

**Market failure and food claims:
an assessment of the utilization of the exaggerated
product claim by food manufacturers and consumers**

by

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Abstract

Regulations for on-package information and voluntary claims are designed to improve the flow of information between food manufacturers and consumers. Of particular importance are exaggerated product claims, where a claimed product is of higher quality nutritionally with regard to the claimed nutrient(s), but lower quality with regard to other nutrients (e.g., it contains more of a less healthy nutrient, or lower amounts of a desirable nutrient). The objective of this research is to assess the extent to which exaggerated product claims result in market failure in the processed food market.

This grocery product study of food claims and nutrient levels uses a multi-method research design that includes an economic model (simulation study), empirical analysis and focus group study. The economic model reveals that an exaggerated product claim can increase a firm's profit if the number of consumers who are significantly influenced by such a claim is sufficiently large relative to the level of less-healthy nutrients in the product implying an incentive for firms to exploit asymmetric information. The empirical analysis demonstrates that exaggerated product claims exist in the marketplace in the following formats: products with a saturated fat claim or cholesterol claim tend to have higher sodium levels; products with a fat claim tend to have higher sugar levels; and products with a sugar claim, sodium claim or omega-3 claim tend to have higher fat levels, on average, all relative to products without these claims. These outcomes support the results from the simulation study that exaggerated product claims can be a profit-maximizing strategy for firms. The focus group study demonstrates that consumers have difficulties utilizing on-package information and are vulnerable to exaggerated product claims and again this implies market failure due to asymmetric information.

Implications include a need to review public policy regarding claim usage on processed foods, consumers experiencing negative diet-health effects and negative claim bias and both firms' and governments' having a decreased ability to use claims as a communication tool.

Preface

This dissertation is original, unpublished, independent work by the author. The fieldwork reported in Chapters 5 and 6 were covered by The University of British Columbia's Behavioral Research Ethics Board Certificate number H11-03419.

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List of Abbreviations

CCHS	Canadian Community Health Survey
CFIA	Canadian Food Inspection Agency
CPLA	Consumer Packaging and Labelling Act
CPLR	Consumer Packaging and Labelling Regulations
ELM	Elaboration Likelihood Model
EPC	Exaggerated Product Claims
FTC	Federal Trade Commission
FDA	Food and Drugs Act
FDR	Food and Drug Regulations
FOP	Front of Package
FSS	Fat, Sugar and Sodium
g	grams
mg	milligrams
MB	Marginal Benefit
MC	Marginal Cost
NFL	Nutrition Facts Label
NLEA	Nutritional Labeling and Education Act
OLS	Ordinary Least Squares
P	Price
PAPM	Precaution Adoption Process Model
Q	Quantity
RDI	Recommended Daily Intake
SSS	Standard Serving Size
UBC	The University of British Columbia
U.S.	United States
USDA	United States Department of Agriculture

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*To my mother,
Angela Irene Chipeur Wiseman*

CHAPTER 1 Introduction

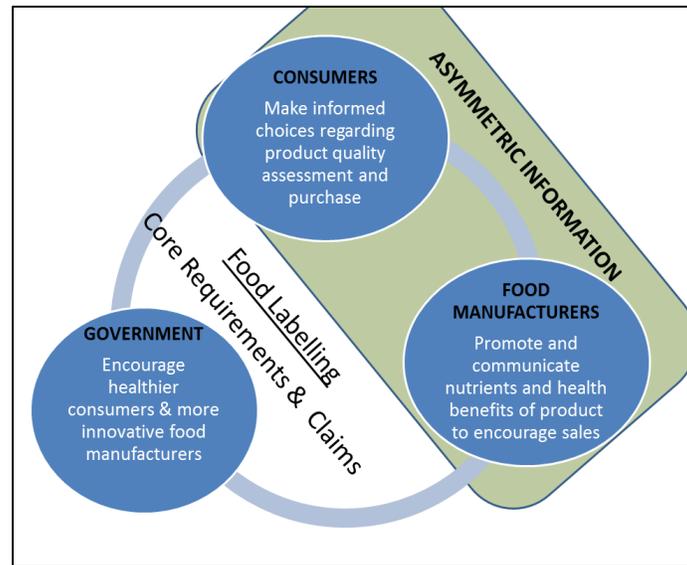
1.1 Background

Asymmetric information exists in an industry when buyers and sellers have different amounts of information regarding the attributes of a product. From a public policy point of view, asymmetric information is a major concern, as the imbalance of information may place buyers at a disadvantage, allowing them to make less informed decisions or be misled by firms for the sake of sales. From an economic policy perspective, asymmetric information is also a concern, as it can influence the operation of a competitive market. In some cases, it may additionally increase the potential of market failure where a suboptimal amount of a particular good is produced, resulting in inefficiently allocated resources. In economic terms, market failure and inefficient allocation of resources result in a reduction of total surplus in the market and may justify government intervention in the market.¹

Figure 1.1 illustrates the interface between the three main players in the processed food industry: food manufacturers, consumers and government. Minor concerns resulting from asymmetry where consumers have less information than food manufacturers (e.g., taste, flavor and texture) can be resolved through standard market discipline (i.e. demand and supply) and as such do not attract the attention of policy makers. For example, if a firm produces a product poorer in taste, a consumer will purchase and consume the product once but not again. Eventually, market demand diminishes and the firm no longer finds it profitable to produce the product. However, when the asymmetry involves the connection between diet and health, policy makers are likely to become involved. Indeed, if the imbalance of information may lead to less informed decisions that can affect consumers' long-term health, the outcome is too important to regulate by market forces alone. As illustrated in Figure 1.1, government policy currently addresses this asymmetric information concern by developing food label regulations that support the provision of quality information, communication and innovation in the industry and recognizes the specific use of this information by each of the industry players.

¹ Market failure results in the inefficient allocation of resources and is measured as the difference in total surplus between a perfectly and imperfectly competitive market. This concept of market failure and total surplus are discussed in further detail in Section 3.2.

Figure 1.1: Use of Food Labelling Information by Players in the Processed Food Industry



Although labelling regulations are currently in place, the processed food industry continues to require policy makers to re-evaluate and develop new regulations due to the dynamics of the industry. These industry dynamics involve consumers demanding products that fit with their increasing awareness of the diet and health connection, and firms viewing this new demand as an opportunity to develop new products and be more profitable. Thus, government policy makers are under a great deal of pressure to balance product innovation, consumer demand and public health in a setting of asymmetric information (Caswell & Padberg, 1992; Golan *et al.*, 2001; Kolodinsky, 2012; Redmond, 2009).

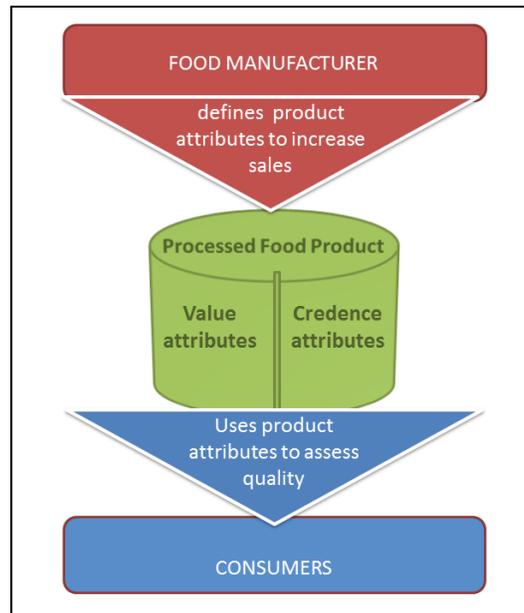
Asymmetry of information between the consumer and food manufacturer is a direct result of the unique, non-observable value² and credence³ attributes embedded in processed food products (Caswell *et al.*, 2003; 2001; Grunert *et al.*, 2000; Ippolito, 2003). Taken as a whole, value and credence attributes define product quality. As illustrated in Figure 1.2, the value and credence attributes are used by firms when promoting their product to increase sales and are used by consumers when judging overall quality of the processed food product in order to make purchase decisions. Although the specific definition of a healthy food may vary with the individual, from a healthy diet standpoint, higher quality food products are typically those with more of the higher quality and healthier nutrients and less of the lower quality and less-healthy nutrients.⁴

² Value attributes are sourced from the product's various non-observable aspects of taste, dietary contribution, food safety, sustainability, ingredient source, processing technique, marketing and supply chains, and social and environmental impact that are associated with the production of the final product.

³ Credence attribute are sourced from the product's promised future nutrition or health benefits that cannot be accurately assessed even after consumption or in the future. Examples include health claims such as "A healthy diet low in saturated and trans fats may reduce the risk of heart disease. KLW cereal is free of saturated and trans fats."

⁴ For example, a cracker with low sodium is generally accepted as being healthier than a cracker that is similar except that it has higher sodium.

Figure 1.2: Attributes of Processed Food Products



Food manufacturers, as decision makers of product development, strategy and processing, typically have more information regarding the value attributes of processed food products than consumers (Caswell, 1996; Grunert *et al.*, 2000; Ippolito, 2003). As well, value attribute information for processed food products is generally not easily accessible to consumers, as much of it is the firm's private competitive information or requires a great deal of research time and effort on the part of the consumer to uncover and understand.

Of particular interest in this dissertation are the credence attributes of processed food products. In the current marketplace, processed food products offer a myriad of health and nutrient benefits with few of them being easily assessed by consumers (Andrews *et al.*, 1998; Caswell & Mojdzuska, 1996; Cowburn & Stockley, 2005; Verbeke, 2005). Food manufacturers, on the other hand, have a great deal of knowledge regarding these attributes because food product development and the influence of these attributes on product sales are part of the firms' marketing expertise. Credence attributes are very important from an asymmetric information viewpoint because firms have the capacity to make changes to the nutrition and health benefits of the product without full consumer awareness.

The idea that credence attributes of a food product can increase the potential of market failure due to asymmetric information is well known in economics literature (Gardner, 2003; Golan *et al.*, 2001; Ippolito, 2003). It is important to keep in mind that market failure in the processed food industry due to asymmetric information is distinct from market failure due to externalities. For example, market failure due to asymmetric information would result from consumers overestimating the quality of a processed food product due to lack of full information, thereby over-consuming that suboptimal food product. If consumers had access to credible quality attribute information to assist them in making more accurate product quality

assessments in this scenario, the potential for market failure would be reduced. In contrast, market failure due to externalities occurs if consumers over-consume lower quality products and incur health costs that are borne by society in general, rather than consumers and/or food manufacturers. In the health externalities scenario, market failure would be reduced if firms and consumers were each required to bear the full cost of their consumption and production. This dissertation focuses on the potential of market failure due to asymmetric information.

Over the past decade, governments have implemented a number of regulations related to health messaging and food product labelling in an attempt to increase the quality and amount of attribute information available to consumers. In Canada, the major labelling regulations implemented in December 2002 provide mandatory core labelling requirements (common name, dealer net quantity, manufacturer/dealer name & address, nutrition facts label (NFL), ingredients/allergens, date markings plus directives associated with bilingual presentation, legibility, display and location) and voluntary claims (nutrient content claims⁵, health claims⁶ and food claims⁷) (Canadian Food Inspection Agency, 2010c; Minister of Health, 2008). In recent years, the focus of Canadian labelling requirements has increasingly involved the nutrition and health benefits of the product rather than information standardization. The United States (U.S.) food labelling regulatory environment has experienced similar progression to Canada in terms of both mandatory requirements (e.g., NFL and ingredient list) and number/type of voluntary claim approvals. While this study focuses on the Canadian food labelling regulation environment, the geographic proximity, reference to studies based in the U.S. and flow of food products from the U.S. makes it necessary to note briefly the similarities and differences between Canadian and U.S. food product labelling regulations.

Although Canada and U.S. food label regulations are quite similar, food manufacturers must still develop two different NFLs due to differences in language, weight and volume measurement, requirements for ingredient declaration and recommended daily intake (RDI) values. Voluntary claims in the U.S. are generally quite similar in type (e.g., nutrient content and health claims) and approval process. However, the claim qualifying nutrient criteria can differ between the two countries. For example, the claim “*free of saturated fat*” is allowed in Canada when the product contains less than 2 grams of saturated fat and 0.2 grams of trans fat per serving, while the U.S. criteria for this claim are 5 grams of saturated fat and 0.5 grams of trans fat. In addition, the U.S. has defined general nutritional criteria for claims whereas Canada has not. For example, in the U.S., products with nutrient content claims exceeding threshold levels for fat, cholesterol, saturated fat or sodium must provide a disclosure statement and products exceeding these

⁵ Nutrient content claims present information regarding a nutrient of interest to the consumer (e.g., low in sodium) (Canadian Food Inspection Agency, 2010c).

⁶ Health claims provide information regarding the consumption of foods (or food constituents) and health (e.g., A healthy diet with adequate calcium and vitamin D, and regular physical activity reduces the risk of heart disease) (Canadian Food Inspection Agency, 2010c).

⁷ Food claims provide information regarding food composition, quantity, origin and quality (e.g., homemade, natural, made in Canada) (Canadian Food Inspection Agency, 2010c).

threshold levels cannot display health claims. Canada does not require disclosure statements on nutrient content claims as food products containing more than a specific nutrient level simply cannot have nutrient content claims on the package. Finally, the U.S. does not generally allow the use of the word “healthy” as a health claim whereas Canada typically does (L'Abbé *et al.*, 2008; Rowlands & Hoadley, 2006; Sillikier Inc, 2010).

When instituting food product regulations, governments generally have several specific objectives, each focusing on information provision to consumers. The first objective supports consumers' informed food choices by standardizing the format and type of product, health, safety and nutrition information available to consumers (Canadian Food Inspection Agency, 2011). Second, specific food to health relationships are substantiated and claims approved for use by food manufacturers in order to facilitate consumers' assessment of credence attributes (Health Canada, 2007, 2012). Third, these regulations, especially claims labelling, encourage food manufacturers' to promote their products' unique nutrient and health benefits in order to differentiate their product, resulting in a greater range of product information being made available to consumers (Herath *et al.*, 2008; Ippolito & Mathios, 1990). These three objectives diminish some of the asymmetry of information in the industry as consumers gain a great deal of information regarding both the value and credence attributes in processed food products.

Being mandatory, food manufacturers' use of core label regulation has of course been increasing. However, as part of their growing interest in the link between food and health, consumers' use of core labelling information when making quality and purchase assessments has also been increasing (Levy *et al.*, 2000; United States Food and Drug Administration *et al.*, 2009; van Trijp, 2009). In addition, the use of voluntary claims by both consumers and food manufacturers has been intensifying since the development of these regulations in 2002 (Brecher & Bender, 2000; Canadian Council of Food and Nutrition, 2009; Datamonitor, 2009b; Health Canada, 2009; Legault *et al.*, 2004; Parker, 2003; Zarkin & Anderson, 1992). While firms and consumers are making increasing usage of claims, the Canadian government also increased the type and number of allowable claims with over 12 nutrient content claims, 5 disease reduction health claims, 5 therapeutic health claims and 29 nutrient function claims being approved in the past ten years (Health Canada, 2012).

In theory, the increased availability of regulated nutrient and health information should benefit both food manufacturers and consumers (Health Canada, 2007; Institute of Medicine of the National Academies, 2010; Leathwood *et al.*, 2007; Rowlands & Hoadley, 2006). For example, food manufacturers may find it easier to communicate the unique nutrition and health benefits of their product to consumers and thus increase their sales, profit and offerings of healthy products. (Agriculture and Agri-Food Canada *et al.*, 2008; Minister of Health, 2008). As well, consumers have access to the form of information that facilitates product quality assessment and selection of food that fits with their diet and health needs, resulting in the purchase of greater quantities of healthier processed food products.

The question of whether these regulations are working to encourage firms to offer healthier processed food products and assist consumers in purchasing healthier food products is an interesting one. There is currently considerable and polarized debate among health, nutritional and government agencies regarding the forms of nutrition information and claims that are most helpful to consumers (Baltas, 2001; Food and Drug Administration, 2009a; Garsetti *et al.*, 2007; Hasler, 2008; Health Canada, 2007; Institute of Medicine of the National Academies, 2010; Neuman, 2010). Proponents of these differing views advocate replacing the current claim regulations with a nutritional profiling system (Drewnowski & Fulgoni, 2008; Food Standards Agency *et al.*, 2009b; Lobstein & Davies, 2009), requiring claims to communicate potential harmful nutrients such as trans fat, calories, sodium, and saturated fats (Institute of Medicine of the National Academies, 2010; Kelly *et al.*, 2009b), or complete elimination of all claim messaging on packages (Nestle & Ludwig, 2010). This debate regarding the most beneficial format of nutrition and claim information is fueled by two major concerns: i) disconcerting marketplace examples of food products with confusing claims and nutrient level combinations, and ii) evidence of consumer confusion regarding claims.

Examples⁸ of products with confusing claims and nutrient levels combinations are relatively easy to find in the Canadian and U.S. marketplace. In 2010, the U.S. Food and Drug Agency (FDA) sent warning letters regarding the use of claims in the following situations: Froot Loops, a cereal that has 12 grams of sugar, being included in the Smart Choices Front of Package (FOP) labelling program; Rice Krispies packages having immunity FOP claims; Dreyer's Dibs bite-size ice cream snacks, which contains 17 grams of saturated fats, with a trans fat claim; and POM pomegranate juice labelling claims indicating that the juice could prevent or cure diseases like hypertension, diabetes and cancer (Center for Science in the Public Interest *et al.*, 2010; Neuman, 2010). In 1989, the United States Federal Trade Commission (FTC) charged that Campbell's use of claims on their soups was deceptive because it presented low fat, cholesterol or heart-healthy claims in ads but did not disclose that the soups were high in sodium (Federal Trade Commission, 1992). It is recognized that firms have an incentive to provide the form of claim that will differentiate their product in order to increase sales and profit (Agriculture and Agri-Food Canada *et al.*, 2008; Brandt *et al.*, 2009; Nestle & Ludwig, 2010). As well, when reformulating the products with the level of nutrients that meet requirements to make voluntary claims, firms will follow a cost reduction strategy and substitute lower quality and lower cost ingredient for higher quality and higher cost ingredients. Thus, these examples of confusing claims (i.e. more of both high quality and low quality ingredients) can be viewed as part of this profit-seeking and cost reduction strategy.

Evidence of consumer confusion and overrating of claims is provided by a number of industry and academic research studies. For example, consumers rated food products with low-carbohydrate FOP claims as having lower calories; organic products as being more nutritious and lower calorie; children's

⁸ Although these are U.S. examples, these same branded products are available in the Canadian marketplace.

cereals with nutrition-related claims as being more nutritious overall; food products with FOP claims as having higher health attributes on factors not related to the claim; and the term “natural” to imply a lower calorie and healthier food (Daniells, 2007; Harris *et al.*, 2011; Roe *et al.*, 1999; Scott-Thomas, 2010; Watson, 2010).

In addition to the industry and academic studies, a number of class actions citing consumers’ confusion over claims have been initiated. Since 2011, an increasing number of class actions associated with nutrient content claims have been initiated in the United States courts including the following: Bumble Bee for having “excellent source of Omega-3” claims on products that have high levels of cholesterol and 18 grams of fat per serving (Courthouse News Service, 2012); Dreyer’s for having a “natural” claim on an ice cream that includes artificial ingredients (ruling supported reasonable consumer expectation regarding the term natural and went against manufacturers’ claim that the artificial ingredient was commonly used in the industry) (Scott-Thomas, 2012), Frito-Lay North America for use of “0 grams trans fat” claim on foods with 13 grams of fat, 480 grams of sodium and 4 grams of saturated fats in a serving (Watson, 2012b), and Cyto-Sport for having claims of “health sustained energy” and “0 g trans fat” on their Muscle Milk bars and sports beverages when the product contains high levels of saturated fat and added sugars similar to that of a chocolate bar (Watson, 2012a). In these class actions and others, the concern is the consumers’ ability to accurately assess a product that combines health claims and poorer nutrient/ingredients levels.

Evidence of food manufacturers using claims to exaggerate product quality and consumers having difficulty using these claims to assess product quality may jointly indicate an industry dynamic where current labelling regulations regarding claims are not effectively limiting asymmetric information. If firms are able to opportunistically change the nutrition and health benefits of the product without consumers being fully aware of these changes, this may lead to a form of market failure where consumers’ overestimate the quality of food products and thus over-consume these suboptimal foods.

1.2 Problem Statement

Food manufacturers use claims to inform consumers of product features, differentiate their product and increase sales (Brandt *et al.*, 2009; Caswell *et al.*, 2003; Herath *et al.*, 2008). In addition, they may employ a cost reduction strategy where higher quality and cost ingredients are substituted with lower quality and cost ingredients to increase profit. The majority of positive health and higher quality benefits appear on the front of packaging (in the form of claims), while the less healthy and lower quality nutrients/ingredients of the product are often not highlighted on the FOP although they are provided in other parts of the packaging as regulated by core labelling requirements. Consumers may review claims

and nutrition information but may have difficulty in fully utilizing⁹ the information in their determination of value and credence attributes, leading to potentially inaccurate assessment of overall product quality.

In this dissertation, the concept of an exaggerated product claim is proposed. In this form of claim, a product is of higher quality nutritionally with regard to desirable adjustments in claimed nutrient(s) (e.g., the claim of “low fat” or “high fibre” are true) but of lower quality nutritionally with regard to non-claimed nutrients that are adjusted (e.g., more sodium or less protein) in order to maintain product matrix/taste¹⁰ or cost. Thus, incongruence exists between claim and less healthy nutrient levels (e.g., products promoted as low fat have lower fat but may also have higher sodium relative to no-claim products). This type of product claim exaggerates the quality of the product as it gives the impression that the product is of a higher quality when in fact, the consumption of the food may not provide a positive net quality contribution to the consumer’s diet relative to no-claim products (Kelly *et al.*, 2009a).

For example, a consumer in a grocery store to purchase a can of mushroom soup has to select between two cans of the soup, one original product without a claim and one product with a low sodium claim. They may assess the two products as similar, except that the product with the claim is viewed as a bit healthier as it is lower in sodium. This assessment would influence them to purchase the mushroom soup with the claim. However, if the product had an exaggerated product claim, the product would have low sodium (e.g., 140 mg or less of sodium per serving) but also have higher less-healthy nutrients such as saturated fat compared to the no-claim product. The resulting net nutrition benefit to the consumer with the purchase of the claim product could be minimal or even negative. In this example, the consumer over-assesses the product quality and over-consumes the food product because of the presence of the exaggerated product claim in the market and their difficulty in detecting this claim.

Thus, the presence of exaggerated product claims in the processed food marketplace is a concern because consumers utilize claims to assess overall product quality and determine what product to purchase. When making these decisions, consumers generally assume that the claim is valid (e.g., low fat claim implies lower fat grams) and that the other nutritional attributes (e.g., levels of sugar and sodium) for the product remains the same or improve, implying an overall higher quality product (Drewnowski *et al.*, 2010; Leathwood *et al.*, 2007; Lee *et al.*, 2013; Patterson *et al.*, 2012 ; Roe *et al.*, 1999). If instead, there is a pattern of exaggerated product claims in the marketplace and consumers do not detect the incongruence between the claim and nutrient levels, the potential for market failure in the processed food industry may be increased by the exaggerated product claim and its impact on asymmetric information.

⁹ In this dissertation, utilization refers to consumers’ being able to both use and understanding nutrition information. In addition, is important to make a distinction between consumers’ use versus understanding. Use denotes a consumer incorporating the information into their decisions whereas understanding refers to a consumer being able to interpret nutrition information in order to make it relevant to their own lifestyle to support healthier food choices.

¹⁰ In this dissertation product matrix/taste includes more than the product palatability by encompassing product features such as packaging, best before dates, environmental, sustainability and ethical issues, recipe microstructure, food safety and food sustainability.

Government policy makers should be concerned if the marketplace exhibits; a combined trend of food manufacturers using exaggerated product claims to maximize sales and profits, and consumers lacking understanding of claims, nutrition information and exaggerated product claims in their product assessment and selection. This combination may indicate a dynamic in the industry that current label regulations are not addressing.

Before describing the specific research questions, it is important to be clear that an exaggerated product claim can occur in several formats. Specifically, a product with this form of claim will be of higher quality nutritionally with regard to the claimed nutrient(s) because of either higher levels of a healthy nutrient (e.g., “high in protein”) or lower levels of a less-healthy nutrient (e.g., “low fat”). In addition, the product will be of lower quality nutritionally with regard to other nutrients because of either lower levels of a healthy nutrient (e.g., lower fibre) or higher levels of a less-healthy nutrient (e.g., higher sodium). The focus of this dissertation will be on the combinations of exaggerated product claims where the less-healthy nutrient levels (e.g., fat, sugar, sodium) increase. This approach is reasonable given that obesity and heart disease are major public health concerns and that higher levels of less-healthy nutrients may contribute to these health concerns. These various combinations are discussed in Section 4.7 in the context of the empirical analysis.

As well, in this dissertation the terms “nutritional poor” and “less-healthy” refer to nutrients such as fat, saturated fat, trans fat, sugar and sodium that tend to be over-consumed rather than under-consumed, and this over-consumption is linked to public health concerns such as obesity and heart disease. In addition, the terms “nutritional good” and “healthy nutrients” refers to nutrients such as protein, fibre, iron, vitamins or calcium that consumers tend to strive to attain as they are linked to positive health and body functions.¹¹

1.3 Research Questions

The overarching question of this dissertation is “Does the potential for market failure occurring in the processed food industry increase as a result of exaggerated product claims which encourage consumers to overestimate product quality and over-consume suboptimal foods?” Three sub-questions are asked.

- I. What product strategy in terms of claims and nutrient levels would food manufacturers use given consumer demand and the existence of asymmetric information in the industry?

¹¹ Although this dissertation links specific nutrients to the terms “good,” “healthy,” “poor” and “less-healthy”, it is also recognized that from a nutritional standpoint, most nutrients can be “essential,” “healthy” or “unhealthy” depending upon the intake level, desired nutrient balance and individual dietary requirements. As well, as noted earlier, although the specific definition of a healthy food may vary with the individual, from a healthy diet standpoint, higher quality food products are typically those with more of the healthier nutrients and less of the less-healthy nutrients.

- II. Do exaggerated product claims have a significant presence in the current marketplace, and if so, what is the nature of these claims?
- III. How do consumers utilize (e.g., use and understand) nutrition information and product claims when assessing product quality?

1.4 Multi-Discipline and Multi-Method

This dissertation addresses the research topic of market failure and the exaggerated product claim in the processed food sector from a multi-discipline and multi-methodological perspective. Theoretical input from the disciplines/areas of economics, health promotion/behavior, marketing communications and consumer behavior are used to develop the conceptual framework of this dissertation regarding consumers' product purchase and food manufacturers' strategy/production decisions. Due to this multi-discipline input to the conceptual framework, a broad range of strategy and behavioral decision constructs have been incorporated into the framework. The conceptual framework is discussed in detail in Section 3.3.

The research methodology used in the dissertation is a sequential two-stage multi-method research design (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009). Stage one of the research design addresses research questions I and II with a quantitative food manufacturer-focused inquiry, where a monopoly firm's product strategy decision, given exogenous consumer demand, is reviewed using an extended vertical product differentiation structural model. The product strategies results from the economic model are examined using empirical data with the aim to highlight the significant presence of exaggerated product claims in the complex real-world marketplace. Stage two addresses research question III with a qualitative consumer-focused inquiry reviewing how consumers' utilize nutrient information, claims and exaggerated product claims in their product quality assessment and selection. Data for stage two was collected via a set of eight focus groups at four locations in the Vancouver, British Columbia. The overarching research question regarding the impact of exaggerated product claims on the potential of market failure is addressed by merging the results from stage one and two. Details regarding the research design, quantitative methodology and qualitative methodology are provided in Section 3.4.

1.5 Dissertation Outline

Chapter 2 describes the development of food labelling regulations in the processed food sector from a policy and then an economic perspective. In addition, an overview of the Canadian agencies, acts and food label regulations associated with the processed food sector is provided. Finally, this chapter provides a review of the literature focusing on the use of on-package information by food manufacturers and consumers, need for government intervention, and rationale for this study in the context of this literature.

Chapter 3 provides a brief overview of the market failure concept, conceptual framework and methodology utilized in this dissertation. Specifically, the three components of the framework, firm decision-making process, consumer decision-making process and exchange between consumer and food manufacturer, are discussed. In addition, the appropriateness of utilizing a multi-method approach and details of the multi-method research design are presented in this chapter.

Chapter 4 presents the food manufacturer-focused quantitative structural model and product strategy results to address research question I, empirical analysis to address research question II and describes model limitations.

Chapter 5 describes the consumer-focused data collection method and procedures used to address research question III, discusses focus group findings and presents thematic results.

Chapter 6 presents results of the combined research methodologies as to the impact of exaggerated product claim on asymmetric information and the potential for market failure.

CHAPTER 2 Processed Food Regulatory Framework

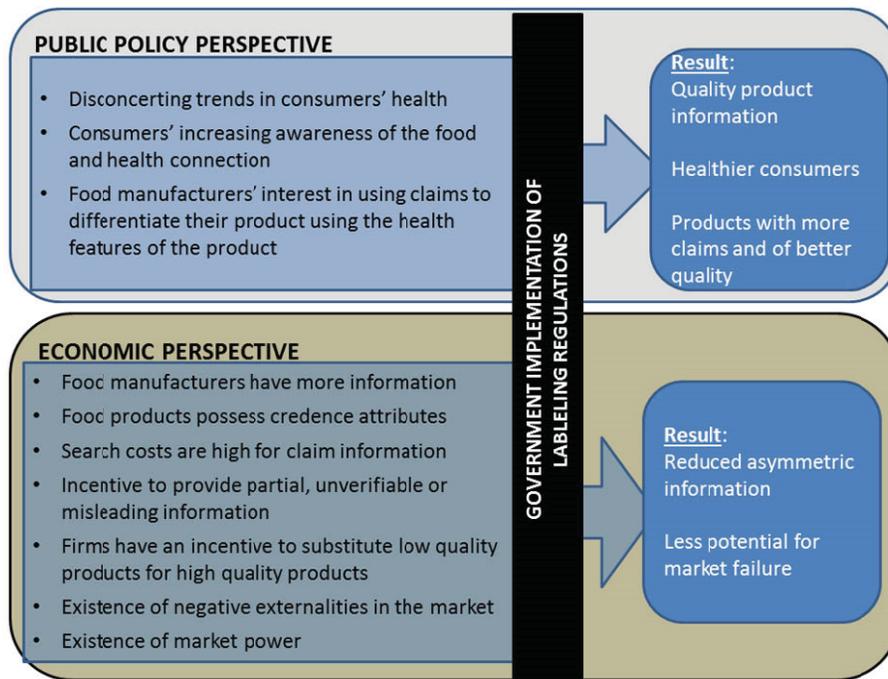
2.1 Introduction

Labelling regulations in the processed food industry have been developed amid a backdrop of key industry trends and characteristics. This chapter provides an overview of the development, governance, regulation and literature related to regulations in the processed food sector. Specifically, Section 2.2 presents the development of the food label regulations from both a policy and an economic perspective. Section 2.3 presents the framework for food labelling in Canada, including details regarding the agencies, acts and on-package mandatory and voluntary claim regulations. Finally, Section 2.4 provides a literature review of food manufacturers' use of claims, consumers' use of NFL and claims, and government intervention in the processed food sector. This section concludes with a discussion of the rationale for the study given the extensive body of literature.

2.2 Development of Food Label Regulations

As illustrated in Figure 2.1, the development of food label regulations can be explained from both a public policy and economic perspective.

Figure 2.1: Development of Food Label Regulations: Public Policy and Economic Perspective



From a public policy perspective, the government has implemented food label regulations as a response to consumer and manufacturer trends (Golan *et al.*, 2001; Health Canada, 2007; Ippolito & Mathios, 1991). These trends include the following:

i. Disconcerting Trends In Consumers' Health

Based on the 2005 Canadian Community Health Survey (CCHS), from 1978/79 to 2004 the obesity rate among children aged 2 to 17 years increased from 3% to 8% while the age-adjusted adult obesity rate increased from 14% to 23% (Statistics Canada, 2005). In the 2008 CCHS, 51% of Canadians surveyed reported they had excess weight, while 17% of Canadians aged 18 or older provided weight and height values that placed them in the obese category (an increase from the 2003 value of 15%) (Statistics Canada, 2009). The health consequences of excess weight are well recognized and can include diabetes, cardiovascular disease, high blood pressure and some cancers (Statistics Canada, 2006).

These trends cause concern for government policy-makers because they can translate into higher future health costs and lower consumer well-being and productivity.

ii. Consumers' Interest in the Relationship between Food and Health

Consumers' increasing interest in the connection between food and health has been the result of the growing body of scientific evidence that supports the role of diet in maintaining health and preventing select chronic diseases (Jones & Bourque, 2003; United States Food and Drug Administration *et al.*, 2009). In addition, a combination of factors such as an aging population, consumer time constraints, dietary requirement concerns and increasing health care costs all act as drivers to increase this consumer interest (Datamonitor, 2007, 2008, 2009a, 2009b).

Governments have responded to this consumer trend by instituting regulations that require food manufacturers to provide standard, accurate and accessible nutrition information.

iii. Food Manufacturers' Interest in Using Claims

Food manufacturers have been increasingly interested in using claims as a means to differentiate their product and thus increase the potential profits through this promotion of health related product attributes and the communication of a better corporate image (i.e., offering healthier product lines) (Brownell & Warner, 2009; Golan *et al.*, 2001; Ippolito & Mathios, 1990).

Governments have responded to food manufacturers' demand for more options by approving an increasing number and type of claim allowances.

Thus from a public policy point of view, these above noted industry trends stimulated the development of food label regulations that specifically encourage quality and quantity of product information that consumers can utilize to make healthier food choices and food manufacturers can use to differentiate and promote their products.

From an economic perspective, governments are motivated to develop food label regulations in order to diminish asymmetric information and circumvent market failure (Caswell & Padberg, 1992; Kolodinsky, 2012; Redmond, 2009). Although related to public policy issues, the economic perspective focuses on those industry characteristics and trends that can contribute to asymmetric information and the specific inefficiencies that create the market failure. The industry characteristics and trends include the following:

i. Food manufacturers have more product quality information than consumers

Food manufacturers have more depth and breadth of information than consumers regarding product quality issues such as production systems, environmental impact, transport, social and corporate responsibilities, source and quality of inputs, food safety and nutrient and health claims quality.

As noted earlier, governments have responded by implementing standardized on-package nutrition facts label and standards for voluntary claim.

ii. Food products possess credence attributes

Processed food products promising future health benefits in the form of claims are not easily verifiable by the consumer either now or in the future.

Governments have developed standards and criteria for a number of nutrient and health claims to assist consumers in assessing the potential benefits of credence products.

iii. Search costs are high for claim information

Consumers review the costs and benefits of an information search when making decisions associated with food and health benefits. Although consumers can search for information, there is an opportunity cost in terms of time and effort so that if search costs are greater than the search benefits, then consumers will not likely conduct thorough information searches.

Governments have approved a wide range and number of FOP claims that serve to assist consumers in streamlining information gathering and decreasing search costs.

iv. Food manufacturers have an incentive to provide partial, unverifiable or misleading information

Food manufacturers also use costs and benefits in their decision-making approach. Thus, firms will engage in behaviors to maximize benefits minus costs. For example, firms have an incentive to use product claims on lower quality products if this strategy increases sales and profit.

v. Firms have an incentive to substitute low quality products for high quality products when asymmetric information exists in an industry

This concept is based upon Akerlof's Lemon Theory of quality-based market failure (Akerlof, 1970). Applying Akerlof's theory, if firms find it more costly to provide a high quality food product and consumers are unable to determine if the product is high quality, then a profit maximizing firm will introduce lower quality products with claims, as a way to differentiate that

product and encourage consumers to purchase it (McCluskey, 2000; Ward & Hunnicutt, 2001). Eventually, if consumers are consistently unable to tell the difference between products of different quality, a scenario may arise in the market where high quality products are driven out of the market by poor quality products (Akerlof, 1970).

vi. Existence of negative externalities in the market

As noted earlier, the true cost of unhealthy food consumption (e.g., health care costs or low productivity) is not borne by the manufacturer of the food or the individual that consumes the food, but by society (Caswell & Padberg, 1992; Engelhard *et al.*, 2009; Gardner, 2003; Herath *et al.*, 2008; Ippolito, 2003; Seiders & Petty, 2004). In any case, the reduced cost for consumers and manufacturers will influence their cost-benefit decision-making process, making unhealthy food consumption and manufacturing more likely.

vii. Market Power

Firms experience increased market power and become dominant in their industries when they are able to take advantage of economies of scale.¹² Market power allows firms to decrease production costs and increase price so that the firm gains, consumers lose and efficiency is not maximized. Examples of dominant firms in the processed food sector that have considerable market power include Kraft, Nestle, Kellogg's, PepsiCo and General Mills (Stuckler & Nestle, 2012).

Regulations in the processed food sector are generally not designed to counter this type of market failure (that is, not directly related to asymmetric information) unless governments identify potentially large efficiency gains. One reason why governments are hesitant to regulate firms with market power is that such regulations can typically stifle product innovations.

Thus, from an economic perspective, these industry characteristics support the need for food label regulations as a means to mitigate asymmetric information and the potential for market failure.

2.3 Overview of Food Labelling in Canada

As described earlier, the main purpose of food labelling in Canada is to support the communication between consumers and food manufacturers, which in turn assists consumers in differentiating between food products and making informed choices (Canadian Food Inspection Agency, 2012a). In addition, food labels on processed food products fulfill three functions:

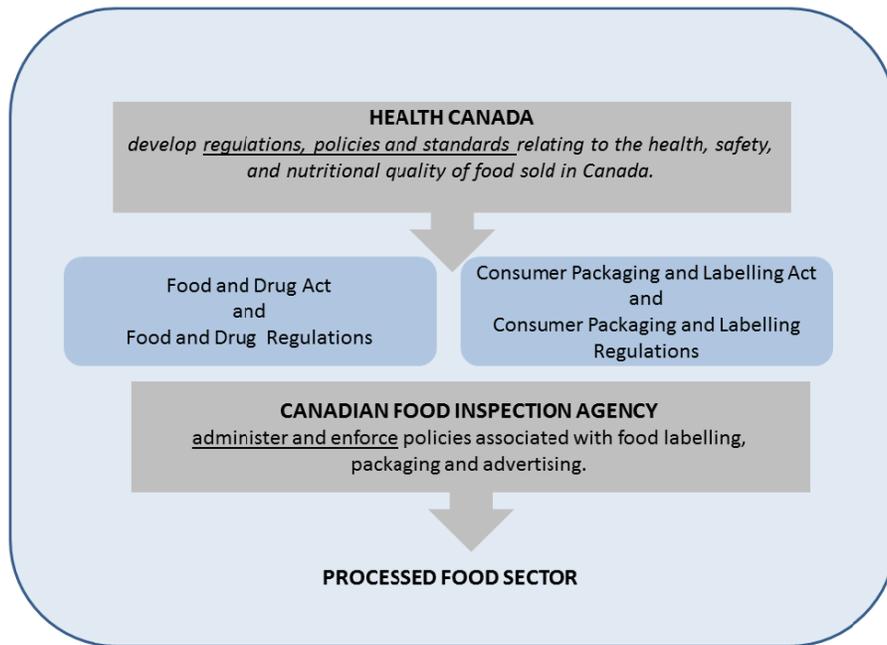
¹² Economies of scale occur when firms experience decreased costs per unit as they expand production. The reason for the decreased unit cost is that firms are able to spread out fixed costs such as technology or equipment over a larger amount of quantity produced. Firms with the highest production and sales will generally have the lowest per unit cost and this cost advantage allows these firms to undercut the price of their competitors. Industries that experience economies of scale have a tendency to be dominated by a few large firms.

- i. Provides basic product information
 - ii. Provides health, safety and nutrition information
 - iii. Provides opportunity for food manufacturers to market, promote and advertise
- (Canadian Food Inspection Agency, 2012a, 2012b).

The first and second functions are fulfilled mainly by the core requirements and food claims regulations. The third function is supported by the nutrient content and health claims regulations.

As illustrated in Figure 2.2, Canadian food labelling regulations are governed by Health Canada and the Canadian Food Inspection Agency (CFIA) through four major laws of Food and Drugs Act (FDA), Food & Drug Regulations (FDR), Consumer Packaging and Labelling Act (CPLA) and Consumer Packaging and Labelling Regulations (CPLR). More details about the agencies, acts and regulations are provided in Sections 2.3.1, 2.3.2 and 2.3.3.

Figure 2.2: Regulatory Framework for Food Labelling in Canada



2.3.1. Canadian Agencies

The role of Health Canada is to develop regulations, policies and standards relating to the health, safety, and nutritional quality of food sold in Canada. Specifically related to food labelling, Health Canada defines the tolerance and standards for nutritional content; tests and approves food claims; mandates items to include in nutritional facts labels; and defines RDIs (Canadian Food Inspection Agency, 2010d, 2012a).

The role of the Canadian Food Inspection Agency (CFIA) is to administer and enforce the regulations, policies and standards associated with food labelling, packaging and advertising. Food

manufacturers self-regulate in terms of their compliance with food label requirements and accuracy of reporting. However, the CFIA encourages compliance through ongoing communications regarding current and future policy changes, inspection of processed food packages to ensure standards are met and provision of a single access food labelling service. When non-compliance with a food label regulation is found, the CFIA follows a risk management policy that reviews the potential level of impact or harm to human health, firms' frequency and severity of non-compliance occurrences and firms' intent and/or willingness to comply (Canadian Food Inspection Agency, 2012d).

Both agencies focus efforts on food products that are to be sold in Canada (imported or manufactured in Canada) as opposed to products for export (Canadian Food Inspection Agency, 2010d, 2012a).

2.3.2. Canadian Acts

A number of federal and provincial laws govern the processed food industry. However, discussion in this section will be limited to the four key federal level laws including the FDA, FDR, CPLA and CPLR. The FDA and FDR apply to all food sold in Canada, while the CPLA and CPLR apply to all prepackaged foods sold in Canada.

The Food and Drugs Act is a federal statute regulating advertising, sale and importing of foods into Canada that includes a set of special provisions related to food packaging. These provisions cover the following: sales of foods that are adulterated, harmful or unsanitary; labels, package or advertising that create an incorrect impression of the product regarding character, value or merit; products that are non-compliant with current package and labelling regulations; and advertisements that imply cure, treatment or prevention of select diseases (e.g., heart disease, obesity, hypertension) (Department of Justice, 2012a).

The Food and Drug Regulations (enabling Act: FDA) sets out the requirements associated with nutrition labelling for processed food packages including mandatory elements for the nutrition facts label, ingredient listing, allowed claims (food, health and nutrient content), best before dates, bilingual labels and labelling of food for special dietary use (e.g., gluten free) (Department of Justice, 2012b).

The Consumer Packaging and Labelling Act is a regulatory statute that states that all processed food product packages must provide accurate and meaningful labelling information to assist informed consumer choice of foods. The regulated information includes product name, net quantity, identification of product retailer/manufacturer/producer, and truthful and non-misleading representations¹³.

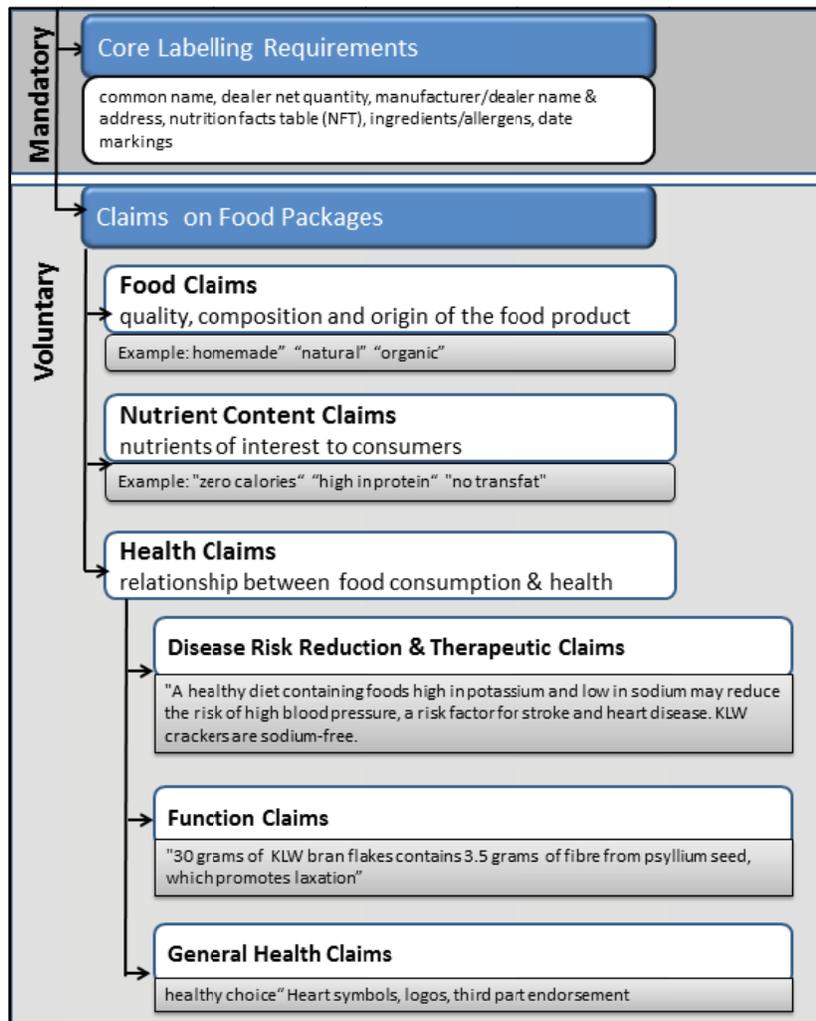
The Consumer Packaging and Labelling Regulations (enabling Act: CPLA) defines food label requirements more specifically. Information regulated through the CPLR includes unit of measurement, bilingual exemptions and requirements, display type size, net quantity declaration as volume or weight, number of servings, and images on labels (Department of Justice, 2012b).

¹³ Representation refers to expressions, words, figures, depictions, descriptions, symbols or illustrations.

2.3.3. Canadian Mandatory and Voluntary Food Label Regulations

As illustrated in Figure 2.3, the food label regulations on prepackaged foods in Canada involve two main streams: mandatory core and voluntary claims. Mandatory core labelling requirements include the following items: common name; dealer net quantity; manufacturer/dealer name and address; NFL; ingredients/allergens; date markings; and directives associated with bilingual presentation, legibility, display and location. Voluntary claims include food claims, nutrient content claims and health claims with each of these having their own specific set of requirements for use (Canadian Food Inspection Agency, 2012a; Health Canada, 2007). Food manufacturers are responsible for the accuracy of values provided in the core label requirements, compliance with mandatory label requirement and if used, voluntary claims standards.

Figure 2.3: Mandatory and Voluntary Food Label Regulations in Canada



Source: Canadian Food Inspection Agency, 2010a, 2010b; Canadian Food Inspection Agency, 2010e; Mariotti, Kalonji, Huneau, & Margaritis, 2010

Food Claims (Voluntary)

As presented in Table 2.1, food claims are subdivided into the three areas of composition and quality, quantity, and origin. It is interesting to note that the terms *natural*, *organic* and *genetically modified*, when used on processed food packages, fall under this claim type. As well, the usage of terms associated with ingredients (i.e., fresh, pure) and country of origin are regulated through this type of food claims.

Table 2.1: Food Claims: Description and Examples

Food Claim Category	Description	Examples
Composition and Quality	<p>These allow for the inclusion of common names, brand and/or product names, terms, images, expressions and grades on the label to support consumers making choices based upon food product composition and quality. Rules limit the use of these claims in scenarios where they are seen to under or over emphasize an ingredient, mislead or misrepresent.</p> <p>Natural claims can be made on foods where ingredients are derived from natural sources. The product can include the claim “natural ingredients” but the food product itself may is not considered a natural food in all cases. Foods cannot be considered natural unless they meet specific criteria associated with processes, additions and removal of ingredients.</p> <p>Organic claims are allowed on products when organic content is greater than or equal to 95% and requirements of the Canadian organic regulation are met. Organic claims defining percent of product organic is allowed on multi-ingredient having 70% to 95% organic products. Products with less than 70% organic ingredients cannot label an organic claim.</p> <p>Products that are or are not genetically engineered do not need to be labeled but can voluntarily be labeled as long as the label does not mislead consumers.</p>	<p>“made with fresh herbs” “no preservatives added” “fresh pasta” “homemade” “natural” “organic” “100% pure” “Kosher style” “genuine” “instant breakfast” “meal replacements” “contain only natural ingredients” “contains 85% organic ingredients” “Genetically engineering”</p>
Quantity	Prohibits the use of claims that intervene with the mandatory net quantity (required by the core labelling).	<p>“family –size litre” “jumbo litre”</p>
Origin	Defines the use of origin claims (Canada or imported) such as “made in Canada” versus “imported” claim based upon varying the combinations and degrees of processing, ingredients and labour. Outlines when the Canadian national coat of arms, maple leaf or flag can be used on labels.	<p>“Made in Canada” “Made in Canada from imported ingredients” “Packaged in Canada” “imported by dealer name and address”</p>
Source: (Agriculture and Agri-Food Canada, 2012; Canadian Food Inspection Agency, 2010c; Health Canada, 2010)		

Nutrient Content Claims(Voluntary)

Nutrient content claims highlight energy value or nutritional information of interest to consumers. As illustrated in Table 2.2, these claims fall into twelve categories based on the general areas of ingredient, energy and nutrient levels. The FDR defines the permitted nutrient content claims as well as the specific wording, compositional criteria, additional label requirements (e.g., nutrient of claim's focus needs to be in the NFL or text size of claim), permitted alteration of claim wording and product exclusions (e.g., products intended for children under 2 years of age may not include this claim type unless the claim is associated with protein, sodium and sugars) (Canadian Food Inspection Agency, 2010a, 2010c, 2012a).

Table 2.2 Nutrient Content Claims: Description and Examples

Nutrient Content Claim Category	Description	Examples
Energy & Calorie	Includes claims using the terms “free, no, zero, without, low, higher, light, lite, reduced, lower, fewer, more, source of” with the words energy or calories.	“zero calories” “calorie reduced” “source of energy”
Protein	Includes claims using the terms “low, excellent, good, higher in, rich in”	“high in protein” “excellent source of protein”
Fat	Includes claims using the terms “free, 0, zero, low, little, lower, lower than, reduced, 100 %, no added, light, lite, lean, extra lean” with the word fat	“100% fat-free” “lower in fat” “low in fat”
Saturated Fatty Acid	Includes claims using the terms “free, no, zero, low, little, reduced, less, lower, fewer” with the words saturated fatty acids, saturated fat or saturates.	“lower in saturated fat” “low saturated fatty acids”
Trans Fatty Acid	Includes claims using the terms “free, no, zero, low, little, reduced, less, lower, fewer” with the words trans fatty acids, trans fat or trans.	“no trans fat” “less trans fatty acids”
Omega-3 and Omega-6 Polyunsaturates	Includes claims using the terms “contains, source of, provides” with the words Omega-3 or Omega-6 Polyunsaturates.	“source of omega-3 polyunsaturated fatty acids”
Cholesterol	Includes claims using the terms “free, no, zero, low, little, reduced, less, lower,” with the word cholesterol.	“reduced in cholesterol”
Sodium	Includes claims using the terms “free, no, zero, low, little, reduced, less, lower, no added, lightly, for use in a sodium-restricted diet, for special dietary use” with the words salt or sodium. The phrases “very low sodium” on labels is not permitted.	“sodium-free” “lightly salted” “less salt” “lower in salt” “sodium-free”
Potassium	Includes claims using the terms “source, contains, high, very high, excellent source” with the word potassium.	“very high in potassium
Sugar & Carbohydrates	Includes claims using the terms “free, no, zero, low, little, reduced, less, lower, fewer, no added, dietetic, unsweetened, lactose level, ” with the words Not permitted to use "source of complex carbohydrates," "low and or light carbohydrate or sugar."	“lower in sugar” “sugar-free” “no added sugar”
Fibre	Includes claims using the terms “source of, contains, high, very high, rich in, more” with the word fibre, dietary fibre, source or fibre, or name of fibre.	“source of dietary fibre”
Vitamin and Mineral	Includes claims using the terms “high in, good source of, contains, very high, rich in, fortified, enriched” with the name of the vitamin or mineral.	“excellent source of Vitamin A” “very high in Vitamin D”

Source: (Canadian Food Inspection Agency, 2012a; Department of Justice, 2012b; Minister of Justice, 2012)

Of particular interest are the compositional criteria (also known as the qualifying criteria) for the nutrient content claims. Health Canada has defined a set of nutrient criteria per serving for each of the major claim categories of fat, cholesterol, sodium, fibre and vitamins/minerals. Some of these criteria are singular nutrient criteria associated with the claim while other nutrient content claims include more than one nutrient in the criteria. For example, a “*low in sodium*” claim is allowed on products that have 140 milligrams (mg) or less of sodium per serving. However, a “*low in cholesterol*” claim is allowed only when a product has 20 milligrams or less of cholesterol, 2 grams (g) or less of saturated fat and trans fat and not more than 15% of calories from the sum of these two fats per standard serving size (Sillikier Inc, 2010). As well, specific terms such as “*excellent*,” “*source of*,” “*low*,” “*very low*,” “*high*” and “*very high*” also have related compositional criteria. For example, “*source of Vitamin C*” indicates 5% of the RDI while “*excellent source of Vitamin C*” indicates at least 50% of the RDI per serving.

Health Claims (Voluntary)

Health claims highlight the relationship between consumption of a food product (e.g., nutrient/ingredient in the food or the food product itself) and health. Similar to food and nutrient content claims, health claims are voluntary. If used, these claims require specific wording, criteria and exemptions, and must be truthful, not misleading or deceptive (Canadian Food Inspection Agency, 2011; Department of Justice, 2012b). Although all claims must adhere to this idea of truthfulness, this is often a more difficult requirement for a health claim due to the credence and thus less verifiable nature of the claim. Due to the more complicated nature of these claim types, additional principles are in place to support the meaningfulness and therefore usefulness of the claim to consumers. These include avoidance of vague wording, required scientific evidence and standards for minimum level of claim nutrient that must be found in the food and mandatory presentation of the amount of the nutrient claim even if it is not required in the NFL. As well, health claims cannot be used on food products intended for children under two years of age or for use in low-energy diets (Minister of Justice, 2012).

Health claims can be divided into three subtypes: disease risk reduction and therapeutic claims, function claims and general health claims. In general, the disease reduction and therapeutic claims are the most highly regulated of the health claims and thus require food manufacturers to follow very specific conditions and wording. The function claims are less rigorously regulated because, in most cases, the major stipulation is that the claim nutrient must be present in an amount of over 5% of the recommended daily amount (RDI). General health claims are viewed as having few specific stipulations (Health Canada, 2007). Details to each of these health claim subtypes are provided below.

i. Disease Reduction and Therapeutic Claims

Disease reduction claims focus on the relationship between consumption of the food and reduction diet-related disease risk (e.g., heart disease, hypertension and cancer). In contrast, therapeutic claims focus on the effect of the food on body functions (including restoring, correcting, or modifying body functions)

and treatment of a health-related disease or condition (e.g., high cholesterol) (Canadian Food Inspection Agency, 2012c). This particular claim type has been very dynamic in the past five years, based on the number of new claims approved by Health Canada. As illustrated in Table 2.3, disease reduction and therapeutic claims each have their own set of approved claims for use on processed food packages.

Table 2.3 Disease Risk Reduction and Therapeutic Health Claims: Description and Examples

Health Claim Category	Description	Examples
Disease Risk Reduction	<p>Five claims have been approved for use by Health Canada. These claims include:</p> <ul style="list-style-type: none"> ▪ sodium, potassium and hypertension ▪ saturated fat, trans fat and heart disease; ▪ fruit, vegetables and cancer; ▪ calcium, vitamin D and osteoporosis; ▪ sugar alcohols and dental cavities. <p>Food manufacturers must obtain approval from Health Canada prior to claims use on a food product (Agriculture and Agri-Food Canada, 2011; Canadian Food Inspection Agency, 2010b; Health Canada, 2010)</p>	<p>"A healthy diet containing foods high in potassium and low in sodium may reduce the risk of high blood pressure, a risk factor for stroke and heart disease. KLM Crackers are sodium-free."</p> <p>"A healthy diet low in saturated and trans fats may reduce the risk of heart disease. KLM Bran Flakes are free of saturated and trans fats."</p> <p>"A healthy diet with adequate calcium and vitamin D, and regular physical activity, help to achieve strong bones and may reduce the risk of osteoporosis. KLM Yogurt is a good source of calcium."</p>
Therapeutic	<p>Five claims have been approved for use by Health Canada. These claims include the association of the five products of unsaturated fats, psyllium fibre, plant sterols, oat fibre and barley fibre with lowering blood cholesterol.</p> <p>As with disease risk reduction claims, food manufacturers' must obtain approval from Health Canada prior to claim being used on a food product. (Agriculture and Agri-Food Canada, 2011; Canadian Food Inspection Agency, 2010b; Health Canada, 2010, 2012)</p>	<p>"½ cup of KLM Bran Flakes supplies 12% of the daily amount of the fibre shown to help reduce cholesterol."</p> <p>"Replacing saturated fats with polyunsaturated and monounsaturated fats from vegetable oils helps lower cholesterol. KLM Bran Flakes are reduced in saturated fat"</p>

Source: (Health Canada 2007; Canadian Food Inspection Agency 2010; Canadian Food Inspection Agency 2010)

ii. Function and Nutrient Function

Function claims are a type of health claims that inform consumers of the positive effects on functional or biological activities resulting from the consumption of a food or food constituent (e.g., fat, proteins, carbohydrates, vitamins, minerals and water). Positive effects could include better health, specific physiological function, and/or physical or mental performance. These claims are based upon well-established food to function relationships.

Nutrient function claims are a more specific form of function claims informing consumers of the relationship between the consumption of specific nutrients (but not the entire food product) and specific and scientifically supported physiological function (e.g. “*builds strong muscles*” or “*supplies energy*”) where the nutrients and related function are considered essential to good health or performance (Canadian Food Inspection Agency, 2012c). Pre-market review of function claims is not required.

Descriptions and examples for function and nutrient function claims are provided in Table 2.4.

Table 2.4: Function and Nutrient Function Health Claims: Description and Examples

Health Claim Category	Description	Examples
Function	Acceptable claims include the following food or food constituents and conditions: coarse wheat bran and laxation or regularity; green tea and antioxidant capacity; psyllium and laxation or regularity; and probiotic and gut flora.	<p>"30 grams of KLW Bran Flakes contains 3.5 grams of fibre from psyllium seed, which promotes laxation"</p> <p>"Provides live microorganisms that naturally form part of the gut flora"</p>
Nutrient Function	<p>Acceptable claims involve the effects of nutrients of protein, fat, docosahexaenoic acid (DHA) and arachidonic (ARA), carbohydrate, vitamin A, vitamin D, vitamin E, vitamin C, thiamine (vitamin B1), riboflavin (vitamin B2), niacin, vitamin B6, folate, vitamin B12, pantothenic acid, calcium, phosphorus, magnesium, iron, zinc, iodine, selenium on specific defined body function, health and performance. Required wording and conditions apply.</p> <p>Two general nutrient function claims exist and allow that all of the above noted nutrients can claim to be a factor in <i>good health and normal growth and development</i> on labels.</p>	<p>"Protein helps build strong muscles"</p> <p>Fat supplies "energy"</p> <p>"Vitamin A supports night vision"</p> <p>"Calcium aids in the formation and maintenance of bones and teeth"</p> <p>"Iron helps build red blood cells"</p> <p>"Vitamin D is a factor in the maintenance of good health"</p>

Source: (Canadian Food Inspection Agency, 2010a, 2010b; Health Canada, 2007)

iii. General

General claims do not associate consumption of foods with health, disease or health conditions. Instead, these claims provide information and graphic/text cues regarding healthy eating and overall diet choices. Claims that include reference to body weight, educational material, quotes from Canada Food Guide diet guidance and third party¹⁴ endorsements/ logos/heart symbols are all regulated as general health claims. (Canadian Food Inspection Agency, 2010a, 2010b; Health Canada, 2007). Examples include "healthy for you," "healthy choice" or the Heart and Stroke Foundation logo.

¹⁴ Third party endorsement refers to certification of a food by a health-related group or association (e.g., Heart and Stroke Foundation).

2.4 Literature Review

Research in the area of food labelling is broad and multi-faceted. This literature review focuses on three main topics considered most directly related to this research study including food manufacturers' use of claims, consumers' utilization of claims and NFL, and the need for government intervention in food labelling.

2.4.1. Food Manufacturers' Use of Claims

Food manufacturers are using an increasing number and type of claims as part of their product differentiation strategy. From 1997 to 2001, U.S.¹⁵ food manufacturers' use of health claims on product packages increased from 4% to 4.4% and use of nutrient content claims increased from 39% to 49.7% (Brecher & Bender, 2000; Legault *et al.*, 2004; Zarkin & Anderson, 1992). The greater use of nutrient content claims compared to health claims has been attributed to the less stringent policies with the former (Parker, 2003). As well, since 1992, food manufacturers have redistributed their use of claims between food product categories. For example, between 1992 and 1999, manufacturers' use of nutrient content claims increased in the categories of soup, vegetables and soft drinks and decreased in the categories of oils, cookies and entrees (Caswell *et al.*, 2003; Williams *et al.*, 2003).

Focusing more specifically on firms' ability to reformulate in order to adopt claims and meet diet-health trends, industry research supports that food manufacturers are indeed concentrating their product differentiation strategies on the diet and health relationship. Over the past decade, firms have formulated, re-formulated and marketed a wide range of products with the idea of adding features that fit the healthy food choice trend (Sloan, 2008). Although reformulation of food products to a healthier version can be limited to some extent by the product matrix/taste requirements, a number of studies and current industry strategies support that reformulation of products to healthier versions (e.g., reduced salt, fat, sugar or carbohydrates) is possible (Food Standards Agency, 2010; Webster, 2009). For example, a 2009 industry study supports the possibility of compensating for the sensorial impacts of reduced sugar and fat quantities (e.g., fat is replaced by air or water in products such as ice-cream or dressing) (Palzer, 2009). As well, recent examples from the marketplace support food manufacturers' ability to reformulate to healthier products, even given the limits of the product matrix/taste. Examples include: industry-wide reduction and/or elimination of trans fats from processed food products after the introduction of mandatory trans fat labelling (Trans Fat Task Force *et al.*, 2006); Nestlé's and Kraft's commitment to a

¹⁵ It should be noted that although many of the studies referenced in this section are associated with United States food manufacturers they are applicable to Canada. The major reason for this is the multinational nature of the processed food industry where processed food products sold in Canada and the U.S. are often manufactured by the same firms (e.g., Kraft, Nestle, General Mills, Frito-Lay, and PepsiCo.). Details regarding similarities and differences in U.S. and Canadian label regulations are provided in Section 1.1.

10% to 15% reduction of sodium in their product lines by 2014 (Daniells, 2010; Foodnavigator-usa.com, 2010); and global food companies' reported manipulation of sugar, salt and fat (Moss, 2013).

As noted earlier, from a public policy point of view, a major reason governments provide labelling regulations is to encourage food manufacturers to differentiate their products and provide higher quality products to the market. Several studies have examined firms' response to on-package legislation and found little product-related benefits or improvements. Moorman (1998) reviewed the positive and negative attributes of products before and after implementation of the Nutritional Labeling and Education Act (NLEA) using a longitudinal quasi-experimental approach. They found that firms increased both the positive and negative attributes of base brands and resulting in minimal net benefit. As well, Kelly *et al.* (2009a) reviewed the effects of nutrient content claim allowance and found that these claims were used to promote single nutritional benefits of a product, even when the product also had less healthy properties. Colby *et al.* (2010) reported that nutrition marketing was being used on products high in saturated fats, sodium and sugar and frequently on products marketed towards children. Finally, consumer class actions involving nutrition marketing used on products with high levels of less healthy ingredients have become increasingly common in the news in both Canada and the U.S. (Astley, 2012; Watson, 2010, 2012a, 2012b), again providing support for this lack of net positive product attributes resulting from additional nutrition marketing regulations.

In contrast, several earlier studies have supported increased positive nutrient attributes in food products associated with additional regulation of RDI requirements and allowance of fiber health claims from the 1970s and 1980s (Ippolito & Mathios, 1990, 1991; Mazis *et al.*, 1981).

Overall, under conditions of increased allowance of on-package information, food manufacturers are increasingly using nutrition marketing and voluntary claims to promote their products and reformulating products to meet diet-health and claims trends. However, there is mixed evidence to support the notion that increased nutrition information allowance results in higher quality processed food products being available to consumers.

2.4.2. Consumers' Utilization of Claims and Nutrition Facts Label

Consumers, as part of their growing interest in the relationship between food and health, want to eat healthier foods and many use on-package nutrition information to make purchase decisions (Drewnowski *et al.*, 2010; Food and Drug Administration, 2009a; Garretson & Burton, 2000; Lalor *et al.*, 2011). A 2009 Canadian study reported that 68% of Canadians use on-pack nutrition labelling as their primary source of nutritional information while a 2008 US study found that 54% of respondents read the label the first time they buy a product (Canadian Council of Food and Nutrition, 2009; United States Food and Drug Administration *et al.*, 2009). This section of the literature review focuses, first, on consumers' use, view and understanding of claims and second, on consumers' NFL utilization.

Claims¹⁶

Consumers' use, view and understanding of claims, as well as the impact of claims of product assessment have been examined extensively in the literature. Findings of select studies are discussed below.

A number of studies have established that consumers' use of claims for product evaluation and selection is relatively high and increasing. In a 2008 Canadian study, consumers were asked what they look for when they view a label. In this study, 21% of respondents indicated looking for nutrient-related statements, 18% health benefit statements and 23% healthy logo or symbols. (Canadian Council of Food and Nutrition, 2009; United States Food and Drug Administration *et al.*, 2009). As well, several studies report consumers' prefer shorter FOP claims over NFL offered on other parts of the package (Grunert & Wills, 2007; Kiesel *et al.*, 2011; Williams, 2005).

The majority of the studies noted above have tended to focus on nutrient and health related claims. However, a smaller number of studies have focused on consumers' usage of third party claims (e.g., healthy logos, symbols or endorsements). Specifically, Grunert (2007) found evidence that consumers in Europe prefer not to see health or traffic light logos because they see such logos as paternalistic. However, a 2008 European internet-based survey reviewed the effect of FOP nutrition formats and found that endorsements by national and international health agencies (i.e., World Health Organization, British Dietetic Association) strongly increased the labelling formats' credibility for consumers (Feunekesa *et al.*, 2008). In agreement with these results, a 2010 study reporting the results of an Australian discrete choice experiment examined the influence of health-related endorsements such as "Pick the Tick"¹⁷ on consumer choice (Muellera & Umbergerb, 2010). According to these authors, this third party endorsement had a high impact relative to on-package promoted product attributes and health claims.

It should be noted that the claim usage reported in these studies is often based upon self-reported data or experimental design, and thus the real-world use of claims may be different. For example, a review of published articles from New Zealand and Australia that focused on claim usage found that self-reported use of labels/claims was high while observed use of label/claims was much lower (Mhurchu & Gorton, 2007). The observed usage study included in this review was conducted through a process of verbal protocol analysis where shoppers verbalize their thoughts while shopping in the grocery store, with these recorded thoughts later being analyzed to review label usage.

In terms of who uses claims, comparatively few studies have specifically investigated the socio-demographics of claim users. Instead, most studies merge claim users and label users into one category, and assume they share similar traits. Pothoulaki and Chrysochoidis (2009) reviewed 42 articles from the US, Australia, Canada, Brazil and the EU. They found that claim and NFL usage was higher among

¹⁶ The literature provided in this section is based upon a much smaller breadth and depth of claims than is approved for the marketplace in various countries today.

¹⁷ "Pick the Tick" is certified by the Australian National Heart Foundation.

Caucasian, higher income and higher educated women. In contrast, a qualitative study by Lalor *et al.* (2011) asserted that claims were primarily used by older populations, mothers of young children and consumers who had a friend or relative that suffered from a condition related to the claim. Also important are factors that go beyond socio-demographic traits. Factors such as personal relevance, health consciousness, trust and frequency of product use have been associated with increased claim usage (Urala *et al.*, 2003; Urala & Lähteenmäki, 2007; van Kleef *et al.*, 2005; van Trijp & van der Lans, 2007; Wansink & Cheney, 2005).

In terms of consumers' view of claims, a number of studies have indicated that consumers often distrust and are skeptical of claims on food products (Cravatta, 1998; Datamonitor, 2009b; Health Canada, 2009; Just-food, 2008; Lewis & Yetley, 1992; Mazis & Raymond, 1997; Tan & Tan, 2007; Tate & Lyle, 2009). For example, the 2008 U.S. Health and Diet Survey reported 41% of Americans trust that all or most of the nutrient claims are accurate while 56% believe that some or none of them are accurate (United States Food and Drug Administration *et al.*, 2009).

Consumers' understanding of claims has also been investigated in the literature. For example, several research studies support that consumers have good overall knowledge of the claims (Abbott, 1997; Burke *et al.*, 1997; Mhurchu & Gorton, 2007) but are often confused when faced with claims supported by different scientific evidence, more than one type of claim, or newer or comparative claims (Abbott, 1997; Burke *et al.*, 1997; Derby & Levy, 2005; Hasler, 2008; Kapsak *et al.*, 2008; Roe *et al.*, 1999; Teratanavat *et al.*, 2004). In contrast, a Health Canada focus group study conducted in 2000 showed that participants did not have the basic nutrition knowledge required to understand health claims (Jones & Bourque, 2003). Not all consumers are confused or misled by claims. However, because of the complex nature of the food purchase decision, it is possible that there may be a large number of consumer segments vulnerable to the newer claims, comparative claims and products having more than one claim (Elliott, 2010; Gibbs & Chapman-Novakofski, 2010; Mackey & Metz, 2009; Redmond, 2009; Roe *et al.*, 1999).

The relationship between consumers' understanding and use claims has been examined in the literature. Interestingly, even when consumers lack understanding or misinterpret the claims they may still use claims in their purchase decisions (Abbott, 1997; Andrews *et al.*, 1998). Looking more specifically at the development of consumers' claim comprehension, a 2002 qualitative study conducted by the Food Standards Agency found that claim understanding was based on individuals' own constructed beliefs rather than on scientific or government-defined information. Moreover, claim usage was additionally based upon these constructed beliefs. This 2002 study also demonstrated that consumers' claim usage was influenced by claim relevancy to personal health, personal understanding of terms and the positive nature of the claim type. The same study also concluded that in general, consumers overstate their understanding of a claim (Food Standards Agency, 2002).

Academic and industry studies have also investigated how the presence of claims on the package influences consumers' assessment and selection of a product. Roe *et al.* (1999) conducted a mall intercept

experimental design study which showed that consumers often revealed a halo effect¹⁸, limited their search to claim information, and placed greater weight on claim information rather than the NFL when either health or nutrient-content claims were present on the products' package. In a more recent study from New Zealand, over 1500 adult grocery shoppers were surveyed regarding their view of "fat-free" and "no sugar added" nutrient content claims (Patterson *et al.*, 2012). This study's main conclusion was that the majority of Maori, Pacific, Asian and low-income consumers from the total shoppers viewed products with claims as healthier products. As well, a 2013 experimental design study conducted in the U.S. reported that *organic* claims exhibited a health halo effect (Lee *et al.*, 2013). Specifically, the term *organic* was overgeneralized because consumers believed that organic implied lower calories, better tasting and healthier product attributes. Finally, in an examination of 120 investigative studies (i.e. survey, focus groups, experimental design and outcome studies) from a range of countries for the years 1984 to 2004 Williams (2005) found evidence that consumers' use of health claims had positive effects on dietary choice and knowledge even when consumers had difficulty distinguishing between claims type and overextended claim benefits.

A number of studies have examined how consumers' perception and assessment of a product are influenced by specific factors such as type of nutrient claimed, number of claims, combined presence of claims and NFL and consumer motivation. Drewnowski *et al.* (2010) conducted a conjoint analysis using data from an online U.S. consumer panel to review the effects of various types of claims on the consumers' perception of the products' overall healthiness. In this study, protein, fibre, calcium and vitamin C claims all improved consumers' perception of product healthiness. Along similar lines, Van Trijp and van der Lans (2007) found that consumers' familiarity with the type of nutrient noted in the claim was more important than claim type as an overall determinant of the consumers' view of the claim and product perception. The combined presence of claims and NFL had varying effects on consumers' claim usage and product perception. Andrews (1998) found that when consumers were asked to interpret nutrient content claims in advertising without the presence of the NFL they over-generalized the claims. In an experimental design study, Keller *et al.* (1997) demonstrated that the presence of a NFL can diminish the positive connection between the perception of product quality and nutrient content claims. Similarly, Garretson and Burton (2000) found that claims did not always positively influence product evaluations or purchase intentions when nutrition facts information was present.

Overall, the literature supports the notion that consumers use claims extensively, although actual use may be lower than self-reported use and mitigated by variables such as claim type, presence of NFL, and type of nutrient that is noted in the claim. In addition, claims are reported to influence consumers' product assessment with a number of studies indicating over-generalization, confusion and truncated information processing by consumers when claims are present.

¹⁸ The halo effect is a consumer behavior cognitive bias theory where one product attribute positively influences the consumer's evaluation of the whole product with consumers often being unaware of this bias.

Nutrition Facts Label

A considerable amount of literature has been published on consumers' use and understanding of the NFL. Cowburn and Stockley (2005) reviewed 113 published and unpublished North American and European papers and concluded that consumers may be viewing but not processing NFL information, despite a high level of self-reported usage. A second conclusion from this study was that NFL understanding was closely related to a consumers' specific purpose for reading the NFL and the complexity of the information that the consumer was attempting to obtain. An overall conclusion from this review was that consumers were able to conduct simple tasks and derive basic values from the NFL but became confused by complex conversions and relationships between nutrients.

These results concerning consumers' use and understanding of the NFL are consistent with Higginson *et al.* (2002) who recruited 14 participants to verbalize their thoughts while grocery shopping for a "healthiest version" of assigned food products in a grocery store. This research confirmed that the greatest amount of nutrition label use involves simply looking at the information available versus processing the information.

As well, a European review of 58 NFL-focused qualitative and quantitative research publications from the period 2003 to 2006 found similar results regarding consumers' NFL use versus understanding of NFL information (Grunert & Wills, 2007). For example, in their review of these studies the authors found that self-reported usage was high with 30% to 65% of consumers reporting that they checked nutrition information always or occasionally. However, in terms of NFL understanding, the review also showed that a majority of consumers indicated they wanted improved NFL formats because they found the format confusing, terms difficult and standardization lacking.

Borra (2006) used qualitative and quantitative methods to examine the use and awareness of food labels. Borra found that 32% of consumers usually looked at the NFL when making foods choices and those consumers mainly considered calories, fat and sodium when reviewing the label. Focus group results from this same study revealed a high level of consumer awareness of the nutrition label and yet confusion regarding the reporting of the percent daily values. In agreement with these results, an Australian and New Zealand study by Mhurchu and Gordon (2007) examined nutrition related literature sourced in those countries and found high self-reported use of the NFL but limited actual NFL use and understanding.

Studies have also examined the effects of select variables on consumers' NFL understanding. Specifically, increased NFL understanding appears to be positively related to: consumers' knowledge of the percent daily intake (Fuan *et al.*, 2000); assessment of fat content rather than percent daily value or food content (Levy *et al.*, 2000) and familiarity with nutrition facts label (Byrd-Bredbenner *et al.*, 2001). As well, various studies reported that consumers' NFL understanding improved when NFL formats were revised to include some combination of the following: non-numerical icons; percentage values for nutrients based on a daily value; clear guidelines; simple, detailed, average, acceptable range and actual NFL values; and

both numeric and graphic icons (Chouinard & McCluskey, 2008; Cowburn & Stockley, 2005; Drichoutis *et al.*, 2006; Lewis & Yetley, 1992; Mackey & Metz, 2009; Verbeke, 2005; Viswanathan *et al.*, 2009).

Current research provides insight but in most cases little consensus concerning the influence of health status, disease, literacy, nutrition knowledge, obesity, gender, education and income on NFL usage and understanding. For example, Campos *et al.* (2011) reviewed 120 select articles, mostly from Canada, Europe and the U.S., and found that although consumers used the NFL as a prime and credible source when making food choices, this usage varied by demographic, with older, younger and obese individuals having the lowest usage. In terms of understanding, this study reported that many consumers, especially those who are comparatively old or young, less educated and health compromised, had difficulty in understanding the values in the label and in comparing products with differing serving sizes and package sizes. Other studies have reported increased NFL usage amongst consumers with comparatively high literacy (Viswanathan *et al.*, 2009) and those with similar socioeconomic traits (Ollberding, 2010). In contrast to the findings of most other studies, Mitra (1999) found that consumers with a wide range of education levels were able to utilize the information contained in the nutrition facts panel.

Other studies have demonstrated a comparatively weak relationship between specific socio-demographic factors and NFL usage. For example, Nayga Jr. (2000) discovered that nutrition knowledge and gender were not related to increased NFL usage. As well, Ollberding (2010) estimated a logistic regression model using U.S. food intake data and found that consumers who consumed more total fat, saturated fat, and cholesterol were less likely to search for these items on the NFL. In addition, using Food and Drug Administration nutrition data, (Lin *et al.*, 2004) identified a positive relationship between knowledge and diet effectiveness with NFL usage. However, these authors did not find a significant relationship between health status and NFL use.

Consumers' ability to use and understand the NFL is seen as important since those who are able to utilize the NFL are more likely to accurately assess product quality and select healthier foods that support healthier lifestyles. Evidence of this relationship is supported by a number of research studies. Burton *et al.* (1999) reported that consumers who are accurately able to use the NFL information are also able to make more accurate product evaluations. Variyam's (2008) correlation study on label usage and food purchase decisions supported a positive relationship between participants' label reading and their dietary practices.

Overall, current research shows high self-reported use of the NFL. Despite this high use, reported and actual understanding of the NFL is lower due to difficulties in NFL interpretation, especially when faced with more complex tasks and conversions. Moreover, label format, socio-demographics and consumer characteristics all appear to be important determinants of consumers' ability to utilize the NFL.

2.4.3. Need for Government Intervention in Processed Food Labelling

A number of studies have investigated the need for government regulations in the processed food marketplace. Golan *et al.* (2001) examined the need for government intervention in food labelling using a set of three case studies involving U.S. government proposed and implemented intervention in the market. These researchers found that government intervention worked well to mitigate asymmetric information in the food sector, thus benefiting both consumers and society, but only if supported with well-defined and enforced standards. In addition, their research also asserted that the need for intervention should be assessed by clearly defining the net cost-benefit effect of the intervention and that the valuation of the costs (e.g., costs of product reformulation, re-labelling and information overload) and benefits (e.g., increased access to quality and dependable information and healthier consumption patterns) are often difficult to define.

Similar outcomes regarding the importance of cost-benefit valuation were found by Caswell and Padberg (1992). In addition, Caswell and Padberg provided that the benefits of labelling should extend beyond the strict product-specific and consumer-specific gains, to the more general gains of consumer confidence and education with regard to label usage to review product quality. Finally, Caswell and Mojdzuska (1996) found that the need for government intervention is related to the type of food product. Intervention is not necessarily required to maintain higher quality products when the food product is an experience good. In this case, consumers will learn from their good or bad product experiences and self-correct their purchases, forcing firms to respond with higher quality products. Conversely, when food products have credence attributes, consumers may be unable to learn from consumption experience and thus consumers need to rely on government intervention or third party endorsement to provide information that signals quality products.

Concerns and challenges regarding industry self-regulation in the food sector have been discussed in several articles. Sharma (2010) asserted the need for well-defined standards to promote successful industry self-regulation and avoid public health failures. Suggested standards include transparent codes created by objective third parties, predefined and science-based benchmarks, public reporting of firms' compliance to codes and a global regulatory body overseeing the self-regulation efforts. Brownell and Warner (2009) also presented concerns regarding industry self-regulation by reviewing and drawing a comparison between food companies and tobacco companies. Specifically, these researchers provide that when faced with the public concerns that their product are harmful, the food and tobacco companies have responded similarly by providing strategic and well-funded public relation and promotion strategies in order to influence consumers, policy makers, regulators and researchers that as firms they support public health. In addition, the researchers state that although food businesses have the opportunity to produce products that are consistent with public health goals, their profit-seeking goals often get in the way.

Finally, they suggest that mandated regulation should be applied if food companies fail to align their products with public health goals.

The relationship between the food industry structure and degree of required government intervention has also been reviewed. Redmond (2009) examined the US packaged food regulatory framework using a political economy approach and found that current industry marketing practices facilitate a regulatory failure in the sector. These marketing practices include food manufacturers' legitimizing healthier-food profit-seeking strategies by masking them as public relation campaigns; competitors working together in order to influence government food policy and regulations; and provision of substantial and confounding food-related research to policy makers in order to ensure industry-friendly regulations that meet food manufacturers' interests. Redmond (2009) also asserted that food manufacturers' interests have taken priority over consumers' interest in the food regulatory framework. Kolodinsky (2012) asserted that the structure and dynamics of the food industry contribute toward sustained information asymmetry in the industry. Specifically, the author presents that the combination of extended lag times to change government regulations, short term and profit-focused nature of food businesses, consumers' inability to use label information, conflicts between regulators and rapidly changing sector trends all contribute to the continued imbalance of information in the food industry. Finally, in a 2012 commissioned article, researchers examined the effect of the food and beverage industry structure on food product offerings (Stuckler & Nestle, 2012). They discussed that the multi-national, highly concentrated and profit-seeking nature of the global food sector has contributed to the current nutritional failures of obesity and malnutrition in the industry. The authors asserted stronger government regulation rather than self-regulation needs to be provided in order to facilitate healthy and nutritional food offerings in the marketplace.

Overall, the literature appears to support, to varying degrees, the need for government intervention in the food sector based upon the industry's inherent structural tendencies toward concentrated market power, asymmetric information and profit-seeking priorities. In addition, the challenges in both self and public regulations are well recognized.

2.4.4. Rationale for this Study

Given the extensive research on claims and NFLs, it is natural to ask, "Why is another study warranted?" The rationale warranting a new study includes the following. First, this study examines the impact of a broader range of claims approved by government and utilized by food manufacturers and a more experienced consumer. In the past ten years, firms have rapidly increased usage of newly approved claims and so consumers now have greater experience and exposure to these more and varied on-package claims (Brecher & Bender, 2000; Legault *et al.*, 2004; Zarkin & Anderson, 1992). The current literature has tended to focus on one or two specific types of claims and/or study less-claim-exposed

consumers. Both of these reasons suggest that this current study, which allows for a wide range of claims and claim-saturated consumers, is warranted.

Second, this study concentrates on the utilization of a unique exaggerated product claim by food manufacturers and consumers. Although the concept of exaggerated product claims has previously been informally discussed in the literature and media (Federal Trade Commission (FTC) 1992; Ogden vs. Bumble Bee 2012) (Federal Trade Commission, 1992; Kolodinsky, 2012; Redmond, 2009), there has been no formal analysis of such claims in the literature, especially studies with current marketplace data and a specific focus on consumers' views of products with an exaggerated product claim.

Third, this study is a multi-discipline and multi-method study that focuses on the exchange between consumers and producers under conditions of asymmetric information (exaggerated product claims) and current food label regulations. Recent studies have generally utilized one method and focused either on consumers' utilization or firms' usage of claims but not on their interplay using multi-methods.

CHAPTER 3 Conceptual Framework and Methodology

3.1 Introduction

This chapter provides an overview of the market failure concept, conceptual framework and multi-method research design used to explore the overall and three research sub-questions of this dissertation. Specifically, Section 3.2 sets the stage for the analysis of exaggerated product claims by first describing market failure, in a general and processed food context, and then by examining how exaggerated product claims have the potential to limit consumers' ability to assess product quality. Section 3.3 presents the conceptual framework highlighting the separate decision-making processes of food manufacturers and consumers and the exchange between consumers and food manufacturers. Section 3.4 presents the rationale for using the multi-method research design and a brief overview of the two stages involved in the research design.

3.2 Market Failure and the Exaggerated Product Claims

According to economic theory, goods are allocated efficiently and total surplus¹⁹ is maximized when a market is perfectly competitive. However, if a market moves away from being perfectly competitive, this will result in a sequence of events where surplus is reduced because some products are under-produced and some products are overproduced, resources are allocated inefficiently and ultimately market failure occurs. The reasons why a market fails (i.e., does not meet the market conditions²⁰ for perfect competition) are generally related to industry structure or developments. For example, if consumers do not have full product information (e.g., asymmetric information exists) or one firm gains market power allowing them to set market price, then the market conditions of a perfectly competitive market are not met and the market fails. Market failure can thus theoretically be examined as the difference between a perfect and imperfect market and measured by a change in total surplus. More generally, market failure is often reviewed as any move away from perfectly competitive conditions with emphasis placed on examining the reasons and impact of this market failure. If warranted, the potential remedies for market failure in an industry include government regulation and policy.

As discussed in Section 2.2 the processed food industry has inherent characteristics and trends that contribute to asymmetric information and increase the potential for market failure (Akerlof, 1970; Kolodinsky, 2012; Redmond, 2009). Food label regulations have been implemented in order to equalize

¹⁹ Total surplus refers to the sum of consumer and product surplus and is a measure of the net benefit gained from a market transaction. More specifically, consumer surplus is the difference between the price a consumer would be willing to pay and price they actually pay for a good. This basic definition applies to the producer except that price then refers to the amount willing to accept and received. Maximization of total surplus is an economic goal.

²⁰ The conditions of a perfectly competitive market include full information for buyers and sellers, homogenous products, zero entry and exit barriers and a large number of buyers and sellers.

the balance of information between firms and consumers in the processed food industry, and support consumers' ability to differentiate higher quality food products. This dissertation asserts that, despite these regulations, firms have an incentive to use exaggerated product claims to differentiate their products and increase sales (Smith, 2009). The incongruence between the levels of "claim nutrient" and "nutrients other than claim nutrient," which is a characteristic of the exaggerated product claim, makes it difficult for consumers to tell the difference between products of different quality. Consequently, the potential for market failure in the processed food industry may be increased by the exaggerated product claim and its impact on asymmetric information.

The effect of the exaggerated product claim on information asymmetry depends on the consumers' ability to utilize²¹ available product claims and nutrition information when assessing product quality. Several factors may affect this ability, including the following:

- Social, individual and cultural characteristics can make it difficult for consumers to use and fully understand nutrition information and claims provided on the package. Examples of these characteristics include balancing competing health concerns, low education, low nutrition literacy, social or cultural vulnerabilities, marginalization characteristics (elderly or low income), time limitations and distractions.
- Credence attribute verification involves search costs (i.e., time, level of effort and complexity) with little or no verifiable benefits. Lack of proficiency is discussed below.
- A considerable level of proficiency is required to convert available nutrition information (i.e., nutrient fact label and ingredient list found on package) to a form that is applicable to the individual in terms of diet requirements, serving size and nutrient restrictions.
- Positive health and quality benefits appear in the FOP in the form of claims while the less healthy and lower quality nutrients/ingredients of the product are generally not highlighted on the FOP.

These factors can influence the consumers' ability to utilize different on-package nutrition information when making their product quality assessment and selection. Not all consumers will misjudge product quality and over-consume a suboptimal product with an exaggerated product claim. However, due to the range and potential prevalence of these four factors in the processed food sector, the size of this vulnerable segment may be considerable. This idea of consumer heterogeneity is discussed in detail in the next section.

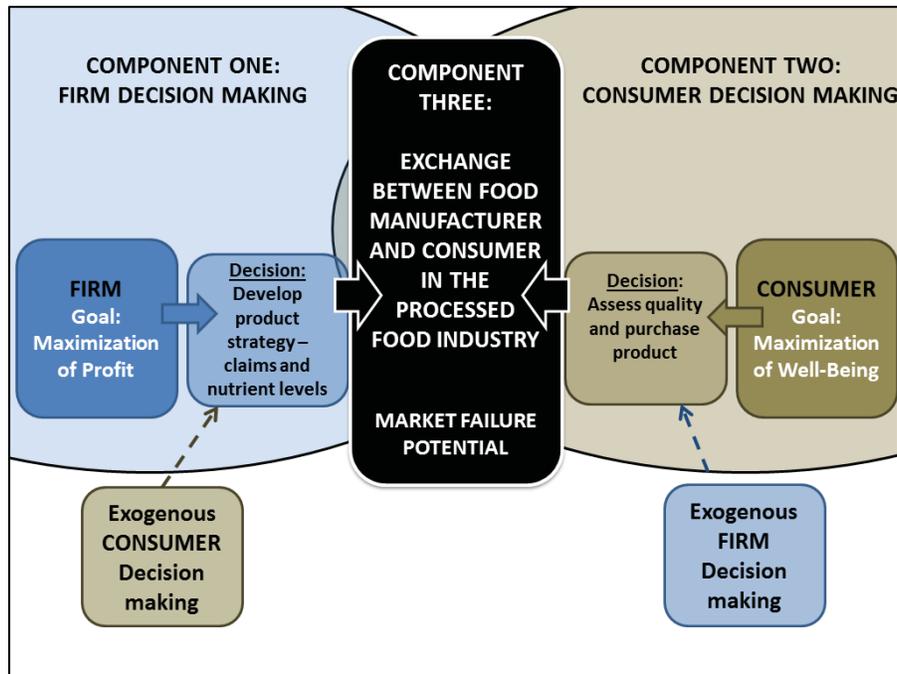
²¹ Recall that utilization refers to consumers' ability to both use and understand claims and additional on-package information.

3.3 Conceptual Framework

As illustrated in Figure 3.1, the conceptual framework used in this dissertation to address the potential for market failure due to asymmetric information (e.g., exaggerated product claims) in the processed food industry has three components:

- Component 1: Food manufacturers' decision-making process regarding product price, claims and nutrient levels. Consumer decision-making is exogenous²² to the firms' decision-making process in this component.
- Component 2: Consumers' decision-making process regarding product quality and selection. Firm decision-making (i.e. price, nutrient level and claims) is exogenous to the consumers' decision-making process in this component.
- Component 3: Exchange between food manufacturers and consumers with a focus on asymmetric information and potential for market failure.

Figure 3.1: Conceptual Framework with Three Components: Firm, Consumer and Exchange



²² Exogenous variables are variables that are determined outside the decision-making process for the component in question. Although exogenous variables influence the outcome, the decision making does not influence the exogenous variable.

3.3.1. Component 1: Food Manufacturers' Decision-Making Process

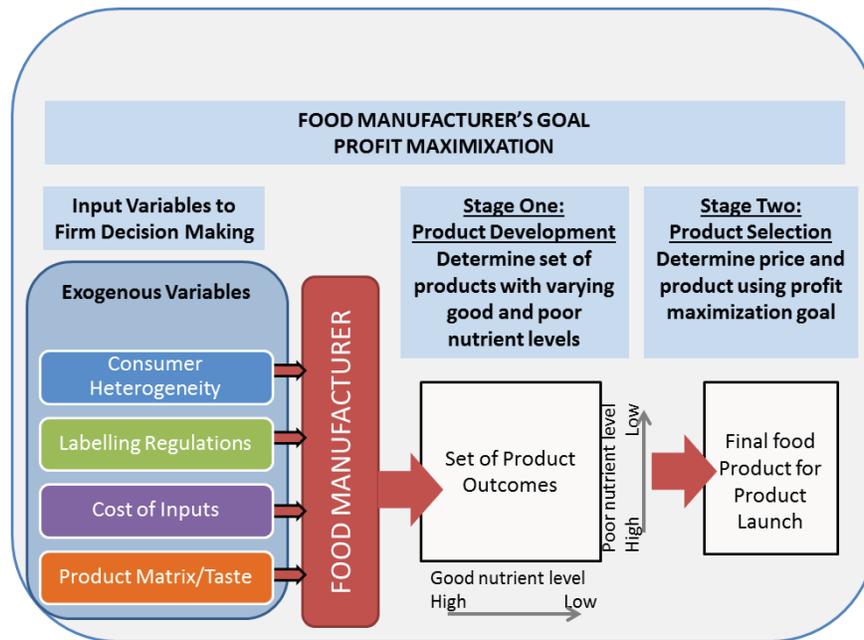
The food processing industry is an example of a monopolistic competitive structure where firms offer consumers differentiated products (Caswell & Mojduszka, 1996; Kiesel *et al.*, 2011). A product strategy where firms differentiate a product by changing or adding product attributes (i.e., value or credence) is used by firms as a means to gain market power, allowing them to raise profits by limiting quantity and raising price (Shaked & Sutton, 1983; Tremblay & Polasky, 2002). Thus, the food manufacturers' decision-making process involves firms selecting product attributes and price with a goal of profit maximization.

Firms may engage in either horizontal and/or vertical forms of differentiation (Wauthy, 1996). This dissertation will utilize the concept of vertical differentiation, which results in products of varying quality consistently rank-ordered by consumers.²³ For example, firms can engage in vertical product differentiation by offering a product that differs only on the level of trans fat included in the product. One product has high trans fat and the other zero trans fat. Given full information, most consumers will rank a zero trans fat product as a product of higher nutritional quality compared to the similar product that has high trans fat. It is important to note that although consumers agree on the ranking of a product based on quality, they may disagree regarding the intensity of the quality differences within the ranking. Although a firm's differentiation strategy can involve changing any of the value and credence product attributes, this dissertation will limit the firm's differentiation strategy to changes in the products' claim and nutrition levels. The firm's selection of these attributes defines overall product quality.

Figure 3.2 illustrates the firm's two-stage decision-making process developed in this dissertation. The process encompasses firms determining price, claims and nutrient levels for the product (and thus product quality) with an implicit goal to profit maximize.

²³ In contrast, horizontal product differentiation results in products of varying quality that are inconsistently rank ordered. For example, firms can horizontally differentiate crackers by offering them in sour cream and salsa flavor. Consumers have different preferences for these two flavors and thus the products have no consistent rank ordering basis quality (Tirole, 1988).

Figure 3.2: Component 1: Firm's Decision-Making Process



Stage One, product development, involves the development of a set of products vertically differentiated by adding or changing claims and nutrient levels given exogenous consumer heterogeneity, labelling regulations, cost of inputs²⁴ (i.e., minimization requirement) and product matrix/taste²⁵ variables. Specifically, in this component, firms are assumed to make decisions regarding the level of good nutrients that can be advertised using FOP claims and the level of poor nutrients provided in other parts of the processed food package. Stage Two, product selection, involves price determination and selection of the product version that will maximize profit for the firm.

Individual consumers are viewed as multi-dimensional decision makers as they use multiple variables (e.g., price, taste, healthy nutrient levels and less-healthy nutrient levels) to assess and select products. In addition, consumers are different from each other as they each place different weights on the variables they use in their decision-making process. Building on this idea of the multi-dimensional consumers, the consumer population is categorized into two segments based upon the on-package nutrition information they utilize when making their product quality assessment and selection. One segment of consumers may utilize only the FOP claims due to factors that limit their capacity to utilize all available on-package nutrition information as discussed in Section 3.2 while a second segment may utilize both FOP claims and nutrient information available on-package when assessing product quality. Based on this shared decision-making characteristics, there is heterogeneity across the consumer segments. Thus, consumer

²⁴ Cost of inputs includes costs of ingredients, packaging, inspection, administration and transport.

²⁵ Recall that product matrix/taste includes more than the product palatability by encompassing product features such as packaging, best before dates, environmental, sustainability and ethical issues, recipe microstructure, food safety and food sustainability.

heterogeneity in this framework refers to the utilization of different on-package nutrition information by multi-dimensional consumers when making their product quality assessment and selection.

If regulations were absent and asymmetric information existed, firms would make false statements regarding credence attributes. Food label regulations have been put in place to ensure that firms use a claim only when criteria (e.g., qualifying nutrient levels, compositional criteria and claim wording) for the claim are met. However, these regulations are unable to control for exaggerated product claims. If the exaggerated product is in place and consumers are unaware or unable to detect these exaggerated product claims, this will effectively limit the consumers' ability to assess product quality and result in some consumers over-assessing product quality. The effectiveness of the exaggerated product claim in limiting the consumers' ability to assess product quality depends upon the level of consumer heterogeneity. If all consumers utilize only the FOP claims, then firms could follow a profit-maximizing product differentiation strategy and exclusively use exaggerated product claims in the marketplace. However, if all consumers utilize both FOP claims and nutrient information available on-package, products with exaggerated product claims will not be used by firms in the marketplace.

This idea that consumer heterogeneity can influence a firm's decision to use an exaggerated product claim as their vertical differentiation strategy forms the basis for this component of the dissertation. The specific impact of consumer heterogeneity on a firm's product differentiation strategy and the resulting profit-maximizing claim strategy (e.g., Research Question I and II) are examined in Stage 1 of the research design in the economic model and empirical analysis (See CHAPTER 4).

3.3.2. Component 2: Consumer Decision-Making Process

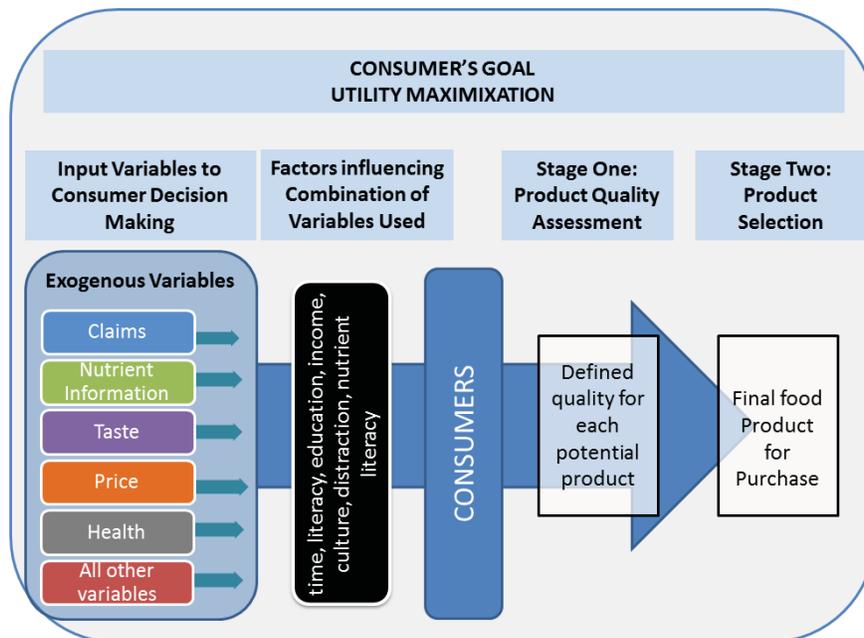
The literature supports that a large number of dynamic, complex and overlapping elements influence consumer food choice. Specific elements that contribute to the complexity of processed food choice include the following:

- Food choice involves an interaction between individual, social and environmental elements. The individual influences are sourced from psychological, mood, biological, attitude, beliefs, taste and norms elements; social influences from family, peers and cultural elements and environmental influences from time, physical and structural elements (Blanck *et al.*, 2009; Booth *et al.*, 2001; Brunt & Schafeer, 1997; Mikkonen & Raphael, 2010).
- Food is more than a necessity and involves emotional, cultural, political and status factors (de Boer *et al.*, 2007).
- Consumers are increasingly aware and interested in the health and diet connection (Jones & Bourque, 2003; United States Food and Drug Administration *et al.*, 2009).
- Product decision making involves time inconsistencies, as well as conscious and unconscious processing (Dodd, 2008; Köster, 2009).

- Elements of cost, benefit, framing, risk, ambiguity and uncertainty can influence final food choice (Drewnowski & Darmon, 2005).
- Information availability, source and timing can influence the final product selection (Barreiro-Hurle *et al.*, 2010; Seiders & Petty, 2004).

Drawing on the above elements and the literature discussed in Section 2.4, this dissertation proposes a two-stage consumer decision-making process as illustrated in Figure 3.3. The consumer decision-making process is conducted under conditions of asymmetric information, food label regulations and exogenous firm decision-making process²⁶.

Figure 3.3: Component 2: Consumers' Decision-Making Process



In Stage one, product quality assessment, consumers utilize a number of exogenous variables to determine product quality. These variables include claims as messaged on FOP, nutrient information as provided on other parts of the package (e.g., NFL), perceived taste, price, personal or household health requirements and other consumer-related variables (i.e., individual, environmental and social). Consumers will utilize (i.e., use and understand) the available variables in different ways depending upon factors such as culture, income, education/literacy, and time limitations; thus, consumers can be grouped into segments based upon the variables they utilize. For example, one segment could be made up of consumers that use only price and taste because they use but do not understand claims and nutrition information. In contrast, another segment could be made up of consumers that use price, taste, claims and nutrition information in

²⁶ The firm decision-making process is where the input variables of claim, nutrient levels, product matrix/taste and price are determined. Thus, this process being exogenous implies consumers do not dynamically influence the process or variables.

their product quality assessment because they are able to utilize all on-package information. In stage two of the process, product selection, consumers define the quality of each product version based on the information they have utilized and select the highest quality food product for purchase.

A consumer's exposure to a defined set of exogenous variables (including exaggerated product claims) yet use of only a subset of these variables when making product assessment and selection decisions (e.g., Research Question III) is explored in Stage 2 of the research design, comprised of focus groups and thematic analysis (See CHAPTER 5).

3.3.3. Component 3: Exchange between Consumers and Food Manufacturers

In component 3, the potential for market failure due to asymmetric information is examined by reviewing the exchange²⁷ between the consumers and producers when exaggerated product claims and current food label regulations are present in the marketplace using the theory of Marginal Cost–Marginal Benefit (Figure 3.4).

Marginal benefits are based upon consumers' assessment of the perceived or real taste of the product. Marginal real or perceived health costs²⁸ are based upon consumers' assessment of the product's net nutrition quality (i.e., value and credence attributes) using claims and nutrition information found on the package.²⁹

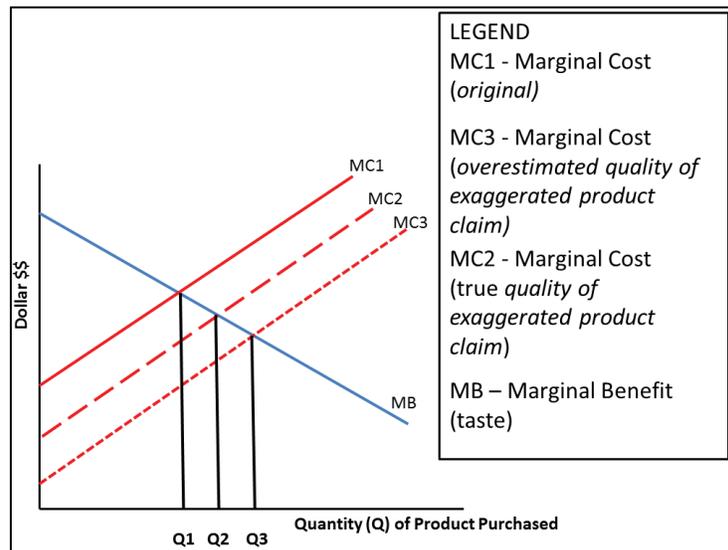
Employing this theory and as illustrated in Figure 3.4, consumers assess a product's marginal cost (MC1) and marginal benefit (MB) and purchase the quantity (Q1) of the product where marginal benefits equal marginal costs.

²⁷ Exchange refers to food manufacturers' product offerings and consumers' product selection conducted in the marketplace. Firm and consumer decision making are based upon processes outlined in Component 1 and 2.

²⁸ Marginal cost is the net nutrient contribution (i.e., net refers to healthy nutrient less less-healthy nutrient levels) of the product to consumers' diet and health obtained from the purchase/consumption of one more unit of the processed food product. Note that increase of healthy nutrients will reduce cost of consuming a processed food product. An increase of less-healthy nutrient will have the reverse effect.

²⁹ The product's net nutrient contribution is included in the model as a cost based on the following logic. First, many consumers tend to view the consumption of processed food as a negative or something they want to limit in order to eat healthier, thus supporting the logic that consumers incur a cost when they consume processed food. Second, defining marginal cost to be based upon consumers' assessment of the product's net nutrition quality allows a more direct view of the effect of exaggerated product claim as only one curve is impacted if taste is sustained.

Figure 3.4: Consumers' Marginal Costs³⁰ and Marginal Benefits when Purchasing a Product with an Exaggerated Product Claim



In the case of an exaggerated product claim, due to the factors previously discussed, consumers incorrectly assess the product as having more of the high quality and healthier nutrients and the same or less of lower quality and less-healthy nutrients and thus overestimate both the product quality and reduction in marginal cost. Thus, as illustrated in Figure 3.4, given the same marginal benefit (MB) and the new reduced marginal cost (MC3) of consuming the processed food product, consumers will purchase and consume higher amounts of this product (Q3).

However, if consumers were able to more accurately assess the product with the exaggerated product claim as offering more of both the high quality and healthier nutrients and lower quality and less-healthy nutrients, then the product quality assessment would be lower and the marginal cost higher (MC2). As illustrated in Figure 3.4, given the same marginal benefit (MB) and the more accurate higher marginal cost (MC2) of consuming the processed food product, consumers should instead be purchasing and consuming lower quantities of this product (Q2).

Therefore, using the marginal benefits-marginal cost theory, market failure due to asymmetric information occurs if consumers incorrectly overestimate a products' quality and over-consume Q3-Q2 (See Figure 3.4) because they are unable to assess the quality of products with exaggerated product claims. This over-assessment leads to resources being allocated to the production of the suboptimal exaggerated claim product.

³⁰ Marginal cost reductions cause the MC line to shift down and to the right. Examples of MC reduction include product having lower levels of a less-healthy nutrient or higher levels of a healthy nutrient. However, it may also involve over assessment of product quality by determining that the product has more of only the healthy nutrients and the same or less less-healthy nutrient when in fact it is a product with an exaggerated product claim.

3.4 Multi-Method Research Design

The multi-method approach involves the application of both qualitative and quantitative research methodology to the overall question of market failure potential. The very different epistemology of these approaches and influence that epistemology has on research questions and process raises a concern. The qualitative approach is based on a naturalistic or constructivist view, focusing on understanding and exploring the meanings people give to their world and experiences. In contrast, the quantitative approach is based on the post-positivist view that focuses on the use of the scientific method (e.g., observation and measurement). Concerns regarding conflicting epistemology can be offset by adopting a pragmatic perspective (Brewer & Hunter, 2006; Morgan, 2007; Onwuegbuzie & Leech, 2006; Teddlie & Tashakkori, 2009). This dissertation utilizes a pragmatic perspective, allowing a practical application of methodologies that focus on the overall and sub-questions.

3.4.1. Rationale for Using a Multi-Method Research Design

The general reasons for conducting multi-method research include the richer data and more encompassing conclusions that result from the application of both qualitative and quantitative methods (Casebeer & Verhoef, 1997; Creswell & Plano, 2007). More specifically, the rationale for using the multi-method approach for this study includes the following reasons.

First, the research area of consumer and food manufacturer decision making is multi-faceted, involves dynamic market and individual factors and thus warrants an equally broad range of methodological approaches (Casebeer and Verhoef, 1997; Curry, Shield & Wetle, 2006). In particular, the multi-method research design adds value to this research topic because it supports the following: i) modeling of a firm's strategic behavior using quantitative methods (stage 1); ii) exploration of the consumers' product quality assessment using qualitative methods (stage 2) and iii) examination of the overarching question of the potential of market failure in the industry through the merging of evidence from both methods (Creswell, 2007; Creswell & Plano, 2007; Marshall & Rossman, 1980; Murphy, 2005).

Second, the use of a multi-methodological approach allows the research questions and sub-questions to be addressed with the method of best fit. The qualitative and quantitative methods provide complementary and overlapping views to more fully answer the sub-questions and overall research question in this dissertation. Specifically, the quantitative method fits well in modeling and measuring the significant presence and nature of the exaggerated product claims in the marketplace (i.e., research question I and II) while the qualitative method fits well in describing and exploring consumers' utilization of the exaggerated product claims and on-package information in that same marketplace (i.e., research question III). In addition, the merging of data between the qualitative and quantitative stages provides a more comprehensive and complimentary approach to the research questions. For example, the multi-method approach allows the consumers' voice and context to be brought into the quantitative empirical

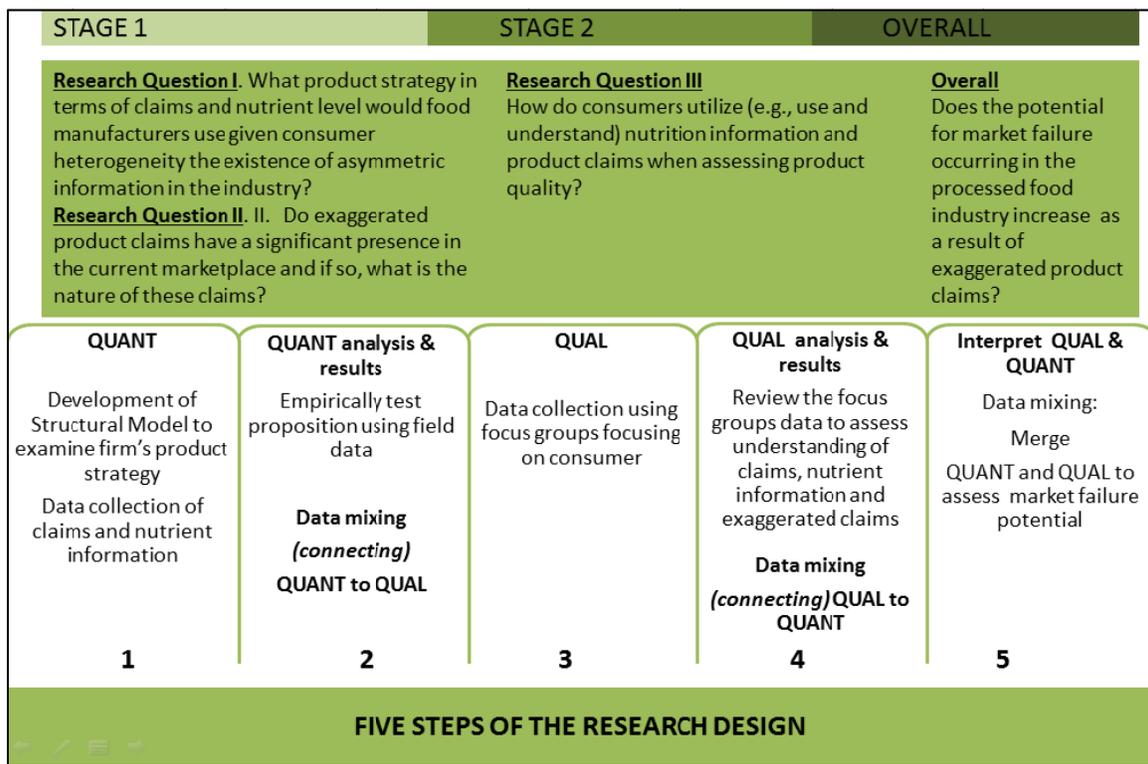
study (e.g., consumers' identification of organic and natural claims usage during focus groups prompts the review of these claims as exaggerated product claims). In addition, empirical results regarding exaggerated product claims can be brought to the focus group study (e.g., third party and saturated fat claims relationship) for closer examination.

The rationale and details of the economic model and empirical analysis are presented in Section 4.3. The rationale and details of the focus group data collection method and thematic analysis are provided in Section 5.4.1.

3.4.2. Overview of the Multi-Method Research Design

As illustrated in Figure 3.5, the research methodology used in this dissertation is a sequential two-stage multi-method research design.

Figure 3.5: Two-Stage Multi-Method Research Design



Stage 1

Stage 1 is a quantitative food manufacturer-focused inquiry that includes Step 1 and 2 of the research design. As illustrated in Figure 3.5, this stage addresses research sub-questions I and II. In Step 1, an extended vertical product differentiation structural model is used to review a monopoly firm's product strategy decision given exogenous consumer demand. The structural model is used to examine the food manufacturer's product strategy (i.e., claims messaging and nutrient level combinations) under various scenarios of consumer heterogeneity (i.e., differing combination and emphasis placed on the variables of

taste, claims usage and nutrient information usage). The details of this structural model and resulting product strategies are discussed in Section 4.3. As well, in this same step, the nutrition levels and claim(s) from the product package of over 1,600 food products are collected from grocery stores in the Vancouver metropolitan area.

Step 2 involves empirical examination of the firms' claim/no-claim product strategies using this data to review the significant presence and nature of exaggerated product claims in the marketplace. The details to this empirical analysis are provided in Section 4.7.

Stage 2

Stage 2 is a qualitative consumer-focused inquiry that includes Steps 3 and 4. Step 3 involves data collection via a set of eight focus groups at four locations in Vancouver, British Columbia. Step 4 involves thematic analysis to define the key categories and themes related to the main topics of utilization of claims, nutrition information and the factors influencing the use of these variables. As illustrated in Figure 3.5, this stage addresses research sub-question III.

Mixing of Preliminary Findings and Results

Mixing of the methods³¹ is an important part of the multi-method approach (Creswell, 1994; Creswell *et al.* 2004). In this dissertation, the specific data from the method are not mixed. Instead, the preliminary findings and results from the two methods are mixed in order support a stronger assessment of the potential for market failure. This mixing occurs in two forms: i) connecting the preliminary findings from the two methodologies with the purpose of informing the data collection and/or analysis of the alternative methodology and ii) merging each method's results in order to fully address the overall research question of market failure potential (Creswell & Plano, 2007).

The connecting of the preliminary findings will occur in Step 2 by having the qualitative data collection and analysis build on the results of the quantitative study. For example, specific illustrations of marketplace exaggerated product claims discovered through the empirical analysis are used as a platform for focus group discussions. Connecting will also occur in Step 4 when the qualitative focus group findings are further explored in the empirical analysis. For example, if focus group members identify organic claims as being influential in their product decision-making process, the relationship between organic claims and nutrient levels can be empirically examined using the product data. Merging, which is the second form of mixing, occurs in Step 5, when the results from each method are interpreted together to address the overall research question of market potential.

The specific methods used in Stage 1 and 2 are presented in CHAPTER 4 and CHAPTER 5, respectively.

³¹ Data mixing is a term used in the multi-method literature and refers to the connecting and merging of data, results and preliminary findings from different methods (Creswell & Plano, 2007).

CHAPTER 4 A Quantitative Examination of Food Manufacturers' Use of Exaggerated Product Claims in their Product Strategy

4.1 Introduction

Over the past twenty years, a large number of regulations associated with on-package information and voluntary claims have been introduced in the processed food sector. These regulations have played a major role in shaping the product strategy of firms in the processed food marketplace. The purpose of this chapter is to examine food manufacturers' claim versus no-claim product strategy and nutrient product strategy in the context of this dynamic marketplace. Throughout this chapter the term "product strategy" sometimes refers to the full range of product manufacturing and marketing decisions (e.g., during the review of the literature), sometimes refers to both the decision regarding nutrient content and the claim decision, and sometimes refers specifically to the claim decision (e.g., no claim, exaggerated claim or non-exaggerated claim). The specific meaning of "product strategy" will be obvious from the context of the discussion.

More specifically, Section 4.2 presents the two major research questions that serve as a basis for the selection of the economic model and empirical methodology. Section 4.3 provides an overview of select theoretical economic models and a set of industry-specific constraints, both of which are used to develop the structure of the economic model that is used in this chapter to examine food manufacturers' optimal exaggerated product claim and no-claim product strategy. In addition, this section presents the specific steps in the model's development. Section 4.4 describes the assumptions of the economic model as they pertain to consumer level utility and decision making, while Section 4.5 outlines the assumptions associated with the various components of the food manufacturers' decision-making process. Section 4.6 provides a general set of results and discussion regarding the conditions where the food manufacturer finds it optimal to produce the exaggerated claim version of the product. In the empirical analysis contained in Section 4.7, the product strategies of food manufacturing firms are examined quantitatively with the aim to measure the extent and nature of exaggerated product claims in the complex real-world marketplace. Finally, a discussion regarding the research questions and limitations of the approach are provided in Section 4.8.

4.2 Research Questions

The research questions associated with this stage of inquiry include the following: What product strategy in terms of exaggerated product claims and nutrient levels would a food manufacturer use given consumer demand and the existence of asymmetric information in the industry? (defined as Research Question I); and Do exaggerated product claims have a significant presence in the current marketplace,

and if so, what is the nature of these claims? (defined as Research Question II). Note that this second research question is equivalent to asking whether exaggerated claims as a fraction of total claims in the market place are a comparatively small or a comparatively large value.

As noted earlier, the quantitative approach fits well with these research questions as it provides insight to the firms' profit-maximizing product strategy through the modeling of the exaggerated product claims and measuring the extent and nature of such claims in the marketplace.

4.3 The Economic Model

This section provides an overview of the standard economic models used to review product strategy, description of the constraints facing firms when they develop product strategy, and the development process of the economic model.

4.3.1. Overview of Economic Theoretical Models used to Examine Firms' Product Strategy

Tirole (1988) provided a standard model of pricing with vertical product differentiation where consumers make purchase decisions based on price and a single quality variable. Shaked and Sutton (1983) extended the model to include more than one firm. They found that when vertical differentiation is used to counter price competition, firms supply products exhibiting the extremes of quality. Tirole and Wauthy both showed that final product choice is affected not just by quality, but by demand-side factors including income, price and other consumer choice variables (Tirole, 1988; Wauthy, 1996). Mussa and Rosen (1978) showed that when a monopolist faces consumers who are heterogeneous in their willingness to pay for quality, the firm will in general, offer a range of differentiated products. Lauga and Ofek (2011) indicated the importance of cost in a firm's differentiation strategy involving two attributes, showing that if the cost of providing quality is not too high, then firm will focus strategies on one attribute and select either extreme high or low quality on the other attribute. Vandenbosch and Weingarten (1995) indicated that firms in a competitive setting will select a position which will represent maximum differentiation on one attribute and minimum attribute on another. Rhee (1996) found that when consumers' consideration of price, quality and heterogeneous unobservable attributes are included into a model of competition, product differentiation is minimal. However, they also found that when heterogeneous unobservable attributes were minimized, quality differentiation increased.

In addition to product differentiation, economists also consider the influence of advertising on firms' product strategy by incorporating advertising expenditures into models of competition. There is a great deal of literature dealing with advertising effects on both firms and consumers, but the focus here is the effects of advertising on demand or market power. Trembley and Polasky (2002) showed that advertising can create subjective distance between differentiated products in the mind of consumers even when there is

little difference in the product. This distance has the effect of increasing market power and decreasing price competition between firms. Verma (1980) asserted that advertising provides information and thus acts as a search cost savings to consumers and increases demand. This effect on demand is separate from the effect of advertising on influencing consumers' taste and preferences toward the product. Ford et al. (1990) examined skepticism of advertising associated with search, experience and credence goods³² and found that consumers are least skeptical of advertising claims about search goods and most skeptical about advertising claims about credence goods. Views regarding advertising claims and experience goods were closer to credence than search goods. Ippolito and Mathios (1990, 1991) studied the consumption effects of health benefit advertising in the cereal sector. Their research found that advertising acts as an important source of information to change consumers' behavior and effectively lower the search costs for broad segments of the population (Ippolito & Mathios, 1990, 1991). Several studies have illustrated that there is a revenue gain from using a health claim on product having credence attributes or otherwise difficult to verify attributes (Herath *et al.*, 2007; Herath *et al.*, 2008).

The economic model developed in this dissertation incorporates a standard monopoly model of pricing with vertical product differentiation (Tirole, 1988; Wauthy, 1996). The base model is adapted for use by adding a health messaging component, increasing the number of consumer decision dimensions and solving the model in one stage, similar to that in the optimal advertising literature (Ippolito & Mathios, 1990, 1993).

4.3.2. Product Strategy Constraints Facing Firms

Food manufacturers have an incentive to provide claims highlighting positive health benefits and high quality nutrients if they believe that such a claim will differentiate their processed food product from competitors, and thus increase their profits by inducing more consumers to purchase their products at a higher price. However, in order to use a claim, firms must ensure that the product meets regulated nutrient levels associated with that claim (e.g., products with "high fibre" claims must contain the regulated level of fibre). In addition to this regulated claim nutrient level, food manufacturers face various product matrix/taste, cost and consumer demand constraints when developing their product strategy. These constraints are discussed below.

First, the product matrix/taste³³ requirements limit and increase the complexity of the firm's claim offering product strategy. Specifically, introducing claims often involves changing levels of healthy or less-

³² In economics, products are categorized as search, experience or credence goods. Search goods are goods where characteristics of the product can be obtained prior to purchase (e.g., frozen peas). Experience goods are goods where the product characteristics such as taste are not known until the product is consumed (e.g., apples). Credence goods are products that promise future nutrition or health benefits that cannot be accurately assessed even after consumption or in the future (e.g., orange juice with a health claim of "*Calcium aids in the formation and maintenance of bones and teeth*").

³³ Recall that the product matrix/taste variable includes more than the product palatability by encompassing product features such as packaging, best before dates, environmental, sustainability and ethical issues.

healthy nutrients in order to support claim usage. In many cases, in order to maintain product matrix/taste requirements, a change in one particular nutrient requires offsetting nutrient adjustments, which in turn creates a secondary effect from use of the original claim. For example, if a healthy nutrient (e.g., fibre) is added it may reduce the texture of the product and in order to offset the loss of consumer appeal that results from the lower texture, more of a less-healthy nutrient (e.g., sugar or fat) may be required.

Second, cost is a strategic consideration because higher quality nutrients are generally more costly than lower quality nutrients. This cost differential implies that overall product cost will typically increase when higher quality nutrients are added to a product to support claim usage. Firms must decide whether to absorb the higher product cost when a claim is made or substitute lower quality nutrients in order to lower the cost toward the no-claim level. Adding to the example above, if a healthy nutrient (e.g., fiber) and thus more of a less-healthy nutrient (e.g., fat) is required to maintain a specific taste for the product, the firm could choose to use a high quality-high cost fat or a low quality-low cost fat (e.g., hydrogenated fat that is high in trans fat).

Finally, a key constraint to the firms' product strategy regarding nutrient levels and voluntary claim usage is the consumers' ability to utilize claims and nutrient information when making product assessments. As discussed earlier, consumers are heterogeneous in their demand and utilization of on-package nutrition (See Section 3.2 and 3.3.1). For example, consumers can use information and yet not understand it. The extent to which consumers are effectively able to utilize on-package information is an important consideration for food manufacturers. For example, the product strategies of food manufacturers regarding claims and nutrient amount will be very different if consumers assess product quality solely using claims versus fully utilizing both claims and all other on-package nutrition information.

The economic model developed in this dissertation incorporates a simplified version of the constraints faced by firms as described above. Moreover, the model integrates various simplifying assumptions regarding marginal cost, product matrix/taste restrictions, exaggerated product claim and no-claim product versions and fixed costs. These assumptions reduce the model's complexity while highlighting the main trade-off facing firms when choosing to make a product with or without an exaggerated claim. Most importantly, the model incorporates the various incentives and cost trade-offs that firms face when identifying which claims and specific nutrients will increase product sales and maximize profit under various scenarios of consumer demand. Although consumer demand is exogenous in the model, the nature of consumer demand is complex because product selection decisions are based on multiple product attributes and consumers form distinct groups that are differentiated according to consumers' varying ability to utilize food product information. Firms are assumed to follow regulations for claim usage (i.e., the issue of compliance is not considered in the analysis). Product matrix/taste requirements are brought into the model through the specification of taste and nutrient level trade-offs. Product costs are included and used to determine the profit-maximizing price.

4.3.3. Development of the Model

In the standard vertical differentiation model, consumers make purchase decisions based on price and a single quality variable (Tirole, 1988). In this analysis, consumers use three product quality attributes in their decision-making process: (i) taste³⁴; (ii) the level of nutritional “good” such as fibre; and (iii) the level of nutritional “poor” such as saturated fat. The objective of the model is to examine a firm’s product strategy in terms of claims and nutrient mix given consumer demand and the existence of asymmetric information in the industry.

This model is developed as follows:

- i. Derive individual and aggregate consumer demand based upon consumers making utility-maximizing product purchase assessments and decisions.
- ii. Specify the assumptions and decision options for a monopoly food manufacturer.
- iii. Determine the profit-maximizing price and quantity for the food manufacturer using marginal revenue (MR) = marginal cost (MC) and the aggregate demand from step (1).
- iv. Determine the optimized profit for the food manufacturer by substituting the profit-maximizing price and quantity from step (3) into the monopolist’s profit equation (i.e., total revenue less total cost equation).
- v. Determine the product version to be launched by comparing the optimized profits of claim and no-claim versions of the product and selecting the version with the highest profit. An illustrative example is provided.
- vi. Examine the sensitivity of the results by presenting an illustrative example and generalized results to review how a firm’s product strategy regarding claim and no-claim product version offerings change with different assumptions about the segmentation of consumer demand and restrictions on the nutrient mix.

4.4 Consumers

4.4.1. Individual Consumer Demand

This section specifies an individual consumer’s utility equation and describes the assumptions that define how the consumer makes the decision to either buy or not buy the product on offer. The individual utility equation that underlies individual consumer demand is based upon the following assumptions:

1. A consumer’s goal is to maximize utility. Consumers obtain utility based on the levels of four product attributes: taste (S), price (P), level of nutritional good (G) and level of nutritional poor (B). In the claim version of the product, nutritional good levels are messaged as a FOP claim while the level of

³⁴ The taste variable includes more than the product palatability encompassing such product features as packaging, best before dates, environmental, sustainability and ethical issues.

nutritional poor is specified on the mandatory nutrition facts label, which resides on the side or back of the package. As noted earlier, in addition to product palatability, the taste variable includes a variety of features such as type of packaging, best before date, perceived environmental sustainability and specific ethical attributes. An increase in the level of nutritional good refers to more of a “good” nutrient (e.g., fibre, protein) or less of a “poor” nutrient (e.g., trans fat or sodium). In contrast, an increase in the level of nutritional poor includes more of a “poor” nutrient or less of a “good” nutrient. Consumers observe all variables prior to making their purchase decisions.

2. Consumer heterogeneity is defined by the different weights that individual consumers place on three of the food product attributes: a is the weight on taste (S); b is the weight on nutritional good (G); and c is the weight on nutritional poor (B). Each individual consumer is defined by a unique combination of values for the a , b and c variables. All three of these variables are assumed to take on positive values. A positive value for c implies a negative value for the B parameter because the nutritional poor are assumed to reduce a consumer’s level of utility. The attribute of Price (P) has a weight of 1 for all consumers and thus is not uniquely weighted for each consumer.³⁵ Thus, consumer utility (U) can be expressed as follows:

$$U = aS + bG + cB - P$$

3. Each consumer must purchase either a processed food product or a base good (i.e., numeraire good). This base good can be considered a non-processed food. For example, if frozen pizza is the processed good then the base good may be a make-your-own pizza. Consumers choose between the processed food product and the base good by considering the utility from each good as follows:

$$\text{Processed food product} \rightarrow aS + bG + cB - P$$

$$\text{Base good} \rightarrow k \text{ (reservation utility level)}$$

³⁵ As noted earlier in Section 3.3.1, consumers are multi-dimensional in that they use multiple variables to make product selections. As well, consumers are different from each other since different consumers place different weights on these decision variables. The weight placed on price is assumed to be the same for all consumers (i.e., price is not uniquely weighted) in order to simplify the model to a three dimensional format. The weight on price is set equal to 1 as a form of model normalization. In other words, setting the weight on price equal to 1 rather than another value has no impact on the analysis because if the weight on price is assumed to be lower or higher the weights on the other decision variables can be scaled proportionately so that the relative importance of price in the overall decision making process remains unaffected. Keep in mind that price is fixed from the perspective of decision-making consumers. Later in the analysis, the firm is allowed to vary price in order to identify the total number of consumers who will choose to purchase the processed food product for different values of P, thus defining the aggregate demand curve.

4. Consumers purchase the processed food product if utility from their purchase is greater than the reservation utility of k . More formally, the processed food product “buy” decision is implied by:

$$(4-1) \quad aS + bG + cB - P \geq k$$

The utility equation (4-1) provides an implicit expression for individual consumer demand. In the simulation results presented below the value of k is set equal to zero. This is another form of model normalization because the values of S , G , B and P can always be scaled up and down proportionately such that the overall demand schedule has realistic properties when $k = 0$.

4.4.2. The Aggregate Consumer Demand

To expand beyond the individual consumer to a market level scenario it is necessary to specify the distribution functions for the a , b and c parameters which define a unique level of utility for each consumer and then count the number of consumers who are in a buy position. Aggregate consumer demand will slope down with respect to the market price (P) of the product because for each value of P , there is a set of consumers who are close to being indifferent between purchasing and not purchasing the product, and so a small increase in P will tip this subset of consumers toward the no-buy option.

As was discussed above, differences in the a , b and c parameters for individual consumers define consumer heterogeneity within the aggregate demand schedule. In addition to this basic heterogeneity, the population of consumers is assumed to be segmented into two groups based on a specific categorization of the a , b and c parameters. Segment 1 consumers, who are assumed “full utilizers of product information,” are not susceptible to exaggerated product claims, whereas segment 2 consumers, who are assumed “partial utilizers of product information,” are susceptible to exaggerated product claims. This segmentation allows the impact of different relative sizes of the two distinct consumer groups on the firm’s optimal product strategy to be analyzed.

With these assumptions about consumer heterogeneity and segmentation in place, the specification of aggregate consumer demand can be described as follows:

1. Consumer segments are sorted into one of the two segments based upon their utilization of the four food product attributes:

Segment 1 (full utilizers) → consumers use $\{S, P, G, B\}$ in their decision making

Segment 2 (partial utilizers) → consumers use $\{S, P, G\}$ in their decision making

In other words, consumers self-select into one of these two segments based upon their utilization of the four food product attributes (i.e., S , P , G and B).

Notice that consumers in Segment 1 are assumed to utilize all four variables when making purchase decisions, which implies using and understanding information about both the nutritional good (G) promoted on the FOP claim and the nutritional poor (B) stated on the NFL. Consumers in Segment 2 are the same except they do not consider or are unable to utilize nutrition information related to B

(found only on the mandatory NFL) in their decision making. This segmentation occurs for a variety of reasons including competing health concerns, low education, low literacy, social or cultural vulnerabilities, marginalization features (elderly or low income), time limitations and distractions.

Segment 2 consumers are formally incorporated into the model by assuming $c = 0$ (recall that c is the weight on the B variable in a consumer's utility function). Perhaps a more appropriate assumption is that Segment 2 consumers actually care about unhealthy nutrients (i.e., $c > 0$) but they are unable or unwilling to identify the value of B regardless of whether or not the NFL is actually read (in effect, Segment 2 consumers believe $B = 0$). This latter assumption appears to be more consistent with the results of the qualitative analysis in Chapter 5 than is the first assumption. Nevertheless, both assumptions give similar outcomes and thus the first assumption is maintained because it is easier to incorporate into the model.

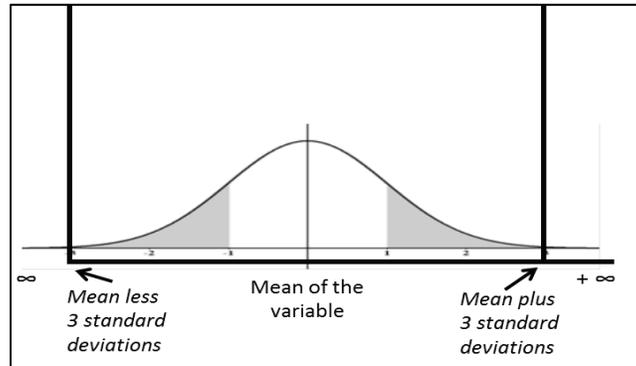
Note that in addition to these two segments, the real world is likely to feature consumers who make purchase decisions using only price and/or taste. These consumers are not included in the model because they would simply add a constant value to aggregate market demand and as such, inclusion of such consumers in the model would not add any insight into the firm's decision regarding the claim.

2. The total consumer population (N) is the sum of the consumers in segment 1 (n_1) and in segment 2 (n_2). In the simulation results, N is set equal to 100 so that the percentage of consumers in segment 1 is $n_1 = N - n_2$ and the percentage of consumers in segment 2 is n_2 .
3. As noted earlier, consumers each place a unique value (i.e., a , b , and c) on the parameters of S , G and B . The utility parameters (a , b and c) are assumed to be distributed across consumers in order to create a heterogeneous population of consumers. More specifically, a , b , and c are assumed to each be normally distributed with a lower and upper truncation. Assuming a truncated normal distribution ensures that a , b and c take on only positive values and that the relative density of consumers is highest near the mean and lowest in the tails of the distribution. The process of truncation is detailed below.

As illustrated in Figure 4.1, the range of a normal distribution is from negative infinity to positive infinity. However, since negative values for the variables of a , b and c are undesirable it makes sense to choose the means of these three variables large enough to ensure that almost all values for a , b and c are above zero. This can be accomplished by choosing values for the mean and standard deviation of each normal distribution such that the mean minus three standard deviations is approximately equal to zero. Three standard deviations was chosen because for the normal distribution the mean plus and minus three standard deviations results in fewer than 0.3% (100-99.7%) of consumers who are excluded from the analysis by imposing a lower and upper truncation. Thus, this truncation specifies that values greater than 0 to be included in the model without leaving out any

large number of cases. In addition, referring to Figure 4.1, using the normal distribution indicates that there are more consumers with values of a , b , and c closer to the mean than at extreme values.

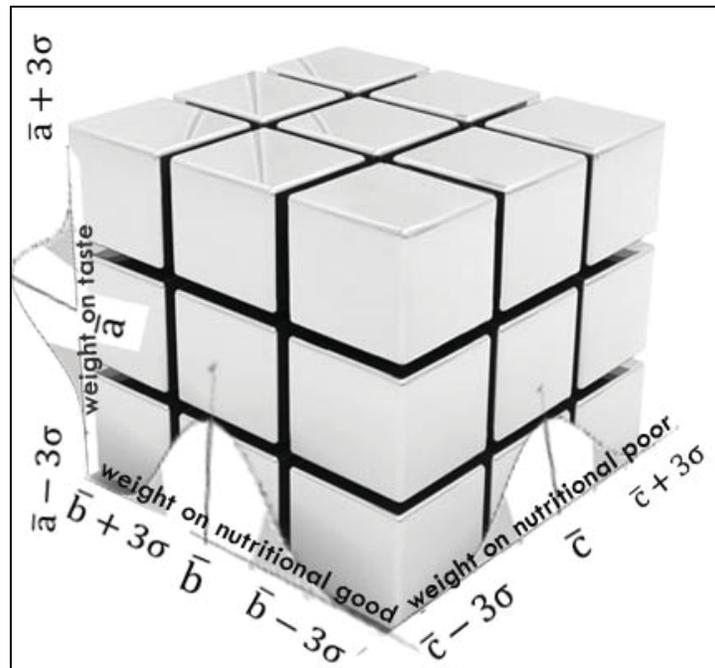
Figure 4.1: Normal Distribution of a , b , and c Utility Parameters



4. The specific steps for deriving the aggregate consumer demand schedule for Segment 1 consumers include:
 - i. Define values for G , B , P and S , and starting values for a , b , and c . These values are calibrated to ensure a reasonable level of aggregate demand over a range of feasible values for a , b , and c . For example, if a , b , and c are altered by twenty percent above or below the starting value for these variables there should still be a reasonable mix of consumers who choose to purchase and not purchase the product.
 - ii. Calculate the fraction of consumers from Segment 1 who purchase the processed product given the pre-defined values of G , P , B and S .³⁶ Specifically:
 - a. Use a cube to represent the total pool of consumer: The range of a , b and c values and the distribution of consumers within that range are illustrated Figure 4.2.

³⁶ A program written using R (R, 2013) is used to calculate the fraction of consumers who purchase the processed food product as explained in the steps a, b and c. The specific program code for R is provided in Appendix A.

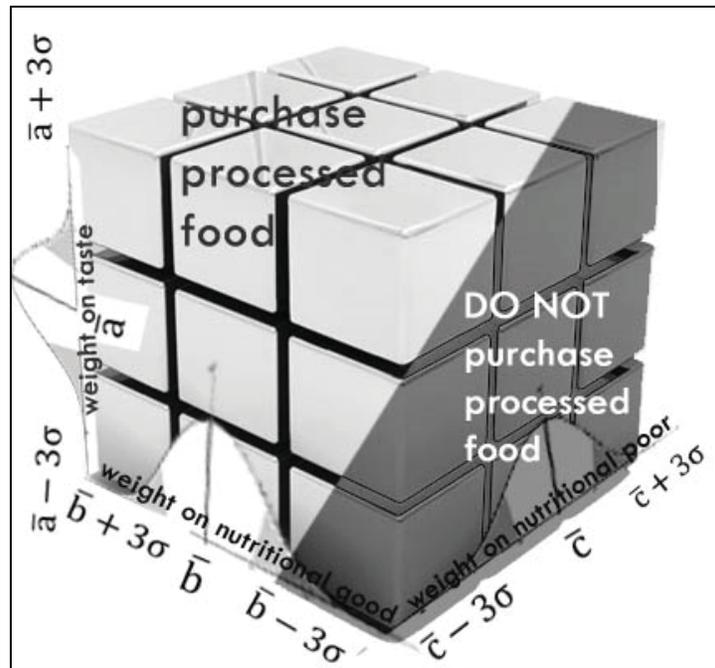
Figure 4.2: Cube representing Total Pool of Consumers



The top left corner of the cube, which represents the maximum values for a and b , and the minimum values for c , identifies the consumer who obtains the highest feasible level of utility and thus the consumer who will definitely purchase the processed food product. In contrast, the bottom right corner of the cube, which represents the minimum values for a and b and the maximum values for c , identifies the consumer with the lowest utility and thus the consumer who will definitely not purchase the processed product. Therefore, regions in the upper, back and left area of the cube are areas of high utility where processed food is purchased. The opposite is true for regions in the lower, front and right areas of the cube.

- b. Calculate the number of consumers who purchase over all combinations of a , b , and c : For a specific set of values for S , P , G , and B , use equation (4-1) to define a two dimensional plane that cuts through the cube on each axis where the area above the plane defines which consumers purchase the processed food product (i.e., $U(S, P, G, B) \geq 0$). As illustrated in Figure 4.3, consumers who place a relatively high value on G and S and a relatively low value on B will purchase the processed food product as opposed to the base good.

Figure 4.3: Cube representing the Proportion of Consumers Purchasing the Processed Food



To improve accuracy of the calculation the main cube is split into a large number of smaller cubes -- the smaller cubes above the plane (i.e., light shaded area) represent those consumers who choose to purchase processed food. Sufficiently small cubes are used in the analysis to ensure that there are a minimal number of partial cubes on the division plane, which defines the areas of buy and no-buy. Once the number of cubes has been defined, the number of consumers per cube is determined by applying the distribution associated with the values of a , b , and c from the normal distribution (i.e., low and high values have small number of consumers).³⁷ Then the total number of consumers buying the processed food at those specific values for S , G , P , and B is obtained by summing the consumer numbers in that area of the cube.

- c. For a given set of values for G , S and B vary P over a range of feasible values and for each value of P repeat the calculations in part (b). This procedure will identify the total number of consumers who will choose to purchase the processed food product for different values of P , thus defining the aggregate demand curve.

³⁷ This is accomplished by inserting the specific set of a , b and c values that define a particular small cube into the three-dimensional normal distribution and noting that the value returned by the function multiplied by w^3 (w is the width of the cube) is equal to the number of consumers who are associated with that particular small cube. Then the total number of consumers buying the processed food at the pre-defined values for S , G , P , and B is obtained by summing the consumer count values over all small cubes that reside in the buy area of the main cube (See Appendix A for the code for the R software program).

5. The aggregate market demand schedule, which was derived in part (3c), consists of a large number of price – quantity pairs rather than an explicit demand schedule.³⁸ This implicit demand schedule is relevant for Segment 1 consumers who use S, G, P and B in their decision-making process.

An equivalent aggregate demand schedule can be derived for Segment 2 consumers by repeating the above steps assuming $c = 0$, thus eliminating the B parameter from the calculations. The potential reasons for Segment 2 consumers not using B are discussed earlier in Section 4.4.2. In this case, the buy and no-buy regions can be identified on a two-dimensional plane rather than a three-dimensional cube. Aggregate demand for Segments 1 and 2 must be added together to generate total market demand facing the food manufacturer.

4.5 Food Manufacturer

This section describes the various assumptions associated with the food manufacturers' decision-making process.

4.5.1. Assumptions

1. A profit-maximizing monopolist food manufacturer must make a strategic decision regarding a product launch of either an exaggerated product claim or a no-claim version of a product. The firm will produce one product.
2. Products have four product attributes: taste (S), price (P), level of nutritional good (G) and level of nutritional poor (B). The values of G and B, which define the product, will depend on whether the product is produced with or without the claim. In the claim version of the product, nutritional good levels are messaged as a FOP claim. The firm is assumed to keep the same value of S regardless of the product version (more discussion about this assumption is provided below).

If the product is produced with a claim then it must have a relatively high level of nutritional good (by assumption, the claim specifies an increase in the level of the good attribute rather than specifying a reduction in the level of the poor attribute). However, because the firm wants S to be the same as the no-claim product, it must increase the level of nutritional poor to offset the reduction in taste that comes with the higher level of nutritional good. For example, if fibre is added to a product to support a FOP claim, this may reduce the taste of the product. In this case, the firm may choose to add more sugar to the product to bring the taste back to the no-claim level. This particular strategy implies an

³⁸ The aggregate market demand schedule is derived as follows: i) a program written with the R software is used to calculate the total units purchased by consumers in Segment 1 and 2 for a claim product and no-claim product for a sequence of prices ranging from \$2 to \$4 (as described earlier in Step 4 in Section 4.4.2 and detailed in Appendix A); and ii) after defining the proportion of consumers in each segment (n_1, n_2), Microsoft Excel is used to calculate total demand by summing quantity demanded from each segment (See Appendix B).

exaggerated product claim because the product has higher levels of both the nutritional poor and the nutritional good attributes but only the higher level of the nutritional good attribute is noted in the FOP claim.

A more specific description of the exaggerated product claim decision-making process is as follows:

- First, firm managers determine that a claim product has the potential for increased sales.
 - Second, managers request that the firm's food engineers develop a claim and no-claim version of the product, and marketing personnel estimate consumer demand for each version of the product. The food engineer defines the G , B and S for the no-claim version of the product and then defines the claimed product's required level of G . This required G depends on the claim regulations and the level of B that maintains product taste given the product matrix/taste restrictions. Marketing personnel will segment the market based on the variables that consumer use for product selection and then determine the size of these segments (e.g., n_2 using P , S and G).
 - Third, food engineers provide their calculated values of G and B for the claim and no-claim versions of the product, and marketing personnel provide their calculated sizes of the two consumer market segments to the firm managers. Managers then calculate the profit potential of each product and select the version of the product with the highest profit.
3. Marginal costs are assumed the same for both the exaggerated product claim and no-claim versions of the product. Marginal costs are also assumed constant with respect to the quantity produced. Fixed costs are not included in the model.
 4. The monopolist firm faces an exogenous consumer demand, which was described in Section 4.4.2. It is important to note that consumer demand is different for the exaggerated product claim and no-claim versions of the product because each version has a unique combination of G and B , and consumer demand for the product depends on the specific values of G and B .

4.5.2. Profit-Maximizing Price and Profit

After the version of the product has been chosen, the firm chooses the optimal quantity to sell by continuing to increase sales until marginal revenue is equal to marginal cost. Marginal revenue, which is the change in total revenue if one more unit of the food product is sold, is derived from the consumer aggregate demand schedule. Marginal revenue declines with higher sales because price must be lowered to attract customers for the additional sales. Choosing the quantity of sales such that the revenue from the last unit sold is equal to the cost of producing the last unit ensures that profit is at a maximum. The profit-

maximizing price is then determined by substituting this profit-maximizing quantity into the aggregate demand schedule.

With the profit maximizing quantity and price defined, it is straightforward to calculate the level of maximized profits. The firm's optimized profit function can be expressed as follows:

$$\begin{aligned} (4-2) \quad \text{Profit } (\pi) &= \text{Total Revenue} - \text{Total Cost} \\ &= (\text{Profit-maximizing price } (P^*) - \text{Marginal Cost } (MC)) \times \text{Quantity } (Q^{*39}) \end{aligned}$$

First, note that profit is equal to revenue minus variable cost minus fixed cost. Revenue is equal to quantity multiplied by price and variable cost is equal to quantity multiplied by marginal cost. Note that variable cost is normally calculated as quantity multiplied by average variable cost but with the assumption that marginal cost does not change with output it is acceptable to calculate variable cost as the product of quantity and marginal cost. The level of fixed costs does not influence the firm's decision regarding which version of the product to sell and so it can be ignored in the analysis. Using this procedure, the optimal level of profit can be calculated and compared for the exaggerated product claim and no-claim version of the product. Whichever version gives rise to the highest profits will be the one chosen by the firm.

4.5.3. Product Strategy Selection: An Illustrative Example

This section provides an illustrative example of how the firm chooses between offering the exaggerated product claim and no-claim version of the product. As discussed earlier in Section 3.3.1, a firm's decision-making process is conducted in two stages. In stage one, the firm develops a claim and no-claim version of the product. In stage two, the profit-maximizing price, quantity and profit are calculated for each version, the latter of which is used to select the version to be produced. The specific levels of G, S, and B in the no-claim version is pre-determined (i.e., exogenous to the analysis). The firm specifies the levels of G, S and B for the claim product in light of exogenous labelling regulations (i.e., minimum levels of G) and product matrix/taste (i.e., B must be adjusted to ensure that the claim and no-claim versions should have the same level of S). Thus, the two product versions that can potentially be supplied by the firm have the same level of S but different levels of G and B. Claim products have more of both G and B than the no-claim product. Consequently, in this analysis all claims are exaggerated.

The next step is to attach numerical values to the various parameters to define the model. Because this is only an illustrative example, the reasons for selecting specific values and way in which the main results of the analysis are likely to change with different parameter values will not be discussed. It is

³⁹ Within equation (4.2) Q^* is the total number of consumers from segment 1 and 2 who choose to purchase the firm's product because utility is higher than that obtained from consuming the base good and P^* is the profit-maximizing price for the product.

sufficient to note that the parameter values used in this example give rise to a market equilibrium outcome that is both reasonable and allows for a wide range of changes in the various parameters as part of the sensitivity analysis. The specific parameter values for this illustrative example are displayed in Table 4.1.

Table 4.1: Parameter Values for Illustrative Example

Symbol	Description	Value for No-claim Product	Value for Claim Product
k	Reservation utility of base good for all consumers	0	0
MC	Marginal Cost	2.25	2.25
G	Level of nutritional good	2.00	2.50
B	Level of nutritional poor	-1.50	-3.00
S	Taste	1.00	1.00
P	Price	Ranging from 2.00 to 4.00	Ranging from 2.00 to 4.00
n1	Percentage of consumer in Segment 1 (use {S, P, G, B} in their decision making)	75	75
n2	Percentage of consumers in Segment 2 (consumers that use {S, P, G} in their decision) making	25	25

Solving the simple example involves three steps. In step one, a program was written in R (Genz & Azzalini, 2011) in order to generate a large number of price – quantity pairs, which collectively represent the aggregate demand schedule. The process for generating the price – quantity pairs were discussed in Section 4.4.2, the code for the R program is contained in Appendix A and the parameter values for the R program come from Table 4.1.⁴⁰ Step two involves inputting the price – quantity pairs from the R program output into Microsoft Excel (Microsoft, 2010) and then using various programming procedures to generate a marginal revenue schedule for the claim and no claim versions of the product (See Appendix B for details). Finally, step three requires determining the profit-maximizing quantity and price as the point where marginal revenue is equal to the firm’s marginal cost, and then identifying the corresponding level of profit (See Appendix B for the details). The optimal strategy for the firm was identified by comparing the profit levels of the exaggerated product claim and no-claim versions.

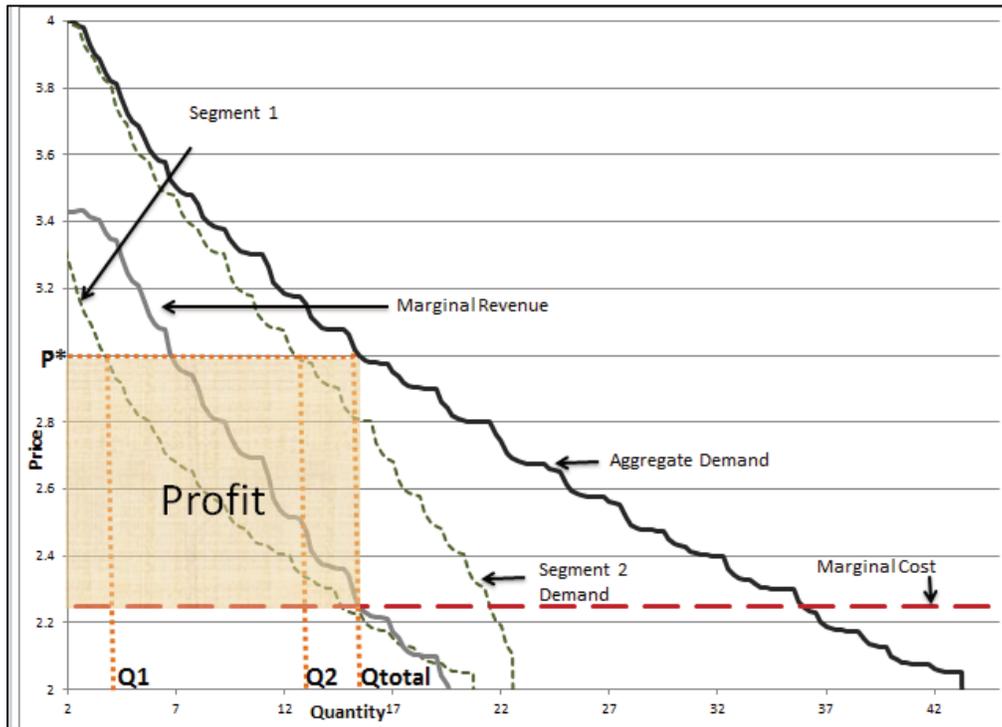
Figure 4.4 illustrates the aggregate demand schedules that were generated with the R program for Segment 1, Segment 2 and combined Segments 1 and 2 consumers for the no-claim product. Also shown in Figure 4.4 is the marginal revenue for combined demand (See Appendix B for the details).⁴¹ The

⁴⁰ The program was written in R rather than Microsoft Excel (Microsoft, 2010) because the multi-dimensional nature of consumer demand implies that tens of millions of calculations are necessary to calculate accurately the fraction of consumers who choose to purchase.

⁴¹ Revenue is the product of price and quantity. Price occurs in evenly spaced intervals but the quantity demanded and the revenue that is associated with each price are not evenly spaced because of the discrete counting procedure within the R program. The unevenness in the spacing gives rise to a very “jagged” marginal revenue schedule. To reduce the severity of these jags, the quantity variable was smoothed by regressing quantity on price, price squared and price cubed, and then using the fitted values for quantity and revenue rather than the actual values. Marginal revenue is then calculated as the change in fitted revenue divided by the change in fitted quantity demand when moving from one price increment to the next. See Appendix B for the details.

intersection of the marginal revenue and marginal cost identifies the profit-maximizing price (P^*).⁴² At this price, consumers in Segment 1 will purchase Q_1 , consumers in Segment 2 will purchase Q_2 and consumer aggregate demand will be Q_{total} . The profits earned by the firm if it chooses to offer the no-claim version of the product is shown as the shaded profit area in Figure 4.4

Figure 4.4: Aggregate Demand Schedule, Marginal Revenue, Marginal Cost and Profit for the No-Claim Product¹



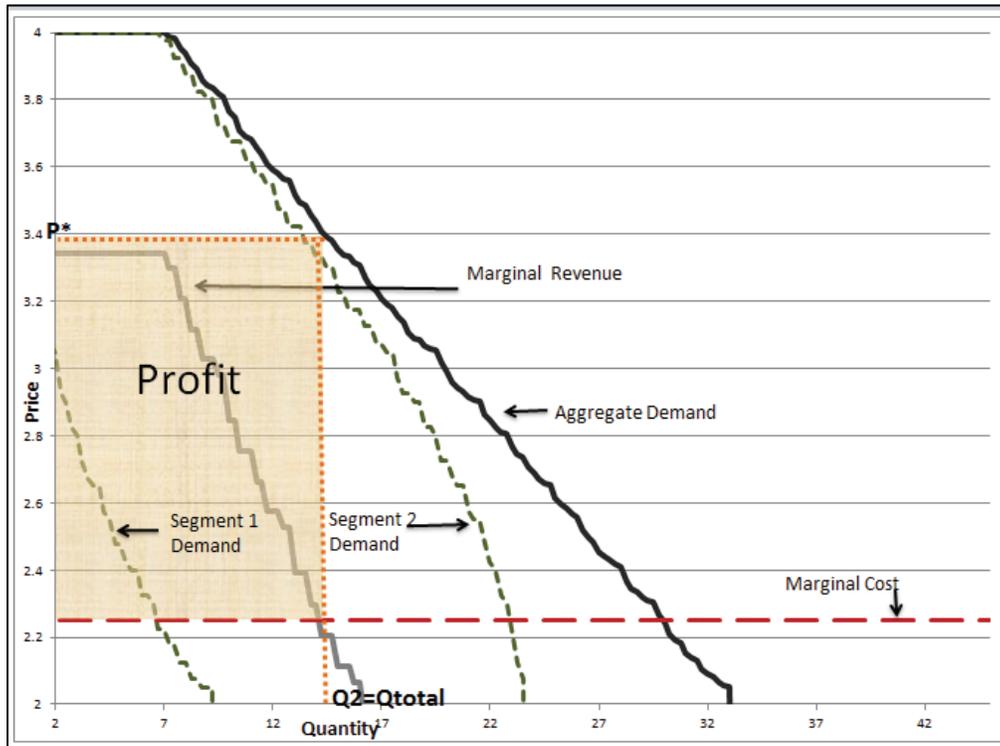
For the no-claim scenario: Marginal Cost = 2.25, $G = 2.00$, $B = -1.50$, $n_1 = 75\%$ and $n_2 = 25\%$.

Figure 4.5 is the same as Figure 4.4, except that it is relevant for the case where the exaggerated product claim version of the product is sold. Note that the demand curve for Segment 1 has shifted left relative to the no-claim product. This shift occurs because the exaggerated product claim version has a higher value of G but also a higher value of B that the Segment 1 consumers do not desire. In reaction to these values, the quantity demand from Segment 1 consumers decreases at each price level. In contrast, the demand curve for Segment 2 shifts to the right relative to the no-claim product because the exaggerated product claim product has more G , which the Segment 2 consumers value, and by assumption the higher level of B does not affect demand by Segment 2 consumers. In this example, the demand schedule for

⁴² Graphing the various schedules is complicated by the fact that the data is generated with price as the exogenous variable and quantity demanded as the endogenous variable but graphing requires the opposite format. To solve this problem an Excel Lookup function procedure was used to find the demand price and marginal revenue values that corresponded to a set of equally spaced quantity values. Exponential smoothing with the dampening factor was used to smooth out the jaggedness of the schedules that result from the lookup procedure. See Appendix B for the details.

Segment 1 consumers and the optimal price, P^* , is such that Segment 1 consumers choose to purchase zero units of the claim product. Thus, all the demand for the exaggerated product claim version comes from the consumers in Segment 2, who are not deterred from purchasing the product by the higher level of B. The shaded area within Figure 4.5 shows the level of profits that can be earned by the firm if it chooses to offer the exaggerated product claim version of the product.

Figure 4.5: Aggregate Demand Schedule, Marginal Revenue, Marginal Cost and Profit for the Exaggerated Product Claim Version ¹



1. For the exaggerated product claim scenario: Marginal Cost = 2.25, $G = 25\%$ higher than no-claim (2.50), $B = 100\%$ higher than the no-claim (-3.00), $n_1 = 75$ and $n_2 = 25$.

A comparison of Figures 4.4 and 4.5 illustrates the differential impact of the exaggerated product claim on consumers' demand and the firm's optimal price and profit. Notice that with the claim version, Segment 1 demand decreases, Segment 2 demand increases and the overall demand becomes less sensitive to price (i.e., steeper, which implies less elastic). The less elastic demand allows the firm to charge a higher price (P^*) for the exaggerated claim product. The higher price charged by the firm results in a higher profit for the claim version relative to the no-claim version of the product. Consequently, for this particular set of parameter values the firm will choose to offer the exaggerated product claim version of the product.

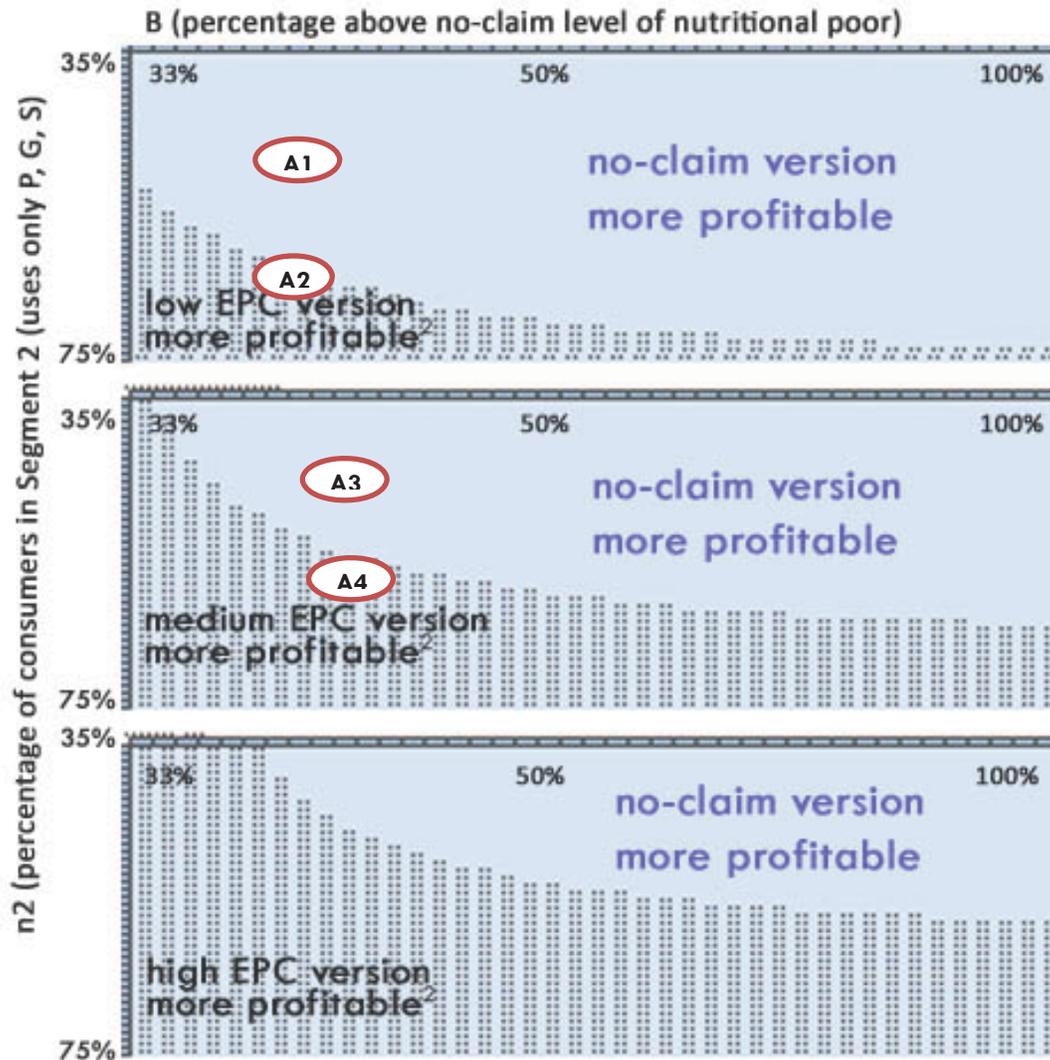
4.6 Generalizing the Results

This section provides a more general set of results concerning the conditions for which the food manufacturer finds it optimal to produce the claim version of the product. Again, as noted earlier, claim products have more of both G and B than the no-claim and thus the claims are exaggerated. Of particular interest is how the exaggerated product claim and no-claim decision varies with: (1) changes in the level of nutritional poor (B) that must be added to the claim version of the product to maintain taste; and (2) changes in the size of consumer Segment 2 consumers (n_2). These two elements are of particular interest because they incorporate the market-driven decisions of food manufacturing managers, food engineers and marketing personnel as they select exaggerated product claim and no-claim versions of the processed food products as part of their overall product strategy. Specifically, the level of B that must be added to preserve taste is a variable that is defined by the unique properties of the food product and thus is likely to vary considerably across product categories. The size of the Segment 2 consumer category, n_2 , is also expected to be important for the claim decision. Recall from the discussion in Section 4.4.2 that Segment 2 consumers will find the claim product relatively attractive because of the higher level of G and because the higher level of B does not affect their purchase decision. As noted in that same section, the percentage of Segment 2 consumers in the market is likely to vary widely across markets due to differences in variables including health, education, geographic location, literacy, social or cultural vulnerabilities and marginalization characteristics (elderly or low income).

The three product strategy profit charts in Figure 4.6 show the sensitivity of the exaggerated product claim and no-claim decision with respect to B^{claim} (horizontal axis) and n_2 (vertical axis). To generate a wide range of sensitivity results, n_2 is allowed to vary from a low of 35% (of total consumers) to a high of 75%, and the claim B value is allowed to vary from a low of 33% to a high of 100% above the no-claim B value. Figure 4.6 was constructed by comparing profits for the exaggerated product claim and no-claim versions of the product for all possible combinations of the B^{claim} and n_2 parameters while setting the values of the other parameters in the model (except for marginal cost and G^{claim}) equal to the values used for the illustrative example in the previous section (See Table 4.1).⁴³ The details and process associated with the firm's profit decision are described earlier in Section 4.5.3. The steps and Microsoft Excel spreadsheet used to develop the product strategy profit tables are detailed in Appendix C. The top diagram in corresponds to a relatively low value for G^{claim} (12.5 percent higher than $G^{\text{no-claim}}$), the middle diagram corresponds to medium value for G^{claim} (18.75 percent higher than $G^{\text{no-claim}}$) and the bottom diagram corresponds to a relatively high value for G^{claim} (25 percent higher than $G^{\text{no-claim}}$). These three diagrams correspond to a low, medium and high exaggerated product claims, respectively.

⁴³ Marginal cost for these profit charts is set at a constant of 0.5. The value of marginal cost in the earlier illustrative example was set at 2.25 to enhance the appearance of the graph.

Figure 4.6: Product Strategy Profit Tables used to Guide the Firm's Profit-Maximizing Exaggerated Product Claim (EPC) and No-Claim Product Decision



1. The no-claim product has Nutritional Good (G) = 2.0 and Nutritional Poor (B) = 1.5 values.
2. The low EPC product has G = 2.25 (12.5% above the no-claim value of G)
3. The Medium EPC product has G = 2.375 (18.75% above the no-claim value of G)
4. The high EPC product has G = 2.50 (25% above the no-claim value of G)
5. n2 refers to percentage of consumers in segment 2 (e.g., consumers using taste(S), price(P) and G in their decision making)

Within Figure 4.6 the upper right section of each chart with no fill (titled “no-claim”) represents the various n2 and B^{claim} combinations where the no-claim version of the product is more profitable than the claim version of the product. Conversely, the lower left section of each chart with solid fill (titled “EPC”) represents the various n2 and B^{claim} combinations where the exaggerated product claim version of the product is more profitable than the no-claim version. Note that the exaggerated product claim area

becomes larger when moving from the top diagram (low value of G^{claim} relative to $G^{\text{no-claim}}$) to the bottom diagram (high value of G^{claim} relative to $G^{\text{no-claim}}$). The reason for this is that the higher level of G^{claim} is attractive to both Segment 1 and Segment 2 consumers. If G^{claim} and B^{claim} are increased at the same time then Segment 2 consumers will always find the exaggerated product claim version of the product more attractive because Segment 2 consumers respond to changes in G^{claim} but not to changes in B^{claim} . On the other hand, Segment 1 consumers may respond positively or negatively to a simultaneous increase in G^{claim} and B^{claim} because for these consumers the increase in G^{claim} is desirable whereas the increase in B^{claim} is undesirable.

To illustrate how the profit chart can be used, suppose the food engineers indicate that they can produce a low exaggerated product claim version of a product within which G^{claim} is 12.5% above $G^{\text{no-claim}}$ and B^{claim} is 40% above $B^{\text{no-claim}}$. In addition, marketing personnel estimate that 40% of consumers in the market are in Segment 2. With these particular values, the firm finds itself situated at point A1 in Figure 4.6, which implies that the no-claim version of the product is more profitable for the firm than the exaggerated product claim version. However, if the marketing personnel revise their estimate of n_2 from 40% up to 65% (i.e., point A2 in Figure 4.6) then the exaggerated product claim version of the product will become the most profitable product for the firm to produce. Thus, from the firm's perspective there is a positive trade-off between the n_2 and B^{claim} levels when offering the claim version of the product. Such a result is expected because a high value for n_2 is desirable for the firm since Segment 2 consumers find the exaggerated product claim version of the product the most attractive and a high value for B^{claim} is undesirable for the firm since the demand for the exaggerated product claim version of the product by Segment 1 consumers decreases with higher values for B^{claim} .

In another example, suppose the food engineers indicate that they could produce a medium exaggerated product claim version of a product within which G^{claim} is 18.75% above $G^{\text{no-claim}}$ and B^{claim} is 40% above $B^{\text{no-claim}}$. As well, the marketing personnel estimate that 40% of consumers in the market are in Segment 2. In this case, the firm is situated at point A3 in Figure 4.6 and the no-claim version of the product is the most profitable for the firm to produce. However, in this medium claim case, an increase of only 15% in n_2 (to 55%) will shift the firm to point A4 and thus make the exaggerated product claim version of the product more profitable to produce than the no-claim version. This result is due to the higher G associated with the medium claim influencing more of the consumers in Segment 2 to purchase the exaggerated product claim product.

Finally, the product strategy profit tables provide a general guide to product categories in the marketplace where exaggerated product claims may be more or less common. For example, product categories where the main purchasers are Segment 1 consumers and/or where G^{claim} is relatively low and B^{claim} are relatively high are product categories where exaggerated product claims are less likely. For example, if organic foods are being purchased by higher income, educated and nutrition literacy consumers (i.e., Segment 1), there may be less exaggerated product claims in organic foods. On the other

hand, exaggerated product claims will be more common for product categories where the main purchasers are Segment 2 consumers and/or G^{claim} is high relative to B^{claim} . The breakfast cereals and cracker product categories are two good examples where this type of outcome may very well occur.

Overall, the illustrative example and the generalized results provides a relevant but simplified version of the marketplace where firms offer only one version of a product (e.g., with either exaggerated claim or no-claim) and make a profit-maximizing product strategy decision by reviewing levels of G , B and n_2 while holding S at a constant level for both products.

Given that the economic model and results show that a number of outcomes are possible depending upon the level of the G , B and n_2 values, it is interesting to examine what exaggerated product claim and no-claim strategies are occurring in the marketplace. In other words, using data from the more complex real-world marketplace where firms are able to offer a myriad of products within a product category and utilize broader product nutrient strategies regarding claim offerings, what relationships are likely to exist between claims and the level of nutritional good and nutritional poor. This question is examined in the empirical analysis section.

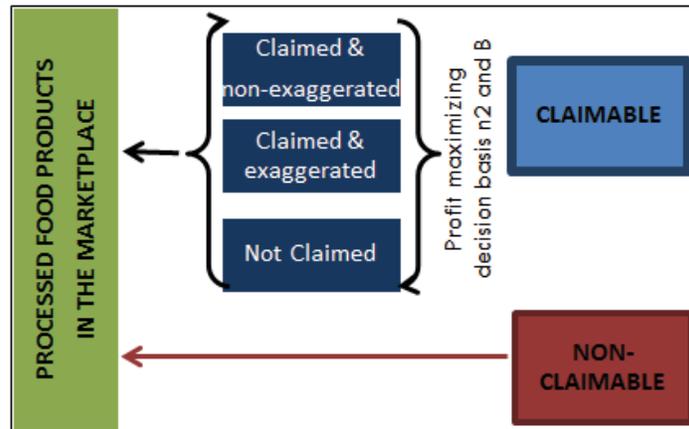
4.7 Empirical Analysis

To begin this real-world empirical analysis, some new terminology is required to simplify the discussion. First, instead of referring to the “B” and “G” nutrients, as was the case in the previous section, the discussion will now refer to the “fat, sugar and sodium (FSS)” and “claimed⁴⁴” nutrients, respectively. This substitution is logical because it is fat, sugar and salt that are typically identified as “poor” nutrients, and by definition a claimed nutrient must imply either more of a “good” nutrient or less of a “poor” nutrient. In addition, segment 2 will now be referred to as “partial utilizers” as these are consumers that use taste, price and nutritional good in their decision making and n_2 is referred to as the “percent of partial utilizers” in order to eliminate the these variables from the discussion.

As illustrated Figure 4.7, the real-world marketplace includes both claimable and non-claimable processed food products. Non-claimable products are those products where claims are never considered by firms because the product matrix/taste for the item in question does not lend itself to the regulated claim requirements or for reasons that are not explained by the theoretical model.

⁴⁴ Claims referred to in the empirical analysis section refer to the voluntary nutrient content, food and health claims outlined in 2.3.3.

Figure 4.7: Claimable and Non-Claimable Products in the Processed Food Marketplace



In contrast, claimable products in the marketplace are those that are either currently claimed or have potential to be claimed. In this case, the specific claim/no-claim decision is assumed to depend on the size of partial utilizers, the level of FSS and the other profit-maximizing variables that were used in the illustrative example and the more general results in Sections 4.5.3 and 4.6 . Claims made by firms in the real-world marketplace are either exaggerated product claims or non-exaggerated product claims.

As illustrated in Table 4.2, exaggerated product claims can occur in four claim and non-claimed nutrient combinations. Of particular interest in this dissertation are the exaggerated product claims where a claim results in improvement in the claim nutrient and significantly higher levels of the FSS nutrient (highlighted in green in Table 4.2). There are likely a variety of reasons why food manufacturers produce claim products with higher levels of FSS nutrient. For example, the level of the FSS nutrient may be increased after the claim product is formulated in order to maintain the product matrix/taste requirements (similar to the theoretical analysis). Alternatively, manufacturers may simply add a claim to an existing product (that currently has a high level of one or more FSS nutrient) without changing the nutritional makeup of the product. From a consumer perspective and a public policy perspective, this distinction is not important because the result in both cases is an exaggerate product claim product that has a relatively high level of the FSS nutrient.

Table 4.2: Exaggerated Product Claim Combinations

Claim = ↓poor nutrient	Claim = ↓poor nutrient
Non-Claim = ↓good nutrient	Non-Claim = ↑poor nutrient
Claim = ↑good nutrient	Claim = ↑ good nutrient
Non-Claim = ↑poor nutrient	Non-Claim = ↓good nutrient

Non-exaggerated claims occur when the FSS nutrient either remains the same or falls in the presence of a claim and can involve various combinations of poor and good nutrient changes. The reasons why food manufacturers produce products with non-exaggerated claims are similar in format to those noted for exaggerated product claims (e.g., no change required to meet product matrix/taste requirements and claim placed on existing products with low FSS products). In addition, food manufacturers may be producing non-exaggerated claim products because they have a deliberate product strategy to maintain FSS nutrient levels at the same or lower levels by allowing a trade-off to different taste, higher cost or higher quality ingredients when providing a claim product. Of interest in this dissertation are the non-exaggerated product claims where the FSS nutrient falls significantly because here consumers gain with respect to both the claimed and non-claimed nutrients. This specific case is referred to as FSS-beneficial.

This empirical analysis will compare the levels of the FSS nutrient of claim and no-claim products in order to examine the significant presence and nature of product claims (e.g., exaggerated and FSS-beneficial). This analysis is not straightforward because the processed food marketplace includes non-claimable, no-claim claimable, claim FSS-beneficial and claim exaggerated products. The empirical analysis is conducted first, at a preliminary level using a case study approach to review the type of exaggerated product claim to nutrient relationships and second, at a more general level using an empirical model and ordinary least squares regression (OLS) applied to a large data set in order to generate a set of statistically valid results. The case study data, approach and results are presented in Section 4.7.1. The specification of the empirical model, descriptive statistics of the data and regression results are presented in Sections 4.7.2 and 4.1.

4.7.1. Case Study of Exaggerated Product Claims

Exaggerated product claims could most easily be detected if both an original (i.e., no-claim) version and claim version of the product were available for review. An example of a matched product is two different versions of a granola breakfast cereal, which appear to be identical other than one version has a “low fat” claim. If these matched products were available for a broad range of products then the nutrient levels of the claim and no-claim products could be directly compared to determine if the FSS nutrient levels are higher (e.g., exaggerated product claim) or lower (e.g., FSS-beneficial claim) when a

claim is made. The case study approach provides a snapshot of exaggerated product claims using 20 matched products in order to highlight specific patterns between the claim type and the nutrient levels (e.g., sodium rises in the presence of a fat claim). The results in this section do not convey any sense of the overall presence of exaggerated product claims in the market place but the fact that twenty examples could readily be found does foreshadow the more general results that are presented in the next section.

Data collection involved purchasing 20 matched products (i.e., an original and a product with at least one exaggerated product claim⁴⁵) within diverse product categories on two occasions in May 2013 in two Vancouver grocery stores. After the products were purchased, nutrition information (from the NFL) and claim information (from the product package) was recorded and coded for analysis. A full product listing with case number and company, brand and variety names are detailed in Appendix D. Claims were coded using Health Canada's claim standards (See Section 2.3.3 for the details). Products with the terms multigrain, whole grain, 1/2 grain and whole wheat were also coded and included in this case study analysis even though these terms are not included in Health Canada's voluntary claim standards.

Table 4.3 details the value (milligrams for sodium and cholesterol and grams for all other nutrients) and percent difference per serving size in the levels of fat, cholesterol, sodium, carbohydrates, fibre, sugar and protein for the twenty matched products (complete nutrient levels and differences for these products are detailed in Appendix E). Trans fat is excluded from the analysis because all 20 matched pairs were free of trans fat. Positive values indicate higher levels of the nutrient while negative values indicate lower levels of the nutrient when moving from a no-claim to a claim version of the product. Grey-shaded cells with bold text identify comparisons directly related to the claimed nutrient (e.g., the percent change in fiber when a fiber claim is made). Of interest here are the cells shaded light red with italic text because in these cells there is a positive increase in the FSS nutrient, which implies that the claim is exaggerated.

⁴⁵ Claims refer to the voluntary nutrient content, food and health claims outlined in 2.3.3.

Table 4.3: Difference in Nutrient Levels (value and percent) Between No-Claim and Claim Versions

		Fat	Saturated Fat	Cholesterol	Sodium	Carbohydrates	Fibre	Sugars	Protein
1ab granola bars fibre	difference (value)	3.0	0.5	0.0	35	3.0	1.0	0.0	1.0
	difference (%)	50	100	n/a	26	11	50	0	33
2ab lasagne noodles whole wheat/low sodium	difference (value)	1.0	0.0	0.0	10	-5.0	5.0	1.00	2.00
	difference (%)	67	n/a	n/a	n/a	-8	167	33	18
3ab granola cereal low fat	difference (value)	-7.0	-1.50	0.0	35	9.0	0.0	6.0	-1.0
	difference (%)	-70	-75	n/a	100	26	0	60	-17
4ab breakfast cereal fibre	difference (value)	1.0	0.20	0.0	110	17.0	4.0	10.0	5.0
	difference (%)	*	*	n/a	48	77	100	333	100
5ab breakfast cereal multigrain	difference (value)	-1.0	-0.40	0.0	152	5.0	1.0	5.0	-1.0
	difference (%)	-50	-100	n/a	1900	25	50	500	-33
6ab crackers low fat	difference (value)	-1.50	-0.10	0.0	25	2.0	0.0	0.0	1.0
	difference (%)	-38	-20	n/a	22	14	0	0	100
6ac crackers whole grain	difference (value)	0.0	0.0	0.0	15	1.0	1.0	0.0	0.0
	difference (%)	0	0	n/a	13	7	100	0	0
6ad crackers multigrain	difference (value)	-1.0	-0.10	0.0	45	0.0	0.0	0.0	1.0
	difference (%)	-25	-20	n/a	39	0	0	0	100
7ab crackers low fat	difference (value)	-2.0	-0.50	0.0	20	1.0	0.0	0.0	0.0
	difference (%)	-44	-50	n/a	9	8	n/a	0	0
7ac crackers multigrain	difference (value)	0.0	0.0	0.0	-10	0.0	0.0	0.0	0.0
	difference (%)	0	0	n/a	-5	0	n/a	0	0
8ab crackers whole grain	difference (value)	-1.0	0.10	5.0	20	1.0	1.0	0.0	0.0
	difference (%)	-25	25	*	13	8	*	n/a	0
9ab cookies sugar	difference (value)	-2.0	-1.50	10.0	105	-2.0	0.0	-11.0	0.0
	difference (%)	-29	-75	*	233	-9	n/a	-100	0
10ab couscous whole wheat	difference (value)	0.50	0.10	0.0	0	0.0	2.0	0.0	1.0
	difference (%)	100	n/a	n/a	n/a	0	200	0	20
11ab pancake and waffle mix omega-3 saturated fat	difference (value)	.50	0.0	0.0	40	0.0	0.0	-6.0	-2.0
	difference (%)	50	0	n/a	11	0	0	-86	-29
12ab miracle whip fat free	difference (value)	-3.50	-0.50	-5.0	10	1.0	0.0	1.0	-0.10
	difference (%)	-100	-100	-100	8	50	n/a	100	-100
13ab bagels 12 grain	difference (value)	4.0	0.30		40.0	2.0	4.0	-1.0	3.0
	difference (%)	400	15		15	6	400	-50	43
14ab salad dressing light	difference (value)	-15.0	-1.50	0.0	150	4.0	1.0	2.0	n/a
	difference (%)	-79	-75	n/a	94	400	n/a	n/a	n/a
15ab bread multigrain	difference (value)	1.50	0.30	0.0	-150	1.0	1.0	1.0	1.0
	difference (%)	300	n/a	n/a	-38	5	100	100	25
16ab frozen french fries low fat	difference (value)	-5.50	-0.30	0.0	65	-13.0	0.0	0.0	-1.0
	difference (%)	-69	-60	n/a	130	-39	0	n/a	-33
17ab cream cheese low fat	difference (value)	-3.50	-2.10	-5.0	40	0.0	0.0	0.0	1.0
	difference (%)	-88	-84	-50	57	0	n/a	0	100
18ab feta cheese lite	difference (value)	-2.50	-1.50	-5.0	60	0.0	0.0	0.0	2.0
	difference (%)	-36	-33	-25	25	n/a	n/a	n/a	40
19ab sour cream fat free	difference (value)	-4.10	-2.20	-15.0	-5	1.0	0.0	1.0	1.0
	difference (%)	-91	-88	-100	-14	50	n/a	50	100
20ab spread organic	difference (value)	0.0	0.50	0.0	15	0.0	0.0	0.0	0.0
	difference (%)	0	25	n/a	20	n/a	n/a	n/a	n/a

1. Differences in value are provided in milligrams for sodium and cholesterol and grams for all other nutrients).

2. Case numbers identify the matched products. For example, case number 1ab the 1a identifies the original or no-claim product and 1b identifies the matched product. Note that a case number such as 6ac indicates there are multiple products (e.g., 6b and 6c) that are compared to the one original product (6a).

3. Grey-shaded cells with bold text identify comparisons directly related to the claimed nutrient. Cells shaded light red with italic text identifies positive increases in the FSS nutrient, which implies that the claim is exaggerated.

* not calculable due to original value of nutrient being zero and thus substituted average of original value (e.g., 0) and claim product as denominator.

Table 4.3 illustrates several interesting and consistent patterns between claim type and level of nutrients. For example, fibre claims tend to be accompanied by higher fat, saturated fat, sugar and sodium levels (see cases 1ab and 4ab) while fat-related claims tend to be accompanied by higher sodium and carbohydrate levels (see case studies 3ab, 6ab, 7ab, 12ab and 4ab in Table 4.3). In the one case involving a sugar claim, the levels of sodium and cholesterol levels are higher than those in the original product (see case 9ab). In addition, case studies with a whole wheat claim generally exhibited either higher fat levels or higher sodium and sugar levels; a multigrain claim generally implies higher sodium or higher carbohydrates levels; and a whole grain claim cases generally implies higher sodium, carbohydrates or fats relative to the original no-claim version of the product. A particularly interesting case in regard to pattern of gain and loss is 13ab where moving from the original to a 12 grain version of the product provides a gain in protein and fibre but also an relatively large increase in the level of fat, saturated fat, sodium and carbohydrates.

Overall, the matched no-claim to claim case study analysis reveals that exaggerated product do exist and that where they exist, there seem to be specific patterns of exaggeration (e.g., select claim type and nutrient level relationships). However, given that these paired products with exaggerated product claims were specifically selected, the case study does not provide information regarding the significant presence of the exaggerated product claim in the marketplace. The significance and presence of the relationship between claims to nutrients are now examined with a more general empirical analysis, which is presented next.

4.7.2. Empirical Model

Data

To achieve statistical validity and thus generalizability, it is necessary to collect on-package NFL data and claim information for either all products or a random sample of processed food products in a typical marketplace. Neither type of data was available for purchase, and so faced with the prospect of collecting this data first hand a decision was made to collect information for all products within select product categories at one particular grocery supermarket. Several major Vancouver grocery stores chains were contacted in order to gain permission to collect the required data. Save on foods⁴⁶ gave permission for a research team to collect on-package nutrition and claim information (but not price data) from The University of British Columbia (UBC) store location.

Data collection was conducted by four research assistants over a seven-month period from July 2010 to January 2011. All research assistants were hired and trained by the author of this dissertation.

⁴⁶ Save on foods is owned by the Overwaitea Food Group Limited Partnership. The UBC store is part of a chain of large scale grocery stores carrying major brands and their own private label brands (e.g., Western Family, Western Classics and Value Priced). All brands on the store shelves were included in the study (Overwaitea Food Group, 2013).

Research assistant tasks included data collection, data input and data accuracy checks. While at the store, research assistants completed data collection sheets for each product in a product category. For each product, data was collected on nutrient levels, nutrient percentages of recommended daily intake and the specific wording of all claims⁴⁷ (see Appendix F for an example of the data collection sheet). The data from the collection sheets was then inputted into a Microsoft Excel template, which was created by the author of this dissertation. Data accuracy checks required each research assistant to compare 80 randomly selected data collection sheets from another researcher with the corresponding spreadsheet data.

Research assistants collected data for 1677 processed food products within 21 selected product categories, all of which contain a wide range of claims (see Appendix G for a complete listing of product categories and number of products within each category). All claims were categorized and coded for analysis by the author. Claims were categorized based upon regulated food, health and nutrient content claims⁴⁸ and then further categorized by nutrient category. Products with ingredient and whole grain information on their packages were also categorized. In total, 15 claims were coded including saturated fat, fibre, calcium, sugar, sodium, whole grain, iron, omega-3, organic, ingredient⁴⁹, natural, cholesterol, third party, fat and trans fat. See Appendix H for a listing of these claims and see Section 2.4 for the definitions of these claims.

Each product's specific level of total fat, saturated fat, trans fat, sodium, sugar, carbohydrates, cholesterol, protein and fiber was recalculated to a product category standard serving size (SSS) to allow for a standardized comparison. This standard serving size was developed using a combination of CFIA Reference Amounts and Serving Sizes (Canadian Food Inspection Agency, 2010e) and product data serving size range and average (see Appendix I for the calculated serving size for each product category). All data analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 21.0 (SPSS, Inc., 2012) and STATA12 (StataCorp., 2013).

Descriptive Statistics

The majority of the 1677 processed food products had some type of claim included on the package. The distribution of claims found on the products is presented in Table 4.4. Notice that the natural, trans fat, fat, saturated fat, third party and ingredient claims are the most common and the omega-3, iron, calcium, sodium and sugar claims are the least common. This outcome is consistent with the case study results, which were presented in the previous section.

⁴⁷ All nutrient data as presented in the NFL by the food manufacturer is assumed as an accurate representation of the nutrient levels in the product.

⁴⁸ Claims refer to the voluntary nutrient content, food and health claims outlined in 2.3.3.

⁴⁹ Ingredient based claims included claims such as peanut free, made with real chocolate chips, No GMO, Gluten-free (F), and no added MSG.

Table 4.4: Number and Percentage of Health, Food and Nutrient Content Claims in Processed Food Products (N = 1677)

Claim Type	Number	Percentage
Ingredient	855	51
Natural	549	33
Trans Fat	511	30
Fat	341	20
Saturated Fat	342	20
Third Party	328	20
Fibre	265	16
Whole Grains	207	12
Cholesterol	188	11
Organic	145	9
Sugar	153	9
Sodium	125	7
Calcium	96	6
Omega-3	76	5
Iron	64	4
Any Claim	n/a	74

Table 4.5 shows the percent of products with any type of claim and the average number of claims per product, broken down by product category. Notice that the product categories with the highest percentage of claims include vegetarian items, breakfast cereal, instant oatmeal, peanut butter, juices and canned beans. Product categories with the lowest percentage of claims included frozen pizza, butter, cookies and frozen meals for one. Overall, the number of claims per product was in the range of one to four. Breakfast cereals and breads had an average of four claims per product, which is the highest across all product categories. See Appendix J for details regarding the 15 claim categories within each of the product categories.

Table 4.5: Health, Food and Nutrient Content Claims within Product Categories (N=1677)

	Number of products in category	Percent of products with any type of claim	Percent of products with an organic claim	Percent of products with a natural claim	Percent of products with a third party claim	Average number of claims per product
Breads	51	86	20	4	35	4
Breakfast Cereal	130	92	20	31	5	4
Butter	13	31	8	23	0	1
Canned And Box Soup	134	84	16	44	28	3
Canned Beans	22	100	55	5	5	2
Cookies	180	51	2	16	21	3
Crackers	124	83	5	23	35	3
Frozen Meals For One	85	49	0	38	4	1
Frozen Pizza	54	11	0	0	0	1
Granola Bars	73	79	0	58	4	2
Hard Cheese	32	53	6	0	6	1
Instant Oatmeal	34	97	0	47	29	3
Juices	190	92	9	65	47	2
Margarine And Spreads	25	72	0	0	40	2
Pasta Sauces	76	49	18	12	4	1
Peanut Butter	23	100	39	30	61	3
Potato Chips	94	85	0	36	5	3
Processed Cheese	57	54	2	0	4	1
Salad Dressings	156	89	10	60	6	2
Vegetarian Items	39	95	0	46	59	2
Yogurt	85	65	8	13	14	1

Table 4.5 also lists the percent of products that have *organic*, *natural* or *third party* claims in each product category. *Natural* claims are most commonly found in the juice, soup, granola bar and salad dressing product categories; *organic* claims are most commonly found in the canned beans, pasta sauces, peanut butter, breads and breakfast cereal product categories; and *third party* claims are most commonly found in the juice, bread, margarine/spreads, peanut butter and vegetarian cracker product categories. In addition, other than the categories of cheese, frozen pizza and margarine and spreads, the *organic*, *natural* and *third party* claim types are reasonably well distributed across the various product categories.

Table 4.6 shows the average level of fat, sodium and sugar (FSS) per standard serving for products with one or more claims versus no-claims, broken down by product category. A casual comparison of the claim and no-claim columns reveals that the FSS nutrient levels are often higher for no-claim products than the claimed products. Does this outcome immediately refute the working hypothesis that exaggerated product claims are common in a real-world market place? To address the issue it is important to recall that the data in Table 4.6 includes products that would never be claimed (i.e., the non-claimables). For example, frozen pizza, that is generally very high in sodium and fat, is unlikely ever to be claimed but is included in the claim – no-claim comparison that is implied by Table 4.6. Similar to the case study presented in the previous section, the desired approach is to compare the levels of FSS nutrients for the claimable products only. Thus, before proceeding with the formal empirical analysis it is desirable to

eliminate the non-claimable products from the data set. Unfortunately, other than having unusually high levels of sodium, fat and sugar, these non-claimable products are difficult to identify.

Table 4.6: Average Fat, Sodium and Sugar per Standard Serving Size in Claim⁵⁰ and No-claim Products

Product Category	average fat (grams)		average sodium (milligrams)		average sugar (grams)	
	claim	no-claim	claim	no-claim	claim	no-claim
Breads	1.68	1.45	214.02	219.25	2.14	2.24
Breakfast Cereal	1.85	2.07	168.51	125.99	8.61	10.27
Butter	8.00	8.00	33.33	59.29	0	0
Canned Beans	1.93	none	303.64	none	0.91	none
Canned/Box Soup	3.26	7.38	882.69	1531.43	5.63	4
Cookies	4.84	6.87	102.72	92.86	8.91	10.49
Crackers	2.83	2.84	147.84	147.58	0.9	0.42
Frozen Meals For 1	6.89	10.28	661.35	851.34	6.65	5.61
Frozen Pizza	13.35	13.50	745.09	829.89	5.11	5.14
Granola Bars	4.51	5.47	96.60	55.94	10.03	13.47
Hard Cheese	8.38	9.32	224.12	208.65	0	0.1
Instant Oatmeal ¹	2.39	2.50	102.98	4	5.04	1
Juices ²	0.01	0.06	56.36	667.99	36.62	26.51
Margarine/Spread	7.04	7.75	63.37	70	0	0
Pasta Sauces	5.91	6.22	518.55	580.05	6.23	5.3
Peanut Butter	7.38	none	32.78	none	1.33	none
Potato Chips	13.81	15.37	325.58	325.69	1.3	1.34
Processed Cheese	5.32	7.78	199.58	171.35	1.4	1.26
Salad Dressings	8.95	6.25	270.97	356.25	2.83	2.88
Vegetarian Items	3.99	none	530.76	none	2.07	none
Yogurt	3.61	3.50	94.28	80	18.47	30

1. Instant oatmeal no-claim includes one unflavored and unsweetened quick oats product while instant oatmeal claim includes a number of sweetened, flavored, unflavored and unsweetened oatmeal, cream of wheat and porridge products. The difference between the claim and no-claim averages in sugar and sodium reflect these different products.

2. There is a wide difference in sodium between the claim and the no-claim for juices are likely that the claimed juices tend to be fruit-based while the non-claimed juices tend to be vegetable-based juices.

A reasonable way to detect non-claimable products is to identify the maximum level of the FSS nutrient across all claimed products within a particular product category and then tag as non-claimable all non-claimed products within that category that have a corresponding FSS nutrient in excess of the identified maximum. Specifically, in the first step of this two-step process, the maximum value for sugar and sodium for products with a fat claim and the maximum value for fat for products with a saturated fat claim was determined for each product category.⁵¹ In the second step, products above these established product category FSS maximum values were categorized as non-claimable and below as either claimed-claimable or no-claim claimable. For example, in the granola bar product category, the maximum value of

⁵⁰ Claims refer to the voluntary nutrient content, food and health claims outlined in 2.3.3.

⁵¹ The fat claim and saturated fat claims were used because they were the more common claim in the data set.

sodium found in products with a fat claim was 94.59 milligrams. Consequently, all no-claim granola bars above this maximum level were categorized as non-claimable and below as no-claim claimable.

To illustrate the potential bias which can result from the inclusion of the non-claimables in the dataset, Figures 4.8 and 4.9 show sodium, sugar and fat levels per standard serving size for all products in the canned/box soup and the granola bar product category, respectively. Within each category, the products are arranged (moving left to right) from highest to lowest level of the FSS nutrient in question. Products that appear with a blue cross icon are products with a claim (a fat claim for the case of the sodium and sugar nutrients, and a saturated fat claim for the case of the fat nutrient). The red solid line icons represent products that are claimable but have not yet been claimed, based on the above definition of a claimable product (i.e., those products with a FSS nutrient level below the maximum FSS nutrient level in the claimed group). Finally, products with a solid round black icon are the non-claimables. Figures 4.8 and 4.9 clearly illustrate that a significant number of non-claimable products reside at the upper end of the FSS spectrum.

Figure 4.8: Fat, Sugar and Sodium Nutrients per Standard Serving Size for Non-claimable, Claimed Claimable and No-Claim Claimable Products in the Canned and Box Soup Product Category

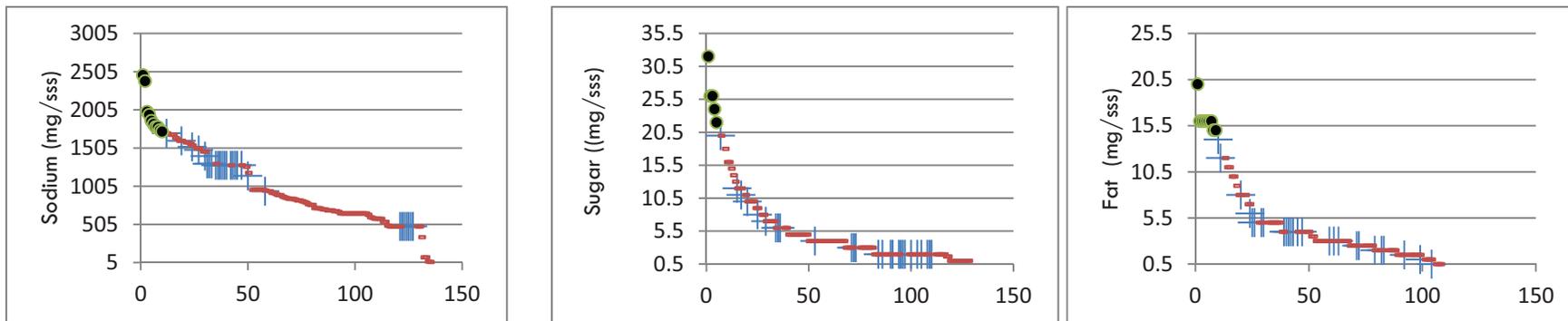
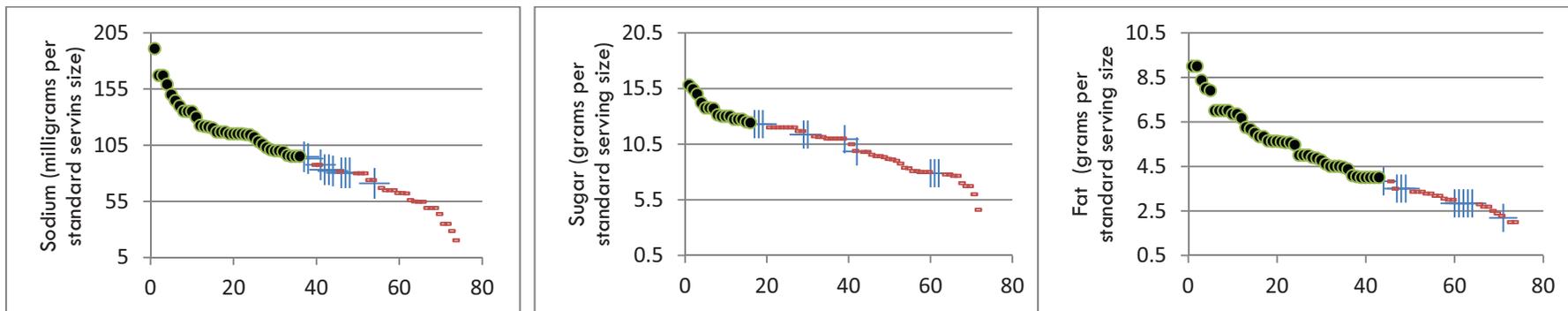


Figure 4.9: Fat, Sugar and Sodium Nutrients per Standard Serving Size for Non-claimable, Claimed Claimable and No-Claim Claimable Products in the Granola Bar Product Category



- + Claimed Claimable
- Non-claim Claimable
- Non-claimable

The empirical analysis proceeds with non-claimable products excluded (out of the 1,667 products this exclusion will eliminate 192 products from the sodium data set, 349 products from the sugar data set and 498 products from the fat data set). Including the non-claimables with the no-claim claimable products will raise the average level of the FSS nutrient in the no-claim group by a significant amount. These extreme values of the FSS nutrient for the non-claimable category therefore help to explain why the FSS levels are generally higher for the no-claim products than the claimed products in Table 4.6. More importantly, failing to exclude the non-claimable products will limit the accurate identification of the presence of exaggerated product claims with the regression analysis.

Specification of the Empirical Model

In this section, the grocery store data (as described above) is used to estimate an empirical model in order to examine the relationship between FSS nutrient levels and product claims. More specifically, the empirical analysis of this section will examine the following: For a specific claim, excluding the nutrient directly associated with the claim,

- i. If the FSS nutrient is higher in the presence of a claim then the claim is said to be exaggerated
- ii. If the FSS nutrient is lower in the presence of a claim then the claim is said to be FSS-beneficial.

The main issue in the specification of the empirical model is what control variables (in addition to claim status) to include in the regression equation when attempting to explain the level of the FSS nutrient for each product in the data set. In order to control for nutrient variation and other unobservables between product categories (claim independent differences), product category fixed effects⁵² is utilized.

A separate regression is conducted for each of the three FSS nutrient dependent variables. The fixed effect model includes claim indicator variables as right-hand side explanatory variables. The specification of the regression equation is completed by assuming that omitted variables, which also contribute toward explaining the specific level of a product's FSS nutrient make up, are controlled by the use of fixed effect and any remaining omitted variables collectively reside in the error term of the regression equation and are assumed uncorrelated with the explanatory variables.

For the case of sodium as a FSS nutrient, the regression equation is as follows:

$$(4-3) \quad Sodium_i = \beta_o + \sum_{j=1}^{19} \beta_{ji} Claim_{ji} + e_i \quad (\text{with fixed effects})$$

Where: -

- Subscript i refers to the i^{th} product in the dataset
- Subscript j refers to the j^{th} claim {saturated fat, fibre, calcium, sugar, sodium, wholegrain, iron, omega-3, cholesterol, fat, trans fat, natural, organic and third party}
- $Claim_{ji}$ is an indicator variable equal to 1 if the i^{th} product has j^{th} claim and 0 otherwise
- e_i is a random error term, as discussed above

⁵² The fixed effects assumption is equivalent to assuming a unique intercept term for each product category.

The regression equations for the other two FSS nutrients (fat and sugar) are the same as Equation (4-3) except for the switch in the dependent variable. The nutrient variables are measured basis a standard serving size (milligrams for sodium and grams for sugar and fat).

Claims are included in the regression equation as independent indicator variables having values of either 0 (no claim) or 1 (claim). The sign and significance of the coefficients on the claim variables are the major focus of this analysis because a particular coefficient is a measure of the claim's impact on the FSS nutrient level. Because the claim variable takes on a value of either 0 or 1, it follows that the coefficient on a claim variable is a measure of the difference in the average level of the FSS nutrient over all the claimed products and the average of the FSS nutrient over all of the no-claim products after controlling for claim-independent differences. Hence, a positive and significant coefficient on the claim variable indicates an exaggerated product claim, while a negative and significant coefficient indicates a FSS-beneficial product claim.

4.7.3. Regression Results and Discussion

Linear regression was used to examine the relationship between the FSS nutrient levels (fat, sugar, sodium) and claims⁵³ using the truncated data as described earlier. Specifically, Equation (4 3) was estimated together with similar equations for sugar and fat using the ordinary least squares (OLS) routine within SPSS and STATA13.

Tables 4.7, 4.8 and 4.9 present the results of the regressions using three models for each of the FSS nutrients. Model 1 is the fixed effects model and includes claims as independent variables. Model 2 includes the same variables as Model 1 and adds a dummy variable to capture company type where 1 indicates multinational/multi-brand and 0 indicates non-multinational (e.g., store brand and smaller firms) (see Appendix K for a listing of companies within each category). Model 3 includes the same variables as Model 2 and adds the additional claim variables consisting of *natural*, *organic* and *third party*. Within these three tables, exaggerated product claims are associated with statistically significant positive coefficients (excluding the case where the claimed nutrient and the FSS nutrient are the same) and FSS-beneficial claims are associated with statistically significant negative coefficients. To allow for easier interpretation of the results, exaggerated product claims are identified as a grey shaded cell and bold text and FSS-beneficial claims are identified as a light red shaded cell and italicized text.

⁵³ Claims refer to the voluntary nutrient content, food and health claims outlined in 2.3.3.

Table 4.7: Regression Results for Sodium (milligrams) per Standard Serving Size

	Model 1 (product category fixed effects and nutrient claims)	Model 2 product category fixed effects, nutrient claims and company type)	Model 3 product category fixed effects, nutrient claims, company type, organic, natural and third party claims
Sodium Mean Value	264.65 milligrams		
Saturated Fat Claim	33.60** (15.44)	33.21** (15.76)	20.60 (15.20)
Fibre Claim	-45.09** (19.83)	-45.38** (19.83)	-45.29** (19.87)
Calcium Claim	4.32 (10.28)	7.52 (10.33)	11.25 (9.786)
Sugar Claims	-33.69** (10.41)	-36.80*** (10.44)	-35.80*** (10.95)
Sodium Claim	-161.62*** (24.32)	-161.92*** (24.27)	-157.07 (23.88)
Wholegrain Claim	-12.28 (10.34)	-13.26 (10.34)	-3.852 (10.87)
Iron Claims	30.96 (27.52)	29.39 (27.55)	26.90 (27.36)
Omega-3 Claim	-20.10* (10.35)	-17.94* (9.91)	-6.123 (10.82)
Cholesterol Claim	47.11** (15.61)	44.46** (15.42)	46.39** (15.90)
Fat Claim	.4978 (12.77)	1.244 (12.78)	.0232 (12.90)
Trans fat Claim	-.9225 (15.94)	-2.671 (15.32)	12.42 (14.24)
Organic Claim			-81.68*** (17.50)
Natural Claim			-41.79*** (9.648)
Third Party Claim			-2.644 (11.232)
Company Type		-12.55** (4.872)	-7.323 (5.544)
Constant	276.9*** (5.95)	295.4*** (9.641)	307.9*** (11.62)
R-squared adjusted	.7691	.7696	.7771
N	1475	1475	1475
Regression coefficients are reported in cells for all claims and the constant. Robust standard errors ⁵⁴ are reported in parentheses. *, **, *** indicates significance at the 90%, 95% and 99% level, respectively.			

⁵⁴ Robust standard errors are reported in order to deal with the concern of heteroscedasticity or data exhibiting large residuals or leverage. In the case of fat, sugar and sodium regressions, robust standard errors are very similar to OLS regular standard errors indicating any variance of errors concerns can be safely ignored(Field, 2005)

Table 4.8: Regression Results for Sugar (grams) per Standard Serving Size

	Model 1 (product category fixed effects and nutrient content claims)	Model 2 product category fixed effects, nutrient claims and company type)	Model 3 product category fixed effects, nutrient claims, company type organic, natural and third party claims
Sugar Mean Value	5.22 grams		
Saturated Fat Claim	-.0101 (.3034)	.0682 (.3095)	.0112 (.3371)
Fibre Claim	..1175 (.4099)	.1071 (.4097)	.1384 (.4081)
Calcium Claim	-2.740*** (.6404)	-2.718*** (.6395)	-2.673*** (.6319)
Sugar Claims	-4.376*** (.7027)	-4.408*** (.7038)	-4.474 (.7125)
Sodium Claim	-.2034 (.4597)	-.2156 (.4488)	-.1043 (.4537)
Wholegrain Claim	-.4463 (.3634)	-.4549 (.3639)	-.4021 (.3614)
Iron Claims	.0283 (.6001)	-.0061 (.6019)	-.0192 (.6064)
Omega-3 Claim	-.5897** (.2632)	-.6325** (.2686)	-.5448** (.2668)
Cholesterol Claim	-.1220 (.2616)	-.1669 (.2596)	-.1135 (.2678)
Fat Claim	.5741** (.2733)	.5874** (.2739)	.6081** (.2655)
Trans fat Claim	.0750 (.3348)	-.0924 (.3331)	-.0331 (.3341)
Organic Claim			-.9125** (.3582)
Natural Claim			-.1041 (.2581)
Third Party Claim			-.2199 (.3808)
Company Type		-.1887 (.1307)	-.1012 (.1385)
Constant	5.5477*** (.1417)	5.749*** (.2347)	5.744*** (.2471)
R-squared adjusted	.6142	.6143	.6154
N	1318	1318	1318
Regression coefficients are reported in cells for all claims and the constant. Robust standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95% and 99% level, respectively.			

Table 4.9: Regression Results for Fat (grams) per Standard Serving Size

	Model 1 (product category fixed effects and nutrient content claims)	Model 2 product category fixed effects, nutrient claims and company type)	Model 3 product category fixed effects, nutrient claims, company type organic, natural and third party claims
Fat Mean Value	4.07 grams		
Saturated Fat Claim	.3295 (.2064)	.3081 (.2109)	.2635 (.2124)
Fibre Claim	-.3895** (.1595)	-.3930** (.1601)	-.3716 (.1616)
Calcium Claim	.0958 (.3865)	.0954 (.3892)	.0697 (.3888)
Sugar Claims	.5492** (.1947)	.5128** (.1992)	.5579** (.2087)
Sodium Claim	.3585* (.1810)	.3518* (.1807)	.3977* (.1800)
Wholegrain Claim	-.1770 (.1494)	-.1783 (.1490)	-.1367 (.1525)
Iron Claims	-.1947 (.2722)	-.2257 (.2746)	-.2486 (.2820)
Omega-3 Claim	2.659*** (.3779)	2.630*** (.3759)	2.698*** (.3767)
Cholesterol Claim	-.8092*** (.2540)	-.8293*** (.2525)	-.7987*** (.2504)
Fat Claim	-2.005*** (.2173)	-1.999 (.2170)	-1.966*** (.2126)
Trans fat Claim	-.0599 (.1942)	.0483 (.1942)	.1268 (.1968)
Organic Claim			-.5548** (.2391)
Natural Claim			-.2372 (.1556)
Third Party Claim			-.2036 (.1587)
Company Type		-.1243 (.1138)	.0927 (.1253)
Constant	4.426*** (.1029)	4.612*** (.1947)	4.722*** (.2091)
R-squared adjusted	.7789	.7790	.7800
N	1169	1169	1169
Regression coefficients are reported in cells for all claims and the constant. Robust standard errors are reported in parentheses. *, **, *** indicates significance at the 90%, 95% and 99% level, respectively.			

General

Based on a series of F-tests, the nine regressions for the FSS nutrients are significant at the 99% level. The Model 1 regressions for sodium, sugar and fat have adjusted R^2 values of .7691, .6142 and .7789, respectively. These values indicate that the regressions have a reasonable amount of explanatory power. Models 2 and 3 have similar adjusted R^2 values as Model 1.

Concerning company type, Model 2 shows that when the company type is a multinational/multi-brand there is a negative significant relationship with sodium.

Nutrient Claims

Recall that exaggerated product claims are indicated by a positive and significant coefficient on a specific claim variable while FSS-beneficial product claims are indicated by a negative and significant coefficient on a specific claim variable. An insignificant variable indicates that there is no significant difference in the FSS variable when a claim is present.

Tables 4.7, 4.8 and 4.9 show that the data set exhibits six exaggerated product claims and seven FSS-beneficial product claims. The six exaggerated product claims include the following: products with a saturated fat claim tend to have higher sodium levels (exception in model 3); products with a cholesterol claim tend to have higher sodium levels; products with fat claims tend to have higher sugar levels; products with sugar claims tend to have higher fat; products with sodium claims tend to have higher fat and products with an omega-3 claim tend to have higher fat levels, on average, all relative to products without these claims. Three specific examples of FSS-beneficial product claims include products with a fibre claim tend to have lower sodium and lower fat, and products with a cholesterol claim tend to have lower fat levels. Additional examples of FSS-beneficial claims can be identified in these same three tables.

The comparative significance of the six exaggerated product claims versus the seven FSS-beneficial product claims found in the data set is important to consider. The six versus seven outcomes may appear to imply that the exaggerated product claim is not significantly present or important. However, when reviewing the exaggerated product claim, it is important to view these six exaggerated product claims in the context of a larger marketplace and consider the implications and nature of their presence.

First, there is an asymmetry regarding consumers' loss versus gain with respect to the FSS nutrients when a claim is made. In other words, consumers and policy makers are much more concerned about claim products where consumers unknowingly experience nutritional losses versus nutritional gains – this alone makes even a smaller number of exaggerated product claims important. For example, individuals considered high risk for health problems such as diabetes and hypertension would be more concerned with consuming higher levels of a less-healthy nutrient than consuming higher levels of healthy nutrient. Thus, the weight of concern is greater for claim products with exaggerated product claims versus FSS-beneficial claims.

Second, the fact that both exaggerated and FSS-beneficial claims simultaneously exist in the marketplace is important in and of itself. The combined existence of these claims provides a confounding context for consumers when making product decisions because sometimes they need to be concerned that the claim product results in higher levels of FSS nutrients and sometimes not. If consumers notice these inconsistencies, their use of the claim to assist informed product decisions may decrease. In other words, if consumers get a negative view of claims because of the higher FSS nutrient levels, they may simply stop using all claims as decision variables. This decreased usage of claims should be a concern for policy makers and manufacturers because the purpose of these types of claims is to provide consumers with nutrition information and food manufacturers with the opportunity to communicate the nutritional benefits of their product to the consumer.

Magnitude and type of nutritional loss are also important considerations when analyzing the impact of exaggerated product claims. In other words, some types of exaggerated product claims will be more important to consider than others will. It is well known that obesity and heart disease are major public health concerns. Thus, exaggerated product claims that result in consumers unknowingly consuming higher levels of sodium and fats that may contribute to these health concerns would be considered of major importance. In terms of magnitude, in order to provide a broader and relative view of the impact of an exaggerated product claim, the value of the nutritional loss for an exaggerated product claim is presented in three ways: standard serving size, percent of the RDI defined by Health Canada and relative to the FSS nutrient mean⁵⁵ across all products. In addition, an illustrative example of the magnitude of a claim in terms of the trade-off between nutritional gain (e.g., claim nutrient) and nutritional loss (e.g., FSS nutrient) is provided.

Based on the regression results from Table 4.7, a saturated fat claim is considered an exaggerated product claim because it has a significant and positive coefficient with a value of 33.60 for sodium (e.g., Model 1). This outcome indicates that, on average, for products with a saturated fat claim, a product's sodium level is 33.60 mg higher per standard serving size than products without that claim. This value represents 2.24% of the 1500 mg RDI⁵⁶ and 12.7% of the 264.65 mg mean value of sodium across all products and categories. As well, a cholesterol claim is also considered an exaggerated product claim because, on average, the sodium level is 47.11 mg higher per standard serving relative to products without a fat claim. This value is 3.14 % of RDI and 17.8 % of the mean value of sodium. Therefore, if an individual consumes a standard serving of a "typical" product with a saturated fat or cholesterol claim, he or she will, on average, unknowingly consume 2% and 3% of RDI more sodium, respectively, or an amount equal to 12% and 17.8 % of the average of sodium in all products, respectively, relative to the product without that claim. This may not be important for a healthy individual but for a person with hypertension this can be a large amount relative to his or her required intake.

⁵⁵ Mean value and descriptive statistics are provided in Appendix L.

⁵⁶ Health Canada's adequate daily sodium intake is 1500 milligrams (Government of Canada, 2012).

In addition, as shown in Table 4.9, sugar claims, sodium claims and omega-3 claims are considered exaggerated product claims because, on average, products with these claims have higher levels of fat in comparison to products that do not have these claims. Specifically, when a sugar claim is present, the fat level per standard serving size is .549 grams higher (.65 % of RDI⁵⁷ and 13.5% of the 4.07 g mean value of fat) than products without these claims and when a sodium claim is present, the fat level per standard serving size is .3585 grams higher (.42 % of RDI and 8.8 % of the 4.07 g mean value of fat) than products without these claims. As well, when an omega-3 claim is present, the fat nutrient is, on average, 2.659 grams higher (3.1% of RDI and 65.3 % of the mean value of fat) on a standard serving size. Consumers who believe that an omega-3 claim indicates a direct exchange of a bad fat for a good fat may be surprised to learn that fat levels tend to be higher when these claims are present. As noted above, higher fat levels may not be a concern for all consumers but for individuals with health concerns requiring fat reduction, their unknowing consumption of higher levels of fat may be a problem.

A final example illustrating the importance of magnitude and type when examining the impact of an exaggerated product claim involves products with a fat claim having a significant and positive association with sugar. Based on Table 4.8, products with a fat claim have a sugar level .5741 grams higher, on average, (1.74 % RDI⁵⁸ and 10.9 % of the 5.22 g mean value of sugar) than products without a fat claim. The specific nutrient types associated with this previously described exaggerated product claim is interesting given that several industry and academic studies have shown that consumers tend to believe that low-fat products are a healthier product option (Patterson *et al.*, 2012 ; Which? Consumers' Association, 2012). For example, a 2012 study reported that 60% of the over 1,000 consumers surveyed indicated that they look for fat reduction messages on a product as a strategy to select lower calories and/or healthier foods (Patterson *et al.*, 2012 ; Which? Consumers' Association, 2012). Therefore, if consumers do indeed use fat claims for selecting healthier product and if fat claims are indeed associated with higher sugar level, then this outcome would be a concern for both policy makers and consumers. Again, not all individuals would be necessarily concerned that products with a fat claim have higher sugar levels. However, this unknowing consumption of higher levels of sugar per serving size could be a concern for consumers using fat claims to detect healthier products and those watching their sugar intake due to concerns with type-2 diabetes or weight management.

As noted earlier, the magnitude (and thus impact) of the claim can also be examined in terms of the nutritional gain (e.g., claim nutrient) and nutritional loss (e.g., FSS nutrient) that occurs when a claim is made. This method allows an alternative and more finely categorized view of product claims because it combines both the gain and loss that occurs when a claim is made. Figure 4.10 provides an illustrative

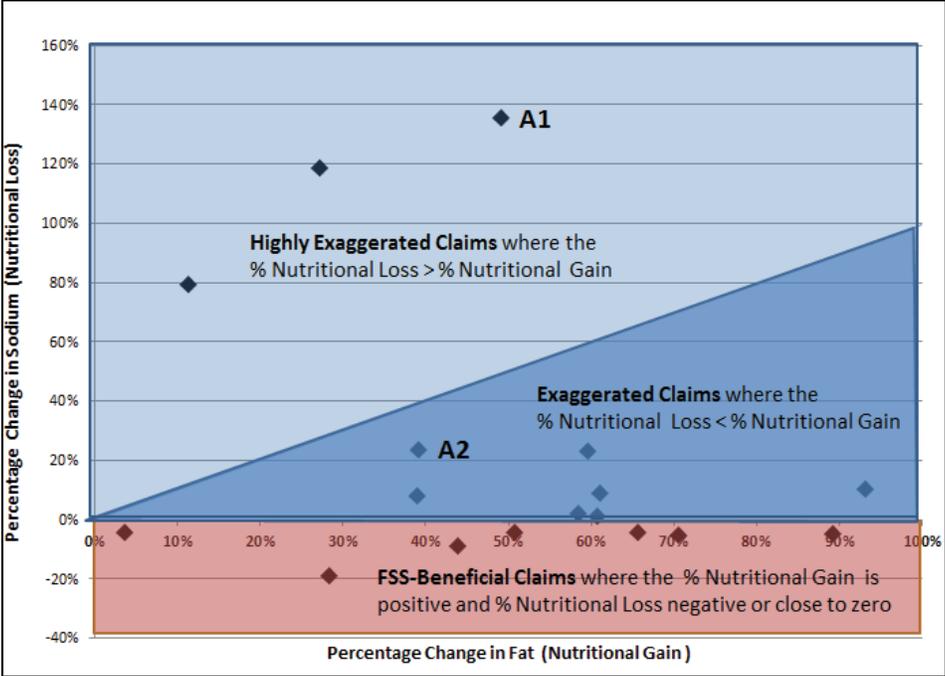
⁵⁷ Health Canada's recommended RDI for fat is 85 grams (Government of Canada, 2012).

⁵⁸ Health Canada has defined a RDI for added sugars as 25% of total energy that is roughly determined as 26 grams for women and 40 grams for men (Health Canada, 2010). An average of these values of 33 grams was used as a base for the percentage of RDI calculation.

example of the nutritional impact of a fat claim by combining the nutritional loss, defined as the percentage change in sodium (vertical axis), and nutritional gain, defined as the change decrease in fat (horizontal axis), relative to the no-claim products for each of the 21 product categories.⁵⁹ Within the chart in Figure 4.10 the upper left section (light blue area titled “highly exaggerated claims”) represents the area where the nutritional loss is greater than the nutritional gain while the middle section (darker blue area titled “exaggerated claims”) represents the area where the nutritional loss occurs but is less than the nutritional gain. The lower section in the chart (light red titled “FSS-beneficial) represents the area where the nutritional loss is minimal or zero and nutritional gain positive. As well, within Figure 4.10, each diamond shape represents the gain and loss combination of products with a fat claim relative to no-claim for each of the 21 product categories. For example, point A1 in Figure 4.10 represents the canned beans product category where, on average, the fat decreases by 50% but the sodium increases by 136% when a fat claim is present, relative to no-claim products in the category. In contrast, A2 in Figure 4.10 represents the cookie category where, on average, products with a fat claim have 39% less fat but 23.4% more sodium relative to the no-claim products in that category. This is still considered an exaggerated product claim but not a highly exaggerated claim. Overall, this method emphasizes an interesting consumer-focused review of the exaggerated product claims where consumers who are selecting claim products as a way of eating healthier may need to examine on-package information closely so that they are avoiding unknowingly trading away nutritional gains with losses.

⁵⁹ The percentage change in sodium (nutritional loss) is generated as follows for each product category: average sodium value for all claim products minus average sodium value for all no-claim products divided by the average sodium value for all no-claim products. The percentage decrease in fat (nutritional gain) uses the same formula but instead uses the fat nutrient.

Figure 4.10: Percentage of Nutritional Gain (Decreased Fat) and Nutritional Loss (Increased Sodium) in Products with a Fat Claim



Natural, Organic, and Third Party Health Claim

In the early stages of this research, the empirical analysis focused exclusively on the relationship between nutrient claims and FSS levels. However, during the research study the focus broadened to *organic*, *natural* and *third party* claims because in the literature and in this study’s focus group findings (discussed later in Section 5.5.2), consumers indicate that these three claims are often used a decision variables and they consider products with these claims as healthier. In reviewing the relationship of these claims to FSS levels, it is essential to note that these claims should be viewed as slightly different from the nutrient type claims because even though they are regulated claims, they do not have specific nutrient compositional requirements (see Section 2.3.3 for claim details). In other words, these claims tend to be descriptive of the product as whole. For example, foods with *natural* claims must have ingredients that are derived from natural sources and are considered *natural* when they meet specific criteria associated with processes, additions and removal of ingredients. As well, the term *organic* is only allowed on products when organic content is greater than or equal to 95% and requirements of the Canadian organic regulation related to production and processing of the food are met. Finally, *third party* claims may or may not be related to nutrient levels depending upon the agency providing the endorsement. As well, these *third party* claims are generally provided on products that are manufactured by the firm or enrolled in the third party’s program. For example, the Heart and Stroke Foundation provides their endorsement to products that enroll in their program and meet their own defined nutrient criteria for the product category. As discussed later in Section 5.5.2, it is also interesting to note that although a large number of the focus

group participants use these claims as input to their product selection, many were unaware of the specific criteria or rules associated with these same claims.

In the analysis, the relationship of the claim to FSS nutrients relationship is examined in the same manner as the nutrient type claims where a significant negative coefficient indicates a FSS-beneficial claim while a significant positive coefficient indicates an exaggerated product claim. Model 3 in Tables 4.7, 4.8 and 4.9 shows the results of the *organic*, *natural* and *third party* claim regressions.

Tables 4.7, 4.8 and 4.9 show that a *natural* claim can be considered FSS-beneficial for the case of sodium. Specifically, sodium is lower by 41.79 mg (2.78% of RDI and 15.8 % of the mean value). This is an interesting result because consumers who select a product using a *natural* claim as a guide to a healthier product may indeed be obtaining the product characteristics associated with a natural claim but are also obtaining slightly lower sodium than product without natural claims. In addition, consumers are faced with a confounding effect associated with the natural claim where products with this claim provide a significant gain in sodium and no significant relationship with sugar or fat relative to products without a natural claim.

In Tables 4.7, 4.8 and 4.9, the *organic* claim is a FSS-beneficial product claim for sodium, sugar and fat. More specifically, when an *organic* claim is made on a product, on average, the sodium is lower by 81.68 mg (5.45% of RDI and 30.9 % of the mean value). In addition, sugar is, on average, lower by .912 g (2.7% RDI and 17.5% of the mean value) and fat is lower, on average, by .5548 g (.65% of RDI and 13.6 % of the mean value). All values are in comparison to products without an *organic* claim. It is useful to discuss some possible explanations for the *organic* claim being a FSS-beneficial product claim rather than an exaggerated product claims.

One explanation for the FSS-beneficial *organic* claim may have to do with the type of consumer who purchases *organic* products. Results from a 2013 survey by the Canada Organic Trade Association of over 1500 Canadians, aged 25 and over, reveals that *organic* food purchasers tend to be urban, educated and wealthier (Canada Organic Trade Association & MacKinnon, 2013a, 2013b). These traits are the same demographic traits that are associated with an increased likelihood of reading nutrition labels, as reported in a summary of a 2013 U.S. National Health Interview Survey study (Roethel, 2012). Given this connection between consumer type, propensity to read labels and *organic* food purchases, it follows that food manufacturers will not typically find it profitable to offer *organic* products with comparatively high levels of the FSS nutrients. In other words, the *organic* consumer is similar to the Segment 1 consumer from the theoretical analysis in Section 4.4.2 (recall that a Segment 1 consumer uses and understands the claim and nutrition facts label when evaluating the overall quality of the product).

A second potential explanation for why *organic* claims tend to be FSS-beneficial claims may have to do with the disconnection between the *organic* claim criteria and product matrix/taste. As noted, the provision of an *organic* claim is related to a product's production process and *organic* content and generally does not require an adjustment to the product matrix/taste. Thus, there is no claim nutrient to adjust when making an *organic* claim resulting in less need to increase FSS nutrient levels. In addition,

because consumers who purchase organic products often do so to obtain products they view as being higher in nutrition and healthier (Lee *et al.*, 2013) and often view healthier foods as less tasty (Wansink *et al.*, 2004), there may not be as strong a taste requirement for organic products resulting in less need for upward adjustments to FSS nutrient levels to accommodate taste. In contrast, consumers who buy products with nutrient type claims (e.g., fibre or low fat) may prefer the product to taste similar to the no-claim product encouraging firms to increase the level of FSS nutrients to accommodate these tastes.

A final important consideration concerning the characterization of the *organic* claims as FSS-beneficial is the consistency of this result with the well-documented halo effect for organic products. In this study, the concept of a halo effect being applied to the organic claim is valid because there is a net gain in nutritional quality based upon the lower levels of FSS nutrients that are not considered part of the *organic* claim criteria. A number of studies have noted that consumers tend to overgeneralize the organic attribute to other product attributes such as lower calories, higher nutrition, better tasting and better nutrition (Lee *et al.*, 2013). The term halo effect is somewhat negative because it tends to imply that beliefs are misguided and/or consumers are gullible. Interestingly, the results from Tables 4.7, 4.8 and 4.9 suggest that a halo effect label for organic foods may actually be warranted in the case of sodium, sugar and fat.

As shown in Tables 4.7, 4.8 and 4.9, third party claims showed no significant relationship to fat, sugar or sodium. As a reminder, third party refers to third party endorsements, logos, heart symbols etc. In this data, a large number of the third party claims are associated with the Heart and Stroke Foundation Health Check claim and logo. Again, these are interesting results in the context of research and industry studies which show that consumers are influenced by third party claims and endorsements by national and international health agencies (Feunekesa *et al.*, 2008; Muellera & Umbergerb, 2010). Specifically, consumers who use these third party claims as decision variables to select healthier products will tend to be buying products where there is no significant differences in the level of fat, sugar and sodium when a *third party* claim is present. Thus, using the third party claim as a decision variable may not be a useful strategy.

4.8 Conclusions from the Economic Model and Empirical Analysis

4.8.1. Addressing the Research Questions

The first research sub-question addressed in this quantitative study is “What product strategy in terms of claims and nutrient levels would a food manufacturer use given consumer demand and the existence of asymmetric information in the industry?” Based upon the results from the economic model, food manufacturers finds it optimal to produce an exaggerated product claim version of a product when the proportion of consumers that use only taste, price and nutritional good from the FOP in their product assessment is high and/or the changes in level of nutritional poor that must be added to the claim version of the product to maintain taste is low. In other words, the exaggerated product claims will be profit

maximizing when the number of consumers who are significantly influenced by such a claim is sufficiently large relative to the level of the less-healthy nutrient in the product. These two elements of segment size and level of nutritional poor are of particular interest because they incorporate the market-driven decisions of food manufacturing managers, food engineers and marketing personnel as they define the firm's exaggerated product claim and no-claim product strategy. The potential impact of these conditions for which the food manufacturer finds it optimal to produce the exaggerated product claim version are discussed in Section 4.6.

The second research sub-question addressed in this quantitative study is "Do exaggerated product claims have a significant presence in the current marketplace and if so, what is the nature of these claims?" Based on the case study and regression results, exaggerated product claims are seen to exist in the marketplace and these claims exhibits specific patterns.

First, the case study approach supports that food manufacturers do in some cases employ exaggerated product claims by incorporating higher levels of the less healthy nutrients when moving from a no-claim to an exaggerated product claim version. As well, the matched exaggerated product claim to no-claim product analysis reveals specific patterns between claim type and nutrient level.

In addition, the empirical results also support that significant exaggerated product claims do exist in the marketplace. In particular, six exaggerated product claims associated with nutrients were found: products with a saturated fat claim tend to have higher sodium levels (exception in model 3); products with a cholesterol claim tend to have higher sodium levels; products with fat claims tend to have higher sugar levels; products with sugar claim or sodium claim tend to have higher fat; and products with an omega-3 claim tend to have higher fat levels, on average, all relative to products without these claims.⁶⁰ The impact of these exaggerated product claims are discussed in detail in Section 4.1.

4.8.2. Strengths and Limitations of the Model, Data and Approach

The strengths of the study include the following:

- i) collection of a unique and large data set that provides good representation of processed food products and supports generalizability of results
- ii) presentation of a product strategy, developed from the economic model, that focuses on the current marketplace factors of consumers' utilization of nutrition information and firm-defined product attributes;

⁶⁰ Often, the term "on average" is used when describing the significant presence and nature of exaggerated product claims. This is done to underscore that individual products may have other exaggerated claims (as seen in the case study), and not every claim type that was found to be exaggerated will exhibit the specific claim to FSS nutrient level relationship that was defined in this study. The study results nevertheless support the general finding that product claims are exaggerated, on average, when a group of products with claims is being compared to a group of products without claims.

- iii) measurement of the significance, magnitude and type of exaggerated product claim in the current marketplace;

The limitations of the study are related to the data and include the following: data was collected for a large number of products but only at one major store; product price was not collected; and accuracy of the NFL data is unknown as it is provided by food manufacturers. The potential impact of these weaknesses on the study is likely limited for the following reasons. First, although data was collected only from one store, the range of products carried by the store is quite broad, as it is part of a larger chain of stores. Additionally, the socio-demographics of the consumers living within a 10-kilometer radius are relatively broad (e.g., students, families, professionals, seniors and apartment and house owners). Data was collected from 21 processed food product categories, which also supports a broad representation of processed food products. Addressing the exclusion of price, the lack of price data limits the exploration of the relationship between a product's prices and claim status. For example, given the disconnected relationship between organic and natural claims with a product's specific nutrient compositional requirements, it would be interesting to explore the strength of the relationship between price and these claims. As well, it would be interesting to review the nutrient claim to price relationship to evaluate if FSS-beneficial claims tend to be associated with higher prices and exaggerated product claims tend to be associated with lower prices. These dimensions cannot be addressed due to the lack of price data. Finally, although food manufacturers provide (and thus self-regulate) their on-package nutrition information, large discrepancies would likely be noticed by the CFIA or competitive firms.

CHAPTER 5 A Qualitative Inquiry of Consumers' Utilization of On-Package Information in their Product Assessment and Selection

5.1 Introduction

The many new voluntary claims approved over the past ten years provide consumers with an increasing range of on-package nutrition information. Research on the topic of consumers' utilization of this information is challenging, given marketplace dynamics that include consumers' growing nutrition awareness and knowledge; manufacturers' increasing use of on-package formats to promote their products' health benefits; and governments' approval of new on-package nutrition information options. The purpose of this chapter is to describe how consumers' use on-package nutrition information and product claims when assessing product quality.

Specifically, Section 5.2 presents the major research questions that serve as a basis for the selection of the study methodology. Section 5.3 provides a brief overview of select theories from the areas of health promotion/behavior, consumer behavior and marketing that are used to guide the methodology, focus group procedures and analysis of the findings. Section 5.4 outlines the research methodology including the rationale for using the focus group approach and details regarding focus group sampling, recruitment, procedures and data analysis. A review and discussion of the major themes developed from the focus group sessions are presented in Section 5.5. A discussion addressing the research questions, additional on-package information topics, and strengths, limitations and rigour of the study are provided in Section 5.6.

5.2 Research Questions

The major research question associated with this inquiry is the previously defined research sub-question III: How do consumers utilize (e.g., use and understand) nutrition information and product claims when assessing product quality? Specifically, this inquiry includes several sub-questions:

1. How do consumers use and prioritize FOP messaging, the NFL, the ingredient list, price and taste to make product quality assessments when selecting "new to you" processed food products?
2. What are consumers' perceptions of the FOP messaging?
3. What are consumers' use and understanding of the rules associated with FOP messaging?
4. Are consumers aware of and/or misled by exaggerated product claims?
5. Are consumers able to fully utilize the NFL as a source of nutrition information for decisions regarding "new to you" processed food products?
6. What elements (e.g., health concerns, healthier eating, and product category) can influence how consumers use and prioritize FOP messaging, the NFL and the ingredient list?

5.3 Overview of Theoretical Models Applied to the Consumers' Product Selection Process

In the literature, a large number of health promotion/behavior, marketing communications and consumer behavior models have been developed and used to review consumers' decision-making process. A subset of these models, considered most relevant to this research topic, has been used to develop the conceptual framework for the consumer decision-making process (Section 3.3.3), select the methodology and define the data collection procedures. In addition, these select theories were viewed as valuable for guiding the analysis of the focus groups findings and developing themes. A brief description of each theory and its potential application to explain the findings from this study is provided below.

The Precaution Adoption Process Model (PAPM) (Weinstein, 1988) specifies that an individual must go through a series of stages before modifying behavior and making healthier food choices. Cognitive processes are involved in stage advancement and barriers that limit progression exist between stages. The PAPM model utilizes the concepts of optimistic bias⁶¹, barrier reduction⁶² and messy desk⁶³ regarding decision making. The PAPM can be used in this study to explain potential barriers to consumers' full utilization of on-package information as well as how consumers at different stages utilize claims and nutrient information when making healthier food choices.

The Elaboration Likelihood Model (ELM) (Wilson, 2007) describes how attitudes are formed and changed. The theory defines that two routes to persuasion exist: central (deep cognitive thought and high elaboration resulting in long term attitude change) and peripheral (shallow cognitive thought and low elaboration resulting in shorter term attitude change). Processing is influenced by contextual factors and individual traits. Health claims providing disease avoidance content (e.g., "*A healthy diet low in saturated and trans fats may reduce the risk of heart disease*") can be considered to provide elaboration and promote long-term attitude change. This theory is used in to the study to provide a basis for understanding consumers' ability to process nutrition information claims and how context factors (e.g., information overload, lack of understanding or distraction) may limit this ability.

The halo effect (Elliott, 2010; Roe *et al.*, 1999) is a consumer behavior cognitive bias theory where one product attribute influences the consumer's evaluation of the whole product with the consumer being unaware of this bias. This theory can be used to review a claim as an opportunity for consumers to generalize the positive benefits of the claim to the whole product, skewing the product quality upward.

⁶¹ Optimistic bias is a belief by an individual that they have a lower risk of facing a health event than others.

⁶² Barrier reduction refers to identification of barriers (e.g., time, money, effort) and provision of support to reduce those barriers and support advance through stages and to behavior change.

⁶³ Messy desk refers to the idea that consumers are aware of a concern and have decided to take action but have competing interests and thus the action become buried under other competition interests.

Hoyer's (1984) theory of consumer buying proposes that purchasing a product consists of a five-stage decision-making process: need recognition, information search, evaluation of alternatives, purchase and post-purchase evaluation. This model has been used in product marketing scenarios to examine the specific role of information sources during the information search and evaluation stages of the purchase decision. In this study, the theory can be used to examine the influence of FOP claims and NFL on the selection of processed foods.

The concept of advertising persuasion and consumers' lack of awareness regarding the persuading influence of advertisements is well developed in the book, *The Hidden Persuaders* (Packard, 1957). Throughout this book, the cognitive and psychological techniques advertising agencies have historically used to induce purchase are thoroughly discussed. This concept brings focus on the need to review consumers' awareness or lack of awareness about the influence FOP claims have on their selection decision.

The anchoring effect (Kahneman & Tversky, 1979) describes the effect that providing an anchor or starting point has on decision making. Claims on processed food products are voluntary and thus, even though they may have the same nutrient levels and net diet contribution, some products in the marketplace include claims and others do not. Based on the anchoring theory, products with claims may be viewed by consumers as higher quality relative to products without claims, thus actively distorting their quality assessment process.

Negative defensive stereotyping occurs when an initial deception produces a strong, negative and broad carryover effect. Several studies have found that deceptive advertising by one firm can create a negative and distrustful attitude in consumers toward general advertising and marketing, and that this attitude is extrapolated to other firms, products and geographic locations (Darke *et al.*, 2010; Darke & Ritchie, 2007). The theory brings forward the need to extend the inquiry beyond consumers' vulnerability to exaggerated product claims; instead, the inquiry should also consider the potential impact that exaggerated claims may have on non-exaggerated claims.

The information processing theory (Simon & Newell, 1971) is rooted in computer to human comparison research. This theory defines that humans are information processors with limited resources and a goal to simplify search and evaluation processes when making decisions. Similar to the information processing theory, the principle of parsimony (Haines, 1974) assumes that individuals adopt heuristics with the goal of restricting data and making satisfactory decisions. The specific rules (in the form of cues) associated with the heuristics can be developed using personal judgments, past experience, real world patterns or additional sources and may not necessarily be based upon full information associated with the decision (Bettman, 1970; Haines, 1974; Kahneman & Tversky, 1979). Based on these theories, consumers may employ FOP claims to achieve efficient and low cost product selection decisions even if they are aware of the associated cost of the search limitations.

As noted earlier, these theories are used in the development of the overall research design, and applied to the focus group discussions to improve explanations of focus group findings.

5.4 Research Methodology

This section provides an overview of the methodology used in this stage of the research.

5.4.1. Focus Group Approach

The consumer-focused stage of the research used a qualitative focus group approach. This approach was guided by the research sub-question (See Section 5.3) and the component of the conceptual framework that focused on consumers' decision-making process (See Section 3.3.3).

A set of two pilot and eight data collection focus groups sessions (two at each of four locations) was determined to be practical and efficient. The four locations allowed consumers with diverse socio-demographic backgrounds to participate, while two sessions per location provided enough sessions to achieve information saturation (Krueger, 1998; Teddlie & Tashakkori, 2009).

As discussed above, a variety of methods including observation, survey and interviews (personal and focus groups) have previously been employed to explore how consumers use and understand on-package information in their processed food purchase decisions. In the specific area of claims and the NFL, the most common methods of analysis are experimental design and, to a lesser extent, industry surveys. In the current context, a specific advantage of the focus group method over other methods is that in order to address the research questions it is important to examine not just consumers' use of nutrition information, but also their understanding and depth of knowledge regarding the NFL, ingredients and claims within the context of product selection. Although consumer use of the NFL is well documented in the literature, several studies have pointed out the importance and difficulties in distinguishing between use and understanding of the NFL and claims (Cowburn & Stockley, 2005; Higginson *et al.*, 2002). In this study, consumers who report use of FOP claims and the NFL need to be differentiated from consumers who utilize this same information because the former may be vulnerable to exaggerated product claims. The focus group discussions and techniques (i.e., probing, clarification and follow-up questions) support the in-depth exploration that is required to differentiate between consumers' use and understanding of on-package information.

A second rationale for the focus group approach stems from the fact that in the past ten years the Canadian government has approved over 51 nutrient and health-related claims (Health Canada 2012). As noted above, studies based on surveys and experimental design work well for analyzing one or two specific claims. However, they are not as well suited for analyzing consumers' perception of this rapid change in the availability of food product information. Given consumers' relatively recent exposure to the large number and unique format of claims, there is an opportunity to gain new insight regarding claim usage in the consumer decision-making process. This goal of gaining insight fits well with the flexible interview guide format of the focus group method. For example, interesting and unanticipated comments brought up by participants during discussions can be followed up in the focus group session.

Another specific advantage of the focus group approach is that, since consumers may be unaware of how they make their product quality and selection decisions, it is appropriate to use a focus group data collection method supporting direct interaction with participants. For example, consumers who do not realize that they use FOP claims in their decisions would simply answer no to any related questions in a formal survey. However, when consumers can be observed viewing products and have their selection comments followed-up during focus group discussions, a much broader range of the consumer decision-making process can be revealed.

Finally, the focus group method is well known to provide the following benefits: richer views and responses; able to provide images/examples; broader range of data due to group dynamics (e.g., interaction and countering of other's opinions); and larger amounts of data collected in a short time period and for lower cost (Bazeley, 2004; Collins & O'Cathain, 2009; Greene, 2007; Macario *et al.*, 1998; Marshall & Rossman, 1980; Sandelowski, 2000; Teddlie & Tashakkori, 2009; Wolcott, 2001).

5.4.2. Sampling, Recruitment and Demographics

Purposive sampling was used to select participants who would provide the strongest insight to the research questions and topics (Creswell, 2007; Miles & Huberman, 1994). The purposive sampling frame used in this study is based upon the conceptual framework and the results of the quantitative analysis reported in CHAPTER 4. The conceptual framework's specific influence was to ensure that the sampling frame resulted in a set of recruited participants who use different combinations of variables (i.e., claims as messaged on FOP, nutrient information as provided on other parts of the package, perceived taste, price, individual, environmental and social variables) and factors (i.e., time, literacy, education, culture) in their decision making.

Regarding the influence of the quantitative analysis on the sampling frame, recall that the empirical results supported the presence of exaggerated product claims in the marketplace, while the model supported positive incentives for food manufacturers to use exaggerated product claims based on consumers' utilization of FOP messaging when selecting products. Given these two outcomes, the sampling frame should result in the recruitment of participants who have broad marketplace experience and exposure to a range of on-package nutrition information.

To ensure that the focus groups sessions were comprised of participants with the above described traits, the purposive sampling frame includes the following attributes:

1. Participants should have experience selecting and purchasing groceries, including a range of processed food products, for a household; and
2. Participants should be recruited from a range of education, age and income levels because more varied socio-demographics implies that participants are more likely to use different variables and factors in their decision-making process and have varying levels of understanding of on-package information (Andrews *et al.*, 2009; Brunt & Schafeer, 1997;

Fullmer *et al.*, 1991; Gibbs & Chapman-Novakofski, 2010; Macario *et al.*, 1998; Nayga Jr., 2000). At the very least, highly varied socio-demographics will ensure a broader representation of views.

Once approval was obtained from the UBC Behavioral Research Ethics Board, a recruitment plan consisting of the following elements was developed and implemented.

- **Inclusion Criteria:** 18 years of age or over, ii) have purchased food products from at least three of the following grocery categories in the past month: cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings, iii) able to speak, read, write and understand English and iv) reside in the Vancouver area.
- **Area Selection:** Four areas (i.e., Mount Pleasant, Sunset, Kerrisdale and Kitsilano) in the city of Vancouver were chosen for both recruitment and the focus group session. These areas reflect the diversity of demographic characteristics (i.e., higher and lower income, education and age) as established by the sampling frame (Vancouver Economic Commission, 2009).
- **Promotions:** Posters and advertisements were designed for the four selected Vancouver area locations. Recruitment posters (See Appendices M and N) were displayed in community centers, senior centers, neighborhood houses, coffee shops, gyms, daycares and public libraries in the four areas. Each poster included the following: a brief overview of the study; remuneration amount; location, date and time of study; participant requirements and contact information. Contact information was available from recruitment business cards (See Appendix O) that were attached to the posters. As well, recruitment newspaper advertisements were placed in two local area papers, *The Courier* and *Coffee News*, for one week with these papers being distributed in the Mount Pleasant, Sunset, Kerrisdale and Kitsilano areas (See Appendix P).

Consumers interested in participating were asked to sign up for a specific date, time and location by contacting Kelleen Wiseman (main contact for the study) via email or phone. Approximately 250 people phoned and emailed to indicate their willingness to be part of the study. Success of the recruitment plan was attributed to strong coverage of the posters and advertisements, ease of sign up (i.e. poster displayed session dates/times/locations and phone or email), provision of both afternoon and evening session options, value of the remuneration and widespread applicability and interest of the research topic.

Selection of the participants from this pool of 250 people was made based on the following: timing of calls/emails (e.g., earlier calls were placed earlier on the potential participant list); requirement to obtain participant diversity of education, age and income levels; preference for those living in the four select areas; and additional inclusion criteria regarding age, literacy and residency as outlined in the UBC ethic's approval. Once selected, each potential participant was contacted by phone to confirm that he or she met all inclusion criteria and was able to commit to attending a specific focus group session. Participants were then mailed or emailed consent forms for their review. A reminder of the date/time of the focus group was provided one day before the focus group session via phone.

Participants were asked to complete a short demographic survey (See Appendix Q). As illustrated in Table 5.1, participants were from a range of age, household income, education, income, racial/cultural, marital and employment groups. There appears to be a good dispersion among all of the categories with the exceptions of gender (50 of the 57 participants were female) and education (38 of the 57 participants had a college, university or graduate degree).

Table 5.1: Demographic Characteristics of Participants in Eight Focus Groups (n=57)

Gender	Female	50
	Male	7
Age (years)	18-29	6
	30-49	14
	50-64	25
	65 and over	12
Total Household Income	less than \$20,000	8
	20,000-34,999	8
	35,000-49,999	6
	50,000-64,999	8
	65,000-79,999	12
	80,000-100,00	4
	Greater than 100,000	10
Highest Level of Education Completed	Some high school	2
	High school graduates	3
	Some university or college	10
	Trade/vocational/technical	4
	University or college degree	28
	Graduate degree	10
Racial or cultural group	White	35
	Asian	14
	South Asian	5
	Other	2
Marital Status	Single	20
	Married	20
	Living common-law	8
	Separated/Divorced	7
	Widowed	
Employment Status	Employed	26
	Retired	18
	Self-employed	4
	Out of work but looking for work and Out of work but NOT looking for work	4
	Homemakers	2
	Student	1
	Unable to work	1

Category summations may not add up to 57 because of non-responses.

The demographic variables (i.e., gender, age, household income and education) broken down by focus group session location are summarized in Table 5.2. Detailed demographics for each location are specified in Appendix R.

Table 5.2 Demographics Characteristics of Participants by Location

Sunset Community Centre	n=15 85% female 92% age range of 30 to 64 69% income levels less than \$64,499 77% university or college degree
Mount Pleasant Neighbourhood House	n=13 93% female 100% age range of less than 64 57% less than 49 years 47% income levels less than \$64,499 Greater concentration of those having income less than \$34,999 73% university or college degree
Kerrisdale Community Centre:	n=15 80% female 80% 50 years and over Greater concentration of those having incomes greater than \$100,000 53% university or college degree
Kitsilano Community Centre	n=14 93% female 79% between 50 and 64 years Greater concentration of those having incomes over \$100,000 and less than \$34,999 64% university or college degree

Overall, Tables 5.1 and 5.2 reveal that participants are characterized by a broad range of demographics in the main categories other than gender, thus allowing for a range of views to be brought to the sessions and research topic.

5.4.3. Focus Group Procedures

Interview Guide

The interview guide outlines the topics, specific questions and activities (with time allotments and prompts) covered during the focus group sessions. It is used by the moderator to ensure consistent and timely coverage of topics. Similar to the sample frame, the interview guide used in the focus group sessions was based upon the research questions, conceptual framework and results from the quantitative study. The main topics in the guide are as follows:

- Introduction of Study
- Activity: Viewing and selection of processed food packages
- Factors considered when purchasing processed food products in a grocery store.
- Package reading practices - Role of the FOP messaging information together with product nutrient information, price and taste
- Exploration of how consumers weight, use and understand each of the factors of FOP messages, perceived taste, NFL and ingredient list when using this information in their product assessment and select decisions.

- Exploration of the perceptions of FOP messaging as it relates to product purchase decisions.
- Identification of how the weight of FOP messages, taste, NFL and ingredient list factors differs when applied to specific scenarios or food categories
- Consumers' package information priorities
- Closing

The full 16-question interview guide is provided in Appendix S.

Pilot Sessions

Two 90-minute pilot focus group sessions were conducted at UBC to test the focus group interview guide and procedures and to allow for training of the moderator and research assistants. These sessions were observed by an experienced focus group moderator, Dr. Gwen Chapman, The University of British Columbia, who provided feedback on how the moderator conducted the group, room set up and research assistant task performance.

Setting and Structure

Eight 90-minute data collection focus group sessions were conducted in four locations. The settings of Mt Pleasant Neighbourhood House, Sunset Community Center, Kerrisdale Community Center and Kitsilano Community Center were selected because they were considered neutral, comfortable and easily accessible locations for participants. The specifics of the sessions in terms of date, time and location are described in Appendix T.

The focus group moderator, Kelleen Wiseman, and two trained research assistants; arrived at the meeting room 60 minutes before each session's start time to set up the room, processed food products and audio recording equipment. Room setup for each session consisted of a large table in the central part of the room, eight to ten chairs placed around the table, a flip chart used for topic and word prompts, and a table with processed food products on display. The product display presented a variety of processed food products to be used in the discussion. Approximately 25 processed food products from eight different product categories (i.e., cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce or salad dressing) were set out for the participants to view (See Appendix U for images of room and product set-up). The product packages in each product category included different flavors, FOP messaging and nutrient levels and in some categories included packages exhibiting exaggerated product claims. For example, one of the packages of cookies on display had both a high fibre FOP message and high sugar content while a second package of cookies did not have any FOP message and had lower sugar content than the first cookie package. Each product also had a price tag

(all prices within the product category were set at the same level). All products on display were at the time available at local grocery stores.

As each participant arrived, they were welcomed by the moderator and then asked to see a research assistant to sign in and pick up a consent form (see Appendix V), demographic survey and name tent. Each participant then took the materials and sat at the table in a location of their choice to complete the paperwork that was later collected by the research assistants. Once all registered participants were present, the moderator switched on the audio equipment and proceeded to introduce the study as outlined in the focus group interview guide. Participants were instructed to take 15 minutes to review the displayed processed food products for products that were “new to them” and if possible make a decision regarding which of the “new to them” product/s they would consider purchasing. Research assistants were present to record observations regarding how participants reviewed packages and verbal comments made during this product review.

Upon completion of the product review and selection, participants were asked to return to their seats at the table. At that point, the moderator began the discussion based on the semi-structured focus group interview guide. At the close of the 90-minute session, participants were provided with a gift card as remuneration for participation in the focus group session.

Role of Moderator

The major duties of the moderator include: communicate the research objectives and procedures; encourage a diversity of opinions from all participants by ensuring a safe and relaxed atmosphere and ensuring that participants were comfortable enough to reveal their knowledge or lack of knowledge regarding on-package information and decision-making process; encourage participants to balance the role of an expert and interactive group participant; provide clarity to the process as requested; guide the discussion toward the research topic areas of interest with the aim of gathering a consensus, but without limiting unanticipated new topics; and maintain a degree of consistency of inquiry across the focus group sessions.

Two concerns, moderator overload and moderator bias, are often associated with the moderator’s role. These concerns have the potential to influence participant discussion and the consistency of procedures, both of which will reduce the quality of the collected data. In this study, moderator overload was a possible concern because the moderator has many duties to manage during the 90-minute session with six to eight individuals. To alleviate this load, two research assistants were hired to conduct administrative tasks and take notes (observations and non-verbal communication) during the sessions. This assistance allowed the moderator to focus more on the defined duties and in particular, to respond and guide participants in their discussion. However, even with this assistance there is still likely to be variation across sessions and location regarding how well the moderator’s duties are completed. This variation can potentially influence the range of data collected in the sessions.

With regard to moderator bias, the nature of qualitative inquiry allows the researcher to be part of the process and thus some moderator bias is unavoidable. Pilot sessions were used to help identify the various biases and formulate strategies to minimize the effect of bias on discussions. For the case at hand, examples of moderator bias includes a lack of recognition that the ingredients list is an important nutrition information variable, a belief that Health Canada is a well-known and credible information provider and a belief that food manufacturers will format their nutrition information in a way that will sell products as opposed to educate or inform consumers. Understanding these biases, the moderator took the following steps to counter their effect on the discussions:

- Limited personal opinions and encouraged a range of views, especially those which are associated with the identified biases
- Gravitated away from a survey format of questions and instead allowed participants to explore issues beyond the interview guide
- Increased awareness of the goal to “find what I am looking for” in the discussions
- Increased awareness of the balance between being an active participant and the moderator
- Increased awareness of the effect of verbal or non-verbal cues on steering, approving or disapproving participants’ opinions

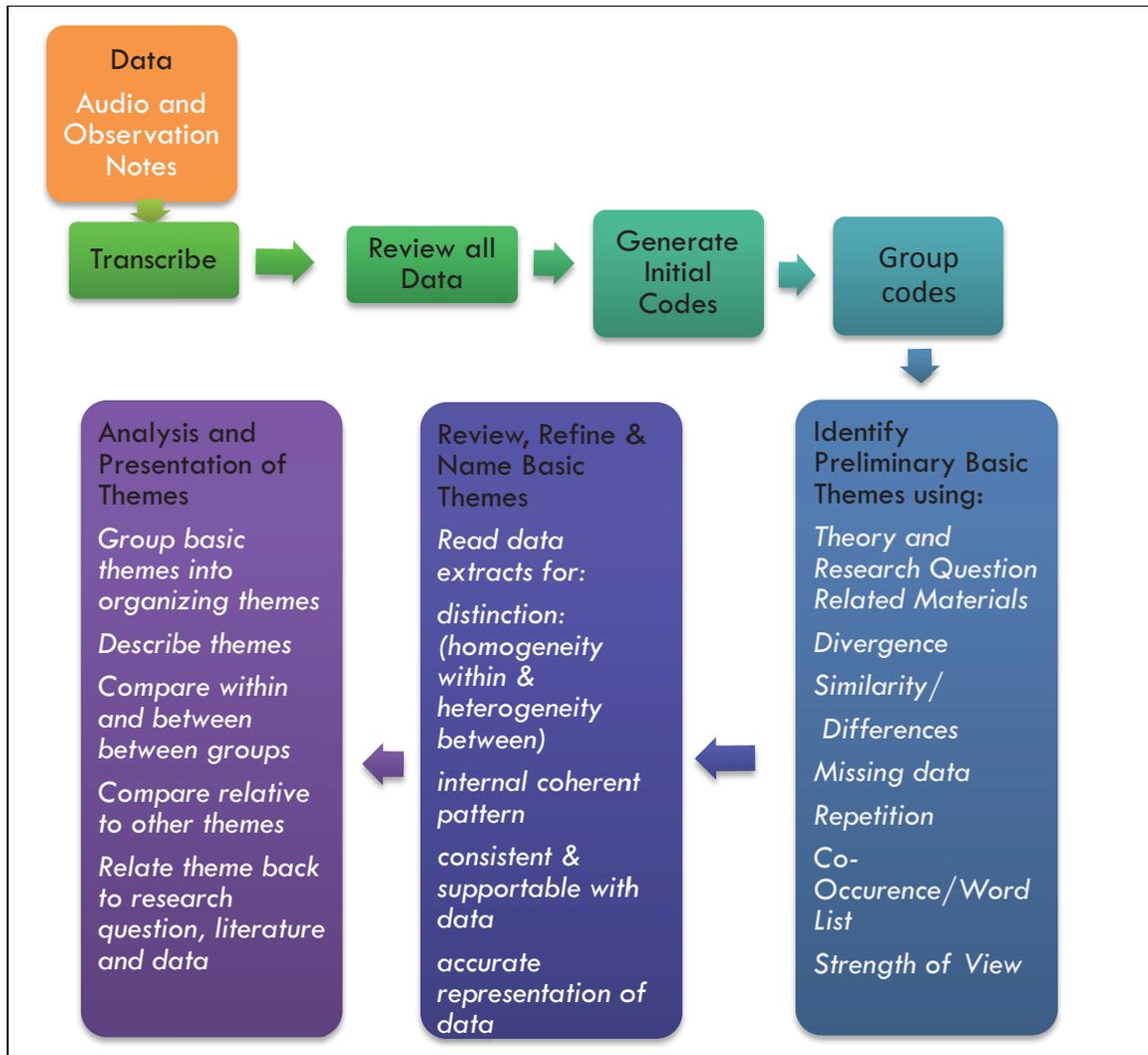
Moderator overload and bias posed significant challenges. However, because the biases were considered, recognized and a set of strategies developed prior to the data collection sessions, their negative effects were greatly reduced. Moderator bias associated with data interpretation and theme development is discussed in Section 5.6.2.

5.4.4. Data Analysis

Thematic analysis, the primary analytic method used in this research study, involves inductive and interpretive analysis of the data with the objective of identifying themes. The role of the identified themes is to go beyond data description toward integration of related ideas in order to develop a picture of the research topic which is both more coordinated and organized, but yet still abstract in nature (Braun & Clarke, 2006; Ryan & Bernard, 2003).

The specific analysis follows a systematic approach of transcription, data coding, code categorization, theme development, theme refinement and theme presentation, as illustrated in Figure 5.1. This systematic pattern of analysis ensures a high level of rigour for the research results (Barbour, 2001; Krueger, 1998).

Figure 5.1 Process of Theme Identification, Assessment and Presentation



Initial coding of the data was based upon the conceptual framework and topics from the research questions (e.g., decision-making variables). However, in an effort to encourage depth and breadth of analysis, a relatively open approach to the coding process was maintained, which implies that the codes were also developed inductively from the raw data (e.g., the tradeoff, 80-20, skepticism of food quality, frustration). Coding was conducted using Atlas.ti software (Muhr, 2012).

Once coding was completed, initial basic themes were then identified using a range of techniques including: relation to theory and research questions; homogeneity and repetition of views; divergence of views; missing perspectives; comparison between and within focus groups; co-occurrence of two or more viewpoints; and strength of viewpoint (Bazeley, 2009; Braun & Clarke, 2006; Guest *et al.*, 2012; Ryan & Bernard, 2003).

After specification, the basic themes were refined and reviewed to ensure that each exhibited the following characteristics:

- Distinction: homogeneous within a theme and heterogeneous between themes;
- Cohesion: an accurate although more abstract representation of the data associated with codes which make sense to the reader;
- Consistency: data within a particular theme exhibits a unified pattern and supports the theme (Braun & Clarke, 2006); and
- Comprehensiveness: broad enough to incorporate a large amount of the data associated with the codes

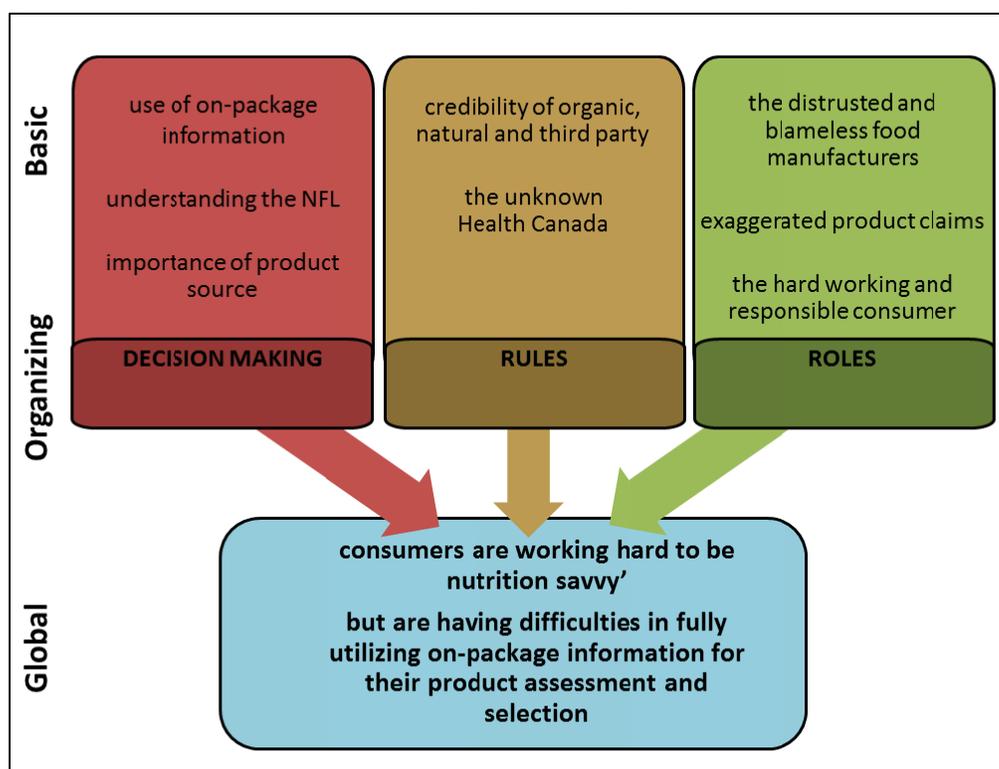
During the final step of the data analysis process, basic themes were grouped into organizing themes to support a more cohesive presentation the data without losing the richness of the participant discussion. These organizing themes were then used to develop the global theme (Attride-Stirling, 2001).

5.5 Themes from Focus Group Sessions

A detailed overview of the emergence of themes is presented in Appendix W. Ultimately, the data analysis process resulted in identification of eight basic themes that were then clustered into abstract concepts represented by three organizing themes – *decision making, rules and roles* (See Figure 5.2). These three organizing themes supported the emergence of the global theme which defines the participants' positions regarding utilization of on-package information for product assessment and selection in the processed food marketplace: consumers are working hard to be 'nutrition savvy' but are having difficulties in fully utilizing on-package information for their product assessment and selection.

The organizing and basic themes are presented in Sections 5.5.1, 5.5.2 and 5.5.3. Each of these sections also includes an integration and discussion section that outlines major findings associated with the themes and explores possible explanations for these findings through application of the theories presented earlier.

Figure 5.2: Thematic Network: Basic, Organizing and Global Themes



5.5.1. Organizing Theme 1: Decision Making

Basic Theme 1: Use⁶⁴ of On-Package Information (NFL, Ingredient List and FOP messages)

Participants were very responsive when answering the question, "what on-package information do you use to help you decide what food to buy?" Across all focus groups, most participants reported using either the NFL and ingredient listing or both from the package when deciding whether purchase products that were "new to them."⁶⁵ Participants often did not use the correct names to differentiate the NFL and ingredient list, simply referring to them as "label," "lists" or "back of package." Participants used phrases such as "straight to the NFL," "read the side panel," "only the ingredients" or "look at the detailed information at the back" when asked what on-package information they used when making decisions. As one

⁶⁴ As discussed earlier when analyzing the consumer decision-making process (Section 2.6.2), utilization refers to both use and understanding of on-package information. The difference between use and utilization depends on consumers' understanding of the specific nutrition information. For example, use of the NFL refers to a consumer being aware of the NFL and including that information in their decisions, while understanding the NFL refers to consumers using NFL information in a way that is relevant to their own or household members' lifestyle and health to support informed food choices. Examples of understanding include knowing RDI base weights (i.e., sodium 1500 milligrams) or percentages that are relevant to their own age or health and conversion required to change NFL nutrient levels or RDI percentages to servings size that are relevant to current consumption levels.

⁶⁵ Focus group participants were asked to consider assessment and selection of products that were "new to them" as opposed to routine purchases of processed food products.

participant put it: *"I always, always - unless it's a product that I've already bought, if it's something new I always read the ingredient list, I always go down the nutrition facts"* (P1).⁶⁶

In contrast to the high reported use of the NFL and ingredient list, only a small number of participants self-reported their use of FOP nutrition information. Among those who did, many indicated that they would use the FOP together with the NFL and/or ingredient list when making product selections. However, others reported that they would focus mainly on the FOP if they were looking for a specific product feature such as *"lower sodium," "higher fibre," "calories," "calcium" or "trans fat."* Some participants indicated that the FOP information *"draws them in"* or supports a *"quick decision,"* such as one participant who said, *"this says whole grain, I'd be like ooh, let's get that one if I was going to pick up something quicker"* (P6) and another who said, *"61% less sodium, so I would choose that one right away because it says - Yeah. I don't have to look at the back because it says it up front, so that's what I would choose"* (P2).

When discussing the FOP nutrition information, many participants made strong negative comments about FOP messages using phrases such as *"lure you in," "never take it for face value," "more critical about what's on there," "I dismiss them," "it's like advertising," "misleading" and "skeptical."* As one participant put it, *"well, the front of the box. - made with whole grain, but that doesn't mean the whole thing is a whole grain. It might be one little Cheerio that's the whole grain, you know. Like it drives me up the wall"* (P5).

Participants were asked probing/clarification questions regarding the specific on-package information they used in product selection. Many indicated they look for phrases such as *"70% organic," "healthy choice," "whole grain," "multigrain," "gluten-free," "low-fat" or "low calorie"* (terms they would find on the FOP) to help them decide. In most sessions, these phrases were noted by participants who had previously indicated they did not use the FOP. As well, during these discussions and/or because others mentioned using the FOP, many participants began to realize – often with surprise and ruefulness - that they actually do use FOP nutrition information. As one person said, *"it's probably that front of package that's going to catch your eye, to be quite frank, much as I hate to say it"* (P7).

In addition to using self-reports and clarification/probing questions to review participants' FOP usage, the moderator and research assistants also observed what participants were reading on the package during the product viewing component of the session. Recorded observations reveal that many of the participants actively read the FOP during product viewing.

A large number of participants across all groups noted using on-package information to look for specific items such as additives or coloring (n=9)⁶⁷, fats (n=14), sodium (n=18), hydrogenated items (n=11), sugar (n=7) and to a lesser extent calories when making product selection. A smaller number of participants noted they were looking for protein or fiber when making product selections.

⁶⁶ P refers to participant. The number refers to the session number (1 through 8).

⁶⁷ n equals the number of times this nutrient was mentioned when participants were asked about product assessment and decision-making process.

There was strong consensus among a large number of participants that products that contained “additives,” “colorings,” “long names with “X Z” and “long non-pronounceable shelf life additives” should be avoided, and many participants reported using the ingredient list to look for these items. Phrases such as “the less ingredients there is -the better” and “if you can’t pronounce it, don’t eat it” were used to describe views regarding ingredient inclusions. A few participants noted that their reason for looking for these types of items was to avoid chemicals that were “not good for the body.”

Participants were asked the question “What if someone in your household is trying to eat “healthier” – does that change how you use the on-package information?” Most responses were similar to those received regarding selection of “new to you” products. Specifically, participants indicated that they would use some or all of NFL, ingredient list and FOP and that they would eat less processed foods. Examples of participant views regarding eating healthier include:

“So, you know, under those circumstances the nutrition facts would become really important” (P1).

“I tend to try to avoid like the boxed things then and just get like fruits, vegetables, and like do everything like myself. So I won’t like grab a granola bar. I’ll have actually like whole grains with fruit on top instead” (P6).

During the session – either at the end of the discussion associated with the use of on-package information for product selection or at the end of the overall session – a number of participants commented that prior to the session they were not aware of the various sources of on-package information which they were using in their product selection decisions.

Basic Theme 2: Understanding the Nutrition Facts Label

Participants’ understanding of the NFL was reviewed using participants’ self-reported views and their responses to various clarification questions.

Most participants self-reported that they often had difficulties with the NFL because serving sizes varied across products within one product category, serving size on the NFL does not match what they really eat or their household’s age or health needs were different than the ones they believed were used to develop the NFL information.

Most participants indicated that serving size was the most trying and prominent issue they faced when attempting to interpret information on the NFL. Many reported particularly high frustration when trying to compare products and make selections based on NFL values when the serving sizes varied on products within the same product categories (e.g., 30 to 40 grams for breakfast cereal). Participants used phrases such as “it really throws you,” “super frustrating,” “sneaky” and “you’ve got to watch” to describe their concerns. As one participant explained, “the serving size really gets me, particularly for common products like margarine and even some of the cereals. And you can’t compare because you feel that some of them are making small serving sizes to make it look better than what it really is” (P1).

In addition to the frustration over serving size variation, many participants described being unhappy and concerned because the NFL values were based upon serving sizes that are too low for their specific needs. In particular, participants noted their frustrations when the serving size was either less than what they would normally eat or less than the whole package. Participants commonly commented that this made the NFL values on the package no longer applicable or useful to them. No one identified serving sizes used in the NFL as being too high in value. Phrases such as “*you get fooled,*” “*that’s not enough,*” “*too complicated*” and “*an hour later you’d be falling over*” were used to describe concerns with the serving sizes. Said one participant, for example,

“It’s misleading sometimes because you have to check for the serving size, because you automatically assume it’s for the whole - I automatically assume it’s for the whole packaging, or what’s in it, I mean. Yeah, but like it could be for just a cup, or especially if you’re looking out for your salt intake or other things” (P1).

Regarding serving size conversions, many of these same participants indicated that if they did try changing the on-package NFL values to another serving size so they could make product comparisons it would require good math skills, a calculator and/or time, as illustrated by this exchange:

“Yeah, you almost have to bring a calculator.”
“It would be easier, actually. It’s true.”
“Yeah, you try to do it in your head you can’t do it” (P8).

In addition to the above serving size difficulties, many participants’ spoke of their concerns with the NFL values (and the corresponding percentage RDI values) when they were buying products for young children, older adults and people with health concerns. Most indicated that they were aware that age and health likely made a difference to the relevancy of the NFL values to their own needs. However, many also said they were unsure of how to adjust the NFL values and/or did not know the reference value appropriate to their own and household members’ needs. Illustrations of the level of participants’ frustration with NFL values include, “*when they come up with that percentage, what is that percentage based on, whether is it for a child, an average adult?*” (P4) and “*but how much you need to take, and I think it’s calcium, it depends on how old you are. So that percentage is useless information*” (P2).

In order to explore the depth of participants’ understanding of the NFL, participants who indicated they used the NFL were asked for the specific benchmark NFL values or RDI percentages they used for comparison or selection. Most participants were able to provide reference NFL values for calorie and trans fat. Participants reported routinely using these two items in their selection process and the benchmark values for comparison that they mentioned were generally quite accurate (“*okay this is 140 for three of those and this is this and therefore I’ve got like 2000 a day*” and “*trans fats, I don’t like it. – I never buy it, even 0.1 or 0.01*”).

In contrast, when asked about reference values for nutrient other than calories and trans fat, most participants responded more generally by identifying specific items (and not values) such as sugar, sodium, potassium and fat that they wanted to avoid or items such as fiber that they wanted to adopt. When

prompted to provide a specific NFL nutrient value, many participants avoided or sidestepped the request and used phrases such as “it depends,” “as many as possible,” “less” or “low ones.” The following few cases where participants did use specific values showed uncertainty and incongruence with Health Canada guidelines, such as a participant who said, “anything above four percent sodium is definitely a high content. So this is 20 percent” (P7), in contrast to public education materials that encourage consumers to choose foods with less than 15% RDI of sodium (Government of Canada, 2012). When questioned about the meaning of “high source of fibre” claims, which can be placed on food having 4 grams of fibre per serving size (Canadian Food Inspection Agency, 2010a), a participant in one group thought, “it should be like three grams or more” (P6) while someone in another group said, “anything above two or above” (P8). The discussion regarding NFL benchmarks prompted these participants to reveal their difficulties with the NFL percentages as follows,

“I’m glad it has fat, protein, sugars and stuff like that, but they never add up to a hundred. Like you’re lucky if you get up to a quarter - so I don’t understand that. It bothers me” (P5).

“I think I learned something, like it’s the percentage is actually the daily intake, I guess, the whole intake percentage of it” (P5).

Basic Theme 3: The Importance of Product Source⁶⁸

Most participants in all of the sessions identified product source⁶⁹ as being of importance to their product quality and selection decisions. More specifically, most indicated they wanted products that were processed in Canada and/or ingredients that were produced in Canada. Participants provided many reasons for wanting Canada-sourced products and ingredients such as “greener footprint,” “less transport,” “support Canada,” “Canada to get jobs,” “taste,” “better tasting,” “because of the rules” and “much rather support them and buy them for taste and everything if it comes from here.” A number of reasons are illustrated in this exchange,

“But it’s pride.”

“I think it’s like the highest end probably, right, if you do a comparison.”

“We want Canadians to get jobs, you know.”

“And it’s a greener footprint, less transport, all these types of things coming into it. Environmentally aware” (P5).

Many participants had difficulties in determining ingredient source and/or country where the product was manufactured. Their difficulties with product source information is illustrated by comments such as “you can spend half an hour trying to find it, you know, where it actually comes from” (P1) or “product of Canada or made in Canada is a very confusing thing” (P5).

⁶⁸ Product source is a regulated food claim as defined in Section 2.3.3. Consistent with actual practice, only the country of origin phrases were provided to participants but not the qualifying terms “food claim.”

⁶⁹ Participants tended to use the term product source to encompass ingredient source, growing conditions, processing and manufacturing location and processing standards.

In their discussion of product source, a number of participants noted that different countries have different standards of processing and production. Often two-way and/or three-way comparisons between California, Canada, Chile, China, Europe, Mexico, Taiwan and U.S. were made. In all cases, participants placed Canadian and U.S. standards near the top and always placed Chinese standards at the very bottom. As one person commented, *“there’s some countries that don’t have as high a standards as we do here in Canada or in the States. And sure, some European ones have higher ones but some don’t”* (P5).

An overriding consensus across all groups was that ingredients or food products from China were foods to avoid. This view received no dissent and was articulated by both Asian and non-Asian participants. In a number of the sessions, an Asian participant came out first and very strongly against purchasing China-sourced processed and/or fresh foods. Once these Asian participants articulated their avoidance of China-sourced products then others in the group (Asian and non-Asian) agreed and the discussion then moved to sharing stories regarding foods from China. Some of the phrases used to describe China-sourced foods included, *“if it said organic still, it would still be a junk product to me,” “throw it back”* and *“won’t touch anything from China.”* Lack of trust, contamination, incorrect labelling, past melamine scares in Chinese products, poor taste and concern over standards were reasons for provided for avoidance of these products. Participants exhibited strong negative feelings on the topic as illustrated in comments such as, *“I would never buy anything from China. I would never trust those people”* (P1) or *“fish from some rivers in Asian countries are so heavily contaminated, even the fish are getting cancer and all that, and we are getting it”* (P5).

Decision Making: Integration and Discussion

Three major themes related to decision making were developed from the focus group discussions; use of on-package information, understanding the NFL and importance of product source.

Specific findings include high reported use of NFL and ingredient lists, but difficulties in understanding the NFL. As well, use of FOP messages was initially reported as low but later revealed as being a combination of relatively higher FOP usage paired with reluctant acknowledgement or lack of awareness of FOP message usage. Results relating more directly to the process of decision making involved use of rules of thumb as a way to process detailed NFL/ingredient lists and inclusion of product source as an important decision making variable.

Use of on-package information is particularly important for both consumers and firms given reports that 76% of purchasing decisions are made in-store with consumers spending an average of 35 seconds per food product bought (European Food Information Council, 2009; POPAI - The Global Association for Marketing at Retail, 2012). The high NFL usage rate found in this study is consistent with studies estimating NFL usage rates in the range of 54% to 65% (Canadian Council of Food and Nutrition, 2009; Grunert & Wills, 2007) and contrasts with a 2012 U.S. study that shows that less than 15% of consumers use the NFL usage (POPAI - The Global Association for Marketing at Retail, 2012). Self-

reported ingredient usage among participants was high, with ingredient inclusion often used as a purchase elimination criterion. In the literature, ingredient list usage is a minor topic with minimal research coverage.

In regard to who uses on-package information, the literature reports label usage as highest among Caucasian, higher income, higher educated and health conscious women (Pothoulaki & Chryssochoidis, 2009). Even though participants in this study came from a wider range of socio-demographics than those noted in the 2009 study, findings indicate a consistent pattern in label usage. In other words, high label usage was reported among an even wider range of age, household income, racial/cultural, marital and employment demographic groups than has been reported in the literature supporting the potential for transferability of this study's findings given additional context-specific consistency. However, it should be noted that because of the gender imbalance in this study, results are more likely applicable to grocery shoppers and women but not men. Grocery shoppers is an applicable segment because 62% of grocery shopping is conducted by women (Hale & The Nielsen Company, 2011).

Difficulty in understanding the NFL emerged as a strong and consistent theme across focus groups, indicating that a gap exists between participants' use and utilization of the NFL for product assessment and selection. Similar to the literature discussed in Section 2.4.2, participants' understanding of the NFL often related to purpose and complexity of the task. Participants were able to understand the NFL when looking for a specific nutrient or calorie level. However, serving size variations, small font size, long nutrient lists, lack of benchmarks and more complex math conversions all caused confusion and appeared to limit participants' ability to understand the NFL. This nuance between use and understanding as self-reported by consumers is examined in a 2002 study (Higginson *et al.*, 2002). This study shows that consumers' self-reported use of the nutrition label should be more correctly classified as accessing rather than using as it primarily involved a review of the nutrient values. Moreover, processing and evaluating tasks such as calculations or assessments were not conducted by these consumers despite their reported label usage. In a related study by Scott and Worsley (1997), 92% of respondents self-reported that they looked at the NFL list, 65% targeted specific nutrients while only 26% indicated that they performed processing or evaluation tasks (e.g., calculations). Thus, similar to the literature, what participants reported as NFL usage may more likely be NFL accessing or looking without evaluation. An understanding of the NFL is particularly important for consumers when assessing exaggerated product claims.

This gap between use and utilization of the NFL is partially explained through application of the Precaution Adoption Model (Weinstein, 1988). The research of Zepeda and Li (2007) and Weinstein (1988) in the context of organic foods and radon protection revealed that socio-demographic traits, cost and benefit assessments, cues to action, competing life demands and personal beliefs can limit movement through the PAM stages. As well, these studies support that some type of intervention (e.g., promotion and education) may be required to encourage progression between stages. Thus, in applying the PAM to this study, participants may not be adopting actions that ensure their understanding of the NFL due to cultural or literacy vulnerabilities, distractions or time limitations, a belief that they already understand the NFL, or

lack of self-efficacy (e.g., believing NFL is too complicated to them to use). In other words, these factors act as barrier and keep participants from fully adopting NFL utilization skills/behaviour.

Concerning FOP being used as an input to the decision-making process, two particularly interesting observations came forward during the focus group discussions. First, during discussions a number of participants became aware of their use of FOP information to facilitate quick decisions and/or minimize information search. This finding is consistent with Williams (2005) and Roe *et al.* (1999) who noted that consumers often truncate their information search and overemphasize claim information when claims are present on the package. Second, a number of the participants, who were skeptical of the FOP because they viewed it as advertising and possibly misleading information, acknowledged using the FOP in their decision-making process. Applying the information processing theory, participants in this study may be using the FOP messages even when they are skeptical of the information because this usage increases efficiency and minimizes search cost (Simon & Newell, 1971). The use of FOP alone or together with NFL use (not understanding) is particularly important when assessing the potential impact of exaggerated product claims on consumers.

Specific rules of thumb (also referred to as a heuristic) were used by participants' to streamline the product decision-making process. A common heuristic was to look for one to three less-healthy items on the NFL and/or ingredient list and if present, then reject the product without further assessment. It was less common for participants to have a heuristic for healthier items. Often the heuristic appeared to be developed based on the individuals' peer group and beliefs as opposed to health education sources. Research focusing specifically on heuristics associated with consumer food choice is limited. However, participants' use of the heuristic process can be explained using the principle of parsimony (Haines, 1974) where participants develop the heuristics using their own personal judgments or past experience not necessarily upon full information and then apply these rules to streamline their decision-making process.

Product source turned out to be a central and yet difficult to determine product selection variable for participants. Product source is a notable theme, first because of the strength of conviction and consensus communicated by participants, and second because it emerged spontaneously from participant comments and not from direct questions specified in the interview guide or the conceptual framework. For most participants, U.S. and Canada are near the top, Mexico and Chile are toward the middle and China is at the very bottom. An important and interesting result that emerged pertained to the strong negative feelings toward food products from China and the strong consensus regarding the need to avoid food products and ingredients from China. This identification of product source and China-sourced product avoidance as being important product selection variables is unique within the existing literature.

Overall, concerning product assessment and selection, participants have developed a perceived hierarchy of credible information to use in the decision-making process with NFL at the top, ingredient list next, and the FOP a distant third. Product source and avoidance of China-sourced products, when available, was also used as input to the decision-making process.

5.5.2. Organizing Theme 2: Rules

Basic Theme 4: The Credibility of Organic, Natural and Third Party⁷⁰

A large number of participants across all sessions expressed the view that when *Health Check*⁷¹, *organic* or to a lesser extent, *natural*, was present on the FOP it was more likely that they would notice the FOP and consider the product to be of higher quality. Similar to other FOP messages, participants' initial low self-reported usage of these FOP terms was later replaced with recognition of higher and varying usage.

Organic

Many participants expressed views that organic foods are “better for you,” more nutritious and less likely to have unhealthy ingredients. In discussions, participants used positive phrases such as “less chemicals,” “healthier,” “few sprays,” “avoiding things,” “ingredients are good,” “not very many preservatives,” and “everybody should buy organic milk” to describe their view of *organic* foods. One participant said this regarding *organic* food, “Yeah, I’m looking for quality of the food, that if it was grown in organic soil it’ll have more micronutrients in it, for example. Things that aren’t going to make the nutrition label” (P7).

A number of participants extended the meaning of ‘*organic*’ beyond farming practices to include aspects of food manufacturing, taste, sustainability and ethical issues (e.g., company integrity and treatment of workers). This extended view of the term *organics* was illustrated in the participants’ comments such as “not made in a lab,” “safer,” “quality,” “value,” “more integrity” and “the way the animals are treated and stuff.”

Several participants indicated their high level of trust in the term *organic* by noting that they would often not check the NFL or ingredient list as thoroughly or at all if the product were *organic*. One participant stated, “when I see *organic* the first thing that comes to my mind is oh, okay, this is healthy and it is better than other things, so I won’t check that much. I won’t check nothing, like the nutrition facts or anything. I’ll just buy it” (P6).

When asked about the price of *organics*, most participants agreed that the price for *organic* foods, especially produce, is higher but only a few stated concerns about the higher price. From those that noted they are not able to buy *organic* because of the higher price, a number of them said that if they had the money they would pay extra for *organic* products. As one participant explains, “it pays because it’s good for your health, so try to invest on that because, you know, it will affect your lifespan also” (P8).

⁷⁰ Third Party is regulated as a general health claims (See Section 2.3.3) and refers to third party endorsements logos and heart symbols. Organic and natural are regulated composition and quality food claims (See Section 2.4.2). Consistent with actual practice, only the text or phrases or term FOP were provided to participants but not the qualifying terms “food claim” or “health claims.”

⁷¹ The logo *Health Check* is a trademark of the Heart and Stroke Foundation. Criteria for placement of the logo are developed by registered dietitians based on Canada Food Guidelines (Heart and Stroke Foundation., 2012). *Health Check* is a third party general health claim.

A different view of *organics* was held by a smaller number of participants who noted concerns with the process of organic certification, differing organic standards across countries and questions regarding the amount of organic ingredients within the actual product. Participants expressed their concerns by using phrases such as “not convinced,” “skeptical,” “unsure” and “not buying into too much organics” with one participant asking, “who certifies it because there seem to be so many different agencies? Like Safeway seem to have their own certifying agency, which makes me a little suspicious” (P2).

Very few participants were able to provide a clear definition of the term *organic* and/or the rules associated with *organic* food production. During the discussion, participants began to reveal more uncertainty about the term *organic* and recognize their own lack of knowledge about its definition. When asked specifically about the rules associated with *organics*, many participants instead responded by asking questions about the agencies that certify organics, what *organic* really means, who makes the rules and what rules apply to different food products. As one participant explained, “I still don’t understand the *organic*. What is *organic*? How does *organic* proceed? How do you get *organic* thing? When you get *organic* meat the *organic* meat, does it taste a little bit different from the ordinary meat, especially chicken?” (P1).

Natural

For many participants, the word *natural* had a positive association. Phrases such as “*natural* healthy,” “*natural* fresh,” “*better for you*” and “*catchy*” were used to describe the term *natural* and/or *natural* ingredients. Many participants self-reported that the term *natural* on the FOP would draw them in when they were trying to be healthier and when selecting products.

However, a number of participants expressed their concern about the meaning of the term *natural*. Phrases such as “*skeptical*,” “*throwaway*,” “*not a standard that I’m familiar with*,” “*no known definition*” and “*cynical*” were used by participants to describe their view of *natural*. A number of participants noted that they had heard/seen news reports in the past months of a sliced meat brand that used the term *natural* on the package of a cold cut meat product even though it contained nitrates (“*because those things that said natural, they’re not*”) making them question the word *natural*. As one participant puts it, “*with all natural ingredients, and I have read some reports that, you know, this word natural, they throw it around very, very loosely*” (P2).

Health Check

When shown products (e.g., soup and cereal) that included the *Health Check* logo, participants had a strong positive response using phrases such as “*reliable*,” “*authority*,” “*approved*,” “*it must be good*,” “*I’ll go for it*,” “*that’s one thing that might influence me*” and “*that’s a big thing*.” As one person said, “*sometimes I’m looking for - there’s a symbol of a heart and then check, so that means that that is healthy. I’m looking for those things on the package*” (P8).

Because of this strong positive response, participants were asked probing questions regarding their understanding of the rules associated with the *Health Check* logo. None of the participants in any of the sessions was able to articulate the criteria involved in the *Health Check* approval process. Responses

included general phrases such as “*probably just cholesterol or fat or something,*” “*I don’t know what’s behind it but I just believe that*” and “*particular measure of nutritional content.*” A number of participants responded by referencing the reputation of the Heart and Stroke Foundation using terms such as “*credibility,*” “*well known*” and “*visibility.*” One participant explained their view as follows, “*it just seems like it’s more reliable because it’s got authority. I would think it’s established that there’s some sort of regulations. Like the fact that they’re endorsing it, that they’ve tested it, that they’ve even examined it, so I would think it’s more reliable than just the ingredients and nutritional facts and all the other key words*” (P6).

A few participants in different sessions noted that they had heard or read that companies have to pay to have a *Health Check* logo included on their food product and that this had made them “*skeptical*” or “*look at them with a great deal of caution.*” When these comments were made, others in the group did not react to any strong degree or change their positive view of *Health Check*.

Participants were shown and asked to compare Health Canada claims (i.e., nutrient content and health claims) to the *Health Check* logo. In order to replicate the real-world marketplace, participants were provided with the text of a claim (e.g., “*40% less fat*” or “*fibre shown to help reduce cholesterol*”) without reference to the Health Canada name or type of claim (nutrient content or health). The *Health Check* claim was presented as it appears in the marketplace, a logo with the text “*Health Check*” and “*Heart & Stroke Foundation*” plus a check mark on a red circle. A majority indicated that the *Health Check* logo was more “*useful*” and “*credible*” whereas the Health Canada claims were described as “*kind of valueless statement*” or “*vague.*” One participant explained their comparison as follows, “*but I do believe that if it’s Heart and Stroke endorsed, then it’s had to go through some particular measure of nutritional content. Whereas oat fibre helps lower cholesterol is a very sort of vague issue*” (P4).

Basic Theme 5: The Unknown Health Canada

Participants from all sessions revealed low or no recognition of the role of Health Canada and CFIA as being the government agencies that govern on-package nutrition information. This lack of recognition is expressed by participants’ questions such as, “*Is there any regulations federally that request that they use the same portion size?*” and “*There is no agency or like governing body or something like which governs all the products which goes on the shelves of the store?*” As well, requests were made for “*standardization of weights and values so that - you could make an actual comparison and trust that it was correct more standardized information*” and “*regulating what is in the package.*” In fact, in all of the discussion groups, Health Canada and the CFIA were only mentioned twice.

When asked if there knew if there were rules associated with the information that can be placed FOP, participant responses ranged from “*Not that I’m aware of but I don’t know*” to “*probably not*” to “*some-rules.*” None of the participants indicated that CFIA or Health Canada was involved with FOP regulations. A number of participants indicated that they believed that industry was the main developer of the FOP messages (“*well, they ARE putting anything they want on it.*”).

After this discussion of rules and FOP, a number of participants acknowledged limits to their knowledge of claims as illustrated by comments such as “25 percent less of what. What is the base? What it used to be?” or “when it says source of something, you know, how much fibre is it? Is it a huge source or is just a tiny little bit of fibre?” In addition, a few participants articulated a connection between their lack of knowledge of FOP rules and their “skeptical” or “dismissive” view of the FOP message as illustrated in this comment:

“I don’t really look at labels but when it says, as you read, with some of that yogurt, more calcium or whatever. Compared with what? How do I know? I mean more than, less than - less than or more than what? Well, I dismiss them, I dismiss them, because I think I don’t know what they’re comparing them with, so how meaningful is it?” (P1).

Most, but not all, participants were able to articulate clearer views regarding NFL rules by noting requirements such as NFL format and mandatory items, ingredient listing format (e.g., most to least important) and product content such as whole grain or nut-free. As one participant explains, “it doesn’t seem like there’s any rules they have to follow. But with the nutrition label it’s different, and with - hopefully with the ingredient list too.” However, as with the FOP, few participants identified Health Canada and CFIA as regulators of the NFL and ingredients list.

When participants were asked their opinions of nutrient content claims versus health claims⁷², they reported some level of confidence in nutrient content claims (“it must be legit somehow for them to be able to use those words”) and expressed a preference for the shorter and more direct phrases found in these claims. In contrast, most participants generally viewed health claims as negative or dismissed them as credible information sources using terms such as “vague” “misleading” or “not telling you anything” when describing them. As one participant explained, “I think it’s okay that you can say it’s a source of something, but it’s when you start to claim that it actually - you can get some result from something that you eat, like that’s -that’s when you can get into trouble. So again, it’s misleading, you know” (P4). A few participants indicated that they found health claims were more “effective” and “informative” than nutrient content claims. Others in the session voiced their disagreement with these participants.

During the discussion, participants were asked to compare *Health Check*, nutrient content claims and health claim. A majority of participants quite confidently ranked *Health Check* first, nutrient content claims lower but second and health claims at the very bottom or not at all.

Rules: Integration and Discussion

Two main themes emerged from discussions of the rules associated with FOP claims. First, participants generally (but not universally) found the *Health Check*, *organic* and *natural* claims to be both

⁷² Text and/or phrases available on the processed food packages were used as examples during discussions.

trustworthy and credible. Second, participants were largely unaware of CFIA's and Health Canada's role in regulating on-package and, more specifically, FOP messages (i.e., nutrient content and health claims).

The trust and credibility associated with *Health Check*, *organic* and *natural* claims did not appear to be the result of participants' knowledge of the claims because many participants were uncertain of the specific meaning and scope of the regulations of these terms. Consistent with the results of a study published by the Food Standards Agency (2002), participants appeared to construct beliefs about regulated claims using sources other than scientific or government facts, and these beliefs were responsible for their trust and use of regulated claims. Information sources used by participants to develop beliefs about *Health Check*, *organic* and *natural* claims included friends, family, the name of the certifying agency on the logo (e.g., USDA *organic* and Heart and Stroke Foundation), overall awareness of the certifying agency (e.g., Heart and Stroke was identified as sponsoring events and having longevity), media and CBC's televised Marketplace program. Furthermore, participants maintained this strong level of trust of these terms even when over the course of the discussion they became explicitly aware of their lack of knowledge regarding the specific regulations of the *Health Check*, *natural* and *organic* claims. In contrast, participants' negative assessment of health claims and their tentative assessment of nutrient content claims appeared to be linked to how they interpreted the words within the specific claim (i.e., vague, misleading).

Participants who trust *Health Check*, *organic* and *natural* designated products tended to view these claims as implying higher overall quality and a healthier product. In the literature this bias is referred to as the "halo effect" (Thorndike, 1920). The halo effect has been applied in a variety of difference contexts including nutrition/health claims (Lee *et al.*, 2013; Roe *et al.*, 1999; Williams, 2005).

Throughout the discussion, some participants were somewhat skeptical of the *organic*, *natural* and other FOP claims, which is consistent with the literature (Cravatta, 1998; Datamonitor, 2009b; Health Canada, 2009; Just-food, 2008; Lewis & Yetley, 1992; Mazis & Raymond, 1997; Tan & Tan, 2007; Tate & Lyle, 2009). For example, a 2008 U.S. Health and Diet Survey reported 56% of consumers believe that some or none of nutrition and health claims are accurate (United States Food and Drug Administration *et al.*, 2009).

However, a unique result from this study is that many participants maintained dual and conflicting beliefs (i.e., strong halo effect and level of trust but at the same time skepticism). For example, participants looked for the term "*natural*" when selecting products but also said they were skeptical of this term or used the FOP "25% less sodium" to select products but expressed mistrust as to what the 25% was compared to. For most participants with conflicting beliefs, the strong halo effect and high level of trust appeared to outweigh feelings of skepticism because many participants reported using these claims to select products. This desire to streamline the product selection process even if it requires using skeptical information sources can be partially explained by the earlier defined information processing theory (Simon & Newell, 1971) and principle of parsimony (Bettman, 1970; Haines, 1974; Kahneman & Tversky, 1979).

As noted above, participants identified the *Health Check*, *organic* and *natural* claims as important information sources. This linkage between source and action is consistent with Hoyer's (1984) consumer buying process model. For example, Bech-Larsen *et al.* (2001) studied the effect of an organic mark as an information source and found that consumers with higher trust in the organic mark purchased organic products in supermarkets while consumers with lower trust purchased such products in health foods stores. This finding suggests that both the logos and levels of trust act as influential information sources in the consumers' buying process and final product selection. Using this theory, claims such as *Health Check*, *organic* and *natural* can be seen as sources in the information search stage of the buying process and as a way to decrease effort required to evaluate alternatives. Participants' resistance to changing their beliefs even when provided with contradictory information (e.g., *organic* claims does not guarantee higher nutrients or better taste) is part of the post-purchase evaluation stage where consumers actively avoid cognitive dissonance (i.e., holding two conflicting views at one time) (Festinger & Carlsmith James, 1959).

The infrequency with which the roles of Health Canada, CFIA or even the term "government" were used during discussions with participants is surprising. The role of government as a regulator of food safety is well documented in the literature (Caswell & Mojdzuska, 1996; Caswell *et al.*, 2003; Redmond, 2009). Less common in the literature is research focusing on consumers' awareness of governments' role and how this awareness impact consumers' use of information to make product selections. In this respect, this study's identification of consumers' lack of awareness regarding governments' rule-making role for processed food on-package claims is a unique result.

When asked to make comparisons, participants typically grouped FOP industry promotion and health claims together. As well, health claims and to a lesser extent, nutrient content claims were commonly reported as less credible and less useful in comparison to *Health Check* and *organic*. The anchoring effect theory of Kahneman and Tversky (1979) helps to explain this phenomena. Using anchoring theory, participants do not view nutrient content and health claims in isolation. Instead, when assessing these claims, participants view them relative to the highly regarded *Health Check* logo and thus discount them, not because they are unknown or vague claims but because they seem less credible relative to what they consider the more trusted claims.

Finally, when participants were asked to compare claims they reported a stronger preference for nutrient content claims over health claims. This can be partially explained by recalling that health claims (e.g., "A healthy diet rich in a variety of vegetables and fruit may help reduce the risk of some types of cancer") promote credence attributes that are generally more difficult for participants to assess accurately. In contrast, nutrient content claims (e.g., 140 calories or low fat) are more similar to search goods where promised benefits can be verified by utilizing the NFL and making product comparisons. This finding that consumers prefer the more specific nutrient content claims over health claims that promise credence attributes is well documented in the literature (Andrews *et al.*, 1998; Caswell & Mojdzuska, 1996; Cowburn & Stockley, 2005; Verbeke, 2005).

5.5.3. Organizing Theme 3: Roles

Basic Theme 6: The Distrusted and Blameless Food Manufacturers

Throughout the discussions, participants used words such as “unconscionable,” “tricky,” “skepticism,” “deceptive,” “distrust” and “misleading” when referring to on-package information, FOP messages, product quality and food manufacturers.

Many participants expressed the feeling that food manufacturers deliberately made on-package information into something that is “deceptive,” “complicated,” “CAN’T figure it out” or “a trick” in order to sell products. The consensus and strength of this negative feeling toward food manufacturers was shown by phrases such as “I don’t know how they get away with that,” “that’s what they WANT you to believe,” “you can’t believe what they said” or “I look at them with a great deal of caution.” One participant described their view as, “cynical, but our food is coming to us through huge corporate organizations and yeah, there’s lots of examples of misleading information, and the regulatory process is quite limited. So my feeling is it’s pretty hit and miss” (P7) while another noted, “it’s a marketing world out there” (P6).

Once this concern or cynicism was articulated by one participant, it was common for others to draw on their own or friends’ experience or media reports to tell stories about food manufacturers’ attempts to sell more products or make the products more attractive to consumers. These stories included: lowering serving size so that NFL fat levels are lower per serving (“it can be zero, but if you look at the whole thing, that might be the real serving size, it would show up”); showing lower values for calories or unhealthy items than what are really in the products (“is it 110 calories or is it 122 calories” or “there’s discrepancies”); showing low or no-fat on the FOP when the product type doesn’t even have fat (“did it ever have trans fat in it?”); using the term *natural* when the product does not contain natural ingredients (“that allows them to get a natural health product on there, even though it’s the furthest thing from it”); using terms such as real fruit or real chocolate when there is only a tiny amount of real fruit or chocolate in the product (“says like 100 percent natural orange juice, but it’s made with like perfumed dyes”); and making the product appear to have less of a unhealthy nutrient (i.e., sodium, sugar, hydrogenated fat) by using different names for the item (“they could use another word for sodium” or “they’ll separate the different types of fats and then you’ll have to add it all up to see how much”). One participant explained their concern by noting, “bananas were advertised as cholesterol-free. Big deal. Bananas have never had cholesterol in them. So they will try and pull the wool over people’s eyes with advertising or using the latest buzz words” (P1).

Many participants expressed their distrust of food manufacturers and on-package information by describing scenarios where they felt food manufacturers were using on-package information not just to draw them in but also to “take them in” or fool them into buying products. Many participants across all sessions used strong negative phrases such as “they got me again,” “marketing ploys,” “just to get you to buy,” “it’s a battleground,” “it’s all spin on the front of these packages,” “suckered in,” “it’s like advertising,” “I find that deceptive” and “they’re just poofing with us” when describing their distrust of on-

package information. One participant remarked, *“well, the whole of the front of the packaging is designed to attract people, you know, sway their decisions. So it’s often misleading, it’s all spin on the front of these packages”* (P4).

Although most participants across all sessions expressed frustration and distrust of on-package nutrition information, very few placed direct blame on food manufacturers. In fact, a number of participants acknowledged the dual role of information provision and product selling that food manufacturers manages in the marketplace. One participant said, *“why should they have to make every label at the front of the box the same for everything they make with other companies, right? So, you know, companies should be able to market in some ways that are, you know, not total lies, I guess”* (P5) while another commented, *“well, I think they’re also caught in between things”* (P5).

Basic Theme 7: Exaggerated Product Claims

When participants were provided with a specific example of an exaggerated product claim⁷³ and asked if they had noticed tradeoffs in nutrient levels in food products with FOP messages, only a small number of participants tentatively acknowledged that they might have noticed such tradeoffs during their product comparisons. One participant said, *“they say it’s low fat but there’s usually something added that’s not that good, like more sugar”* (P3) and another commented, *“because they started to bring in the whole grain and they just put too much sugar in there”* (P5).

Most participants said they had not noticed these tradeoffs when grocery shopping. Several participants said that it was unlikely that they would notice these tradeoffs because of how they utilized on-package information focusing on the FOP rather than the NFL. As one participant said, *“well, honestly, a lot of time, no. [laughs] -If I like something like which I have tasted before, I mean I won’t - honestly, I don’t check that much, you know. So if it is just whole grain, okay, whole grain is good so that’s it”* (P6). Interestingly, even after discussing the format of the exaggerated product claim, many participants remained confused about this type of claim.

Participants’ reaction to the example of products with exaggerated product claims included a mix of acceptance or complacency (*“so there it goes”* and *“oh, well”*) to mild surprise (*“interesting”*) to concern (*“phony”* and *“gets you upset”*). In one session, participants reacted very strongly. Their stunned silence and then strong reaction using phrases such as *“tricking you”* and *“coercing you”* was noted by the moderator and both research associates.

Basic Theme 8: The Hard-Working and Responsible Consumer

Many participants across all sessions reported that the process of product selection and food shopping was hard work, using phrases such as *“very very complicated,” “big work to do,” “odds are against you”* and *“frustrating”* to describe this process. One person made the following remark, *“I’ll actually check,*

⁷³ The term, exaggerated product claim, was not used and defined until later in discussion.

go right down the list and see if they really are the same product, and I'll shop that way" (P1) while another person said, "scrutinize the ingredients list anyway, but it gets pretty tedious to read that long list for every item" in describing their selection process" (P8).

In addition to the distrust and difficulties participants experienced with on-package information, participants also noted they had an increasing number of factors such as "convenience," "time limits," "recycling," "greener footprint," "more vegetarian," "environmental," "my ethics," "buy locally" and "volume" to consider when grocery shopping. Many participants said that having to include so many factors took time and made them resist grocery shopping as illustrated in comments such as "that's one of the reasons why I dislike shopping so much; it's like a bloody research project every time you go out the door" (P8) or "it's so much work just to buy one item. You know, it's a lot of deciding" (P8). As well, a number of people reported that having a large number of considerations made them limit their use of on-package information to just one or two items as illustrated in the following comments, "you do the list of nutrients and maybe the front of package and that's it, for me at least" (P2) or "if it says it on the box I usually just accept it" (P5).

A few participants commented that consumers needed to use extra information from the media, web and friends to make product selections. Participants used terms such as "buyer beware," "have a background knowledge before you go into the grocery store," "but it's always up to the individual" and "Google it" to describe consumers' responsibility to obtain information. As one participant said, "So I think you have to do the best you can and to some degree go with that, you know" (P5). Support for this view was mixed and consensus was not achieved.

Roles: Integration and Discussion

The distinct roles of the food manufacturers (distrusted and blameless) and consumers (hard working and responsible) appear to be well recognized by the focus group participants. The major findings associated with this organizing theme include participants' distrust of on-package information and food manufacturers; vulnerability to exaggerated product claims; and the definition of the conflicting and co-existing roles of consumers and food manufacturers.

Multiple reasons may exist for participants' distrust of on-package information and food manufacturers. First, this distrust may be due to exposure to one or two examples of deceptive or misleading nutrition information that evolved to a general (and varying degree) level of distrust toward on-package information. In the literature this response is referred to as negative defensive stereotyping and it has been shown to create a negative bias toward other firms even when consumers are provided with confirmation that the firm can be trusted (Darke *et al.*, 2010; Darke & Ritchie, 2007). Second, participants may be reacting to the tension they experience in viewing on-package information as advertising versus credible information. Many participants seemed aware that FOP messages are meant to

persuade but they continue to use this information as a credible source (sometimes as their only source) because it is the easier choice in terms of information processing.

In general, the results indicated low participants awareness, somewhat complacent attitude (or lack of surprise) and potential vulnerability toward exaggerated product claims. This result can be partially explained with reference to the advertising processing literature and the especially the Elaboration Likelihood Model. Studies have shown that low elaboration and low detection of deceptive advertising generally occurs when the advertising message is complex or consumers are unmotivated, distracted or lack the ability to assess information (Petty *et al.*, 1983; Wilson, 2007; Xie & Boush, 2011). Based on this theory, consumers may not be able to detect exaggerated product claims because distractions (e.g., tired, hungry or time-restricted) and difficulties in utilizing the NFL limit their ability to elaborate on-package information. In other words, even though the information required to detect the exaggerated product claim may be available to participants, it is not being utilized. In addition, a potential reason for participants' complacency or lack of surprise may involve their acceptance that the food manufacturers' primary role is to sell them products and because of that consumers have the expectation that product packages may include potentially misleading or difficult to assess information. A final potential reason for participants' low awareness of exaggerated product claims may be their lack of self-efficacy regarding utilization of on-package information. This outcome is possibly due to consumers' acceptance of the role of the profit-maximizing and distrusted food manufacturer. If participants believe that their efforts will not allow them to reach their goal of detecting healthier foods, then they will continue to use on-package information and be discouraged from making the efforts to utilize this information.

As noted, findings from the study support the existence of conflicting and co-existing consumer and food manufacturer roles in the marketplace. Despite strong feelings of distrust, most participants did not generally hold food manufacturers accountable or blame them directly and instead articulated their views that consumers need to work hard and show self-responsibility when making product selection decisions. This view of "distrust without blaming" and "hardworking and responsible" held by participants is an interesting and rather unexpected combination that acknowledges the market-driven marketplace that food manufacturers and consumers operate. As noted earlier, the implicit message from participants regarding the perceived roles in the marketplace is that a firm's role is to sell products, make profit and present the type of on-package nutrition information that is required to encourage sales. In turn, consumers must operate within this marketplace and thus their role is to work hard to make the best choice possible for themselves. This acceptance of roles was most apparent when participants were provided with examples of exaggerated product claims. Participants across most sessions showed concern but not surprise when they learned about this type of strategy by food manufactures. The literature is limited concerning consumers' view of food manufacturing claim usage in the context of the marketplace. Thus, participants' definition of the role of food manufacturers as "distrust without blaming" and the role of consumers as "hardworking and responsible" is unique to this study.

5.5.4. Global Theme

The global theme, *consumers are working hard to be 'nutrition savvy' but are having difficulties in fully utilizing on-package information for their product assessment and selection*, was developed from the previously identified organizing and basic themes. The first part of the global theme, *consumers are trying hard to be nutrition savvy*, emerges based on the evidence that participants use on-package information, are interested in understanding the NFL and are attentive to product and ingredient source and standards. In addition, participants acknowledge the use of heuristics and have strong views about FOP information (e.g., the trust of terms such as organic, natural and Health Check versus the distrust of health claims) that further strengthens the assertion that consumers are serious about the acquisition of nutrition information. Overall, participants appear to devote a high level of effort toward the task of processed food product selection.

The second part of the global theme, *but are having difficulties in fully utilizing on-package information for their product assessment and selection*, is supported by factors both in and out of participants' control. Specifically, the difficulties that are associated with the complexities and assessment of NFL information, rules governing FOP information and the roles of Health Canada and CFIA contribute to participants' lack of understanding (and thus utilization) of on-package information in a way that supports their own diet and health related food choices. Some, but not all, of the factors can be alleviated through information search and increased nutrition literacy. In this respect, consumers can gain more control over the task of food product selection through increased knowledge of the NFL and FOP claims. However, these pursuits would be undertaken only if consumers feel that the benefit of the information collected is greater than the search cost. In other words, consumers would need to feel it was worthwhile to make this effort.

However, other factors contributing to consumers' difficulties in fully utilizing on-package information appear to be out of their direct control. For example, as discussed earlier in Section 3.2, a consumer's ability to utilize on-package information can be hampered by consumer-specific traits including social, individual, demographic and cultural characteristics, challenges with credence attribute verification and level of proficiency that is required to understand on-package nutrition information, most of which is largely out of consumers' direct control. Moreover, the food manufacturers' role in providing products with exaggerated product claims, undefined product source and difficult to assess NFLs is generally seen as out of the consumers' control. Finally, consumers' acceptance of the role of the profit-maximizing and distrusted food manufacturer combined with the acknowledgement of their own self-responsible role in the marketplace appears to generate a lack of self-efficacy among consumers regarding the utilization of on-package information.

5.6 Conclusions from the Focus Group Study

Section 5.6.1 addresses the research question, how do consumers utilize nutrition information and product claims when assessing product quality? In addition, the development of accurate heuristics, use of credible claims, motivation to increase NFL proficiency and detection of exaggerated product claims are discussed as areas where potential exists to increase consumers' understanding of on-package information. The strengths, limitations and rigour of the study are discussed in Section 5.6.2.

5.6.1. Addressing the Qualitative Research Question

The research question, "how do consumers utilize nutrition information and product claims when assessing product quality?", can be most directly addressed by the global theme, *consumers are working hard to be 'nutrition savvy' but are having difficulties in fully utilizing on-package information for their product assessment and selection*. Participants were seen to be working hard to use available on-package information in their product quality and selection of processed food. However, select factors (some in and some out of their control) create a gap between use and utilization of available nutrition information for product selection. See Section 5.5.4 for a discussion of participants' efforts and difficulties associated with the global theme.

Key consumer-focused findings sourced from the basic and organizing themes regarding the utilization of on-package information for product assessment and selection include:

- Consumers view their responsibility is to work hard in the marketplace to select products that are beneficial to their needs. (Theme 8)
- Consumers view food manufacturers as distrustful. However, little blame is placed directly on the firms by consumers as they accept that firms need to promote their products. (Theme 6)
- Consumers develop and use a hierarchy of credible information for product selection consisting of NFL at the top, ingredient list next, and the FOP a distant third. (Theme 1)
- Consumers self-reported high usage of the NFL and ingredient list. However, consumers find it difficult to understand these items, resulting in a gap between use and utilization of this specific nutrition information. (Theme 2)
- Consumers' FOP messages usage is relatively high and is used primarily to streamline decisions. A lack of knowledge regarding FOP rules creates difficulties in the full utilization of this form of information. (Theme 1)
- Consumers' usage and trust of the FOP messages of *Health Check*, *organics* and to a lesser extent, *natural*, are relatively high and usage often downsizes on-package information search efforts. As well, consumers attach a halo effect to these FOP messages. (Theme 4)
- Consumers place a high value on the avoidance of China-sourced products and the location of Canada and the U.S. as a product source. (Theme 3)

- Consumers use and develop heuristics associated with the ingredients list, largely to eliminate products from selection pool. (Theme 1)
- Consumers group nutrient content claims, health claims and industry promotion together and classify these as less useful information for their product selection decisions. Some preference exists for nutrient content claims over health claims. (Theme 5)
- Consumers lack awareness about the role that Health Canada and CFIA plays in governing on-package information and claims, which in turn may influence claim credibility. (Theme 5)
- Consumers' lack of awareness and possible complacency regarding the exaggerated product claim and the potential nutrient tradeoff that are associated with such as claims exists due to a lack of self-efficacy. (Theme 7)

In this study, findings suggest that although the use of NFL, ingredient list and select FOP messages are relatively high, a lack of understanding may be limiting consumers' utilization of on-package information and detection of exaggerated product claims. As discussed earlier, not all factors contributing to consumers' difficulties in fully utilizing on-package information are in their or even policy makers direct control. However, development of accurate heuristics, use of credible claims, motivation to increase nutrition information proficiency and detection of exaggerated product claims are areas where potential to increase understanding may exist. These topics are discussed in the balance of this section.

Findings show that heuristics are used to minimize selection effort. Examples of heuristics from the study include the rejection of a product if it contains a specific ingredient (i.e. coloring, additive); defining a product as high quality if the FOP includes the terms *organic*, *natural* or *Health Check* and the ignoring of health claims as an information source to guide healthier food selection. Heuristics such as these can be beneficial as long as these rules of thumb are based on nutritionally sound information that enables consumers to make food choices that are aligned with their own health and diet objectives.

A specific example of an accurate heuristic concerns the *Health Check* logo. Understanding that the logo does not imply an overall healthier product but that the product meets the Heart and Stroke Foundation's guidelines for a specific product category is a meaningful product selection mechanism for consumers. Consumers who use the logo should be acquainted with the product guidelines to ensure that they are avoiding nutrients that they do not want and/or obtaining the nutrients that they do want in a product. An example of an inaccurate heuristic includes selecting a *natural* product with the belief that it is a healthier and more ecologically sound product even though production, process and nutrient composition are not part of the regulated definition of the term *natural*.

To be accurate, heuristics must be developed based on an understanding of the FOP claim, NFL, ingredients and individual dietary requirements. However, based on findings from this study, heuristics are often developed using a mixture of accurate information and individually sourced beliefs. If heuristics are not accurate and consumers are using them to select or reject products, they may be missing potential

benefits or not gaining the benefits they expect. From a policy point of view, there are strong incentives such as healthier consumers, lower health costs and a better information flow to consumers that are associated with the development and promotion of an accessible set of heuristics. For example, a number of years ago, health promotion and on-going media reports of trans fats concerns resulted in increased consumer awareness of the negative health issues of trans fat consumption. Most current day grocery shoppers may not know the definition or source of trans fat but they do know they should avoid it.⁷⁴ Thus, policymakers' can support the development of accurate heuristics that can potentially lead to easier and healthier product selection for consumers through the promotion of NFL percentage benchmarks, definitions of select claims, and names of ingredients to avoid.

Credible claim usage can be a method to decrease consumers' information processing requirements, streamline decisions and increase utilization of on-package information. As with heuristics, this method is beneficial as long as it based upon accurate information and meets the objective to assist the consumer in eating healthier with less effort. Findings from this study show that *organic* and *Health Check* claims are well used for product selection, and they are viewed as credible, trustworthy and signals of a high quality product. In contrast, nutrient content and health claims were generally viewed as less credible and sources of information that often did not signal higher product quality.

It is interesting to consider how consumers' positive view of *organic* and *Health Check* claims was developed. Based upon the findings, consumers' positive views of these claims appear to be based on two elements: high product saturation of these claims and individually constructed beliefs. Consumers' positive view of the *organic* and *Health Check* claims did not appear to be based upon a strong understanding of the claim definition, as few consumers were able to articulate a definition of these claims. Consumers likely have a high awareness of the term *organic* and *Health Check* because of the cross-product/type applicability of the terms *organic*. In other words, consumers view these claims no matter what form (e.g., fresh or processed) or type (e.g., cookies, juice or cheese) of food they purchase. In addition, findings also show that high awareness of *Health Check* is based upon the Heart and Stroke Foundation name appearing on the logo, noted sponsorship of events and longevity of the foundation. Concerning the individually constructed beliefs, consumers appear to have constructed their beliefs from friends, family and media information as opposed to government health education releases. Given these findings, it is interesting to consider how claim format or promotion strategy can raise awareness and change beliefs (and thus credibility) of nutrient content and health claims. A broadening of awareness would in turn support use of a wider range of claims in the product selection process. An obvious example of a potential claim format is the inclusion of Health Canada's or CFIA's name within a specific claim type. Examples of more general potential promotion topics include the role of Health Canada with respect to claim definition

⁷⁴ This trans fat avoidance heuristic was present in this study's findings.

and development, the role of the CFIA in enforcing claim standards, the transparency of the role of food manufacturers in claim development and the clarity of health and nutrient content claims.

Findings suggest that participants use but do not fully understand the NFL, and lack awareness and exhibit complacency regarding the exaggerated product claim. Reasons for this conduct, both in and out of participants' control, were discussed in Section 5.5.4. Focusing on efforts to change consumers' conduct, it is possible that consumers would pursue a higher level of proficiency that is required to understand on-package nutrition information if they felt that the benefit to these efforts were greater than the cost. In other words, consumers may consider that the NFL is too complex or that food manufacturers' efforts to confound them are too great, so why bother with detection. Thus, an option for policymakers is to educate consumers in order to lower their cost of improved NFL understanding (e.g., provide simple rules for NFL benchmarks, scaling techniques for serving size or a method to prioritize nutrients). As well, benefits could be increased by promotion of awareness of healthy food benefits, decreased time expended with higher NFL proficiency and empowerment over food manufacturers. A feasible option is for government to launch a health promotion campaign that targets a specific consumer segment. The campaign would encourage the targeted segment to increase their NFL proficiency via a method that fits with the segment and place that message in a location that reaches the segment (e.g., online media, community center posters or grocery stores).

Using the findings associated with exaggerated product claims, an important question to consider is the following, "Assuming firms use exaggerated product claims in the marketplace, are consumers able to detect these exaggerated product claims?" It is clear that consumers' vulnerability to exaggerated product claims is dependent upon their ability to use and understand the two decision-making variables of FOP claims and NFL together. For example, if consumers utilize the FOP claim and ignore the NFL, they are likely to remain unaware of exaggerated product claims. In other words, full utilization of the FOP claim alone will not prevent consumers from falling prey to the exaggerated product claim. As well, if consumers utilize the FOP claim and use but do not understand the NFL, then they too may be unable to detect exaggerated product claims. Based on this study's findings it is evident that, to varying degrees, participants select products in a manner that are similar to these above two examples implying that, in general, they are vulnerable to the exaggerated product claim. The overall impact of this vulnerability on the consumer is related to the number, magnitude and type of exaggerated product claims in the processed food marketplace. The presence and nature of these claims is discussed in Section 4.1 and Section 4.8. The impact on the exaggerated product claims on consumers is discussed in detail later in Section 6.3.

5.6.2. Strengths, Limitation and Rigour of the Study

Strengths

The strength of this consumer-focused study hinged on the use of focus groups as a data collection method. First, focus groups proved to be an appropriate and efficient method to identify with considerable clarity, depth and insight the complex process of product quality assessment and selection by consumers. The focus group method also made it possible to collect a range of views and to organize these views into consistent themes. The interaction between participants undoubtedly had a positive effect on the range and depth of discussion. When one participant made a comment, it was common for another participant to enter the conversation to affirm or disagree, or to note that the comment made him or her think about the topic in a new way.

Second, the focus group method facilitated a specific differentiation between participants' use versus understanding of NFL and FOP claims, and supported new insight into the consumers' decision-making processes. A good example of such insight is the importance of product source, ingredient list, rule awareness and the *Heart Check* logo in consumers' quality assessment and selection process.

Limitations

A limitation of the consumer-based component of this research is that the purposive sampling frame possibly restricted the range of views collected. The purposive sampling frame was defined to ensure homogeneity within locations and heterogeneity across locations in order to encourage broader participation and support effective group dynamics. The expectation was that the differences in age, income and education across locations would be reflected in the collective views. Despite achieving a relatively strong diversity of socio-demographics across session locations, there was consistency in the findings across sessions. Possible explanations for this commonality of views across sessions include the following: only socially acceptable opinions were encouraged to emerge; people from different socio-demographic backgrounds but with common views self-selected into the sessions; or, contrary to what was expected, views tend to be common across a broad range of socio-demographics. The first two reasons can be discounted somewhat since discussions appeared to encourage both agreement and dissent, and self-selection of this nature is unlikely given the structure of the recruitment process. Thus, it is likely that participants from a wide range of socio-demographics do indeed share common views regarding on-package information relative to what was originally expected. This common view across a broad range of socio-demographics (other than gender) serves to support the transferability of the study findings.

Although a broad range of socio-demographics was achieved in terms of age and employment, the study did not include a large number of males, thus limiting the transferability of the findings to male grocery shoppers. However, based on a 2011 study, women conduct 62% of the grocery shopping (Hale & The Nielsen Company, 2011). Thus, although the findings cannot be viewed as transferrable to men, they are applicable to typical grocery shoppers.

Another potential limitation to the study was the possibility of an artificial performance by participants when viewing products or discussing their decision process (Smithson, 2000). Although this is a concern, the potential for artificialness was mitigated to some extent by the moderator's direct and confirmatory questions (e.g., "what would you do different in a grocery store?" and "how would you use these variables differently when you were grocery shopping?") and indirect questions (e.g., confirmatory and probing questions to differentiate usage and understanding of on-package information). Thus, although the themes that emerged from the group discussion should be viewed as having been constructed in a specific and structured setting, they should not be viewed as excessively artificial.

A third potential limitation of the focus group approach was the reporting of only the majority opinion and exclusion of the dissenting view (Mansell *et al.*, 2004). In this research study, there was a direct interest in consensus and common themes and so inattention to dissent was not particularly problematic. Nevertheless, even though the study focused on commonality, different opinions were obtained and reported in the themes section in order to provide a contrast of views.

A fourth potential limitation involves moderator bias in the sessions and analysis. With regard to moderator bias, the nature of qualitative inquiry requires the researcher to be part of the process and thus some moderator bias is unavoidable. Moderator bias influences data collection, analysis and theme development. Neutrality of the researcher when completing these stages is not possible because it is the job of the moderator to collect the data (e.g., asks probing questions and selects participants), obtain meaning from the data (e.g., code development) and abstract from the data (e.g., data interpretation and theme development). Consequently, at each stage the moderator's own views necessarily become connected to the research findings. Examples of topics where the moderator's assumptions and views are likely to be influential to the findings include: acceptable NFL proficiency, math complexity benchmark, usefulness of health claims, the determinants of healthy eating, food manufacturers' strategy to profit maximize, marketing perspective of food claims and the response to men versus women participants. Several techniques were used to understand and minimize moderator bias including the: i) use of pilot sessions to identify biases and formulate strategies to minimize the influence of bias on discussions⁷⁵; ii) involvement of two trained research associates in data collection to obtain multiple views; iii) coding and recoding of transcripts several times and during each recoding considering how personal assumptions/views (e.g., focus solely on research question III, loyalty to participants, business versus nutrition perspective, or pro-business versus pro-consumer) influence data interpretation; iv) involvement of academics external to the moderators' discipline in theme refinement in order to gain a broader perspective and v) allowance of time and several iterations in theme refinement.

A fifth potential limitation of this study is that the focus group mainly consisted of participants with high nutrition knowledge, who self-selected into the study. Judging from the nature of the discussions, this

⁷⁵ See Section 5.4.3 for details of the steps used to counter the effect of moderator bias on participant discussions.

limitation did not appear to be acute. Specifically, if those with the highest nutrition knowledge self-selected into the focus groups then it should not be the case that *consumers are having difficulties in fully utilizing on-package information for their product assessment and selection*, which is a component of the global theme.

A final potential limitation is that participants' views may be taken out of context and/or a singular view may be interpreted as a common view. The potential for this limitation was reduced by achieving study credibility as discussed below.

Rigour

The rigour of this study is assessed based upon the criteria of credibility, transferability and dependability (Barbour, 2001; Guba & Lincoln, 1989; Mansell *et al.*, 2004; Smithson, 2000).

Credibility refers to the strength of association between the study conclusions and the data (O'Cathain *et al.*, 2007; Onwuegbuzie & Leech, 2006). For this study, credibility refers to the validity of the relationship between what was actually discussed by participants and the resulting themes. In order to achieve study credibility, a systematic approach of transcription, data coding, code categorization, theme development and theme refinement was applied to the data in order to develop various themes. In addition, once the set of themes was developed each specific theme was assessed to ensure it was distinct, cohesive, consistent and comprehensive. The specific details of the data analysis process were discussed earlier in Section 5.4.4.

Transferability refers to how the study conclusions can be applied to other settings (i.e., consumers in different geographic locations or socio-economic circumstances) (Jick, 1983; Long *et al.*, 2000; Moffatt *et al.*, 2006). The results of this study are made transferable through detailed provision of the following factors: research methodology; participant recruitment, scheduling and demographics; and focus group procedures, setting and moderator role. Knowing the specific context of the study will allow other researchers to assess whether conclusions of this study can be applied to related settings. In addition, the findings were highly consistent across a relatively wide range of age, household income, racial/cultural, marital and employment demographic groups. The wide range of demographics, other than gender, supports the applicability of the study findings to a broad socio-demographic segment of grocery shoppers.

Dependability denotes the potential for replicating study results (Miles & Huberman, 1994; Moffatt *et al.*, 2006). Complete replication in the case of qualitative research is not possible because both the study context and the moderator's input would change if the study was repeated, and this would influence the findings. The dependability of this study was reinforced through detailed provision of the data analysis process, methodology and focus group procedures so that if replication were attempted then the changes in setting between this study and subsequent studies could be documented.

Finally, confirmability refers to the whether the results of the study can be confirmed (Sandelowski, 2000). Data audit strategies, which were used to support the confirmability of this study, included the following: review of transcripts for moderator bias and consistency of procedures; rechecking of the data coding; review of themes for cohesion and consistency; transparency of thematic development process; and searching for missing or negating views (Thorne, 2000).

CHAPTER 6 Discussion of the Impact of Exaggerated Product Claims on Market Failure

6.1 Introduction

In this final chapter, the results from the quantitative and qualitative methodologies are merged to address the overall research question, “Does the potential for market failure occurring in the processed food industry increase as a result of exaggerated product claims that encourage consumers to overestimate product quality and over-consume suboptimal foods?”

As noted earlier, market failure is defined as any move away from perfectly competitive market conditions and is typically measured as a loss in the total surplus. However, rather than measuring market failure as a loss in total surplus, the discussion in this chapter will focus on the market failure outcomes for the recipients of this surplus, which include consumers, firms and the marketplace as a whole. The overall research question that examines the link between exaggerated product claims and market failure potential is addressed in Section 6.2. The implications of the answer to this research question and recommendations for future research are presented in Section 6.3.

6.2 Assessing the Potential for Market Failure

As discussed earlier, the processed food sector has inherent industry characteristics and trends that contribute to asymmetric information. In order to equalize the balance of information between firms and consumers and to support consumers’ ability to differentiate higher quality food products, food label regulations have been implemented. An important component of these regulations is what can and cannot be claimed about the nutrients within a food product. Exaggerated product claims are a market feature that the current label regulations are not addressing (i.e., an unintended outcome). If firms use exaggerated product claims to differentiate their products and increase sales, and consumers are unable to recognize the difference between products of different quality because of their difficulties in utilizing on-package nutrition information, then exaggerated product claims may be influencing asymmetric information and increasing the potential for market failure in the processed food industry.⁷⁶

As discussed earlier in Section 3.4.2, merging is a form of data mixing and it is an essential part of the multi-method approach. In this dissertation, merging allows for a stronger assessment of the potential for market failure. First, merging ensures that the underlying elements of the methodologies (e.g., economic model, data, empirical analysis, focus groups findings and thematic analysis) are merged and

⁷⁶ This scenario is defined as a market failure because the exaggerated product claims ultimately leads to consumers’ overestimating the quality of food products and over-consuming these suboptimal foods. In addition, resources are being allocated to the production of these suboptimal goods.

interpreted together in general terms. Second, merging ensures that the specific results from each of the quantitative and qualitative methodologies are used to individually address the research sub-questions. These two aspects are then combined to answer the overall research question.

Merging of the elements of the methodologies involves a number of steps. First, the grocery supermarket data shows that some products have claims and some products have no claims. Building on this data, the empirical analysis reveals that when a claim is made, the levels of a particular FSS nutrient sometimes increases, in which case the claim is exaggerated, and sometimes decreases, in which case the claim is FSS-beneficial. The dual outcome where a claim might be exaggerated or might be FSS-beneficial appears to be largely dictated by the product matrix/taste restrictions.

Although examined in the empirical analysis, the FSS-beneficial claim is not part of the theoretical economic model. Concerning FSS-beneficial claims, it is logical to assume that firms have a choice to use or not use claims and that this choice is made using a cost-benefit approach. Costs would include reformulation and repackaging while benefits would include increased sales due to differentiation of the product. The FSS-beneficial claim outcome is not a concern for government policy makers because these claims provide consumers with more information, reduced search cost and reduced levels of the FSS nutrients. As well, firms benefit with this claim through improved information flow, and thus promotion potential, to consumers.

Similar to the FSS-beneficial claim, firms have a choice to use or not use the exaggerated product claims. The theoretical economic model predicts that an exaggerated product claim will be used if: i) the fraction of consumers who do not utilize the NFL to assess product quality is sufficiently large; ii) the level of FSS nutrients (referred to as B in the theoretical model) is not excessively large; and iii) the cost of reformulation is not excessive. Exaggerated product claims are a concern for government policy makers because there are two possible outcomes, acceptable and market failure. Although an acceptable outcome is still an exaggerated product claim, the benefits to consumers in terms of information flow, lowered search cost and nutritional gains (e.g., increased claimed nutrient levels) more than offsets the harm created by consumers unknowingly consuming higher levels of FSS. In the market failure outcome, the benefits (as noted above) do not offset the harm created by consumers unknowingly consuming higher levels of FSS. Whether or not the market fails depends critically on consumers' ability to utilize on-package claim and NFL information.

The preceding discussion implies that three conditions must exist in order for market failure to be a serious concern in the processed food sector. First, exaggerated product claims must be a profit maximizing product strategy for food manufacturers. Second, exaggerated product claims must have a significant presence in the marketplace. Third, consumers must be unable to utilize (understand & use) nutrition information and the various types of product claims when assessing processed food quality. These three conditions are summarized in Table 6.1 and are roughly aligned with the research sub-questions.

- I. What product strategy in terms of claims and nutrient levels would food manufacturers use given consumer demand and the existence of asymmetric information in the industry? (condition 1)
- II. Do exaggerated product claims have a significant presence in the current marketplace, and if so, what is the nature of these claims? (condition 2)
- III. How do consumers utilize (e.g., use and understand) nutrition information and product claims when assessing product quality? (condition 3)

Although the table defines the conditions as being either true or false, these designations should not be considered as absolutes but instead as “largely true” and “largely false.”

Table 6.1: Market Failure Outcomes associated with Exaggerated Product Claims (EPC)

Combinations	Condition 1 EPC are a profitable strategy	Condition 2 EPC have significant presence	Condition 3 Consumers unable to utilize product information	Outcome
i	True	True	True	Wide application of EPCs Market failure is a serious concern
ii	True	True	False	Relatively few highly exaggerated claims Consumers' utilization of nutrition information key in market outcome Failure is small for the market as a whole but may be serious for a subset of highly vulnerable consumers
iii	False	False	True	EPCs are seldom offered Product matrix/taste key in market outcome Market failure is small overall

The next step in the merging process is to identify the outcome that is associated with different true/false combinations for Conditions 1 through 3 (these outcomes are described in the last column of Table 6.1). For example, the middle row shows that if Conditions 1 and 2 are true but Condition 3 is false then there is low potential for market failure. In all three combinations, it is essential to recognize the influence of the product matrix/taste considerations (e.g., the extent that FSS nutrients must increase when implementing claims across a wide range of products) and the consumers' ability to utilize nutrition information on the final market outcome. Although a number of combinations are possible, only these three more important combinations as outlined in Table 6.1 are discussed in detail below.

The first row of Table 6.1 (combination i) corresponds to a true outcome for all three conditions. In this combination, consumers do not utilize on-package nutrition information and the product matrix/taste is such that substantially higher FSS nutrients are required when a claim is established. In this combination, firms find it profitable to offer a wide variety of exaggerated product claims for a wide range of products because the revenue from the additional sales more than offsets their cost of initiating the claim. As noted in the theoretical economic model (See Section 4.5.3), even highly exaggerated product claims

can be profit maximizing as long as the number of consumers who are significantly influenced by such a claim and who are unaware of FSS nutrient increases is sufficiently large. Combination i from Table 6.1 represents the highest potential for market failure.

The middle row of Table 6.1 (combination ii), corresponds to a false outcome for Condition 3 and a true outcome for Conditions 1 and 2. In this combination, consumers are largely aware of the changes in all nutrients of a claimed product because they are able to utilize on-package nutrition information in the product quality assessment. As a result, sales of claimed products with particularly large levels of FSS (e.g., highly exaggerated product claims⁷⁷) are small and market failure, in general, is also small. In addition, the frequency of FSS-beneficial claims and exaggerated product claims with comparatively small increases in FSS are still in widespread use. Thus, this combination of conditions implies both a high frequency of exaggerated product claims and a seriously failing market for a subset of highly vulnerable consumers. This particular combination implies that failure is small for the market as a whole and emphasizes the importance of consumers' utilization of nutrition information in the market outcome.

The last row (combination iii) of Table 6.1 corresponds to a true outcome for Condition 3 and a false outcome for Conditions 1 and 2. In this combination, there is a potential for large market failure because consumers are not able to utilize product information, thus making exaggerated product claims potentially profitable. However, exaggerated product claims are generally not a concern because the product matrix/taste for most products is such that only a decrease or small increase of the FSS nutrient is required when a claim is in place. Thus, market failure with this combination of conditions is small overall. This combination emphasizes the importance of the product matrix/taste in the market outcome.

Now that the various elements from the methodologies have been merged and the range of outcomes described, it is possible to move to the second aspect of the merge process. Specifically, the results from the various stages of the research design can be used to determine how the specific Table 6.1 conditions are aligned with the three research sub-questions that were noted above. Doing so allows for a closer examination of the assessment of market failure. The first two conditions were addressed using the Stage one quantitative methodology while the third condition was addressed using the qualitative methodology. Based upon Stage one results, conditions 1 (sub-question 1) and 2 (sub-question 2) are true, to varying degrees. Results from focus groups and thematic analysis in Stage two indicate that condition 3 (sub-question 3) is also true but to varying degrees.

Therefore, based on the merged results from the three separate analyses in this dissertation the outcomes for Conditions 1, 2 and 3 appear to provide the greatest support for combination i. This being the case it is possible to conclude, in general, that there is a strong potential for market failure due to exaggerated product claims in the processed food market.

⁷⁷ Recall from Section 4.1 that exaggerated product claims can be viewed as highly exaggerated when percentage nutritional loss (e.g., increase of FSS nutrients) is greater than percentage nutritional gain (e.g., increase of claimed nutrient).

However, it is interesting to note that several sub-cases from the analysis may correspond to the other two combinations from Table 6.1. The case of *organic* claims can be viewed as an example of combination iii. Recall from the literature that consumers who purchase *organic* products tend to have higher levels of education and income and tend to be able to utilize on-package nutrition information. As well, recall from the empirical analysis that *organic* claims, on average, are considered a FSS-beneficial claim. These two observations imply a false, false, true result for Conditions 1, 2 and 3, respectively, where consumers' awareness of changes in all nutrients of a claimed product likely limit the firms' ability to offer exaggerated product claims. Thus, there is a low frequency of exaggerated product claims due to the influence of consumers' ability to utilize on-package nutrition information, thus implying a low potential for market failure, in general.

6.3 Implications and Recommendations

The major findings of this research are that consumers are unable to fully utilize the on-package nutrition information and that exaggerated product claims have a significant presence in the marketplace implying conditions for market failure due to asymmetric information. When reviewing the implications of these findings, it is important to recall that the main purpose of food labelling in Canada is to support communication between consumers and food manufacturers (Canadian Food Inspection Agency, 2012a). Accordingly, the implications and recommendations for government, consumers and firms are reviewed relative to this purpose.

Government

Focusing first on government, research findings imply that policy makers may need to review the format and accessibility of the on-package claim and NFL information. The main purpose of food labels is to support communication and inform consumers' food choices. However, specific findings regarding consumers' limited knowledge regarding claim specifics, difficulties in NFL usage with more complex calculations, minimal use of health claims, difficulties in determining product source, desire to use FOP to streamline quality assessments, lack of awareness regarding the role of Health Canada, together with firms' use of exaggerated product claims in the marketplace in six specific formats imply a need to look at more effective ways to convey nutrition information.

Recommendations include a combination of regulation and health promotion strategies. Regulation changes could include re-formatting of the NFL to support easier access to convey key and summary nutritional information; a stricter tolerance level for products with nutrient content claims (e.g., minimum gains and maximum losses of nutrients or maximum nutrient levels); a reduction in the approval or usage of new health claims that consumers find less useful; use of standard serving size and standard volume amount (e.g., similar to European Union NFL legislation that requires units of either 100 g or 100 milliliters); the prohibition of more than 2 claims per product to decrease processing efforts by consumers; and the

disallowance of claims in specific processed food product categories such as potato chips or candy. These regulations would result in less complicated on-package information for consumers to assess.

Health promotion efforts (in the form of social marketing) could include dissemination of information regarding serving size; serving size conversion techniques; benchmarks for nutrient highs and lows (e.g., USDA promotes a 5% low and 20% high NFL nutrient benchmarks); benchmarks for age and health specific RDI values or percentages (e.g., If your age is 70, add 10% to sodium and fats RDI to determine the age-appropriate value); encouragement of whole product assessment; and claim verification. Finally, health promotion efforts could promote the role of the CFIA and Health Canada as the regulator and provider of credible on-package information. These health promotion efforts would need to utilize targeted social marketing versus mass marketing efforts to ensure the information meets the needs of the consumer segment (e.g., teens, seniors).

As noted earlier, government policy makers should be concerned if the marketplace includes exaggerated product claims as a feature in the industry that increases the potential for market failure. However, it is essential to recognize that exaggerated product claims appear in varying degrees. The same can be said for consumers' inability to utilize claims and NFL information. This variation is important in the overall assessment of market failure and the determination of the need for government intervention. For example, when the degree of exaggeration (measured by the magnitude and type of the claimed nutrient gain and FSS nutrient loss) is high and the consumers' utilization of claims and NFL information is low, then this constitutes a major problem for consumers and government policy makers. However, when these conditions are opposite in magnitude then governments may not need to intervene even if concerns of market failure exist.

Consumers

The impact to consumers arising from the lack of utilization of on-package nutrition information and the presence of exaggeration product claims include a negative diet-health effect and negative claim bias. Focusing first on the impact on consumers' diet and health, consumers who select products with exaggerated product claims may unknowingly consume more FSS nutrient. Depending on the size of the exaggeration, the net nutritional benefit for consumers of the claimed product may be minimal or even negative. This negative impact, which will occur regardless of consumers' awareness of the exaggerated product claims, is especially disconcerting if the individual consumer is trying to select foods that are healthier because of health concerns of their own or their family. As discussed earlier, the overall impact of consuming higher FSS nutrients may not be a concern to all individuals but is likely to be a strong concern for consumers with health vulnerabilities.

The second consumer impact, negative claim bias, is generally an issue only when consumers become aware of the incongruence in the relationship between exaggerated product claims and FSS nutrients. There are varieties of reasons why an exaggerated product claim can result in a negative claim

bias. Such reasons include consumers experiencing cognitive dissonance, negative defensive bias and cognitive claim overload. For example, if consumers become aware that claims sometimes result in FSS increases and sometimes result in FSS decreases, they may face cognitive dissonance,⁷⁸ increasing their potential to discount claims as a valid information source in the consumer buying process. As well, as discussed earlier in Section 5.5.3, consumers who detect exaggerated product claims and believe they are being deceived may then exhibit a general level of distrust toward all FOP and/or on-package information. A final contributor to consumers' negative claim bias is the cognitive claim overload. This may occur when a consumer realizes that due to the presence of this claim offering more of both the claim and FSS nutrients, they are now required to not only use and understand claims but also to assess overall nutrient gains and losses in the claimed product. In effect, the exaggerated product claim places another level of confusion and responsibility on the consumer. The overall impact of consumers' negative claim bias includes consumers' decreasing their use of claims so that their search cost increases and information flow between firms and consumers decreases.

Recommendations for consumers include familiarizing themselves with the meaning of the specific claims and ingredients that they consider important in their healthy food choice process. As well, consumers should consider researching specific NFL benchmarks of the key nutrients that are important to their dietary requirements. For example, an individual who wants to increase his or her fibre intake could identify the specific meaning of a "high fibre" claim and age and health appropriate RDI benchmarks for fibre. By combining an improved understanding of claims and the NFL in their area of interest, consumers will find it quicker and easier to assess on-package information, will make product selections that better meet their needs and will effectively detect products with exaggerated product claims.

Firms

The implication for food manufacturers flows directly from the negative claim bias that is experienced by consumers. If consumers tend to distrust and decrease usage of claims because of this negative claim bias then this will limit a food manufacturer's ability to use claims as a communication tool. This limitation would be experienced by all firms, whether they do or do not use exaggerated product claims as part of their product strategy. For example, consumers may also view FSS-beneficial claims as manipulative or deceptive because of their experience with exaggerated product claims. If this is the case, then the ability of the firm to use FOP messaging to promote their products' health attributes will be highly diluted.

The second implication of exaggerated product claims for firms is based upon the earlier noted Akerlof's Lemon Theory of quality-based market failure (Akerlof, 1970). According to this theory, firms

⁷⁸ Cognitive dissonance is the feeling of distress experienced by a person when they holding two conflicting beliefs (Festinger & Carlsmith James, 1959). For example, claims are useful and not useful when selecting healthier processed food products.

producing a high quality product find it difficult to compete with firms producing a low quality product because it is less costly to produce and consumers are unable to determine if the product is low or high quality. These being the case, profit-maximizing firms in the processed food industry have a strong incentive to produce lower quality products with claims. Eventually, if consumers are consistently unable to tell the difference between products of different quality, a scenario may arise in the market where firms who produce high quality products with non-exaggerated claims are driven out of the market by firms that produce poor quality products. In this scenario, both the firms producing high quality goods and consumers will lose because of the decreased presence of high quality products and increased presence of exaggerated product claims in the marketplace.

In terms of recommendation, firms should consider consumers' dual view of the FOP messages as advertising and information when developing their claim products and associated FOP messages. Specifically, efforts to provide direct, uncluttered, credible and easy to verify nutrient content claims would encourage consumers to use the FOP as a credible source of information. Additional strategies include the use of FOP messages that verify Canadian-sourced ingredient or origin of manufacturing (e.g., 70% Canadian-sourced ingredients) and alliances with trustworthy third party agencies (Canadian Public Health Association, Agriculture and Agri-Food Canada, Canadian Medical Association). In addition, firms could address consumers' frustration and difficulties with the NFL by providing clear, consistent and accessible on-package information plus supporting material online. For example, firms could decrease the complexity of NFL on their products by offering consistent serving sizes in both volume and form (e.g., 30 grams or 2 cookies) across all product categories; providing on-package apps and easy-to-use web resources for conversion of their product's NFL to additional age and health requirements; and supplying web-based information that describes why ingredients are used in a particular product (e.g., preservatives to prevent or delay undesirable spoilage) in order to ensure transparency of ingredient information. Besides providing this information, food manufacturers could conduct societal marketing campaigns in order to promote their efforts in making consumers' decision making easier and more accurate. These efforts to increase credibility, ease-of-use and transparency could result in company/brand loyalty, firm differentiation and increased sales for the firm. Nevertheless, it is important to recognize that these efforts will generally only be undertaken by firms where more information and transparency is beneficial to their product image.

In terms of recommendations for future research, the research on exaggerated product claims can be extended in several ways. First, research regarding presentation formats that more effectively convey nutrition information to consumers should be conducted. In addition, research related to claim type, demand for claims by consumers, and claim usage on a per product and product category basis should be conducted.

As well, the impact of exaggerated product claims could be framed with respect to net nutrition gain and losses or through application of stoplight food labels. Doing so would allow a finer

categorization of claims based upon the net nutritional effect of the claims. Additionally, claims could be examined in combination or in bundles and the relationship of these bundles to FSS nutrients could then be examined. This approach may reveal a different relationship between the claim and FSS nutrient combinations as compared to the case of a single claim.

Examining the product strategy of food manufacturers is a natural direction for future research. Specifically, exploring the role that corporate social responsibility and public image plays in the provision of product claims (exaggerated and non-exaggerated) could provide an interesting extension to the firm decision-making framework. As well, research exploring the influence that a firms' ability to offer a range of products or brands within one product category is a natural extension of the claim/no-claim product strategy. Finally, research regarding patterns of firms' claim strategy within a product category could be examined. For example, Table 4.6 provides averages of fat, sugar and sodium per standard serving size in claim and no-claim products within each product category. Reviewing these averages shows patterns where the average of one of the FSS nutrient levels are higher for the claim product while the average of the other two FSS nutrients in that same product category are lower for the claim product.

Consumer-related research could be pursued on a variety of fronts including a further exploration of the parameters and potential for negative claim bias. This approach would provide a clearer picture of the impact of exaggerated product claims on future claim usage. Additionally, a closer examination of how consumers develop their understanding of nutrient, disease and food claims and how these relate to their claim usage is likely to generate important insights for researchers. Finally, it would be useful for researchers to identify the number of consumers and characteristics of consumers who are particularly vulnerable to exaggerated product claims.

Lastly, the concept of the exaggerated product claim could be extended to areas outside of the processed food sector including branded technology products such as cellphones and laptops, mortgage and credit contracts with financial institutions and leases with rental and equipment firms. The general lessons from this dissertation may shed an interesting light on the exaggerated product claims that are likely to characterize these industries.

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Appendices

Appendix A. Code for the R Software Program used to Develop the Values for the Aggregate Demand Schedule

```
# never use c, t, cat, F, T, D (these are reserved for R)
# define type 1 consumers as making purchases based on three attributes: X, Y and Z
# define type 2 consumers as making purchases based on two attributes: X and Y
# consumer's utility is given by  $U = aS + bG + cB$  ( $c = 0$  for type 2 consumers)
# consumers purchase if  $U - P > K$  where  $P$  is the price and  $K$  is reservation utility
# reservation utility may be different for the two types of consumers ( $K$  for type 1 and  $K2$  for type 2)79
K <- 0
K2 <- 0
# attribute B is the "poor" ingredient, so it takes on a negative value ( $a$ ,  $b$  and  $c$  are all positive)
# let the values for  $S$ ,  $G$  and  $B$  as chosen by the firm be contained in the vector "choice"
# define variable for  $S =$  Taste,  $G =$  good ingredient,  $B =$  poor ingredient  $ND =$  net diet impact good plus poor ingred
S <- 1
G <- 2.25
B <- -1.5080
ND <- G + B
choice <- c(S,G,B)81
# the utility coefficients ( $a$ ,  $b$ ,  $c$ ) are jointly normally distributed across consumers
# let  $\mu$  denote the vector of mean values of value 1 for  $a$ ,  $b$  and  $c$  for type 1 consumers
# mean value of 1 allows mean less 3 standard deviations to near 0
mu <- c(1,1,1)
# specify variance - covariance matrix for  $a$ ,  $b$  and  $c$  for type 1 consumers
# define variance (sd squared) using  $.997/3 = .332$  sd then variance or sd sq = 0.11 basis bottom range close to 0
# set covariance to 0 as assuming non-correlated  $a$   $b$   $c$  and diagonal of variance
Sigma <- matrix(c(.11,0,0,0,.11,0,0,0,.11), 3, 3)82
# specify maximum value for each of  $a$ ,  $b$  and  $c$ 
coef_max = 2
# specify number of increments that range of values for each of  $a$ ,  $b$  and  $c$  are divided into
num_inc <- 4083
# calculate width of each increment for  $a$ ,  $b$  and  $c$ 
width = coef_max/num_inc84
```

⁷⁹ The utility of the numeraire for both segments 1 and 2 is set to 0.

⁸⁰ Utility equation is by $U = aS + bG + cB$. Thus, the value of the level of nutritional poor is set at a negative value as it decreases the utility for consumers.

⁸¹ Calibration was used to define a base value for each of $S, G, B, K, K1$ and P so that the model can be used to review the research question 1 regarding purchase of processed food by segment 1 and 2 consumers over a range of scenarios of segmentation and product matrix (Cooley, 1997) For example, setting starting values for the parameters such that 50% of segment 2 consumers and 10 % of segment 1 consumers purchase processed food allows examination of what occurs to these percentages when some or all of the parameter values are changed.

⁸² Coefficients a , b , and c are not correlated and are thus independent so that the correlation matrix only has variance values for a/a , b/b and c/c with all covariance values set to 0. Variance (σ^2) values are based upon setting mean value less three standard deviations as near zero and solving for standard deviation (σ). Then squaring the variance value.

⁸³ This value defines the number of increments between in minimum value (near 0) and maximum value (2) for each variable which in turn defines the number (not the size) of cubes. For example, if increment is 40 then $40 \times 40 = 64,000$ cubes would be contained in the large cube.

```

# begin price loop (calculate total quantity demanded for each price in price vector)
pmax <- 385
pmin <- 2
pinc <- .05
Pvec <- seq(pmin, pmax, by=pinc)86

prep <- (pmax-pmin)/pinc +1
total_purchase <- rep(0, prep)87

for(i in 1:prep){

P <- Pvec[i]

# TYPE 1 CONSUMERS n segment using three decision variables S G B88
# build the three dimensional matrix and fill cells with values for a, b and c
# begin my creating a matrix m for each combination of triplets in set of integers, 1, 2, ... num_inc
m <- data.matrix(expand.grid(rep(list(1:num_inc), 3)))89
# get length of m
dim_m <- dim(m)90
dim_m[1]91
# (1) multiply m by width variable to scale values to the range [0, coef_max] rather than [1,2, ..., num_inc]
# (2) calculate aT + bG + cB for each cell in the matrix
# subtract off K + P from each element. Set element to 0 if element is negative and to 1 if element is
positive
who_buys <- ifelse(width*m %>% choice - (K+P) > 0, 1, 0)92
# use normal density function to specify number of consumers associated with each each cell in previous
matrix
# http://azzalini.stat.unipd.it/SW/Pkg-mnormt/mnormt-manual.pdf

```

⁸⁴ This formula of coef_max value /increments is the size of the side of the cube. For example, if coefficient max = 2 and the incements = 40 then 2/40 defines each side of the 64,000 cubes as.05.

⁸⁵ Minimum and maximum value of P obtained through calibration process. Both the range and increment values must be defined as then a corresponding quantity demanded will be calculated for all prices in the range. Quantity demanded is the number or percent of consumers buying processed food at the defined parameter values and range of a, b, and c coefficient values.

⁸⁶ Code to set up the vector of prices.

⁸⁷ Sets up an empty vector ready to complete with total quantity demanded (purchases) to match the number of prices in the vector. Once calculated, quantity demanded associated with each price will be placed into the vector.

⁸⁸ Defining the number of Segment 1 consumers who purchase processed food products given because they utilize P, S, G, B and determine that the processed food product has a greater utility than numeraire good utility. This quantity demanded value is calculated by defining the number of cube and number of people in each cube.

⁸⁹ Setup a data matrix to name each of the cubes (i.e., 64,000 cubes). Naming occurs via this command using integer names to create a 3 column matrix (names = 111, 110, 11 40). The name is really the position of the cube in the larger cube.

⁹⁰ Provides the number of rows in the matrix.

⁹¹ Provides the length of the matrix

⁹² Defines the cube as a buy or no-buy cube by going through three steps all embedded in the command: step 1: rescale the integer values that give the cube's position in larger cube (i.e., named cube of 1,1,40) to relative position on the range of a, b, and c (i.e., between 0 and 2) so that cube named (1, 1, 40) at a =.05 b = 1.5 and c = 2. These values of a, b, and c are used in the utility equation; step 2: determine the unique utility of each cube using equation of [choice - (K+P)] where the values for the parameters S, G, B and K and P are defined; and step 3: assign the cube value of 1 if processed food product utility is greater than numeraire good utility. After this step all all cubes are assigned values of 0 and 1.

```

library(mvtnorm)93
prob_den <- dmvnorm(width*m, mu, Sigma)94

# multiply elements of who_buys with elements of prob_den and then sum
# multiply by width^3 to ensure that probabilities sum to one
# the final result is frac_buy, which is the fraction of total type 1 consumer (SGB) who purchase the
product
frac_buy <- t(who_buys) %*% prob_den*width^395

# TYPE 2 CONSUMERS n segment using two decision variables S G 96
# use the first two rows/columns from the choice, mu and Sigma matrices to generate a two dimensional
problem
m <- data.matrix(expand.grid(rep(list(1:num_inc), 2)))
dim_m <- dim(m)
dim_m[1]
who_buys <- ifelse(width*m %*% choice[1:2] - (K2+P) > 0, 1, 0)
library(mvtnorm)
prob_den <- dmvnorm(width*m, mu[1:2], Sigma[1:2,1:2])
# the final result is frac_buy2, which is the fraction of total type 2 consumer (SG) who purchase the
product
frac_buy2 <- t(who_buys) %*% prob_den*width^2

# specify the number of n = total consumers of S1 and S2; type 1 consumers (SBG) n-n2 and type 2
consumers (SG) n2 = 1-n sd segment difference (s2-s1) n2-n
n <- 100
n2 <- 50
# calculate total purchases by multiplying frac_buy with n and then summing across the two groups
total_purchase[i] <- frac_buy*(n-n2)+frac_buy2*n2
# end price loop
}
# display price vector and corresponding quantity purchased
Pvec
total_purchase

write.csv(Pvec, file = "price.csv")
write.csv(total_purchase, file = "purchase.csv")

```

⁹³ This is a R code package that provides functions for computing the density and the distribution function of normal distribution in a multidimensional space (a, b, c) (Genz & Azzalini, 2011)

⁹⁴ This command calculates the number of consumers in each cube as defined by applying the probability density (normal distribution) to each cube and using the earlier defined mean and variance. Width (size of the cubes) times the m (data matrix of named cubes) is used to move the distribution from a 2 dimensional to a 3 dimensional space, mu is the mean (i.e., 1, 1, 1) and sigma is the value of the variance (i.e., 0.1 1) from the variance/covariance matrix.

⁹⁵ Defines the fraction of the Segment 1 consumers that purchase the processed food product by applying the command of who-buy (matrix of 0 and 1 assigned to each cube) multiplied by probability density (number of consumer in each cube) and then multiply by width (width of each small cube) to the power of 3. Width³ is required to rescale volume from two dimensional value of one (normal distribution assumption of area under the curve =1) to actual cube size and volume (i.e., width³). The cubes assigned a 0 value (these are no-buy cubes) will not be counted as 0 times probability density = 0.

⁹⁶ Conduct the same process for Segment 2 consumers of cube naming, converting name to coefficient values, defining cube as buy/no-buy and assigning probabilities distribution to get number of consumers in cube. This is two dimensional as this segment uses only S and G.

Appendix B. Excel Worksheets Used to Develop Aggregate Demand and Marginal Revenue for Claim and No-claim Products

The following steps were used to develop Aggregate Demand and Marginal Revenue graphs for Claim and No-claim Products:

- i. Use R to calculate the total units purchased by consumers in Segment 1 (frac_buy) and Segment 2 (frac_buy2) for a claim products (i.e., $G=2.50$ and $B = 03.00$) and no-claim product ($G= 2.00$ and $B=-1.50$) at combination of price from \$2 to \$4. S is set at 1.
- ii. Copy prices, frac_buy and frac_buy2 values into excel worksheets. Define n_2 and n values where $n + n_2 = 100$ and calculate total purchase to calculate in the spreadsheet the quantity demanded by Segment 1 (Qd1) and quantity demanded by Segment 2 (Qd2).

N17										
A	B	C	D	E	F	G	H	I	J	K
		price	fracbuy	fracbuy2	total purchase	Qd1	Qd2	check	% Qd1 sales	% Qd2 sale
1		2	0.27506	0.897732	64.86634954	11.00242	53.86393	64.86635	16.96%	83.04%
2		2.025	0.27506	0.897732	64.86634954	11.00242	53.86393	64.86635	16.96%	83.04%
3		2.05	0.27506	0.897732	64.86634954	11.00242	53.86393	64.86635	16.96%	83.04%
4		2.075	0.256614	0.897732	64.12849189	10.26456	53.86393	64.12849	16.01%	83.99%
5		2.1	0.238847	0.872036	61.87607358	9.553899	52.32217	61.87607	15.44%	84.56%
6		2.125	0.238847	0.872036	61.87607358	9.553899	52.32217	61.87607	15.44%	84.56%
7		2.15	0.221742	0.872036	61.19184548	8.869671	52.32217	61.19185	14.49%	85.51%
8		2.175	0.221742	0.872036	61.19184548	8.869671	52.32217	61.19185	14.49%	85.51%
9		2.2	0.205376	0.842138	58.74331959	8.21505	50.52827	58.74332	13.98%	86.02%
10		2.225	0.205376	0.842138	58.74331959	8.21505	50.52827	58.74332	13.98%	86.02%
11		2.25	=D\$2*D5+D\$1*E5	0.818892	=D\$2*D9	7.588516	50.52827	=D\$1*E9	13.06%	86.94%
12		2.2		0.842138		8.21505	50.52827			86.94%
13		2.3	0.189713	0.842138	58.11678517	7.588516	50.52827	58.11679	13.06%	86.94%

Develop marginal revenue (MR) values as follows:

- Regress total purchase (Q) to price, price² and price³ to obtain coefficients for price, price² and price³ that can be used forecasted total purchase (Q-forecast). This allows smaller and smoother increments between total purchase and supports more accurate marginal revenue values.
- Calculate marginal revenue as change in total revenue (price times Q-forecast) from prior year to current year divided by change in total purchase for those same years.

Q	Price	Price ²	Price ³	Q_forest	MR	SUMMARY OUTPUT	
64.86635	2	4	8	65.41187	-0.56969	Regression Statistics	
64.86635	2.025	4.100625	8.303766	64.78162	-0.44562	Multiple R 0.999061	
64.12849	2.075	4.305625	8.921172	63.46561	-0.32857	R Square 0.998123	
61.87607	2.1	4.41	9.261	62.70105	-0.21776	Adjusted R Square 0.99805	
61.87	=ABS\$22+ABS\$23*UB		.595703	62.0796	0.11254	Standard Error 0.845848	
61.19	=ABS\$24*V8+ABS\$25*		.938375			Observations 81	
61.19	W8		0.28911			ANOVA	
58.74			10.648			df SS MS F significance F	
58.74332	2.225	4.950625	11.01514	59.11693	0.262978	Regression 3 29299.15 9766.382 13650.51 7.5E-105	
58.11679	2.25	5.0625	11.39063	58.34007	0.347571	Residual 77 55.09034 0.715459	
58.11679	2.275	5.175625	11.74555	57.54994	0.4291	Total 80 29354.24	
58.11679	2.3	5.29	12.167	56.74715	0.507827	Coefficient Standard Error t Stat P-value Lower 95% Upper 95% Lower 95.0% Upper 95.0%	
55.45736	2.325	5.405625	12.56808	55.93229	0.583983	Intercept 1.709182 15.32288 0.111544 0.911475 -28.8026 32.22093 -28.8026 32.22093	
54.89085	2.35	5.5225	12.97788	55.10598	0.657775	X Variable 114.3108 15.92703 7.177159 3.83E-10 82.59604 146.0256 82.59604 146.0256	
54.89085	2.4	5.76	13.824	53.4214	0.798987	X Variable -54.12 5.404611 -10.0137 1.36E-15 -64.8819 -43.358 -64.8819 -43.358	
52.03808	2.425	5.880625	14.26052	52.56434	0.866721	X Variable 6.445112 0.599539 10.75011 5.47E-17 5.251278 7.638947 5.251278 7.638947	
51.5323	2.45	6.0025	14.70613	51.69824	0.932724		

- iii. Create a section of the spreadsheet that contains values of price, total purchase (Q), quantity demanded by Segment 1 (Q1), quantity demanded by Segment 2 (Q2), marginal revenue (MR) and marginal cost (MC).

	A	B	C	D	E	F	G
6	Price	Q	Q1	Q2		MR	MC
7	2	64.86635	11.00242	53.86393			
8	2.025	64.86635	11.00242	53.86393		-0.56969	2.25
9	2.05	64.86635	11.00242	53.86393		-0.44562	2.25
10	2.075	64.12849	10.26456	53.86393		-0.32857	2.25
11	2.1	61.87607	9.553899	52.32217		-0.21776	2.25
12	2.125	61.87607	9.553899	52.32217		-0.11254	2.25
13	2.15	61.19185	8.869671	52.32217		-0.01232	2.25

- iv. Transpose current spreadsheet layout of total purchase (Q), quantity demanded by Segment 1 (Q1), quantity demanded by Segment 2 (Q2), marginal revenue (MR) and marginal cost (MC) associated with price to new format that supports graphing of the aggregate demand allowing price on vertical axis and Q on horizontal axis and thus associating price, MR and MC with Q. Q1 and Q2 values.

F	G	H	I	J	K	L	M	N	O	P
			Qaxis	P_Q	P_Q1	P_Q2	MR	MC		Profit
			0	4	4	4	3.415132	2.25		0
			0.25	4	3.675	4	3.415132	2.25		0.4375
			0.5	4	3.425	4	3.415132	2.25		0.875
			0.75	4	3.325	4	3.415132	2.25		1.3125
			1	4	3.225	4	3.415132	2.		
			1.25	4	3.125	4	3.415132	2.		
			1.5	4	3.05	4	3.415132	2.		
			1.75	4	2.975	4	3.415132	2.		
			2	4	2.925	4	3.415132	2.		
			2.25			4				3.9375
			2.5			4				4.375
			2.75			4				4.8125
			3			4				5.25
			3.25			4				5.6875
			3.5	4	2.675	4	3.415132	2.25		6.125

=IF(I10<=MAX(\$B\$7:\$B\$87),INDEX(\$A\$7:\$A\$87,MATCH(I10,\$B\$7:\$B\$87,-1),1),0)

=IF(I12<=MAX(\$C\$7:\$C\$87),INDEX(\$A\$7:\$A\$87,MATCH(I12,\$C\$7:\$C\$87,-1),1),0)

=IF(I12<=MAX(\$D\$7:\$D\$87),INDEX(\$A\$7:\$A\$87,MATCH(I12,\$D\$7:\$D\$87,-1),1),0)

=IF(I12<=MAX(\$B\$7:\$B\$87),INDEX(\$F\$7:\$F\$87,MATCH(I12,\$B\$7:\$B\$87,-1),1),0)

- v. Exponentially smooth values of Q, Q1, Q2, MR and MC using MS excel data analysis and damping factor between 0.3 to 0.5.
- vi. Graph Q, Q1, Q2, MR and MC to illustrate no-claim and claim product profit maximizing price.

Appendix C. Excel Worksheets Used to Develop Product Strategy Profit Tables

The following steps were used to develop the product strategy profit tables:

- i. Use R to calculate the total units purchased by all consumers for each of the **claim** products (i.e., low claim $G=2.25$, medium claim $G = 2.375$ and high claim $G= 2.50$) at every combination of the variables: price (range from \$2 to \$4), B (range from -2 to -4) and percentage of consumers in Segment 2 (purchase with P, G, S). S is set at 1.
- ii. Use R to calculate the total units purchased by all consumers for the **no-claim** product (i.e., no-claim $G=2.00$ and $B=-1.50$) at every combination of the variables: price (range from \$2 to \$4) and percentage of consumers in Segment 2 (i.e., consumers that purchase with P, G, T).
- iii. Copy n2, B values, prices and total purchase values into excel worksheets.
- iv. Determine the maximum profit for each product by reviewing each “price times total purchase’ value for each combination of B and n2.

	A	B	C	D	E	F	CD	CE	CF	CG	CH	CI	CJ	CK	CL
1		B	n2	Prices											
2	1	0	0	2	2.025	2.05	3.95	3.975	4	profit max					
3	2	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
4	3	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
5	4	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
6	5	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
7	6	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
8	7	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
9	8	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
10	9	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
11	10	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
12	11	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
13	12	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					
14	13	-1.5	35	49.78841	49.17886	49.17886	3.394166	3.380313	2.989344	98.35772					

- v. Copy values of B (absolute value), n2 and maximum profit for each of the four products into new worksheet.

	A	B	C	D	E	F	G	H	I
1	B	n2	no claim	low claim	med claim	hi claim			
2	2	35	98.36	93.78	99.91	106.80			
3	2	36	99.62	95.19	101.25	108.19			
4	2	37	100.89	96.60	102.60	109.59			
5	2	38	102.15	98.01	104.07	110.99			
6	2	39	103.42	99.42	105.54	112.39			

- vi. Create pivot tables (row = n2 and column =B) of maximum profit levels for each claim version and no-claim product.

LOW CLAIM								
Sum of low claim	Column Labels							
Row Labels	2	2.05	2.1	2.15	2.2	2.25	2.3	2.35
35	93.78	92.09	90.66	89.31				
36	95.19	93.53	92.12	90.78				
37	96.60	94.96	93.58	92.26				
38	98.01	96.40	95.05	93.85				
39	99.42	97.86	96.61	95.44				
40	100.87	99.41	98.18	97.02				

Given the low claim product then value in the table is the maximum profit level when n2 = 40 and B = -2.00

Note that the no-claim product has only one value of B (1.5) and thus maximum profit level are provided for different n2 only.

NO CLAIM						
Sum of no claim	Column Labels					
Row Labels	1.5	1.5	1.5	1.5	1.5	1.5
35	98.36	98.36	98.36			
36	99.62	99.62	99.62			
37	100.89	100.89	100.89			
38	102.15	102.15	102.15			
39	103.42	103.42	103.42			
40	104.68	104.68	104.68	104.68	104.68	104.68

Given the no-claim product then value in the table is the maximum profit level when n2 = 40 and B = -1.50

- vii. Create table that compares maximum profit level from claim pivot table to no-claim pivot table for each combination of n2 and B and place a claim if claim is more profitable and 0 if no-claim is more profitable.

NO CLAIM TO LOW CLAIM												
	2	2.05	2.1	2.15	2.2	2.25	2.3	2.35	2.4	2.45	2.5	
35	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0
53	claim	0	0	0								0
54	claim	0	0	0								0
55	claim	0	0	0								0
56	claim	claim	0	0								0
57	claim	claim	0	0								0

=IF('Pivot table claim no-claim'!K53:AY93-'Pivot table claim no-claim'!K7:AY47>0,"claim",0)

Max profit for each product type across a range of prices from \$2 to \$4

- iii. Develop final Claim Product Strategy Profit Table

Appendix D. Listing of Products for the Case Study of Exaggerated Product Claims

Case Study Number	Product Type	Company Name	Brand Name	Product Name	Product Variety
CS1b	granola bars	General Mills	Nature Valley	Crunchy Fruit Granola Bars	Cranberry Strawberry
CS1a	granola bars	General Mills	Nature Valley	Crunchy Granola Bars	Roasted Almond
CS2a	uncooked lasagne noodles	Ronzoni Foods	Catelli	Express Lasagne	(Original)
CS2b	uncooked lasagne noodles	Ronzoni Foods	Catelli	Healthy Harvest Lasagne	Whole Wheat
CS3a	granola cereal	Western Family		Crunchy Granola Cereal	Original
CS3b	granola cereal	Western Family		Crunch Granola Cereal	Low Fat Raisin and Almond
CS4a	breakfast cereal	Kellogg's		Special K	Original
CS4b	breakfast cereal	Kellogg's		Special K	Satisfaction
CS5a	breakfast cereal	General Mills		Cheerios	(Original)
CS5b	breakfast cereal	General Mills		Cheerios	Multigrain
CS6a	crackers	Kraft	Christie	Wheat Thins	Original
CS6b	crackers	Kraft	Christie	Wheat Thins	Low fat
CS6c	crackers	Kraft	Christie	Wheat Thins	Whole Grain
CS6d	crackers	Kraft	Christie	Wheat Thins	Multigrain
CS7a	crackers	Kraft	Christie	Vegetable Thins	Original
CS7b	crackers	Kraft	Christie	Vegetable Thins	Low fat
CS7c	crackers	Kraft	Christie	Vegetable Thins	Multigrain
CS8a	crackers	Pepperidge Farm		Goldfish	Original
CS8b		Pepperidge Farm		Goldfish	Whole Grain (Cheddar)
CS9b	cookies	Kraft	Peek Freans	Lifestyle Selections	Vanilla Yogurt Crème
CS9a	cookies	Kraft	Peek Freans	Lifestyle Selections	Shortcake
CS10a	couscous	Henri Jonas	Aroma del Mediterraneo	Couscous	Natural and Exotic
CS10b	couscous	Henri Jonas	Aroma del Mediterraneo	Couscous	Whole Wheat
CS11a	pancake & waffle mix		Coyote	Pancake and Waffle Mix	Original
CS11b	pancake & waffle mix		Coyote	Pancake and Waffle Mix	Flaxseed
CS12a	miracle whip	Kraft		Miracle Whip	Original
CS12b	miracle whip	Kraft		Miracle Whip	Fat Free
CS13b	bagel	Dempsters		Bagel	Original
CS13a	bagel	Dempsters		Bagel	12 Grain
CS14a	salad dressing	Johnny's Fine Foods	Johnny's	Great Caesar	Original
CS14b	salad dressing	Johnny's Fine	Johnny's	Great Caesar	Light

Case Study Number	Product Type	Company Name	Brand Name	Product Name	Product Variety
		Foods			
CS15a	bread	Save on Foods		Sliced Bread	Sourdough
CS15b	bread	Save on Foods		Sliced Bread	Multigrain
CS16a	frozen french fries	McCain Foods	McCain	Superquick Fried Potatoes	Shoestring
CS16b	frozen french fries	McCain Foods	McCain	Superfries Fried Potatoes	Straight Cut - Low fat
CS17a	cream cheese	Kraft	Philadelphia	Cream Cheese Product	Herb and Garlic (Original)
CS17b	cream cheese	Kraft	Philadelphia	Cream Cheese Product	Herb and Garlic - Low fat
CS18a	feta cheese	Western Family		Feta Cheese	Regular
CS18b	feta cheese	Western Family		Feta Cheese	Lite
CS19a	sour cream	Saputo	Dairyland	Sour Cream	Regular
CS19b	sour cream	Saputo	Dairyland	Sour Cream	Fat Free
CS20a	spread	GFA Brands Inc.	Earth Balance	Traditional Spread	Original
CS20b	spread	GFA Brands Inc.	Earth Balance	Organic Buttery Flavour Spread	Organic Whipped

Appendix E. Positive and Negative Difference for the Products used in the Case Study of Exaggerated Product Claims

Legend:											
	Type of Claim	Value of Unit	Fat (g)	Saturated Fat (g)	Trans Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbohydrates (g)	Fibre (g)	Sugars (g)	Protein (g)
1ab GRANOLA BARS											
Original		38	6	0.5	0	0	135	27	2	11	3
Claim	fibre	46	9	1	0	0	170	30	3	11	4
difference (value)			3.0	0.5	0.0	0.0	35	3.0	1.0	0.0	1.0
difference (%)			50%	100%	n/a	n/a	26%	11%	50%	0%	33%
2ab UNCOOKED LASAGNE NOODLES											
Original		85	1.5	0	0	0	0	64	3	3	11
Claim	whole wheat low sodium	85	2.5	0.5	0	0	10	59	8	4	13
difference (value)			1.0	0.0	0.0	0.0	10	-5.0	5.0	1.00	2.00
difference (%)			67%	n/a	n/a	n/a	n/a	-8%	167%	33%	18%
3ab GRANOLA CEREAL											
Original		55	10	2	0	0	35	35	4	10	6
Claim	low fat	55	3	0.5	0	0	70	44	4	16	5
difference (value)			-7.0	-1.50	0.0	0.0	35	9.0	0.0	6.0	-1.0
difference (%)			-70%	-75%	n/a	n/a	100%	26%	0%	60%	-17%
4ab BREAKFAST CEREAL											
Original		29	0	0	0	0	230	22	0	3	5
Claim	fibre	54	1	0.2	0	0	340	39	4	13	10
difference (value)			1.0	0.20	0.0	0.0	110	17.0	4.0	10.0	5.0
difference (%)					n/a	n/a	48%	77%		333%	100%
5ab BREAKFAST CEREAL											
Original		27	2	0.4	0	0	8	20	2	1	3
Claim	multigrain	30	1	0	0	0	160	25	3	6	2
difference (value)			-1.0	-0.40	0.0	0.0	152	5.0	1.0	5.0	-1.0
difference (%)			-50%	-100%	n/a	n/a	1900%	25%	50%	500%	-33%
6ab CRACKERS											
Original		20	4	0.5	0	0	115	14	1	2	1
Claim	low fat	21	2.5	0.4	0	0	140	16	1	2	2
difference (value)			-1.50	-0.10	0.0	0.0	25	2.0	0.0	0.0	1.0
difference (%)			-38%	-20%	n/a	n/a	22%	14%	0%	0%	100%
6ac CRACKERS											
Original		20	4	0.5	0	0	115	14	1	2	1

Legend:	Type of Claim	Value of Unit	Fat (g)	Saturated Fat (g)	Trans Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbohydrates (g)	Fibre (g)	Sugars (g)	Protein (g)
Claim	whole grain	21	4	0.5	0	0	130	15	2	2	1
difference (value)			0.0	0.0	0.0	0.0	15	1.0	1.0	0.0	0.0
difference (%)			0%	0%	n/a	n/a	13%	7%	100%	0%	0%
6ad CRACKERS											
Original		20	4	0.5	0	0	115	14	1	2	1
Claim	Multi grain	20	3	0.4	0	0	160	14	1	2	2
difference (value)			-1.0	-0.10	0.0	0.0	45	0.0	0.0	0.0	1.0
difference (%)			-25%	-20%	n/a	n/a	39%	0%	0%	0%	100%
7ab CRACKERS											
Original		20	4.5	1	0	0	220	13	0	1	1
Claim	low fat	20	2.5	0.5	0	0	240	14	0	1	1
difference (value)			-2.0	-0.50	0.0	0.0	20	1.0	0.0	0.0	0.0
difference (%)			-44%	-50%	n/a	n/a	9%	8%	n/a	0%	0%
7ac CRACKERS											
Original		20	4.5	1	0	0	220	13	0	1	1
Claim	Multi grain	20	4.5	1	0	0	210	13	0	1	1
difference (value)			0.0	0.0	0.0	0.0	-10	0.0	0.0	0.0	0.0
difference (%)			0%	0%	n/a	n/a	-5%	0%	n/a	0%	0%
8ab CRACKERS											
Original		20	4	0.4	0	0	150	13	0	0	2
Claim	whole grain	20	3	0.5	0	5	170	14	1	0	2
difference (value)			-1.0	0.10	0.0	5.0	20	1.0	1.0	0.0	0.0
difference (%)			-25%	25%	n/a		13%	8%		n/a	0%
9ab COOKIES											
Original		34	7	2	0	0	45	23	0	11	2
Claim	sugar	29	5	0.5	0	10	150	21	0	0	2
difference (value)			-2.0	-1.50	0.0	10.0	105	-2.0	0.0	-11.0	0.0
difference (%)			-29%	-75%	n/a		233%	-9%	n/a	-100%	0%
10ab COUSCOUS											
Original		42	0.5	0	0	0	0	31	1	1	5
Claim	whole wheat	43	1	0.1	0	0	0	31	3	1	6
difference (value)			0.50	0.10	0.0	0.0	0	0.0	2.0	0.0	1.0
difference (%)			100%		n/a	n/a	n/a	0%	200%	0%	20%
11ab PANCAKE AND WAFFLE MIX											
Original		38	1	0.2	0	0	370	26	4	7	7

Legend:											
	Type of Claim	Value of Unit	Fat (g)	Saturated Fat (g)	Trans Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbohydrates (g)	Fibre (g)	Sugars (g)	Protein (g)
Claim	sat fat flaxseed omega-3	38	1.5	0.2	0	0	410	26	4	1	5
difference (value)			.50	0.0	0.0	0.0	40	0.0	0.0	-6.0	-2.0
difference (%)			50%	0%	n/a	n/a	11%	0%	0%	-86%	-29%
12ab MIRACLE WHIP											
Original		15	3.5	0.5	0	5	120	2	0	1	0.1
Claim	fat free	15	0	0	0	0	130	3	0	2	0
difference (value)			-3.50	-0.50	0.0	-5.0	10	1.0	0.0	1.0	-0.10
difference (%)			-100%	-100%	n/a	-100%	8%	50%	n/a	100%	-100%
13ab BAGELS											
Original		75	1	0.2			260	36	1	2	7
Claim	12 grain	85	5	0.5			300	38	5	1	10
difference (value)			4.0	0.30			40.0	2.0	4.0	-1.0	3.0
difference (%)			400%	15%			15%	6%	400%	-50%	43%
14ab SALAD DRESSING											
Original		30	19	2	0	0	160	1	0	0	
Claim	light	30	4	0.5	0	0	310	5	1	2	1
difference (value)			-15.0	-1.50	0.0	0.0	150	4.0	1.0	2.0	n/a
difference (%)			-79%	-75%	n/a	n/a	94%	400%	n/a	n/a	n/a
15ab BREAD											
Original		50	0.5	0	0	0	390	22	1	1	4
Claim	multigrain	55	2	0.3	0	0	240	23	2	2	5
difference (value)			1.50	0.30	0.0	0.0	-150	1.0	1.0	1.0	1.0
difference (%)			300%		n/a	n/a	-38%	5%	100%	100%	25%
16ab FROZEN FRENCH FRIES											
Original		85	8	0.5	0	0	50	33	2	0	3
Claim	low fat	85	2.5	0.2	0	0	115	20	2	0	2
difference (value)			-5.50	-0.30	0.0	0.0	65	-13.0	0.0	0.0	-1.0
difference (%)			-69%	-60%	n/a	n/a	130%	-39%	0%	n/a	-33%
17ab CREAM CHEESE											
Original		15	4	2.5	0.1	10	70	1	0	1	1
Claim	low fat	15	0.5	0.4	0	5	110	1	0	1	2
difference (value)			-3.50	-2.10	0.1	-5.0	40	0.0	0.0	0.0	1.0
difference (%)			-88%	-84%	100%	-50%	57%	0%	n/a	0%	100%
18ab FETA CHEESE											
Original		30	7	4.5	0.1	20	240	0	0	0	5

Legend:											
	Type of Claim	Value of Unit	Fat (g)	Saturated Fat (g)	Trans Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbohydrates (g)	Fibre (g)	Sugars (g)	Protein (g)
Claim	lite	30	4.5	3	0.1	15	300	0	0	0	7
difference (value)			-2.50	-1.50	0.0	-5.0	60	0.0	0.0	0.0	2.0
difference (%)			-36%	-33%	0%	-25%	25%	n/a	n/a	n/a	40%
19ab SOUR CREAM											
Original		30	4.5	2.5	0	15	35	2	0	2	1
Claim	fat free	30	0.4	0.3	2	0	30	3	0	3	2
difference (value)			-4.10	-2.20	2.0	-15.0	-5	1.0	0.0	1.0	1.0
difference (%)			-91%	-88%	n/a	100%	-14%	50%	n/a	50%	100%
20ab SPREAD											
Original		10	8	2	0.1		75	0			0
Claim	organic	10	8	2.5	0.1		90	0			0
difference (value)			0.0	0.50	0.0	0.0	15	0.0	0.0	0.0	0.0
difference (%)			0%	25%	0%	n/a	20%	n/a	n/a	n/a	n/a

Grey-shaded cells identify comparisons directly related to the claimed nutrient.

Cells shaded light red with italic text identifies positive increases in the FSS nutrient, which implies that the claim is exaggerated.

Case numbers identify the matched products. For example with case number 1 ab the “1 a” identifies the original or no-claim product and 1 b identifies the matched claim product. Note that a case number such as 6ac indicates that there are multiple claims (e.g., 6b and 6c) which are compared to the one original product (6a). In the particular case of 6c it is the second claim that is being evaluated.

Appendix F. Data Collection Sheet

PRODUCT ID #			
PRODUCT CATEGORY			
COMPANY NAME			
BRAND NAME			
PRODUCT NAME			
PRODUCT VARIETY			
	units	% DV	
Total weight or Volume of the Product			
Unit (e.g., Volume or wt.)			
Nutrition Facts Label Unit (e.g., Vol. or wt.)			
Value of Unit			
Calories			
Fat (g)			
Saturated Fat (g)			
Trans Fat (g)			
Cholesterol (mg)			
Sodium (mg)			
Potassium (mg)			
Carbohydrates (g)			
Fibre (g)			
Sugars (g)			
Protein (g)			
Vit A (% Daily Value)			
Vit C (% Daily Value)			
Calcium (% Daily Value)			
Iron (% Daily Value)			

FAT CLAIM	
SATURATED FAT CLAIM	
TRANS FAT CLAIM	
FIBRE CLAIM	
CALCIUM CLAIM	
SUGAR CLAIM	
SODIUM CLAIM	
WHOLE GRAINS CLAIM	
IRON CLAIM	
OMEGA-3 CLAIM	
ORGANIC CLAIM	
INGREDIENT CLAIM	
NATURAL CLAIM	
CHOLESTROL CLAIM	
CHECKOFF (E.G., SENSIBLE SOLUTION, HEART AND STROKE)	
No Claim	

Appendix G. Total Number and Percentage of Products by Product Category (N=1677)

Product Category	Number	Percentage
Cookies	180	10.73%
Canned And Box Soup	134	7.99%
Frozen Pizza	54	3.22%
Breakfast Cereal	130	7.75%
Canned Beans	22	1.31%
Crackers	124	7.39%
Instant Oatmeal	34	2.03%
Granola Bars	73	4.35%
Breads	51	3.04%
Yogurt	85	5.07%
Frozen Meals For One	85	5.07%
Vegetarian Items	39	2.33%
Hard Cheese	32	1.91%
Processed Cheese	57	3.40%
Pasta Sauces	76	4.53%
Salad Dressings	156	9.30%
Potato Chips	94	5.61%
Juices	190	11.33%
Margarine And Spreads	25	1.49%
Butter	13	0.78%
Peanut Butter	23	1.37%
Total	1677	100.00%

Appendix H. Claim Listing and Examples⁹⁷

Claim number	Claim Type	Example of Claim Types included in categories
1	Saturated Fat	Low in Saturated Fat, Free of Saturated Fat, a healthy diet low in saturated and trans fats may reduce the risk of heart disease. Quaker instant oatmeal is low in saturated and trans fats
2	Fibre	2g fibre per 40g serving, Source of Fibre, “Prebiotic – 1g of prebiotic insulin fibre per 30g serving,” soluble oat fibre contributes to healthy cholesterol levels
3	Calcium	good source of calcium and iron
4	Sugar	No sugar added (F)(as in juice) no refined sugar for peanut butter
5	Sodium	
6	Whole grain	100% whole grain, made with whole grain, baked with whole grain, made with whole oats, made with oat bran, multigrain, oats, barley and rice flour, wheat biscuits, Made with 100% whole grain quaker oats (F), baked with the goodness of wheat - baked with goodness of whole wheat – F, delicious bar of whole grain oats and almonds, contains wheat and oat ingredients, 100% whole wheat pasta
7	Iron	good source of calcium and iron
8	Omega-3	source of omega-3 & 6 polyunsaturated.
9	Organic	Any term “organic, USDA organic
10	Ingredient Based	Peanut free, real dates, goodness of real fruit, made with real chocolate chips, No GMO, Made with 56% cocoa, made with real lemons, Gluten-free (F), no added MSG, U.S. inspected & passed by department of agriculture, At McCain, our recipe is simple: Good food starts with real ingredients. Made with a hint of real cocoa- F, artificial flavour, Source of 6 Vitamins & Minerals, Source of 6 Essential Nutrients, Wheat Free
11	Natural	No artificial flavor or color, natural ingredients, No preservatives, No artificial flavoring, No coloring, No artificial flavoring, no preservatives, a natural food, a natural cereal
12	Cholesterol	0 Cholesterol, soluble oat fibre contributes to healthy cholesterol levels
13	Third Party	Health Check
15	Fat	low in fat, 40% Less Fat Than Original Triscuit Crackers, Fat Free, low in fat and saturated fat, free of Fat, 50% less fat and 33% less calories than regular tofu, 100% fat free, 100% fat-free, 100% free of fat
16	Trans-Fat	trans fat, trans fat free, 0g trans fat, No hydrogenated fats, a healthy diet low in saturated and trans fats may reduce the risk of heart disease. Quaker instant oatmeal is low in saturated and trans fats - F

⁹⁷ Claims categories are based upon regulated food, health and nutrient content claims as defined by Health Canada and then further categorized by nutrient category. See Section 2.3.3 for details of the claims.

Appendix I. Calculated Serving Size for each Product Category

product category name	Product category number	Standard Serving Size Used ⁹⁸	Unit
cookies	1	30	grams
canned and box soup	2	125	ml
frozen pizza	3	150	grams
breakfast cereal	4	40	grams
canned beans	5	250	ml
crackers	6	25	grams
instant oatmeal	7	35	grams
granola bars	8	35	grams
Breads	9	60	grams
Yogurt	10	150	grams
Frozen meals for One	11	255	grams
Vegetarian Items	12	100	grams
Hard Cheese	13	30	grams
Processed Cheese	14	30	grams
Pasta Sauces	15	125	ml
Salad Dressings	16	30	ml
Potato chips	17	50	grams
Juices	18	250	ml
Margarine and Spreads	19	10	grams
Butter	20	10	grams
Peanut Butter	21	15	grams

⁹⁸ Standard Serving were developed using the serving size range and average of the products within the product category plus the CFIA Reference Amounts and Serving Sizes (Canadian Food Inspection Agency, 2010e)

Appendix J. Type of Claims with Product Categories

Claim Type→	Saturated Fat		Fibre		Calcium		Sugar		Sodium		Whole Grains		Iron		Omega-3		Organic		Ingredient		Natural		Cholesterol		Third Party		Fat		Trans Fat	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Cookies	47	26	14	8	9	5	4	2	1	1	8	4	9	5	2	1	3	2	60	33	28	16	40	22	37	21	34	19	65	36
Canned And Box Soup	28	21	31	23	0	0	0	0	34	25	6	4	8	6	0	0	22	16	57	43	59	44	11	8	37	28	73	54	32	24
Frozen Pizza	0	0	2	4	4	7	0	0	0	0	2	4	4	7	0	0	0	0	31	57	0	0	0	0	0	0	0	0	0	0
Breakfast Cereal	41	32	79	61	0	0	6	5	30	23	64	49	1	1	13	10	26	20	89	68	40	31	3	2	7	5	72	55	66	51
Canned Beans	1	5	9	41	0	0	0	0	7	32	0	0	7	32	0	0	12	55	0	0	1	5	1	5	1	5	1	5	1	5
Crackers	65	52	36	29	0	0	1	1	5	4	45	36	6	5	4	3	6	5	52	42	29	23	38	31	43	35	12	10	102	82
Instant Oatmeal	11	32	25	74	0	0	2	6	0	0	8	24	3	9	0	0	0	0	7	21	16	47	13	38	10	29	7	21	13	38
Granola Bars	10	14	28	38	3	4	1	1	5	7	29	40	4	5	4	5	0	0	41	56	42	58	3	4	3	4	3	4	10	14
Breads	19	37	25	49	7	14	0	0	1	2	32	63	0	0	10	20	10	20	25	49	2	4	10	20	18	35	15	29	23	45
Yogurt	0	0	3	4	43	51	12	14	0	0	0	0	0	0	0	0	7	8	82	96	11	13	0	0	12	14	30	35	3	4

Frozen Meals For One	0	0	5	6	6	7	0	0	0	0	10	12	14	16	0	0	0	0	39	46	32	38	0	0	3	4	2	2	0	0
Vegetarian Items	0	0	2	5	3	8	0	0	1	3	0	0	4	10	3	8	0	0	31	79	18	46	1	3	23	59	8	21	29	74
Hard Cheese	0	0	0	0	12	38	0	0	0	0	0	0	0	0	0	2	6	4	13	0	0	0	0	2	6	7	22	0	0	
Processed Cheese	0	0	0	0	7	12	0	0	0	0	0	0	0	0	0	1	2	12	21	0	0	0	0	2	4	22	39	0	0	
Pasta Sauces	2	3	1	1	0	0	1	1	1	1	0	0	1	1	0	0	14	18	30	39	9	12	0	0	3	4	17	22	0	0
Salad Dressings	55	35	0	0	0	0	12	8	0	0	0	0	0	0	29	19	15	10	50	32	94	60	38	24	9	6	24	15	59	38
Potato Chips	41	44	0	0	0	0	0	0	12	13	3	3	0	0	0	0	0	62	66	34	36	24	26	5	5	10	11	73	78	
Juices	2	1	5	3	2	1	108	57	16	8	0	0	3	2	1	1	17	9	158	83	124	65	0	0	89	47	1	1	2	1
Margarine And Spreads	14	56	0	0	0	0	0	0	1	4	0	0	0	0	10	40	0	0	12	48	0	0	4	16	10	40	1	4	15	60
Butter	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	1	8	4	31	3	23	0	0	0	0	0	0	0	0
Peanut Butter	6	26	0	0	0	0	6	26	10	43	0	0	0	0	0	0	9	39	9	39	7	30	2	9	14	61	2	9	18	78

Appendix K. Listing of Companies

Dummy Variable in Nutrient Claims Regressions & Company Type	Examples of Companies
<p>1</p> <p>Multi nationals, Multi Brands</p>	<p>Agropur</p> <p>Aliments Ultima Foods</p> <p>Amy's Kitchen</p> <p>Annie's Homegrown</p> <p>Astro</p> <p>B & G Foods</p> <p>Baxters Lean Cuisine</p> <p>Bellisimo</p> <p>Cadbury</p> <p>Campbell's</p> <p>Carr's of Carlisle (McVites)</p> <p>ConAgra Foods</p> <p>DANONE</p> <p>Dare</p> <p>Dr. Oekter</p> <p>Finn Crisp</p> <p>General Mills</p> <p>General Mills Canada</p> <p>Glutino</p> <p>Hain Celestial</p> <p>Heinz Canada</p> <p>Heinz</p> <p>Island Farms (Agropur)</p> <p>Kavli International</p> <p>Kashi (Kelloggs)</p> <p>Kellogg</p> <p>Kraft</p> <p>Liberte Inc</p> <p>Liberty Ritche</p> <p>Maple Leaf and Dempsters and Canada Bread Company</p> <p>McCain Foods</p> <p>McVitie's</p> <p>McVitie's Penguin</p> <p>Nature Valley</p>

	<p>Nature's Path Foods Nestle Nestle Canada Inc Pacific Foods Parmalat Canada Parmalat Canada Pepperidge Farm (Campbell's) Pepsi - QTG Canada Post Foods Canada Quaker (Pepsi) Robin Hood Saputo Smucker Foods of Canada Co. The Ryvita Company Limited Tribe Mediterranean Foods Inc (Nestle) Unico Inc Unilever Vassan & Vassan Oy Wasa Walkers Short Bread Ltd Weetabix Weight Watchers Weston Bakeries Limited Wolfgang Puck (Campbells) Yves Veggie (Hanes Celestial)</p>
<p>0 Store Brands & Other</p>	<p>O Organics Safeway Lucerne Foods Western Family Products Overwaitae Food Group LP Overwaitae, Annas Thins Arnott's Biscuits Limited Aventure Leclerc Bahlsen Barbara's Bakery Barber Cream Crackers Biscuit Leclerc Ltd. Leclerc Blue Diamond Growers</p>

Blue Star Farms
Crest Holland
Eden Foods
Hans Freitag
Healthy Times
Inc
Jacobs Bakery
John WM Macy's
Jordan's Cereal
Lander's Australian
Late July
Late July Snacks
Loacker
LU General Biscuits
Mandarin Soy Foods
Mary's Organic
MGC Inc.
Morinaga Nutritional Foods
Partners
Rogers Food Ltd
Roka
S.A. Piazza & Associates
Shasha Co
Silver Hills
Sunrise Soya Foods
Walker's Short Bread Ltd.

Appendix L. Descriptive Statistics for Sodium, Sugar and Fat

Summary Statistics for Sodium (milligrams per standard serving**)

	Number of Products	Minimum	Maximum	Mean	Standard Deviation
Fat*	1475	.0000	70.65	4.740	4.865
Saturated fat*	1475	.0000	20.00	1.349	1.825
Trans fat*	1475	.0000	6.000	.0530	.2781
Cholesterol*	1475	.0000	72.91	5.116	10.17
Sodium*	1475	.0000	1820.	264.6	297.1
Carbohydrates*	1475	.0000	194.1	21.73	14.59
Fibre*	1475	.0000	20.00	1.700	2.275
Sugar*	1475	.0000	61.06	9.580	12.48
Protein*	1475	.0000	25.86	3.831	4.110
*represents per standard serving					
** based on data truncated using fat claim					

Summary Statistics for Sugar (grams per standard serving size**)

	Number of Products	Minimum	Maximum	Mean	Standard Deviation
Fat*	1318	.0000	65.21	5.585	4.928
Saturated fat*	1318	.0000	20.00	1.633	2.009
Trans fat*	1318	.0000	6.000	.0688	.2967
Cholesterol*	1318	.0000	83.33	6.642	12.14
Sodium*	1318	.0000	2460	326.5	341.6
Carbohydrates*	1318	.0000	194.1	18.65	13.82
Fibre*	1318	.0000	19.31	1.810	2.202
Sugar*	1318	.0000	32.00	5.219	5.483
Protein*	1318	.0000	29.41	4.283	4.556
*represents per standard serving					
**based on data truncated using fat claim					

**Summary Statistics for Fat
(grams per standard serving**)**

	Number of Products	Minimum	Maximum	Mean	Standard Deviation
Fat*	1169	.0000	20.00	4.070	4.606
Saturated fat*	1169	.0000	20.00	.7.380	1.048
Trans fat*	1169	.0000	6.000	.0279	.2848
Cholesterol*	1169	.0000	30.00	1.482	4.154
Sodium*	1169	.0000	2460.	262.8	325.5
Carbohydrates*	1169	.0000	63.90	21.99	13.45
Fibre*	1169	.0000	20.00	1.715	2.340
Sugar*	1169	.0000	61.06	9.794	13.25
Protein*	1169	.0000	20.00	2.628	2.546
*represents per standard serving					
** based on data truncated using a saturated fat claim					

PARTICIPANTS NEEDED FOR RESEARCH ON HOW CONSUMERS PURCHASE GROCERY PRODUCTS

As a participant in this study, you would spend 90 minutes in one focus group discussion talking about your experiences in purchasing processed food products. In appreciation for your time, you will receive a \$50 gift card.

Participants should:

- ❖ Be **18 years of age** or over
- ❖ Have purchased food products from **at least 3** of the following grocery categories in the past month: cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings.
- ❖ Be able to speak, read, write and understand English
- ❖ Reside in the Vancouver area

Insert study recruitment cards here for potential volunteers to take away—sample copy on next page

Focus Group sessions will be held on February XX, 2012 at 2 pm and 7 pm at the Community Room Kerrisdale Public Library.

Version: January 30, 2012

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If you are interested in volunteering for this study, please contact:
Kelleen Wiseman,
Faculty of Land and Food Systems
The University of British Columbia
email: @ubc.ca
phone: 604-822-9704

Appendix N. Recruitment Poster 2

**PARTICIPANTS NEEDED FOR RESEARCH
ON HOW CONSUMERS PURCHASE
GROCERY PRODUCTS**

As a participant in this study, you would spend 90 minutes in one focus group discussion talking about your experiences in purchasing processed food products. In appreciation for your time, you will receive a \$50 gift card.

Participants should:

- Be **18 years of age** or over
- Have **purchased food products from at least 3 of the following grocery categories in the past month:** cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings.
- Be able to speak, read, write and understand English
- Reside in the Vancouver area

Focus Group sessions will be held on February XX, 2012 at 2 pm and 7 pm at the Community Room Kerrisdale Public Library.



Insert study recruitment cards here for potential volunteers to take away—sample copy on next page

If you are interested in volunteering for this study, please contact:
Kelleen Wiseman,
Faculty of Land and Food Systems
The University of British Columbia
email: @ubc.ca
phone: 604-822-9704



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Appendix O. Recruitment Business Card

A set of these were placed with each posters for interested consumers to take with them.



Appendix P. Recruitment Advertisements for Local Newspapers

PARTICIPANTS NEEDED FOR RESEARCH ON HOW CONSUMERS PURCHASE GROCERY PRODUCTS

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- Have purchased food products from at least 3 of the following grocery categories in the past month: cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, juice or salad dressings.
- Be able to speak, read, write & understand English
- Reside in the Vancouver area

Meetings will be held at 1:30 pm and 7:00pm at:

- **Mt. Pleasant Neighbourhood House** **March 19**
- **Sunset Community Center-** **March 21**
- **Kerrisdale Community Center-** **March 26**
- **Kitsilano Community Center** **March 28**

TO VOLUNTEER CONTACT US AT:
604-822-9704 or
email: grocery.study@ubc.ca

PARTICIPANTS NEEDED

for Research on How Consumers Purchase Grocery Products

As a participant in this study, you would spend **90 minutes in one focus group discussion** talking about your experiences in purchasing processed food products.

In appreciation of your time, you will receive a \$50 gift card.

Meetings will be held at 1:30 pm and 7:00 pm at:

- ▶ **Mt. Pleasant Neighbourhood House**March 19
- ▶ **Sunset Community Centre**March 21
- ▶ **Kerrisdale Community Centre**March 26
- ▶ **Kitsilano Community Centre**March 28

PARTICIPANTS SHOULD:

- Be 18 years of age or over
- Have purchased food products from **at least three of the following grocery categories** in the past month: cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, juice or salad dressings
- Be able to speak, read, write and understand English
- Reside in the Vancouver area

TO VOLUNTEER, CONTACT US AT
604-822-9704 or
email: grocery.study@ubc.ca

Appendix Q. Demographic Survey for Participants



Study Title: Using focus groups to understand consumers' use of on-package information when purchasing processed food products

All information collected in this survey will be kept strictly confidential. Participation is voluntary.

NAME: _____

1. What is your gender?

- Female Male

2. What is your age?

- 18 – 29 years old
 30 – 49 years old
 50 – 64 years old
 65 years and over

3. What is your marital status?

- Single, never married
 Married
 Living common-law
 Separated/Divorced
 Widowed

4. Including yourself, how many people live in your household?

	people
--	--------

5. Of the people in the household, how many are children (under 18 years of age)?

	children
--	----------

6. What is your current employment status?

- Employed for Wages
 Self employed
 Out of work but looking for work
 Out of work but not currently looking for work
 A homemaker
 A student
 Retired
 Unable to work

7. How many times in a month do you go to the grocery store?

	times a month
--	---------------

8. How much do you typically spend per week at grocery stores?

	dollars
--	---------

9. How many minutes do you typically spend in the grocery store each time you shop?

	minutes
--	---------

10. What is your total household income?

- Less than \$20,000
 \$20,000 to \$34,999
 \$35,000 to \$49,999
 \$50,000 to \$64,999
 \$65,000 to \$79,999
 \$80,000 to \$100,000
 Over \$100,000

11. What is the highest level of education you have completed?

- Some high school
 High school graduate
 Some university or college
 Trade/vocational/technical
 University or college degree
 Graduate degree

12. What is your racial or cultural group? (Check all that apply)

- White
 Asian
 South Asian (e.g., East Indian, Sri Lankan)
 Black
 Aboriginal (e.g., First Nations, Inuit, Metis)
 Other _____

Appendix R. Demographics of Focus Groups Participants

MOUNT PLEASANT COMMUNITY CENTRE	
Gender	
Female	14
Male	1
Total	15
Age	
18-29 years	4
30-49 years	5
50-64 years	6
65 and over	0
Total	15
Marital Status	
Single	6
Married	3
Living Common-law	3
Separated	3
Widowed	0
Total	15
Employment Status	
Employed	8
self employed	2
Out of work but looking for work	0
Out of work but NOT looking for work	1
Homemaker	2
Student	0
Retired	1
Unable to work	0
Total	14

Total Household Income	
< 20,000	1
20,000-34,999	3
35,000-49,999	2
50,000-64,999	1
65,000-79,999	4
80,000-100,000	2
>100,000	2
Total	15
Education	
Some high school	0
High school graduate	1
Some university or college	2
Trade/vocational/technical	1
University or college degree	9
Graduate degree	2
Total	15
Racial/ Cultural group	
White	6
Asian	6
South Asian	3
Black	0
Aboriginal	0
Other	0
Total	15

SUNSET COMMUNITY CENTRE

Gender

Female	11
Male	2
Total	13

Age

18-29 years	0
30-49 years	5
50-64 years	7
65 and over	1
Total	13

Marital Status

Single	6
Married	5
Living Common-law	0
Separated	1
Widowed	1
Total	13

Employment Status

Employed	9
self employed	0
Out of work but looking for work	0
Out of work but NOT looking for work	0
Homemaker	0
Student	0
Retired	2
Unable to work	1
Total	12

Total Household Income	
< 20,000	3
20,000-34,999	1
35,000-49,999	2
50,000-64,999	3
65,000-79,999	3
80,000-100,000	0
>100,000	1
Total	13
Education	
Some high school	1
High school graduate	1
Some university or college	1
Trade/vocational/technical	0
University or college degree	7
Graduate degree	3
Total	13
Racial/ Cultural group	
White	7
Asian	4
South Asian	2
Black	0
Aboriginal	0
Other	0
Total	13

KERRISDALE COMMUNITY CENTRE	
Gender	
Female	12
Male	3
Total	15
Age	
18-29 years	1
30-49 years	2
50-64 years	5
65 and over	7
Total	15
Marital Status	
Single	5
Married	8
Living Common-law	0
Separated	1
Widowed	1
Total	15
Employment Status	
Employed	3
self employed	1
Out of work but looking for work	0
Out of work but NOT looking for work	2
Homemaker	0
Student	0
Retired	7
Unable to work	0
Total	13

Total Household Income	
< 20,000	1
20,000-34,999	3
35,000-49,999	1
50,000-64,999	2
65,000-79,999	2
80,000-100,000	1
>100,000	4
Total	14
Education	
Some high school	1
High school graduate	1
Some university or college	4
Trade/vocational/technical	1
University or college degree	6
Graduate degree	2
Total	15
Racial/ Cultural group	
White	12
Asian	2
South Asian	1
Black	0
Aboriginal	0
Other	0
Total	15

KITSILANO COMMUNITY CENTRE

Gender

Female	13
Male	1
Total	14

Age

18-29 years	1
30-49 years	2
50-64 years	7
65 and over	4
Total	14

Marital Status

Single	3
Married	4
Living Common-law	5
Separated	2
Widowed	0
Total	14

Employment Status

Employed	2
self employed	2
Out of work but looking for work	1
Out of work but NOT looking for work	0
Homemaker	0
Student	1
Retired	8
Unable to work	0
Total	14

Total Household Income	
< 20,000	3
20,000-34,999	1
35,000-49,999	1
50,000-64,999	2
65,000-79,999	3
80,000-100,000	1
>100,000	3
Total	14
Education	
Some high school	0
High school graduate	0
Some university or college	3
Trade/vocational/technical	2
University or college degree	6
Graduate degree	3
Total	14
Racial/ Cultural group	
White	10
Asian	2
South Asian	0
Black	0
Aboriginal	0
Other	1
Total	13

Appendix S. Focus Group Interview Guide

Using focus groups to understand consumers' use of on-package information when purchasing processed food products study

Preparation

- A name tent for each participant will be placed at each seat
- Flipchart will be set up in a visible, central area, with markers.
- Food products (approximately 16 to 20 products from the categories of cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings) will be set up around the room ready for review by participant when needed.
- Refreshments of tea, water, juice, cookies and fruit will be set up in an accessible location to the group (i.e., table center/back table)
- A signed consent form will be obtained from each participant.

Upon entering the room each participant will be asked to sit by their name tent and help themselves to refreshments. They will also be asked to complete a short demographic survey.

Introduction (5 minute)

My name is Kelleen Wiseman and I am a PhD student and researcher at UBC.

Assistants:

Helping today are two research assistants-Cici and Hannah who will be taking notes and assisting with some of the logistics of the group today. Also, writing and why?

Thanks

First, I would like to thank you for volunteering to be part of the focus group study

Remind you that your participation in this study is completely voluntary and that you may refuse to participate or withdraw from the study at any time.

Confidentiality

I also want to remind you that **I consider your comments from this discussion confidential** and ask that each of you **keep each other's participation and remarks confidential**. Your name will not be placed in any papers or reports published about this study.

Research

The focus of this research today is to understand how you as grocery shoppers make decisions about what product to buy.. Specifically – how you use on-package information when purchasing food products

How the Discussion Goes

We would like the discussion to be **informal**.

I am interested in learning from you and hearing about all type of views based on your **personal experiences**. ..so there are **no wrong or right answers**. I am interested in your insights and opinions ...

In the discussion –

- There is no need to wait for me to call on you to respond.

- I encourage you to comment and to respond directly to other people's comments, but please no interrupting or side conversations. I want to hear all that is said .. and so does the audio recorder

- If you don't understand a question, please let me know. We have people from a wide range of backgrounds .. I will be careful of my speed ..but stop me..

- You do not need to answer any questions that make you feel **uncomfortable**.

Audio

As noted in the consent form, to make sure I do not **miss any of your comments**–I will be audio recording the discussion.

Is that all OK?

Your turn

Then let's start by going around the room and introduce ourselves.

Tell us just your first name and how often you shop for food.-favourite food to shop for?

Thanks .. so let's move to the first part of the focus group..

Potential questions or points to provide depending upon group and context:

I would like everyone to participate.

I may call on you if I haven't heard from you in a while.

Every person's experiences and opinions are important.

We want to hear a wide range of opinions

Activity: Showing processed food packages (15 minutes)

Let's get to the Food Products

In a minute I am going to ask you to get up and take a look at these food products just as you would if you were in a grocery store and considering purchasing these products..

As you see we have a **number of packaged food products set up around the room**,-- you will see we have products grouped into different food types (cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings).

And we have several food products in each of these groups.

That is the food set up

Now I know when you go to the grocery store there are certain products you may purchase each and every time (certain brands, flavours, products) and so you see these on the shelf and buy it ..

HOWEVER ...

- In this case I am interested in those times when the product is “new to you”.
- **For example**, you are considering purchasing a different product or new product or even a new feature /characteristics of a product. I am specifically interested in how you make those decisions to purchase when the product is “new to you”.

EXAMPLE: buying tortilla chips and new flavor, or type or ingredient

- Do you see what I mean? Is that ok?

So I would like you to take about 10 minutes and do the following -

- Look around the room and choose **2- to 3 product groups** that you are interested (cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings).

SO maybe cheese and cereal and soup

- Then once you have decided on the product groups –I want you to go over to those products and take a look at these “new to you” products and if possible make a decision as to the product/s you would buy.
- When you are done you can come back to your seat. And do help yourself to the refreshments.

Topic: Factors you consider when purchasing processed food products in a grocery store.

1. (6 minutes) So now that you have taken a look at these food products just as you would if you were in a grocery store and were considered purchasing these as “new to you “ products, let’s get to the actual discussion.

I’d like to hear a little about why you chose one of the product you did..

just choose one of the products and briefly tell the rest of us **why and how** you decided upon that food product.

Go around the table and give each person a chance to talk about their decision-making process and why they chose the food products/s.

Probing question/s:

Any other reasons why you chose that food product?

Topic: Package reading practices - Role of the FOP messaging information and product nutrient information, price and taste

(10 minutes) I would like to direct the discussion a bit now into the **on-package information**

as I am interested in hearing some specifics about **how you use the information on the package** when deciding which of several ‘new to you’ products to purchase.

2. So to start with, what on-package information do you use to help you decide what food to buy? And why do you use those? Still focusing on the New to You foods
- and remember we expect to see a range of views on this .. and no wrong/right answers
3. Is there any on-package information that you always use or never use?

Let me take a minute now focus you in on the information found on the package ...

BRING 3 EXAMPLE PACKAGES OVER

On-Package information...

All the information on the box or bag

FOP – all the words or images on the front of the package (logo, name, info about the content- weight)

Nutrition Facts Label: where the amount of a nutrient (sodium, fat, calories etc.) in the product serving are found

Ingredient List

4. Do you use the Nutrient fact label when making these purchase decisions?

How do you use it?

Why or Why not? When?

- What kind of nutrients do you look for?
 - Poor nutrient, good nutrient? Good, poor, healthy, unhealthy, specific name/s?
- Any specific nutrients – do you look more for good or bad nutrients??

5. Do you use the FOP messaging? Why or Why not? When?

- Any specific nutrients – do you look more for good or bad nutrients??

6. Do you ingredient list then? What looking for? Amount in product? When?

7. What if someone in your household is trying to eat “healthier” – does that change how you use the on- package information ?

Don't define – big word

Would you use the NFL? FOP? Ingredient List

One more one or the other? When? Why?

Probing question/s: Focus into nutrient (nutrient facts label) and FOP messaging if not mentioned by the following:

- Did you notice the words or messaging on the front of the package? Do you use these?
- What information from the nutrient fact label do you look at or not bother with?

8. (3 minutes) Moving away from using just the on-package information –

I am also interested in where taste fit into your decision making– taste can be what you think the product taste like or real taste –in a “new to you” product purchase?

Probing question/s:

What if you are trying to **eat healthy** how does that affect the importance of taste in your decision making (i.e., health –seeking)?

Taste and “healthier” product suspect change a taste?

Would you

9. (3 minutes) Where does price come into consideration?

May include additional sentences noting that price is likely always an important factor, but given that you have enough money to buy groceries and have already decided to purchase something in that category (e.g., chips, cookies, yogurt), then how do you consider price when choosing among food products in the same category?(understanding whether participants perceive or actually see real price differences in products with different FOP messaging and different nutrient levels)

Do you ever expect to see different prices for foods with different nutrients or FOP or healthier foods?

Topic: To explore the how consumers weight each of the factors of FOP messages, taste and nutrients in their product purchase decision.

10. (10 minutes) I want you now to consider how important that each of FOP information, taste, and nutrient levels (ex: ...) are in your decision making when you again decide to buy a “new to you” food products?

- Could you provide a list ranking these? There isn't a ‘correct answer’ – likely we will have very different views about this.
- Can you or Do you split out “good for you” nutrients (fibre or protein) versus “not so good for you” nutrients (sat fat, sugar)?

Probing question/s:

- How would you rank these? FOP message, taste, poor nutrient, good nutrient?
- Do you ever use just one or two of the factors in your decisions? When? Why?
- Do you differentiate between good and not-so-good nutrients?
- How important are the messages you see on the front of the package in helping you decide? Why?
- Can you tell me something else about...?
- Does anyone use these factors in a different way when considering their purchases?

Topic: To understand what elements can influence the use and weight placed on these factors of FOP message, taste and nutrients.

11. (10 minutes) What kind of things can change how you use these factors of FOP, taste and nutrients when deciding on a food product? They may be things that are associated with you or your household of course.

- Change rank or use

What if you are trying to eat healthy how does that affect the weight placed on these factors (i.e., health – seeking)?

Can you give an example

After one example - Any other example ??

What about if someone in your household is trying to be healthier or needs to be healthier (i.e., increased health vulnerability), how does this change use of the factors?

Probing question/s:

- Please tell me (more) about that...element
- Could you explain what you mean by... element
- Anything else?

Topic: To explore perceptions of FOP messaging as it relates to product purchase decisions

(10 minutes) Many of the products here today had words or sentences on the front of package – take a look at these packages again if you like. We have discussed your use of the front of package words and images in your decision making and now I would like to explore this area a bit more.

12. So to start with what kind of FOP message do you find

Most useful?

Least useful? In these foods and in the grocery store?

Use examples on boxes

How easy or difficult is it for you to understand the FOP message?

Other ones?

Have you considered RULES around what can be placed onto the FOP?

CLAIM belief and what does it mean?

CLAIM what do you expect ..

Whole Wheat claim – would it surprise you if?? High salt and not much protein/fibre

Natural claim – would it surprise you if?? High sugar corn syrup

13. What is your **overall impression** of the food product when it has a **FOP messaging**?

- Does the presence of the FOP message make a difference to how you view the whole product?
Halo effect of natural or organic??
- Do you ever make a decision on FOP alone? Why? When?
- Healthiness
- Does the presence of the FOP message make a difference to how you view the whole product?

14. How does the **source** or **type** affect how you think about or use the FOP?

- Example - all natural versus a healthy diet low in saturated and trans fat and reduced risk of heart disease?)
- Sources??

Probing question/s:

- Do you ever make a decision on FOP alone? Why? When?
- How do things such as “eating healthy, health concerns, distraction, and lack of time” affect use of FOP?

More, less, used in isolation?

- Do you think about who is the source of the FOP message?
- Does the presence of a specific wording or logo make a difference?
- Do you consider the different level of messages? For example: all natural versus a healthy diet low in saturated and trans fat and reduced risk of heart disease?)

Topic: To identify if the use of these factors differs when applied to various processed food product categories

15. (10 minutes) So we have talked about how you use these factors of FOP message, nutrients and taste in general terms, now I want to understand from you if you use these FOP, NFL and Ingredient List any differently in the different type of food products groups. For example, dairy versus cookies? Or Snack versus bread?

Why would you use them different??

Probing question/s:

- For which types of foods are you most likely to look at the nutrients and the nutrient facts label? (cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings)
- For which types of foods are you most likely to look at the FOP messaging? (cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings)
- Why do these differences exist or not exist?
- Does anyone feel differently or have a different experience?
- Can anyone think of other reasons why the use of these factors may change with the food product category?

Topic: Package Information Priority

16. (5 minutes) So for our final question in the discussion, if you could share one opinion or idea you have about on-package information in a decision about “new to you” products, what would that be?

Close

17. (3 minutes) Is there anything we missed that you would like to talk about?

Then I will close the group discussion by thanking you for your participation. Please ensure you have a copy of the consent form and your gift card upon leaving.

90 minutes

Appendix T. Schedule and Location of Focus Group Sessions

LOCATION	ROOM	ADDRESS	DATE	DAY	START TIMES	NO. OF PARTICIPANTS
Mt Pleasant Neighbourhood House	Room 4	800 East Broadway	March 19	Monday	1:30	7
Mt Pleasant Neighbourhood House	Room 4	800 East Broadway	March 19	Monday	7:00	8
Sunset Community Center	Multipurpose Room	6810 Main Street	March 21	Wednesday	1:30	6
Sunset Community Center	Arts & Crafts Room	6810 Main Street	March 21	Wednesday	7:00	7
Kerrisdale Community Center	Arts & Crafts Room (Rm 013)	5851 West Boulevard	March 26	Monday	1:30	8
Kerrisdale Community Center	Arts & Crafts Room (Rm 013)	5851 West Boulevard	March 26	Monday	7:00	7
Kitsilano Community Center	Board Room (Rm 121)	2690 Larch Street	March 28	Wednesday	1:30	8
Kitsilano Community Center	Board Room (Rm 121)	2690 Larch Street	March 28	Wednesday	7:00	6

Appendix U. Images of Product Set up



Appendix V. Consent Form for Focus Group Participants

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Land and Food Systems
Grounded in Science | Global in Scope

Suite 248 - 2357 Main Mall
Vancouver, B.C. Canada V6T 1Z4

Tel: 604.822.1219
Fax: 604.822.6394
www.landfood.ubc.ca

Consent Form for Focus Group Participants

Study Title: Using focus groups to understand consumers' use of on-package information when purchasing processed food products

Main contact: Kelleen Wiseman (PhD Candidate) Integrated Studies in Land and Food Systems The University of British Columbia Phone: 604-822-9704 Email:	Principal Investigator: Dr. Gwen Chapman Human Nutrition The University of British Columbia Phone: 604-822-6874
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You are invited to participate in a focus group discussion about your experience in purchasing grocery products. To participate in the study you will need to attend one discussion group meeting which will take approximately 90 minutes. As compensation for your time and transportation you will be given a \$50 gift card.

The purpose of the study is to explore how consumers use package and product information when purchasing processed food products. The project is funded by University of Alberta. The data from these focus groups discussions will be used as part of a PhD dissertation completed within the Faculty of Land and Food Systems at The University of British Columbia. An electronic copy of the thesis will be available in 'Circle: UBC's Institutional Repository' upon completion (<https://circle.ubc.ca/>).

To be eligible for participation in the focus group you must:

- Be 18 years of age or over
- Have purchased food products from **at least 3** of the following grocery categories in the past month: cheese, yogurt, cookies, soup, breakfast cereal, granola bars, crackers, potato chips, breads, pasta sauce, juice or salad dressings.
- Be able to speak, read, write and understand English
- Reside in the Vancouver area

What will you be asked to do if you participate?

If you choose to participate you will be asked to go to one focus group meeting (either an afternoon or evening session). At the meeting you be asked to complete a short demographic survey and then shown a set of processed food products commonly found in the grocery store. Then, all focus group participants, moderated by a graduate student, will be asked to discuss how they use package and product information in their purchase decisions. The discussion will be audio-recorded. There will be research assistants from UBC helping to take notes as well. Refreshments will be served at the beginning of the group discussion.

Personal information and privacy:

Your participation in this study is completely voluntary. You may refuse to participate or withdraw from the study at any time. There are no foreseeable risks associated with this project. You can refuse to answer any questions that make you feel uncomfortable. Your name will not be placed in any papers or reports published about this study. Only members of the research team and a professional transcriptionist will be given access to this information for research purposes. Your information will be coded for documentation purposes only and will remain confidential. Participants are asked to not to disclose the contents of the discussion outside of the focus group; however, we cannot control what other participants do with the information discussed.

If you have any questions, you can contact Kelleen Wiseman at grocerystudy@ubc.ca. If you have any questions or concerns later on about how you were treated during the study, you may contact the Director of Research Services at the University of British Columbia, at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca.

By signing this form, you are telling us that you agree to participate in this study; you understand that you can leave the study at any time; you understand that participation is totally voluntary; and that you have received a copy of this agreement form to keep for yourself.

Participant's Signature

Participant's Name (please print)

Date

Appendix W. Focus Group Codes, Categories and Themes

GLOBAL THEME					
Consumers are working hard to be 'nutrition savvy' but are having difficulties in fully utilizing on-package information for their product assessment and selection					
THEME 1					
CODES →	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)	ORGANIZING THEME	
<ul style="list-style-type: none"> ▪ decision making NFL ▪ decision making FOP ▪ decision making ingredient list ▪ ranking NFL first and FOP last in decision making ▪ ranking of decision factors FOP last ▪ start to realize they do use FOP - draw them in ▪ switcher - use and not use product information misleading mistrust .. but then no blame on processors ▪ switchers use FOP NFL now price etc.. do they know? 	<p>Using NFL, FOP and Ingredients List in decision making</p> <p>FOP using or not</p>	HOW DO I MAKE DECISIONS	USE OF ON-PACKAGE INFORMATION: NFL, INGREDIENT LIST AND FOP MESSAGES	DECISION MAKING	
CODES →	CATEGORY →	THEME			
<ul style="list-style-type: none"> ▪ decision making - focus on key items and not others (vitamins) ▪ decision making - other ▪ decision making – sodium ▪ use lots of things ▪ decision making -avoid hydrogenated products ▪ decision making additives ▪ decision making calories ▪ decision making fat ▪ decision making nutrients bad more than 	<p>Decision – looking for good, poor, healthy, or unhealthy ingredients or nutrients</p> <p>Avoidance</p> <p>Increase or</p>	DECISION MAKING HEURISTICS: I'M LOOKING FOR SOMETHING SPECIFIC			

<ul style="list-style-type: none"> good ▪ decision making protein ▪ decision making sugar ▪ decision making taste is important 	<p>decrease amounts</p>			
THEME 2				
CODES	→	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)
<ul style="list-style-type: none"> ▪ confusion and difficulty in using NFL ▪ confusion deep and consensus high re: percent on NFL ▪ confusion re: percent RDI ▪ confusion serving size ▪ confusion with information ▪ not differentiating NFL and ingredient0s 		<p>Confusion</p> <p>The Serving Size Quandary</p>	<p>UNDERSTANDING THE NUTRITION FACTS LABEL</p>	<p>UNDERSTANDING THE NUTRITION FACTS LABEL</p>
THEME 3				
CODES	→	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)
<ul style="list-style-type: none"> ▪ Canada product sourcing concerns ▪ Canada – how do I tell the source of ingredient Canada or where? ▪ China 		<p>Sourcing in Decision Making</p> <p>How do I find if it is made in Canada?</p> <p>Worried about China products</p> <p>Source and quality links</p>	<p>PRODUCT SOURCE IS IMPORTANT - BUT HOW DO YOU TELL?</p>	<p>THE IMPORTANCE OF PRODUCT SOURCE</p>

THEME 4					ORGANIZING THEME
CODES →	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)		
<ul style="list-style-type: none"> ▪ decision making organic ▪ organic, natural or third party - are there rules? ▪ organic natural third party halo effects ▪ use third party when making product decisions - heart stroke 	Organic Natural Third Party Rules and Promises I believe these Rules are fuzzy Trust of Heart and Stroke or others third parties	BELIEFS AND CREDIBILITY REGARDING ORGANIC, NATURAL AND THIRD PARTY	THE CREDIBILITY OF ORGANIC, NATURAL AND THIRD PARTY		
THEME 5					
CODES →	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)		
<ul style="list-style-type: none"> ▪ government role in labelling unknown ▪ government seems to be involved in NFL ▪ unknown rule makers ▪ unknown rules regarding FOP 	Rules Roles Responsible Company roles	UNKNOWN RULES AND HIERARCHIES – FOP, CLAIMS AND MARKETING	THE UNKNOWN HEALTH CANADA		

RULES

THEME 6					ROLES
CODES	→	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)	
<ul style="list-style-type: none"> ▪ distrust of food manufacturers ▪ distrust of values in NFL ▪ does not believe FOP ▪ misleading information ▪ skepticism of on-package information ▪ skepticism of quality of food ▪ misleading 		Trust Annoyance Skeptical	DISTRUST AND MISLEADING INFORMATION	THE DISTRUSTED AND BLAMELESS FOOD MANUFACTURERS	
THEME 7					
CODES	→	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)	
<ul style="list-style-type: none"> ▪ exaggerated product claim concern related ▪ trade off -trying to figure out good and bad and trade offs 		Gaining Losing Good to bad nutrients Hoping for gain	EXAGGERATED PRODUCT CLAIMS	EXAGGERATED PRODUCT CLAIMS	
THEME 8					
CODES	→	CATEGORY →	THEME DEVELOPMENT	BASIC THEME (REFINEMENT)	
<ul style="list-style-type: none"> ▪ decision making is complicated and beyond NFL, FOP, to bigger picture ▪ frustrated with information formats ▪ healthy eating and or food shopping is lots of work ▪ influence of time in decision making ▪ influences of decision making selection, hunger, kids, age of consumers, convenience, taste ▪ time and in a hurry limits decision making ▪ use sources beyond the package information when deciding ▪ working hard to understand product quality 		Hard work making decisions Difficult product selection	DIFFICULT DECISIONS AND HARD WORK	THE HARD-WORKING AND RESPONSIBLE CONSUMER	
CODES	→	CATEGORY →	THEME DEVELOPMENT		
<ul style="list-style-type: none"> ▪ 80 20 rule 		Healthier eating	EATING HEALTHY		

<ul style="list-style-type: none"> ▪ healthier eating means using the NFL more ▪ healthy eating ▪ healthy eating does not change the way package information used ▪ healthy means less processed or non-processed foods ▪ healthy means organic ▪ healthy means using FOP and ingredients ▪ taste and healthier food trade off 	<p>decision changes</p>	<p>.</p>		
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