

Mount Saint Vincent University
Department of Applied Human Nutrition

**Exploring How Consumers Compare and Respond to Food Products Based on a
Multiple Traffic Light System that Includes Positive Nutrient Indicators**

by Lillian Lau

A Thesis

Submitted in partial fulfillment

of the requirements for the degree of
Master of Science in Applied Human Nutrition

May 2016
Halifax, Nova Scotia

© Lillian Lau 2016

Mount Saint Vincent University
Department of Applied Human Nutrition

**Exploring How Consumers Compare and Respond to Food Products Based on a
Multiple Traffic Light System that Includes Positive Nutrient Indicators**

by Lillian Lau

Approved:

Theresa Glanville, P.Dt., Ph.D.
Thesis Advisor
Professor of Applied Human Nutrition

Jessica Wegener, RD., Ph.D.
Thesis Co-advisor
Assistant Professor in School of Nutrition at Ryerson

Judy Fraser Arsenault, P.Dt., MAHE
Department of Applied Human Nutrition

ABSTRACT

Objective: The United Kingdom's Food Standard Agency developed the Multiple Traffic Light (MTL) system to help consumers better understand the nutritional value of a food product. This study investigates Canadians' response to the MTL system. Additionally, it explores how consumers make food decisions using a dichotomous MTL system that contains positive and negative nutrients.

Methods: A qualitative research design was used to explore this topic and convenience sampling was used to recruit participants. Participants were asked to partake in a 1-1.5 hour long focus group interview session, which assessed their responses to mock food labels. Five focus group interview sessions were conducted throughout Spring, Summer, and Winter of 2015. Focus group interview sessions were documented, audiotaped, and transcribed verbatim. The MAXQDA software was used to code data to help generate themes.

Results and Conclusion: A total of 20 adult participants from Toronto, ON and Guelph, ON participated in the study and they differed by age and gender. Seven female participants aged 18-29, four female participants aged 30-40, and three female participants aged 50+ participated in the study. In addition, three male participants aged 18-29 and three male participants aged 30-49 participated in the study. No male participants were aged 50+. Two distinct themes emerged from data collected: 1) Success of the MTL system is dependent on education and design of the label and 2) Consumers compare food products based on levels of negative nutrients, nutritional attributes, expectations, and importance of nutrients in their diet. No distinct differences were observed between age and gender groups in regards to interest in negative nutrients. The findings also suggest that the colours and text on the MTL system have more impact on food decisions compared to its numerical information.

Recommendations: Further research is required to explore consumers' responses to label alterations (e.g., design, content, separating nutrients, etc.) in comparison to new FOP labelling systems (e.g., 5-CNL), as the most effective design has not been established. Research should also be conducted to determine the most effective method to clearly educate the public about the MTL system. Researchers should also collect a larger and more diverse sample to re-examine how age and gender impact responses to dichotomous labelling schemes. Finally, the concepts of expectations and nutrient trade-offs should be further analyzed because they appear to significantly influence food decisions.

ACKNOWLEDGEMENTS

I would like to sincerely thank my supervisor, Dr. Theresa Glanville, for her guidance, patience, and motivation throughout the process of completing my thesis. You helped me improve my critical thinking skills and become a better researcher. It is with gratitude that I thank my co-supervisor Dr. Jessica Wegener for her encouragement, insight, and time. With your guidance and help, I was able to overcome challenges and have a rewarding and fulfilling research experience. Thank you to Prof. Judy Fraser Arsenault for being a member of my thesis committee and providing valuable suggestions.

I would also like to acknowledge my volunteers Virginia and Huda, it was a pleasure to working with you!

I want to thank my sister, Tiffany, for her advice and taking the time to edit my drafts. I would also like to thank my mom and dad for their unconditional support during my three years of study. Finally, I would like to extend my gratitude towards my friends who supported me throughout this journey.

This accomplishment would not be possible without all of you!

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 1.0: INTRODUCTION	1
1.1 Problem Statement	1
1.2 Objectives	8
1.3 Research Questions	8
1.4 Definitions of Key Terms	8
CHAPTER 2.0: LITERATURE REVIEW	11
2.1 The Nutrition Environment	11
2.11 Nutrition Information Environment	11
2.12 Positive and Negative Nutrients in Relation to Eating Well with Canada's Food Guide (EWCFG)	11
2.2 Knowledge of Nutrition and Food Literacy Among Canadians	13
2.3 Nutrition Facts Table (Nft)	15
2.31 Overview of the Development and Purpose of the Nft	15
2.32 Use and Impact of Nft Among Canadians	16
2.33 Barriers Associated with the Use of Nft	17
2.4 FOP Labelling System	20
2.41 Considerations of the FOP Labelling System	20
2.42 Categorizing FOP Labelling Systems	22
2.43 Consumers Trust in FOP Labelling Systems	24
2.44 Elements for an Effective FOP Labelling System	25
2.45 Consumers' Understanding of Different FOP Labelling Systems	26
2.451 <i>Comparing Nutrition Specific Systems: Nutrition Panel vs. TL</i>	27
2.452 <i>Consumers Understanding of the MTL System</i>	28
2.46 Consumers' Preference for FOP Labelling Systems	29
2.47 Consumers' Purchasing Behaviour Based on FOP Labelling Systems	31
2.48 Consumers Perceived Healthfulness of FOP Labelling Systems	32
2.49 Conclusion	34
CHAPTER 3.0: THEORETICAL FRAMEWORK	35
CHAPTER 4.0: METHODOLOGY	37
4.1 Research Design	37
4.11 Qualitative Research and Focus Group Interview Sessions	37
4.12 Advantages and Disadvantages of Focus Group Interview Sessions	37
4.13 Grounded Theory Approach	38
4.2 Participant Selection	39
4.21 Recruitment Methods	39

4.22 Inclusion Criteria	40
4.23 Exclusion Criteria	40
4.24 Sample Size	40
4.3 Research Design	41
4.31 Structure of Focus Group Interview Sessions	41
4.32 Resources	43
4.33 Age and Gender Distributions	44
4.331 <i>Modifications to Age and Gender Distributions</i>	44
4.4 Data Collection	44
4.5 Data Analysis	45
4.51 Qualitative Data Analysis	45
4.52 Coding	46
4.53 Credibility of Qualitative Research	47
4.531 <i>Trustworthiness</i>	47
4.532 <i>Conformability</i>	47
4.533 <i>Transferability</i>	48
4.6 Ethical Considerations	48
CHAPTER 5.0: RESULTS	50
<hr/>	
5.1 Demographic Data	50
5.11 Age	50
5.12 Educational Background	50
5.13 Frequency of Grocery Shopping	52
5.2 Themes	52
5.21 Theme: Success of MTL System is Dependent on the Education on the label and Design of the Label	53
5.211 <i>Subtheme: Marketing Scheme</i>	53
5.212 <i>Subtheme: Confusion with Colour Interpretations</i>	56
5.213 <i>Subtheme: Using the MTL System is Time Consuming</i>	57
5.214 <i>Subtheme: MTL System is Missing Key Nutrients and Attributes</i>	59
5.215 <i>Subtheme: Education on the MTL System is Critical</i>	60
5.216 <i>Subtheme: Design of the MTL System</i>	63
5.22 Theme: Consumers Compare Food Products Based on Levels of Negative Nutrients, Nutritional Attributes, Expectations, and Importance of Nutrients in Diet	67
5.221 <i>Subtheme: Ideas for Positive and Negative Nutrients are not from Government Recommendations</i>	68
5.222 <i>Subtheme: Negative Nutrients</i>	69
5.223 <i>Subtheme: Expectations</i>	71
5.224 <i>Subtheme: Trade-Off Concept</i>	72
CHAPTER 6.0: DISCUSSION	74
<hr/>	
6.1 Introduction	74
6.2 Modified Theory of Planned Behaviour Framework	76
6.3 Participants Support MTL System	77

6.4 Additional Nutrients and Nutritional Attributes	78
6.41 Judgeability Theory	79
6.5 Positive and Negative Nutrients	80
6.51 Economic Burden of Chronic Diseases	80
6.52 Fear-Based Messages	80
6.53 Diet-Disease Relationships	81
6.54 Canadians Intake of Positive and Negative Nutrients	82
6.6 Education	83
6.61 Availability of Various Nutrition Resources Impacts Nutrition Knowledge	83
6.7 Expectations and Nutrient Trade-Offs	84
6.71 Systematic Information Processing	84
6.8 Exploring Alternative Labelling Formats	85
CHAPTER 7.0: LIMITATIONS	86
7.1 Recruitment	86
7.2 Dynamics of Focus Group Sessions	86
7.3 Moderator	87
7.4 Interview Guide	87
7.5 Analysis	87
CHAPTER 8.0: CONCLUSION	89
CHAPTER 9.0: RECOMMENDATIONS	91
REFERENCES	92
APPENDICES	
Appendix A: Ethics Approval	100
Appendix B: Recruitment Poster	102
Appendix C: Pre-screening Questionnaire	103
Appendix D: Consent Form	108
Appendix E: Interview Guide	112
Appendix F: Debriefing Letter	117
Appendix G: Key Definition Sheet	118
Appendix H: SHEET B	119
Appendix I: SHEET C	122
Appendix J: SHEET D	125

LIST OF TABLES

TABLE 1: STEPS FOR INTERPRETING NFT.....	16
TABLE 2: AGE AND GENDER DISTRIBUTION OF PARTICIPANTS WITH A BACHELOR'S DEGREE.....	51
TABLE 3: AGE AND GENDER DISTRIBUTION OF PARTICIPANTS WITH A GRADUATE DEGREE.....	51
TABLE 4: AGE AND GENDER DISTRIBUTION OF PARTICIPANTS WITH A COLLEGE DEGREE.....	51

LIST OF FIGURES

FIGURE 1: MULTIPLE TRAFFIC LIGHT (MTL) SYSTEM.....	6
FIGURE 2: FACTS UP FRONT.....	27
FIGURE 3: %DV SYSTEM.....	28
FIGURE 4: COLOUR RANGE LOGO.....	30
FIGURE 5: SIMPLE TRAFFIC LIGHT (STL).....	30
FIGURE 6: THEORY OF PLANNED BEHAVIOUR (TPB) MODEL.....	36
FIGURE 7: GROUNDED THEORY APPROACH.....	38
FIGURE 8: MODIFIED THEORY OF PLANNED BEHAVIOUR FRAMEWORK.....	76
FIGURE 9: 5-COLOUR NUTRITION LABEL.....	85

CHAPTER 1.0: INTRODUCTION

1.1 Problem Statement

Canadians rank food and nutrition as the most important factor for maintaining optimal health (1) with 60% of them being somewhat or extremely concerned about the healthfulness of their own diet (1). Although the majority of Canadians appear to be health conscious, approximately a third of Canadian adults are overweight, while approximately a quarter are obese (2). These statistics are alarming because overweight and obesity are risk factors for chronic diseases (2). In order to help address this negative health outcome, it is critical for the federal government to take action by implementing policies and improving educational programs.

A healthful diet is one of four modifiable risk factors that can help decrease the prevalence of chronic diseases (1). Consumers, however, regularly encounter barriers at the macro, community, interpersonal, and intra-personal levels which hinders their ability to obtain and consume healthy foods (3). The macro level consists of public policies, media advertisements, and development/zoning regulations, which influences accessibility/access to types of foods that promote a healthful diet (4). For example, food-pricing policies affect eating patterns because healthy foods can be more expensive than less nutrient dense foods (4). Community or institutional level barriers in neighbourhoods, work sites, and schools (4) shape consumers' food environment and impacts their ability to consume a healthy diet. For example, consumers may face difficulties accessing healthy foods because grocery stores may have a limited food selection (4), or the distance to a store in the absence of public transportation may be too great. At the individual level interpersonal factors such as food availability at home, time

constraints, screen time, culture, and social support (4) will impact food choices. For example, younger individuals are more likely to associate fast food with friends, socialization, and pleasure in comparison to healthy foods (4). Lastly, at the intrapersonal level factors such as preferences, knowledge, skills, motivation, age, and perceptions, influence what one eats (4). The most common barriers to consuming a nutritious diet includes price, difficulty searching for affordable healthy foods (1), taste, convenience (5), and socioeconomic status. It is important to recognize that the macro, community, interpersonal, and intra-personal levels are inter-connected. For example, promoting changes to nutrition policies (e.g., food labelling) at the macro level can help to relieve some of the barriers consumers encounter at other levels.

Health Canada, the federal government entity that oversees population health, has a broad mandate that includes all areas of health/food such as disease outbreaks, chemicals, and use of medical devices (6). With respect to food and nutrition, through the Office of Nutrition Policy and Promotion, it is responsible for establishing labelling policies, setting dietary standards, and providing advice and information on the safety and nutritional value of foods (7). It also promotes the nutritional health and well being of Canadians by collaboratively defining, promoting, and implementing evidence-based nutrition policies and standards (7). Health Canada also administers (the provisions) of the Food and Drugs Act, which relate to public health, safety, and nutrition (7). Health Canada along with The Canadian Food Inspection Agency (CFIA) are the federal authorities that oversee food labelling requirements in Canada (8). The CFIA oversees food labelling misrepresentation, advertising, grade, and packaging (8). However, both

entities enforce laws and regulations (Consumer Packaging and Labelling Act) to help protect the health and safety of Canadians (8, 9).

Health Canada developed educational tools (e.g., inpatient and outpatient education, packages for newcomers to Canada, and public health units) and nutrition resources (e.g., teaching Eating Well with Canada's Food Guide to students) to promote a healthy diet that allows Canadians to consume adequate amounts of positive and negative nutrients. However, based on the results of the Canadian Community Health Survey 2.2, Canadians lack sufficient amounts of magnesium, calcium, fibre, iron, potassium, and vitamin D (10-12). For the purposes of this study, these nutrients are positive nutrients because they aid in health promotion. On the other hand, negative nutrients refer to fat, trans fat, sodium, and sugar because research demonstrates a link between excess consumption of negative nutrients and higher disease risk.

In January 2003, Health Canada and the CFIA established the Nutrition Facts Table (Nft). Canadians pressured the government to standardize labels so they could be more aware of the amounts of positive and negative nutrients in food products (13). The Nft is a population-level educational tool that appears on food labels to inform consumers about the nutritional value of food products. It helps consumers compare food products and they view it as a source of trustworthy nutrition information (14). However, Canadians often face difficulties using the Nft as a source of nutrition information. Some of the identified challenges with using the current Nft include: a need for numerical comprehension and a need for significant cognitive effort (14). All Canadians may not

have the numeracy skills required to understand and compare serving sizes and Percent Daily Values (%DV) (14). The %DV is important because it describes the relative amount of a nutrient in a serving compared to the amount of the nutrient that individuals should consume in a day (10). Consumers who lead busy lifestyles may also feel unmotivated to use food labels, as it requires time to interpret and process information on the Nft (14). As a result, consumers may unknowingly be purchasing food products that are not consistent with Health Canada's recommendations for a healthy diet.

Recently, the United States (US) implemented changes to its Nft because of the difficulties consumers face when trying to interpret it. The United States Food and Drug Administration (USDA) implemented several food-labelling changes including updated nutrition science information, revised serving size requirements, and a refreshed design (15). Health Canada has since proposed similar food-labelling changes to help consumers better understand the Nft and to improve health outcomes. Health professionals are also urging Health Canada to implement these changes because it will make labels more visible, clear, and consistent, enabling Canadians to make healthier food choices (10)(16). Health Canada intends to alter its Nft by re-prioritizing the nutrients list, including information on added sugars and %DV of total sugars, stating potassium and vitamin D amounts, and including a message to explain the %DV concept which will help consumers understand the significance of the level of positive and negative nutrients in a food product (10). Along with these improvements, the addition of identifiable colours or images can further reduce difficulties with label reading.

Front of Package (FOP) labelling systems are an alternative way to display nutrition information. The Heart and Stroke Foundation of Canada first introduced the concept of FOP labelling systems to the Canadian market in 1999 to address consumer confusion (17). FOP labelling systems, such as the Health Check Program, allows consumers to quickly compare food products to determine which products meet their nutritional goals at the point of purchase (18). They use nutrient rating criteria and symbols to highlight specific nutrients, and it allows consumers to gain an overall perspective of a product's nutritional profile (17). Symbols are usually present on the display panel of a product, but may also be found on the side, top, or back panels, or on shelf tags (17). One major drawback of FOP labelling systems is that they are currently voluntary and unregulated in Canada (18). As a result, food manufacturers can create their own FOP labelling system based on their own criteria and use it to market their products. Food manufacturers can decide and highlight which nutrients appear on the front of their packages. This creates confusion among consumers because it means that several different types of FOP labelling systems, with inconsistent criteria, are available in the market. For instance, a survey of pre-packaged foods in three major Toronto supermarkets revealed 30 different FOP labelling systems for fibre (19). The current FOP labelling systems are also misleading because consumers focus on the highlighted nutrients in food products and ignore the levels of other nutrients. Both of these drawbacks help to emphasize the need for regulating and standardizing FOP labelling systems to more effectively help consumers make healthier food choices.

The FOP labelling system with the most empirical support is the Multiple Traffic Light

(MTL) system (20-22), which was created by the United Kingdom’s (or Britain’s) Food Standards Agency (FSA). The MTL system is a nutrient specific system that highlights and colour codes only negative nutrients such as fat, sugar, and salt to help consumers make healthier food choices (17). A green light represents low levels, an amber light represents medium levels, and a red light represents high levels of a negative nutrient (17). The MTL system also contains additional text and nutrient reference values to help consumers interpret the overall nutritional value of a product (23). It guides consumers to healthier food choices because they simply have to choose products that contain more images of green and/or amber lights and fewer foods with red lights. The MTL system is effective because it contains interpretable information such as Calories per serving, daily caloric requirement information, and text to indicate high/medium/low nutrient levels (22). In September 2013, modifications were applied to the MTL system including the elimination of interpretive colour for energy (Calories) value, displaying the Kilojoules (kJ) value alongside the Calories (kcal) value, and replacing the phrase “[%] of your Guideline Daily Amount” with “% of the Reference Intakes” (Figure 1).

Figure 1: Multiple Traffic Light (MTL) System



In Canada, research on the MTL system is limited and its impact on consumers’ food behaviours is unclear. Furthermore, the majority of research on this topic has taken place outside of Canada, in countries such as Europe, Australia, New Zealand, and the US. As little research currently exists overall, there is not a clear understanding of how the MTL

system affects actual purchase decisions, food consumption, and food behaviour in diverse populations (e.g., children, adolescents, demographics, and ethnicities). In particular, purchasing behaviour is an area of uncertainty because the majority of previous studies were based on self-reported measures. It has been shown that self-reported evaluations of consumers' intention to use nutrition labelling systems are a poor predictor of how they will actually use them (24). In conclusion, future research should assess the needs and preferences of target audiences to better understand the factors that influence consumers' food choices and purchasing behaviour.

The intent of this study is to explore Canadians' response to the MTL system and how they make food decisions when they compare key nutrients on a dichotomous MTL system that contains positive and negative nutrients. Food products that can be high in a positive nutrient and low in a negative nutrient are said to have a dichotomous health message. For example, a product could be considered healthy because it aids in minimizing disease risk by being low in fat, sugar, and sodium. At the same time, another product within the same category could be considered healthy because it promotes health by being high in fibre, calcium, and vitamin D. Examples of food products that may have dichotomous health messages include yogurt (e.g., low in fat and high in calcium) and crackers (e.g., low in sodium and high in fibre). When consumers make a food product decision by comparing food products that are either high in a positive nutrient or low in a negative nutrient, there may be a significant impact on their dietary patterns, and potentially on their risk of developing chronic diseases. Although individual food choices may not significantly impact health outcomes, the pattern of food

selection over time may help decrease the rates of chronic diseases.

1.2 Objectives

1. To examine the impact of adding positive nutrient indicators to the MTL system as the current model only includes sodium, sugar, saturated fat, and total fat
2. To assess consumers' response to dichotomous health messages on the MTL system
3. To determine whether demographics (e.g., age and/or gender) impact consumers' response to dichotomous health messages on the MTL system
4. To determine whether consumers identify health properties of selected nutrients as being positive or negative

1.3 Research Questions:

How do Canadian consumers respond to the inclusion of positive nutrients (e.g., vitamin D, calcium, and fibre) on the MTL system? Do they value the MTL system itself?

When consumers compare food products using the MTL system, do they place a greater value on food products that are high in a positive nutrient (i.e., nutrients that promote health) and/or low in a negative nutrient (i.e., nutrients to limit to avoid illnesses)? Are consumers aware of what constitutes a positive and negative nutrient?

Do gender and/or age impact consumers' response to dichotomous MTL system?

1.4 Definition of Key Terms

High in calcium: The food provides $\geq 15\%$ of RDI. Products that contain 25% or more of

the total nutrient level through fortification of additives are not permitted to include this label (25).

High in fibre:

1. The food contains 4 g or more of A) fibre per reference amount and serving of stated size, if no fibre or fibre source is identified in the statement or claim or B) each identified fibre or fibre from an identified fibre source per reference amount and serving of stated size, if a fibre or fibre source is identified in the statement or claim (26).
2. The food contains at least one ingredient that meets the condition set out in (1), if the food is a pre-packaged meal (26)

High in iron: Provides $\geq 15\%$ of RDI (14 mg). A product that contains $\geq 25\%$ of the total nutrient level through fortification or additives is not permitted to include this label (25).

High in magnesium: Provides $\geq 15\%$ of RDI. A product that contains $\geq 25\%$ of the total nutrient level through fortification or additives is not permitted to include this label (25).

High in potassium: Provides at least 350 mg per serving of stated size (27)

High in vitamin D: Provides $\geq 15\%$ of RDI (600 IU). A products that contains $\geq 25\%$ of the total nutrient level through fortification or additives is not permitted to include this label (28).

Low in fat: Contains ≤ 3 g of fat per serving of stated size and reference amount (29)

***Low in saturated fats:** Contains ≤ 2 g of saturated fat and trans fat combined per A)

reference amount and serving of stated size; or 100 g, if the food is a pre-packaged meal and B) The food provides $\leq 15\%$ energy from the sum of saturated fat and trans fats (30).

***Low in trans fats:** Contains < 0.2 g of trans fat per A) reference amount and serving of stated size, or serving of stated size, if the food is a pre-packaged meal and B) meets the conditions set out for "low in saturated fats" (30).

Low in sodium:

1. Food that contains ≤ 140 mg of sodium per reference amount and serving of stated size and if the reference amount is ≤ 30 g or ≤ 30 mL per 50g (31).
2. Food that contains ≤ 140 mg of sodium per 100 g if the food is a pre-packaged meal (31).

Lower in sugar: Compared to a reference food of the same food group, a product must contain $< 25\%$ of sugars or < 5 g sugars per reference amount (13).

Note 1: Optional %DV for: cholesterol, folate, magnesium, niacin, phosphorus, potassium, riboflavin, selenium, thiamine, vitamin B12, vitamin B6, vitamin D, vitamin E, zinc, and other vitamins and minerals.

*Note 2: For the purposes of establishing low, medium, and high levels of saturated fat for yogurt packages, and a combination of saturated and trans fat for cracker packages: low referred to a product that was $\leq 5\%$ of daily intake, medium referred to a product that was $> 5\%$ and $< 15\%$, and high referred to a product that was $\geq 15\%$.

CHAPTER 2.0: LITERATURE REVIEW

2.1 The Nutrition Environment

2.11 Nutrition Information Environment

The federal government is primarily responsible for developing nutrition resources that are available to consumers in the information environment (8). The information environment is established through the production of information, its dissemination to consumers and suppliers, and the creation of food products that could influence dietary changes (32). More specifically, the federal government provides funding for pertinent research on disease relationships, develops expert assessments based on the body of scientific literature, and produces behavioural data on diet and health issues (32). The federal government uses various vehicles to communicate current evidence including: dietary tools (e.g., Eating Well with Canada's Food Guide), third party dissemination (e.g., press and authors, professionals/experts in the field), regulation of voluntary claims in the food industry, and through the development of mandatory nutrition labelling policies (32). The information environment has a powerful impact on food behaviour because it influences consumers' awareness of key nutrients and, consequently, has the potential to influence their food choices and dietary behaviours (32). As a result, standardized and regulated FOP labelling systems are required for consumers who are comparing products with varying levels of positive and negative nutrients.

2.12 Positive and Negative Nutrients in Relation to Eating Well with Canada's Food Guide

In order to decrease consumers' risk of developing chronic diseases, the federal

government developed nutrition resources such as the Eating Well with Canada's Food Guide (Canada's Food Guide, or CFG). This evidence-based dietary tool encourages Canadians to consume a diet low in trans fat, salt, fat, saturated fat, sugar, and cholesterol (33). A diet that is high in trans fats (>1% of daily energy intake), for example, raises the levels of unhealthy low-density lipoprotein (LDL) cholesterol while lowering levels of healthy high-density lipoprotein (HDL) cholesterol (34). LDL cholesterol has been shown to cause blockages in the arteries and increase the risk of developing high blood pressure, atherosclerosis, heart attack, and stroke (34). Diets that are high in sodium (> 2300 mg per day) have been shown to increase blood pressure by drawing water into the vascular system and increasing blood volume (35-37). Lastly, when energy from sugar exceeds 25% of calories, it increases the risk of displacing other vitamins and minerals in the diet (37), especially in those with a low total energy intake.

In contrast, the CFG encourages Canadians to consume a diet rich in lean meats or meat alternatives, fruits, vegetables, and whole grains (33). These recommendations help promote optimal health by helping Canadians meet their daily consumption of nutrients such as fibre, vitamins, and minerals. Health Canada states, however, that Canadians are currently not consuming enough fibre, vitamin D, magnesium, calcium, and potassium (38). This may be due to several factors including busy schedules, lack of time to prepare meals, exposure to various conflicting nutrition messages, and limited food availability (14). A fibre rich diet is important because it helps prevent the onset of obesity, certain cancers, and coronary heart disease (39). Similarly, a diet that includes vitamin D and calcium is key as they play an important role in maintaining bone health (40). Potassium

is also important because it lowers blood pressure, reduces cardiovascular disease mortality, decreases the risk of osteoporosis, and prevents or delays the progression of renal disease (41). Low iron levels are prevalent among young children, pregnant and pre-menopausal women, athletes, vegetarians and older adults (42). Iron is responsible for carrying oxygen throughout the body, and is more effective in its heme form (e.g., iron from meat, fish, and poultry) (42). Finally, magnesium is responsible for maintaining health, using energy to form proteins; and is important for bone, muscle, and nerve function (43).

Messages conveyed by the CFG may affect food decisions and behaviours because it may encourage consumers to search for food products that are high or low in specific nutrients. Although some FOP labelling systems express levels of nutrients directly, the Nft, which is most commonly used on food packages, requires consumers to determine if food products contain high and/or low levels of nutrients by comparing the %DV. Currently, Canadians generally search for information on whole grains (82%), fibre (81%), protein (76%), total fat (75%), calories (74%) and sugar (73%) (5). This trend may coincide with messages that are being broadcast in the nutrition information environment, and thus, demonstrates the powerful impact these messages have on food behaviour.

2.2 Knowledge of Nutrition and Food Literacy Among Canadians

Despite the abundance of nutrition resources available from the federal government, Canadians have a general understanding of food, nutrition, and health but experience

difficulties connecting these concepts together (44). This can be partially attributed to the low rates of food literacy among Canadians. Food literacy is defined as an individual's food related knowledge, attitude, and skills (44) and is critical for using and interpreting the Nft. Currently, only 38% of Canadians consider themselves to be very knowledgeable about food and nutrition, and this percentage has remained stable over the last 20 years (5). This low percentage is alarming because it may mean that Canadian label users are not properly using food labels to their full advantage. Non-label users may also not understand the importance of reading food labels to guide their food choices. It can be said then, that the current Nft may not be a suitable tool for Canadians as some groups could lack the knowledge required to interpret serving sizes and %DVs (14, 44).

The state of nutrition knowledge and food literacy among Canadians further supports the need for a standardized and regulated FOP labelling system that is simple, consistent, and easily understood. Currently, however, multiple FOP labelling systems exist and are unregulated and not standardized. By using these inconsistent FOP labelling systems, consumers may mistakenly believe a product is healthier than another. This can occur when the label indicates that a product has high or low levels of a specific nutrient that they feel is relevant to their health. As a result, consumers may ignore the levels of other nutrients in the product and assume the product is generally healthy. It is critical to determine which nutrients are important to consumers, and how these nutrients impact consumers' assessment of the nutritional value of a food product. This will help to inform FOP labelling system policies and allow health educators to design programs that

address knowledge gaps related to FOP labelling systems and nutrients.

2.3 The Nutrition Facts Table

2.31 Overview of the Development and Purpose of the Nft

In 2003, the Nft was introduced in Canada and was mandatory for all pre-packaged food products (13, 18). The regulated Nft is an important source of nutrition information and is based on a 2000-Calorie diet (45). It provides details on Calories, Calories from fat, 13 core nutrients, serving size, servings per container, and %DV (45). In Canada and the US, the energy value of a food product is expressed in Calories (Kilojoules in other parts of the world) and is calculated based on the nutrient content values of alcohol, protein, carbohydrates, and fat in a food item (46). The serving size is defined as the quantity of food that can be reasonably consumed at a single eating occasion and is based on reference amounts developed by the CFIA (46). The serving size must also be expressed as a consumer friendly measure and in metric units (46). Core nutrients that are present on a food label include fat/fatty acids, sodium, potassium, carbohydrate, sugar, protein, vitamins, and minerals (46). Fats, saturated fats, trans fats, sodium, carbohydrate, fibre, vitamin A, vitamin C, calcium, and iron are translated into %DV in order to help consumers interpret and compare the amount of nutrients and the nutritional value of food products (47). It is calculated as: $\% DV = [\text{Amount of nutrient per serving} \div \text{Daily value of nutrient}] \times 100\%$. Health Canada (2011) recommends three steps (Table 1) to interpret the %DV and serving size to help consumers choose the healthier food option when they are comparing food products (48).

Table 1: Steps for interpreting the Nft

1. The first step requires consumers to examine the serving size and compare it to the amount they typically consume (49).
2. The second step involves reading the %DV to determine if the food contains a little or a lot of a nutrient (49). A %DV that is 5% or less it indicates low levels of a nutrient, and 15% or greater indicates high levels of a nutrient (49).
3. Finally, the third step requires consumers to consider the nutrients they want less or more of in their diet (49).

2.32 Use and Impact of Nft Among Canadians

Approximately more than half of the Canadian population uses the Nft because they view it as a source of important nutrition information (50). In fact, the national Tracking Nutrition Trends survey showed that 71% of adult Canadian food label readers looked for the Nft (5). Compared to FOP labelling systems, the Nft is viewed as more consumer friendly in terms of likability, helpfulness, credibility, and influence on purchase decisions (51). Nft use is dependent on several factors including gender, age, race, income, and health behaviours (50) all of which can influence an individual's motivation and level of food literacy. The majority of label users are young adults or middle aged Caucasians (50). In terms of gender, women are more likely to use Nft compared to men (50). Label users are typically individuals who are: married, more literate and educated, older, regularly physically active, part of a larger household, have healthy eating habits, concerned with dietary guidelines, and place a greater value on the nutritional quality of food (50). Individuals who have a lower income status and minimal nutrition knowledge are less likely to use nutrition labels (50). The variability in label use suggests that the Nft is not useful for certain segments of the Canadian population. This could be due to

several circumstances such as poor food literacy skills, lack of motivation, and time constraints (14). As a result, it is not the most effective population health approach to use in order to promote a healthy diet to reduce the rates of chronic diseases.

Although there is a positive relationship between Nft use and healthier diets, it is only present in certain populations as food behaviour is affected by age, socioeconomic status, gender, education, and ethnicity/race (50). Nft users exhibit lower fat, sodium, cholesterol, and energy consumption (50). They are also more likely to consume healthier varieties of food, and in turn, increase their intake of fibre, iron, and vitamin C (50). These results indicate that food labels have the potential to improve Canadians' dietary habits and decrease their risk of developing chronic diseases. However, food-labelling efforts need to be modified to help non-label users overcome barriers to label use.

2.33 Barriers Associated with the Use of the Nft

Barriers that affect the use of the Nft among Canadians are trust, time, food literacy skills, confusion, taste, price, convenience, habits, preference, brand loyalty, and lack of interest (14).

Trust is one of the major factors that affects Canadians' use of the Nft. Trust refers to consumers' belief that the labels are regulated and credible. Although the Nft is regulated, consumers' trust in the Nft is variable (14) being greatest among younger respondents and individuals with higher levels of education (50). The variation in trust

could possibly stem from a lack of food labelling education, and consequently, low nutrition knowledge.

Time is another barrier that affects the use of the Nft because consumers may not necessarily have sufficient time to process the information and compare food labels (14). The Heuristic-Systematic Model of Information Processing supports the notion that individuals are guided by a principle of least effort when they receive and process persuasive messages (52). Comprehending and interpreting the Nft requires a significant amount of cognitive effort because consumers must calculate the %DV relative to the serving size (52). More specifically, consumers may need to identify the amount of a specific nutrient a product contains, assess what counts as a low or high amount of the nutrient, decide the overall healthiness of a product, compare a specific or overall nutrient content of a product with one or more similar products or between different types of products, calculate the amount of a nutrient eaten in a serving, and assess the product in the context of a meal choice or daily intake (53). As a result, consumers may often use other features on the label to evaluate the nutritional value of a product (54). Therefore, Nft should be altered to include more direct messaging to reduce the cognitive effort required for interpretation. Interestingly, eye-tracking technology was used to examine the relationship between the time viewing nutrition information and the nutrient quality of food products chosen (54). However, there was no significant relationship between label viewing time and the nutrient density food score (54). This shows that consumers who spend more time viewing Nft during a single shopping trip may not select more nutritious foods (54). This may be due to their inability to properly interpret the

numerical values on the Nft.

Consumers' poor nutrition knowledge is another barrier that affects their ability to meet their own individual nutritional requirements (14, 44). Approximately 80% of the general Canadian population uses the Nft to compare food products, however, the majority of that percentage has difficulties comprehending the quantitative aspects of the Nft such as %DV, serving size, and recommended daily amounts (50). This problem is especially prevalent among people who have diabetes, patients with chronic kidney disease, older adults, adolescents, infrequent label users, and individuals with lower levels of education (50). As a result, these vulnerable groups are comparing food products based on other factors such as brand, price, nutrition claims, and ingredient lists (5, 14). As previously mentioned, the % DV helps consumers compare food products. Consumers, however, tend to use individual nutrients' absolute amounts (e.g., milligrams and grams) rather than the %DV (14). This demonstrates the ineffectiveness of having the %DV on Nft because comparing absolute amounts of individual nutrients requires more numeracy skills and food literacy than comparing %DVs. It also shows that consumers are not well educated on the Nft despite current efforts.

To address some of these barriers, modifications should be implemented to strengthen nutrition education programs (55) and/or food labelling policies. This will help provide consumers with a better understanding of the roles and function of nutrients, and may impact their decision making process. In addition, the Nft needs to be simpler and more comprehensible to promote label use and to effectively help current label users choose

the healthiest food option when they compare food products. This involves developing a new and innovative approach to labelling.

In 2014, Health Canada consulted Canadian parents and consumers to determine how the current Nft could be improved to address some of its limitations. Health Canada is in the process of revising the Nft and suggestions were published in Canada Gazette I. Changes include (56):

- Adding vitamin D and potassium and removing vitamin A and C from the micronutrient list
- Declaring “added sugars”
- Using 100 grams as the basis for calculating the %DV of total sugars
- Grouping sugar based ingredients under one ingredient termed “sugars”
- Regulating and making more realistic serving sizes
- Ensuring that the serving size and Calories stand out on the label
- Including a footnote at the bottom of the Nft to explain the %DV concept
- Making the ingredients list and allergens easier to read and find
- Identifying food colours by their common name
- Listing nutrients that provide Calories under the Calories heading

2.4 FOP Labelling Systems

2.41 Considerations of the FOP Labelling System

In 1999 the Canadian Heart and Stroke Foundation introduced the “Health Check” program, which is a type of FOP labelling system that helps consumers easily identify the

nutritional value of food products by summarizing the its key nutritional characteristics (17). FOP labelling systems are designed to combat the limitations associated with NfT and enables consumers to make informed food selections at the point of purchase (18). FOP labelling systems are successful if consumers notice them, understand and compare the contents of them, and use them to purchase a food product that is in line with the objectives of the CFG. A single FOP labelling system could potentially be very effective if it was standardized and regulated because it would provide simple and practical nutrition information.

Several different FOP labelling systems are present in the food market and it is one of the highest forms of nutrition marketing, after nutrient content claims, found on pre-packaged foods in Canadian grocery stores (57). This is because globalization and food trends drive food manufacturers to continually create or modify products to remain competitive in the market. Consequently, they initiate changes in branding, advertising and promotion, distribution, product quality, and price of food products (58). A significant portion of the food package is dedicated to the use of colours, typography (style and appearance), images, and messages to attract and appeal to consumers' attention (17). Approximately 48% of Canadian food packages advertise nutrition information to help market the product (57). Researchers used the Food Label Information Program (FLIP) database to gather data on Canadian food package labels to measure the prominence of FOP labelling systems in the market (57). Results showed that 18.9% of products contained a FOP labelling system and that there were 158 unique FOP labelling systems identified (57). More specifically, 80 products contained a

Nutrient Specific System, 11 products used a Summary Indicator System, 47 products contained a Food Group Information System, and 20 products used a Hybrid System (i.e., combination of 2 or more systems) (57).

Health professionals criticize the current FOP labelling systems because they appear to mislead and cause consumer confusion. This is because food manufacturers take advantage of unregulated labelling opportunities to market their product. Food manufacturers create their own criteria in order to highlight the nutritional benefits of food products that may not necessarily support a healthy diet. This contributes to consumer confusion because they assume that the product is healthy when it is not. Furthermore, food industries do not support the regulation and standardization of FOP labelling systems because they would have to display a complete nutritional profile of their food products. As a result, the amounts of negative and positive nutrients would be clearly defined for consumers so that they could make more informed food choices. Regulating and standardizing FOP labelling systems would ensure that consumers are comparing products on an equal basis.

2.42 Categorizing FOP Labelling Systems

As previously mentioned, there are three types of FOP labelling systems that are available on the market. The Nutrient Specific Summary System displays the amount per serving of certain nutrients from the Nft right on the front of the food product (59). Information is expressed as a %DV or through Guideline Daily Amounts (%GDA) (59). Nutrient Specific Summary Systems can also take the form of symbols that are based on

claim criteria or incorporated with colours and words to indicate levels of specific nutrients (“high”, “medium”, and “low”) (59). As well, the Calories per serving may be presented on the front of the food package (59). The Nutrient Specific Summary Systems that are presented as a nutrition panel (e.g., nutrition highlights and MTL system) appear to be the least misleading, as it is essentially an abbreviated version of the Nft. The additional text and colours help consumers interpret the numerical values and allows them to conclude the overall nutritional value of a food product. Examples of Nutrient Specific Summary Systems include the General Mills Nutrition Highlights and Goodness Corner, Harris Teeter Wellness Keys, Kellogg’s Nutrition at a Glance, UK Traffic Light, and Wegmans Wellness Keys (59).

The Summary Indicator System uses a single symbol, icon, or score to summarize the nutrient content of a food product (59). Specific information on nutrients is not displayed. This system specifically uses nutrient thresholds or algorithms to evaluate and determine if the food product can carry a symbol, icon, or score (59). As a result, consumers must refer to the Nft for more nutrition information details. Since criteria for including a Summary Indicator System is unregulated, food manufacturers can easily use this labelling system to disguise unhealthy food products. Examples includes Canada’s Health Check (Heart and Stroke Foundation of Canada), Smart Choices Logo, Guiding Stars (Loblaws), Heart Check (American Heart Association), NuVal, Smart Choices, Sweden’s Keyhole (Swedish National Food Agency), and Australia/New Zealand’s Tick Programme (Heart Foundation) (59).

Finally, the Food Group Information System is a symbol that is displayed on a packaging

label if a food group or food ingredient is present (59). Similar to the symbols that are used in the Nutrient Specific System, this type of labelling system can possibly be misleading for consumers. For example, consumers who are specifically interested in fibre may assume that a product with a whole grain symbol is overall healthy without consulting the Nft. Examples of Food Group Information Systems include the Whole Grain Council Whole Grain Stamp and the ConAgra Start Making Choices (59).

2.43 Consumers' Trust in FOP Labelling Systems

FOP labelling systems are not widely used as a source of nutrition information because it appears as a marketing scheme to consumers. Only 23% of Canadian label readers are searching for nutrition information using healthy slogans, logos, or symbols (5).

Consumers believe that the government controls what consumers eat by using FOP labelling systems (22). In addition, they assume that the purpose of FOP labelling systems is to market food products (22). Although only a small percentage of the population use FOP labelling systems, approximately 65% of Canadians strongly believe that a regulated and standardized FOP labelling system should be present on all food packages (59). FOP labelling systems will be maximally effective if the label is perceived as credible (22). Individuals consistently desire a label where the definition of healthfulness is understood and comes from a trusted source (22). It is important to educate consumers about the nature of FOP labelling systems and how they should be interpreted. This may help minimize the concerns regarding credibility and misrepresentation of FOP labelling systems.

2.44 Elements for an Effective FOP Labelling System

Specific features can be incorporated into the design of FOP labelling systems to help improve consumers' purchasing behaviour, attention to and use of the label, and comprehension of nutrition information. The Institute of Medicine (IOM) reported that an effective FOP labelling system should be simple, interpretive, and ordinal (18). More specifically, simplicity is achieved if consumers do not need to rely on nutrition knowledge (18). Interpretive refers to a labelling system that provides guidance rather than information alone (18). Lastly, ordinal involves a FOP labelling system that uses a scale or ranking approach (18). To minimize confusion, food labels should not contain percentages and should include minimal text to help consumers interpret nutrient levels (22, 46). A well-designed FOP labelling system should also present information on key nutrients such as total fat, saturated fats, sugar, and sodium (47). The MTL system satisfies the majority of these requirements because it highlights key nutrients and uses a combination of colour and text to indicate nutrient levels and guides consumers to the healthiest food option.

Other factors that affect the success of FOP labelling systems include the size of the FOP labelling system, colour scheme, and location on the package. For instance, attention is more accurate and faster when a FOP labelling system is doubled in size, contains a monochromatic colouring scheme, and is consistently located on the top-right corner of all food packages (60). However, further research needs to be conducted in this area to establish formal specifications for graphical and technical requirements (22) such as the orientation, exact measurements of a FOP labelling system, colouring scheme, type and

size of font, appearance on different containers, and the order and type of nutrients. Specifications are essential because a standardized FOP labelling system will be more credible to consumers. This will help encourage label use among non-label users and ensure that consumers are accurately interpreting labels to make healthier food choices when comparing food products.

2.45 Consumers' Understanding of Different FOP Labelling Systems

Consumers can generally comprehend most FOP labelling systems (61, 62), but the coexistence of several FOP labelling system formats in the market cause consumer confusion (63). Researchers have been unable to identify the most effective FOP labelling system that should be used as the standard for consumers. It is difficult to determine a standard FOP labelling system model because consumers' understanding of FOP labelling systems is dependent on multiple demographical factors such as education and socioeconomic status. For example, older adults (65+), people with lower levels of education and individuals with lower socioeconomic status are less likely to interpret FOP labelling systems accurately (61). Furthermore, it is challenging for researchers to evaluate all FOP labelling systems because manufacturers continually create new variations of FOP labelling systems that fall within the three categories. Presently, the majority of research compares the general Traffic Light (TL) system to the Facts Up Front, %DV, MTL system, and the Single Summary Indicator System. However, the TL system shows promising results because it is an improvement from the Nft. Preliminary research shows that a Nutrient Specific Summary System is most comprehensible for consumers because it provides sufficient nutrition information for consumers to

determine the overall healthiness of food products (2).

2.451 Comparing Nutrition Specific Systems: Nutrition Panel Versus TL System

The concept of the TL system appears to be more comprehensible to consumers in comparison to alternative FOP labelling systems because it displays numerical values alongside colour coded high/medium/low level indicators. This is possible because the TL system requires a lesser degree/amount of processing depth (64). For instance, researchers measured and compared consumers' comprehension of the Facts up Front display (Figure 2) and the TL system by using a series of quizzes that evaluated their nutritional knowledge (65). The results of the study showed that consumers scored higher on the quizzes when they were presented with a TL system that contained levels for positive and negative nutrients (e.g., Calories, saturated fat, sugars, sodium, protein, and fibre indicators) (65-66).

Figure 2: Facts Up Front



Similarly, another study compared the TL system and the %DV system (Figure 3) to determine which system helped consumers correctly identify the healthier food product (67). The results indicated that consumers who used the TL system were five and three times more likely to identify the healthier product compared to a monochrome version of the %DV and colour coded version of the %DV respectively (67).

Figure 3: %DV System



2.452 Consumers' Understanding of the MTL System

A balanced FOP labelling system that combines text, %DV, and traffic light colours can help minimize confusion related to the interpretation of nutrition information. For example, consumers are able to interpret and compare products more effectively using the MTL system and an MTL system paired with caloric information, in comparison to Single Summary Indicators on food packages (65). It is important to note that providing a vast amount of nutrition information on a FOP labelling system can compromise consumers' ability to interpret nutrition information (65). At this point, the MTL system seems to be the most ideal option because it encompasses the ideal characteristics for a comprehensible FOP labelling system.

Potential drawbacks associated with the MTL system have been identified. For example, consumers may experience difficulties interpreting the colour of the lights because some participants do not realize that the red/amber/green colours are meaningful (61). In addition, consumers may believe that the colours are related to specific nutrients and standards (61). Even though a green traffic light seems to increase the perceived healthfulness of a food product among consumers who are health conscious (68), consumers who have visual impairments (e.g., colour blindness, etc.) may experience difficulties using and interpreting colours on the MTL system. These issues can be

resolved by including the interpretive text that indicates high/medium/low levels of certain nutrients. Another potential drawback is that consumers may be swayed by a red light for an individual nutrient when the product as a whole is healthier compared to other products within that category (66). Also, consumers may find it difficult to choose the healthier product if they compare products that have the same pattern of lights (66).

2.46 Consumers' Preference for FOP Labelling Systems

Consumers' preference for a FOP labelling system is an important consideration because it may affect consumers' attention and use of labels. Surprisingly, consumers' preference for a FOP labelling system is independent of how well they comprehend a label. For example, one study indicated that Australian participants viewed the TL system (lists grams of nutrient but not %DV) as a marketing scheme and preferred using a colour coded system that contained %DVs (65). Participants found that this FOP labelling system provided detailed nutrition information and thus they found it helpful, influential in purchases, and credible (69). This study demonstrated a disjuncture between understanding and preference because systems that contained %DV appeared to be less comprehensible to participants compared to the TL system (65, 69).

Preferences for FOP labelling systems are largely influenced by demographic factors. Individuals with higher education favour the MTL system (that does not list grams or %DV for nutrients) and the Colour Range Logo (CR) (Figure 4) (70). This group also exhibits higher nutrition knowledge and likelihood of reading nutrition information on food packages (70). The CR is different from the MTL system because it positions the

nutritional quality of a food product on a colour scale, and thus does not provide a categorical judgment (62). It uses a continuous colour gradation from green to red, passing through orange and yellow intermediate areas (62). The closer the star is to the green area the healthier the product (62). Self employed individuals, farmers, and managerial staffs prefer the CR logo (70). Employees and manual workers are more favourable towards the Simple Traffic Light (STL) (Figure 5) (70). These individuals are more likely to have limited nutrition knowledge and rarely used food labels (70). The STL proposes either a positive, neutral or negative judgment, plus advice relating to consumption frequency. These findings highlight the complexity of developing a simple labelling scheme that can be interpreted and used by all groups within the population because there are several factors that must be considered. This includes demographics, preference for a FOP labelling system, and comprehension of FOP labelling systems.

Figure 4: Colour Range Logo



Figure 5: Simple Traffic Light (STL)



Although there are mixed results for the most preferred FOP labelling system, there is a large support for the MTL system. The MTL system is an ideal option because it is

easier to understand and is viewed to be trustworthy and appealing (22). An online survey distributed to Canadians revealed that more than half the participants preferred the TL system (lists grams but not %DV) compared to the single summary indicators (e.g. Health Check and Smart Pick) (69). In addition, label users and non-label users in New Zealand preferred the STL and MTL system (does not list grams or %DV of nutrients) most often compared to the Nft and %DV formats (71). All in all, there are a very limited number of studies that examined consumer preference.

2.47 Consumers' Purchasing Behaviour Based on FOP Labelling Systems

Examining the impact of FOP labelling systems on use and purchasing behaviour is crucial as it ultimately determines whether the FOP labelling system initiative supports public health goals. Currently, there are a limited number of studies that examined the impact of FOP labelling systems on actual sales of food products. Currently, 78% of Canadians sometimes use FOP labelling systems and 6.7% only use them during the first time they purchased a product (69). Moreover, women are more likely to use FOP labelling systems when they make food purchases in comparison to men (2).

No distinct pattern exists between food purchases and the type of FOP labelling system that is present on the display panel. Products with a single summary indicator (e.g., Choices Logo) are used for purchases of dairy products followed by oils and fats, vegetables and fruits, and soup (72). In addition, the TL system has no affect on consumers' food purchases (73), which can be attributed to the lack of trust in FOP labelling systems. Presence of an FOP labelling system also led to significant and

positive changes in consumers' purchase intentions towards a product regardless of label size, nature of the FOP labelling system used, and nutritional value of the food product (74).

2.48 Consumers Perceived Healthfulness of FOP Labelling Systems

Consumers' perceived healthiness of a food product increases when a FOP labelling system is present on a food package. For example, one study indicated that 50% of their participants believed FOP labelling systems could effectively guide consumers to a healthier choice (2). Approximately 44% of participants believed that a FOP labelling system also changed their perception of a healthy diet (2).

Using the TL system, the perceived healthfulness of an item is dependent on the type of food product. For example, a TL system (does not list grams or %DV of nutrients) decreases the perceived healthiness of foods that are part of the four food groups in the CFG while increasing the perceived healthiness of foods that are not part of the four food groups (2). This leads to difficulties in developing a single FOP labelling system because one type of system can influence peoples' perceptions in very different ways (2).

Health perceptions were also assessed using a frozen chicken dinner with a Smart Choices Logo, a TL system with %GDA (similar to MTL system), and no logo (75).

Participants viewed an unhealthy product as being healthier and having lower levels of negative nutrients when it had the Smart Choices logo and TL system with %GDA.

Therefore, they appeared to judge the overall nutritional value of a food product based on

the presence of FOP labelling systems rather than its nutritional content. In contrast, another study found that the perceived healthiness of a product did not differ between %GDA, TL (lists grams but not %DV of nutrients), and nutrition table formats (64).

A discrepancy exists between perceived healthiness of a food item and intent to purchase that food item. For example, consumers perceived the healthiness of salmon to be lower with the TL system (does not list grams or %DV of nutrients), but they purchased more of this food item because they were possibly influenced by the government's recommendations to increase consumption of fatty fish (2).

When health perceptions of food products based on two types of food packaging are compared, a FOP labelling system with both reductive and evaluative features is ideal because it provides shoppers with the most useful information during comparative and non-comparative processing (76). A reductive icon is a type of FOP labelling system that extracts information from the Nft and presents it directly on the front of the package (e.g., Facts up Front) (76). An evaluative icon is defined as a symbol that provides shoppers with an overall evaluation of a product's healthfulness (e.g., Single Summary Indicators) (76). It is essentially a shortcut that can reduce the processing load that is often associated with comparing nutrient levels (76). Consumers rate the perceived healthiness of a product as high when the reductive and evaluative icons are used to evaluate a single product (76). However, the reductive icon has a greater influence on perceived healthiness, perceived retailer concern for shoppers, and purchase intentions in comparison to the evaluative icon (76). This may be due to the fact that consumers can

verify the information using the Nft (76). When multiple products within the same category are compared, the evaluative icon has a positive influence on evaluation, purchase intention, and choice (76). It allows consumers to easily discriminate between products that are healthy and unhealthy (76).

2.49 Conclusion

The purpose of this review was to demonstrate the difficulties consumers face when using the Nft to compare the nutrient levels in food products, and to introduce alternative labelling formats that may help consumers better understand the levels of positive and negative nutrients in a food product. Based on the research reviewed, the MTL system appears to be the most ideal option because it contains interpretable information and is well understood by consumers. However, current research on the MTL system is limited and has primarily taken place outside of Canada. Along with this, it is important to conduct more studies on the MTL system because consumers' perceived healthfulness of a food product seems to be variable when this label is used to compare food products. Finally, more research is also required to gain a better understanding of how the MTL system affects actual purchase decisions, food consumption, and food behaviour in diverse populations (e.g., children, adolescents, demographics, and ethnicities).

Chapter 3.0: THEORETICAL FRAMEWORK

The Theory of Planned Behaviour (TPB) explores the relationship between an individual's beliefs and behaviour. The well-studied TPB model is an individual level health behaviour theory that has been used to understand a number of diet and health-related behaviours (77) including smoking cessation, alcohol consumption, exercising, and dieting (78).

The TBP recognizes that the interaction between our attitudes, subjective norms, and perceived behavioural control affects an individual's intention and consequently his/her health-related behaviour (77). Attitude refers an individual's evaluation of the behaviour (49). Subjective norms measure how the opinions that others hold about performing or not performing the behaviour affects whether an individual is willing to comply with those referents (49). Finally, perceived behavioural control is the perceived ease or difficulty associated with performing the behaviour (49). For example, when the TPB was used to explain dietitians' intention to promote whole-grain foods (79) they found that dietitians supported the health benefits of whole grains. Although they did not encounter perceived barriers promoting whole grains, poor self-efficacy and knowledge decreased their confidence in their ability to help clients consume more whole grain foods (79).

The TBP can help explain how consumers compare products that are high or low in a specific nutrient, and how this may be dependent on:

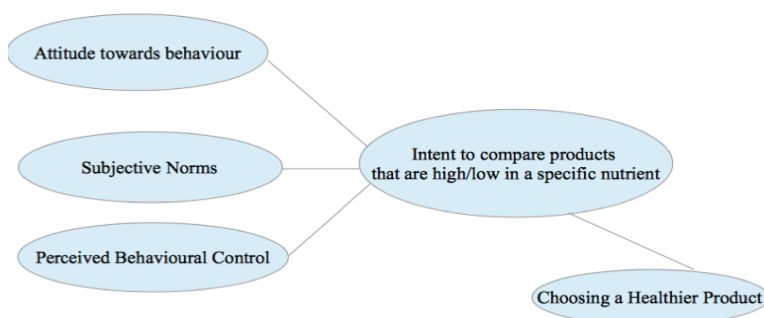
- Attitude: Using a standardized and regulated MTL system to compare products

will result in choosing a healthier product

- Normative beliefs: My food choices are based on recommendations from the federal government (e.g., Eating Well with Canada’s Food Guide)
- Perceived behavioural control: Perceived barriers to using the MTL system decreases likelihood of using it to compare food products

This study uses the TPB model (Figure 6) to explore how attitude, subjective norms, and perceived behavioural control can impact consumers’ intention to compare products using a MTL system. It provides insight on their likelihood of choosing a healthier food product and potentially decreasing the rates of chronic diseases. This model suggests that a regulated and standardized MTL system is beneficial for label users and may encourage non-label users to compare the nutritional content of food products. It supports both of these groups because it reduces barriers (e.g., comprehension and time) by providing interpretive information on nutrient levels, is viewed as a trustworthy source of information, and allows consumers to make informed food decisions and adopt healthy dietary patterns.

Figure 6: TPB model



Chapter 4.0: METHODOLOGY

4.1 Research Design

4.11 Overview of Qualitative Research and Focus Group Interview Sessions

A qualitative study is a type of research design that involves understanding human behaviours through the exploration of participants' personal experiences and perspectives (80). It allows researchers to answer "why" and "how" questions and to collect data that provides depth, context, and meaning (80). Furthermore, qualitative research involves explaining and questioning the hypothesis rather than testing it (80). There exists several different types of qualitative research methods, and for this study, the qualitative research method of focus group interview sessions was used. Focus group interview sessions involve interviewing a group of people at the same time to gain subjective reactions and higher levels of meaning that are important to people's behaviour (80). This method also allows researchers to examine the auditory and visual behaviours of participants (80).

4.12 Advantages and Disadvantages of Focus Group Interview Sessions

Several advantages and disadvantages exist when focus group interview sessions are used to collect data.

They are advantageous because:

- They are inexpensive, flexible, and can produce quick results (80, 81)
- Participants are likely to provide candid responses (81)
- They are useful for needs assessments or for project evaluation purposes (81)
- They allow participants to build on each other's ideas through "piggy-backing" (81)

- They allow researchers to look beyond facts and numbers to confirm the meaning behind the facts (81)
- They support exploratory research (80)

Focus group interview sessions are disadvantageous because:

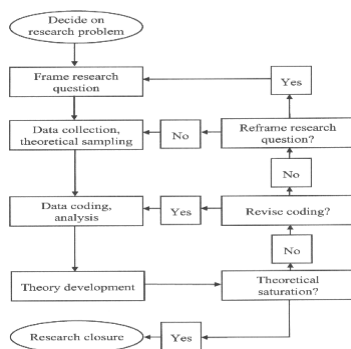
- They heavily rely on assisted discussions to produce results (81)
- Data quality is dependent on the skills of the moderator (81)
- It is difficult to analyze large volumes of qualitative data (81)
- There is limited transferability (81), so the results would not apply to the general population
- A possibility that outspoken individuals could dominate a discussion, which may create changes in group dynamics or produce bias results (81)

4.13 Grounded Theory Approach

Grounded theory approach helps generate a theory from the data collected (Figure 7).

This involves deciding on a research problem, framing the research question, collecting data, coding and analyzing that data, and developing a theory (82). It is important to note that data collection, data analysis, and theory development occur simultaneously (82).

Figure 7: Grounded Theory Approach



4.2 Participant Selection

4.21 Recruitment Methods

Participants were recruited using a non-probability technique. More specifically, a convenience sample was used because it has been shown to be ideal for exploratory studies (83). A convenience sample is a method of gathering participants who are readily available or convenient to the researcher.

After obtaining appropriate ethics approval from the University Ethics Review Board of Mount Saint Vincent University and Ryerson University (Appendix A), recruitment posters were posted in grocery stores, libraries, community centres, and local universities (in Toronto, ON and Guelph, ON) as it was believed that students, adults, and older adults commonly frequented these areas. Recruitment posters described the purpose of the study, highlighted the incentives for participation, and included removable tabs with contact information (Appendix B). Due to lack of participation, recruitment posters were also posted online (Kijiji and Craigslist) and former participants were asked to promote the study through word of mouth.

The researcher contacted participants who responded to the poster via telephone or e-mail. Interested participants either completed a preliminary screening questionnaire through e-mail (in which they were asked to have completed within a week) or verbally over the phone (Appendix C) to ensure they qualified for the study. The questionnaire was used to assess age, educational background, frequency of grocery shopping, and availability. When there were at least five participants interested in the study at the same

time, the researcher scheduled them in to attend a focus group interview session.

4.22 Inclusion Criteria

To be eligible for the study, participants had to be 18 years of age or older, not formally educated in the field of food and nutrition, the principal shopper of a household (shops for groceries at least once a month), and able to comprehend and speak English. Adults were the focus for this study because it's been shown that food label use is low among adolescents (50, 54, 84). More specifically, less than 25% of adolescents use food labels to guide their food purchases (84). Participants also had to be the primary shopper in their household, as they would have greater exposure to food labels. Individuals who had formal education in the field of food and nutrition were excluded from the study because their food literacy skills would be higher than the general population and thus, their opinions and perspectives would have potentially altered data or group dynamics.

4.23 Exclusion Criteria

Exclusion criteria included participants who had visual impairments, as they would not be able to read the text or see the colours of the MTL system.

4.24 Sample Size

The total number of participants was dependent on the number of sessions and the consistency of responses. The researcher in conjunction with committee members initially estimated a minimum of 42 participants (with a proportionate number of females and males) to allow for at least seven participants for each focus group interview session.

Ideally, focus group interview sessions should have between seven to eight participants (85) because small groups allow participants to feel more comfortable sharing their insight and observations (85). Furthermore, it is easier for the researcher to recruit, host, and capture discussions among group members (85).

4.3 Research Design

4.31 Structure of Focus Group Interview Sessions

Participants who met the inclusion criteria were scheduled for a focus group interview session. A reminder phone call or e-mail was sent one day prior to their session.

Before the focus group interview sessions began, refreshments and consent forms (2 copies – one for the participant and one for the researcher) (Appendix D) were given to participants. A voice recorder was set up and the researcher's co-supervisor along with an undergraduate student volunteer from Ryerson University served as note takers. They were instructed to document participants' responses and behaviours, suggestions for improving the interview guide, feedback for the facilitator, and/or any noteworthy events or expressions.

During the session, the moderator followed an interview guide that outlined the main topics of inquiry and the order in which they were to be covered (Appendix E) (80). The voice recorder was turned on only after the moderator introduced the study and nature of the focus group interview session. The moderator asked questions, probed unclear areas, and pursued lines of inquiry (80). Focus group interview sessions were audio recorded

and transcribed verbatim. The researcher completed four transcriptions and an undergraduate student volunteer from Brescia University College transcribed one audio recording. Each session was approximately 40-50 minutes long and took place at either Ryerson University or a dental office in Guelph. Focus group interview sessions were conducted over Spring, Summer, and Winter 2015.

To maximize participation rate, potential participants were notified that for their participation in the study, their names would be entered into a draw to win one of six \$25 gift certificates for Starbucks. Names were drawn after the study was completed and winners were sent a gift card.

After participants completed a focus group interview session, the researcher, research assistant, and co-supervisor would debrief as it (86):

1. Helped clear confusion, helped identify missing information, and ensured objectives were met
2. Provided an opportunity to log any new or additional information/topics, to discuss execution issues, and to identify areas for further research outside of the focus group setting
3. Allowed the researcher to compare data collected from previous sessions and to modify the interview guide accordingly
4. Provided time for the moderator and note-taker to exchange constructive feedback

When the study was completed, a debriefing letter was e-mailed to participants

(Appendix F) to ensure ethical standards for research involving humans were followed. Even though deception was not an issue, participants had the right to be fully informed about the study. The letter included a statement of thanks, an explanation of the purpose and results of the study, an ethics approval statement, and the researcher's contact information.

4.32 Resources

During the focus group interview sessions, participants were provided files with documents that allowed them to compare product labels, which helped prompt discussion and elicit reactions (80). Each file contained:

- A Key Definition Sheet (Appendix G)
- Sheet B: Three yogurt packages (Appendix H) which consisted of:
 - A MTL system with negative nutrients only
 - A MTL system with positive nutrients only
 - A MTL system with both positive and negative nutrients
- Sheet C: MTL systems of six cracker packages with varying levels of positive and negative nutrients (Appendix I)
- Sheet D: MTL systems of six yogurt packages with varying levels of positive and negative nutrients (Appendix J)

The high/medium/low indicators of the MTL system were based on the %DV and industry guidelines for nutrient claims. The nutrition content of food products were derived from the Canadian Nutrient File to reflect the types of products that are available to consumers in supermarkets. Similar to Kelly et al. (2009), each food package displayed

brand and product name, net weight, product image, and the MTL system on the top right hand corner (67). The positive nutrients displayed on the MTL system were vitamin D, calcium, and fibre because they are nutrients that are commonly found in pre-packaged food products. Potassium, iron, and magnesium were not included on the MTL system because their quantities are typically negligible in pre-packaged food products.

4.33 Age and Gender Distribution of Participants

Initially, age and gender groups were separated as follows: males 18-30, females 18-30, males 31-49, females 31-49, males 50+, and females 50+ to reflect the differences in nutrient needs and food behaviour by life stage group, and account for varying perspectives and lifestyle situations across groups (85).

4.331 Modifications to Age and Gender Divisions

Recruitment efforts resulted in a sample that was primarily female (70%), which would have lead to disproportionate focus groups if the initial age and gender group distribution were used (as explained above). As a result, focus group interview sessions were made to contain a mix of different genders and ages instead, to ensure there were enough participants at each focus group interview session. To analyze the collected data, participants' responses from one session were compared to responses of participants in other sessions who were within the same age and gender category.

4.4 Data Collection

An interview guide was developed and piloted with three individuals to ensure the

questions were comprehensible. The interview guide began with an introduction that welcomed participants, an explanation of the research objectives, a description of how focus group interview sessions worked, an explanation of the purpose of the tape recorder, and an assurance of confidentiality. Six main questions and probes that were based on the theoretical framework and the dichotomous health messages portrayed by the MTL system followed. Earlier questions were more generalized and open-ended and later ones gradually became more specific (80). The interview guide was structured in this manner to help establish rapport at the beginning of the session and make participants feel more comfortable. This helped to facilitate discussion among participants and allowed the researcher to gain valuable insight. The general, more open-ended questions that were asked earlier in the focus group interview session also helped to provide context for the more specific questions that were discussed later in the session. Finally, the interview guide allotted 10 minutes for participants to provide feedback and closing remarks and for the moderator to summarize and clarify the discussions to help maximize credibility and ensure information was accurate and complete.

4.5 Data Analysis

4.51 Qualitative Data Analysis

Data were analyzed after each session because the researcher, co-supervisor, and research assistant met for 15 minutes to debrief the focus group interview session. When focus group interview sessions were completed, the researcher and research assistant transcribed them verbatim. Each interview transcript was labelled with the date and time of the focus group interview session, number of participants, and name of the study.

Transcriptions excluded extraneous information, quoted direct responses, and documented non-verbal behaviours (e.g., laughter, confusion, etc.). In the final report, one quotation was selected to represent repetitive responses and/or ideas. The researcher excluded comments that were irrelevant or mentioned once throughout the entire study. However, if a participant felt strongly about a specific idea or concept that was only mentioned once, it was included as part of the analysis and report.

4.52 Coding

Analyzing qualitative data involves transforming raw data into more abstract and general ideas (80). When data were transcribed, the software program MAXQDA (87) was used to help organize, categorize, and generate reports from data. The constant comparative method was used to generate concepts from data. This method involves coding and analyzing data using open, axial, and selective coding (82).

Open coding is the initial stage that involves reading the entire transcript, selecting the first question to analyze, examining the responses, and generating a code or title that describes the comment (85). Similar comments are grouped into one category and subsequent comments are compared and placed under existing or new categories (85). Grouping responses together involves consideration of frequency (how many times a concept was mentioned), extensiveness (how many people mentioned the concept), intensity (how much passion or force was behind the comment), specificity (how much detail was provided), internal consistency (were views consistent), and participant perception of importance (whether participants saw the concept as being important) (85).

Axial Coding involves making connections between categories and subcategories, noting conditions, examining cause-effect relationships or interactions (82), and prioritizing analytic themes (85). Negative cases that contradict the evolving themes are also analyzed to increase credibility (82).

Selective coding refers to the integration of categories and subcategories with central concepts, and provides sufficient detail and density to create an evolving theory (82).

Sampling is more directed and deliberate to help fill in additional detail, test for further variations, and clarify final questions. At this stage, the study is nearly complete and data reaches a saturation point (82, 88). The hypothesis that is generated by the relationships between categories is tested and is continually revised until it qualifies to all data materials (82).

4.53 Credibility of Qualitative Research

4.531 Trustworthiness

One or two research assistants were present at each focus group interview session to help take notes and document participants' responses. Credibility was achieved using the theory of triangulation because the study used different theoretical perspectives to look at the same data (89).

4.532 Conformability

An audit trail is a record of all the transactions or data entries, and it was used in this study to ensure conformability (90). It included raw data, data reduction and analysis products, data reconstruction and synthesis products (categories, findings, and final

report) and materials related to intentions, dispositions, and development of instruments (90).

4.533 Transferability

Transferability was difficult to achieve because data were not collected separately for each age and gender group. As previously mentioned, participants, regardless of age or gender, were grouped together to ensure that enough participants were present for each focus group interview session. To improve transferability, data analysis involved extracting individual participant responses from one focus group interview session and comparing them to the responses of participants within the same age and gender categories from other focus group interview sessions.

4.6 Ethical Considerations

Before the study was conducted, participants received a copy of a consent form. This consent form outlined: the study's purpose, involvement risks/benefits, participation cost, confidentiality and commitment clauses, the researcher's contact information, and lastly, provided an option to withdraw from the study at any time without penalty. Participants were also made aware that the University Ethics Review Board at Mount Saint Vincent University and Ryerson University reviewed and approved the study.

While the researcher took all precautions to keep contact information safe, there was a very slight risk of losing private information that was gathered from the pre-screening questionnaires and/or focus group interview sessions. To maximize confidentiality,

personal identifiers were not released in transcriptions or notes, and a letter or number was used to identify each participant. Hard copies of data were also stored in a locked filing cabinet and password protected computer. The researcher, supervisor, co-supervisor, and research assistants were the only people who had access to data. When the study was completed the list of participants' names and their contact information was destroyed.

Although the pre-screening questionnaire and focus group interview sessions may have included sensitive questions (e.g., age, educational background, and grocery shopping habits), participants were not pressured to answer those questions.

Chapter 5.0: RESULTS

Although the researcher was unable to gather 42 participants, sample size was sufficient to reach data saturation as no new information emerged from data collection and data analysis stages. During the study, a total of 34 participants completed the questionnaire, but only 20 participants were able to participate in a focus group interview session.

Thirteen participants dropped out of the study because of scheduling conflicts or lack of response, and one participant was excluded from the study due to ineligibility.

Difficulties with recruitment also resulted in four focus group interview sessions that had four to six participants and one session with two participants.

5.1 Demographic Data

5.11 Age

A total of 14 females participated in the study and their age distribution was as follows: 18-30 years n=7, 31-49 years n=4, and 50+ n=3. In addition, a total of six males participated, and their age distribution was as follows: 18-30 years n=3 and 31-49 years n=3.

5.12 Educational Background

Participants were well educated as 55% of participants held a Bachelor's degree in areas such as Accounting, Political Science, Health Administration, Economics, and Computer Sciences.

Table 2: Age and Gender Distribution of Participants with a Bachelor’s Degree

Age Categories (years)	Number of Males	Number of Females
18-30	2	4
31-49	1	3
50+	0	1

15% of participants held Graduate degrees in areas such as Global Affairs, Social Work, Accounting, and Business Economics.

Table 3: Age and Gender Distribution of Participants with a Graduate Degree

Age Categories (years)	Number of Males	Number of Females
18-30	1	2
31-49	0	0
50+	0	2

Lastly, a total of four participants (20%) held College degrees in Dental Hygiene, Tourism and Hospitality, and Computer Science Technology.

Table 4: Age and Gender Distribution of Participants with a College Degree

Age Categories (years)	Number of Males	Number of Females
18-30	0	1
31-49	2	1
50+	0	0

5.13 Frequency of Grocery Shopping

Participants were regularly exposed to food labels as results show that 95% shopped at least once a week. This included seven females aged 18-29, three females aged 31-49, three females aged 50+, three males aged 18-29, and three males aged 30-49. One female participant aged 31-49 shopped only once a month.

5.2 Themes

Data analysis revealed two distinct themes: 1) Success of the MTL system is dependent on education and design of the label and 2) Consumers compare food products based on level of negative nutrients, nutritional attributes, expectations, and importance of nutrients in their diet.

Participants were initially doubtful and skeptical of the MTL system. They stated that it created confusion, was present to market food products, did not list other important food and nutrition information, and was time consuming to use. Participants agreed that with education on the label, regulation of the label, and design alterations, the MTL system would be seen as more trustworthy and useful. As a result, they would be more willing to use it to filter and compare the nutritional value of food products to make healthy food choices.

When participants were selecting food products based on the nutrients listed on the dichotomous MTL system, participants were more concerned about the level of negative nutrients in a food product because they believed they could obtain positive nutrients

from other sources. In addition, participants' definition of a healthy food product extended beyond the government's recommendations for positive and negative nutrients. It included other nutritional attributes such as types of ingredients, amount of processing, and whether preservatives were added. This is not surprising because, although participants were not formally educated or trained in food and nutrition, they were able to receive nutrition information from other sources such as the Internet, media, and word of mouth.

Prior expectations of food products along with nutrient trade-offs are also key factors, which determine whether consumers choose a healthy food product.

5.21 Theme: Success of MTL System is Dependent on the Education and Design of the Label

All participants had no prior knowledge of the MTL system. Thus, when participants were first introduced to the MTL system, they expressed doubt in its trustworthiness and effectiveness. They did not value this type of FOP labelling system because they felt it was a marketing scheme, confusing to interpret, time consuming to use, and missing key nutrients. When the concept of the MTL system was clearly communicated to participants, they felt more comfortable using it. Furthermore, they offered suggestions to improve its design to increase its value.

5.211 Subtheme: Marketing Scheme

When participants were first introduced to the MTL system, they believed the MTL system was designed to market food products instead of assisting to make food decisions.

This poor attitude decreased their interest in using the MTL system to make informed food decisions. Male and female participants less than 50 years of age specifically voiced concerns regarding the creditability of the MTL system. Participants also thought that the system took attention away from other nutrients in food products.

“I kind of have a skeptical view of it. I almost feel like sometimes it is used as a way to market the product, that the product is good for this one thing but it might actually not have all that nutritional value if you actually look into it. I think of it like a marketing scheme to catch the eye in some cases.”

“...Some people will look at that and think like for instance if there was blue menu they will think, think that it is healthy and just buy it.”

“...Like the nutritional facts always has everything, pretty much everything in there, but this just highlights the stuff that is special...”

“I think its good it just sums up the um...um I guess if you say in this yogurt these are the important things and so then it makes it stand out a little bit more um uh I think...like are there other things in the yogurt that I should be aware of? Is it just the fat, saturated fats and sugar? Like are there other ingredients I should be looking at as well...?”

Even though participants were familiar with different types of FOP labelling systems (e.g., whole grain symbol, health check symbol, etc.), they rarely used them to help make

food decisions. Instead, even though they had trouble using the Nft, participants felt more comfortable using it or the ingredients list as their primary source of a food product's nutrition information rather than using the MTL system. This was because they felt that those sources were more reliable as they came from a trusted source and listed all a food product's contents. Participants also felt confident in their ability to interpret the Nft. This was evident from the following quotations:

“For me, I don't really change the way I shop. I don't look at the label and say oh whole grain I am buying this. I do check myself so I won't do that front of package shopping, like that is not what draws me.”

“I don't look at it. I will look at the ingredients and table. Everything else is just a logo to me.”

“Yes that is where I go to the ingredients list. I don't care how you know if it is organic, I don't care if it's high in like your whole grains - that doesn't matter to me. I am always looking at the ingredients.”

“... Nutrition Facts is clear, not like this one where it's like, oh, they have colour! What does high mean, what does low mean?”

Their discussion also highlighted that they had difficulties comprehending the Nft's numerical values. Females over the age of 30 and males aged 18-29 would question the

accuracy of the %DV and were concerned about individual targets.

“I was thinking the same thing like who is determining like what is our fat target? Are they using the average man the average woman what is average?”

“You don’t...you...going in how many calories you are talking about. This is a product that is for kids, women, men, what does it mean? Like there is no context for it right? It’s like 4% of your energy what does that mean?”

“...Is it really going to help me if I am not this is average woman you know like um and then of course there are people with more specific um health concerns like uh if you have diabetes or whatever...”

“But I still look at those you know they are high and low and like high and low for who? Like you know we talk about sodium and it is high in this but now having read somewhere that now that people are not having enough sodium so I just I don’t know it is not individual.”

5.212 Subtheme: Confusion with Colour Interpretations

Without a clear understanding of the MTL system, females and males aged 18-29 did not understand that the colours on the MTL system served a purpose. Most participants assumed that the colours were for decoration. In addition, some participants did not see the colours' relation to the TL concept and incorrectly interpreted the MTL system.

“Also when I am looking at this I am like wait there is green and red so should I eat it...?”

“Well I think that like if you don’t understand it I think going back to the education of it is really important because like without you explaining I would be like I don’t know what this means. Its just like pretty colours...”

“I think it is useful if you understand it but I think it can be confusing if you didn’t really know what the different colours meant...”

“...Like green is just colourful to me, I don’t really see it with a stop light necessarily.”

“... So the green colour is also saying “oh, I kind of recommend it, why don’t you take more. It’s like, looking at the calcium, “oh, I should get more sugar.””

“Um I can see the potential for someone who doesn’t know the system in that a green can mean they can eat a lot of something rather than being a limiting...”

“...That is a very good point though about trickery because like I said it will be green there is more green and then the next one has got orange and then the fourth is red so someone may automatically make a decision.”

5.213 Subtheme: Using the MTL System is Time Consuming

Without a clear explanation of the MTL system, participants believed that they would

need to spend a copious amount of time trying to understand what the system was telling them, and that this would lead to greater time spent on label reading. This belief was primarily expressed by females aged 18-30 and 50 plus:

“I think it has to do more with design but I mean when I think of um the...the front of package label right now, their pretty one specific thing it is pretty clear what they are talking about whereas this I actually have to stand there and think, and I don’t have time to do that.”

“I would still read the ingredients and the panel because it just takes this long to read this one as it does for the other one [Moderator: Ok, ok so it doesn’t um...] this just adds to the clutter and when I see clutter I won’t read it.”

“I just don’t get that...I can’t see a busy person uh reading these labels...”

“I think you need to give more information and sort of I guess in a way more work for the consumer to decide well this is high in sugar but also high in calcium and vitamin D (Moderator: right!) You would have to be more conscious when you are actually thinking about packages that...of a product.”

Males between the ages of 30-49 stated that they would consider using the MTL system, but in conjunction with the Nft and ingredients list to confirm or supplement the information displayed on the system:

“It draws me but I still look at the back because you know, you are always that curious [Moderator: yes] oh so this is low fat and it says high in sugar and stuff like that, you know, so I look at it [Moderator: so it allows you to verify] you look at it, you can see the ingredients that I use to make my choice whether I am going to buy.”

“...For me uh it would be somewhat helpful it would get my attention uh but I will still read the back if it didn't have what I was looking for so...”

5.214 Subtheme: MTL System is Missing Key Nutrients and Attributes

Participants seemed to use other nutrients and nutritional attributes to determine the nutritional value of a food product. The nutrients highlighted on the MTL system were insufficient because participants searched for other nutritional attributes and nutrients that went beyond the government's standard ones (e.g., sugar, fat/trans fats/saturated fats, sodium, fibre, vitamin D, and calcium). Although their definition of a healthy food product included the government's recommendations, participants were also interested in other nutritional qualities such as the amount of additives, preservatives, or vitamin B in a food product. In addition, they looked for products that were organic, not genetically modified (GMO-free), and gluten-free:

“Organic...low sodium um...no additives preservative, healthy grains... whether it is a processed food or whether it is whole.”

“...Yeah I look for nutrients trans fats you know all those contents...”

“Like the B vitamins, B 1, B2, B6”

“...Whole grains, um vitamin D, if it is gluten free...”

“... I want to focus more on trying to stay away from the negative nutrients so uh I am looking at look for low fat, low sodium, low sugar.”

“...If it’s trans fat or cholesterol I kind of avoid them.”

“...Non-GMO, sometimes. Corn, that sort of thing. If you read about it... it really depends. Sometimes, depending on the food product, I’ll go for non-GMO or organic.”

5.215 Subtheme: Education on the MTL System is Critical

Female and male participants aged 18-29 and one female participant aged 50+ indicated that education on the purpose and concept of the MTL system would be required for its successful implementation. This education could be in many forms including literature, ad campaigns, commercials, presentations, etc.

“I mean the public will need to be educated on how to use it and that um...its because for me it would be beneficial for a healthy lifestyle and discipline.”

“Um, it’s hard to follow if you didn’t explain it to me, if I was just a consumer and I walked into a grocery store and I saw this, I wouldn’t know how to interpret it, unless someone explained it to me...um yeah...But if...now that I understand, I guess it could be

helpful.”

“I think for me its too much information on the package so it needs some sort of an introduction like ad campaign where it would explain how are we determining these numbers because like is it really going to help me if I am not this is average woman you know like um and then of course there are people with more specific um health concerns like uh if you have diabetes or whatever that would that help you at all so...”

“...I think if you educate people about it then you start putting the labels on the package then you could be more aware and be like oh I remember the discussion and they say they are trying to educate people and stuff like that oh yeah here it is the traffic light and I will take a look at it because I remember you know...”

When participants clearly understood the purpose of the MTL system, several male and female participants aged 18-30 and one female participant aged 50+ felt that a standardized and regulated MTL system (one with positive and negative nutrients) could potentially be used to help consumers compare and sort through similar food products to make healthy choices.

“...I think they are intended to be like a quick look like you are walking through the aisle and rather than staring at every product you can see the colours quickly and then go ok these ones have a lot of green and then go and compare them...”

“...I think for me, one way this could be helpful is if, if I am advised by my doctor to say he should be on a low fat diet and then I just look for products with fat in the green label (Moderator: right) so that will be easier for me to, to kind of filter products...”

“Yeah I think I think if I see a product of uh different nutrients in the in labelling green then I would uh have the impression that it might be better for us compared to a similar product that has more red or...or amber”

“...Oh well, not really, but like you have to find one thing out of like 50 things, and three of them have those labels on it, and then you have a concern, that would make it easier to make a selection.”

Participants also described how the MTL system could be beneficial for chronic disease management:

“It seems useful to me if you are a diabetic or something like that this may be helpful to understand...like I think it would help you make a decision about whether or not you should buy this because you are a diabetic.”

“It can be helpful for certain people that are, for instance, for, um, uh, people with heart- more likely to get heart attacks, looking for something with psyllium fibre, or for a particular type of thing. It’s easier to identify with that rather than to try and search for ingredients.”

“If there’s a common health condition that, and this is just speaking from my parents, they’re trying to now find food that’s specific to their condition, so they pick out stuff easier. And it’s, if they forget their glasses...”

“...But I can see from their perspective that that makes sense. And if anyone does have any sort of condition then it would be helpful for them.”

5.216 Subtheme: Design of the MTL System

All participants agreed that including both positive and negative nutrients on the MTL system would be less misleading and allow consumers to make informed food decisions:

“Well I like the one with the positive and negative because it give a more balanced view of the product...”

“ I think it is better with the positive and negative so we can compare and still make a decision whether or not you want to buy it but if it just the positive it does not, not do justice to the people because your not telling them you know the negative side of it and I think if is fair for people to know the negative and positive to you know make a choice if they want to get it”

“It is fair to then you know let them have both so they can make a more informed decision of what you are going to get compared to having one thing.”

“I totally agree and I mean from my perspective it is also more transparent so I would be

more trusting... ”

“The third one I find is the most useful, in addition to all the positive attributes so you can come to a more well rounded decision when you buy a product.”

Additionally, participants felt that the MTL system should be consistent and mandated on food products to build trust:

“Yeah, I would only be comfortable with comparing different products based on this system if there is a consistent standard across all products.”

“...I would appreciate having it mandated as long as it is clear what it meant and if it was like a systematic kind of thing like it is on every package and the public would be told what it is meant as a whole then I think having that as something that must be on a package would be helpful, otherwise its just there its just another again I am critical about marketing scheme...I have mixed feelings.”

“As long as they are showing the equivalent for each uh product in that group of food products then I don't have a problem with it being there I mean like if you took something like another yogurt that is uh healthier and then it has uh you know no saturated fats then you might say I am not going to take this yogurt with the red I am going to take the one that doesn't have that colour [Moderator: right] as long as it is strictly comparable within the product group right...”

Participants offered suggestions to improve the design of the MTL system to increase its impact on consumers' food decisions. One female aged 50+ discussed several improvement strategies on the colour and appearance of the label:

"Yeah would like it black and white...I can read it for myself or I don't but I want it to be the same measurements."

"I am just thinking that black on uh a dark green background is hard to read actually [Moderator: ok] its its like it has to be less involved..."

"I think that you are using the expression of positive and negative or good and bad than go all the way if it is high in something that is great for you put it in a bigger print ok like alert people right now it is all in the same size of prints right? And I mean you don't want to be that fair do we? I, I would put the ones that you want people to eat more of or have more of in bigger print and let the colours do the rest. I just uh because right now like there is nothing you go ok fat, sugar, calcium, as long as the order is the same you can...I don't know maybe that will help."

"I just have one more thing to add perhaps the whole box being a certain colour that will allow the print to stand out more but just have a, an outline in green and outline in green instead of being like the whole box green and then you know the story about the print size and everything it would stand out by contrast right just you know you don't have to be

so...in fact that it is all green you know we get that just the outline will be just as uh meaningful. It is something that I can't read quickly right that's why I can't.

"I know that it may not be dimensionally the actual size the actual size but I just the percentages don't...I still don't like them, I don't know what the percentages are supposed to convey to me. The colours are I think can be um assessed subjectively."

One female aged 18-29 discussed creating a legend to help guide consumers, however, this may not be practical for a food package:

"I almost wondered if like and I think that it is impractical on an actual product but having like a legend."

Additionally, one male participant suggested separating the positive and negative nutrients to help consumers better understand the label:

"So I think the third one is the best [MTL system with Positive and Negative Nutrients] but they need to be separated because right now green can mean two things so it will definitely be confusing to people. Because you could have low in sugar and that would be green sitting beside a high in calcium and people may not necessarily read the top but they will see the colour and then just grab it or something like that so...if they are separated then that would be the best..."

It is interesting to note that two males (aged 18-29 and 30-49) expressed interest in

displaying preservatives and/or additives directly on the MTL system, as those were two of their main concerns when making food decisions:

“Another comment about this is that by having these labels standardize and having them on the front it might open up the opportunity to extend the more detailed nutritional label to include um like artificial sweeteners or you know corn starch that sort of thing that’s replacing fats and stuff to have the flavouring so that we have more detail about the [Moderator: What is exactly in there] yeah so then you will have someone who doesn’t really care about that stuff they will have this and they won’t be scared by a more detailed black and white label at the side of the panel and then just kind of zone out and not really read it anymore so then they might be able to have two markets...”

“...But the thing that they should add there is like those words I don’t know how to pronounce like how much of that is in there that will be good...”

5.22 Theme: Consumers Compare Food Products Based on Levels of Negative Nutrients, Nutritional Attributes, Expectations, and Importance of Nutrients in Their Diet

As previously mentioned, participants had considered several factors when comparing and choosing food products. These factors included the level of nutrients participants were concerned about, the quality of ingredients, the presence of additives or preservatives, and gluten content. Expectations and the importance of the nutrient in their diet also affected food decisions. These phenomena can be attributed to how readily

available nutrition information is.

5.221 Subtheme: Ideas for Positive and Negative Nutrients are not from Government

Recommendations

Participants' ideas of a healthy food product were not solely developed from the government's health messages and resources. It seemed that males and females aged 18-29 gained their nutritional knowledge through alternative sources such as media reports, Internet, research, word of mouth, and health classes.

“Various research on the Web I can't think of anything specific [Moderator: Ok!] You have to be conscious about what you read so...”

“I think it is like also because in school they are always like oh you got to have your food groups and stuff like that and whole grains so I guess just in school we learn it as well but then I think it depends because before I would just look at the fat content and like nothing else and be like oh I shouldn't eat this or this has like 0% fat whereas like now if I am going to the gym more, everyone is like you should have protein so I am just like oh now I will look at protein then...when I go to the gym so when you hear that you kind of pick up on it as well.”

“...I think it is like you know people talk and then you, you learn things on the Internet and there is a mix of oh ok those are healthy or those are fibrous and whole grain ok these are good it is just like that.”

“There are probably a lot of people on the Internet who look up how to lose weight...and

then like everything that comes up on the Internet at least is like don't eat candy or like a lot of trans fats, sugar like don't have that much salt in your food and stuff like that. Its not really, I have never personally heard anything from the government at least to my knowledge being like don't eat this stuff right? Especially for stuff that the government wants us to eat more of like magnesium, calcium and stuff like that. To be honest I don't really look at like that section of the Nft."

"Health class...um but I think also like in media for me at least in a lot what I see in media it is like crunching down on low fat and I mean my parents are getting older so low sodium is something that comes up a lot um...."

"Media, newspaper articles and keeping up with trends that you know Canadians are apparently lacking vitamin D or you know where you have too much sodium in our diet so hearing about these things and trying to make a positive decision about your own health and diet."

There was even one female participant aged 30-49 who was not concerned about the content of negative nutrients in a food product at all.

"Um I don't actually concern myself with all the sugar and salt and fat..."

5.222 Subtheme: Negative Nutrients

Participants indicated that the level of nutrients in a food product was a factor that affected their food decisions. When participants were asked to compare dichotomous

MTL systems, they were more concerned about the level of negative nutrients in a food product versus its level of positive nutrients. This was because participants felt that positive nutrients could be obtained from other sources. This observation was consistent among females from each age range and males aged 18-29.

“...So the last you have more negative nutrients in green so that is why I narrowed it down on the last”

“I guess I would go with the last one. [Moderator: The last one, so the one that is low in fats, um medium sodium, and low in fibre? And why is that?] Because um fibre you can get it elsewhere you know fat and um trans fat is I don't know to be it is just bad so...”

“I am personally not that concerned about fibre I am just like if you eat your vegetables then like you know [Moderator: So you find that you can get those] yeah from whole foods so I am less concerned but I am more concerned about sodium.”

“My focus was the calcium and low sugar um so I think I looked at it my first reaction is to look for the green and then the, the orange. [Moderator: So vitamin D is like your least concern] yeah its like I would take supplements for that...”

“I think I would go for the one with less trans fats and fats and maybe 1% lower in the fibre you know because I believe that I can pick up fibre somewhere else”

5.223 Subtheme: Expectations

Some female participants aged 18-29 and one male participant aged 18-29 discussed how expectations of a food product could dictate the types of nutrients they searched for in a food product:

“I expect it to have sugar to have the taste, so the main factor to me was the lower fat content and the one with the higher calcium content at least it is fortifying bones and like it is useful that way.”

“I mean it seems like it seems like a toss up between fat or sodium...and so to me a lower fat is probably less important (Moderator: so you are less concerned about the fat than the sodium) and with crackers you expect it to have salt because otherwise it would be tasteless if it didn't have salt.”

“I expect those things, I look to labels to inform me more around that so I don't want to find out more about um for instance what was it calcium content and yogurt, I was not expecting that to be high, so I am expecting to be able to compare on other factors like fat on the label um so that it would get more...so I can compare based on those other things not just compare it based on things that I expect the product to already have.”

“...Um, so C because there's only two with a decent amount of calcium and vitamin D of which... that's what you get milk for.”

Interestingly, one male participant aged 18-29 mentioned that he did not expect packaged foods to be high in positive nutrients as compared to more “fresh” foods. As a result he was more concerned about using the MTL system to control his intake of negative nutrients:

“For me...I feel uh pre-packaged foods before I purchase it, I am under the assumption that it is generally less uh nutritious than or less healthy than say fresh produce so if I want to uh have something that is high in fibre I wouldn't go to crackers I would have some vegetables or other stuff. So for me what I want to get from this labelling is uh how uh is if I can control my uh the intake of negative nutrients...”

Expectations seemed to decrease the amount of information processing participants used because it reduced their effort in comparing nutrients between food products.

5.224 Subtheme: Trade-Off Concept

One male participant aged 18-29, one male participant aged 30-49, and one female participant aged 30-49 also discussed the “trade-off” concept. This involves settling on a product that has an ideal level of one nutrient but not another. This challenged individuals to find a product that met all their nutritional needs. Interestingly, nutrient trade-offs affected meal decisions throughout the day. One participant also compared this concept to playing a game of Russian roulette.

“You always look for a trade-off so say you want something that is high in protein but you also don't want it to be 600 or 700 calories.”

“...So this is low in sugar but it could be made up somewhere else. Or if you are looking for something that is high in protein yeah you could go and get something like a pepperette which is high in protein but it also has a ridiculous amount of sodium and potentially fat depending on what it is made of right so...”

“I guess for myself I would look like the one I am drawn to is the one that has the most reasonable numbers right so that would take out all the ones that have 1 gram of fibre because 1 gram of fibre is really bad right?...right? Um and then looking for and then the one with four is really good but then um what is the trade off of that right? What I am going to have to give up in order to get that good fibre...?”

“Yeah I would go for the vitamin one on the second page because it is the highest it is just the saturated fats versus the sugars so its just whatever one has you know what your Russian roulette is um...”

“So yogurt is one of my staple foods based on what I normally buy and the label that fits it the most is the very last one. Just because my trade off that I mentioned earlier is that I will have chemical and artificial sweeteners in order to save sugar for desserts that I love so it is the lowest in sugar actually most artificial sweetened yogurts have a 0% fat version so it is close in terms of only two grams of trans fat and then um calcium is reasonable vitamin D is a little low but like Marilyn said I can get that somewhere else right?”

Chapter 6.0: DISCUSSION

6.1 Introduction

The risk of developing a chronic disease increases when consumers make poor food choices. It is estimated that in 2020, almost three-quarters of all deaths worldwide will be related to chronic diseases (91). Although more than half of the Canadian population uses the Nft to help make healthier food choices (50), poor food literacy skills make it difficult for consumers to comprehend, interpret, and/or evaluate the detailed nutrition information on the label (14, 44, 50).

Although participants viewed the Nft as the most credible source of nutrition information, they had difficulties interpreting numerical values. However, some of the proposed changes to the Nft that are published in Canada Gazette Part I (56) may help resolve this issue. For example, one of the proposed changes to the Nft is to incorporate a footnote to inform consumers how to use the %DV to help them determine if a product contains high or low levels of nutrients. This footnote is important because provides interpretation for consumers who do not understand the purpose of %DV. Rather than having consumers try to understand and compare the absolute values of nutrients, they are able to compare %DV of several nutrients for which the %DV is established. Furthermore, the present study shows that participants had a strong concern over the level of negative nutrients in a food product (e.g., sodium, fat, and sugar). The proposed Nft supports consumers' needs because it includes a %DV for sugars, which makes it easier for consumers to interpret the level of total sugars in a food product.

Other features of the proposed Nft help address some of the concerns that were raised by participants during focus group interview sessions. For example, participants' lack of concern for positive nutrients in a food product is alarming. In an effort to increase consumers' awareness of positive nutrients using the Nft, Health Canada proposed to list the amounts of potassium, vitamin D, calcium, and iron, which are of public health concern in Canada (56). Furthermore, many participants expressed their interest in using the ingredient list to gain nutrition information. Changes to the ingredients list (e.g., format, grouping of sugar-based ingredients, food colours listed by name, etc.) (56) may help consumers better identify the quality and types of ingredients, which were additional factors that influenced their view on the nutritional value of a food product. However, the proposed Nft may still be time consuming because it requires consumers to apply the %DV concept to each nutrient and turnover packages to compare the nutrient content between products.

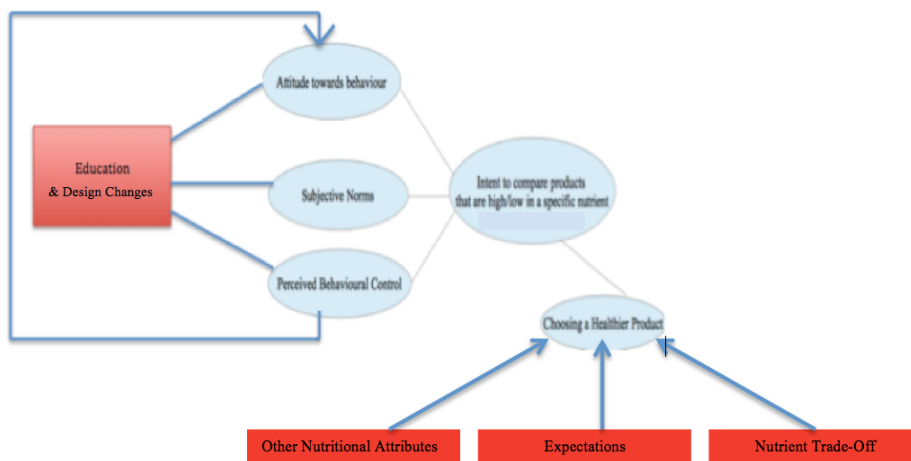
Health Canada is also in the process of reviewing other designs and information on food labels. FOP labelling systems are a part of this review because they are widespread in the Canadian marketplace (57). In countries outside of Canada, the MTL system in particular has been shown to help consumers better understand the nutritional value of food products (65-67). Therefore, the MTL system could potentially be a useful tool for Canadian consumers as well. Currently, there is limited knowledge regarding whether Canadian consumers value the MTL system or how the levels of nutrients in a food product impact their food decisions. This study explored Canadians' response to

variations of the MTL system and how dichotomous health messages influenced their food decisions.

6.2 Modified Theory of Planned Behaviour Framework

The TBP was applied to understand how consumers' attitude, subjective norms, and perceived barriers affected their use of the MTL system for comparing nutrient levels between several food products. Using this theory, the resulting model suggests that consumers are more likely to compare and choose healthier food products if they do not encounter barriers using the MTL system, have a positive attitude towards the MTL system, and have high beliefs in the government's recommendations for positive and negative nutrients. The theory behind this model is supported if: 1) education on how to use the MTL system is provided and 2) design alterations to the MTL system are made (Figure 8).

Figure 8: Modified Theory of Planned Behaviour Framework



6.3 Participants Support MTL System

The results of the study indicated that participants supported the MTL system if it contained relevant nutrition information, reduced barriers of time/trust/confusion, and was regulated and standardized. Research shows that the standardization and regulation of food labels are particularly important to consumers because it increases the credibility of the nutrition information that is displayed on the label (22)(69).

A standardized and regulated FOP labelling system should be simple, easily interpretable, and ordinal in order to be effective (18). In the present study, the MTL system satisfied the requirements listed above and it reduced barriers, which led to a more positive attitude towards the MTL System as outlined in **Figure 8**.

Support for the TL concept was also evidenced by their criticism over the design of the MTL system. The majority of design improvements were related to appearance and content of the MTL system rather than the interpretive features such as the colours and nutrient level indicators.

The present study shows that a well-designed MTL system can potentially be a useful source of nutrition information for health conscious and educated individuals. This is because the MTL system incorporates interpretative colours and text, which help participants understand the nutrition information. Furthermore, these features have shown to improve consumers' attention to the label (92). Since the MTL system structurally presents information on key nutrients and energy, it helps consumers detect

the healthier alternative when they are comparing food products within the same category (with varying levels of nutrients) (93). However, support for the MTL system among non-label users remains uncertain and requires further research.

6.4 Additional Nutrients and Nutritional Attributes

Although participants valued the MTL system with positive and negative nutrients, the design did not provide enough nutrition information for them because they were interested in other nutritional attributes such as type of ingredients, degree of food processing, gluten content, additives and/or preservatives content, and vitamins and/or minerals content (Figure 8). In the present study, nutrient concerns did not significantly differ between gender and age groups because most participants searched for similar nutritional attributes. However, previous studies have shown that males and females have different perspectives on food labelling and health (85), and younger individuals were more interested in vitamins and minerals whereas older adults were more concerned about their cholesterol intake (50). Differences in label preference create difficulties in determining what additional information should be included on the MTL system and how that information should be presented.

Nutrition trends contributed to participants' interest in a product's gluten content or use of organic ingredients. These factors influenced their idea of a healthy food product and it suggests that more education is needed to refocus consumers' attention to nutrient levels rather than insignificant nutritional attributes that do not promote health or prevent disease. This is because food products labelled "gluten-free" or "organic" may not

necessarily be a healthier food option. For example, a product that is organic could still contain high levels of fat, sodium, and sugar; and a gluten-free product may contain more calorie dense ingredients to preserve the taste and texture of a food item. Educating the public about false nutrition claims would help decrease the type and amount of nutrition information that consumers expect to be listed on the MTL system. This would further help create a label that appeals to a widespread audience.

6.41 Judgeability Theory

As previously mentioned, participants preferred having an MTL system that displayed more nutrition information to help make healthier food choices. However, studies have shown that consumers do not have the motivation or time to process nutrition information at the point of purchase (94). The Judgeability Theory can be used to explain the discrepancy between the nutrition information that consumers want and use on a food label. When consumers are making food decisions under pressure, they understand and respond to simpler cues (94). The additional information on a food label (e.g., nutrient names, percentages, and gram values) for instance, just reassures them that their food decisions are rational (94). This was evident in the present study because most participants referred to the interpretive cues such as colours and high/medium/low indicators on the MTL system rather the additional numerical information. In fact, participants felt that the numerical information was confusing. In addition, participants preferred an MTL system that listed positive nutrients and negative nutrients even though negative nutrients were their main focus when making food decisions. A suggestion for further research is to examine consumers' response to an MTL system that excludes numerical information, which can help reduce processing load.

6.5 Positive and Negative Nutrients

6.51 Economic Burden of Chronic Diseases

Participants were able to distinguish the differences between positive and negative nutrients, and placed greater value on food products that were low in negative nutrients than those that were high in positive nutrients. This suggests that participants would prefer to maintain health by limiting nutrients that are linked to chronic disease, rather than increasing their consumption of nutrients that help support and build their health. Currently, a significant number of Canadians are managing preventable chronic diseases such as cancer, cardiovascular disease, respiratory disease, and diabetes; and individuals who are managing a severe chronic illness may not be able to work or they may experience a premature death. Chronic diseases are estimated to be responsible for 67% of total direct healthcare costs (95) and can be attributed to expensive medications and/or hospital treatments. Thus, participants may fear the economic burden associated with disease management, which motivates them to avoid illness by becoming more aware of the level of negative nutrients in their food product.

6.52 Fear-Based Messages

Their strong interest in negative nutrients can possibly be related to the prominence of fear-based messages associated with the excess consumption of negative nutrients, as messages emphasizing the relationship between positive nutrients and their role in health promotion are rare. Fear-based messages are designed to persuade consumers to change their behaviour by demonstrating the health risks that are associated with their actions (96). Moderate and strong fear-based messages have shown to be persuasive and they encourage individuals to change their attitude and behaviour (96). One common example

of a fear-based message is a sodium reduction message from Health Canada: “Eating too much sodium can cause high blood pressure, stroke, heart disease and kidney disease (97).”

6.53 Diet-Disease Relationships

In the present study, the messages associated with an excessive fat intake seemed to resonate with participants the most because the amount of fat (saturated, trans, and total) in food products was a common concern for most participants compared to sodium and sugar levels. This finding was consistent among participants from different age and gender categories. Previous studies have shown that consumers concentrate on the amount of fat in a food product because it is associated with being more “health conscious” (98). Women and educated individuals also tend to be highly aware of diet-disease relationships (99). Diet-disease health messages that are regularly broadcasted in the media include hypertension and sodium, or heart disease and fat (98). In contrast, Tracking Nutrition Trends Survey (2013) found that 70% of Canadians were concerned about the amounts of both positive and negative nutrients such as protein, fat, fibre, whole grain, sodium, salt, and sugar (100). With the exception of fibre, participants’ concern for positive nutrients did not include those that are lacking in the Canadian diet such as vitamin D, calcium, iron, magnesium, and potassium. Again, this shows the importance for health professional to educate consumers on the relationship between adequate nutrient consumption and health outcomes. Also, improving consumers’ awareness of diet-disease relationships may encourage food manufactures to reformulate their food products to contain lower levels of negative nutrients or higher levels of positive nutrients.

Participants were less concerned about the diet-disease health messages for positive nutrients. This includes the relationship between a high fibre consumption and cancer prevention, or adequate vitamin D/calcium intake and decreased risk of osteoporosis. Participants agreed that they could obtain positive nutrients from secondary sources such as supplements or whole foods. This was not surprising, as supplement use is extensive and continually growing among well educated and health conscious consumers (101). One participant strongly felt that processed foods would not provide a significant amount of positive nutrients. This may related to the widespread message of consuming whole/natural foods rather than processed foods as nutrients can easily be lost when food is manufactured. Whole and unrefined foods contain phytochemicals that are beneficial for controlling lipoprotein levels, improving colon function, and providing oxidative defense mechanisms (102).

6.54 Canadians Intake of Positive and Negative Nutrients

Although Canadians are encouraged to regularly consume home cooked meals, approximately 62% of the dietary energy in Canada comes from ultra processed foods (103). A high consumption of processed foods may contribute to insufficient intakes of positive nutrients because this study show that consumers seem to focus more on the level of negative nutrients in food products. To ensure that Canadians consume adequate amounts of positive nutrients, health professionals may need to educate the public on fortified foods or meal planning.

6.6 Education

Being educated on how to use the information provided on a food label is an important part of being able to use it to make healthy food decisions. A recent study has shown that consumers were more likely to view a FOP labelling system in place of the Nft if signage was present to communicate the presence and meaning of the FOP labelling system (104).

6.61 Availability of Various Nutrition Resources Impacts Nutrition Knowledge

Although an incredible amount of research and education has been involved with developing and implementing the Nft and FOP labelling systems, consumers are still uninformed. Previous research has shown that 61% of Canadians still have difficulties choosing healthy food products because they are overwhelmed by the amount of nutrition information (98). In this study, participants' expressed confusion using numerical values on the label and failed to understand that labels were population based. The availability of non-credible nutrition information (e.g., word of mouth, media reports, and websites) also creates consumer confusion because it does not follow the governments' recommendations. Many consumers access food and nutrition information through various credible and non-credible sources such as the Internet (50%), food product labels (70%), Nft (51%), friends/relatives/colleagues (49%), and magazines (48%) (100). Conflicting messages from non-credible sources makes it difficult for consumers to understand the value and purpose of food labels. An effective education strategy needs to be implemented to educate and inform the public on food labels, and positive and negative nutrients. It should explain the importance of making healthy food choices, help increase the availability and accessibility to nutrient dense foods, and provide an

incentive for making healthier food choices (98).

6.7 Expectations and Nutrient Trade-Offs

The TPB can be used to explain how consumers choose a healthy food product; however, this study showed that expectations and nutrient trade-offs also influenced food decisions (Figure 8). For example, some participants in the study expected a yogurt product to have high levels of a positive nutrient (e.g., vitamin D and calcium), which made them more concerned about the levels of negative nutrients. Other participants were debating whether they would choose a yogurt that was high in sugar or high in fat. Therefore, it can be said that expectations and nutrient trade offs for a food product are individualistic and dependent on a person's food literacy skills and/or awareness of diet-disease relationships.

6.7.1 Systematic Information Processing

A Systematic Information Processing style can be used to explain how expectations and nutrient trade-offs affect food decisions. In the present study, participants were primarily women who were well educated. Therefore, they were more likely to practice healthy eating habits and rank nutrition of high importance (5). Their interest and knowledge in nutrition provided them with the cognitive resources, willingness, and ability to process nutrition information (94). Product expectations and nutrient trade-offs are an example of Systematic Information Processing because participants processed and evaluated more detailed nutrition information to make healthy food decisions that were in line with their individual nutritional goals (94). As previously mentioned, the Heuristic Model of Information Processing is typically used to explain consumers' use of food labels because

the general population uses the principal of least effort when reading food labels, as they have poor food literacy skills (52). Thus, future research should examine if expectations or nutrient trade-offs are concerns for individuals who are less knowledgeable about food and nutrition.

6.8 Exploring Alternative Labelling Formats

Although the present study shows that education on the MTL system can help health-conscious consumers better understand the nutrition information, the MTL system may not be effective for individuals who have low food literacy. A recent study compared a 5-Colour Nutrition Label (5-CNL) to the MTL system. The 5-CNL is a Summary Indicator System that provides the overall nutritional value of a food product based on a score (Figure 9). The score is represented on a scale, based on five colours: green (highest nutritional quality), yellow, orange, pink, and red (lowest nutritional quality) (105). Interestingly, individuals with no nutrition knowledge could better understand the nutritional value of a food product using the 5-CNL compared to the MTL system. The results of this study suggests that researchers must continually review new and upcoming FOP labelling systems to address population health, as the MTL system may not be the best option. This is because the MTL system does not appear to increase nutritional awareness for those who are nutritionally at-risk. However, there is limited research on this type of FOP labelling system and it requires further research.

Figure 9: 5-Colour Nutrition Label



7.0 LIMITATIONS

7.1 Recruitment

Recruitment difficulties led to a sample size that was small and not diverse. Thus, this study has limited transferability because the majority of the sample was composed of female participants aged 18-29. This is relevant, as women have more interest in using labels compared to men (51). It was also difficult to establish trends between the age and gender division due to the sample distribution. A low participation rate may have been attributed to a high time commitment, a lack of immediate compensation, a limited number of time slots for participating in a focus group interview session, and difficulties commuting to Downtown Toronto. In an effort to increase participation rate, recruitment sites changed from Toronto, ON to Guelph, ON. Future research needs to be conducted to explore confirm, supplement, or contradict the results of this study.

7.2 Dynamics of Focus Group Interview Sessions

The distribution of participants for each focus group interview session affected the dynamics of the session. To ensure that each session had a sufficient number of participants, the researcher combined participants from different age and gender groups. As a result, some participants were more reserved as they may have felt uncomfortable being with older/younger individuals and/or opposite gender. Furthermore, the researcher created groups in which participants knew each other or knew the moderator and this affected discussions because laughter and irrelevant discussions ensued. The moderator and supervisor would intervene to refocus the discussion when this happened.

7.3 Moderator

The moderator's lack of experience with conducting focus group interview sessions affected the data quality. The moderator had trouble deviating from the interview guide to further explore important concepts that were mentioned during the discussion. Fortunately, a co-supervisor was present to provide feedback and probe when necessary.

7.4 Interview Guide

Based on the responses of the focus group interview sessions, the interview guide was regularly updated to reduce the amount of definitions/explanations and to change terminology to help increase the quality of data collected. In the future, the researcher should conduct a pilot study with a group of people to ensure that the interview guide is clear. Due to recruitment difficulties, the interview guide was piloted with only three individuals. Finally, the researcher should consider limiting the number of dichotomous MTL systems that participants were required to review because it may have been overwhelming. The researcher included six labels for each food product to expose participants to every possibility and combination. This allowed the researcher to get a more accurate picture of what participants were concerned about in terms of positive and negative nutrients.

7.5 Analysis

During data transcription process, there were some areas that were unclear because participants were either soft spoken or several people talked at once. As a result, the researcher was unable to obtain all accurate statements. In the future, the researcher

should ask participants to speak up and to talk one at a time prior to conducting the focus group interview sessions. Fortunately, the co-supervisor and research assistants were present to take notes to ensure that transcriptions were accurate.

Chapter 8.0: CONCLUSION

More and more Canadians are relying on processed foods for their meals because they lack sufficient time to prepare home cooked ones. In an effort to help Canadians make healthier food choices, this study examined how Canadians respond to the MTL system and how dichotomous health messages affect food decisions.

This study found that education on how to use the MTL system is important to help health conscious consumers choose healthier food products. Education on the MTL system helped reduce barriers to label reading and lead to a positive view of the MTL system. Design of the MTL system was also a factor that affected participants' acceptance of the MTL system. Suggestions for improvements were primarily related to the appearance and regulation of the label. More importantly, the colours and the high/medium/low indicators on the MTL system played a significant role in food decisions compared to its numerical information.

The results clearly indicate that health conscious participants were most concerned about the levels of negative nutrients in a food product. More specifically, several participants were concerned about the levels of total fat, saturated fat, and trans fats. This can be attributed to the diet-disease (e.g., heart disease and fat) messages and fear-based messages that are regularly broadcasted in the media. Additionally, the economic burden associated with disease management may contribute to their interest in negative nutrients. Participants' lack of concern for positive nutrients may indicate a need for education, food fortification, and/or supplementation.

The health value of a food product was based on other nutritional attributes such as gluten content, addition of preservatives and additives, ingredients, and degree of processing. Consumers are constantly bombarded with non-credible nutrition information, which indicates a need for health professionals to educate consumers on nutrition trends because some of these factors do not always result in choosing a healthier product. Education on nutrition trends would also inform the design of the MTL system because it may eliminate insignificant nutritional attributes or nutrients that consumers expect to be listed on the MTL system.

Finally, health-conscious and well-educated individuals use a Systematic Processing style to make healthy food decisions. As a result, food decisions may be based on product expectations or nutrient trade-offs.

Chapter 9.0: RECOMMENDATIONS

This study contributes to the body of knowledge that is currently published on the MTL system. As previously mentioned, further research should be completed to explore consumers' response to label alterations (e.g., design, content, separating nutrients, etc.) as the most effective design has not been established. It is unclear whether these changes will help eliminate the barriers associated with using the MTL system. Therefore, new labels such as the 5-CNL should also be tested further to determine its value in comparison to the MTL system.

Although an educational component on the MTL system is ideal, research needs to be conducted to determine the content and method of delivery. It is important to develop material and messages that are clear and resonates with consumers.

Recruitment difficulties led to poor age and gender divisions. As a result, there were no distinct patterns related to participants' response towards dichotomous MTL systems. Future studies may be interested in re-examining this concept by collecting a larger and more diverse sample (that also includes non-label users). This is important because it may impact the use, design, and implementation of the MTL system.

Finally, expectations and nutrient trade-offs were novel concepts that emerged from data collected. Future research should explore these ideas further because findings show that it has an affect on food decisions.

REFERENCES

1. Schermel A, Mendoza J, Henson S, Dukeshire S, Pasut L, Emrich T, Lou W, Qi Y, L'abbé M. Canadians' perceptions of food, diet, and health--a national survey. *PLoS one*. 2014;9(1).
2. Savoie N, Barlow K, Harvey K, Binnie M, Pasut L. Consumer perceptions of front-of-package labelling systems and healthiness of foods. *Can J Public Health*. 2013;104(5):e359-63.
3. Story M, Kaphingst K, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. *Annu Rev Public Health*. 2008;29:253-72.
4. Fitzgerald N, Spaccarotella K. Barriers to a healthy lifestyle: from individuals to public policy and ecological perspective. *J Extension*. 2009; 12: 44-19.
5. Canadian Council of Food and Nutrition. Tracking nutrition trends: a 20 year history; 2009 [cited 2014 September 9]. Available from: [https://www.cfdn.ca/Downloads/CCFN-docs/20-Years-of-TNT-\(Sep12\)---Final.aspx](https://www.cfdn.ca/Downloads/CCFN-docs/20-Years-of-TNT-(Sep12)---Final.aspx)
6. Health Canada. Activities and responsibilities; 2008 [cited January 28, 2014]. Available from: <http://www.hc-sc.gc.ca/ahc-asc/activit/index-eng.php>
7. Health Canada. Food and Nutrition; 2012 [cited December 1]. Available from: <http://www.hc-sc.gc.ca/fn-an/index-eng.php>
8. Canadian Food Inspection Agency. Labelling legislative framework; 2014 [cited September 8]. Available from: <http://www.inspection.gc.ca/food/labelling/labelling-legislative-framework/eng/1387771371233/1387771427304>
9. Canadian Food Inspection Agency. Acts and regulations; 2014 [cited September 8]. Available from: <http://www.inspection.gc.ca/about-the-cfia/acts-and-regulations/eng/1299846777345/1299847442232>
10. Health Canada. Health Canada's proposed changes to the daily values (DVVs) for Use in Nutrition Labelling; 2014 [cited October 30]. Available from: <http://www.hc-sc.gc.ca/fn-an/consult/2014-daily-value-valeurs-quotidiennes/document-consultation-eng.php#a54>
11. Health Canada. Do Canadian adults meet their nutrient requirements through food intake?; 2012 [cited December 1]. Available from: <http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/art-nutr-adult-eng.php>
12. Sacco J, Tarasuk V. Discretionary addition of vitamins and minerals to foods: implications for healthy eating. *Eur J Clin Nutr*. 2011;65(3):313-20.
13. Canadian Sugar Institute. Nutrition labelling and claims; 2014 [cited October 31]. Available from: <http://www.sugar.ca/Nutrition-Information-Service/Health-professionals/Nutrition-Labelling-and-Claims-on-Food-Products.aspx>
14. Health Canada. Research synthesis on nutrition labelling; 2013 [cited November 30]. Available from <http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/res-rech/synth-eng.php>

15. U.S Food and Drug Administration. Proposed changes to the nutrition facts table; 2014 [cited November 23]. Available from: <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm385663.htm>
16. Dietitians of Canada. Nutrition labelling; 2013 [cited December 12]. Available from: <http://www.dietitians.ca/Dietitians-Views/Food-Regulation-and-Labeling/Nutrition-Labeling.aspx>
17. Institute of Medicine. Front-of-package nutrition rating systems and symbols: Promoting healthier choices. Washington, D.C: National Academies Press; 2012
18. Emrich T, Arcand J, L'Abbe M. Front-of-pack nutrition labelling systems: A missed opportunity. *Can J Public Health*. 2012;103(4):260-2.
19. Sacco J, Sumanac D, Tarasuk V. Front-of-package references to fibre on foods in canadian supermarkets highlight the need for increased nutrition knowledge among consumers. *J Nutr Educ Behav*. 2013;45(6):518-24.
20. Borgmeier I, Westenhoefer J. Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study. *BMC Public Health*. 2009;184(9):1-12.
21. Maubach N, Hoek J, Mather D. Interpretive front-of-pack nutrition labels: comparing competing recommendations. *Appetite*. 2014;82:67-77.
22. Hawley K, Roberto C, Bragg M, Liu P, Schwartz M, Brownell K. The science on front-of-package food labels. *Public Health Nutr*. 2013;16(3):430-9.
23. Tymms S. Design, format, and impact of front of pack nutrition labelling: an independent review of refereed literature. 2011.
24. Van H, Trijp H. Front-of-pack nutrition labels. Their effect on attention and choices when consumers have varying goals and time constraints. *Appetite*. 2011;57(1):148-60.
25. Canadian Food Inspection Agency. Vitamin and mineral nutrient claims; 2014 [cited November 1]. Available from: <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/nutrient-content/specific-claim-requirements/eng/1389907770176/1389907817577?chap=13>
26. Canadian Food Inspection Agency. Dietary fibre claims; 2014 [cited November 1]. Available from: <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/nutrient-content/specific-claim-requirements/eng/1389907770176/1389907817577?chap=12>
27. Canadian Food Inspection Agency. Potassium claims; 2014 [cited October 30]. Available from: <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/nutrient-content/specific-claim-requirements/eng/1389907770176/1389907817577?chap=10>
28. Health Canada. Vitamin D and calcium: Updated dietary reference intake; 2012 [cited October 30]. Available from: <http://www.hc-sc.gc.ca/fn-an/nutrition/vitamin/vita-d-eng.php#a11>

29. Canadian Food Inspection Agency. Fat claims; 2014 [cited October 30]. Available from: <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/nutrient-content/specific-claim-requirements/eng/1389907770176/1389907817577?chap=4>
30. Health Canada. General questions and answers on trans fats; 2009 [cited February 28]. Available from: http://www.hc-sc.gc.ca/fn-an/nutrition/gras-trans-fats/tfa-age_question-eng.php
31. Health Canada. Guidance for the food industry on reducing sodium in foods; 2012 [cited October 30]. Available from: <http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/2012-sodium-reduction-indust-eng.php>
32. Ippolito P. How government policies shape the food and nutrition information environment. *Food Policy*. 1999;24(2-3):295.
33. Health Canada. Eating well with Canada's food guide. Ottawa: Health Canada; 2011.
34. Woodside J, McKinley M, Young I. Saturated and trans fatty acids and coronary heart disease. *Curr Atheroscler Rep*. 2008;10(6):460-6.
35. Sacks F, Svetkey L, Vollmer W, Appel L, Bray G, Harsha D, Obarzanek E, Conlin P, Miller E. Effects on blood pressure of reduced dietary sodium and the dietary approaches to stop hypertension (DASH) diet. *N Engl J Med*. 2001;344(1): 3-10.
36. U.S Food and Drug Administration. Sodium in your diet: using the nutrition facts label to reduce your intake; 2014 [cited December 2]. Available from: <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm315393.htm>
37. Simons-Morton D, Karanja N, Lin P. Effects on blood pressure of reduced dietary sodium and the dietary approaches to stop hypertension (DASH) diet. *N Engl J Med*. 2001;344(1):3-10.
38. Tarasuk V. Policy directions to promote healthy dietary patterns in Canada. *Appl. Physiol. Nutr. Metab*. 2010;35(2):229-33.
39. Buttriss J, Stokes C. Dietary fibre and health: an overview. *NBU Nutrition Bulletin*. 2008;33(3):186-200.
40. Ross A, Manson J, Abrams S, Aloia J, Brannon P, Clinton S, Durazo-Arvizu R, Gallagher J, Gallo R, Jones G, Kovacs C, Mayne S, Rosen C, Shapses S. The 2011 dietary reference intakes for calcium and vitamin D: What dietetics practitioners need to know. *J Am Diet Assoc*. 2011;111(4):524-7.
41. He F, MacGregor G. Beneficial effects of potassium on human health. *Physiol Plant*. 2008;133(4):725-35.
42. Dietitians of Canada. Increasing your iron intake; 2010 [cited November 4]. Available from: <http://www.dietitians.ca/Nutrition-Resources-A-Z/Factsheets/Minerals/Increasing-Your-Iron-Intake.aspx>
43. Dietitians of Canada. Food sources of magnesium; 2014 [cited November 21]. Available from: <http://www.dietitians.ca/Nutrition-Resources-A-Z/Factsheets/Minerals/Food-Sources-of-Magnesium.aspx>

44. The Conference Board of Canada. Improving food literacy in Canada. Canada: Ontario Public Health Association; 2013.
45. Garretson J, Burton S. Effects of nutrition facts panel values, nutrition claims, and health claims on consumer attitudes, perceptions of disease-related risks, and trust. *J Public Policy*. 2000;19(2):213-27.
46. Canadian Food Inspection Agency. Nutrition labelling; 2014 [cited November 30]. Available from: <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/nutrition-labelling/eng/1386881685057/1386881685870>
47. Temple N, Fraser J. Food labels: a critical assessment. *Nutrition*, 2014;30(3):257-60.
48. Health Canada. Using the nutrition facts table: % daily value; 2011 [cited November 20]. Available from: <http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/cons/dv-vq/index-eng.php>
49. Fila S, Smith C. Applying the theory of planned behavior to healthy eating behaviors in urban native american youth. *Int J Behav Nutr Phys Act*. 2006;3.
50. Campos S, Doxey J, & Hammond D. Nutrition labels on pre-packaged foods: a systematic review. *Public Health Nutr*. 2011;14(8):1496-506.
51. Emrich T, Qi Y, Mendoza J, Lou W, Cohen J, L'abbe. Consumer perceptions of the Nutrition Facts table and front-of-pack nutrition rating systems. *Appl Physiol Nutr Metab* 2014;39(4): 417-424.
52. Cook L, Burton S, & Howlett E. Health risk factors and their effect on consumers' use of nutrition facts panels. *J Consum Aff*. 2011;45(3):516-27.
53. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: A systematic review. *Public Health Nutr*. 2005;8(1):21-8.
54. Nelson D, Graham D, Harnack L. An objective measure of nutrition facts panel usage and nutrient quality of food choice. *J Nutr Educ and Behav*. 2014;46(6):589-94.
55. Lin C, Lee J, Yen S. Do dietary intakes affect search for nutrient information on food labels. *Soc Sci Med*. 2004;59:1955-1967.
56. Health Canada. Consultation Canada gazette part I; 2015 [cited 2016 March 23]. Available from: <http://www.healthycanadians.gc.ca/alt/pdf/health-system-systeme-sante/consultations/food-label-etiquette-des-aliments/process-processus-eng.pdf>
57. Schermel A, Emrich T, Arcand J, Wong C, L'Abbe M. Nutrition marketing on processed food packages in Canada: 2010 food label information program. *Appl Physiol Nutr Metab*. 2013;38(6):666-72.
58. Agriculture and Agri-Food Canada. The Canadian snack food manufacturing industry. 2013 [cited October 21], Available from: <http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/processed-food-and-beverages/the-canadian-snack-food-manufacturing-industry/?id=1172692863066>

59. Institute of Medicine. Examination of front-of-package nutrition rating systems and symbols. Washington, D.C: National Academies Press; 2010
60. Bialkova S, Hans T. What determines consumer attention to nutrition labels. *Food Quality and Preference*. 2010;21(8):1042-51.
61. Food Standards Agency. Comprehension and use of UK nutrition signpost labelling schemes. The University of Surrey; 2009.
62. Mejean C, Macouillard P, Peneau S, Hercberg S, Castetbon K. Consumer acceptability and understanding of front-of-pack nutrition labels. *J Hum Nutr Diet*. 2013;26(5):494-503.
63. Draper A, Adamson A, Clegg S, Malam S, Rigg M, Duncan S. Front-of-pack nutrition labelling: Are multiple formats a problem for consumers? *Euro J Public Health*. 2013;23(3):517-21.
64. Siegrist M, Leins-Hess R, Keller C. Which front-of-pack nutrition label is the most efficient one? the results of an eye-tracker study. *Food Qual Preference*. 2014;39:183-90.
65. Roberto C, Bragg M, Schwartz M, Seamans M, Musicus A, Novak N, Brownell K. Facts up front versus traffic light food labels. *Am J Prev Med*. 2012;43(2):134-141
66. Roberto C, Bragg M, Seamans M, Mechulan R, Novak N, Brownell K. Evaluation of consumer understanding of different front-of-package nutrition labels 2010-2011. *Prev Chronic Dis*. 2012;9.
67. Kelly B, Hughes C, Chapman K, Louie J, Dixon H, Crawford J, King L, Daube M, Slevin T. Consumer testing of the acceptability and effectiveness of front-of-pack food labelling systems for the Australian grocery market. *Health Promot Internation*. 2009;24(2):120-9.
68. Schuldt J. Does green mean healthy? Nutrition label color affects perceptions of healthfulness. *Health Commun*. 2013;28(8): 814-821.
69. Emrich T, Mendoza J, L'Abbé M. Effectiveness of front-of-pack nutrition symbols: A pilot study with consumers. *Can J Diet Pract Res*. 2012;73(4):200-3.
70. Méjean C, Macouillard P, Péneau S, Hercberg S, Castetbon K. Perception of front-of-pack labels according to social characteristics, nutritional knowledge and food purchasing habits. *Public Health Nutr*. 2013;16(3):392-402.
71. Gorton D, Ni Mhurchu C, Chen M, Dixon R. Nutrition labels: A survey of use, understanding and preferences among ethnically diverse shoppers in New Zealand. *Public Health Nutr*. 2009;12(9):1359-65.
72. Vyth E, Steenhuis I, Vlot J, Wulp A, Hogenes M, Looije D, Brug J, Seidell J. Actual use of a front-of-pack nutrition logo in the supermarket: consumers' motives in food choice. *Public Health Nutr*. 2010;13(11):1882-9.
73. Sacks G, Rayner M, Swinburn B. Impact of front-of-pack 'traffic-light' nutrition labelling on consumer food purchases in the UK. *Health Promot Internation*. 2009;24(4):344-52.

74. Hamlin R, McNeill L, Moore V. The impact of front-of-pack nutrition labels on consumer product evaluation and choice: an experimental study. *Public Health Nutr* 2015;18(12):2126-2134.
75. Andrews JC, Burton S, Kees J. Is simpler always better? Consumer evaluations of front-of- package nutrition symbols. *J Public Policy Mark*. 2011;30(2):175.
76. Newman C, Howlett E, Burton S. Shopper response to front-of-package nutrition labeling programs: potential consumer and retail store benefits. *J Retailing*. 2014;90(1):13-26.
77. Zoellner J, Krzeski E, Harden S, Cook E, Allen K, Estabrooks P. Qualitative application of the theory of planned behaviour to understand beverage behaviours among adults. *J Acad Nutr Diet*. 2012; 112(11):1774-1784.
78. Krzeski E. Using the theory of planned behaviour to understand drink choices in southwest Virginians. Virginia Polytechnic Institute and State University; 2011.
79. Chase K, Reicks M, Jones JM. Applying the theory of planned behavior to promotion of whole-grain foods by dietitians. *J Am Diet Assoc*. 2003;103(12):1639.
80. Monette D, Sullivan T, DeJong C. *Applied social research: a tool for the human services*. 8th ed. California: Nelson Education; 2011.
81. Leung F, Ratnapalan S. Spotlight on focus groups. *Can Fam Physician*. 2009;55: 218-219.
82. Bitsch V. Qualitative research: A grounded theory example and evaluation criteria. *Journal of Agribusiness*. 2005;23(1).
83. Sue V, Ritter L. *Conducting online surveys*. 2nd ed. USA: Sage; 2012.
84. Wojcicki J, Heyman M. Adolescent nutritional awareness and use of food labels: Results from the national nutrition health and examination survey. *BMC Pediatrics*. 2012;12:55.
85. Krueger R, Casey M. *Focus groups: a practical guide for applied research*. 4th ed. California: Sage Publications; 2009.
86. Mack N, Woodsong C, MacQueen K, Guest G, Namey E. *Qualitative research methods a data collector's field guide*. North Carolina: Family Health International.
87. MAXQDA. *How MAXQDA can help you do great research*. Berlin: VERBI; 2014.
88. Kolb S. Grounded theory and the constant comparative method: Valid research strategies for educators. *Journal of Emerging Trends in Educational Research and Policy Studies*. 2012; 3(1): 83-86.
89. Patton M. Enhancing the quality and credibility of qualitative analysis. *Health Serv Res*. 1999;34(5):1189-1208.
90. Betzner A. *A pragmatic and dialectic mixed method approaches: an empirical comparison*. University of Minnesota: ProQuest; 2008.

91. World Health Organization. Diet, nutrition and the prevention of chronic diseases. Geneva: World Health Organization or of the Food and Agriculture Organization of the United Nations; 2003.
92. Antúñez L, Giménez A, Maiche A, Ares G. Influence of interpretation aids on attentional capture, visual processing, and understanding of front-of-package nutrition labels. *J Nutr Educ Behav.* 2015; 47(4): 292-9.
93. Hodgkins C, Raats M, Fife-Schaw C, Peacock M, Gröppel-Klein A, Koenigstorfer J, . . . Grunert K. Guiding healthier food choice: systematic comparison of four front-of-pack labelling systems and their effect on judgements of product healthiness. *Br J Nutr.* 2015; 113(10), 1652-1663.
94. Hodgkins C, Barnett J, Wasowicz-Kirylo G, Stysko-Kunkowska M, Gulcan Y, Kustepeli Y, et al. Understanding how consumers categorize nutritional labels: A consumer derived typology for front-of-pack nutrition labelling. *Appetite.* 2012;59(3):806-17.
95. Public Health Agency of Canada. Healthy aging in Canada: A new vision, a vital investment from evidence to action; 2006 [cited 2016 March 23]. Available from: http://www.swsd.gov.nl.ca/publications/pdf/seniors/vision_rpt_e.pdf
96. Wilson B. Designing media messages about health and nutrition: What strategies are most effective? *J Nutr Educ Behav.* 2007; 39(2S): S13-S19.
97. Health Canada. Educational tools and key messages; 2012 [cited 2016 March 23]. Available from: <http://www.hc-sc.gc.ca/fn an/nutrition/sodium/education-messages/index-eng.php>
98. Ellis S, Glanville T. (2007). Consumer use and interpretation of trans fat information on food labels. *Can J Diet Pract Res.* 2010;71(1):6-10.
99. Teisl M, Levy A, Derby B. The effects of education and information source on consumer awareness of diet-disease relationships. *J Public Policy Mark,* 1999;18(2):197-207.
100. Canadian Foundation for Dietetic Research (2013). Tracking nutrition trends 2013; [cited 2014 September 9] Available from: <https://www.cfdp.ca/Downloads/CCFN-docs/TNT-2013-Summary-Report.aspx>
101. Thomas P. Supplement use among US adults: Implications for the dietetics professional. *J Am Diet Assoc.* 2004;104(6):950-1.
102. Bruce B, Spiller G, Klevay L, Gallagher S. A diet high in whole and unrefined foods favorably alters lipids, antioxidant defenses, and colon function. *J Am Coll Nutr.* 2000;19(1):61-67.
103. Moubarac J, Martins A, Claro R, Levy R, Cannon G, Monteiro C. Consumption of ultra-processed foods and likely impact on human health. *Public Health Nutr.* 2013;16(12): 2240-8.
104. Graham D, Heidrick C, Hodgkin K. Nutrition label viewing during a food-selection task: front-of-package labels vs nutrition facts labels. *J Acad of Nutr Diet.* 2015;115(10), 1636.

105. Ducrot P, Méjean C, Julia C, Kesse-Guyot E, Touvier M, Fezeu L, . . . Péneau S. Objective understanding of front-of-package nutrition labels among nutritionally at-risk individuals. *Nutrients*. 2015;7(8), 7106-25.

Appendix A: Ethics Approval



University Research Ethics Board

Certificate of Research Ethics Clearance

Effective Date	April 2, 2015	Expiry Date	April 1, 2016
-----------------------	----------------------	--------------------	----------------------

File #:	2014-082
Title of project:	<i>Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators</i>
Researcher(s):	Lillian Lau
Supervisor (if applicable):	Theresa Glanville
Co-Investigators:	Jessica Wagner
Version :	1

The University Research Ethics Board (UREB) has reviewed the above named research proposal and confirms that it respects the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* and Mount Saint Vincent University's policies, procedures and guidelines regarding the ethics of research involving human participants. This certificate of research ethics clearance is valid for a period of **one year** from the date of issue.

Researchers are reminded of the following requirements:	
Changes to Protocol	Any changes to approved protocol must be reviewed <u>and</u> approved by the UREB prior to their implementation. Form: REB.FORM.002 Info: REB.SOP.113 Policy: REB.POL.003
Changes to Research Personnel	Any changes to approved persons with access to research data must be reported to the UREB immediately. Form: REB.FORM.002 Info: REB.SOP.113 Policy: REB.POL.003
Annual Renewal	Annual renewals are contingent upon an annual report submitted to the UREB prior to the expiry date as listed above. You may renew up to four times, at which point the file must be closed and a new application submitted for review. Form: REB.FORM.003 Info: REB.SOP.116 Policy: REB.POL.003
Final Report	A final report is due on or before the expiry date. Form: REB.FORM.004 Info: REB.SOP.116 Policy: REB.POL.003
Unanticipated Research Event	Researchers must inform the UREB immediately and submit a report to the UREB within seven (7) working days of the event. Form: REB.FORM.008 Info: REB.SOP.115 Policy: REB.POL.003
Adverse Research Event	Researchers must inform the UREB immediately and submit a report to the UREB within two (2) working days of the event. Form: REB.FORM.007 Info: REB.SOP.114 Policy: REB.POL.003

*For more information: <http://www.msvu.ca/en/home/research/researchethics/policies/default.aspx>

Dr. Derek Fisher, Chair
University Research Ethics Board

166 Bedford Hwy Halifax Nova Scotia B3M 2J6 Canada
Tel 902 457 6350 • Fax 902 457 2174
msvu.ca/researchethics

To: Lillian Lau
Nutrition

Re: REB 2015-124: Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators

Date: April 23, 2015

Dear Lillian Lau,

The review of your protocol REB File REB 2015-124 is now complete. The project has been approved for a one year period. Please note that before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required.

This approval may be extended after one year upon request. Please be advised that if the project is not renewed, approval will expire and no more research involving humans may take place. If this is a funded project, access to research funds may also be affected.

Please note that REB approval policies require that you adhere strictly to the protocol as last reviewed by the REB and that any modifications must be approved by the Board before they can be implemented. Adverse or unexpected events must be reported to the REB as soon as possible with an indication from the Principal Investigator as to how, in the view of the Principal Investigator, these events affect the continuation of the protocol.

Finally, if research subjects are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research.

Please quote your REB file number (REB 2015-124) on future correspondence.

Congratulations and best of luck in conducting your research.



Lynn Lavallée, Ph.D.
Chair, Research Ethics Board

Nutrition Study

Do you look at food labels? We are recruiting adults 18 years or older to tell us what you think about different food label options.



- * Must be 18 years or older
- * Not formally educated in the field of food and nutrition
- * Principal shopper in your household (shops at least once a week)
- * Able to comprehend and speak English

**Refreshments
will be served**

**If you wish to participate please contact foodlabels@msvu.ca
or call (416) 979-5000 ext. 7544 for more information.**

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

foodlabels@msvu.ca

(416) 979-5000 ext 7544

APPENDIX C: PRESCREENING QUESTIONNAIRE



Excellence • Innovation • Discovery
Department of Applied Nutrition



Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators

I am a student in the Master of Science Applied Human Nutrition (Dietetics) Internship Education Program at Mount Saint Vincent University in Halifax, NS.

For my thesis, I am examining the decision process that occurs when consumers are presented with products that are high or low in certain nutrient. This study will be beneficial for consumers and healthcare professionals because it provides insight on current food labelling policies.

This pre-screening questionnaire is to determine if you are eligible to participate in the study. It will assess your age, educational background, frequency of grocery shopping, and availability. This questionnaire will take approximately five minutes to complete. Please return this questionnaire as an attachment or in the body of an e-mail addressed to: foodlabels@msvu.ca within a week. The researcher, co-supervisor, and supervisor are the only people who have access to this e-mail account and it has been set up just for this project. We will be the only ones to have any knowledge of the names of the respondents, but will not make any records, nor will we share this information with others.

Please be aware that:

- The completion of this questionnaire is voluntary
- You may skip questions that you feel are uncomfortable
- There are no direct benefits associated with this questionnaire
- Your responses will remain confidential: The researcher, co-supervisor, and supervisor are the ones who can access the data. Although there is a slight risk of losing private information, the questionnaires will be stored on a locked and password-protected computer.

Participants who qualify for the study will be sent a follow-up e-mail asking for your name and contact information.

Please contact the Principal Investigator Lillian Lau if you need further explanation of this particular research study at (416) 979-5000 ext. 7544 or foodlabels@msvu.ca.

I.D. Number: _____

If you wish to participate in this study, please indicate your informed consent below:

- Yes, I read and understand the information and provide informed consent
- No, I read and understand the information and do provide informed consent (will not fill out and submit questionnaire)

For the following responses please check or fill in the space provided to indicate a selection.

Gender:

How do you identify?

- Male
- Female
- Transgender

Age:

How old are you?

- <18 years of age
- 18-30 years of age
- 31-49 years of age
- 50+ years of age

Educational Background:

Which describes your educational background? Please specify your degree and program.

- Less than high school
- High school
- Some college: Degree: _____ Program: _____
- Bachelor Degree: _____ Program: _____
- Graduate Degree: _____ Program: _____

Frequency of grocery shopping:

How often do you go grocery shopping?

- Never
- At least once a week
- At least once a month
- At least once every 2 weeks

Availability

Are you able to participate in a 1-1.5 hour long focus group session?

- Yes
- No

Thank you for your participation!

Telephone Pre-screening Questionnaire

I am a student in the Master of Science Applied Human Nutrition (Dietetics) Internship Education Program at Mount Saint Vincent University in Halifax, NS.

For my thesis, I am examining the decision process that occurs when consumers are presented with products that are high or low in certain nutrient. This study will be beneficial for consumers and healthcare professionals because it provides insight on current food labelling policies.

This pre-screening questionnaire is to determine if you are eligible to participate in the study. It will assess your age, educational background, frequency of grocery shopping, and availability. This questionnaire will take approximately five minutes to complete. Is there a better time for you to answer these questions?

Gender:

How do you identify?

- Male
- Female
- Transgender

Age:

How old are you?

- <18 years of age
- 18-30 years of age
- 31-49 years of age
- 50+ years of age

Educational Background:

Which describes your educational background?

- Less than high school
- High school
- Some college: Degree: _____ Program: _____
- Bachelor Degree: _____ Program: _____
- Graduate Degree: _____ Program: _____

Frequency of grocery shopping:

How often do you go grocery shopping?

- Never
- At least once a week
- At least once a month
- At least once every 2 weeks

Availability

Are you able to participate in a 1-1.5 hour long focus group session at Ryerson University?

- Yes
- No

If the participant is eligible ask for contact information:

Name: _____

E-mail Address: _____

Telephone Number: _____

Thank you very much for your participation!

Appendix D: Consent Forms



TITLE OF RESEARCH Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators

NAME OF PRINCIPAL INVESTIGATOR: The lead researcher Lillian Lau, is a MSc student at Mount Saint Vincent University who is studying Applied Human Nutrition.

PHONE NUMBER AND EMAIL OF PRINCIPAL INVESTIGATOR: (519) 835-6048 or lillian.lau@msvu.ca

INTRODUCTION:

You have been selected to participate in a research study that examines how consumers make food purchasing decisions when presented with new nutrition labels, such as the Multiple Traffic Light (MTL) label. Although previous studies have shown that consumers prefer and understand this type of label, researchers have not identified the key nutrients that affect how consumers make decisions about food purchases using the MTL system. This study will be beneficial to consumers and healthcare professionals because it provides insight on current food labelling policies. This will be accomplished by:

- Understanding consumers' perceptions of the MTL label
- Understanding consumers' perceptions of the health messages expressed by the MTL label
- Evaluating consumers' perceptions of various designs for the MTL label
- Determining whether consumers identify health properties of selective nutrients as being positive or negative
- Determining whether gender and/or age impact consumers' response to health messages that are expressed by the MTL label

Participants must be 18+ years, able to comprehend and speak English, the principal in their household (shops at least once a week) and not formally educated in the field of food and nutrition. Participants who qualify will be eligible to continue the research study.

WHAT IS INVOLVED IN THE STUDY:

If you agree to participate in the study, you will voluntarily participate in a 1-1.5 hour long focus group session. A moderator will ask you about your opinion and experience with nutrition labels. Note takers will document your responses and this session will be recorded with a voice recorder. Audio consent must be provided in order to participate in the study. Please be advised that you can skip questions that you do not feel comfortable answering. When the study is complete, the researcher will e-mail a full summary of the report to inform you of the research outcomes.

RISKS:

While we will take all precautions to keep your contact information safe, there is a very slight risk of losing private information from the pre-screening questionnaire and/or focus group sessions. Participants may also feel hesitant answering sensitive questions during the focus group session such as grocery shopping habits, use of nutrition labels, and nutrition knowledge.

Confidentiality: Personal identifiers will not be released in transcriptions or notes, as a number will identify each participant. Hard copies of data will be kept in a locked filing cabinet and electronic files will be encrypted and stored on a password-protected computer. The researcher, supervisor, co-supervisor, and research assistants are the only people who have access to the data. When the study is complete the list of names and contact information will be destroyed.

Please be aware that other focus group participants and the researcher will know your identity. Please keep all comments made during the focus group confidential and do not discuss what happened during the focus group outside the meeting.

Please also note that the researcher may travel between institutions (i.e. Mount Saint Vincent University and Ryerson University), which limits the security of your data.

BENEFITS:

You may not directly gain benefits from this research; however, you will contribute to the body of knowledge surrounding front of package labelling policies and programs. This may be beneficial to health practitioners.

COSTS:

There are no costs involved with participating in this study.

COMPENSATION:

If you agree to participate, you will be entered into a draw to win one of six \$25 food or beverage gift certificates at the end of the session.

QUESTIONS:

Please contact the Principal Investigator Lillian Lau if you need further explanation of this particular research study at (416) 979-5000 ext. 7544 or foodlabels@msvu.ca.

If you have questions about how this study is being conducted and wish to speak with someone not involved in the study, you may contact the Chair of the University Research Ethics Board (UREB) c/o MSVU Research Office, at 902-457-6350 or via e-mail at research@msvu.ca; or The Ryerson University Research Ethics Board c/o Office at 416-979-5042 or via e-mail at rebchair@ryerson.ca

CONSENT:

Participation in this study is voluntary and you may withdraw from the study without penalty. If you choose to stop participating, you have the option of excluding your data from the study. Please contact the researcher through e-mail, telephone, or in person as soon as possible if you choose withdrawal before, during, or after the focus group session. Your choice of whether or not to participate will not influence your future relations with Ryerson University, Mount Saint Vincent University, or the investigators (*Lillian Lau, Dr. Jessica Wegener, and Dr. Theresa Glanville*).

Your signature indicates that you give permission for the information provided in interviews to be used for publication in research articles/journals/books, and/or teaching materials. Additionally, your signature indicates that you have received a copy of the consent form.

Consent

Name of person consenting (Please print): _____

Signature: _____ Date: _____

E-mail Address:

We ask that you provide your email address so the researcher can send you the results of the study. Your e-mail address will also allow the researcher to send a gift certificate to you if you are one of the winners of the prize draw:

_____@_____



Consent for Audio Recording

Participant Name (please print)	
Research Study Title	Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators
Researcher	Lillian Lau

As a participant in this research study, I agree to be audio recorded for the purpose of exploring how consumers evaluate nutrition labels, I am aware that I am able to withdraw this consent at any time without penalty or consequence, at which time the recordings will be completely erased and destroyed.

I understand that the recordings will be kept confidential and that no information about me, including these recordings, will be given to anyone.

I consent to excerpts of these recordings, or descriptions of them, being used by the researcher for the purpose of research or the presentation of research. I understand that the researcher will edit out from these recordings, or from descriptions of the recordings, any information that may identify me.

I understand that I will be offered the opportunity to review the transcript of the recording and that I may withdraw or alter part or all of the transcript.

I understand that I will be given the opportunity to provide or withdraw my permission for the use of the recordings for purposes other than what was stated in the original consent form prior to their use.

I understand that if I have any comments or concerns resulting from my participation in this study that I can contact the Research Ethics Coordinator, Office of Research Ethics, at 902-457-6350 or research@msvu.ca.

Signatures

Participant	
Date	
Researcher	
Date	

APPENDIX E: INTERVIEW GUIDE

“Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators”

A. INTRODUCTION

- a) Moderator welcomes participants and introduces self-
 - *Hello everyone thank you for coming this morning.*
 - *My name is Lillian and I am a nutrition student from Mount Saint Vincent University.*
 - *On my research team today I have Jessica who will be helping taking notes during this session.*
- b) Moderator outlines the research objectives-
 - *The intent of this research is to assess a new product label and find out how the levels of specific nutrients in a food product influence what you eat or which foods you choose to buy.*
 - *Your opinions can help inform our Government’s use of food labels on packaged products.*
- c) Moderator explains how focus group discussion will work (i.e. duration of discussion, participants are free to say whatever comes to mind about the label or other content without any consequences, option to withdraw at anytime)
 - *In terms of the FG discussion; you are free to say whatever comes to mind about the label or other content without any consequences.*
 - *There are no right or wrong answers and would like to hear a wide range of opinions*
 - *Respect each others comments*
 - *The discussion should be approximately 1-1.5 hours long and you also have option to withdraw at anytime.*
- d) Moderator explains purpose of audio recorder
 - *The audio recorder is here to capture what is said during the discussion so it is important to talk louder and one at a time*
 - *Allows us to type out what was said*
 - *Allows us to refer back to the discussion later*
 - *Allows us to make comparisons between the groups*
 - *Is everyone fine with being recorded?*
- e) Moderator assures confidentiality
 - *I also want to let you know that I will not associate your name with what has been said in the final report.*
 - *You will remain anonymous throughout the study.*
- f) *Are there any other questions before we get started?*

B. INTRODUCTORY QUESTIONS

1. Would you like to go around the table and introduce yourselves?
2. When you picture yourself walking down the aisles of a grocery store, what kinds of packaged foods do you see yourself selecting?

3. Do you find challenging in reading information on products that you buy?

C. CONSUMER ATTITUDE SURROUNDING THE USE AND DESIGN OF FRONT OF PACKAGE LABELLING SYSTEMS AND MULTIPLE TRAFFIC LIGHT SYSTEMS

Question 1	<p>Are you familiar with the term “front of package labeling (FOP)?”</p> <p>What does the term “front of package labeling (FOP)” mean to you?</p>
Probes	<p>Moderator reads:</p> <ul style="list-style-type: none"> • <i>Typically, FOP labels are defined as symbols that indicate the nutritional characteristics of a food product.</i> • <i>They can be found on the principal display panel of the product; the side, top, or back panels; or on shelf tags.” (ORANGE BOX-GIVE EXAMPLES). Examples include the health check symbol (yogurt), whole grain symbol (bread), guiding stars program (Loblaws)</i> <ul style="list-style-type: none"> o Having heard the definition of FOP labels, are you familiar with this labelling method on food packages? o How often do you use FOP labels to compare pre-packaged food products? o What are (if any) some of the benefits to using the FOP label?
Question 2	<p>Moderator explains that the Traffic Light (TL) label is one type of FOP:</p> <ul style="list-style-type: none"> • <i>“TL label uses the traffic light concept to show the level of nutrients that we should limit in a food product (such as saturated fat, trans fats, sugar, and salt).</i> • <i>A green light represents low levels, a red light represents high levels, and an amber light indicates medium levels of a nutrient that we should limit in our diet.” (BLUE BOX).</i> • <i>This is similar to the traffic light system that is used when driving where green is representative of something good, amber is occasionally, and red is caution.</i> • <i>[At this point, display the yogurt TL system with negative nutrients only (SHEET B)]. This is an example of a TL label that I created and contains additional features to make it as realistic as possible. But, focusing on the TL label, what is your impression of this MTL label at the top right corner in terms of the format (colour, placement, indicators)?</i>

Probe	<ul style="list-style-type: none"> • Are there any factors that would stop you from using of the TL label to compare food products? <ul style="list-style-type: none"> ▪ Cost ▪ Interpretation ▪ Interest ▪ Brand loyalty-consumers purchase products from the same food manufacturer because they are committed to the brand ▪ Design ▪ Marketing Scheme-food manufacturers use nutrition labels to market their product • How could be more informative or changed to help you make healthier food choices and increase the use of this label?
Question 3	<p>There are some countries (such as the UK) that have implemented this type of label. However, the labels are not identical on food packages. Food manufacturers can also create their own nutritional requirements to carry this label.</p>
Probe	<ul style="list-style-type: none"> • If these labels were regulated and identical on food packages (similar to the Nutrition Facts Table), how would this change your perception of the TL label?

D. DECISION MAKING PROCESS

Question 4	<p>So far, we have talked about the design of the labels. We are going to switch gears and talk about your perspective on pre-packaged food products. We will talk more about the label later on.</p> <ul style="list-style-type: none"> • What are some features or characteristics of a healthy food product?
------------	--

Probe	<ul style="list-style-type: none"> • What source(s) of health information shaped your understanding of ‘healthy’ pre-packaged food products? - Health Canada - Food companies - Research studies - Health professional - Internet - Magazines/newspaper - Media - Friends/family
Question 5	<p>Our government recommends:</p> <ul style="list-style-type: none"> • Nutrients that consumers should consume more of include magnesium, calcium, fibre, iron, potassium, and vitamin D (GREEN BOX). • Nutrients that consumers should limit in their diet (saturated fat, sugar, sodium) due to a link between excess consumption of these nutrients and higher disease risk (YELLOW BOX). <ul style="list-style-type: none"> ◦ Do you pay attention to any of the nutrients that the government focuses on when you are selecting food products? Why?
Probe	<ul style="list-style-type: none"> • <i>[Moderator presents 3 yogurt packaging samples in which the TL systems indicates levels for nutrients that we need to limit, nutrients we need to consume more of, and one with both] (SHEET B):</i> <ul style="list-style-type: none"> ◦ What are your thoughts on a TL label that contains indicators for both positive and negative nutrients? Is it more informative? Is it easier to interpret? Less skeptical? Although it provides more information, is it too much for the general population (more confusing)?
Question 6	<p><i>[Moderator presents and explains the labels for the 6 mock cracker (Sheet C) and 6 mock yogurt packages (Sheet D) with the a combination of nutrients we should consume more of and limit].</i></p> <ul style="list-style-type: none"> • The MTL label on the package contains both positive and negative nutrients with different levels (The positive nutrients include.....the negative nutrients are...) • Assuming the cost and flavor were identical between the 6 cracker

	<p>and 6 yogurt products, which product would you buy? Why did you choose these items?</p> <p>**SEPARATE C & D</p>
Probe	<ul style="list-style-type: none"> • So what I hear is that you are more concerned about the levels of nutrients that we should limit, can you tell me more about that? • Looking at the MTL label, which products from SHEET C and SHEET D seem healthy to you? <ul style="list-style-type: none"> o Low in fat/saturated fat/trans fats (Crackers) vs. High in fiber (Crackers) vs. Low in sodium (Crackers) o Low in fat/saturated (Yogurt), versus high in Vitamin D (Yogurt) vs. low in sugar • Do you typically purchase packaged yogurt or cracker products?

E. OTHER QUESTIONS

- Expectations
- Trade-off
- How to inform consumers of how to use the MTL labeling system
- Menu labeling using MTL labeling system
- Colour-blind

F. FEEDBACK AND CLOSING REMARKS (10 minutes)

- a) Ask participants if there are any other issues impacting their general nutrient comparisons of food products and/or the use/design of the of the MTL system?
- b) Moderator summarizes the main points of the discussion and asks for feedback (MTL and nutrients).
- c) Moderator thanks participants for attending and contributing to the focus group session.
- d) Moderator informs participants to contact Lillian Lau if they require further information or clarification on research study
- e) If you know anyone who might be interested in participating please ask them to e-mail me or phone me.

Appendix F: Debriefing Letter



Date: March 2, 2016

Project Title: Exploring How Consumers Compare and Respond to Food Products Based on a Multiple Traffic Light System that Includes Positive Nutrient Indicators

Thank you very much for taking part in this study. The time you took to participate in the focus group interview and your contribution to the discussion were greatly appreciated. As you recall, this study examined how consumers make food decisions when presented with information on the health value of the food as displayed on the Multiple Traffic Light (MTL) front-of-package labelling system.

Based on the analysis of the focus group sessions, we learned that consumers are concerned about having information on nutrients that they should limit in their diet such as fat, sugar, and sodium implying that they value information on disease prevention.

Other nutritional attributes such as content of vitamins, minerals, additives, preservatives, and organic growing practices also impacted food purchasing behaviours.

We also learned that education on how to use the information provided on a food label will be an important part of achieving healthful food choices.

The results were consistent across all demographic groups that took part in the focus group sessions.

This research was very timely as Health Canada is in the process of reviewing the design of several aspects of food labels in Canada and front-of-package labeling will be an important part of this review.

This study received ethics clearance through the Research Ethics Committee at Mount Saint Vincent University and Ryerson University. If you have any questions or concerns about your participation in this study, you can contact Lillian Lau at foodlabels@msvu.ca.

APPENDIX G: KEY DEFINITIONS

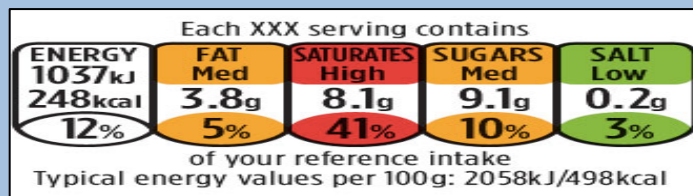
Front of Package (FOP) Labels is defined as:

- Symbols that indicate the nutritional characteristics of a product.
- Located on the principal display panel of the product; the side, top, or back panels; or on shelf tags

[Examples Given]

Multiple Traffic Light (MTL) Label:

- Uses the traffic light concept to indicate the level of negative nutrients (saturated fat, sugar, and salt) in a food product
- A green light represents low levels, a red light represents high levels, and an amber light indicates medium levels of a nutrient



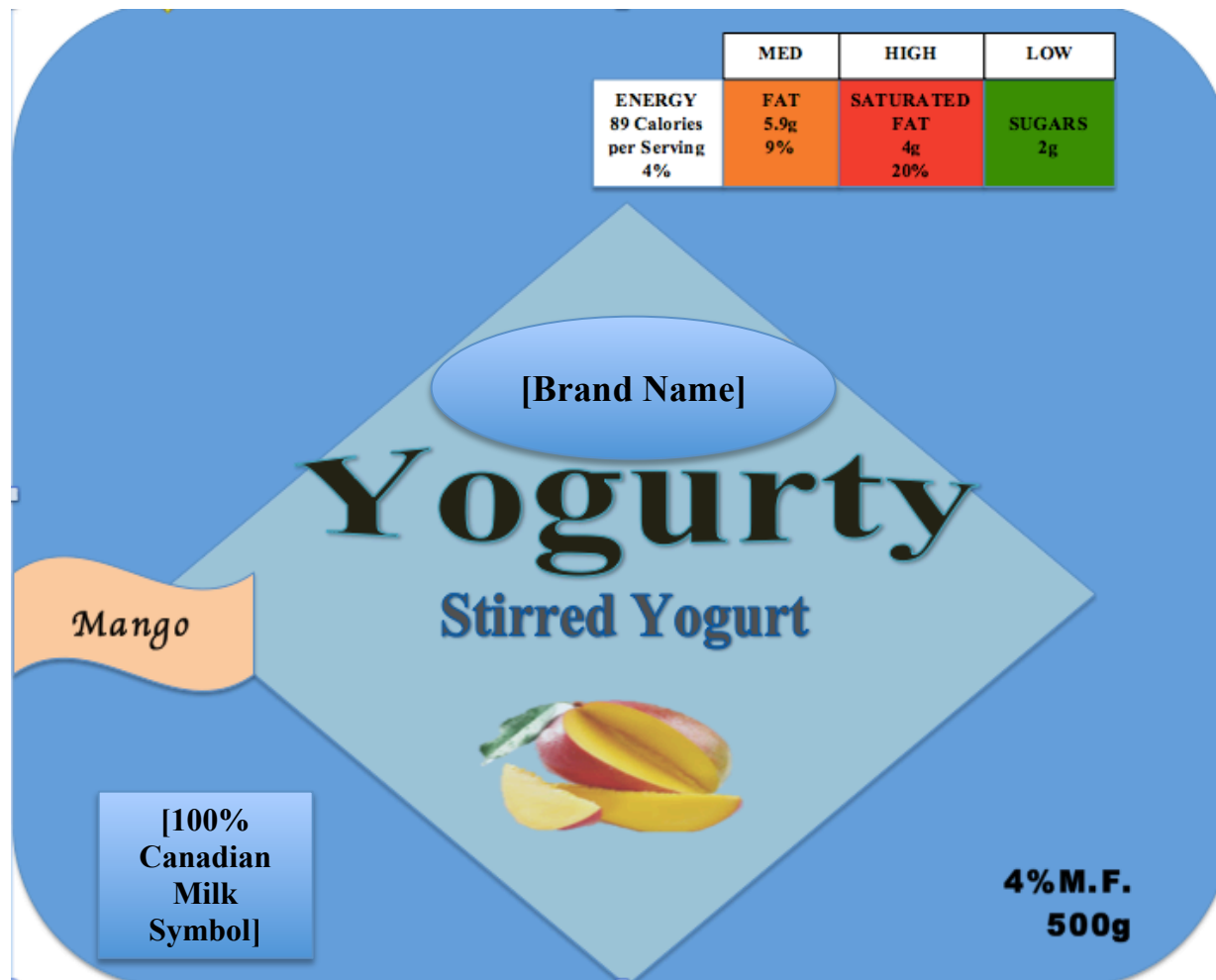
Nutrients to Consume More of:

- Nutrients Canadians should increase intake of: magnesium, calcium, fibre, iron, potassium, and vitamin D

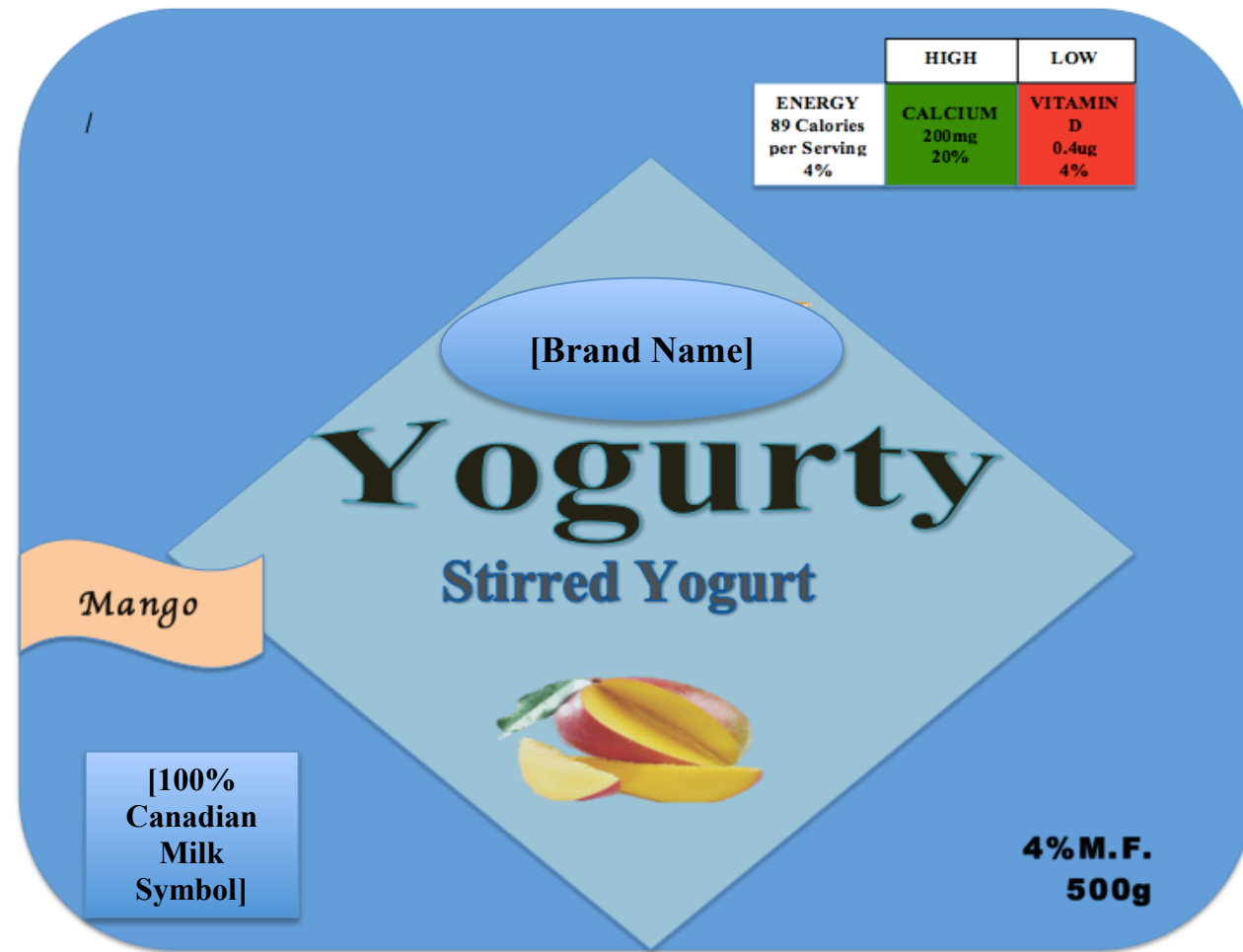
Nutrients to Limit:

- Nutrients you should decrease intake of: trans fats, sodium, sugar, and cholesterol
- Based on scientific research that demonstrates a link between excess consumption of these nutrients and higher disease risk.

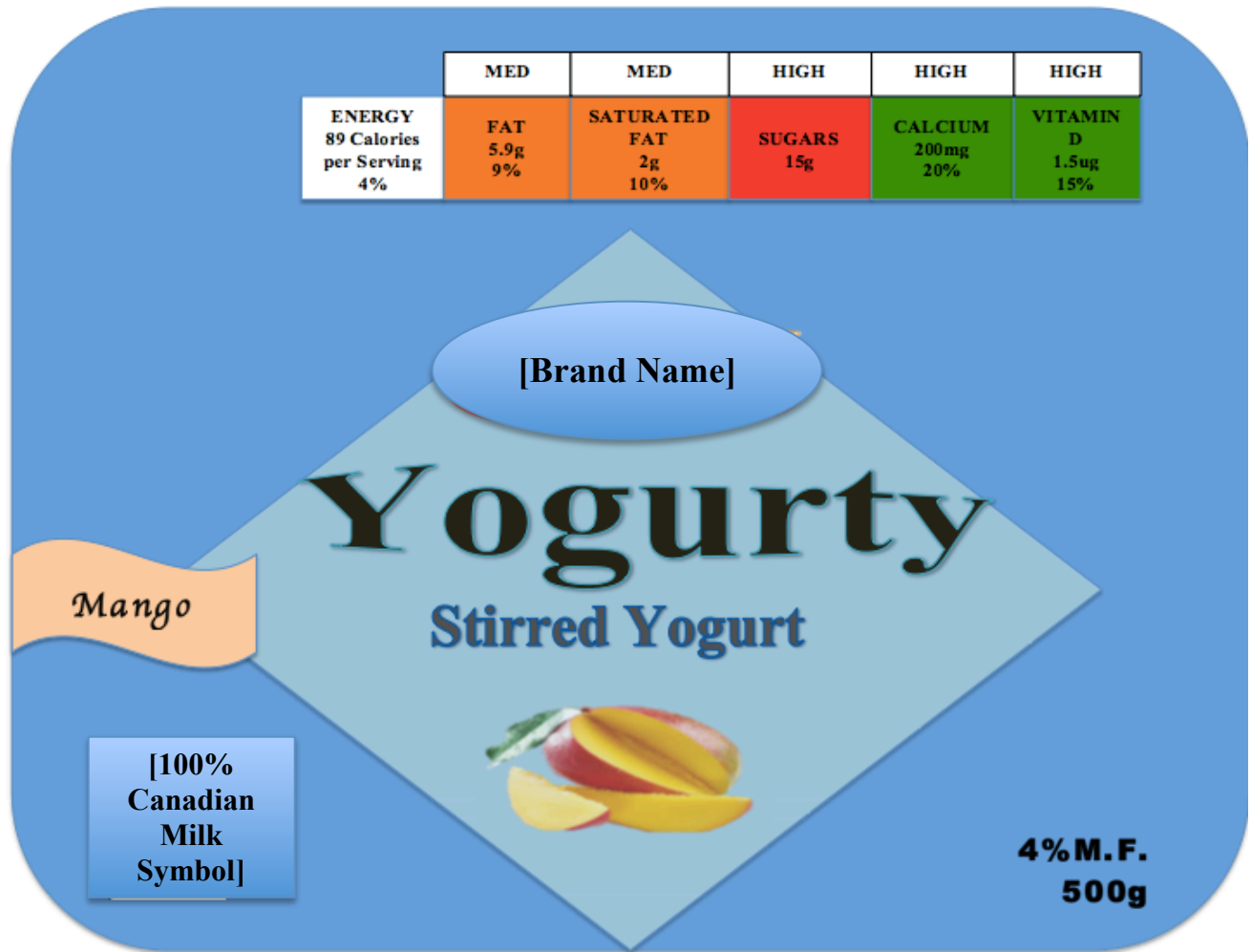
APPENDIX H: SHEET B



*Original Design-Nutrients to Limit
Design A*



*Modification-Nutrients to consume more of
Design B*



*Modification-Nutrients to consume more of and limit
Design C*

APPENDIX I: SHEET C


	HIGH	HIGH	MED	HIGH
ENERGY 91 calories per serving 5%	FAT 10g 15%	SATURATED AND TRANS FAT 3g 15%	SODIUM 184 mg 8%	FIBER 4g 16%

[Brand Name]

CRUNCH

Baked

ORIGINAL



[Peanut Free Symbol]

**NET WT
7.1 oz**


	MED	MED	HIGH	HIGH
ENERGY 91 calories per serving 5%	FAT 4g 6%	SATURATED AND TRANS FAT 1.2g 6%	SODIUM 360 mg 15%	FIBER 4g 16%

[Brand Name]

CRUNCH!

Baked Crackers

ORIGINAL



[Peanut Free Symbol]

**NET WT
7.1 oz (200g)**


	HIGH	HIGH	LOW	MED
ENERGY 91 calories per serving 5%	FAT 10g 15%	SATURATED AND TRANS FAT 3g 15%	SODIUM 96mg 4%	FIBER 2 g 8%

[Brand Name]

CRUNCH!

Baked Crackers

ORIGINAL



[Peanut Free Symbol]

**NET WT
7.1 oz (200g)**


	MED	MED	LOW	LOW
ENERGY 91 calories per serving 5%	FAT 4g 6%	SATURATED AND TRANS FAT 1.2g 6%	SODIUM 96mg 4%	FIBER 1 g 4%

[Brand Name]

CRUNCH!

Baked Crackers

ORIGINAL



[Peanut Free Symbol]

**NET WT
7.1 oz (200g)**

	LOW	LOW	HIGH	MED
ENERGY 91 calories per serving 5%	FAT 2g 3%	SATURATED AND TRANS FAT 0.6g 3%	SODIUM 360 mg 15%	FIBER 2 g 8%

[Brand Name]

CRUNCH!

Baked Crackers

ORIGINAL



[Peanut
Free
Symbol]

NET WT
7.1 oz (200g)

	LOW	LOW	MED	LOW
ENERGY 91 calories per serving 5%	FAT 2g 3%	SATURATED AND TRANS FAT 0.6g 3%	SODIUM 184 mg 8%	FIBER 1 g 4%

[Brand Name]

CRUNCH!

Baked Crackers

ORIGINAL



[Peanut
Free
Symbol]

NET WT
7.1 oz (200g)

APPENDIX J: SHEET D

	LOW	LOW	HIGH	HIGH	MED
ENERGY 89 Calories per Serving 4%	FAT 0.2g 0%	SATURATED FAT 0.1g 0%	SUGARS 15g	CALCIUM 200mg 20%	VITAMIN D 0.6ug 6%

[Brand Name]

Yogurty
Stirred Yogurt

Mango

[100%
Canadian
Milk
Symbol]



0% M.F.
500g


	LOW	LOW	MED	HIGH	LOW
ENERGY 89 Calories per Serving 4%	FAT 0.2g 0%	SATURATED FAT 0.1g 0%	SUGARS 6g	CALCIUM 200mg 20%	VITAMIN D 0.4ug 4%

[Brand Name]

Yogurty
Stirred Yogurt

Mango

[100%
Canadian
Milk
Symbol]



0% M.F.
500g

	MED	MED	HIGH	HIGH	HIGH
ENERGY 89 Calories per Serving 4%	FAT 5.9g 9%	SATURATED FAT 2g 10%	SUGARS 15g	CALCIUM 200mg 20%	VITAMIN D 1.5ug 15%

[Brand Name]

Yogurty

Stirred Yogurt

Mango

[100%
Canadian
Milk
Symbol]



4% M.F.
500g

	HIGH	HIGH	MED	HIGH	HIGH
ENERGY 89 Calories per Serving 4%	FAT 10g 15%	SATURATED FAT 4g 20%	SUGARS 6g	CALCIUM 200mg 20%	VITAMIN D 1.5ug 15%

[Brand Name]

Yogurty

Stirred Yogurt

Mango

[100%
Canadian
Milk
Symbol]



4% M.F.
500g

	HIGH	HIGH	LOW	HIGH	MED
ENERGY 89 Calories per Serving 4%	FAT 10g 15%	SATURATED FAT 4g 20%	SUGARS 2g	CALCIUM 200mg 20%	VITAMIN D 0.6ug 6%

[Brand Name]

Yogurty

Stirred Yogurt



Mango

[100%
Canadian
Milk
Symbol]

**4% M.F.
500g**

	MED	MED	LOW	HIGH	LOW
ENERGY 89 Calories per Serving 4%	FAT 5.9g 9%	SATURATED FAT 2g 10%	SUGARS 2g	CALCIUM 200mg 20%	VITAMIN D 0.4ug 4%

[Brand Name]

Yogurty

Stirred Yogurt



Mango

[100%
Canadian
Milk
Symbol]

**4% M.F.
500g**