Healthy Food Labeling on UBC Campus Written Report

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Executive Summary

In Canada, the economic burden of poor dietary habits is estimated at $6.3 billion annually[1]. At the University of British Columbia (UBC), nutrition labeling has been identified as a key action area to improve student dietary habits and health (L. McGowan, oral communication, 2014). Excessive consumption of total fat, added sugar, sodium and calories place individuals at a higher risk for obesity[2], hypertension[3], type 2 diabetes[4] and heart disease[5]. Due to a high level of interest from students, it is an appropriate time to implement a user-friendly food labeling system to help students to choose healthier food options. The goal of our proposed UBC Healthy Food Labels (HFL) is to decrease the prevalence of hypertension and obesity, as well as the risks for type 2 diabetes and heart disease in UBC students over the next four years.

To decrease the consumption of foods high in total fat, added sugar, sodium, and calories among UBC students dining on campus, we propose modeling the UBC HFL after the United Kingdom (UK) Traffic Light Signpost Labeling System (TLSLS), an efficient, user-friendly, consumer-preferred method of communicating nutrition information[6]. Our proposed criteria for the UBC HFL are tailored to fit the UBC student population in the context of Canadian nutrition guidelines. By September 2014, we hope the community partners will approve this labeling system and use it to build upon the existing "Rez Allergen Checklist" labels, which identify common food allergens and/or intolerances.

By addressing qualities that affect the speed and extent that UBC HFL will successfully spread throughout the UBC campus, we want to see at least 50% of students using the UBC HFL to decrease their total fat, added sugar, sodium and caloric intake by the end of April 2016. While a process evaluation is used throughout the development of the project, an impact evaluation will be used to determine community partners' approval of the proposed UBC HFL using a Likert scale and the UBC HFL's effect on promoting healthy eating among UBC students using a campus-wide survey and review of food sale patterns. Overall, we are confident that by using TLSLS as a model for the UBC HFL we can reach our goal.

Introduction

In Canada, obesity rates have increased 18% from 2000 to 2011 and are not predicted to stop rising[7]. The prevalence of hypertension is also growing with 20% of Canadians already suffering from this affliction[8]. Respectively, these two diseases are highly associated with type 2 diabetes[7] and heart disease[8]. As young adulthood is recognized as a critical period for the onset of many negative health behaviours[9] and 1.5 million students annually attend Canadian universities[10], prevention needs to be focused on this group.

At the University of British Columbia (UBC) there is a high level of interest, particularly from the UBC Vice-President, in improving student health (B. Mansfield, oral communication, 2014). The UBC Wellbeing Project (UWP) is a major initiative looking to achieve this goal and within it healthy food labeling is a key action area (L. McGowan, oral communication, 2014) as food labels have been shown to make it easier and more convenient for students to choose healthy food options[8]. A labeling scheme originally scheduled for summer 2013 was put on hold for broader reasons related to rebranding of how communications should be done (B. Mansfield, oral communication, 2014). Currently, UBC utilizes the Rez Allergen Checklist (see appendix A), which identifies food allergens and/or intolerances for students with specific dietary needs.

Excess consumption of fat, added sugar, sodium and calories place individuals at a higher risk for obesity, hypertension[3], type 2 diabetes[4] and heart disease[5]. In order to decrease the consumption of these among UBC students, our project proposes a traffic light labeling system, which was reviewed by the World Cancer Research Fund as the most efficient, user-friendly, consumer-preferred method of communicating nutrition information[6].

Situational Analysis & Planning Framework

i) Health Problems

Overweight and obesity have been highly associated as risk factors for heart disease, type 2 diabetes and hypertension, all of which have been on the rise in Canada[2,11,12]. In 2012, 42.0% of Vancouverites 18 years and older were classified as overweight or obese[13]. As UBC is situated within Vancouver, we can estimate UBC students have a similar statistic. With overweight/obesity shown to increase risk for developing type 2 diabetes[14], it is imperative that students decrease their risk, as type 2 diabetes, when triggered between the ages of 18 and 44, has been associated with more aggressive heart disease symptoms[15]. Increased rates of obesity and type 2 diabetes have also been correlated with an increased risk for with hypertension[3]. With 90% of Canadians expected to develop hypertension over their lifespan[3] and 81% of UBC's undergrad population being domestic students[16] in addition to the high rates of overweight/obesity[7], UBC students are at high risk for heart disease.

In addition to personal health implications of overweight/obesity, hypertension, type 2 diabetes and heart disease, societal costs are also high[17]. Respectively, these cost the Canadian government $4.6 billion[17], $2.3 billion[17], $12.2 billion[17], $20.9 billion[18] each year. Though the statistics for diabetes include both type one and two, approximately 90% of those with diabetes have type 2 diabetes[11], so we can attribute the majority of the cost to this problem. These diseases are also large contributors to Canadian mortality rates with 57,000 deaths related to obesity[17], 7.5 million deaths related to hypertension[11], 7,500 due to diabetes[16], and 69,700 deaths due to heart disease[17]. These mortality rates also have an added indirect cost of loss of productivity[19]. Overall, we need to protect our upcoming population from these diseases in order to promote their health and decrease further strain on Canada's health care and economy.

ii) Health Behaviors

In order to decrease students' risk of obesity, hypertension, type 2 diabetes and heart disease, four key health behaviors of UBC students regarding food choices will be targeted: consumption of foods higher in calories, fat, added sugar, and sodium. In North America, the average energy intake has increased dramatically[20]. Five in ten Canadian women and seven in ten Canadian men are exceeding their recommended energy intakes[21]. In large part, this is due to greater caloric intake from eating out[20]. In Canada, higher caloric intake has been associated with increased fat intake outside the home, leading to excess weight gain[20]. With very little literature on Canadian university student's fat intake, we look to U.S. studies investigating the North American diet. In a study of Rhode Island University students, the average intake of total fat comprised 46% of their total energy intake[22], far outside the total fat Acceptable Macronutrient Distribution Range (AMDR) of 20-35%[23]. Choosing lower fat foods is the first key behavior UBC students can apply, as it has been shown to decrease their risk of both obesity[24] and heart disease[25].

According to Statistics Canada, Canadians consume about 92 g of added sugar a day, which is almost double the recommended amount[26]. Eating excessive amounts of added sugar contributes highly to increased caloric intake in Canadians[26], which has been shown to increase weight gain and obesity[27]. As well, respectively, being overweight or obese has been associated with a two to threefold and sevenfold increase in odds of developing type 2 diabetes[28]. Selecting foods lower in added sugar and calories will be targeted to help students decrease their intake of less nutrient dense foods, as these have been shown to increase their risk of obesity[27] and type 2 diabetes[11].

Lastly, having students opt for foods lower in sodium will be addressed to decrease the risk of hypertension and thus heart disease[29]. According to Health Canada, sodium intakes have also been shown to far exceed the recommended amount by more than double[30]. A study conducted at Simon Fraser University has estimated that if the sodium intakes were decreased by 1800 mg, hypertension prevalence would decrease by 30% and thus save of the government about $430 million per year in terms of physician

visits, laboratory tests and medication costs[31]. All four of these health behaviors can be substantially improved by supplying students with a concise, consumer-friendly healthy food label[32]. Through UBC HFL, we intend to decrease the number of times UBC students choose to consume foods higher in fat, added sugar, sodium, or calories in UBC Food Service establishments.

Mediating Factors

There are many mediating factors influencing food choice; as our intervention focuses on food labels, we concentrate on the key mediating factors surrounding their adoption, using the five levels of the ecological perspective: intrapersonal, interpersonal, institutional, community, and public policy[33].

At the intrapersonal level, factors affect the individual's decision to use of food labels[33]. Students often prioritize their food choices based on cravings and taste preferences rather the nutritional content[34]. However, students with more nutritional knowledge are more likely to utilize food labels to choose healthier options[35]. Individuals who have diet restrictions, food allergies, and health conditions, such as obesity, have been found to refer to food labels more often[36]. Busy personal schedules and the lack of cooking skills are known barriers to healthy eating, which leads students to depend on food options available on campus[37]. Therefore convenient, easy to understand food labeling is crucial to facilitating healthier food choices[38].

Interpersonal level factors involve the social norms created between friends and family[33]. Parents have the biggest influence, as children learn by imitating others around them[39]. Therefore, students who grow up in families with a higher interest in nutrition are more likely to read food labels when making food choices[40]. Furthermore, individuals are influenced by other students' decisions when dining together on campus[41]. Thus if friends and family use healthy labels, students will be more likely to use them.

At an institutional level, food choices are influenced by the price[33] and the nutrition information made available[42]. However, UBC does not have nutrition labeling for in-house prepared foods packaged at the point of purchase (L. McGowan, oral communication, 2014). In a study at Ohio State University, which has a similar age, gender, and race distribution to UBC[43], it was found that labeling foods in residence

dining halls with total calories, serving size, fat, protein, and carbohydrates was associated with a significant decrease in the energy content of the entrees students consumed[42]. It was also found that after the labels were taken away, caloric intake increased, which increases the confidence that the drop seen was related to the intervention[42]. This shows that nutrition labels that are quick and easy to read influence university students food choices[42]. Without this information available to consumers, they are likely to underestimate the energy of their meal by up to 600 kcal[42].

On a community level, there are several projects on campus that aim to increase healthy eating among students, such as the UWP and the UBC Food Systems Project (L. McGowan, oral communication, 2014). UBC students are highly interested in having easy to read, understandable food labels on campus (B. Mansfield, oral communication, 2014). However, on a public policy level, pre-packaged foods are not required to have nutrition facts table if they are fresh baked goods sold individually or if clerks package them at the time of sale[44]. Thus, the vast majority of foods sold from UBC food establishments do not require nutrition facts tables. Therefore, though UBC students may be trying to eat healthier, without nutrition labels, individuals are likely unaware what is actually in their food purchases[42].

This situational analysis identifies that UBC students may be over consuming fat[22], added sugar[26], sodium[30], and calories[20, 21], which may increase their risk for obesity[20, 24,27], hypertension[29], type 2 diabetes[11, 28], and heart disease[25, 29]. This analysis was limited by the lack of literature available on UBC student food choices. Consequently, the information provided may not be an exact description of the target population. However, through combining information in American studies with external validity to the target population, and the observations of the UWP, the situational analysis should be fairly accurate and suggests that healthy food labels will increase UBC students' health by decreasing the consumption of foods high in fat, added sugar, sodium, and calories.

Health Behavior Theories

Understanding that health promotion is affected by multiple levels[33], our situational analysis takes an ecological approach to address the implementation of the UBC HFL as an innovation to promote healthy eating. Focusing primarily on addressing institutional factors, we used the Diffusion of Innovations Theory (DIT)[33], a community- level theory that explains qualities that influence the adoption and maintenance of an innovation such as UBC HFL. Due to time restraints and limited scope, we will lay the foundation for the initial stages towards increasing the likelihood that UBC HFL will be adopted, but we will not be able to address the results of potential adopters using UBC HFL. Thus, we encourage our community partners to use the DIT and our UBC HFL to influence the other levels of the ecological perspective.

According to the DIT, the extent to how quickly UBC HFL can be adopted and diffused throughout the UBC community depends on five key attributes: relative advantage, compatibility, complexity, trialability, and observability[33]. Although all are important, we focus on relative advantage, compatibility and complexity in our project planning. The other two constructs, trialability and observability, are beyond the scope of our project as the labels will not be implemented by the time the course concludes.

In respect to relative advantage, healthy food labeling will be a new component to what is already in place on campus. To date, UBC Food Services uses a Rez Allergen Checklist (see appendix A) that labels common food allergens and/or intolerances, such as wheat, dairy, and soy (L. McGowan, oral communication, 2014). Aside from pre-packaged foods which legally requires nutritional information[45], there is no universal labeling system already in place, which students can use to identify foods high in total fat, added sugar, sodium and calories.

Our situational analysis explores the compatibility construct of tailoring labels towards UBC student values. A systematic review found that younger and middle-aged adults were more likely to use nutrition labels[46], which is consistent with the age demographics at UBC where the average undergraduate and graduate students are 21 and 31 years old, respectively[16]. Furthermore, a study conducted at UBC found

that Canada's Food Guide recommendations and messages were key components of eating a healthy diet, whereas unhealthy eating was associated with food high in fat and high in calories[34]. We intend to integrate the most important nutritional information sought by potential adopters such as fat, sodium and energy[46] and find the best way of presenting it on labels. We will provide a labeling system that is consistent with student values and needs to increase the likelihood of the healthy labels being adopted.

Ultimately, the main focus in our project planning is the construct of complexity to make the healthy food labels easy to use. A systematic review suggests that younger participants with higher education, literacy and numeracy are more likely to understand nutrition labels[46]. However, they found that consumers had the most difficulty understanding quantitative information like recommended daily amounts, percent daily values and serving sizes[46]. Our focus is to reduce the perceived degree of difficulty in adopting food labels to make healthier food choices. We intend to use suggestions from other studies that prove to be effective such as graphics and symbols, minimal numerical content, larger, more legible print[46], so that consumers with little nutrition knowledge will understand the information presented (L. McGowan, oral communication, 2014).

In order to successfully implement UBC HFL, adopters must see a relative advantage compared to not having labels and the labeling system must be compatible with their norms, values and needs. Minimizing the complexity of using healthy food labels is a crucial attribute affecting whether the innovation will be adopted. By addressing the five attributes of DIT, we hope to see the UBC HFL adopted by UBC students and diffused throughout the community.

Project Goal: To decrease the prevalence of hypertension and obesity, as well as the risks for type 2 diabetes and heart disease in UBC students over the next four years.

SMART Objectives:

Short-term:

UBC community partners will:

1. agree by the end of April 2014 that Traffic Light labels indicating total fat, added sugar, sodium, and calories on UBC food products, can positively influence students' food choices to decrease their risk factors for type 2 diabetes, hypertension, heart disease, and obesity.
2. agree by the end of April 2014 that UBC Healthy Food Labels with the Rez Allergen Checklist will be a more useful tool for all UBC students to make healthier food choices compared to solely the latter.
3. feel motivated to use the Healthy Food Labeling System to complement the existing "Rez Allergen Checklist" labels at UBC by May 2014.
4. approve the materials presented in the UBC Healthy Food Label guidelines and use them to build upon the existing food labels, "Rez Allergen Checklist", by September 2014.

Medium-term:

5. At least 50% of students will use the healthy food label system to decrease their total fat, added sugar, sodium, and caloric intake by the end of April 2016.
6. Sales of foods that are high in total fat, added sugar, sodium, and calories at UBC Food Services establishments will decrease by 6% or more by the end of April 2016.

Long-term:

7. Overweight/obesity and hypertension will be decreased in the UBC students, which will decrease the risk for type 2 diabetes and heart disease by the end of April 2018.

Project Outputs

i) Traffic Light Signpost Labeling System

Originating in the United Kingdom (UK), the traffic light signpost labeling system (TLSLS) has four core elements included to provide consistent nutritional information: fat, saturated fat, added sugar and salt[47]. Each nutrient is color coded into red, amber or green traffic light symbols to identify whether foods are high, medium, or low in that particular category. The European Regulation, the Committee on the Medical Aspects of Food Policy, and the Scientific Advisory Committee on Nutrition developed the nutritional criteria for each colour category[48]. These criteria are advantageous compared to other labeling systems because it sets basic criteria for a standardized scheme, but allows for flexibility if additional nutrition information is to be included[49]. A systematic review found that traffic light labels increase the consumer's ability to identify healthier food options[46]. Therefore, we based the UBC HFL off TLSLS.

From the onset of this project, the community partners requested that the nutrition information included on the UBC HFL be tailored to UBC students (L. McGowan, oral communication, 2014). In a UBC SEEDS report, students defined healthy as foods low in fat, sugar, salt and calories[50]. Geared towards students dining on campus, our recommendation adds calorie labeling, and removes saturated fat, as it is already taken into account under total fat. Canada's Food Guide encourages Canadians to choose foods lower in fat, sugar and salt[51]. The UK criteria use salt as opposed to sodium as we do in Canada. Sodium is a nutrient found in salt [30], therefore we converted the salt criteria using a conversion of 1g salt to 400mg sodium[52]. Thus, UBC HFL proposes to include total fat, added sugar, sodium and caloric content.

Table 1: TLSLS Nutrition Criteria for Labeling

	Green (Low)	Amber (Medium)	Red (High)
Total Fat	≤ 3.0g/100g	> 3.0 to ≤ 20.0g/100g	> 20.0g/100g
Added sugar	≤ 1.6g/100g	> 1.6 to ≤ 6.4g/100g	> 6.4g/100g
Sodium	≤ 120mg/100g	> 120 to ≤ 600mg/100g	> 600mg/100g

ii) Tailoring the Traffic Light Criteria to Health Canada's Guidelines

As the criteria for TLSLS is based on UK recommendations, the criteria for the UBC HFL needed to be examined in the context of Canadian nutrition guidelines and tailored to fit the UBC student population (for calculations see Appendix B). According to the Government of Canada, Canadians should consume 'low sodium' or 'no added sodium' products whenever possible[53]. Health Canada classifies low sodium as 140mg per 100g serving[54]. This value is similar to that of the TLSLS; however, the evidence to support that healthier foods have 120mg or less sodium, is based on studies of individuals in the UK[47]. Thus, this intervention recommends changing the green (low) sodium category criteria to less than 140mg per 100g serving. On the other end of the spectrum, the Government of Canada recommends limiting foods with more than 15% of the Daily Value (DV%) for sodium[53], which works out to be 225mg per 100g serving. This value is much lower than the original value of 600mg per 100g serving in the UK TLSLS[48]. However, this would cause bread to be classified as red (high), which may cause students to avoid it. As bread in Canada is fortified with folic acid, which has been shown to decrease the incidence of neural tube defects by 25 - 40%[55], it is not advisable to knowingly influence students, especially young women, to consume less. Therefore, we propose keeping the original recommendation of 600mg per 100g serving as red (high).

Health Canada recommends limiting total added sugar intake to 25% of total calories[56]. This is much higher than the 10% value that the World Health Organization (WHO) suggests[57]. Using the Canadian guidelines of 5% DV being low and 15% DV being high[30] in conjunction with the WHO sugar guidelines, in a 2000kcal diet, less than 2.5g added sugar per 100g serving would be considered green and more than 7.5g added sugar per 100g serving would be considered red. As Health Canada added sugar recommendations are very high and the WHO values are similar to those in the original recommendation, we suggest no change to the added sugar criteria.

Based on a 2000kcal diet, Health Canada suggests the consumption of 65g of fat a day[58]. Using the guidelines for low and high DV% of 5% and 15%, respectively[58], less than 3.25g of fat per 100g serving would be considered green and more than 9.75g of fat per 100g serving would be considered red. Though the criteria defining a low fat product is similar in both the TLSLS criteria and Health Canada's criteria, the criteria defining high fat products are much higher in TLSLS. Thus, we suggest following Health Canada's guidelines as nutrient requirements reflect the current state of scientific knowledge established by Canadian and American scientists[23].

As our community partners specified no numerical values be included (L. McGowan, oral communication, 2014), we decided to use a range for calories. Without a range specified in the TSLS, we based our criteria on a Canadian study using a traffic light labeling in Subway[20]. As the original was based off six-inch sandwich servings, we found the average of the sandwiches to be 234g[59] and thus calculated the calories per 100g serving and rounded off the numbers to decrease complexity. By using a Canadian study, the ranges were already tailored to our population. For examples of the UBC HFL on foods found at UBC Food Service Establishments, see Appendix C.

Table 2. Suggested UBC Healthy Food Label Criteria

	Green (Low)	Amber (Medium)	Red (High)
Sodium	≤ 140mg/100g	> 140 to ≤ 600mg/100g	> 600mg/100g
Added sugar	≤ 1.6g/100g	> 1.6 to ≤ 6.4g/100g	> 6.4g/100g
Total Fat	≤ 3.25g/100g	> 3.25 to ≤ 9.75g/100g	> 9.75g/100g
Calories	≤ 190kcal/100g	> to 190 to ≤ 280 kcal/100g	> 280 kcal/100g

Framing Nutrition Information Using a Traffic Light Labeling System

The UBC HFL is a tool to help students to determine which foods suit their diet needs at a glance, even without any prior nutritional knowledge. For example, the more "green" symbols displayed on the label

indicates a more healthy food choice. The relative ease in which students may use this traffic light color-coding system is demonstrated by its innate simplistic design. Thus, this intervention can reduce consumer confusion and by simplifying nutritional values into green (low), amber (medium), and red (high). These symbols will also be easily distinguishable from afar to increase observability.

Another advantage to using this proposed UBC HFL is to teach students to evaluate foods with more than one objective in mind, meaning that they will be able to look beyond classifying foods as "good" or "bad". Foods "red" in one category can still be a healthy choice depending on the student's dietary needs since it is may be "green" in other categories. For example, a plain bagel with cream cheese from Bernoulli's might healthy for an endurance athlete as it is high in total fat, which is needed to fulfill energy needs, but low in added sugar, which contributes empty calories. Finally, the UBC HFL indicates that food, by itself, should not be seen as good or bad, instead, they should be placed across a healthy food continuum where 'choose-more' foods are those that have more "green" symbols. By developing a habit of choosing foods with more "green" symbols more often, students will gradually adopt healthy eating patterns.

Community partners can justify using UBC HFL as it is easy to implement and complements the current food labels. The addition of the proposed UBC HFL to the Rez Allergen Checklist label will add relative advantage by making it useful for a broader range of students. Those who have different diet regimens, for example, athletes, will be able to look at the content of total fat, added sugar, sodium and calories they are consuming and choose foods that best suit their needs. Thus, UBC HFL will increase the availability of nutrition information for students who seek it. The UBC HFL addresses the constructs of the DIT to ensure that UBC students will successfully adopt it, making its' use widespread throughout campus.

Evaluation

Formative evaluation best assesses short-term objectives, and thus should be used throughout the development of the project[60]. Therefore, brief interviews using open-ended questions with the community partners before and after they have reviewed the UBC HFL proposal will be used to evaluate the short term objectives (1, 2, and 3) (see Appendix D for examples). These surveys will use a Likert Scale to assess community partners' confidence in the UBC HFL's ability to positively influence students' food choices to decrease their risk factors for type 2 diabetes, hypertension, heart disease, and obesity can be assessed. They will also assess if the UBC community partners believe UBC Students will find the UBC HFL comprehensive and easy to understand and if it is more helpful in making healthy food choices than the current labeling system, which in effect, assesses the complexity and the relative advantage of the new labeling system. UBC community partners' level of motivation to move forward with the UBC HFL will also be measured on the Likert Scale before and after they have reviewed the UBC HFL proposal. Their interests will indicate if the proposed system will enhance the current Rez Allergen Checklist. For objective (4), their approval of the proposed TLSLS will be assessed and observed by a follow-up email in September 2014.

Summative evaluation can be used once the program is implemented and will better fit the medium and long-term objectives in this project[60]. Summative evaluation will help to analyze the effectiveness of the UBC HFL among students on UBC campus. Process evaluation can be conducted to assess if the program is/was implemented by the allocated time[60]. In regards to the medium objective (5), there will be a campus-wide survey sent through email to all students with a goal of attaining 50% response rate[61]. The survey will evaluate the percentage of students that use the new food labeling system and if it has impacted their decision-making at point of purchase. Sample questions will include:

- "Have you located the Traffic Light food label? If so, do you choose your food item(s) based on the information on the label?"

- "How often do you look at the Traffic Light food label when purchasing foods on UBC campus?"

These questions will help measure and observe the number of students that use the healthy labeling system. Furthermore, another survey will be conducted in UBC Residence Hall dining services and the Student Union Building, aiming to attain a 80-85% response rate[61] in which students will be shown cards with the traffic label system on different food items without any branding[62] (see Appendix D for example) They will then be asked to select one out of two food items[62] and their reasoning for their decision. Lastly, there will be a picture of the traffic light food label (see Appendix C for example), where participants are asked to explain their understanding of the label and the different colors. The level of complexity and compatibility of the label will be assessed based on whether the participants noticed the food label. Furthermore, in regards to objective (6), collecting information about sales revenue and items sold from UBC Food Services will help evaluate the pattern of sales. If sales of food items higher in added sugar, sodium, total fat, and calories have decreased by six percent or more per transaction[63], it can be observed that students have decreased their intake of foods high in these.

For the long-term objective (7), the prevalence of hypertension and obesity can be measured and compared to prevalence prior to implementation of the labeling system. The data will be collected from UBC Student Health Services as they regularly assess students' blood pressure during medical visits, and for the purpose of this study, will begin to take waist circumference, before and during the UBC HFL implementation. Through juxtaposing the trends in hypertension and obesity in the student body with the sales trends of foods high in added sugar, sodium, total fat, and calories, the intervention can be evaluated. If we see a decrease in trends for both food sales and hypertension and obesity in the student body, then the UBC HFL will have been a successful intervention.

Conclusion

The UBC Wellbeing Project has identified food labeling as an important step to improve UBC students' health. We justify that healthy food labeling has the most impact on decreasing the prevalence of obesity/overweight, hypertension, and the risks of type 2 diabetes and heart disease. Based on a thorough investigation of literature research, we focus our food label system and define healthy eating for our population as consumption of foods lower in total fat, added sugar, sodium and calories. Utilizing a successful example of food labeling from the UK, we recommend the use of TLSLS as our UBC HFL model. Our proposed UBC HFL addresses key attributes of the DIT, emphasizing a decrease in complexity to make nutritional information easy to use, and thus increase UBC students' adoption of the label.

Working on this project, we have learned that constant communication with our stakeholders is crucial in order to tailor our labeling guidelines to UBC students. Clarifying questions should be asked earlier in the project to help direct our progress. Although it is imperative to follow recommendations by the community partners, we need to rely on research to guide the assembly of the UBC HFL guidelines in order to ensure the UBC HFL's success. While presenting our ideas, we also learned to justify our decisions based on several studies, as there are limited studies on Canadian students, much less UBC students.

Effective diffusion of the UBC HFL across UBC will require both informal and formal communication, which will be the next step after our short-term objectives (1-4) have been met. A pilot test can be set up at one food outlet to assess the understanding and likelihood of usage by UBC students before it is implemented to all UBC Food Service outlets and dining residences. We recommend strategies using the UBC Food Services website, digital poster advertisements, as well as in-person promotion at booths set up near food service outlets. Through campus-wide email surveys the student body's acceptance and adoption of the UBC HFL can be gauged. Overall, we are confident that we will achieve our long-term objective (7), as we strongly believe that our guidelines will be well received by the UBC students.

References

1. Sibbald B. Canada's nutrition labels: A new world standard? *Can Med Assoc J*. 2003;168:887.
2. Public Health Agency of Canada. Obesity in Canada –Snapshot. http://www.phac-aspc.gc.ca/publicat/2009/oc/index-eng.php. Accessed March 26, 2014.
3. Hypertension Canada. The Case for Sodium Reduction in Canada. 2014. https://www.hypertension.ca/images/whatsnew/Final%20Sodium%20Fact%20Sheet_2014.pdf. Accessed March 26, 2014.
4. Reyes-Velazquez W, Hoffman EW. Toward reducing the diabetes pandemic: College students' perspectives of type 2 diabetes. *Diabetes Spectr*. 2011;24:161-168. http://dx.doi.org/10.2337/diaspect.24.3.161.
5. Public Health Agency of Canada. Tracking Heart Disease and Stroke in Canada – Stroke highlights 2011. http://www.phac-aspc.gc.ca/cd-mc/cvd-mcv/sh-fs-2011/pdf/StrokeHighlights_EN.pdf. Accessed March 26, 2014.
6. World Cancer Research Fund. Traffic light labelling- helping people make healthy choices. http://www.wcrf.org/PDFs/Food-Labelling-Position-WCRF.pdf. Accessed April 9, 2014.
7. Gotay CC, Katzmarzyk PT, Janssen I, Dawson MY, Aminoltejari K, Bartley NL. Updating the Canadian obesity maps: An epidemic in progress. *Can J Public Health.* 2013;104:64-68.
8. Tanase CM, Koski KG, Laffey PJ, Cooper MJ, Cockell KA. Canadians continue to consume too much sodium and not enough potassium. *Can J Public Health.* 2011;102:164-68.
9. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: An overlooked age for weight-related behavior change. *Obesity.* 2008;16:2205-2211.
10. Association of Universities and Colleges of Canada. Canadian universities. https://www.aucc.ca/canadian-universities/. Accessed April 9, 2014.

11. Canadian Diabetes Association. An Economic Tsunami the Cost of Diabetes in Canada. http://archive.diabetes.ca/documents/get-involved/FINAL_Economic_Report.pdf. Accessed March 26, 2014.
12. Rahmouni K, Correia MLG, Haynes WG, Mark AL. Obesity-associated hypertension: New insights into mechanisms. *J Am Heart Assoc*. 2004;45:9-14.
13. Statistics Canada. Census Metropolitan Area of Vancouver, British Columbia. http://www.statcan.gc.ca/pub/82-625-x/2013001/article/11845/cma-rmr/cma-rmr33-eng.htm. Accessed March 26, 2014.
14. Bloomgarden ZT. Type 2 diabetes in the young. *Diabetes Care.* 2004;27:998-1010.
15. Hillier TA, Pedula KL. complications in young adults with early-onset type 2 diabetes: Losing the relative protection of youth. *Diabetes Care.* 2003;26:2999-3005.
16. University of British Columbia. UBC Vancouver Campus Fact Sheet. http://www.pair.ubc.ca/statistics/profile/UBCV%20factsheet.pdf. Accessed March 18, 2014.
17. Heart & Stroke Foundation. Statistics. http://www.heartandstroke.com/site/c.ikIQLcMWJtE/b.3483991/k.34A8/Statistics.htm. Accessed March 6, 2014.
18. Canadian Heart Health Strategy and Action Plan. Building a Heart Healthy Canada. http://www.chhs.ca/sites/default/files/Document%20Links/Reports/English/CHHS%20-%20Building%20a%20Heart%20Healthy%20Canada%20-%20EN%20-%20Feb%202009.pdf. Accessed March 26, 2014.
19. Mirolla M. The Cost of Chronic Disease in Canada. http://www.gpiatlantic.org/pdf/health/chroniccanada.pdf. Accessed March 26, 2014.
20. Hammond D, Goodman S, Hanning R, Daniel S. A randomized trial of calorie labeling on menus. *Preventive Medicine.* 2013;57:860-866.

21. Health Canada. Do Canadian Adults Meet Their Nutrient Requirements Through Food Intake Alone? http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/art-nutr-adult-eng.php. Accessed March 6, 2014.
22. Fernandes J, Arts J, Dimond E, Hirshberg S, Lofgren IE. Dietary factors are associated with coronary heart disease risk factors in college students. *Nutr Res*. 2013;33:647-652. http://dx.doi.org/10.1016/j.nutres.2013.05.013.
23. Health Canada. Dietary Reference Intakes. http://www.hc-sc.gc.ca/fn-an/nutrition/reference/table/index-eng.php#fnb1. Accessed March 30, 2014.
24. Sinaiko AR, Donahue RP, Jacobs Jr DR, Prineas RJ. Relation of weight and rate of increase in weight during childhood and adolescence to body size, blood pressure, fasting insulin, and lipids in young adults: The Minneapolis children's blood pressure study. *Circulation*. 1999;99:1471-1476.
25. World Heart Federation. Cardiovascular disease risk factors: Diet. http://www.world-heart-federation.org/cardiovascular-health/cardiovascular-disease-risk-factors/die/. Accessed April 10, 2014.
26. Heart and Stroke Foundation. Hold the Sugar. http://www.heartandstroke.com/site/apps/nlnet/content2.aspx?c=ikIQLcMWJtE&b=4869055&ct=7134805. Accessed March 26, 2014.
27. American Heart Association. Added sugars. https://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/HealthyEating/Added-Sugars_UCM_305858_Article.jsp. Accessed March 6, 2014.
28. Hart CL, Hole DJ, Lawlor DA, Smith GD. How many cases of type 2 diabetes mellitus are due to being overweight in middle age? Evidence from the midspan prospective cohort studies using mention of diabetes mellitus on hospital discharge or death records. *Diabetic Med*. 2007;24:73-80.

29. Statistics Canada. Blood pressure in Canadian adults. http://www.statcan.gc.ca/pub/82-003-x/2010001/article/11118-eng.htm. Accessed March 6, 2014.
30. Health Canada. Sodium In Canada. http://www.hc-sc.gc.ca/fn-an/nutrition/sodium/index-eng.php. Accessed March 26, 2014.
31. Joffres MR, Campbell NR, Manns B, Tu K. Estimate of the benefits of a population-based reduction in dietary sodium additives on hypertension and its related health care costs in Canada. *Can J Cardiol*. 2007;23:437-443.
32. Deshpande S, Basil MD, Basil DZ. Factors influencing healthy eating habits among college students: An application of the health belief model. *Health Mark Q*. 2009;26:145-164.
33. National Institutes of Health. *Theory at a glance: A guide for health promotion practice.* 2nd ed. United States of America: US Department of Health and Human Services; 2005.
34. House J, Su J, Levy-Milne R. Definitions of healthy eating among university students. *Can J Diet Pract Res.* 2006;67:14-18.
35. Shepherd J, Harden A, Rees R, Brunton G, Garcia J, Oliver S, Oakley A. Young people and healthy eating: a systematic review of research on barriers and facilitators. *Oxford Journals.* 2006;21:239-257.
36. Loureiro ML, Yen ST, Nayga RM, The effects of nutritional labels on obesity. *Agr Econ*. 2012;43:333-342.
37. Morse KL, Driskell JA. Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutr Res*. 2009;29:173-179.
38. Silliman K, Rodas-Fortier K, Neyman M. Survey of dietary and exercise habits and perceived barriers to following a healthy lifestyle in a college population. Californian Journal of Health Promotion. 2004;2:10-19.

39. Scaglioni S, Salvioni M, Galimberti C. Influence of parental attitudes in the development of children eating behaviour. *Br J Nutr*. 2008;99:S22–25.

40. Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. *J Am Coll Nutr*. 2005;24:83-92.

41. Cason KL, Wenrich TR. Health and nutrition beliefs, attitudes, and practices of undergraduate college students: A needs assessment. *Top Clin Nutr*. 2002;17:52-70.

42. Chu YH, Frongillo EA, Jones SJ, Kaye GL. Improving patrons' meal selections through the use of point-of-selection nutrition labels. *Am J Public Health*. 2009;99:2001-2005. http://dx.doi.org/10.2105/AJPH.2008.153205.

43. The Ohio State University. Statistical Summary. http://www.osu.edu/osutoday/stuinfo.php. Accessed March 26, 2014.

44. Canadian Food Inspection Agency. Guide to Food Safety. http://www.inspection.gc.ca/food/non-federally-registered/safe-food-production/guide/eng/1352824546303/1352824822033. Accessed March 26, 2014.

45. Health Canada. Nutrition Labelling. http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/index-eng.php. Accessed March 25, 2014.

46. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: A systematic review. Public Health Nutr. 2011;14:1496-1506.

47. Food Standards Agency. Traffic Light Labelling. http://www.eatwell.gov.uk/foodlabels/trafficlights/. Accessed March 30, 2014.

48. Malam S, Clegg S, Kirwan, S, McGinigal S, BMRB Social Research. Comprehension and use of UK nutrition signpost labelling schemes. http://multimedia.food.gov.uk/multimedia/pdfs/pmpreport.pdf. Accessed March 25, 2014

49. Tigerstrom BV. Food Labelling for Healthier Eating: Is Front-Of-Package Labelling The Answer?. http://dunraven.cc.umanitoba.ca/mlj/images/Articles/33v1/food%20labelling.pdf. Accessed March 25, 2014.
50. Chan G, Law S, Leung C, Liu T, Singer A. Healthy & Sustainable Snacks. http://sustain.ubc.ca/sites/sustain.ubc.ca/files/seedslibrary/2013-LFS450-Grp2-Snacks-Original.doc_.pdf. Accessed March 6, 2013.
51. Health Canada. Eating well with Canada's food guide: A resource for educators and communicators. http://www.hc-sc.gc.ca/fn-an/pubs/res-educat/res-educat-eng.php. Accessed March 25, 2014.
52. Institute of Medicine of National Academics. Dietary Reference Intakes for Water, Potassium, Sodium, Chloride and Sulfate. http://www.nal.usda.gov/fnic/DRI/DRI_Water/water_full_report.pdf. Accessed March 26, 2014.
53. Government of Canada. Reducing Sodium at the Grocery Store. http://www.healthycanadians.gc.ca/eating-nutrition/sodium/grocery-epicerie-eng.php. Accessed March 26, 2014.
54. Health Canada. Guidance for the Food Industry on Reducing Sodium in Processed Foods. http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/2012-sodium-reduction-indust-eng.php. Accessed March 24, 2014.
55. Jagerstad M. Folic acid fortification prevents neural tube defects and may also reduce cancer risks. *Acta Paediatr.* 2012;101:1007-1012.
56. Health Canada. Dietary Reference Intake Tables. http://www.hc-sc.gc.ca/fn-an/nutrition/reference/table/index-eng.php. Accessed March 25, 2014.

57. Nishida C, Uauy R, Kumanyiko S, Shetty P. The joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases: Process, product and policy implications. *Public Health Nutrition.* 2004;7:245-250.

58. Health Canada. Fats: The Good the Bad and the Ugly. http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/med/fats-gras-eng.php. Accessed March 25, 2014.

59. Subway Canada. Subway Nutrition Facts - Canada. http://www.pr.com/upload/presskit_1214_1111255579.pdf. Accessed April 10, 2014.

60. DiClemente RJ, Crosby RA, Salazar LF. Evaluating theory-based public health programs: Linking principles to practice. In: *Health Behavior Theory for Public Health: Principles, Foundations, and Applications.* Burlington, MA: Jones and Bartlett Learning; 2013:287-308.

61. University of Texas. (2011). Conduct Research- Response Rates. http://www.utexas.edu/academic/ctl/assessment/iar/teaching/gather/method/survey-Response.php?task=research. Accessed April 2, 2014.

62. 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;9:184-195.

63. Bollinger B, Leslie P, Sorensen A. Calorie Posting in Chain Restaurants. *Standford Graduate School of Business.* 2010.

64. USDA. National Nutrient Database for Standard Reference. http://ndb.nal.usda.gov/ndb/search/list. Accessed April 10, 2014.

65. EaTracker. My Food. https://www.eatracker.ca/. Accessed April 10, 2014.

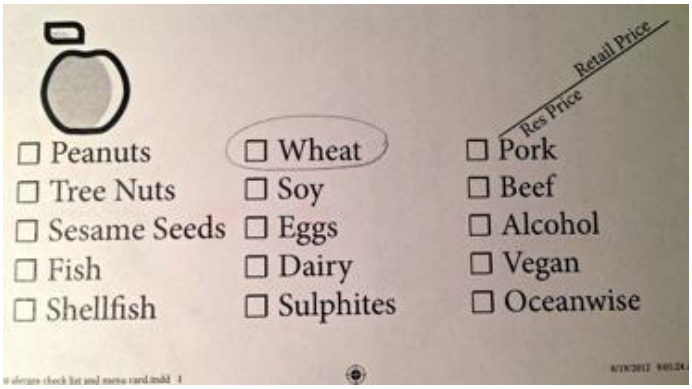
66. Allrecipes.com. Bagels II. http://allrecipes.com/Recipe/Bagels-II/Detail.aspx?event8=1&prop24=SR_Thumb&e11=bagel&e8=Quick%20Search&event10=1&e7=Home%20Page&soid=sr_results_p1i2. Accessed April 10, 2014.

67. Oral communication. Bernoulli's Staff Member. April 10, 2014.

68. Kraft Foods. Philadelphia Cream Cheese Nutrition Facts Table. April 10, 2014.
69. Health Canada. Canadian Nutrient File. http://webprod3.hc-sc.gc.ca/cnf-fce/search-rechercher.do?lang=eng. Accessed April 10, 2014.
70. Allrecipes.com. Sushi Roll. http://allrecipes.com/Recipe/Sushi-Roll/Detail.aspx?event8=1&prop24=SR_Thumb&e11=sushi%20rice&e8=Quick%20Search&event10=1&e7=Home%20Page&soid=sr_results_p1i9. Accessed April 10, 2014.
71. Allrecipes.com. Classic Bran Muffins.http://allrecipes.com/Recipe/Classic-Bran-Muffins/Detail.aspx?evt19=1. Accessed April 10, 2014.
72. Muffin Image. http://upload.wikimedia.org/wikipedia/commons/8/8a/Muffin_NIH.jpg. Accessed March 27, 2014.
73. Blue Chip Cookies. http://www.ams.ubc.ca/at-the-sub/food/blue-chip-cookies/. Accessed March 27, 2014.

Appendices

Appendix A: UBC Rez Allergen Checklist



Appendix B: Calculations Used to Tailor TLSLS Criteria to UBC Student Population

Calculations for Sodium Range

- Criteria salt: (1g salt: 400mg sodium)
  - Green <300mg/100g = 120mg sodium/100g (Changed to 140mg/100g)
  - Amber > 0.3 to < 1.5g/100g
  - Red > 1.5g salt/100g = 600mg/100g sodium (15% of DV = 225mg/100g)

Calculations for Calorie Range

- Original criteria per sandwich
  - Green = <450 kcal
  - Amber= 451-660 kcal
  - Red= > 661kcal
- Average Sandwich weight calculated using Subway Canada Nutrition Facts serving size for all 22 sandwiches = 234g per sandwich[59]
- Adjusted criteria to per 100g
  - Green = 450kcal/ 234g x 100g = 192 kcal
  - Amber = 192 kcal to 282kcal
  - Red= 661 kcal/234g x 100g= 282kcal
- Round off to decrease complexity
  - Green= < 190 kcal per 100g
  - Amber= 190-280 kcal per 100g
  - Red= >280 kcal per 100g

Calculations for Added Sugars Range

- No more than 25% total kcal from added sugars (Health Canada) based on 2000kcal diet
  - 500kcal x 1g/4kcal = 125g sugar
- No more than 10% total kcal from added sugars (WHO) based on 2000kcal diet
  - 200kcal x 1g/4kcal = 50g sugar
  - High = >15% DV (Health Canada) = 50g x 0.15= 7.5g sugar
  - Low = < 5% DV (Health Canada)= 50g x 0.05 = 2.5g sugar

Calculations for Total Fat Range

- Health Canada recommends a DV of fat to be 65g
  - AMDR 20-35% fat (Health Canada)
    - Based on a 2000kcal diet this falls within the AMDR
      - 20% fat of total kcal= 44g
      - 35% fat of total kcal= 78g
  - High = >15% DV (Health Canada)
    - 15% of total fat= 9.75g
  - Low = < 5% DV (Health Canada)
    - 5% of total fat= 3.25g

Appendix C: Examples of UBC HFL on Foods Served By UBC Food Services

Plain Bagel with Cream Cheese from Bernoulli's

Grams of Food Component	Calories (kcal)	Total Fat (g)	Added Sugar (g)	Sodium (mg)
Bagel (131g[64])	283[65]	2[65]	2.1[66]	493[65]
Cream cheese (87g[67])	298[65]	30[65]	0[68]	280[65]
Total (218g)	581	32	2.1	773
Total per 100g	**267**	**15**	**1.0**	**355**
Designated category	**Amber** (>190 to ≥ 280 kcal/100g)	**Red** (> 9.75g/ 100g)	**Green** (≤ 1.6g/ 100g)	**Amber** (>140 to ≤ 600mg/100g)

Suggested label:

Sushi with Fish and Vegetables from the Honor Roll

Grams of Food Component	Calories (kcal)	Total Fat (g)	Added Sugar (g)	Sodium (mg)
Sushi with Fish and Vegetables (8 pieces= 208g[69])	336[69]	1.0[69]	9.45[70]	552[69]
Total per 100g	**162**	**0.5**	**4.5**	**265**
Designated category	**Green** (≤ 190kcal/ 100g)	**Green** (≤ 3.25g/100g)	**Amber** (< 1.6 to 6.4g/100g)	**Amber** (>140 to ≤ 600mg/100g)

Suggested label:

Bran and Raisin Muffin from Blue Chip

Grams of Food Component	Calories (kcal)	Total Fat (g)	Added Sugar (g)	Sodium (mg)
Muffin, wheat bran, with raisins, homemade (57g[69])	200[69]	7.6[69]	11.6[71]	242[69]
Total per 100g	**350**	**13.3**	**20.4**	**425**
Designated category	**Red** (> 280kcal/ 100g)	**Red** (> 9.75g/ 100g)	**Red** (> 6.4g/ 100g)	**Amber** (>140 to ≤ 600mg/100g)

Suggested label:

Limitations:

The above labels are based on recipes that were estimated to be similar to those used in the UBC Food Services establishments; however, using the original recipes from UBC Food Service Establishment, will provide more exact estimates.

Appendix D: Examples of Evaluation Tools

Example questions for interview to Community Partners:

(1) Rank your level of motivation to move forward with UBC HFL

1	2	3	4	5
Not motivated				Very Motivated

(2) The UBC HFL is easy to use

Strongly Disagree Disagree Neutral Agree Strongly Agree

Example questions for interview to UBC students:

Which snack item would you choose? And Why?

72

73

73

Example questions for campus wide online survey to UBC students:

(1) Have you located the Traffic Light food label?

Yes No What is a food label?

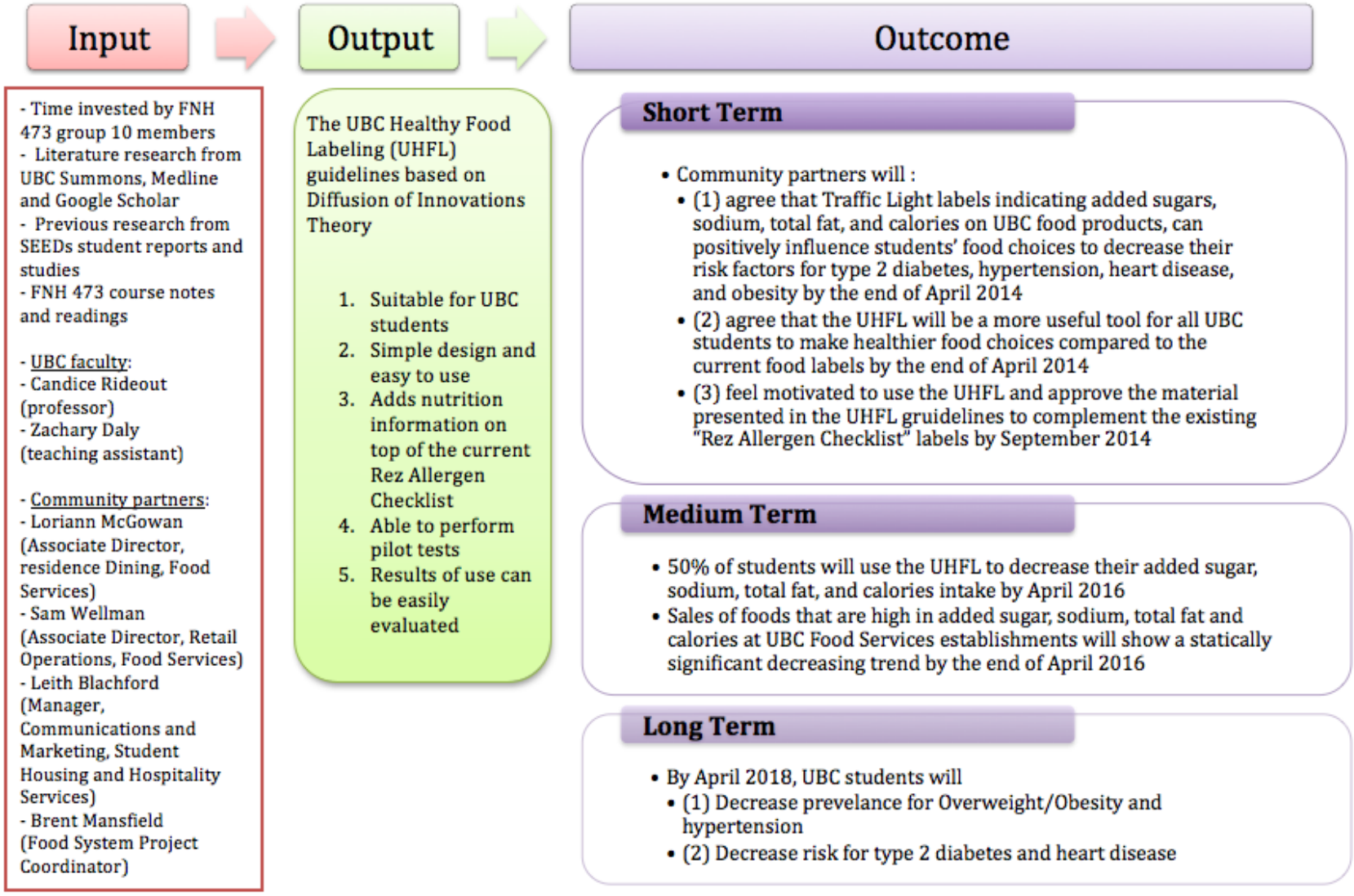
If so, do you choose your food item(s) based on the information on the label?"

Yes No Sometimes

(2) How often do you look at the Traffic Light food label when purchasing foods on UBC campus?

Never Sometime Always Every time

UBC Healthy Food Labeling Project Logic Model - Overview



UBC HEALTHY FOOD LABELLING SYSTEM

UBC FOOD SERVICES

ams student society

UBC Healthy Food Labelling System

ON CAMPUS DINING

APRIL 11TH, 2014

This proposed Healthy Food Label will easily help students identify whether a particular food is low, medium or high in tota fats, calories, sodium and added sugars. Guidelines for labeling this system are tailored to the UBC Student population.

You are what you eat

As nutrition students, many of us think what we eat is important. As members of the UBC Healthy Food Labelling project, we all share a single goal to positively impact our fellow peers' food choices. To achieve this goal, we created a framework for which nutrition labels on food should be designed. In class, we learned that the biggest impact on student health must be initiated at an institutional or policy level; this means that it is time for the food labelling policy at UBC to be revamped. Thus with the help of Candice Rideout, our FNH 473 course instructor, and our community partners, we created criteria for a succinct UBC Healthy Food Label (HFL).

Communication is key

This is essential in any relationship, especially the one we have with our project stakeholders. In the beginning (without consulting project stakeholders), we focused on the "nice-to-haves" such as having a "nutrient density bar graph". However, after meeting with our community partners, we shifted our focus on the "need-to-haves", such as improving on the generalizability of labels to all UBC students.

The Importance of Justification

Since there are very few studies looking at food labelling within the UBC student population, we had to work with what was available in the literature. We learned that we could still borrow research findings from similar studies, providing that we justified how they were relevant to the UBC student population. We also learned the importance of following the recommendation in the literature and justifying this to our community partners. Originally, our community partners did not want a colour-based labeling system. However, we found evidence-based research to support the efficacy of such a system. After doing our best at researching what constitutes a "healthy" food label, we feel more confident in our final guidelines for the UBC HFL.

The Bright Future Ahead

In addition to our academic growth, our group strongly feels that UBC students will benefit from this label. We hope that our community partners will acknowledge our contributions to the UBC Healthy Food Label Project and that our recommendations will assist future stakeholders in the project leading to a succinct and concrete healthy food label.