using and trusting the Guiding Stars should be performed, which may signal that as individuals increase their nutrition literacy they may choose to move away from overly basic sources of nutrition information like the Guiding Stars.

Table 5.8 shows results from the regression on level of trust for the traffic light label, which has 10 statistically significant variables, not including the randomized factor that indicates whether respondents say the Guiding Stars first or not in the online survey. Respondents who were female and respondents with an income of over $75,000 before taxes in relation to those under $75,000 have higher levels of trust in the traffic light label. Conversely, individuals from British Columbia appear to have lower levels of trust for this source of nutrition information relative to respondents in Alberta or Saskatchewan. Similar to the regression on the level of trust for the Guiding Stars (Table 5.7), those individuals indicating that nutritious/healthy food is important to them when grocery shopping, those who feel more strongly about the linkage between nutrition and their health, and those who need more nutrition information about the traffic light label tend to have lower levels of trust in this information signal. Individuals who had seen the traffic light label before the online survey appear to have higher levels of trust in this source of nutrition information. Supporting the notion that the traffic light label and Nutrition Facts table have a working relationship with one another, those who more frequently make use of the NFT and those who focus on sugar content on the NFT were found to have a higher level of trust in the traffic light label. Ultimately, results in Chapter 4 showed the average respondent had a higher level of trust for and likelihood of using the traffic light label than

Guiding Stars, a potential reason there is little evidence showing respondents are not trusting nor finding the traffic light label difficult to be used.

When comparing results from Table 5.8 and the willingness to use the traffic light label in the original and modified regressions, two of the same independent variables were statistically significant across all regressions, namely “NFTUse” and “IncomeG2”. Both of these variables had a positive coefficient in each instance, suggesting that the level of trust for and willingness to use the traffic light label relate with one another. Furthermore, Table 5.8 and results in the last section show other similar variables that were statistically significant, namely “”TLLExposure”, “TLLMoreEducation”, “HealthyNutritiousRank123”, and “BritishColumbia”, and all coefficients maintained the same sign. “NFTSugar”, “Gender”, and “IncomeG2”, were statistically significant in Table 5.8, but were not statistically significant in the other regression results for the traffic light label. Ultimately, as with the case of the Guiding Stars, a larger sample size could produce clearer results about the linkage between trust for and the likelihood of using the traffic light label.

As can be seen in Table 5.9 and Table 5.10, fewer variables impacted the perceived level of difficulty of using either source of nutrition information. In both cases, for the Guiding Stars (Table 5.9) and traffic light label (Table 5.10), only four explanatory variables were statistically significant. When comparing results between Table 5.9 and 5.10, two variables were significant in both instances: the first measures whether respondents needed more education about each source of nutrition information before using it, and those that did were signalled to have more difficulty using each source of nutrition information; the second measures a respondent’s stance on how important nutrition is to their health, where those expressing stronger linkages found each source of nutrition information less difficult to use. When it comes to the Guiding Stars, those respondents with children and those indicating that nutritious/healthy food is a key consideration when grocery shopping were found to have less difficulty in using this source of nutrition information. In the case of the traffic light label, those that find the Nutrition Facts table more difficult to use tended also to be those who find the traffic light label as difficult, which makes intuitive sense given that the traffic light label reframes nutrition information from the NFT.

In conclusion, descriptive statistics in Chapter 4 suggests that the average respondent did not perceive either the Guiding Stars or traffic light label difficult to use, a potential reason for both regressions (Table 5.9 and 5.10) having few statistically significant variables. Results in Chapter 4 also showed that the level of trust in the traffic light label and Guiding Stars varied, where respondents on average trusted the traffic light label more than the Guiding Stars; therefore, the heterogeneity in responses for trust in each source of nutrition information may explain why there are different factors impacting the level of trust in the Guiding Stars and traffic light label.

Table 5.7: Summary of ordered probit regression results from STATA 15 for trust in the Guiding Stars

Guiding Stars Trust (n = 242, Pseudo R^2 = 0.1097, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	-0.02095	0.057683	0.716
NFTDifficult	0.007535	0.05338	0.888
NFTAll	-0.14949	0.301648	0.62
NFTcalories	0.202228	0.172459	0.241
NFTTotalFat	0.076954	0.179689	0.668
NFTSaturatedFat	0.15074	0.191935	0.432
NFTSugar	0.036752	0.190487	0.847
NFTSodium	**-0.31348**	**0.172388**	**0.069***
GSExposure	0.150303	0.26722	0.574
GSMoreEducation	**-0.08953**	**0.041173**	**0.03****
HealthyNutritiousRank123	**-0.69306**	**0.196057**	**0*****
Complex2SHFP	0.032195	0.047329	0.496
NutritionKnowledge	**-0.27654**	**0.084222**	**0.001*****
NutritionQuality	-0.00306	0.105569	0.977
Nutrition2Health	**0.422645**	**0.086645**	**0*****
AverageILOC	**-0.14937**	**0.0714**	**0.036****
AveragePLOC	0.075768	0.0678	0.264
AverageCLOC	-0.05889	0.059058	0.319
Gender	**0.384892**	**0.154015**	**0.012****
HH18	**0.347618**	**0.184901**	**0.06***
Education (High School)	0.172042	0.568786	0.762
Education (College)	-0.13001	0.554707	0.815
Education (2 year degree)	-0.7533	0.575441	0.191
Education (4 year degree)	-0.16615	0.564929	0.769
Education (Professional)	-0.09285	0.561966	0.869
Education (Doctorate)	-0.47288	0.69622	0.497
Income(75k-150k)	0.127035	0.171745	0.459
Income(150k+)	0.094383	0.247028	0.702
BritishColumbia	-0.20871	0.155677	0.18
Saskatchewan	0.207659	0.222854	0.351
Age(35-44)	0.047118	0.226499	0.835
Age(45-54)	**0.531713**	**0.227841**	**0.02****
Age(55-64)	**0.524148**	**0.240565**	**0.029****
Age(65+)	**1.114846**	**0.247078**	**0*****
TLLGSRandom	**0.396246**	**0.149947**	**0.008*****
Where; * p<0.1; ** p<0.05; *** p<0.01			

Table 5.8: Summary of ordered probit regression results from STATA 15 for trust in the traffic light label

Traffic Light Label Trust (n = 242, Pseudo R^2 = 0.0766, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	**0.105116**	**0.058967**	**0.075***
NFTDifficult	-0.01083	0.054294	0.842
NFTAll	0.284068	0.303162	0.349
NFTcalories	0.136162	0.173691	0.433
NFTTotalFat	0.127359	0.181687	0.483
NFTSaturatedFat	0.089233	0.194131	0.646
NFTSugar	**0.31801**	**0.192645**	**0.099***
NFTSodium	-0.1207	0.175096	0.491
TLLExposure	**0.46009**	**0.223139**	**0.039****
TLLMoreEducation	**-0.15111**	**0.042631**	**0*****
HealthyNutritiousRank123	**-0.4932**	**0.19653**	**0.012****
Complex2SHFP	0.025825	0.047493	0.587
NutritionKnowledge	**-0.15683**	**0.084627**	**0.064***
NutritionQuality	0.015355	0.106113	0.885
Nutrition2Health	0.122725	0.085305	0.15
AverageILOC	0.043138	0.071937	0.549
AveragePLOC	-0.01204	0.06893	0.861
AverageCLOC	0.075788	0.060136	0.208
Gender	**0.255257**	**0.153033**	**0.095***
HH18	-0.23639	0.184779	0.201
Education (High School)	0.135276	0.587812	0.818
Education (College)	0.128556	0.573985	0.823
Education (2 year degree)	-0.19997	0.591101	0.735
Education (4 year degree)	-0.17161	0.581116	0.768
Education (Professional)	0.251295	0.583482	0.667
Education (Doctorate)	-1.11349	0.711587	0.118
Income(75k-150k)	**0.383825**	**0.174337**	**0.028****
Income(150k+)	**0.53059**	**0.250718**	**0.034****
BritishColumbia	**-0.39266**	**0.158507**	**0.013****
Saskatchewan	0.253589	0.228573	0.267
Age(35-44)	-0.10122	0.228111	0.657
Age(45-54)	0.084931	0.227153	0.708
Age(55-64)	-0.09183	0.236507	0.698
Age(65+)	0.137456	0.244555	0.574
TLLGSRandom	0.007451	0.151832	0.961
Where; * p<0.1; ** p<0.05; *** p<0.01			

Table 5.9: Summary of ordered probit regression results from STATA 15 for the difficulty of using the Guiding Stars.

Guiding Stars Difficulty (n = 242, Pseudo R^2 = 0.0966, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	0.01302	0.058712	0.825
NFTDifficult	-0.05879	0.054572	0.281
NFTAll	-0.31397	0.311955	0.314
NFTcalories	-0.2232	0.175805	0.204
NFTTotalFat	0.188588	0.18444	0.307
NFTSaturatedFat	-0.00949	0.196204	0.961
NFTSugar	-0.29681	0.194564	0.127
NFTSodium	0.141794	0.174546	0.417
GSExposure	0.24698	0.291811	0.397
GSMoreEducation	**0.244644**	**0.044443**	**0*** **
HealthyNutritiousRank123	-0.03954	0.200356	0.844
Complex2SHFP	-0.00603	0.048375	0.901
NutritionKnowledge	0.121179	0.085101	0.154
NutritionQuality	0.03113	0.109256	0.776
Nutrition2Health	**-0.18938**	**0.086328**	**0.028****
AverageILOC	-0.00984	0.072917	0.893
AveragePLOC	0.083996	0.068982	0.223
AverageCLOC	0.041591	0.060747	0.494
Gender	0.013841	0.158305	0.93
HH18	**-0.44905**	**0.192176**	**0.019****
Education (High School)	-0.38498	0.590504	0.514
Education (College)	-0.52586	0.577952	0.363
Education (2 year degree)	-0.15529	0.592601	0.793
Education (4 year degree)	-0.40546	0.586432	0.489
Education (Professional)	-0.39919	0.584118	0.494
Education (Doctorate)	-0.30974	0.720555	0.667
Income(75k-150k)	-0.0165	0.175727	0.925
Income(150k+)	0.072349	0.256884	0.778
BritishColumbia	-0.06483	0.158781	0.683
Saskatchewan	-0.06874	0.232003	0.767
Age(35-44)	-0.06376	0.233017	0.784
Age(45-54)	0.071443	0.230131	0.756
Age(55-64)	0.151993	0.242959	0.532
Age(65+)	-0.24034	0.249083	0.335
TLLGSRandom	**-0.71183**	**0.15518**	**0*** **
Where; * p<0.1; ** p<0.05; *** p <0.01			

Table 5.10: Summary of ordered probit regression results from STATA 15 for the difficulty of using the traffic light label

Traffic Light Label Difficulty (n = 242, Pseudo R^2 = 0.1425, [Probability > Chi^2] = 0.00)			
Variable	Coefficient	Standard Error	P-Value
NFTUse	0.003561	0.061941	0.954
NFTDifficult	**0.152085**	**0.057648**	**0.008**
NFTAll	-0.47403	0.320512	0.139
NFTcalories	-0.22123	0.181306	0.222
NFTTotalFat	0.301977	0.191199	0.114
NFTSaturatedFat	**-0.36188**	**0.205149**	**0.078**
NFTSugar	-0.24094	0.201306	0.231
NFTSodium	0.098532	0.1821	0.588
TLLExposure	-0.29986	0.236228	0.204
TLLMoreEducation	**0.328776**	**0.047679**	**0**
HealthyNutritiousRank123	-0.07604	0.208772	0.716
Complex2SHFP	-0.04757	0.051395	0.355
NutritionKnowledge	0.056269	0.089166	0.528
NutritionQuality	-0.05967	0.11488	0.603
Nutrition2Health	**-0.17906**	**0.089021**	**0.044**
AverageILOC	0.030228	0.077683	0.697
AveragePLOC	0.059746	0.072182	0.408
AverageCLOC	0.054825	0.063768	0.39
Gender	-0.07673	0.16235	0.636
HH18	-0.00117	0.198685	0.995
Education (High School)	-0.21678	0.634888	0.733
Education (College)	-0.10701	0.621917	0.863
Education (2 year degree)	0.038134	0.635896	0.952
Education (4 year degree)	-0.03698	0.628888	0.953
Education (Professional)	-0.20572	0.632082	0.745
Education (Doctorate)	0.899915	0.755415	0.234
Income(75k-150k)	0.102476	0.182859	0.575
Income(150k+)	0.199842	0.262345	0.446
BritishColumbia	0.169952	0.166347	0.307
Saskatchewan	-0.0992	0.242549	0.683
Age(35-44)	-0.26243	0.242992	0.28
Age(45-54)	-0.12247	0.240346	0.61
Age(55-64)	0.132262	0.25131	0.599
Age(65+)	-0.10306	0.261659	0.694
TLLGSRandom	0.221499	0.160716	0.168
Where; * p<0.1; ** p<0.05; *** p<0.01			

5.5 Summary and Conclusions

This chapter presented the econometrics results from the ordered probit model examining factors impacting the likelihood of using the Guiding Stars and traffic light label. When it comes to using the traffic light label, marginal effects for the very unlikely to use category were relatively small in magnitude compared to marginal effects for the somewhat likely to use and very likely to use categories, reflecting generally more positive reactions to the traffic light label within the survey sample population. With respect to the Guiding Stars, marginal effects for the somewhat likely to use category were smaller in magnitude to marginal effects for the very unlikely and very likely to use categories, perhaps reflecting some ambivalence towards this program. This suggests a stronger preference towards being likely to use the traffic light label than the Guiding Stars, supporting discussion in the descriptive statistic results from Chapter 4.

A variable that impacted the likelihood of using both the Guiding Stars and traffic light label was the randomizer variable, noting whether respondents saw questions about the Guiding Stars before the traffic light label in the online survey. This variable indicates the presence of ordering effects in the survey and highlights the importance of being able to control for these effects in a regression analysis.

Both the perceived level of difficulty and trust for each source of nutrition information had relatively large impacts on the willingness to use the Guiding Stars and traffic light label. More specifically, as an individual exhibited a higher level of trust in a given source of nutrition information, he/she was more likely to be willing to use that source, although the marginal effects for trust in the Guiding Stars regression are smaller in magnitude than the traffic light label, suggesting that higher levels of trust have a stronger influence on likelihood to use the traffic light label than the Guiding Stars. Similar results were seen with respect to the level of difficulty of using each source of nutrition information, except the marginal effects were negative; in this case, the marginal effects were greater in magnitude when being very likely to use the traffic light label in relation to the Guiding Stars, suggesting that the increased difficulty of using this source of nutrition information has greater impacts on the likelihood of its use.

When it comes to the traffic light label, it was seen that as respondents increased their use of the NFT, they were more likely to use the traffic light label, suggesting a potential linkage between the two sources of nutrition information. As respondents felt they were more

knowledgeable about their nutrition they were more likely to use the traffic light label; therefore, the relevance of this source's nutrition information to an individual's decision making while shopping may grow as they improve their nutrition literacy. Respondents who felt they are in more control over the quality of their nutrition have a lower probability of being very likely to use the traffic light label, but are still somewhat likely to use it, suggesting may they access this type of nutrition information when wanting an external source of guidance.

When it comes to the Guiding Stars, it was seen that as respondents found the NFT more difficult to use, they were more likely to use the Guiding Stars by a small margin, indicating potentially low levels of competition between these sources of nutrition information. When respondents indicated they use all of the NFT there was a higher probability of them being very likely to use the Guiding Stars, suggesting that the Guiding Stars may act as a shortcut to understanding this nutrition information. An important statistic is how those who have seen the Guiding Stars before are less likely to use it, and while the proportion of the sample who had noticed the this source of nutrition information is small, understanding specific details about why they are less likely to use this source of nutrition information after being exposed to it would be informative. As individuals feel the complexity of selecting healthy food products increases, they are slightly more inclined to being "very likely" to use this source of nutrition information, which suggests the Guiding Stars may be accessed when needing a heuristic to simplify selecting a healthy shopping basket. In addition, as respondents feel their nutrition is increasingly linked to their health there is a higher probability of being very likely to use the Guiding Stars; therefore, the provision of generic healthy eating advertisements in combination with information about the Guiding Stars seen in Chapter 2 may incentivize individuals towards using this source of nutrition information. When it comes to the likelihood of using either the Guiding Stars or traffic light label, some specific demographics were also important in understanding their willingness to adopt. While demographic variables like income, province and age were relevant determinants of the willingness to use the Guiding Stars and traffic light label, there were no obvious discernible patterns as a result of these findings.

Ultimately, what was seen in this chapter is how impacts on the traffic light label, in general, move respondents from between being very likely and somewhat likely to use this source of nutrition information, while impacts on the Guiding Stars, in general move respondents from being very unlikely to very likely to use this source of guidance. Given that both sources of

nutrition information aim to capture the largest consumer base as possible, factors impacting the likelihood of their use can be explored to better understand how to meet the average needs of the market. Chapter 6 further discusses policy and industry implications of these results and includes a discussion of areas for further research based on the findings outlined up to this point.

Chapter 6. Summary and Conclusions

6.1 Introduction

Chapter 6 summarizes the objectives and key results of this thesis, discusses policy and industry implication, identifies limitations of this study and concludes with a discussion of areas for further research.

Two main areas of focus and three key research objectives are under investigation in this thesis, namely:

A. Exploring how the sample population of Canadian consumers respond to the private provision of nutrition information, in the form of the Guiding Stars system and the traffic light label, both individually and in combination with the mandated Nutrition Facts table (NFT).
    1. Does the private provision of nutrition information substitute for the NFT?
    2. Which frames of nutrition information are most likely to be used, and what are factors impacting the likelihood of using the Guiding Stars and traffic light label?

B. Stimulating research around the hiring of nutrition experts by private retailers as a nutrition information intervention.
    3. Understanding whether or not nutrition experts are likely to be accessed for advice and determining whether dietitians are a trusted source of nutrition guidance by the survey sample.

The first three chapters of this thesis discussed how the Canadian food retail market is seeing shifts in the framing of nutrition information presented to Canadians at the point of decision-making through the private provision of nutrition information, and that Canadians are demanding additional and specific nutrition information to help them make informed shopping choices. While nutrition information in the Canadian food retail market is always being updated and added to, the Government of Canada only recommends that Canadians make use of the mandated Nutrition Facts table (NFT) and ingredients lists to learn about prepackaged food products, while understanding that Canadians do not have a primary source of nutrition information to access to learn about non-prepackaged food products at the point of product selection.

Three different private provisions of nutrition information are examined in this thesis, which are the installation of a storewide nutritional navigation program called the Guiding Stars, the hiring of in-store nutrition experts to help consumers with their custom nutrition related questions, and the use of traffic light labels. The Guiding Stars and in-store nutrition experts are sources of nutrition information that are delivered through an intervention between the product and consumer and can provide Canadians with access to additional nutrition information in context where products either have or do not have the recommended mandated nutrition information. The third widely popular private provision of nutrition information that is not found in Canada, known as the UK's traffic light label, was also examined, which is a front of package nutrition label. Ultimately, the Guiding Stars, traffic light label, and nutrition experts can all substitute for the NFT and each source of nutrition information can act as a source of education or decision-making heuristic. Furthermore, past empirical applications discussed in this thesis show that the traffic light label has also been tried as a nutrition information intervention, making it potentially substitutable for the Guiding Stars system. Figure 6.1 shows the three different food labels examined in this thesis, where the NFT is found on the back of a prepackaged product, the traffic light label is found on the front of a prepackaged food product, and the Guiding Stars are found on shelf tags storewide.

Figure 6.1: Images of the NFT, Guiding Stars, and traffic light label previously outlined in Chapter 2.

The three private provisions of nutrition information examined are intended to be consistent with Government recommendations for healthy eating, and, since many Canadians value the health impacts of a food product, nutrition information that is customizable, about

health related benefits and/or specific attributes of food may benefit shoppers by helping them make more informed food purchases. Due to the fact that the nature of information sharing between food labels and in-person discussion is fundamentally different, the primary focus of this thesis is on the three food labels discussed (NFT, traffic light label and Guiding Stars). With an abundance of nutrition information for Canadians to use while shopping, nutrition information that is trustworthy, easily accessible, and straightforward to use may assist Canadians with the selection of healthy food products, and may help protect shoppers from noise in the retail market and from making uninformed decisions. Through the administration of an online survey to respondents in Alberta, British Columbia, and Saskatchewan, this thesis explores how willing individuals are to use the private provision of nutrition information in relation to using the NFT, factors impacting the willingness to use the Guiding Stars and traffic light label, and the extent to which these privately provided food labels would substitute for the mandated NFT. The research has implications for the Government of Canada, private retailers, and food producers, which are discussed in the next section. Questions in the survey are also designed to stimulate discussion around the hiring of nutrition experts by private retailers by understanding whether or not they are likely to be accessed for advice, which may include assistance with using the NFT, and private labelling systems such as the Guiding Stars and traffic light label.

Behavioural economic theories and past empirical applications provided insight into whether Canadians are likely to use the private provision of nutrition information and to understand impacts of adding education, heuristics, and the three private provisions of nutrition information to a context that already has an abundance of nutrition information. Past empirical applications about the Guiding Stars and traffic light label all suggested positive impacts on consumer shopping decisions when it comes to selecting healthy food products, although the benefits of these sources of nutrition information have not previously been compared. Insights from two leading behavioural economic theories informed the research in this thesis: Simon's theory of bounded rationality and Kahneman-Tversky's theory of errors and biases. Insights from these approaches offer different positions on the potential influence of nutrition information on decision-making:

- Simon's theory of bounded rationality suggests that individuals learn about the foods they purchase over time, and are intrinsically incentivized to improve their nutrition literacy to a point where they can satisfice in selecting products that meet their nutrition needs and

preferences; therefore, while individuals may make errors in judgement during decision-making, they are solved over time through experience and other methods of learning.

- Kahneman-Tversky's theory of errors and biases suggests that consumers need some form of guidance to select the best quality source of nutrition information available to them to learn about the foods they purchase; although, there is no form of paternalism directing Canadians to a given source of nutrition information while shopping leaving their decision-making up to chance.

It is recognized that consumers are presented with an abundance of nutrition information, information and other stimuli to process while shopping, which may ultimately impact their ability to select healthy foods and use the recommended nutrition information from the Government of Canada. In addition, Canadians are heterogeneous in their nutrition needs and preferences, indicating no clear hypothesis as to which source of nutrition information is viewed as most beneficial to Canadians. The online consumer survey instrument to collect primary data for this thesis was administered to a general population sample of Canadians in three western provinces, and included a final dataset of 242 full responses that were demographically representative by age range and province (Alberta, British Columbia, Saskatchewan).

6.2 Major Findings and Policy and Industry Implications

When it comes to the representative general population sample of Canadians by age and province surveyed, respondents were found to be relatively evenly distributed amongst males and females, well educated in terms of schooling accomplishments, and are experienced primary grocery shoppers, who to some extent plan their shopping trip ahead of time and follow nutrition/dietary advice for selecting foods in their shopping basket. Further, the sample population claimed to be selecting healthy and nutritious foods, while being conscious about the cost of their groceries, aligning with the referenced 2013 Business Development of Canada study about Canadian consumer trends (Chapter 2, Section 2). Descriptive statistic results in Chapter 4 suggested that the survey population on average feels comfortable with selecting healthy food products while grocery shopping given the nutrition information they currently have, but are still welcoming new nutrition information without strong expectations of it giving them any time saving benefits. Both behavioural economic theories suggest that consumers may face issues in recognizing the highest quality heuristic while experimenting with choice selection.

Given that majority of respondents had not seen the traffic light label or Guiding Stars before this survey, and were educated about these sources of nutrition information for the first time during the survey, understanding their level of willingness to be used in relation to the current frequency of use of the longstanding NFT is of importance in understanding how to provide Canadians with a frame of nutrition information they prefer and potentially need. Respondents on average indicated they were reasonably comfortable with using the NFT, despite the discussion in Chapter 2 suggesting that Canadians may be having difficulty using the NFT, prompting the GOC to propose revisions to the way in which the information is presented. Results also showed this information was wanted on average by the sample population for making healthy and informed shopping choices. The likelihood of accessing nutrition experts while shopping was also measured and is discussed in this chapter. When it comes to the NFT, the survey sample on average is comfortable using this mandated nutrition information, and finds it important to their decision making, where some use all of the information and many reference specific ingredients, namely those found on the traffic light label (calories, sugar, salt, and fats). In addition: the survey sample on average were not concerned about the time needed to use the NFT, even though both the Government of Canada and the Guiding Stars claim it may be difficult and timely to use; and, the sample somewhat wanted this nutrition information available on prepackaged food products, where no nutrition information is currently mandated.

The traffic light label and the NFT were the best received sources of nutrition information by the sample population, discussed in Chapter 4. Descriptive statistics results showed that the sample's willingness to use the traffic light label relatively mirrored their perceived frequency of using the NFT, where both results were skewed towards having higher willingness to adopt. As can be seen from the descriptive statistics in Chapter 4, the traffic light label sees slightly more of the survey sample expressing a stronger likelihood of using it than in relation to responses about the frequency of using the NFT. On the other hand, the Guiding Stars sees a flatter distribution of results in relation to the NFT and traffic light label, with a slight skew towards "unlikely to be used".

In Chapter 4, nutrition experts were shown to have somewhat similar results as the Guiding Stars in terms of likelihood of use; more specifically, the Guiding Stars and nutrition experts both showed relatively flat distributions of responses where some of the sample was likely, somewhat likely and not very likely to use it. An important detail about the Guiding Stars is how

about half of the survey respondents indicated shopping where the nutritional navigation program is installed (Loblaws exclusively), but had never seen it before, meaning the delivery of the program may not be as accessible as anticipated. Furthermore, while a larger sample size is needed, this may suggest that the studies examined in the literature review suggesting that the installation of the Guiding Stars benefits grocery shoppers by helping them to select ready to eat cereal products are potentially correlating the benefits of their in-store nutrition program to a healthy eating trend already pushing individuals towards selecting healthy products that coincidentally are rated more nutritious by the Guiding Stars. To further support this notion, a generic description of the Guiding Stars was given to respondents, which read "if there was a nutrition label that rates a food product based on its level of healthfulness, how likely would you be able to use it while grocery shopping". Responses to this phrase expressed a higher likelihood of use than was indicated for the Guiding Stars itself, suggesting the nutritional navigation may need a change of frame in the Canadian food retail market. The reception of the Guiding Stars in Canada and the US could be different given that any private retailer and others can license the Guiding Stars, while in Canada only Loblaws has rights to its use.

A main objective was to understand whether the private provision of nutrition information substitutes for the NFT. Two questions were asked, one about the traffic light label and one about Guiding Stars, about whether each source of nutrition information would help the respondent better understand nutrition information on the NFT. Average responses indicated that the traffic light label would allow them to better understand the nutrition information on the NFT, while the Guiding Stars does not. A specific section of six questions in the online survey discussed in Chapter 4 asked respondents to mark their most preferred source or sources of nutrition information, given the options of having the NFT, Guiding Stars and traffic light label alone, the NFT with the Guiding Stars, the NFT with the traffic light label, or none of the above options, when shopping for a number of categories of food products (bread, cereal, beverages, meat products, fresh prepackaged vegetables, and yogurt products). There was a clear stronger preference towards using the traffic light label in conjunction with the NFT over any of the other options. The second strongest preference by a large margin was for the NFT, while the Guiding Stars was the less commonly selected option, but still desired by some of the sample. More specific details about the effects of each source of nutrition information were measured in the econometrics results, where:

- The existence of a complementary relationship between the traffic light label and NFT may exist, as higher usages of the NFT is associated with a stronger likelihood of being "very likely" to use the traffic light as shown by marginal effects.
- A potential, but not definite signal that the Guiding Stars may compete with the NFT is based on the finding that being "very likely" to use the Guiding Stars increases as respondents find the NFT progressively more difficult to use, shown by the estimated marginal effects.

The traffic light label and the NFT appear to be used together and may be complementary, so the Government of Canada could consider creating a hybrid label where their own version of the traffic light label signals could be placed besides ingredients in the NFT, given that this was the type of nutrition information most preferred by Canadians in the sample. Since the relationship between the NFT and Guiding Stars appears to lack this degree of complementarity and instead act like substitutes, and the Guiding Stars often went unnoticed by the sample population, the Guiding Stars program may simply need to make their source of nutrition information more credible to Canadians before it becomes more widely adopted, particularly if the main marketed purpose is to serve as a heuristic that substitutes for mandated nutrition information. In any regard, none of these sources of nutrition information is complete or inclusive enough to meet the demands of all Canadians; therefore, public-private-partnerships could be formed to help reshape the framing of nutrition information to better meet the needs of Canadians.

In this thesis, the private food retail market has been characterized as having two primary contexts of decision making, where products either have mandated nutrition information on their labels (prepackaged food products) or do not (non-prepackaged food products like fruits and vegetables), which is important since the Nutrition Facts table and ingredients list are the two recommended sources of nutrition information by the Government of Canada. It is recommended that Canadians align their shopping decisions with the Food Guide's healthy eating template, which suggests primarily buying foods without mandated nutrition information, leaving consumers without ready access to nutrition information for much of their shopping basket. The two current examples of private provision of nutrition information in Canada (Guiding Stars and hired nutrition experts) present shoppers with nutrition information storewide, which can act as a substitute for the mandated nutrition information presented at the point of product selection. The

traffic light label presents an additional source of nutrition information that can substitute for the Guiding Stars and be provided storewide, even though, where in use currently, it is only seen on prepackaged food products. The Government of Canada may choose to consider providing Canadians with mandated nutrition information where it is currently not available; for example, fresh fruits and vegetables and bulk items. In this case, the survey results suggested potential benefit from having a signal akin to a traffic light label to better understand these food products.

The second main objective was to determine factors impacting the willingness to use the Guiding Stars and traffic light label. After determining which variables were statistically significant in the ordered probit econometrics models, discussion about the marginal effects focuses on the magnitude of these impacts. When it comes to the Guiding Stars, marginal effects were strongest in magnitude and statistical significance in categories of being very unlikely or very likely to use this source of nutrition information. Naturally, those finding this source of nutrition information difficult had a lower probability of being in the very likely to use category and those that trusted it had a higher probability of being found in the same category. Interestingly, those in the sample who have seen the Guiding Stars before saw a strong negative impact on the probability of being very likely to use this source of nutrition information. The implication of this statistic is important for the Guiding Stars to consider as consumers being exposed to its nutritional navigation program appear less likely to be willing to use it, even while survey respondents on average signalled it was relatively easy to use. Therefore, initial interactions with this nutrition label may be met with a lack of trust, indeed, the survey data show a lower level of trust for the Guiding Stars relative to the NFT and traffic light label. Furthermore, private food retailers and third party nutrition information were rarely selected as the most trustworthy sources of nutrition information. On the other hand, based on the results, it appears that the Guiding Stars attracts those who consider that shopping for healthy food products is complex. Individuals who feel nutrition correlates strongly to their level health were also more inclined to be very likely to use this source of nutrition information.

Of the demographic variables, only those with an income between $75,000 and $150,000, and between the ages of 35-44 and 65 and over were very likely to use the Guiding Stars. The over 65 category was highlighted as a special population of interest by the Business Development Bank of Canada study (2013), as more Canadians are moving towards this age range and are using nutrition information while grocery shopping, suggesting evidence that

programs like the Guiding Stars may become more relevant in years to come. Given that the Guiding Stars is looking to provide a basic source of nutrition information to all Canadians, but only specific demographics appear to be more willing to use it, the majority of those shopping where it is installed have not seen it, and those that have seen it at Loblaws locations become less likely to use it, the third party nutritional navigation program may benefit from expanding usage of their star ratings to other private retailers and in other environments relevant to the demographic segments to which this information appears to have more appeal

When it comes to the traffic light label, marginal effects were strongest in magnitude and statistical significance in categories of being somewhat likely or very likely to use this source of nutrition information. This result alone suggests stronger preferences among the survey sample to have access to this source of nutrition information. Naturally, like the Guiding Stars, those finding the traffic light label difficult to use had a lower probability of being very likely to use the label, and those that trusted it had a higher probability of being found in the same category. Interestingly, those expressing a higher level of nutrition knowledge tended to be very likely to use this source of nutrition information, while those feeling in control over the quality of their nutrition have a lower probability of being very likely to use the label. Ultimately, fewer variables were statistically significant for the traffic light label than the Guiding Starts, which may be attributed to a generally strong willingness to use the traffic light label.

In both ordered probit regressions there was a randomizer variable that controlled for the effect of seeing questions about the Guiding Stars first in relation to the traffic light label in the online survey. Those seeing the Guiding Stars first in the online survey tended to show a stronger willingness to use the Guiding Stars than was the case for the traffic light label, suggesting that it was important to control for the ordering of information in the survey with this variable.

To address the last objective, two key questions were asked about nutrition experts. The first asked respondents about their likelihood of accessing nutrition experts as a source of nutrition information, and responses were relatively evenly distributed between being likely, somewhat likely and not likely to use it. The second question asked respondents to indicate their most trusted source of nutrition information from list of potential sources, which turned out to be dietitians. The environment in which this form of nutrition information is provided may be impacting the stated likelihood of its use; for example, private retailers were not as trusted by the

survey sample and are the ones hiring nutrition experts, and interactions with dietitians are often in a private consultation setting rather than in a grocery store. While nutrition experts are being added into private retailer locations across Canada, limited discussion about them as a nutrition information intervention is available, and this thesis offers some initial insights into the role that this type of intervention may play. For example, nutrition experts at the point of purchase may be an effective means of educating Canadians about the new version of the NFT and ingredients lists on prepackaged food products; given the sample population's level of trust for different sources of nutrition information, the role of a nutrition expert being hired by the Government to improve nutrition literacy may be perceived as more beneficial than if they were hired by private food retailers. The extent to which this may be the case cannot be determined from the present analysis but is a potential topic for further research.

6.3 Limitations of Research

Some limitations of this study will now be outlined. First, the survey sample size was relatively small (n=242) and geographically concentrated, thus, even though the sample is representative by age and province for the three provinces covered, clearly it cannot be used to make definitive claims about behaviour the entire Canadian population. While the online survey that was designed for collecting primary data in this thesis was determined to be an effective means of collecting data for the outlined objectives, the lack of incentive given to fill out the survey required a questionnaire that was relatively concise and only incurred low time costs for those filling it out, which limits the scope of information that could be collected. Additional information about why people have not seen the Guiding Stars while shopping in a context where this signal is present would be most informative to understand why it is frequently skipped over. Collecting this type of data could best be done through an in person survey in the natural context of the decision-making environment.

The collection of data through accessing the Probit panel of respondents means potential biases of this population may have made their way into the final dataset, such as: having a higher than normal level of education; not being able to fill lower age range quotas; having no monetary incentive to fill out the survey may have attracted different average respondents than if a reward were given (albeit that would have introduced its own set of biases). In the end, each frame of data collection holds its own benefits and drawbacks; therefore, a number of methods of data

collection could be used to get a more complete assessment of the benefits of accessing the private provision of nutrition information investigated in this thesis. However, if a natural context was used (e.g. in-store observation of an in-store experiment), it may not be able to evaluate the substitutable relationship between the traffic light label and Guiding Stars as effectively as through a survey.

Despite pre-testing of the survey, one mistake in the survey was found after data was collected. The question asking for a respondent's level of income was missing a bracket, leading to the three aggregate responses of those with incomes between $0-$75,000, $75,001-$150,000, and more than $150,000. A final consideration is potential survey respondent fatigue, which also underlines the importance of randomization of information and controlling for information order in the regression analysis to isolate ordering effects.

6.4 Areas for Further Research

Based on the results of this thesis, the sample of Canadians appears receptive to the traffic light label and may use it as a complementary source of nutrition information to the NFT; therefore, the impacts of adding this source of nutrition information to the existing Nutrition Facts table could be examined. In addition, it could be further investigated how this type of information could be presented, for example whether it would be most beneficial to frame the information on the front or back of a prepackaged food product or even as an intervention such as the Guiding Stars. Further experimentation on using the traffic light label as a nutrition information intervention would help to determine if this nutrition information is helpful when selecting healthy food products storewide. It would also be useful for further research to focus on understanding and differentiating if the likelihood of using the Guiding Stars and traffic light label is impacted by the type of information it shares (specific attribute information already found on the NFT vs new product rating information), the visual cues used (colours vs stars vs combination of both), or the source of the information signal (public vs private vs 3rd party).

Given planned changes to the mandated nutrition information in Canada, it may be valuable to examine the best means to inform Canadians about the proposed changes to the NTF, such as through in-person delivery of information in stores (akin to the nutrition experts examined in this study) or the temporary installation of education in aisles of a stores through signs. Understanding the psychological impacts of using systems such as the Guiding Stars, traffic light

label and nutrition experts as sources of nutrition information could help to understand how to better provide Canadians with the nutrition information they demand. For example, do these types of information still affect decision making even if they are not knowingly accessed, given that the food labels use symbols that are commonly found in other decision-making contexts. Furthermore, research could be directed towards understanding whether the visual cues of star ratings and traffic light label colours differ are more beneficial to consumers, and whether individuals are able to intuitively understand the label without prior information about it, such as how the traffic light label is delivered without education. In this case, the Guiding Stars could explore whether the addition of traffic light colours to their nutritional navigation program may benefit those trying to use it, where, for example, food products with 2 and 3 stars could be green, those with 1 star could be yellow, and those with 0 stars and have been rated could be red.

A previous study suggested that the Guiding Stars benefits shoppers in the US by helping them select more healthy ready to eat cereals, however, data collected in this thesis suggests the Canadians are not widely ready to adopt the Guiding Stars system, suggesting that more research is needed to determine whether broader health trends explain the US results or whether there are other factors in the Canadian context which explain reluctance to use this nutrition signal. Of interest would be examining whether allowing the Guiding Stars to be used exclusively by Loblaws in Canada, versus under a competitive setting in the US, has had an effect. Of particular interest is determining why previous exposure to the Guiding Stars in a retail environment appears to lead to a lower willingness to use it in the survey population. In addition, future research can examine strategic responses by food processors to nutrition information signals such as the Guiding Stars and the traffic light label, including whether food processors respond by changing the nutrition profile of their food products to obtain more positive ratings by either system.

More research could investigate the primary drivers of willingness to use the Guiding Stars and traffic light label. For example, Chapter 5.4 investigates the ordered probit regression models for the likelihood of using the Guiding Stars and traffic light label when being run without explanatory variables “GSDifficult (TLLDifficult)” and “TrustGS (TrustTLL)”, and the purpose is to determine whether these variables are capturing some of the significance from other explanatory variables and therefore any impacts on other independent variables from removing these variables. Given that some of these explanatory variables are significant, Chapter 5.4

investigates four additional ordered probit regressions to examine the types of consumers who are likely to find the Guiding Stars and traffic light label difficult to use or are likely to trust these signals. Further research could build upon this approach.

6.5 Conclusions

This thesis has outlined a set of most and least influential factors impacting the willingness to use the traffic light label and the Guiding Stars, with hopes of improving our understanding of how to provide Canadians with useful nutrition information and to explore the role of privately provided nutrition signals in this regard. This thesis suggests that the traffic light label could have a complementary relationship with the Nutrition Facts table (NFT) yet the Guiding Stars program appears to have a slightly substitutable relationship with the NFT. Results show how the traffic light label in combination with the NFT is the most preferred combination of nutrition information examined, where the likelihood of adopting the Guiding Stars, either on its own or in combination with the NFT is lower. Canadians are heterogeneous in their nutrition information needs and preferences, and the respondents surveyed for this study signalled stronger preferences for access to a traffic light label across a number of decision-making contexts to improve their nutrition literacy.

References

Altman, M. (2012a). *Behavioural Economics for Dummies*. Toronto: J. Wiley & Sons Canada. Date Accessed: May 1, 2015.

Altman, M. (2012b). Implications of Behavioural Economics for Financial Literacy and Public Policy. *The Journal of Socio-Economics,* Volume 41, Issue 5, October 2012, Pages 677-690, ISSN 1053-5357. doi: https://doi.org/10.1016/j.socec.2012.06.002. Date Accessed: May 1, 2015.

Balcombe, K. et al. (2015). Information Customization and Food Choice. *American Journal of Agricultural Economics,* Volume 98, Issue 1, June 2015, Pages 54-73. doi: https://doi.org/10.1093/ajae/aav033. Date Accessed: January 12, 2016.

Borgmeier, I., & Westenhoefer, J. (2009). Impact of Different Food Label Formats on Healthiness Evaluation and Food Choice of Consumers: a randomized-controlled study. *BMC Public Health,* Volume 9:184, June 2009. doi: http://doi.org/10.1186/1471-2458-9-184. Date Accessed: January 14, 2016.

Business Development Bank of Canada (BDC). (2013). Mapping Your Future Growth. *Five game-changing consumer trends.* Date Accessed: June 15, 2015. Retrieved from: http://www.bdc.ca/Resources%20Manager/study_2013/consumer_trends_BDC_report.pdf

Brant, R. (2004). Ordinal Logistic Regression. *Proportional odds assumption.* Date Accessed: July 15, 2017. Retrieved from: https://www.stat.ubc.ca/~rollin/teach/643w04/lec/node62.html

Chen, Z., Lopez, R. A., & Xiaoou, L. (2015). Information Cost and Consumer Choices of Healthy Foods. *American Journal of Agricultural Economics,* Volume 98, Issue 1, Pages 41-53, November 10, 2015. doi: https://doi.org/10.1093/ajae/aav057. Date Accessed: January 12, 2016.

Cohen, E. (2009). Applying Best-Worst Scaling to Wine Marketing. *International Journal of Wine Business Research,* Volume 21, Issue 1, Pages 8-23, 2009. doi: https://doi.org/10.1108/17511060910948008. Date Accessed: June 8, 2017.

Dietitians of Canada. (2016). Dietitians of Canada. *Planning meals using eating well with Canada's Food Guide.* Date Accessed: November 5, 2016. Retrieved from: http://www.dietitians.ca/Downloads/Public/Senior-Friendly-collection.aspx

Dietitians of Canada. (2015). Your Health. *Difference between dietitian and nutritionist.* Date Accessed: November 2, 2015. Retrieved from: http://www.dietitians.ca/Your-Health/Find-A-Dietitian/Difference-Between-Dietitian-and-Nutritionist.aspx

Dietitians of Canada. (2014). Diet Promotion. *Dietitians promote health through food and nutrition.* Date Accessed: November 02, 2015. Retrieved from: https://www.dietitians.ca/Downloads/Public/Dietitians-Promote-Health-bilingual.aspx

European Food Information Council (EUFIC). (2015). Global Update on Nutrition Labelling. *Executive summary January 2015.* Date Accessed: November 15, 2016. Retrieved from: http://www.eufic.org/upl/1/default/doc/GlobalUpdateExecSumJan2015.pdf

Finn, A. and Louviere, J.J. (1992). Determining the Appropriate Response to Evidence of Public Concern: The Case of Food Safety. *Journal of Public Policy and Marketing*, Volume 11, Issue 1, Pages 12-25, Fall 1992. JSTOR: http://www.jstor.org/stable/30000270. Date Accessed: June 8, 2017.

Food Standards Agency. (2007). Food. *Using traffic lights to make healthier choices.* Date Accessed: November 15, 2016. Retrieved from: www.food.gov.uk

Government of Canada. (2015a). Proposed Food Label Changes. *Canada gazette, part I consultation on proposed food label changes.* Date Accessed: October 16, 2015. Retrieved from: http://www.healthycanadians.gc.ca/health-system-systeme-sante/consultations/food-label-etiquette-des-aliments/process-processus-eng.php#s2

Government of Canada. (2015b). Labelling Legislative Framework. *Purpose of food labelling.* Date Accessed: October 16, 2015. Retrieved from: http://inspection.gc.ca/food/labelling/labelling-legislative-framework/eng/1387771371233/1387771427304

Government of Canada. (2015c). Food Labelling. *Nutrition Labelling.* Date Accessed: October 16, 2015. Retrieved from: https://www.canada.ca/en/health-canada/services/food-nutrition/food-labelling/nutrition-labelling.html

Government of Canada. (2015d). Understanding Food Labels. *Nutrition facts table.* Date Accessed: October 16, 2015. Retrieved from: http://www.healthycanadians.gc.ca/eating-nutrition/label-etiquetage/understanding-comprendre/nutrition-fact-valeur-nutritive-eng.php

Government of Canada. (2014a). Food Labelling for Consumers. *Interactive tool: understanding a food label.* Date Accessed: October 16, 2015. Retrieved from: http://www.inspection.gc.ca/food/labelling/food-labelling-for-consumers/understanding-a-food-label/eng/1400530265966/1400530332584

Government of Canada. (2014b). Food Labelling for Consumers. *Interactive tool - food labelling requirements.* Date Accessed: October 16, 2015. Retrieved from: *http://www.inspection.gc.ca/food/labelling/food-labelling-for-consumers/food-labelling-requirements/eng/1302802599765/1302802702946*

Government of Canada. (2012). Understanding Food Labels. *Interactive tool: interactive nutrition label.* Date Accessed: October 16, 2015. Retrieved from: http://www.healthycanadians.gc.ca/eating-nutrition/label-etiquetage/understanding-comprendre/interactive-tools-outils-interactifs/label-etiquette-eng.php

Government of UK, Food Standards Agency, Food Standards Scotland and Administrations in Northern Ireland and Wales. (2016). Guide to Creating a Front of Pack (FoP) Nutrition Label for Pre-Packaged Products Sold Through Retail Outlets. *November 2016 update.* Date Accessed: January 16, 2017. Retrieved from: https://www.food.gov.uk/sites/default/files/multimedia/pdfs/pdf-ni/fop-guidance.pdf

Greene, W. H. (2012). *Econometric analysis* (7th ed.). Boston: Prentice Hall. Date Accessed: January 15, 2017.

Guiding Stars®. (2015a). About. *Decoding nutrition labels can be confusing. Guiding Stars® takes the guesswork out of choosing foods that are nutritious for you and your family.* Date Accessed: May 14, 2015. Retrieved from: http://guidingstars.ca/about/

Guiding Stars®. (2015b). How it Works. *A proprietary algorithm based on a food's nutrient density per 100 calories determines the Guiding Stars® 0,1,2,3 rating system.* Date Accessed: May 14, 2015. Retrieved from: http://guidingstars.ca/about/how-it-works/

Guiding Stars®. (2014a). Letter to the Bureau of Nutritional Sciences. *Guiding Stars® response to Health Canada's Nutrition Facts Label Changes.* Date Accessed: June 19, 2015. Retrieved from: https://guidingstars.app.box.com/s/fgeeki7gwpip3akdnyxp

Guiding Stars®. (2014b). Guiding Stars goes nationwide in Canada. *CTV Atlantic takes a quick look at the Guiding Stars as it goes nationwide in Canada*. Date Accessed: June 19, 2015. Retrieved from: https://guidingstars.ca/blog/guiding-stars-goes-nationwide-in-canada/

Guiding Stars®. (2012). Guiding Stars Backgrounder. *Understanding the science behind the Guiding Stars® algorithm for Canada.* Date Accessed: May 14, 2015. Retrieved from: https://guidingstars.app.box.com/s/xiojahqbytvefu8t8zes

Health Canada. (2016). Food and Nutrition. *Nutrient value of some common foods: frequently asked questions.* Date Accessed: August 6, 2016. Retrieved from: http://www.hc-sc.gc.ca/fn-an/nutrition/fiche-nutri-data/nvscf_faq-faq-eng.php

Health Canada. (2014a). Food and Nutrition. *The development and use of a surveillance tool: the classification of foods in the Canadian nutrient file according to eating well with Canada's food guide*. Date Accessed: October 15, 2015. Retrieved from: http://publications.gc.ca/collections/collection_2014/sc-hc/H164-158-2-2014-eng.pdf

Health Canada. (2014b). Food and Nutrition. *Count food guide servings in a meal.* Date Accessed: May 13, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/using-utiliser/count-calcul-eng.php

Health Canada. (2012). Food and Nutrition. *Ready to use presentation on nutrition labelling.* Date Accessed: May 13, 2015.Retrieved from: http://hc-sc.gc.ca/fn-an/label-etiquet/nutrition/educat/info-nutri-label-etiquet-eng.php

Health Canada. (2011a). Food and Nutrition. *Physical activity.* Date Accessed: May 15, 2015. Retrieved from: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/activit-eng.php

Health Canada. (2011b). Food and Nutrition. *Be active.* Date Accessed: June, 30, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/maintain-adopt/weights-poids-eng.phpb

Health Canada. (2010). Food and Nutrition. *Keep track of your eating.* Date Accessed: June 30, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/maintain-adopt/track-noter-eng.php

Health Canada. (2007a). Food and Nutrition. *Canada's food guides from 1942-1992.* Date Accessed: June 15, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/context/fg_history-histoire_ga-eng.php

Health Canada. (2007b). Food and Nutrition. *Using the food guide.* Date Accessed: May 13, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/using-utiliser/index-eng.php

Health Canada. (2007c). Food and Nutrition. *How much food you need each day.* Date Accessed: May 13, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/quantit-eng.php

Health Canada, (2007d). Food and Nutrition. *What is a food guide serving?* Date Accessed: May 13, 2015. Retrieved From: http://hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/serving-portion-eng.php

Health Canada. (2007e). Food and Nutrition. *Choosing foods.* Date Accessed: May 13, 2015. Retrieved from: http://hc-sc.gc.ca/fn-an/food-guide-aliment/choose-choix/index-eng.php

Helmer SM, Krämer A, Mikolajczyk RT. (2012). Health-related locus of control and health behaviour among university students in North Rhine Westphalia, Germany. *BMC Research Notes*, Volume 5:703, December, 2012. doi: https://doi.org/10.1186/1756-0500-5-703. Date Accessed: January 20, 2016.

Katchova, A. (2013). Econometrics Academy: *Ordered probit and logit models.* Date Accessed: March 15, 2017. Retrieved from: https://sites.google.com/site/econometricsacademy/econometrics-models/ordered-probit-and-logit-models

LinkedIn. (2015). Sobeys. *Search results for wellbeing counsellors at sobeys.* Date Accessed: November 2, 2015. Retrieved from: https://www.linkedin.com/title/wellbeing-counsellor-at-sobeys

Loblaws. (2015). Home page. *Dietitian.* Date Accessed: November 2, 2015. Retrieved from: www.loblaws.ca

Moore, C. (2013). University of Texas: *An introduction to logistic and probit regression models.* Date Accessed: July 15, 2017. Retrieved from: http://liberalarts.utexas.edu/prc/_files/cs/Fall2013_Moore_Logistic_Probit_Regression.pdf

Nutrition Research Division. (2010). Canadian Nutrient File. *Complication of Canadian food composition data user guide.* Date Accessed: December 16, 2015. Retrieved from: http://www.nutribase.com/docs/CNF.pdf

Rahkovsky, I. et al. (2013). Effects of the Guiding Stars Program on purchases of ready-to-eat cereals with different nutritional attributes, *Food Policy*, Volume 43, Pages 100-107, December 2013, ISSN 0306-9192. doi: https://doi.org/10.1016/j.foodpol.2013.08.013 Date Accessed: January 18, 2016.

Simon, H.A. (1987). Bounded Rationality. *The New Palgrave: A Dictionary of Economics*, First Edition, J. Eatwell, M. Millgate, and P. Newman, October 1987, doi: https://doi.org/10.1057/9780230226203.2091. Date Accessed: January 28, 2016.

Simon, H. (1990). Invariants of human behaviour. *Annual Review of Psychology,* Volume 41, Issue 1, Pages 1-19, February 1990. doi:

https://doi.org/10.1146/annurev.ps.41.020190.000245. Date Accessed: January 28, 2016.

Sonnenberg, L. et al. (2013). A traffic light food labeling intervention increases consumer awareness of health and healthy choices at the point-of-purchase, *Preventive Medicine*, Volume 57, Issue 4, Pages 253-257, July 2013, ISSN 0091-7435. doi: https://doi.org/10.1016/j.ypmed.2013.07.001. Date Accessed: January 12, 2016.

Sutherland, L. et al. (2010). Guiding Stars: the effect of a nutrition navigation program on consumer purchases at the supermarket. *American Journal of Clinical Nutrition,* Volume 91, Number 4, Pages 1090S-1094S, April 2010. doi: https://doi.org/10.3945/ajcn.2010.28450C. Date Accessed: January 12, 2016.

Statistics Canada. Table 051-0001. *Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual (persons unless otherwise noted),* CANSIM (database). Date Accessed: October 2, 2016.

Statistics Canada. Table 117-0005. *Distribution of the household population of Canadians by adult body mass index (BMI),* CANSIM (database). Date Accessed: October 2, 2016.

Statistics Canada. Catalogue No 82-0030. *Estimates of obesity based on self-report versus direct measures*. Date Accessed: October 12, 2017.

Todd, P. & Gigerenzer, G. (2003). Bounding rationality to the world. *Journal of Economic Psychology*, Volume 24, Issue 2, Pages 143-165, April 2003, ISSN 0167-4870. doi: http://dx.doi.org/10.1016/S0167-4870(02)00200-3. Date Accessed: January 28, 2016

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science,* Volume 185, Number 4157, Pages 1124-1131, September 1974. JSTOR: Retrieved from http://www.jstor.org/stable/1738360. Date Accessed: January 28, 2016.

UCLA (2017). Ordered Logistic Regression. *Stata data analysis examples*. Date Accessed: July 15, 2017. Retrieved from: https://stats.idre.ucla.edu/stata/dae/ordered-logistic-regression/

UCLA (2011). Ordered Logistic Regression. *FAQ: What are pseudo R-squareds?* Date Accessed: July 15, 2017. Retrieved from: https://stats.idre.ucla.edu/other/mult-pkg/faq/general/faq-what-are-pseudo-r-squareds/

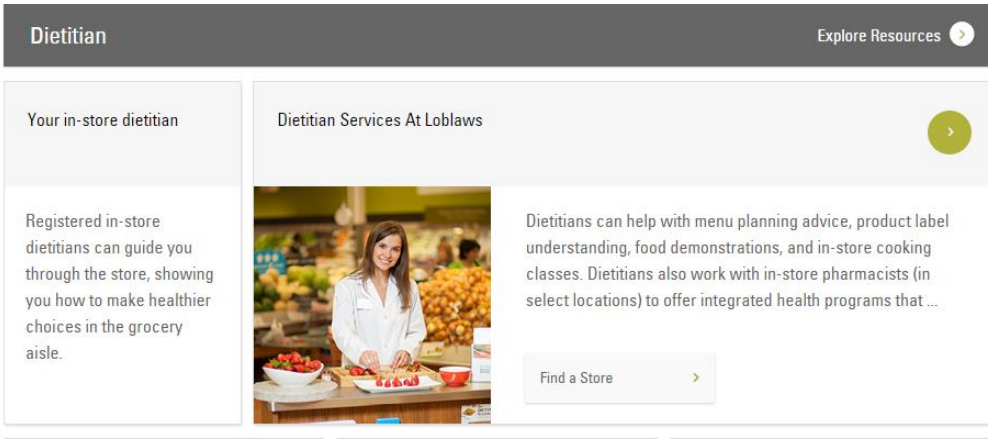
Wallston KA, Wallston BS, DeVellis R. (1978). Development of the Multidimensional Health Locus of Control (MHLC) Scales. *Health Education Monogr*aphs, Volume 6, Number 2, Pages 160-170, Spring 1978, PubMed PMID: 689890. Date Accessed: November 27, 2016.

Appendix A: In-Store Nutrition Experts

Figure A.1: Sobeys Extra hires in-store dietitians and wellbeing counsellors to help Canadians with their shopping and healthy eating needs.

Source: Author, 2015

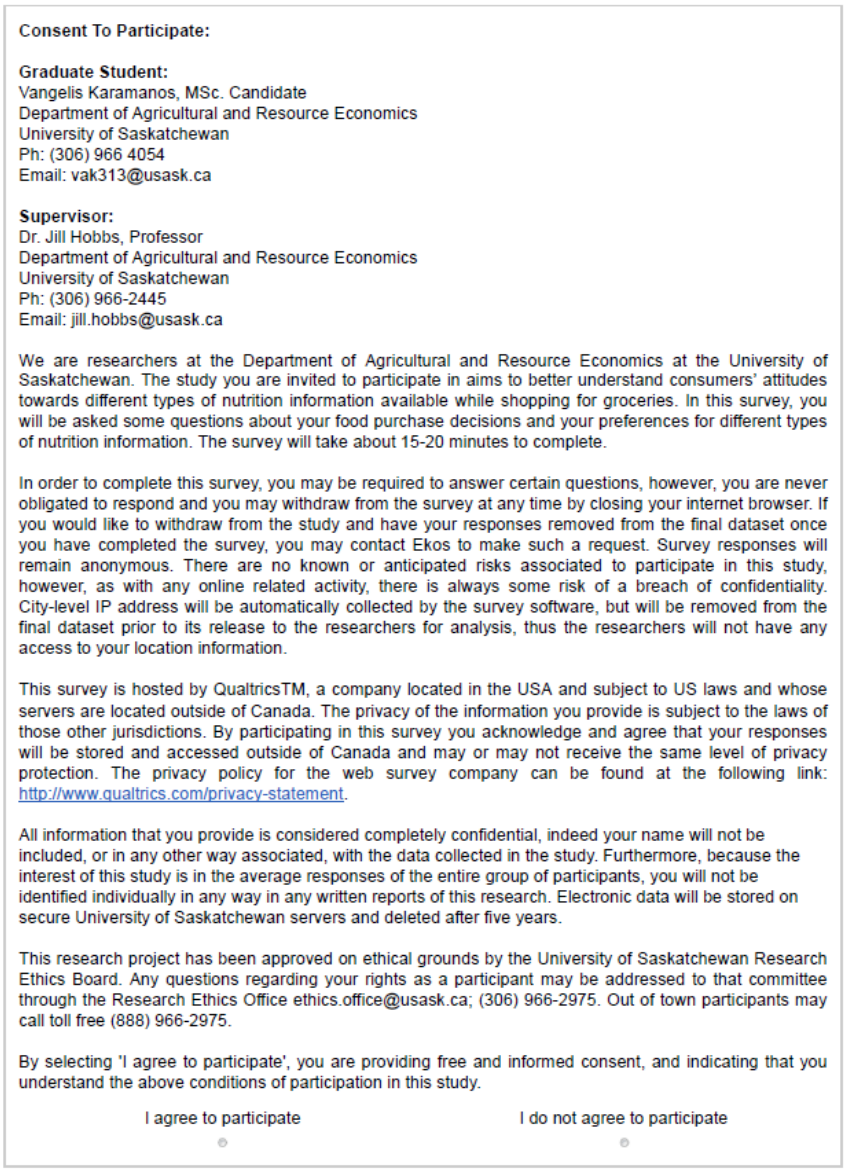
Figure A.2: Loblaws hires in-store dietitians to help Canadians with their shopping and healthy eating needs.



Source: www.loblaws.ca, 2015

Appendix B: Survey Instrument

Appendix B shows screenshots of the survey instrument used to collect primary data.



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We are researchers at the Department of Agricultural and Resource Economics at the University of Saskatchewan. The study you are invited to participate in aims to better understand consumers' attitudes towards different types of nutrition information available while shopping for groceries. In this survey, you will be asked some questions about your food purchase decisions and your preferences for different types of nutrition information. The survey will take about 15-20 minutes to complete.

In order to complete this survey, you may be required to answer certain questions, however, you are never obligated to respond and you may withdraw from the survey at any time by closing your internet browser. If you would like to withdraw from the study and have your responses removed from the final dataset once you have completed the survey, you may contact Ekos to make such a request. Survey responses will remain anonymous. There are no known or anticipated risks associated to participate in this study, however, as with any online related activity, there is always some risk of a breach of confidentiality. City-level IP address will be automatically collected by the survey software, but will be removed from the final dataset prior to its release to the researchers for analysis, thus the researchers will not have any access to your location information.

This survey is hosted by QualtricsTM, a company located in the USA and subject to US laws and whose servers are located outside of Canada. The privacy of the information you provide is subject to the laws of those other jurisdictions. By participating in this survey you acknowledge and agree that your responses will be stored and accessed outside of Canada and may or may not receive the same level of privacy protection. The privacy policy for the web survey company can be found at the following link: http://www.qualtrics.com/privacy-statement.

All information that you provide is considered completely confidential, indeed your name will not be included, or in any other way associated, with the data collected in the study. Furthermore, because the interest of this study is in the average responses of the entire group of participants, you will not be identified individually in any way in any written reports of this research. Electronic data will be stored on secure University of Saskatchewan servers and deleted after five years.

This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca; (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

By selecting 'I agree to participate', you are providing free and informed consent, and indicating that you understand the above conditions of participation in this study.

I agree to participate | I do not agree to participate

Screener

Who is the primary grocery shopper (the person responsible for at least 50% of food purchases) in your household?

- I am
- Shared responsibility
- Someone else

Quotas

In which province do you live?

- Alberta
- British Columbia
- Saskatchewan
- Other

What is your age?

Under 18	18-24	25-34	35-44	45-54	55-64	65+
○	○	○	○	○	○	○

Section 1: Shopping Behaviours

On average, how often do you shop for groceries?

- Daily
- A few times a week
- Once a week
- 2-3 times a month
- Once a month
- Less than once a month

Section 1: Shopping Behaviours

On average, how much time does it take you to shop for groceries?

- 15 minutes or less
- 16-30 minutes
- 31 minutes - 1 hour
- 1 hour - 1.5 hours
- Over 1.5 hours

On average, how often do you plan a grocery list ahead of shopping?

- Never
- Rarely
- Sometimes
- Often
- Always

On average, how much of your food purchases follow a diet/nutrition plan or specific dietary guidelines?

- I don't know
- None at all
- A little
- A moderate amount
- A lot
- A great deal

Section 1: Shopping Behaviours

Which food retailers do you most often shop at? Select all that apply.

- ☐ Box
- ☐ Co-op
- ☐ Costco
- ☐ Dad's Organic
- ☐ Extra Foods
- ☐ IGA
- ☐ Independent
- ☐ Loblaws
- ☐ No Frills
- ☐ Overwaitea's
- ☐ Safeway
- ☐ Save-On-Foods
- ☐ Sobeys
- ☐ Sunterra
- ☐ Superstore
- ☐ T&T
- ☐ Thriftys
- ☐ Walmart
- ☐ Farmers Market
- ☐ Other (Please Specify)

Please rank the top 3 most important factors when it comes to your food choices while grocery shopping; where 1 = is the most important factor, and 3 = the third most important factor.

- Price
- Organic
- Convenience
- Product Origin
- Brand
- Taste
- Healthy/Nutritious
- Other (Please Specify)

Section 1: Shopping Behaviours

Please indicate the extent to which you agree or disagree with the following statements on a scale of 1 to 7; where 1 = strongly disagree, 4 = neither agree nor disagree, and 7 = strongly agree.

	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)
It is complex to understand how to select healthy food products while grocery shopping.	○	○	○	○	○	○	○
It takes too much time to select healthy food products while grocery shopping.	○	○	○	○	○	○	○
I am looking for ways to save time when it comes to selecting healthy food products while grocery shopping.	○	○	○	○	○	○	○
Comparing nutrition information between food products takes too much time.	○	○	○	○	○	○	○
I have the nutrition information I need to select the food products I want to purchase while grocery shopping.	○	○	○	○	○	○	○
I tend to trust the nutrition information found on a prepackaged food product.	○	○	○	○	○	○	○
I am overloaded with nutrition information while grocery shopping.	○	○	○	○	○	○	○

Section 2: Use of Nutrition Information

Please answer the following question by using the scale provided.

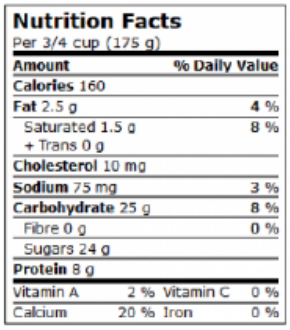
	Never (1)	(2)	(3)	(4)	(5)	(6)	Always (7)
How often do you use nutrition information when purchasing foods/beverages?	○	○	○	○	○	○	○

Section 2: Use of Nutrition Information

Please answer the following questions by using the provided scale; where 1 = extremely unlikely, 4 = neither likely nor unlikely, and 7 = extremely likely.

	Extremely Unlikely (1)	(2)	(3)	(4)	(5)	(6)	Extremely Likely (7)
If there was a nutrition label that rates a food product based on its level of healthiness, how likely would you be to use it while grocery shopping?	○	○	○	○	○	○	○
If there was a nutrition label that shows whether a food product high, medium or low levels of fats, salt, and sugar, how likely would you be to use it while grocery shopping?	○	○	○	○	○	○	○
If a nutrition expert (dietitian, nutritionist, etc) was made available for free consultation in a grocery store, how likely would you be to seek advice from them while grocery shopping?	○	○	○	○	○	○	○

The image shows a Nutrition Facts table found on prepackaged food products in Canada:



Nutrition Facts

Per 3/4 cup (175 g)

Amount	% Daily Value
Calories 160	
Fat 2.5 g	**4** %
Saturated 1.5 g + Trans 0 g	**8** %
Cholesterol 10 mg	
Sodium 75 mg	3 %
Carbohydrate 25 g	**8** %
Fibre 0 g	**0** %
Sugars 24 g	
Protein 8 g	

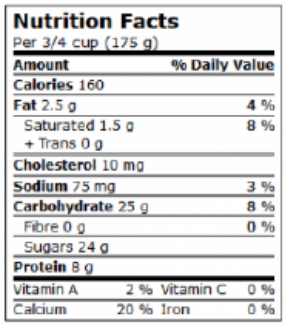
Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %

Use this image to answer the next three questions.

	Never (1)	(2)	(3)	(4)	(5)	(6)	Always (7)
How often do you use the Nutrition Facts table while grocery shopping?	○	○	○	○	○	○	○

Section 2: Use of Nutrition Information

	Not at All (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How knowledgeable are you about the Nutrition Facts table?	○	○	○	○	○	○	○
How important is the Nutrition Facts table when choosing food products?	○	○	○	○	○	○	○



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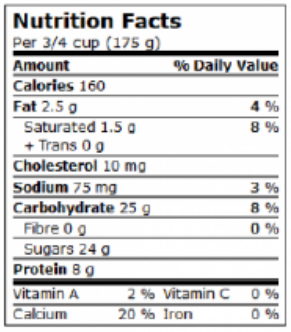
Saturated 1.5 g + Trans 0 g	**8** %
Cholesterol 10 mg	
Sodium 75 mg	**3** %
Carbohydrate 25 g	**8** %
Fibre 0 g	**0** %
Sugars 24 g	
Protein 8 g	

Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %

The nutrition information that you most frequently use on the Nutrition Facts table is: (Select all that apply)

- ☐ I use all the information
- ☐ Amount of food
- ☐ Serving size
- ☐ Calories
- ☐ % Daily Value
- ☐ Total Fat
- ☐ Saturated Fat Contents
- ☐ Trans Fat Contents
- ☐ Cholesterol
- ☐ Sodium
- ☐ Total Carbohydrates
- ☐ Fibre
- ☐ Sugar
- ☐ Protein
- ☐ Vitamin A
- ☐ Vitamin C
- ☐ Calcium
- ☐ Iron
- ☐ Other (Please Specify)
- ☐ I don't use any of the information

Section 2: Use of Nutrition Information



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Cholesterol 10 mg	
Sodium 75 mg	**3** %
Carbohydrate 25 g	**8** %
Fibre 0 g	**0** %
Sugars 24 g	
Protein 8 g	

Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %

Please indicate the extent to which you agree or disagree with the following statements on a scale of 1 to 7; where 1 = strongly disagree, 4 = neither agree nor disagree, and 7 = strongly agree.

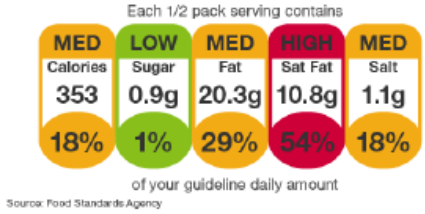
	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)
I find the Nutrition Facts table difficult to understand.	○	○	○	○	○	○	○
It takes too much time to use the Nutrition Facts table to learn about a food product.	○	○	○	○	○	○	○
It takes too much time to use the Nutrition Facts table to compare food products.	○	○	○	○	○	○	○
The Nutrition Facts table provides all the nutrition information needed to select the prepackaged food products I want to purchase.	○	○	○	○	○	○	○
A Nutrition Facts table for non-prepackaged food products, like fruits, vegetables, bulk products, etc., would be useful to me.	○	○	○	○	○	○	○

Section 3: Traffic Light Label

Have you even seen this nutrition label on the front of a prepackaged food product?

- Yes
- No
- I don't know

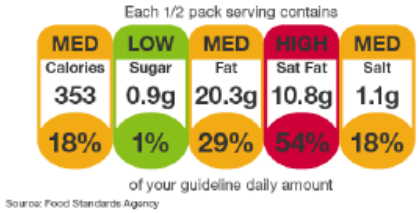
The picture below is a traffic light label that can be found on the front of prepackaged food products. This label identifies nutrition information about a product (fat, salt and sugar). The levels of fat, salt and sugar are surrounded by a border where red suggests a high amount, yellow suggests a medium amount, and green suggests a low amount. The label was made by an independent party and uses scientific dietary guidelines.



Ensure that you've read the above information to continue.

- I confirm I have read this

Section 3: Traffic Light Label



Please answer the following question by using the scale below; where 1 = extremely unlikely, 4 = neither likely nor unlikely, and 7 = extremely likely.

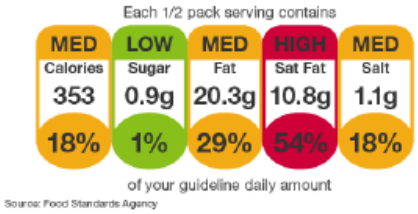
	Extremely Unlikely (1)	(2)	(3)	(4)	(5)	(6)	Extremely Likely (7)
How likely would you be to use the traffic light label while shopping for groceries?							

Please answer the following questions by using the scales provided.

	Not at All (1)	(2)	(3)	(4)	(5)	(6)	Very Much So (7)
Would the traffic light label allow you to better understand the nutrition information on the Nutrition Facts table?							

	Not at All (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How knowledgeable are you about the traffic light label?							
How important would the traffic light label be to you when choosing food products?							

Section 3: Traffic Light Label



Please indicate the extent to which you agree or disagree with the following statements on a scale of 1 to 7; where 1 = strongly disagree, 4 = neither agree nor disagree, and 7 = strongly agree.

	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)
I need more information about the traffic light label before I would use it.	○	○	○	○	○	○	○
I would find the traffic light label difficult to use.	○	○	○	○	○	○	○
The traffic light label would reduce the time I need to learn about a food product.	○	○	○	○	○	○	○
The traffic light label would reduce the time I need to compare food products.	○	○	○	○	○	○	○
The traffic light label would provide me with the nutrition information I need to select the prepackaged food products I want to purchase.	○	○	○	○	○	○	○
The traffic light label would improve my ability to select the healthy prepackaged food products that I want to purchase.	○	○	○	○	○	○	○
If the traffic light label were available for non-prepackaged food products, like fruits, vegetables, bulk products, etc., it would improve my ability to select the healthy foods I want to purchase.	○	○	○	○	○	○	○

Section 4: Guiding Stars

Have you even seen these star symbols while grocery shopping?

- Yes
- No
- I don't know

Please read the following information about the star symbols:

- The star ratings are found on shelf tags, not on food products.
- Information about the star ratings can be found in the aisles of a grocery store.
- More stars mean a food product, within the same category of food products, has a higher nutritional value.
  - A product has either 1, 2, or 3 stars or no stars.
  - No stars can mean a food product has the lowest nutritional value or that the food product has not been rated.
- More stars mean a food product has more vitamins, minerals, dietary fibre, whole grains, and omega-3 fatty acids, and less saturated fat, trans fat, added sodium and added sugars.
- The stars can be found on single ingredient food products, like fruits and vegetables, and on prepackaged food products that have more than one ingredient, such as breakfast cereals.
  - Star ratings for prepackaged food products are based on the nutrition information in the Nutrition Facts table and in the Canadian Nutrient File.
  - The Canadian Nutrient File is Health Canada's database of nutrition information for single-ingredient foods, of fresh fruits and vegetables that do not have any nutrition information on their food labels.
- The star symbol ratings are devised by an independent source of nutrition information (i.e. not the food manufacturer or retailer).

Ensure that you've read the above information to continue.

- I confirm I have read this

Section 4: Guiding Stars

Please answer the following question by using the scale below; where 1 = extremely unlikely, 4 = neither likely nor unlikely, and 7 = extremely likely.

	Extremely Unlikely (1)	(2)	(3)	(4)	(5)	(6)	Extremely Likely (7)
How likely would you be to use the star symbols while shopping for groceries?	○	○	○	○	○	○	○

Please answer the following questions by using the scale below.

	Not at All (1)	(2)	(3)	(4)	(5)	(6)	Very Much So (7)
Would the star symbols allow you to better understand the nutrition information on the Nutrition Facts table?	○	○	○	○	○	○	○

	Not at All (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How knowledgeable are you about the star symbols?	○	○	○	○	○	○	○
How important would the star symbols be to you when choosing food products?	○	○	○	○	○	○	○

Section 4: Guiding Stars

Please indicate the extent to which you agree or disagree with the following statements on a scale of 1 to 7; where 1 = strongly disagree, 4 = neither agree nor disagree, and 7 = strongly agree.

	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)
I need more information about the star symbols before I would use them.	○	○	○	○	○	○	○
I would find the star symbols difficult to use.	○	○	○	○	○	○	○
The star symbols would reduce the time I need to learn about a food product.	○	○	○	○	○	○	○
The star symbols would reduce the time I need to compare food products.	○	○	○	○	○	○	○
The star symbols would provide me with the nutrition information I need to select the food products I want to purchase.	○	○	○	○	○	○	○
The star symbols would improve my ability to select the healthy prepackaged food products that I want to purchase.	○	○	○	○	○	○	○
The star symbols would improve my ability to select the healthy non-prepackaged food products that I want to purchase, like fresh fruits, vegetables, bulk products, etc.	○	○	○	○	○	○	○

Section 5: Nutrition Information Preference

If the following sources of information were available where you regularly purchase groceries, please indicate which nutrition information you would most prefer to use when purchasing BEVERAGES (juice, pop, etc)?

Nutrition Facts Table	Nutrition Facts Table & Guiding Stars	Nutrition Facts Table & Traffic Light Label	Guiding Stars	Traffic Light Label	I would not use any of these types of nutrition information.
○	○	○	○	○	○

Section 5: Nutrition Information Preference

If the following sources of information were available where you regularly purchase groceries, please indicate which nutrition information you would most prefer to use when purchasing BREAD PRODUCTS?

Nutrition Facts Table	Nutrition Facts Table & Guiding Stars	Nutrition Facts Table & Traffic Light Label	Guiding Stars	Traffic Light Label	I would not use any of these types of nutrition information.
					

If the following sources of information were available where you regularly purchase groceries, lease indicate which nutrition information you would most prefer to use when purchasing YOGURT PRODUCTS?

Nutrition Facts Table	Nutrition Facts Table & Guiding Stars	Nutrition Facts Table & Traffic Light Label	Guiding Stars	Traffic Light Label	I would not use any of these types of nutrition information.
					

Section 5: Nutrition Information Preference

If the following sources of information were available where you regularly purchase groceries, lease indicate which nutrition information you would most prefer to use when purchasing BREAKFAST CEREAL PRODUCTS?

Nutrition Facts Table	Nutrition Facts Table & Guiding Stars	Nutrition Facts Table & Traffic Light Label	Guiding Stars	Traffic Light Label	
					I would not use any of these types of nutrition information.

If the following sources of information were available where you regularly purchase groceries, please indicate which nutrition information you would most prefer to use when purchasing FRESH MEAT PRODUCTS?

Nutrition Facts Table	Nutrition Facts Table & Guiding Stars	Nutrition Facts Table & Traffic Light Label	Guiding Stars	Traffic Light Label	
					I would not use any of these types of nutrition information.

Section 5: Nutrition Information Preference

If the following sources of information were available where you regularly purchase groceries, please indicate which nutrition information you would most prefer to use when purchasing FRESH PREPACKAGED VEGETABLE PRODUCTS?

Nutrition Facts Table	Nutrition Facts Table & Guiding Stars	Nutrition Facts Table & Traffic Light Label	Guiding Stars	Traffic Light Label	I would not use any of these types of nutrition information.
○	○	○	○	○	○

Section 6 - Nutrition Information Scale Questions

Please indicate the extent to which you would trust the following sources of nutrition information on a scale of 1 to 7; where 1 = no trust, and 7 = trust completely.

	No Trust (1)	(2)	(3)	(4)	(5)	(6)	Trust Completely (7)
The star symbols	○	○	○	○	○	○	○
The Nutrition Facts table	○	○	○	○	○	○	○
The traffic light label	○	○	○	○	○	○	○
An in-store nutrition expert (dietitian, nutritionist) hired by a private retailer	○	○	○	○	○	○	○

Please indicate how easy the following sources of nutrition information would be to use on a scale of 1 to 7; where 1 = not easy at all, and 7 = extremely easy.

	Not Easy (1)	(2)	(3)	(4)	(5)	(6)	Extremely Easy (7)
The star symbols	○	○	○	○	○	○	○
The Nutrition Facts table	○	○	○	○	○	○	○
The traffic light label	○	○	○	○	○	○	○
An in-store nutrition expert (dietitian, nutritionist) hired by a private retailer	○	○	○	○	○	○	○

Do you have another preferred source of nutrition information that you use to help you select healthy food products?

- ○ Yes (Please Specify) _____
- ○ No

Please rank your top 3 most trusted sources of nutrition information; where 1 = is your top choice, and 3 = your third choice.

- Friends / Family
- Doctor
- Internet
- Dietitian / Nutritionist
- Food Manufacturers
- 3rd party
- Food Retailers
- Government
- Other (Please Specify) _____

Section 7 - Health Status and Behaviors

In general, would you say your health is __?

Poor	Fair	Good	Very Good	Excellent
○	○	○	○	○

In general, would you say the quality of your nutrition is __?

Poor	Fair	Good	Very Good	Excellent
○	○	○	○	○

Please answer the following questions by using the scale below.

	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Extremely (7)
How important is your nutrition to your overall health?	○	○	○	○	○	○	○
How knowledgeable are you about your nutrition?	○	○	○	○	○	○	○

Please indicate the extent to which you agree or disagree with the following statements on a scale of 1 to 7; where 1 = strongly disagree, 4 = neither agree nor disagree, and 7 = strongly agree.

	Strongly Disagree (1)	(2)	(3)	(4)	(5)	(6)	Strongly Agree (7)
I am in control of my nutrition.	○	○	○	○	○	○	○
The main thing which affects my health is what I myself do.	○	○	○	○	○	○	○
I am in control of my health.	○	○	○	○	○	○	○
If I get sick, it is my own behaviour which determines how soon I get well again.	○	○	○	○	○	○	○
Regarding my health, I can only do what my doctor tells me what to do.	○	○	○	○	○	○	○
Having regular contact with my physician is the best way for me to avoid illness.	○	○	○	○	○	○	○
Health professionals control my health.	○	○	○	○	○	○	○
My good health is largely a matter of good fortune.	○	○	○	○	○	○	○
Luck plays a big part in determining how soon I will recover from illness.	○	○	○	○	○	○	○
If it's meant to be, I will stay healthy.	○	○	○	○	○	○	○

Section 8 - Demographics

Please answer the following questions about yourself. We would like to remind you that all information that you provide in this survey is completely confidential. This means that no individual will be associated with the survey's results. All data is combined and analyzed in aggregate to protect the confidentiality of each respondent. However, please note that you may choose to skip individual questions and proceed with the remainder of the survey.

In what year were you born?

What is your gender?

Male ○ Female ○

How many people live in your household?

1 ○ 2 ○ 3 ○ 4 ○ 5+ ○

How many people in your household are under the age of 18?

0 ○ 1 ○ 2 ○ 3 ○ 4+ ○

Please indicate the highest level of education you have completed.

- ○ Less than high school
- ○ High school
- ○ Some college
- ○ 2 year degree
- ○ 4 year degree
- ○ Professional degree
- ○ Doctorate

Please indicate your approximate yearly household income before taxes.

- ○ Under $25,000
- ○ $25,001 - $49,999
- ○ $50,000 - $75,000
- ○ $100,000 - $149,999
- ○ $150,000 and over

What is your body weight in pounds (lbs) or kilograms (kg)?

- Pounds (lbs)
- or Kilograms (kg)

Please answer the following question about your height.

	Feet and Inches		Centimetres
	ft	in	cm
What is your height in feet and inches or centimetres?			

Appendix C: Secondary Data from CANSIM Table 051-0001

Appendix C shows the secondary data used to calculate sample population quotas for the administration of the online survey to a representative population sample of Canadians by age from Alberta, British Columbia, and Saskatchewan. All data in this appendix comes from CANSIM Table 051-0001, through two different forms. The first form (Section C.1) is estimates of population by gender for July 1, 2016 in Canada, Alberta, British Columbia and Saskatchewan. The second form (Section C.2) is estimates of population by age range for July 1, 2016 in Alberta, British Columbia, and Saskatchewan. A table of results for quota calculations is at the end of this appendix (Section C.3).

Section C.1: CANSIM Table 051-0001 - Estimates of population by gender for July 1, 2016 in Canada, Alberta, British Columbia, and Saskatchewan (annual persons), with footnotes and source.

Geography	Sex	2016
Canada	Both sexes	36,286,425
	Males	17,995,581
	Females	18,290,844
Saskatchewan	Both sexes	1,150,632
	Males	580,442
	Females	570,190
Alberta	Both sexes	4,252,879
	Males	2,158,020
	Females	2,094,859
British Columbia	Both sexes	4,751,612
	Males	2,356,920
	Females	2,394,692

Footnotes:

1. Postcensal estimates are based on the 2011 Census counts adjusted for census net undercoverage (CNU) (including adjustment for incompletely enumerated Indian reserves (IEIR)) and the components of demographic growth that occurred since that census. Intercensal estimates are produced using counts from two consecutive censuses adjusted for CNU (including (IEIR) and postcensal estimates.
2. Estimates are final intercensal up to 2010, final postcensal for 2011 and 2012, updated postcensal from 2013 to 2015 and preliminary postcensal for 2016.
3. Population estimates for Northwest Territories and Nunavut are presented separately from 1991.
4. Prior to 1991, only estimates of population for Northwest Territories and Nunavut combined are available.
5. Age at last birthday in years.
6. Data for persons aged 90 to 100 years and over will be available from 2001.
7. The population growth, which is used to calculate population estimates, is comprised of the natural growth (CANSIM 51-0002 and 51-0013), international migration (CANSIM 51-0011) and interprovincial migration (CANSIM 51-0012).

Source: Statistics Canada. *Table 051-0001 - Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual (persons unless otherwise noted),* CANSIM (database). (accessed:)

Section C.2: CANSIM Table 051-0001: Estimates of population by age (25-99) for July 1, 2016 in Canada, Alberta, British Columbia, and Saskatchewan (annual persons), with footnotes and source.

Geography	Age group [5, 6]	2016
Saskatchewan	All ages	1,150,632
	18 years	14,227
	19 years	14,821
	20 to 24 years	78,988
	25 to 29 years	87,875
	30 to 34 years	86,009
	35 to 39 years	75,671
	40 to 44 years	68,757
	45 to 49 years	66,525
	50 to 54 years	77,143
	55 to 59 years	78,131
	60 to 64 years	68,738
	65 to 69 years	53,861
	70 to 74 years	37,540
	75 to 79 years	29,473
	80 to 84 years	23,132
	85 to 89 years	16,085
	90 to 94 years	7,980
	95 to 99 years	2,172

Geography	Age group [5, 6]	2016
Alberta	All ages	4,252,879
	18 years	49,027
	19 years	50,995
	20 to 24 years	288,738
	25 to 29 years	343,821
	30 to 34 years	370,899
	35 to 39 years	333,975
	40 to 44 years	294,964
	45 to 49 years	277,636
	50 to 54 years	290,406
	55 to 59 years	283,038
	60 to 64 years	233,269
	65 to 69 years	177,308
	70 to 74 years	119,391
	75 to 79 years	84,681
	80 to 84 years	61,925
	85 to 89 years	40,622
	90 to 94 years	17,842
	95 to 99 years	4,440

Geography	Age group [5, 6]	2016
British Columbia	All ages	4,751,612
	18 years	56,592
	19 years	61,630
	20 to 24 years	326,885
	25 to 29 years	317,345
	30 to 34 years	328,085
	35 to 39 years	312,835
	40 to 44 years	304,587
	45 to 49 years	327,972
	50 to 54 years	351,517
	55 to 59 years	351,325
	60 to 64 years	316,552
	65 to 69 years	281,853
	70 to 74 years	203,061
	75 to 79 years	146,672
	80 to 84 years	106,992
	85 to 89 years	69,643
	90 to 94 years	32,914
	95 to 99 years	8,283

Footnotes:

1. Postcensal estimates are based on the 2011 Census counts adjusted for census net undercoverage (CNU) (including adjustment for incompletely enumerated Indian reserves (IEIR)) and the components of demographic growth that occurred since that census. Intercensal estimates are produced using counts from two consecutive censuses adjusted for CNU (including (IEIR) and postcensal estimates.
2. Estimates are final intercensal up to 2010, final postcensal for 2011 and 2012, updated postcensal from 2013 to 2015 and preliminary postcensal for 2016.
3. Population estimates for Northwest Territories and Nunavut are presented separately from 1991.
4. Prior to 1991, only estimates of population for Northwest Territories and Nunavut combined are available.
5. Age at last birthday in years.
6. Data for persons aged 90 to 100 years and over will be available from 2001.
7. The population growth, which is used to calculate population estimates, is comprised of the natural growth (CANSIM 51-0002 and 51-0013), international migratior (CANSIM 51-0011) and interprovincial migration (CANSIM 51-0012).

Source: Statistics Canada. *Table 051-0001 - Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual (persons unless otherwise noted),* CANSIM (database). (accessed:)

Section C.3: Survey Quota Calculations: Survey quotas for Alberta, British Columbia, and Saskatchewan, and for age ranges within each province.

Province	Population in 2016	Population (Ages 18-99)	Quota[7] (276 Respondents)	Quota[7] (242 Respondents)
Alberta	4,252,879 (42%)	3,322,977 (41%)	116	101
British Columbia	4,751,612 (47%)	3,904,743 (48%)	128	114
Saskatchewan	1,150,632 (11%)	887,128 (11%)	32	27
Total	10,155,123	8,114,848	276	242

Alberta Age Ranges:	Population (18-99)	Quota[8] (116)
18-24	388,760	13
25-34	714,720	25
35-44	628,939	22
45-54	568,042	20
55-64	516,307	18
65+	506,209	18
Total	3,322,977	

British Columbia Age Ranges:	Population (18-99)	Quota[8] (128)
18-24	445,107	15
25-34	645,463	21
35-44	617,422	20
45-54	679,489	22
55-64	667,877	22
65+	849,418	28
Total	3,904,743	

Saskatchewan Age Ranges:	Population (18-99)	Quota[8] (32)
18-24	108,036	4
25-34	173,884	7
35-44	144,428	5
45-54	143,668	5
55-64	146,869	5
65+	170,243	6
Total	887,128	

[7] Provincial quotas for 276 and 242 respondents were calculated using the following equation:

- ***[Prov. total pop. / 3-prov. total pop.] * Quota = Provincial Quota***

[8] Age range quotas for respondents were calculated using the following equation:

- ***[Prov. age range pop. / Prov. total pop. of ages 18-99] * Provincial Quota = Provincial Age Range Quota***

Appendix D: Secondary Data from CANSIM Table 117-0005

CANSIM Table 117-0005: Distribution of the household population of Canadians by adult body mass index (BMI), with footnotes and source.

Classifications	2015
Underweight	1.7[E]
Normal weight	34.2
Overweight	36.0
Obese, class I	16.7
Obese, class II	7.4
Obese, class III	4.0

Footnotes:

1. Source: Canadian Health Measures Survey (CHMS).
2. 2009 data - Total household population aged 18 to 79, except those meeting the exclusion criteria (see the Canadian Health Measures Survey (CHMS) Data User Guide: Cycle 1). Data collected between March 2007 and March 2009.
3. 2011 data - Total household population aged 18 to 79, except those meeting the exclusion criteria (see the Canadian Health Measures Survey (CHMS) Data User Guide: Cycle 2). Data collected between August 2009 and November 2011.
4. 2013 data - Total household population aged 18 to 79, except those meeting the exclusion criteria (see the Canadian Health Measures Survey (CHMS) Data User Guide: Cycle 3). Data collected between January 2012 and December 2013.
5. 2015 data - Total household population aged 18 to 79, except those meeting the exclusion criteria (see the Canadian Health Measures Survey (CHMS) Data User Guide: Cycle 4). Data collected between January 2014 and December 2015.
6. The classifications used in this table can be found in Health Canada, 2003, "Description of the Canadian Guidelines for Body Weight Classification in Adults," Canadian Guidelines for Body Weight Classification in Adults, Health Canada Catalogue no. H49-179/2003E, p. 9-12. http://www.hc-sc.gc.ca/fn-an/nutrition/weights-poids/guide-ld-adult/weight_book_tc-livres_des_poids_tm-eng.php (accessed Dec 19 2006).
7. The Canadian Health Measures Survey (CHMS), the Canadian Community Health Survey (CCHS) - Annual and the 2015 CCHS - Nutrition, all collect height and weight data and derive obesity rates based on Body Mass Index (BMI). Users should take note of the data collection method, the target population and the classification system used by each survey in order to select the appropriate data set.

Source: Statistics Canada. *Table 117-0005 - Distribution of the household population by adult body mass index (BMI) - Health Canada (HC) classification, by sex and age group, occasional (percent),* CANSIM (database). (accessed:)

Appendix E: Econometrics Results

Regression results from the probit and logit models for the Guiding Stars and traffic light label are found in this appendix, where:

- Section E.1 has the ordered probit and logit results for the traffic light label, which include results for the two corresponding proportional odds assumption tests (Brant and omodel).
- Section E.2 has the ordered probit and logit results for the Guiding Stars, which include results for the two corresponding proportional odds assumption tests (Brant and omodel).
- Section E.3 has the marginal effects for the traffic light label.
- Section E.4 has the marginal effects for the Guiding Stars.

A description of the dependent and independent variables for the ordered probit and logit regressions are found in Chapter 5. The regression results and marginal effects in this appendix are screenshots of the original tables produced by Stata 15. Summarized results of the statistically significant variables in the regressions and marginal effects are found in Chapter 5.

The proportional odds assumption for the Guiding Stars and traffic light label regressions was tested in Stata 15 via the 'Brant' and 'omodel' test. Ordered logit models had to be used for both tests in Stata 15. Furthermore, the 'Brant' and 'omodel' tests can only be run after the ordered logistic regression, and both tests produce their own regression outputs. In order for the traffic light label and Guiding Stars regressions to pass the proportional odds tests, suggesting the proportional odds assumption is not violated and the current econometric models perform well given the final dataset, the null hypothesis of the regression must be rejected, where the 'Brant' and 'omodel' regressions are not found to be statistically significant (p-value over 0.1). In both cases, the Guiding Stars and traffic light label were shown to not violate the proportional odds assumption.

Section E.1: Ordered Probit and Logit Regressions for the Traffic Light Label

Ordered probit model

```
Iteration 0:   log likelihood = -218.78058
Iteration 1:   log likelihood = -146.08246
Iteration 2:   log likelihood = -144.25875
Iteration 3:   log likelihood = -144.24329
Iteration 4:   log likelihood = -144.24328

Ordered probit regression                       Number of obs     =        242
                                                LR chi2(37)       =     149.07
                                                Prob > chi2       =     0.0000
Log likelihood = -144.24328                     Pseudo R2         =     0.3407
```

TLLLikelihood3	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
NFTUse	.1881914	.0753044	2.50	0.012	.0405975	.3357852
NFTDifficult	.0940221	.0720997	1.30	0.192	-.0472907	.2353349
NFTAll	.204663	.3845519	0.53	0.595	-.5490448	.9583708
NFTcalories	-.0019095	.2171941	-0.01	0.993	-.4276021	.4237832
NFTTotalFat	-.0272397	.2366106	-0.12	0.908	-.4909879	.4365085
NFTSaturatedFat	-.053632	.252627	-0.21	0.832	-.5487718	.4415077
NFTSugar	.186167	.240293	0.77	0.438	-.2847986	.6571327
NFTSodium	.128192	.2190114	0.59	0.558	-.3010623	.5574464
TLLExposure	.4469722	.273285	1.64	0.102	-.0886566	.982601
TLLMoreEducation	.0429553	.0615866	0.70	0.486	-.0777523	.1636628
TLLDifficult	-.4089015	.085066	-4.81	0.000	-.5756278	-.2421751
TrustTLL	.3563152	.0696453	5.12	0.000	.2198129	.4928175
HealthyNutritiousRank123	-.3547436	.2484053	-1.43	0.153	-.841609	.1321219
Complex2SHFP	.0288106	.0628249	0.46	0.647	-.0943238	.1519451
NutritionKnowledge	.1918912	.1078309	1.78	0.075	-.0194535	.4032359
NutritionQuality	-.2898615	.1425357	-2.03	0.042	-.5692263	-.0104967
Nutrition2Health	.1444775	.1067424	1.35	0.176	-.0647338	.3536887
AverageILOC	-.0488884	.0972563	-0.50	0.615	-.2395073	.1417305
AveragePLOC	-.0280261	.0902157	-0.31	0.756	-.2048457	.1487934
AverageCLOC	.0387915	.078369	0.49	0.621	-.1148089	.192392
Gender	-.0923078	.1964541	-0.47	0.638	-.4773507	.2927351
HH18	-.3867168	.2420917	-1.60	0.110	-.8612078	.0877741
Education						
2	.2204645	.7539876	0.29	0.770	-1.257324	1.698253
3	.0494777	.731853	0.07	0.946	-1.384928	1.483883
4	.2205627	.760355	0.29	0.772	-1.269706	1.710831
5	.3945271	.7507011	0.53	0.599	-1.07682	1.865874
6	.6294981	.7558586	0.83	0.405	-.8519576	2.110954
7	-1.648129	.9454891	-1.74	0.081	-3.501254	.2049952
Income						
1	-.0002672	.2218726	-0.00	0.999	-.4351294	.4345951
2	.6843656	.3362281	2.04	0.042	.0253707	1.343361
Province						
1	-.1576056	.2032043	-0.78	0.438	-.5558787	.2406675
2	.2083444	.3014147	0.69	0.489	-.3824176	.7991063
AgeQuota						
1	-.3351453	.2876963	-1.16	0.244	-.8990197	.2287291
2	-.3468174	.2856111	-1.21	0.225	-.9066048	.2129701
3	.0662617	.3139408	0.21	0.833	-.5490509	.6815744
4	-.0933097	.3175838	-0.29	0.769	-.7157626	.5291432
TLLGSRandom	-.3721781	.1963869	-1.90	0.058	-.7570893	.0127331
/cut1	.6957686	1.302288			-1.85667	3.248207
/cut2	3.060932	1.316654			.4803369	5.641526

Ordered logit model

```
Iteration 0:   log likelihood = -218.78058
Iteration 1:   log likelihood = -150.56823
Iteration 2:   log likelihood = -143.09594
Iteration 3:   log likelihood = -142.95346
Iteration 4:   log likelihood = -142.95316
Iteration 5:   log likelihood = -142.95316

Ordered logistic regression                     Number of obs     =        242
                                                LR chi2(37)       =     151.65
                                                Prob > chi2       =     0.0000
Log likelihood = -142.95316                     Pseudo R2         =     0.3466
```

TLLLikelihood3	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
NFTUse	.3557302	.1372791	2.59	0.010	.086668	.6247924
NFTDifficult	.2095914	.1311618	1.60	0.110	-.047481	.4666637
NFTAll	.2667247	.6694876	0.40	0.690	-1.045447	1.578896
NFTcalories	-.0407167	.3852665	-0.11	0.916	-.7958252	.7143917
NFTTotalFat	.0033817	.4097407	0.01	0.993	-.7996952	.8064587
NFTSaturatedFat	-.0704219	.439831	-0.16	0.873	-.9324747	.7916309
NFTSugar	.23665	.4205704	0.56	0.574	-.5876527	1.060953
NFTSodium	.2639621	.3863887	0.68	0.495	-.4933457	1.02127
TLLExposure	.8185218	.5096248	1.61	0.108	-.1803245	1.817368
TLLMoreEducation	.0713898	.1101234	0.65	0.517	-.1444482	.2872277
TLLDifficult	-.7323467	.1568338	-4.67	0.000	-1.039735	-.4249581
TrustTLL	.7034157	.1374346	5.12	0.000	.4340489	.9727825
HealthyNutritiousRank123	-.6476731	.4432604	-1.46	0.144	-1.516447	.2211013
Complex2SHFP	.0435544	.1109509	0.39	0.695	-.1739053	.2610141
NutritionKnowledge	.315472	.1920657	1.64	0.100	-.0609699	.6919138
NutritionQuality	-.5011278	.2542695	-1.97	0.049	-.9994868	-.0027688
Nutrition2Health	.2811783	.1849456	1.52	0.128	-.0813084	.6436651
AverageILOC	-.1014778	.1712718	-0.59	0.554	-.4371644	.2342088
AveragePLOC	-.0920314	.1587207	-0.58	0.562	-.4031183	.2190555
AverageCLOC	.0558254	.1400928	0.40	0.690	-.2187514	.3304022
Gender	-.1536317	.3524508	-0.44	0.663	-.8444225	.5371591
HH18	-.6691949	.4265027	-1.57	0.117	-1.505125	.166735
Education						
2	.539148	1.265579	0.43	0.670	-1.941342	3.019638
3	.2531406	1.231587	0.21	0.837	-2.160726	2.667007
4	.4985579	1.281405	0.39	0.697	-2.01295	3.010066
5	.854333	1.265771	0.67	0.500	-1.626532	3.335198
6	1.413668	1.287307	1.10	0.272	-1.109407	3.936744
7	-2.55916	1.623297	-1.58	0.115	-5.740764	.6224442
Income						
1	-.0756434	.3964436	-0.19	0.849	-.8526586	.7013719
2	.9353289	.6228479	1.50	0.133	-.2854306	2.156088
Province						
1	-.3035353	.3570901	-0.85	0.395	-1.003419	.3963484
2	.3641271	.5228092	0.70	0.486	-.66056	1.388814
AgeQuota						
1	-.5661329	.5133846	-1.10	0.270	-1.572348	.4400825
2	-.6553687	.5071767	-1.29	0.196	-1.649417	.3386794
3	.1643635	.5657769	0.29	0.771	-.9445388	1.273266
4	-.2147156	.5656339	-0.38	0.704	-1.323338	.8939065
TLLGSRandom	-.5283538	.3451568	-1.53	0.126	-1.204849	.1481411
/cut1	1.632365	2.302239			-2.879941	6.144671
/cut2	5.971613	2.355743			1.354442	10.58879

Ordered logit model – 'Omodel' test

```
Iteration 0:   log likelihood = -218.78058
Iteration 1:   log likelihood = -159.46531
Iteration 2:   log likelihood = -154.69175
Iteration 3:   log likelihood = -154.33978
Iteration 4:   log likelihood = -154.33624
Iteration 5:   log likelihood = -154.33624

Ordered logit estimates                           Number of obs   =        242
                                                  LR chi2(27)     =     128.89
                                                  Prob > chi2     =     0.0000
Log likelihood = -154.33624                       Pseudo R2       =     0.2946
```

TLLLikelih~3	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
NFTUse	.2867261	.1257838	2.28	0.023	.0401944	.5332579
NFTDifficult	.1653527	.1231791	1.34	0.179	-.076074	.4067793
NFTAll	.3031652	.6319633	0.48	0.631	-.9354601	1.541791
NFTcalories	.0149411	.3603426	0.04	0.967	-.6913175	.7211997
NFTTotalFat	.1860643	.3842404	0.48	0.628	-.5670332	.9391617
NFTSaturat~t	-.1732623	.4075757	-0.43	0.671	-.9720959	.6255714
NFTSugar	.1510108	.3947026	0.38	0.702	-.622592	.9246136
NFTSodium	.2409412	.3642368	0.66	0.508	-.4729498	.9548323
TLLExposure	.542848	.4715764	1.15	0.250	-.3814247	1.467121
TLLMoreEdu~n	.0630351	.1025153	0.61	0.539	-.1378913	.2639615
TLLDifficult	-.7009971	.1462384	-4.79	0.000	-.9876191	-.414375
TrustTLL	.7517097	.1292818	5.81	0.000	.498322	1.005097
HealthyN~123	-.3004613	.412741	-0.73	0.467	-1.109419	.5084961
Complex2SHFP	.0199755	.1052072	0.19	0.849	-.1862268	.2261777
NutritionK~e	.2856033	.1845814	1.55	0.122	-.0761696	.6473762
NutritionQ~y	-.5163424	.2333995	-2.21	0.027	-.973797	-.0588877
Nutrition2~h	.2198901	.1760109	1.25	0.212	-.1250849	.5648651
AverageILOC	-.028983	.1617515	-0.18	0.858	-.34601	.2880441
AveragePLOC	.0026821	.149396	0.02	0.986	-.2901287	.2954928
AverageCLOC	.0333371	.1288368	0.26	0.796	-.2191784	.2858526
Gender	-.1615107	.3257188	-0.50	0.620	-.7999078	.4768864
HH18	-.4966295	.3804605	-1.31	0.192	-1.242318	.2490594
Education	.0896405	.1190021	0.75	0.451	-.1435993	.3228804
Income	.0671133	.2542036	0.26	0.792	-.4311167	.5653433
Province	-.0154187	.2176758	-0.07	0.944	-.4420554	.4112181
AgeQuota	-.0597096	.1251468	-0.48	0.633	-.3049927	.1855735
TLLGSRandom	-.3083033	.3142337	-0.98	0.327	-.9241901	.3075834
_cut1	1.831684	1.953351	(Ancillary parameters)			
_cut2	5.868218	2.003719				

```
Approximate likelihood-ratio test of proportionality of odds
across response categories:
         chi2(27) =     36.19
       Prob > chi2 =    0.1111
```

Ordered logit model – 'Brant' test

```
. brant

Brant Test of Parallel Regression Assumption
```

Variable	chi2	p>chi2	df
All	25.35	0.555	27
NFTUse	0.00	0.965	1
NFTDifficult	0.04	0.835	1
NFTAll	0.21	0.646	1
NFTcalories	1.25	0.263	1
NFTTotalFat	0.43	0.513	1
NFTSaturat~t	0.05	0.827	1
NFTSugar	0.29	0.590	1
NFTSodium	0.13	0.716	1
TLLExposure	2.17	0.141	1
TLLMoreEdu~n	0.06	0.801	1
TLLDifficult	0.04	0.848	1
TrustTLL	4.64	0.031	1
HealthyN~123	1.53	0.216	1
Complex2SHFP	1.52	0.217	1
NutritionK~e	5.37	0.021	1
NutritionQ~y	3.10	0.078	1
Nutrition2~h	0.08	0.778	1
AverageILOC	0.12	0.729	1
AveragePLOC	0.00	0.976	1
AverageCLOC	0.10	0.752	1
Gender	0.14	0.705	1
HH18	1.05	0.305	1
Education	1.44	0.230	1
Income	3.39	0.066	1
Province	1.60	0.205	1
AgeQuota	0.06	0.802	1
TLLGSRandom	0.01	0.935	1

```
A significant test statistic provides evidence that the parallel
regression assumption has been violated.
```

Section E.2: Ordered Probit and Logit Regressions for the Guiding Stars

Ordered probit model

```
Iteration 0:   log likelihood = -257.07041
Iteration 1:   log likelihood = -166.85528
Iteration 2:   log likelihood = -164.78873
Iteration 3:   log likelihood = -164.77676
Iteration 4:   log likelihood = -164.77676

Ordered probit regression                       Number of obs     =        242
                                                LR chi2(37)       =     184.59
                                                Prob > chi2       =     0.0000
Log likelihood = -164.77676                     Pseudo R2         =     0.3590
```

GSLikelihood3	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
NFTUse	.0198701	.0716364	0.28	0.781	-.1205346	.1602749
NFTDifficult	.1515478	.0666293	2.27	0.023	.0209567	.2821388
NFTAll	.6216345	.3705124	1.68	0.093	-.1045565	1.347826
NFTcalories	.2378108	.2145645	1.11	0.268	-.182728	.6583495
NFTTotalFat	-.17292	.2241089	-0.77	0.440	-.6121654	.2663253
NFTSaturatedFat	.1024683	.2392513	0.43	0.668	-.3664556	.5713922
NFTSugar	-.1610503	.2358738	-0.68	0.495	-.6233544	.3012539
NFTSodium	.5477464	.2188216	2.50	0.012	.118864	.9766288
GSExposure	-.9127933	.3361368	-2.72	0.007	-1.571609	-.2539773
GSMoreEducation	-.0200821	.0538402	-0.37	0.709	-.1256069	.0854428
GSDifficult	-.2513493	.0657789	-3.82	0.000	-.3802736	-.122425
TrustGS	.4101308	.0668578	6.13	0.000	.2790919	.5411697
HealthyNutritiousRank123	.2210396	.2479595	0.89	0.373	-.264952	.7070312
Complex2SHFP	.1078198	.058612	1.84	0.066	-.0070576	.2226972
NutritionKnowledge	.0019469	.108595	0.02	0.986	-.2108954	.2147893
NutritionQuality	.0379973	.1286957	0.30	0.768	-.2142416	.2902361
Nutrition2Health	.1983238	.113328	1.75	0.080	-.023795	.4204425
AverageILOC	-.023772	.0864296	-0.28	0.783	-.1931708	.1456269
AveragePLOC	.105127	.0828039	1.27	0.204	-.0571656	.2674196
AverageCLOC	.0489674	.0723319	0.68	0.498	-.0928006	.1907353
Gender	.0515774	.1896956	0.27	0.786	-.3202192	.423374
HH18	-.3267977	.2355958	-1.39	0.165	-.7885569	.1349615
Education						
2	-.1180176	.6465491	-0.18	0.855	-1.385231	1.149195
3	-.4937656	.631293	-0.78	0.434	-1.731077	.7435459
4	-.1268808	.6553678	-0.19	0.846	-1.411378	1.157616
5	-.3497558	.6431636	-0.54	0.587	-1.610333	.9108216
6	.4479022	.6397212	0.70	0.484	-.8059283	1.701733
7	-1.198969	.8487656	-1.41	0.158	-2.862519	.4645809
Income						
1	.4586222	.2138701	2.14	0.032	.0394446	.8777999
2	.422956	.3040593	1.39	0.164	-.1729892	1.018901
Province						
1	.1598407	.1922693	0.83	0.406	-.2170002	.5366815
2	.4916137	.2905208	1.69	0.091	-.0777966	1.061024
AgeQuota						
1	.5749738	.286662	2.01	0.045	.0131266	1.136821
2	.1885499	.2819715	0.67	0.504	-.3641042	.7412039
3	.351536	.2953367	1.19	0.234	-.2273132	.9303853
4	.6655614	.3124022	2.13	0.033	.0532644	1.277858
TLLGSRandom	.7890882	.1979828	3.99	0.000	.4010491	1.177127
/cut1	2.779138	1.215183			.397423	5.160853
/cut2	4.854486	1.240134			2.423868	7.285104

Ordered logit model

```
Iteration 0:   log likelihood = -257.07041
Iteration 1:   log likelihood = -170.19006
Iteration 2:   log likelihood = -164.49696
Iteration 3:   log likelihood = -164.41521
Iteration 4:   log likelihood = -164.41517
Iteration 5:   log likelihood = -164.41517

Ordered logistic regression                     Number of obs     =        242
                                                LR chi2(37)       =     185.31
                                                Prob > chi2       =     0.0000
Log likelihood = -164.41517                     Pseudo R2         =     0.3604
```

GSLikelihood3	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
NFTUse	.0397915	.1260195	0.32	0.752	-.2072021	.2867852
NFTDifficult	.2868667	.1154763	2.48	0.013	.0605373	.513196
NFTAll	1.054855	.6609857	1.60	0.111	-.240653	2.350364
NFTcalories	.461589	.3727273	1.24	0.216	-.268943	1.192121
NFTTotalFat	-.3351767	.3935225	-0.85	0.394	-1.106467	.4361133
NFTSaturatedFat	.2104623	.4154708	0.51	0.612	-.6038454	1.02477
NFTSugar	-.2845964	.4066291	-0.70	0.484	-1.081575	.512382
NFTSodium	.8772108	.3827786	2.29	0.022	.1269786	1.627443
GSExposure	-1.5658	.584633	-2.68	0.007	-2.711659	-.4199399
GSMoreEducation	-.0297153	.0960769	-0.31	0.757	-.2180226	.158592
GSDifficult	-.4492735	.1193632	-3.76	0.000	-.6832212	-.2153259
TrustGS	.721421	.1203851	5.99	0.000	.4854706	.9573714
HealthyNutritiousRank123	.3352019	.4311014	0.78	0.437	-.5097413	1.180145
Complex2SHFP	.1860552	.1026598	1.81	0.070	-.0151543	.3872647
NutritionKnowledge	.0540612	.1885259	0.29	0.774	-.3154427	.4235651
NutritionQuality	.0688375	.226669	0.30	0.761	-.3754256	.5131007
Nutrition2Health	.3270486	.1996378	1.64	0.101	-.0642342	.7183314
AverageILOC	-.0438139	.1527549	-0.29	0.774	-.343208	.2555801
AveragePLOC	.1857607	.1469169	1.26	0.206	-.1021912	.4737125
AverageCLOC	.0900699	.1315868	0.68	0.494	-.1678356	.3479753
Gender	.0905691	.3401295	0.27	0.790	-.5760726	.7572107
HH18	-.6108469	.4144277	-1.47	0.140	-1.42311	.2014165
Education						
2	.1090038	1.371542	0.08	0.937	-2.579169	2.797177
3	-.6125054	1.35049	-0.45	0.650	-3.259418	2.034407
4	.1247759	1.393939	0.09	0.929	-2.607293	2.856845
5	-.3701207	1.371073	-0.27	0.787	-3.057375	2.317134
6	1.059439	1.371609	0.77	0.440	-1.628865	3.747743
7	-1.539413	1.704749	-0.90	0.367	-4.880659	1.801833
Income						
1	.8013638	.3730657	2.15	0.032	.0701684	1.532559
2	.6693056	.5560265	1.20	0.229	-.4204863	1.759097
Province						
1	.2262264	.3338927	0.68	0.498	-.4281914	.8806441
2	.8535814	.5159035	1.65	0.098	-.1575708	1.864734
AgeQuota						
1	1.11145	.4942462	2.25	0.025	.1427452	2.080154
2	.396749	.4910244	0.81	0.419	-.5656411	1.359139
3	.6257013	.5096116	1.23	0.220	-.3731191	1.624522
4	1.211228	.5585415	2.17	0.030	.1165068	2.305949
TLLGSRandom	1.340922	.3477112	3.86	0.000	.6594207	2.022424
/cut1	5.293656	2.33811			.7110442	9.876268
/cut2	8.977389	2.407332			4.259105	13.69567

Ordered logit model – 'Omodel' test

```
Iteration 0:   log likelihood = -257.07041
Iteration 1:   log likelihood = -180.49544
Iteration 2:   log likelihood = -175.93286
Iteration 3:   log likelihood = -175.62941
Iteration 4:   log likelihood = -175.62752
Iteration 5:   log likelihood = -175.62752

Ordered logit estimates                           Number of obs   =        242
                                                  LR chi2(27)     =     162.89
                                                  Prob > chi2     =     0.0000
Log likelihood = -175.62752                       Pseudo R2       =     0.3168
```

GSLikeliho~3	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
NFTUse	.0314715	.1203141	0.26	0.794	-.2043398	.2672828
NFTDifficult	.2851248	.1107334	2.57	0.010	.0680913	.5021583
NFTAll	1.125611	.6368508	1.77	0.077	-.122594	2.373815
NFTcalories	.3805125	.3542149	1.07	0.283	-.313736	1.074761
NFTTotalFat	-.2555968	.3713163	-0.69	0.491	-.9833634	.4721698
NFTSaturat~t	.0575343	.3856898	0.15	0.881	-.6984039	.8134724
NFTSugar	-.146238	.3861295	-0.38	0.705	-.903038	.610562
NFTSodium	.8082256	.3665561	2.20	0.027	.0897887	1.526662
GSExposure	-1.207526	.5385175	-2.24	0.025	-2.263001	-.1520513
GSMoreEduc~n	-.008478	.0900689	-0.09	0.925	-.1850098	.1680538
GSDifficult	-.3909299	.1143752	-3.42	0.001	-.6151013	-.1667586
TrustGS	.6780454	.1134692	5.98	0.000	.4556498	.9004409
HealthyN~123	.288071	.4048284	0.71	0.477	-.505378	1.08152
Complex2SHFP	.1349516	.0965568	1.40	0.162	-.0542963	.3241995
NutritionK~e	-.0225992	.1789558	-0.13	0.900	-.3733462	.3281478
NutritionQ~y	.0511539	.2172689	0.24	0.814	-.3746853	.4769931
Nutrition2~h	.2953218	.1887007	1.57	0.118	-.0745247	.6651683
AverageILOC	.0219962	.1443576	0.15	0.879	-.2609395	.3049319
AveragePLOC	.2196538	.138035	1.59	0.112	-.0508899	.4901975
AverageCLOC	.0504788	.1227316	0.41	0.681	-.1900708	.2910284
Gender	.1157512	.3216609	0.36	0.719	-.5146926	.746195
HH18	-.2863499	.3705965	-0.77	0.440	-1.012706	.440006
Education	.1659794	.1136405	1.46	0.144	-.0567518	.3887106
Income	.242013	.2345707	1.03	0.302	-.2177371	.7017632
Province	.300472	.2164044	1.39	0.165	-.1236728	.7246168
AgeQuota	.2145826	.1234249	1.74	0.082	-.0273258	.456491
TLLGSRandom	1.286928	.3227068	3.99	0.000	.6544346	1.919422
_cut1	5.689628	1.860372	(Ancillary parameters)			
_cut2	9.086415	1.936485				

```
Approximate likelihood-ratio test of proportionality of odds
across response categories:
         chi2(27) =     33.11
       Prob > chi2 =    0.1936
```

Ordered logit model – 'Brant' test

```
. brant

Brant Test of Parallel Regression Assumption
```

Variable	chi2	p>chi2	df
All	33.95	0.168	27
NFTUse	0.01	0.938	1
NFTDifficult	0.81	0.367	1
NFTAll	0.24	0.622	1
NFTcalories	0.50	0.478	1
NFTTotalFat	0.65	0.422	1
NFTSaturat~t	0.23	0.630	1
NFTSugar	0.17	0.677	1
NFTSodium	0.86	0.354	1
GSExposure	0.09	0.766	1
GSMoreEduc~n	0.68	0.410	1
GSDifficult	7.11	0.008	1
TrustGS	3.04	0.081	1
HealthyN~123	1.82	0.177	1
Complex2SHFP	6.62	0.010	1
NutritionK~e	2.18	0.140	1
NutritionQ~y	0.17	0.676	1
Nutrition2~h	1.36	0.244	1
AverageILOC	0.12	0.731	1
AveragePLOC	5.02	0.025	1
AverageCLOC	0.36	0.550	1
Gender	1.34	0.247	1
HH18	0.09	0.765	1
Education	0.57	0.452	1
Income	2.40	0.121	1
Province	2.79	0.095	1
AgeQuota	0.09	0.770	1
TLLGSRandom	0.11	0.745	1

```
A significant test statistic provides evidence that the parallel
regression assumption has been violated.
```

Section E.3: Marginal Effects for the Traffic Light Label

The first screenshot shows the marginal effects for those 'very unlikely to use' the traffic light label, the second shows marginal effects for those 'somewhat likely to use' the traffic light label, and the last screenshot shows marginal effects for those 'very likely' to use the traffic light label.

Outcome 1 – 'Unlikely to use'

```
. mfx, predict(outcome(1))

Marginal effects after oprobit
      y  = Pr(TLLLikelihood3==1) (predict, outcome(1))
         =  .01072497
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
NFTUse	-.0053313	.00304	-1.75	0.080	-.011295	.000632	4.85124
NFTDif~t	-.0026636	.00234	-1.14	0.254	-.007241	.001914	2.49587
NFTAll*	-.0050811	.00853	-0.60	0.551	-.021804	.011641	.206612
NFTcal~s*	.0000541	.00616	0.01	0.993	-.012012	.012121	.438017
NFTTot~t*	.000782	.0069	0.11	0.910	-.012733	.014297	.289256
NFTSat~t*	.0015696	.00766	0.20	0.838	-.013439	.016578	.239669
NFTSugar*	-.005363	.00734	-0.73	0.465	-.019743	.009017	.524793
NFTSod~m*	-.0036334	.0064	-0.57	0.570	-.016184	.008917	.491736
TLLExp~e*	-.0186261	.01711	-1.09	0.276	-.052163	.014911	.859504
TLLMor~n	-.0012169	.00181	-0.67	0.501	-.004759	.002326	3.60744
TLLDif~t	.0115838	.00523	2.21	0.027	.00133	.021837	2.21074
TrustTLL	-.0100941	.0046	-2.19	0.028	-.019111	-.001077	4.92562
Heal~123*	.0082924	.00603	1.37	0.169	-.003533	.020118	.760331
Comple~P	-.0008162	.00181	-0.45	0.652	-.004369	.002736	3.18595
Nutrit~e	-.0054361	.00377	-1.44	0.149	-.012816	.001944	5.30992
Nutrit~y	.0082115	.0052	1.58	0.115	-.001989	.018412	3.32645
Nutrit~h	-.0040929	.0035	-1.17	0.242	-.010943	.002758	5.8719
Ave~ILOC	.001385	.00282	0.49	0.623	-.004137	.006907	5.63774
Ave~PLOC	.000794	.00259	0.31	0.759	-.004275	.005863	2.54821
Ave~CLOC	-.0010989	.00226	-0.49	0.626	-.005523	.003325	2.73554
Gender*	.0025984	.00561	0.46	0.643	-.008395	.013592	.53719
HH18*	.0131178	.01111	1.18	0.238	-.008656	.034891	.322314
Educat~2*	-.00517	.01461	-0.35	0.723	-.033807	.023467	.115702
Educat~3*	-.0013619	.01957	-0.07	0.945	-.039721	.036997	.243802
Educat~4*	-.0052281	.01506	-0.35	0.729	-.034748	.024292	.136364
Educat~5*	-.0091561	.01489	-0.62	0.539	-.038332	.02002	.252066
Educat~6*	-.012292	.01171	-1.05	0.294	-.035253	.010668	.198347
Educat~7*	.228775	.28359	0.81	0.420	-.327046	.784596	.03719
IncomeG2*	7.57e-06	.00629	0.00	0.999	-.012314	.012329	.355372
IncomeG3*	-.0121633	.00657	-1.85	0.064	-.025033	.000706	.157025
Britis~a*	.0045998	.00632	0.73	0.467	-.007782	.016982	.429752
Saskat~n*	-.0049857	.00643	-0.77	0.438	-.017595	.007624	.136364
AgeG2*	.0120958	.01367	0.88	0.376	-.014694	.038886	.202479
AgeG3*	.0127067	.01419	0.90	0.370	-.015096	.040509	.194215
AgeG4*	-.0017882	.00811	-0.22	0.825	-.017676	.0141	.177686
AgeG5*	.0028258	.01034	0.27	0.785	-.017447	.023098	.194215
TLLGSR~m*	.0106915	.00717	1.49	0.136	-.003368	.024751	.512397

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 2 – 'Somewhat likely to use'

```
. mfx, predict(outcome(2))

Marginal effects after oprobit
      y  = Pr(TLLLikelihood3==2) (predict, outcome(2))
         =  .51526511
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
NFTUse	-.0695868	.0283	-2.46	0.014	-.125058	-.014116	4.85124
NFTDif~t	-.0347662	.02677	-1.30	0.194	-.087235	.017702	2.49587
NFTAll*	-.0764242	.1444	-0.53	0.597	-.35945	.206601	.206612
NFTcal~s*	.000706	.08031	0.01	0.993	-.156691	.158103	.438017
NFTTot~t*	.0100574	.08723	0.12	0.908	-.160901	.181015	.289256
NFTSat~t*	.0197571	.0927	0.21	0.831	-.161927	.201441	.239669
NFTSugar*	-.0686198	.0883	-0.78	0.437	-.241685	.104445	.524793
NFTSod~m*	-.047368	.08086	-0.59	0.558	-.205852	.111116	.491736
TLLExp~e*	-.153835	.08545	-1.80	0.072	-.321319	.013649	.859504
TLLMor~n	-.0158834	.0228	-0.70	0.486	-.06057	.028803	3.60744
TLLDif~t	.151198	.03339	4.53	0.000	.085764	.216632	2.21074
TrustTLL	-.1317534	.02731	-4.82	0.000	-.185278	-.078228	4.92562
Heal~123*	.1324399	.09281	1.43	0.154	-.049466	.314346	.760331
Comple~P	-.0106532	.02324	-0.46	0.647	-.056199	.034893	3.18595
Nutrit~e	-.0709549	.0402	-1.76	0.078	-.149753	.007844	5.30992
Nutrit~y	.107181	.05334	2.01	0.044	.002642	.21172	3.32645
Nutrit~h	-.0534229	.03963	-1.35	0.178	-.131088	.024242	5.8719
Ave~ILOC	.0180773	.03598	0.50	0.615	-.052444	.088599	5.63774
Ave~PLOC	.0103631	.03336	0.31	0.756	-.055018	.075744	2.54821
Ave~CLOC	-.0143438	.029	-0.49	0.621	-.071191	.042503	2.73554
Gender*	.0341439	.07269	0.47	0.639	-.108319	.176607	.53719
HH18*	.1388523	.08389	1.66	0.098	-.025563	.303267	.322314
Educat~2*	-.0825882	.2841	-0.29	0.771	-.63942	.474244	.115702
Educat~3*	-.0183477	.27211	-0.07	0.946	-.55167	.514975	.243802
Educat~4*	-.0825758	.28636	-0.29	0.773	-.64383	.478678	.136364
Educat~5*	-.1471405	.27864	-0.53	0.597	-.693274	.398993	.252066
Educat~6*	-.2329046	.26814	-0.87	0.385	-.758451	.292642	.198347
Educat~7*	.220405	.18393	1.20	0.231	-.14009	.5809	.03719
IncomeG2*	.0000988	.08204	0.00	0.999	-.160696	.160893	.355372
IncomeG3*	-.2519487	.11761	-2.14	0.032	-.482466	-.021431	.157025
Britis~a*	.0580287	.07459	0.78	0.437	-.088175	.204232	.429752
Saskat~n*	-.077977	.1135	-0.69	0.492	-.300426	.144472	.136364
AgeG2*	.1192041	.09743	1.22	0.221	-.071757	.310165	.202479
AgeG3*	.1229791	.09589	1.28	0.200	-.064964	.310922	.194215
AgeG4*	-.0246162	.11718	-0.21	0.834	-.254293	.20506	.177686
AgeG5*	.0342229	.11542	0.30	0.767	-.191995	.260441	.194215
TLLGSR~m*	.136666	.07183	1.90	0.057	-.004125	.277457	.512397

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 3 – 'Very likely to use'

```
. mfx, predict(outcome(3))

Marginal effects after oprobit
      y  = Pr(TLLLikelihood3==3) (predict, outcome(3))
         =  .47400992
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
NFTUse	.0749181	.02999	2.50	0.012	.016147	.133689	4.85124
NFTDif~t	.0374298	.02872	1.30	0.193	-.018863	.093722	2.49587
NFTAll*	.0815054	.15264	0.53	0.593	-.217657	.380668	.206612
NFTcal~s*	-.0007601	.08646	-0.01	0.993	-.170223	.168703	.438017
NFTTot~t*	-.0108394	.0941	-0.12	0.908	-.195273	.173595	.289256
NFTSat~t*	-.0213266	.10033	-0.21	0.832	-.217966	.175313	.239669
NFTSugar*	.0739828	.09512	0.78	0.437	-.11245	.260416	.524793
NFTSod~m*	.0510014	.08695	0.59	0.558	-.119422	.221424	.491736
TLLExp~e*	.1724611	.10024	1.72	0.085	-.024012	.368935	.859504
TLLMor~n	.0171003	.02451	0.70	0.485	-.030937	.065137	3.60744
TLLDif~t	-.1627818	.03382	-4.81	0.000	-.229073	-.09649	2.21074
TrustTLL	.1418474	.02767	5.13	0.000	.087608	.196087	4.92562
Heal~123*	-.1407323	.09733	-1.45	0.148	-.331496	.050031	.760331
Comple~P	.0114694	.02501	0.46	0.646	-.037544	.060483	3.18595
Nutrit~e	.076391	.04292	1.78	0.075	-.007738	.16052	5.30992
Nutrit~y	-.1153925	.05676	-2.03	0.042	-.226646	-.004139	3.32645
Nutrit~h	.0575158	.04251	1.35	0.176	-.025803	.140835	5.8719
Ave~ILOC	-.0194623	.03872	-0.50	0.615	-.095348	.056424	5.63774
Ave~PLOC	-.0111571	.03592	-0.31	0.756	-.081551	.059237	2.54821
Ave~CLOC	.0154427	.0312	0.49	0.621	-.045704	.07659	2.73554
Gender*	-.0367423	.07817	-0.47	0.638	-.189961	.116477	.53719
HH18*	-.1519701	.09292	-1.64	0.102	-.33409	.03015	.322314
Educat~2*	.0877581	.29841	0.29	0.769	-.497106	.672622	.115702
Educat~3*	.0197096	.29168	0.07	0.946	-.551973	.591392	.243802
Educat~4*	.0878039	.30109	0.29	0.771	-.502314	.677922	.136364
Educat~5*	.1562966	.29253	0.53	0.593	-.417055	.729649	.252066
Educat~6*	.2451967	.27783	0.88	0.377	-.299342	.789736	.198347
Educat~7*	-.44918	.10964	-4.10	0.000	-.664071	-.234289	.03719
IncomeG2*	-.0001064	.08833	-0.00	0.999	-.173222	.173009	.355372
IncomeG3*	.264112	.12133	2.18	0.029	.026309	.501915	.157025
Britis~a*	-.0626285	.08045	-0.78	0.436	-.220311	.095054	.429752
Saskat~n*	.0829627	.1195	0.69	0.488	-.151244	.317169	.136364
AgeG2*	-.1312999	.10972	-1.20	0.231	-.346354	.083754	.202479
AgeG3*	-.1356858	.10862	-1.25	0.212	-.348586	.077215	.194215
AgeG4*	.0264044	.1252	0.21	0.833	-.218977	.271786	.177686
AgeG5*	-.0370487	.12566	-0.29	0.768	-.283344	.209246	.194215
TLLGSR~m*	-.1473575	.07703	-1.91	0.056	-.298333	.003617	.512397

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Section E.4: Marginal Effects for the Guiding Stars

The first screenshot shows the marginal effects for those ‘very unlikely to use’ the Guiding Stars, the second shows marginal effects for those ‘somewhat likely to use' the Guiding Stars, and the last screenshot shows marginal effects for those ‘very likely to use’ the Guiding Stars.

Outcome 1 – ‘Unlikely to use’

```
. mfx, predict(outcome(1))

Marginal effects after oprobit
      y  = Pr(GSLikelihood3==1) (predict, outcome(1))
         =  .18824889
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
NFTUse	-.0053614	.01934	-0.28	0.782	-.043274	.032551	4.85124
NFTDif~t	-.040891	.01819	-2.25	0.025	-.076535	-.005247	2.49587
NFTAll*	-.1406766	.06981	-2.02	0.044	-.277505	-.003848	.206612
NFTcal~s*	-.0633	.05661	-1.12	0.263	-.174251	.047651	.438017
NFTTot~t*	.048137	.06449	0.75	0.455	-.078265	.174539	.289256
NFTSat~t*	-.026992	.06159	-0.44	0.661	-.147715	.093731	.239669
NFTSugar*	.0432915	.06311	0.69	0.493	-.080408	.166991	.524793
NFTSod~m*	-.1468084	.05871	-2.50	0.012	-.261882	-.031735	.491736
GSExpo~e*	.1674614	.04132	4.05	0.000	.086474	.248449	.913223
GSMore~n	.0054186	.0145	0.37	0.709	-.023009	.033846	4.45041
GSDiff~t	.0678197	.01826	3.71	0.000	.032026	.103613	2.77273
TrustGS	-.1106624	.01964	-5.63	0.000	-.149159	-.072166	3.64463
Heal~123*	-.0626109	.07347	-0.85	0.394	-.206618	.081396	.760331
Comple~P	-.0290922	.01589	-1.83	0.067	-.060239	.002055	3.18595
Nutrit~e	-.0005253	.0293	-0.02	0.986	-.057959	.056908	5.30992
Nutrit~y	-.0102525	.03475	-0.30	0.768	-.078356	.057851	3.32645
Nutrit~h	-.0535122	.03066	-1.75	0.081	-.113614	.00659	5.8719
Ave~ILOC	.0064142	.02334	0.27	0.783	-.039333	.052161	5.63774
Ave~PLOC	-.0283656	.02243	-1.26	0.206	-.072318	.015587	2.54821
Ave~CLOC	-.0132125	.01953	-0.68	0.499	-.051485	.02506	2.73554
Gender*	-.01394	.05139	-0.27	0.786	-.114661	.086781	.53719
HH18*	.0925362	.07016	1.32	0.187	-.044972	.230044	.322314
Educat~2*	.0331072	.18831	0.18	0.860	-.335971	.402185	.115702
Educat~3*	.1471725	.20463	0.72	0.472	-.253898	.548243	.243802
Educat~4*	.035616	.19113	0.19	0.852	-.338982	.410215	.136364
Educat~5*	.1013231	.19877	0.51	0.610	-.28826	.490906	.252066
Educat~6*	-.1062986	.13111	-0.81	0.417	-.363264	.150667	.198347
Educat~7*	.4299688	.32294	1.33	0.183	-.202982	1.06292	.03719
IncomeG2*	-.1163375	.05134	-2.27	0.023	-.216962	-.015713	.355372
IncomeG3*	-.0993723	.06183	-1.61	0.108	-.220555	.021811	.157025
Britis~a*	-.0426907	.05098	-0.84	0.402	-.142609	.057227	.429752
Saskat~n*	-.1115933	.05497	-2.03	0.042	-.219336	-.00385	.136364
AgeG2*	-.1316105	.05555	-2.37	0.018	-.240496	-.022725	.202479
AgeG3*	-.0482575	.06845	-0.70	0.481	-.182421	.085905	.194215
AgeG4*	-.085256	.064	-1.33	0.183	-.210686	.040174	.177686
AgeG5*	-.147386	.05655	-2.61	0.009	-.258231	-.036541	.194215
TLLGSR~m*	-.2134015	.05441	-3.92	0.000	-.320047	-.106756	.512397

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 2 – 'Somewhat likely to use'

```
. mfx, predict(outcome(2))

Marginal effects after oprobit
      y  = Pr(GSLikelihood3==2) (predict, outcome(2))
         =  .69492043
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
NFTUse	.0014611	.00533	0.27	0.784	-.008986	.011908	4.85124
NFTDif~t	.0111435	.00766	1.45	0.146	-.003868	.026155	2.49587
NFTAll*	-.0084652	.0432	-0.20	0.845	-.093127	.076197	.206612
NFTcal~s*	.0157556	.0157	1.00	0.316	-.015013	.046524	.438017
NFTTot~t*	-.0156371	.02488	-0.63	0.530	-.064397	.033123	.289256
NFTSat~t*	.0062333	.01216	0.51	0.608	-.017598	.030065	.239669
NFTSugar*	-.0115143	.01749	-0.66	0.510	-.045794	.022766	.524793
NFTSod~m*	.0381769	.0255	1.50	0.134	-.01181	.088164	.491736
GSExpo~e*	.0909276	.08944	1.02	0.309	-.084375	.26623	.913223
GSMore~n	-.0014767	.00399	-0.37	0.711	-.009291	.006338	4.45041
GSDiff~t	-.018482	.01119	-1.65	0.099	-.040417	.003453	2.77273
TrustGS	.0301573	.01709	1.76	0.078	-.003345	.06366	3.64463
Heal~123*	.0221178	.03232	0.68	0.494	-.041237	.085473	.760331
Comple~P	.0079281	.00605	1.31	0.190	-.003938	.019794	3.18595
Nutrit~e	.0001432	.00798	0.02	0.986	-.015506	.015793	5.30992
Nutrit~y	.002794	.0096	0.29	0.771	-.016015	.021603	3.32645
Nutrit~h	.0145829	.0115	1.27	0.205	-.007958	.037124	5.8719
Ave~ILOC	-.001748	.00645	-0.27	0.786	-.014394	.010898	5.63774
Ave~PLOC	.0077301	.00746	1.04	0.300	-.006884	.022344	2.54821
Ave~CLOC	.0036006	.00566	0.64	0.524	-.007488	.014689	2.73554
Gender*	.0038384	.01448	0.27	0.791	-.024534	.03221	.53719
HH18*	-.0326283	.03193	-1.02	0.307	-.095217	.02996	.322314
Educat~2*	-.0111754	.07494	-0.15	0.881	-.158062	.135711	.115702
Educat~3*	-.0638637	.11549	-0.55	0.580	-.29022	.162492	.243802
Educat~4*	-.0120588	.07645	-0.16	0.875	-.161907	.13779	.136364
Educat~5*	-.0394411	.09767	-0.40	0.686	-.23087	.151988	.252066
Educat~6*	.0038752	.04031	0.10	0.923	-.075122	.082873	.198347
Educat~7*	-.3136563	.29801	-1.05	0.293	-.897748	.270436	.03719
IncomeG2*	.018909	.01809	1.05	0.296	-.016545	.054363	.355372
IncomeG3*	.0016608	.02554	0.07	0.948	-.048396	.051718	.157025
Britis~a*	.0108818	.01376	0.79	0.429	-.016083	.037847	.429752
Saskat~n*	-.0059319	.0338	-0.18	0.861	-.072173	.060309	.136364
AgeG2*	-.0048052	.03409	-0.14	0.888	-.071615	.062004	.202479
AgeG3*	.0086654	.00918	0.94	0.345	-.009322	.026652	.194215
AgeG4*	.0067252	.01727	0.39	0.697	-.027129	.040579	.177686
AgeG5*	-.0155736	.04389	-0.35	0.723	-.101596	.070449	.194215
TLLGSR~m*	.0586649	.03327	1.76	0.078	-.006541	.123871	.512397

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 3 – 'Very likely to use'

```
. mfx, predict(outcome(3))

Marginal effects after oprobit
      y  = Pr(GSLikelihood3==3) (predict, outcome(3))
         =  .11683068
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
NFTUse	.0039003	.01407	0.28	0.782	-.023685	.031486	4.85124
NFTDif~t	.0297475	.01362	2.18	0.029	.003058	.056437	2.49587
NFTAll*	.1491417	.10518	1.42	0.156	-.057006	.35529	.206612
NFTcal~s*	.0475444	.04416	1.08	0.282	-.039	.134089	.438017
NFTTot~t*	-.0324999	.04067	-0.80	0.424	-.112205	.047205	.289256
NFTSat~t*	.0207588	.05015	0.41	0.679	-.077541	.119059	.239669
NFTSugar*	-.0317772	.04688	-0.68	0.498	-.123669	.060115	.524793
NFTSod~m*	.1086315	.04521	2.40	0.016	.020029	.197234	.491736
GSExpo~e*	-.2583891	.12028	-2.15	0.032	-.494143	-.022635	.913223
GSMore~n	-.0039419	.0106	-0.37	0.710	-.02472	.016836	4.45041
GSDiff~t	-.0493377	.01369	-3.61	0.000	-.07616	-.022516	2.77273
TrustGS	.0805051	.01561	5.16	0.000	.049917	.111094	3.64463
Heal~123*	.040493	.04251	0.95	0.341	-.042826	.123812	.760331
Comple~P	.0211641	.01171	1.81	0.071	-.001795	.044124	3.18595
Nutrit~e	.0003822	.02132	0.02	0.986	-.041403	.042167	5.30992
Nutrit~y	.0074585	.02528	0.30	0.768	-.042081	.056998	3.32645
Nutrit~h	.0389292	.02247	1.73	0.083	-.005104	.082962	5.8719
Ave~ILOC	-.0046662	.01696	-0.28	0.783	-.03791	.028577	5.63774
Ave~PLOC	.0206355	.01632	1.26	0.206	-.011344	.052615	2.54821
Ave~CLOC	.0096119	.01423	0.68	0.499	-.018282	.037505	2.73554
Gender*	.0101015	.03707	0.27	0.785	-.062548	.082751	.53719
HH18*	-.0599079	.04128	-1.45	0.147	-.140805	.02099	.322314
Educat~2*	-.0219319	.11353	-0.19	0.847	-.244442	.200578	.115702
Educat~3*	-.0833089	.09118	-0.91	0.361	-.262015	.095398	.243802
Educat~4*	-.0235572	.11485	-0.21	0.837	-.248668	.201553	.136364
Educat~5*	-.061882	.10225	-0.61	0.545	-.262289	.138525	.252066
Educat~6*	.1024234	.16729	0.61	0.540	-.225467	.430314	.198347
Educat~7*	-.1163125	.03447	-3.37	0.001	-.183875	-.04875	.03719
IncomeG2*	.0974285	.04942	1.97	0.049	.000566	.194291	.355372
IncomeG3*	.0977115	.08103	1.21	0.228	-.061099	.256522	.157025
Britis~a*	.031809	.03883	0.82	0.413	-.044294	.107912	.429752
Saskat~n*	.1175252	.08234	1.43	0.154	-.043865	.278915	.136364
AgeG2*	.1364157	.08078	1.69	0.091	-.021916	.294747	.202479
AgeG3*	.0395922	.06317	0.63	0.531	-.084222	.163406	.194215
AgeG4*	.0785309	.07421	1.06	0.290	-.066916	.223978	.177686
AgeG5*	.1629596	.09134	1.78	0.074	-.016063	.341982	.194215
TLLGSR~m*	.1547367	.04105	3.77	0.000	.074279	.235194	.512397

(*) dy/dx is for discrete change of dummy variable from 0 to 1