

INFLUENCE OF THE USE OF MULTIPLE NUTRITIONAL CLAIMS ON SOUTH AFRICAN CONSUMERS' PERCEPTIONS AND PURCHASING DECISIONS OF FOOD PRODUCTS

by
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Declaration

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General Abstract

As part of the World Health Organization's goal, the prevalence of non-communicable diseases in South Africa should be reduced. This goal can be achieved with interventions such as encouraging nutritional labelling.

This led to the aim of the study on how South African consumers perceive multiple nutritional claims on a food product and how this influences their purchasing decisions. A questionnaire was developed on REDCap and randomly distributed through various online platforms. MS Excel was used to capture the data along with STATISTICA 14: TIBCO Software Inc. (2020). The relation between nominal variables was investigated with contingency tables and appropriate chi-square tests like the likelihood ratio chi-square test were used to determine the strength of agreement. This was used to evaluate the significant difference between the influence of nutritional information on a consumer's perception and the demographical, social, and behavioural factors. This method was also used to determine the correlation between whether consumer sees and actively seek nutritional logos and Health Logos (HLs) before they purchase a food product. The relationships between continuous response variables and nominal input variables, such as the different diets, were analysed by using a one-way analysis of variance with a confidence level of 95%. The differences were considered significant when the p -values were smaller than 0.05. The multiple comparisons test, namely Fisher Least Significant Difference Method, was applied post hoc to determine where significant differences occurred among the levels of the age factor involved compared to the particular diet.

It was found that more nutrient claims and ingredient claims encourage the consumers to purchase a food product, but the consumers are not necessarily looking for HLs and other nutritional visual representations before they purchase a food product. There was a significant difference between the influence of more nutritional claims on a consumer's and the frequency of practising a sport or exercise ($p=0,01$, $p<0,05$) as well as whether consumers count calories ($p=0.03$, $p<0.05$). The majority of the consumers have knowledge about health terms, but there was confusion regarding the term nutritional reference value (NRV) as only 47.80% were able to define the term correctly. The study also noted that the nutritional logos and HLs were found significantly different in terms of whether the consumers have seen the logos before and whether they actively look for the logos before they purchase a food product ($p<0.01$). Therefore, consumers have seen some of the HLs previously, but they don't necessarily actively look for the nutritional logos before they purchase a food product. Specific claims such as low-fat, Reference Intake (RI), and Heart and Stroke Foundation South Africa (HSFSA) were noted to increase the health perception of a food product.

The information obtained from this study may be used by manufacturers and regulatory bodies to improve the effectiveness of nutritional communication. This can enable consumers to understand nutritional information and to enable them to make healthier, informed food choices.

Algemene Uittreksel

Die Wêreldgesondheidsorganisasie se doel is om die voorkoms van nie-oordraagbare siektes in Suid-Afrika te verminder en dit kan bereik word deur voedingsetikette intervensies aan te moedig.

Dit het gelei tot die doel van die studie oor hoe Suid-Afrikaanse verbruikers verskeie voedingsaansprake op 'n voedselproduk sien en hoe dit hul aankoopbesluite beïnvloed. 'n Vraelys is op REDCap ontwikkel en lukraak deur verskillende aanlyn platforms versprei. MS Excel is gebruik om die data saam met STATISTICA 14: TIBCO Software Inc. (2020) op te neem. Die verband tussen nominale veranderlikes is ondersoek met gebeurlikheidstabelle en gepaste chi-kwadraat toetse, soos die waarskynlikheidsverhouding chi-kwadraat toets, is gebruik om die sterkte van ooreenkoms te bepaal. Dit is gebruik om die beduidende verskil tussen die invloed van voedingsinligting op die persepsie van 'n verbruiker en die demografiese-, sosiale- en gedragsfaktore te evalueer. Hierdie metode is ook gebruik om die verband te bepaal tussen die vraag of verbruikers voedingslogo's en gesondheidslogos sien en aktief soek voordat hulle 'n voedselproduk koop. Die verwantskappe tussen deurlopende responsveranderlikes en nominale insetveranderlikes, soos die verskillende diëte, is ontleed deur 'n eenrigting-variëansieanalise te gebruik, met 'n vertrouwensvlak van 95%. Die verskille is as beduidend beskou as die p -waardes kleiner as 0,05 was. Die meervoudige vergelykingstoets, naamlik Fisher Least Significant Difference Method, is post hoc toegepas om te bepaal waar beduidende verskille tussen die vlakke van die ouderdomsfaktor in vergelyking met die spesifieke dieet voorkom.

Daar is gevind dat meer voedingsaansprake en bestanddeelaansprake verbruikers aanmoedig om 'n voedselproduk te koop, maar verbruikers is nie noodwendig op soek na gesondheidslogos en ander voedingsvisuele voorstellings voordat hulle 'n voedselproduk koop nie. Daar was 'n beduidende verskil tussen die invloed van meer voedingsaansprake op die persepsie van 'n verbruiker (dit moedig die verbruiker aan, ontmoedig of beïnvloed hul nie) en die frekwensie van die beoefening van 'n sport ($p=0,01$, $p<0,05$), sowel as die verbruiker kalorieë tel ($p=0,03$, $p<0,05$). Die verbruikers het kennis gehad oor van die gesondheidsterme, maar die voedingsverwysingswaarde het die meerderheid van die verbruikers verwar aangesien slegs 47.80% die korrekte definisie kon gee. Die studie het ook opgemerk dat die voedingslogos en gesondheidslogos aansienlik anders was as die verbruikers die logos voorheen gesien het en of hulle aktief na die logo's gesoek het voordat hulle 'n voedselproduk gekoop het ($p<0.01$). Daarom het verbruikers sommige van die gesondheidslogos al voorheen gesien, maar hulle soek nie noodwendig aktief na die voedingslogo's voordat hulle 'n voedselproduk koop nie. Spesifieke bewerings soos lae-vet, verwysingsinname logo en 'Heart and Stroke Foundation South Africa' (HSFSA) is opgemerk om die gesondheidspersepsie van 'n voedselproduk te verhoog.

Die inligting van die studie kan deur vervaardigers en regulerende liggame gebruik word om die doeltreffendheid van voedingskommunikasie te verbeter. Dit kan verbruikers in staat stel om voedingsinligting te verstaan en hulle in staat te stel om gesonder, ingeligte voedselkeuses te maak.

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Notes

The language (United Kingdom English) and style used in this thesis are following the requirements of the International Journal of Food Science and Technology (IJFST). This thesis represents a compilation of manuscripts where each chapter is an individual entity, thus some repetition between chapters (Methodology and Materials) was unavoidable.

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Chapter 1

Introduction

Non-communicable diseases (NCDs) contribute significantly to global deaths (World Health Organization (WHO), 2018). Strategies are in place to reduce NCD-related mortality by at least a third of the current status by 2030 which is under the third Sustainable Development Goal (SDG) namely Good Health and Well-Being. One of the strategies is to improve the diet of individuals in general which can influence the overall health and NCD risk. The information on a food product's label is a medium through which consumers can identify what the food product contains as well as its nutritional value before they purchase or consume the product. The SDG can be achieved with interventions such as encouraging nutritional labelling that adheres to the regulation, for all pre-packaged food products, which includes the products that contain nutritional or health claims. Additionally, the development and production of food products that promote a healthy diet and which are accessible and affordable should also be encouraged, but it should be according to the relevant South African nutritional labelling standards (inclusive of information regarding salt, fats (and/ or trans-fat) and sugars). Thus, Front-of-Pack (FOP) and Back-of-Pack (BOP) nutritional information and claims can be used to assist consumers in the process of making healthier, informed food choices.

This led to the aim of the study on how South African consumers perceive multiple nutritional claims on a food product and how this influences their purchasing decisions. This study included the evaluation of FOPLs, nutrition claims, and other nutrition information to evaluate the effect of multiple claims on a consumer's perception of a food product and their purchasing intent. The following research questions were established to undertake this study (1) To what extent do internal factors (demographical, social, and behavioural factors) influence a consumer's perception of multiple nutritional and ingredient claims? (2) What type of ingredient and nutritional information are considered as more important by a consumer before purchasing a food product? (3) Does an increasing number of nutritional claims and ingredient claims discourage, encourage or not influence the consumer's purchasing choice? (4) What is the consumers' nutritional knowledge and perception of nutritional terms? (5) What type of Health Logos (HLs) have consumers seen before and do they actively seek the HLs before they purchase a food product? A questionnaire was developed on REDCap and randomly distributed through various online platforms. This study was a self-reported study and not an observational consumer study, therefore the actual purchasing behaviour of consumers was not evaluated. The survey was conducted in an artificial context and therefore it may limit the external validity. MS Excel was used to capture the data along with STATISTICA 14: TIBCO Software Inc. (2020). The relation between nominal variables was investigated with contingency tables and appropriate chi-square tests like the likelihood ratio chi-square test were used to determine the strength of agreement. This was used to evaluate the significant difference between the influence of nutritional information on a consumer's perception and the demographical, social,

and behavioural factors. This method was also used to determine the correlation between whether consumer sees and actively seek nutritional logos and Health Logos (HLs) before they purchase a food product. The relationships between continuous response variables and nominal input variables, such as the different diets, were analysed by using a one-way analysis of variance with a confidence level of 95%. The differences were considered significant when the p -values were smaller than 0.05. The multiple comparisons test, namely Fisher Least Significant Difference Method, was applied post hoc to determine where significant differences occurred among the levels of the age factor involved compared to the particular diet.

This study and the findings may assist food manufacturers to develop packaging that will communicate accurate information, differentiate and promote the brand values by adding nutritional claims in the correct amounts to encourage purchasing. The findings may assist manufacturers in choosing which claims to add and to ensure effective communication between the manufacturer and the consumer. Effective communication can assist a consumer with the analysis, interpretation, and understanding of nutritional information and it can enable them to make healthier food choices.

Chapter 2

Literature review

2.1 Background of food labelling

Non-communicable Diseases (NCDs) in South Africa account for about 51% of the annual mortality rate compared to other causes combined (World Health Organization (WHO), 2018). Risk factors such as obesity, sodium intake, diabetes, and raised blood pressure contribute to the mortality rate. Diabetes and cardiovascular disease contribute 7% and 19% respectively to these NCD-related deaths. A national target was therefore set to reduce the risk factors in both males and females by 2025. The percentage of the South African population with obesity should be reduced, and the aim is for females to obtain a 9% reduction and for males to obtain a 7% reduction by 2025 (WHO, 2018). The percentage of the South African population with raised blood pressure should also be reduced, where females should obtain a 4% reduction and males a 3% reduction by 2025 (WHO, 2018). To achieve these goals, one of the interventions is to encourage nutritional labelling, which should be according to the regulation, of all pre-packaged food products, which includes the products that contain nutritional or health claims. The development and production of food products that promote a healthy diet and which are accessible and affordable should also be encouraged, but it should be according to the relevant South African nutritional labelling standards (inclusive of salt information, fats (and/ or trans-fat), and sugars) (WHO, 2013). Thus, Front-of-Pack (FOP) and Back-of-Pack (BOP) nutritional information and claims can be used to assist consumers in the process of making healthier, informed food choices (Van Kleef *et al.*, 2007).

Labelling enables information to be transferred from the manufacturer to the consumer as it identifies, describes, grades and differentiates the product and associates a specific quality with the brand (Bernues *et al.*, 2003; Nocella & Kennedy, 2012). Labelling is a fundamental indication of information and quality as it enables consumers to make informed purchasing decisions (Dimara & Skuras, 2005). Therefore, consumers can obtain information regarding the quality, process, nutrition, weight, origin, ingredients, additives, and product attributes (Dimara & Skuras, 2005). Food labels are an essential medium through which consumers can identify what the food product contains as well as its nutritional value before they purchase or consume the product (Gorton *et al.*, 2010). Nutritional labelling aims to encourage consumers to make healthier food choices (Grunert & Wills, 2007).

Coronavirus 2019 (COVID-19) is driving the 'Food as Medicine' movement, as consumers will buy specific foods for specific health benefits or reduce the risk of diseases (Ift.org, 2021). This movement aims to teach people the power of healthy food by enabling them to identify foods that are nutritious and inform them how food transforms and influences their health, thus food labelling will increasingly be focused on highlighting the health-promoting ingredients (Ift.org, 2021). The dietary shift of the population can be assisted by improving and encouraging the consumption of

functional foods (FFs). This can be achieved by communicating nutritional information and by adding nutritional claims to processed and packaged FFs (Van Buul & Brouns, 2013). FFs are generally characterised by foods that improve consumers' overall health and that can reduce the risk of health-related diseases (Schnettler *et al.*, 2015). Nevertheless, FFs can only improve the health of consumers if they have the knowledge of the nutritional benefit of the FFs and if consumers are willing to purchase these food products.

The WHO recommends that adults limit their fat intake to 10-30%, sugar consumption to a maximum of 10%, and saturated fat consumption to a maximum of 10% of their total energy consumption daily. Consumers should also consume a minimum of five fruits or vegetable portions (or 400 g) per day and reduce their salt intake to less than 5 g per day (WHO, 2003). If WHO wants to encourage consumers to stay within the advised levels of salt, sugar, and saturated fat, consumers should read and utilise food labels to make healthier diet choices. To connect the two concepts of what consumers should consume and the diet choices they make, they need to read, interpret and understand nutritional information correctly (Campos *et al.*, 2011). A study of young North American and European consumers discovered that the perception of healthiness, including the taste, food quality, and price, is the most significant predictor of food choices and purchasing choices (Johansen *et al.*, 2011; Latiff *et al.*, 2016). Various other factors influence the product preference and diet choices of consumers. If nutrition labelling is implemented effectively and if the consumer utilises, understands, and trusts it adequately, it may assist the purchasing decisions and consumption of healthier foods. Nutritional labelling also encourages transparency as this is monitored by the Consumer Goods Council of South Africa (CGCSA) (CGCSA, 2020).

Information about the food product is usually presented on the FOP and the BOP. The FOP label states the name, description, volume, pictorial representations, or other claims on the forward-facing side that the consumer sees in a retail store. Whereas the BOP label does not face the consumer in a retail store and the consumer needs to move or turn the food product to see this information. The BOP label contains information such as nutritional information (energy (kilojoule), protein content, fat *et cetera*), storage instructions, and an ingredient list. The Regulations Relating to the Labelling and Advertising of Foodstuffs (No. R146), notes that all food labels should contain an ingredient list (Foodstuffs, Cosmetics and Disinfectants Act and Regulations, 2010).

There are three fundamental sources of nutritional information on food products which are the FOP Labels (FOPLs), Nutrition Information Panel (NIP), and Health and Nutrition Claims (HNCs) (Talati *et al.*, 2016). These sources of nutritional information vary in purpose, information, and presentation style. The FOPLs and the health-related claims are typically on the FOP and may duplicate information of the NIP (Van Der Bend *et al.*, 2014). The NIP is generally on the BOP or the side as it contains the nutrition component, amount, and the recommended daily intake contribution (Gorton *et al.*, 2010). There are two major types of FOPLs: reductive FOPLs (Reference Intake (RI)) and interpretative FOPLs. Interpretative FOPLs can be divided into nutrient-specific (Multiple Traffic Lights (MTLs) and Warning Labels (WLs)) and summary indicator FOPLs (Health Logos (HLs) and

Nutri-Score). A hybrid FOPL contains both the nutrient-specific FOPL and the summary indicator information on one food product (Talati *et al.*, 2019). In South Africa, the RI, HLs, and hybrid FOPLs are predominantly used. HLs are theoretically classified as FOPLs but can also be used as BOP labels (BOPLs). HLs in South Africa are monitored and implemented by institutes such as Heart and Stroke Foundation South Africa (HSFSA), Diabetes South Africa, Glycaemic Index (GI) Foundation South Africa, and the Tiger Brands movement of Eat Well Live Well. The NIP also named the Typical Nutritional Information Table, is not mandatory on pre-packaged food products in South Africa, unless a manufacturer makes a nutrition or health claim as stated in the Regulations Relating to the Labelling and Advertising of Foodstuffs (No. R146). HNCs are usually indicated by "source", "low", "free or virtually free", or "high" for example "Source of protein" or it can be indicated as "reduced", "less than", "fewer", increased, "light", "more than", "lite" (Foodstuffs, Cosmetics, and Disinfectants Act and Regulations, 2010).

Various studies were conducted to evaluate the effect of various nutritional information and claims on a consumer's preference and purchasing choice. Jacobs *et al.*, (2010) identified the information which South African, Potchefstroom, consumers utilised on food labels and why they tend to not read food labels. The correlation between the information and the consumer's understanding and their ability to make healthier choices was investigated. This study found that the most frequently read information included the expiry date, followed by the ingredient list and nutritional information. Van Buul and Brouns (2013) also conducted a study to evaluate the consumer's perception of HNCs. This study included the evaluation of how these nutritional claims and the inclusion of functional ingredients influence a consumer's perception and consequently the purchasing intent. The consumers in the study indicated that the food products with approved and valid nutritional claims helped them to reach their overall health goals. Talati *et al.*, (2019) conducted a study to evaluate consumers' perceptions of five different FOP nutrition label formats namely the MLTs, Health Star Rating (HSR), Nutri-Score, RI, and WLs)) across 12 countries (Argentina, Australia, Bulgaria, Canada, Denmark, France, Germany, Mexico, Singapore, Spain, the United Kingdom, and the United States of America) by using an online survey. The respondents' perceptions were assessed by including comprehensibility, liking, trust, and the need for the nutritional information to be mandatory. Participants ranked the Nutri-Score as the top FOPL and noted that they believe nutritional labelling should be mandatory.

This leads to the study question on how South African consumers perceive multiple nutritional claims on a food product and how this influences their purchasing decisions. This study will include the evaluation of FOPLs, nutrition claims, and other nutrition information to evaluate the effect the amount of claims has on a consumer's perception of a food product.

2.2 Types of nutritional information and types of claims

Various studies indicated that the following influence the efficiency, expectation, purchasing decision, and consumption of a food product (Van Buul & Brouns, 2013):

- Type of claim (HCs and NCs)
- Type of consumer group (need, acceptance, trust, and understanding)
- Food packaging container (food category, brand, type of packaging, and location of the nutrition and health claims),
- The wording of the claim
- Length of the claim

As previously mentioned, there are three types of nutritional information namely NIP, FOPLs, and HNCs. Table 1 summarises the typology of health and nutrition-related FOPLs with examples and a visual presentation. Table 1 only summarises the different FOPLs namely reductive and interpretative FOPLs (nutrient-specific and summary indicators) and is not an exhaustive list.

2.2.1 Front Of Pack Labels (FOPLs)

FOPLs supply nutritional information that is simplified and is focused on levels of key negative nutrients such as saturated fat, energy, sugars, and total sodium. There are two major types of FOPLs namely interpretative FOPLs (nutrient-specific and summary indicators) and reductive FOPLs. A hybrid FOPL contains both the nutrient-specific FOPL and the summary indicator information on one food product (Talati *et al.*, 2019). FOPLs with nutritional information assist consumers with food choices and it enables them to compare products' healthiness (Grunert *et al.*, 2010). These formats aim to enable consumers to easily review nutritional information as it is pre-processed information (Maubach *et al.*, 2014).

2.2.1.1 Reductive FOPLs

Reductive FOPLs are classified as labels that reduce the nutrition information in the NIP and it does not offer an interpretation of the nutrient information, for example, Guideline Daily Amounts and Facts-Up-Front (Hamlin *et al.*, 2014; Newman *et al.*, 2016; Ikonen *et al.*, 2019). Reductive FOPLs provide nutritional information in a less complex manner and at a more accessible location on the product's packaging as it is usually stated on the FOP instead of BOP. Nevertheless, these labels are still classified as time-consuming and consumers find them complicated to interpret (Talati *et al.*, 2016).

The below figure (Figure 1) indicates reductive FOPLs namely Reference Intake (RI). The specific nutrients are indicated at the top with a percentage of the nutrient below relative to the contribution to an adult's daily reference intake if they consume one serving. The serving size is usually indicated on the logo in the relevant volume or weight.

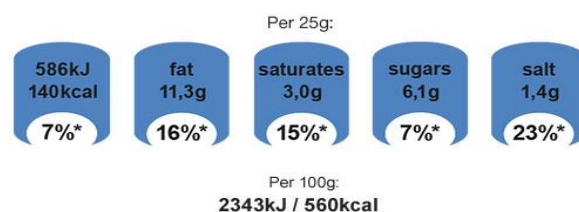
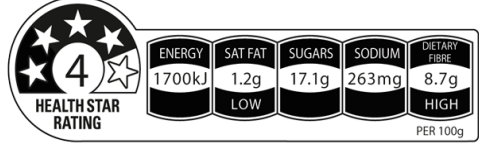


Figure 1 Reference Intake (RI) that is classified as a reductive FOPL.

Table 1 Classification of different health and nutrition-related Front-of-Pack Labels (FOPLs)

Type of FOPLs	Divisions	Visual presentation
Reductive	Reference Intake (RI)	
Interpretative	Nutrient-Specific	Warning labels (WLs)  Multiple Traffic Lights (MTL) 
	Summary indicator	Health Logos (HLs) (Choices logo)  Nutri-Score 
Hybrid	Rating labels (Health Star Rating (HSR))	

2.2.1.2 Interpretative

Interpretative FOPLs, also known as Evaluative FOPLs, are an assessment and evaluation of the information in the NIP, in the form of WLs, HLs, Nutri-Score, and MTLs (Newman *et al.*, 2016; Talati *et al.*, 2016; Ikonen *et al.*, 2019) (Table 1). Thus, an interpretative FOPL evaluates the overall healthiness of a specific food product.

Nutrient-specific labels

Nutrient-specific labels involve the interpretation of the healthiness of one or more specific nutrients, for instance, the Multiple Traffic Light (MTL) systems emphasize a level of a specific nutrient by utilising colours (Ikonen *et al.*, 2019). The MTL system evaluates nutrients and rates the amount of a nutrient in a food product and then one of three different colours is allocated for a particular nutrient such as salt, total sugar, saturated fatty acids, and fat. Green suggests a low value, amber suggests a medium value and red indicates a high value (Van Der Bend *et al.*, 2014; Talati *et al.*, 2016; Ikonen *et al.*, 2019). The amount of energy, in kilocalories or kilojoule, has a neutral colour (grey) (Van Der Bend *et al.*, 2014). The MTL system's purpose is to enable a consumer to make a quicker, more informed, and healthy decision before purchasing a food product (Van Der Bend *et al.*, 2014). Ikonen *et al.*, (2019) found that the MTL labels influence a consumer's purchasing decision positively compared to the other FOPLs. However, other research suggests that the MTL labels increase consumers' attention to negative nutrients such as saturated fat (Jones & Richardson, 2007). Thus, the MTL labels can have a negative and harmful impact (if the product scores red on two or more nutrient information blocks) on the perception of a healthier product's nutritional value, compared to a product that does not include an MTL system (Ikonen *et al.*, 2019).

WLs are also classified as interpretative nutrient-specific labels and have been mandated in various countries. These labels consist of a black hexagon and in the middle of the hexagon the words "high in" are noted followed by the specific warning nutrient such as sugar, calories, salt, or saturated fat (Talati *et al.*, 2019). As WLs and MTL systems are not widely used in South Africa, the Department of Health in South Africa can implement WLs on sugar or salt content in food to encourage healthier food choices. Figure 2 indicates the WLs and the MTL systems which are classified as nutrient-specific interpretative FOPLs.

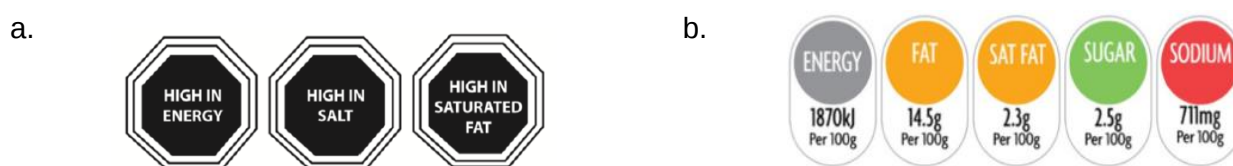


Figure 2 Figure 2 The WLs (a) and the MTLs system (b) are classified as nutrient-specific interpretative FOPLs.

Summary Indicator labels

Interpretative summary indicator labels involve the summarising of the overall nutritional profile of a specific food product for example the HLs, and a Nutri-Score system (Ikonen *et al.*, 2019). Interpretative summary indicator labels enable consumers to compare various competitor products at the point-of-purchase, to ensure that they choose the healthiest food product out of their selection (Newman *et al.*, 2016). Ikonen *et al.* (2019) found that the interpretative summary label does not have any positive or negative impact on a consumers' attitude. Nevertheless, it had the strongest effect on a consumer regarding the health identification of a product. Therefore, it enables a consumer to identify healthier products easier compared to other FOPLs on food products.

The Nutri-Score label was found to be the easiest to understand by consumers, nevertheless, it was also noted to be the least trusted and consumers did not feel that it should be compulsory on food labels (Talati *et al.*, 2019).

HLs can be one of the most effective FOPLs as it is a small, bright logo that is regulated and implemented by institutes such as HSFSA, Diabetes South Africa, GI Foundation South Africa, and the Tiger Brands movement of Eat Well Live Well. These endorsement programs encourage the partnership between the food industry and the administering body of the program and the food industry, thus the development of healthy foods is encouraged (Volkova & Mhurchu, 2015). It can also encourage consumers to choose healthier food options, as nutritional information is processed and regulated which is more easily understood (Volkova & Mhurchu, 2015). HLs are widely used in South Africa and studies found that consumers generally respond positively to these labels (Koen *et al.*, 2018a).

❑ Heart and Stroke Foundation South Africa (HSFSA)



The price, taste, and quality of a food product will always influence a consumer's purchasing choice, but these logos simplify food labels (Heart and Stroke Foundation South Africa, 2021). The Heart Mark collaborates with manufacturers to encourage the development of healthier foods. The Heart Mark program works under the approval of the National Department of Health and it is within the food regulatory framework (Heart and Stroke Foundation South Africa, 2021). The HSFSA ensures food that contains less salt, sugar, saturated fat, and higher fibre, to ultimately reduce the prevalence of NCDs and stroke deaths. There are currently 450 food products with the Heart Mark on the food label in South Africa (Heart and Stroke Foundation South Africa, 2021).



❑ Diabetes South Africa (DSA)

The Diabetes South Africa (DSA) program is licensed by the HSFSA and it aims to improve the diets of diabetes. These foods are low in sugar, salt, saturated fat, and refined carbohydrates (Heart and Stroke Foundation South Africa, 2021).



❑ *Eat Well Live Well*

Eat Well Live Well is a Tiger Brands nutrition initiative and it aims to simplify nutritional information and to make it easily available. Therefore, if a customer identifies an Eat Well Live Well logo, it ensures the consumer that it is a better and healthier food choice. Consumers are encouraged to increase the consumption of foods with the Eat Well Live Well logo as it improves their health (Eat Well Live Well, 2021).

❑ *Glycaemic Index (GI) Foundation South Africa (SA)*

The GI Foundation SA health endorsement logo rates a food product based on the GI value of the product and the HL is approved by the South African government in terms of Regulation 146. Food products are endorsed that have lower fat, a GI rating, and less sodium (The Glycaemic Index Foundation of SA, 2021). The GI Foundation of SA (2021) has four food categories for food products namely frequent, often, active, and exercise foods (Table 2).

The GI Foundation groups various foods into categories to differentiate between the healthiness and level of physical activity required if a consumer consumes the product. The four categories evaluate the level of GI, blood sugar, and carbohydrate release in the foods, and then the foods are placed into the following categories: frequent, often, active, and exercise foods (Table 2).

2.2.1.3 Hybrid FOPLs

As reductive and interpretative FOPLs are time-consuming and complicated, the hybrid FOPL was implemented where the reductive component indicates the amount of a specific nutrient such as sugar and the evaluative (interpretative) component is the star rating, which assigns a rating between 0.5 and 5 to a specific product based on the nutritional profile (Figure 3). Health Star Rating (HSR) is the latest hybrid FOPL (Talati *et al.*, 2016). Although the system combines the reductive and interpretative elements, Maubach *et al.*, (2014) conducted a study and noted that HSR has less impact on a consumer's food choice than other interpretative FOPLs such as MTL ratings.

Figure 3 indicates the Hybrid FOPL where a HSR is given on the left and the right the specific nutrients are named with the serving size or amount per 100 grams. Below the amount of a specific nutrient, the nutrient amount is labelled as "low" or "high".



Figure 3 The hybrid method where the HSR, an interpretative FOPL, is on the left and the RI, a reductive FOPL, is on the right.

Table 2 Categories of the Glycaemic Index (GI) Foundation SA health endorsement logos

Categories	Description	Health endorsement logos in South Africa
Frequent foods	These food products are low in GI and very low in fat, thus it has minimal effects on blood cholesterol, blood glucose, and/or blood pressure levels. These foods are virtually free from fat, thus these HLs are aimed at health-conscious individuals and those with an extremely low-fat or fat-free diet (The GI Foundation of SA, 2021).	   
Often foods	These food products are low in GI and fat, thus the 'green' indicates that it has a minimal effect on an individual's blood glucose level. The product is healthy if it is consumed within normal and recommended amounts (The GI Foundation of SA, 2021).	   
Active (Sometimes) foods	These foods have lower fat and an intermediate GI, but more than often and frequent foods. These products are aimed at healthy and active individuals but should be limited. Therefore, a recommended serving size is displayed on the packaging (The GI Foundation of SA, 2021).	 
Exercise foods	Foods with a high GI are classified as exercise foods and it is not recommended for diabetes, but might be for other consumers. These logos endorse the prevention of feeling fatigue and will boost energy levels (The GI Foundation of SA, 2021).	  

2.2.1.4 Comparison of FOPLs

Research indicated that interpretative labels are increasingly effective compared to reductive labels, regarding the shift of consumers' food choices to healthier food choices (Volkova & Mhurchu, 2015). Hutton and Gresse (2020) also found that South African consumers have a positive response to interpretative labels with a decreasing impact from HLs followed by the Nutri-Score and MTL system. It was also found that females perceived HLs to be the easiest to understand, while males chose the Nutri-score. The MTL system was found to be trustworthy and useful as it provides the necessary nutritional information, whereas the RI (reductive FOPL) and WL (nutrient-specific interpretative FOPLs) were the most unfavourable as it was found to be confusing and difficult to understand (Hutton & Gresse, 2020).

Consumers tend to find interpretative aids such as colour more favourable, but this leads to a risk of the exclusion of desired information by consumers and thus it may be less trusted (Talati *et al.*, 2019). Consumers also find it difficult to interpret the NIP and they prefer nutritional information to be less complex. They prefer a single FOPL on all food products, instead of various FOPLs currently on South African food labels (Koen *et al.*, 2018b). Thus, the use of one single FOPL can be more effective. Koen *et al.*, (2018b) found that South African consumers prefer simpler and understandable FOPLs with a clear indication of the link between a health benefit and a specific nutrient or ingredient. Consumers also prefer short and easy-to-read FOPLs with bold, bright colours (Koen *et al.*, 2018b).

It is essential to improve the effectiveness of FOPLs to encourage healthier food consumption and this can be obtained by investigating the influence of FOPLs on a consumer's perception (Ikonen *et al.*, 2019). The type of FOPLs that influence consumers the most, without any misleading claims, can encourage healthier food consumption (Ikonen *et al.*, 2019).

2.2.1.5 Nutrition Information Panel (NIP)

A few countries have made it mandatory to indicate the NIP when a health claim is made on the packaging to ensure customers have access to unbiased nutritional information (Talati *et al.*, 2016). NIPs, otherwise known as the Typical Nutritional Information Panel in South Africa, are standardized presentations to reduce consumer confusion and to allow food to be compared to one another at the point of purchase (L'Abbe *et al.*, 2012). An example of a NIP is in the below figure (Figure 4). According to the Regulations Relating to the Labelling and Advertising of Foodstuffs (No. R146) the NIP should be included on the food packaging if a nutrient content claim is made and the NIP is required to comply with the regulations (Foodstuffs, Cosmetics and Disinfectants Act and Regulations, 2010). This regulation indicates what nutrients are required to be indicated with the specific rounding of each nutrient value.

TYPICAL NUTRITIONAL INFORMATION		
AVERAGE VALUES	PER 100 ml	PER 30 ml SERVING
Energy	676 kJ	203 kJ
Protein	2,4 g	0,7 g
Glycaemic carbohydrate	31 g	9 g
of which total sugar	28,5 g	8,6 g
Total fat of which:	0,2 g	<0,1 g
saturated fat	<0,1 g	<0,1 g
trans fat	0,0 g	0,0 g
monounsaturated fat	0,2 g	<0,1 g
polyunsaturated fat	<0,1 g	<0,1 g
Cholesterol	<5 mg	<5 mg
Dietary fibre*	0,6 g	0,2 g
Total sodium	1378 mg	413 mg
INFORMATION FOR PREPARED / AS SOLD PRODUCT. *AOAC 991.43		

Figure 4 An example of the Nutrition Information Panel (NIP), otherwise known as the Typical Nutritional Information Panel, indicates the numerical values of each nutrient per serving and per 100 grams.

A significant number of consumers state that they utilise the nutritional information on a food products' packaging to decide on the specific food product (Campos *et al.*, 2011). NIPs will enable customers to evaluate a product based on all the quantitative information stated in the NIP (Talati *et al.*, 2016). However, consumers struggle to interpret quantitative information. NIP labels require higher levels of the cognition process, as a consumer should locate, process, and interpret the BOP numerical facts (Maubach *et al.*, 2014).

Additionally, consumers are required to first read and evaluate the NIP before they can evaluate a claim or FOPLs, and then only they can evaluate whether the claims are relevant and accurate (Talati *et al.*, 2016). Evidence suggests that FOPLs can enable a consumer to process information quicker, with less conscious effort and it is more likely to influence a consumers' purchasing choice (Maubach *et al.*, 2014). Thus, the combined effect of claims and NIPs can improve the communication efficiency between the manufacturer and the consumer, but it is required of the consumer to read both the NIP and the health or nutrition claim before consuming or purchasing the product.

A consumer that can correctly process and interpret the numerical data in the NIP requires numerical skills and nutritional knowledge. Consumers that do not read the NIP struggle to differentiate between food, moderate and poor nutritional profiles of food labels (Maubach *et al.*, 2014). Therefore, NIPs are usually used in conjunction with other claims to validate the claim or to link the nutritional benefit to a specific nutrient. Another benefit of the combined use of NIP and claims is that consumers can also view the overall healthiness of a specific food product as all the nutrients are indicated, whereas claims (excluding the HLs) focus on one specific nutrient.

Other observational studies evaluated whether customers in supermarkets look at the NIP before they purchase a product and it was found that a low number of customers look at the NIP (Grunert *et al.*, 2010). Thus, there is a low probability that consumers will turn over a food product to read the NIP on the BOP or side of the pack in a supermarket (Talati *et al.*, 2016). This is aligned with a study conducted by Celemin and Grunert (2012) that found that consumers only look at labels for less than four seconds and it was concluded that four seconds is inefficient to process information extensively. With the time constraint in supermarkets, it results in consumers that only view and read the FOP, and the possibility is higher that they would purchase the product than consumers that read the BOP (Gorton *et al.*, 2010). Bix *et al.*, (2015) and Ikonen *et al.*, (2019) also concluded that FOPLs decrease the attentiveness of customers to the NIP, thus consumers depend greatly on the FOP information.

2.2.2 Health and Nutrition Claims

Health and Nutrition Claims (HNCs) can be utilised as interpretative aids and can encourage consumers to identify and purchase food products that are healthier (Kaur *et al.*, 2017). Ikonen *et al.*, (2019) found that consumers react positively to HNCs. Consumers can react positively to these claims, but the claims should also be consistent and not deceptive (L'Abbe *et al.*, 2012).

HNCs are divided into nutrition claims and health claims. Nutrition claims, or nutrient content claims, focus on the positive level of a specific nutrient of a specific product, for example, 'low in fat' or 'high in protein' (Dixon *et al.*, 2014). Whereas, health claims connect specific nutrients with a specific health aspect or a specific risk reduction benefit, such as 'low in sodium may reduce the risk of high blood pressure, which is a risk factor for strokes and heart disease'. Gorton *et al.*, (2010) state that health claims can be divided further into two main categories namely general level health claims (this indicates a specific substance or nutrient with a health benefit present in a product such as calcium that improves bone and teeth strength) and high-level health claims (this claim connect a specific nutrient in the product and serious disease or health risk such as low sodium might reduce the risk of high blood pressure).

Health Claims

Health claims transfer information to communicate the health benefits of the food product to the consumers and it enables them to make informed decisions about the products (Nocella & Kennedy, 2012). Health claims are a comprehensive category of health-related claims and nutrient-specific claims which are a written description of a particular nutritional component of the product (Talati *et al.*, 2016) and it specifies the connection between the particular food and the stated health outcome (Kaur *et al.*, 2017). Generally, health-related claims are placed close to FOPLs (Maubach *et al.*, 2014).

Kaur *et al.* (2017) conducted a meta-analysis of seventeen studies and concluded that health-related claims encouraged the purchasing and consumption of food products, thus it has a considerable effect on consumers' dietary choices. Kaur *et al.*, (2017) systematic review concluded

that products with a health-related claim tend to increase the purchasing decision by 75% compared to the same food product, but without any health-related claims. It was also found that health claims have an equal effect on the food choices of customers compared to nutrition claims (Kaur *et al.*, 2017). Other studies such as Maubach *et al.*, (2014) concluded that if a health claim was present on a food label, it had a positive effect on a consumer's food choices. Health claims can also be used to educate consumers and to communicate chronic disease prevention and management (Ippolito & Mathios, 1991). Consumers also tend to evaluate written nutrition information better than numerical information, which can indicate that health claims are more effective than reductive FOPLs (Kleef *et al.*, 2007). However, health claims have been condemned by some consumers as misleading as it emphasizes the benefits of the product, without providing an overall summary of the other nutritional components although it might not be seen as healthy such as sugar, saturated fat, and sodium (Hastak & Mazis, 2011).

In South Africa, health claims are currently not allowed, but nutrition content claims are allowed if it is according to the Regulations Relating to the Labelling and Advertising of Foodstuffs (No. R146) and HLs can be added additionally to convey a health benefit to the consumer (Foodstuffs, Cosmetics and Disinfectants Act and Regulations, 2010). The draft legislation is pending since 2014 on Regulations Relating to the Labelling and Advertising of Foods: Amendment (No. R429) which includes the guidelines on the utilisation of specific health claims (Foodstuffs, Cosmetics and Disinfectant Act and Regulations, 2014). Nevertheless, the regulation is still in draft format, therefore health claims are not currently allowed in South Africa. It is not allowed to use a function claim nor a reduction of disease risk claim in South Africa, but in other countries (for example the United States) these claims are compared to the claim and the numerical information to ensure consumers make an informed decision (Maubach *et al.*, 2014) (Table 3).

Nutrition Claims

A nutrition claim, or nutrient content claim, is a claim that implies, indicates, or suggests that a specific food product has specific nutritional properties from the nutrient, energy, or any other component in the product. Nutrition claims are allowed in South Africa if it complies with the Regulations Relating to the Labelling and Advertising of Foodstuffs (No. R146). Nutrition claims can also be found in the format of "Comparative claims" which is where one nutrient level(s) and/or energy value of two or more similar foodstuffs are being compared (examples: "reduced", "less than", "fewer", "increased", "more than", "light", "lite") (Foodstuffs, Cosmetics, and Disinfectants Act and Regulations, 2010). An example of a comparative claim is 70% less fat than the original Pizza Flavoured Two Minute Noodles". A nutrition claim can also be found in the format of content claims, which state "high", "free or virtually free", "low", or "source of" linked to a specific nutrient (Table 3). Table 3 is an adapted summary and overview of the types of HNCs from Van Buul and Brouns (2013).

Table 3 An adapted summary and overview of the types of Health and Nutrition claims from Van Buul and Brouns (2013)

Type of claim	Sub-division	Parameter	Example of claim
Nutrition Claims	Content claims	Regulations Relating to the Labelling and Advertising of Foodstuffs (No. R146) of the Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Foodstuffs, Cosmetics and Disinfectants Act and Regulations, 2010).	"free or virtually free", "low", "source" or "high" e.g. "Source of protein"
	Comparative claims	Nutrient level(s) and/or energy value of two or more similar foodstuffs are being compared and the comparison is based on a relative difference of at least 25% in the energy value or nutrient or the alcohol content of an equivalent mass or volume (Foodstuffs, Cosmetics and Disinfectants Act and Regulations, 2010).	"reduced", "less than", "fewer", "increased", "more than", "light", "lite"
Health Claims	Function claims	Based on the commonly accepted scientific evidence	"Vitamin C increases iron absorption" (Van Buul and Brouns, 2013)
		Based on recently developed scientific data	"Cocoa flavanols help maintain endothelium-dependent vasodilation, which contributes to normal blood flow" (Van Buul and Brouns, 2013)
	Reduction of disease risk claims	Includes claims regarding child development and growth	"Plant sterols have been shown to lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease" (Van Buul and Brouns, 2013)

Ikonen *et al.*, (2019) found that consumers are less influenced by nutrition claims (for example 30% less sugar) compared to health claims. The studies indicated that consumers find it difficult to analyse and evaluate if there is too much information on the food label and if certain terminology is used. Consumers also found it difficult to interpret the definition of certain nutrients and the connection between energy and calories when they are making diet-planning calculations (Food Standards Agency, 2007). Future consumer research should focus on the consumer's understanding and perception of health and nutrition claims to improve the effectiveness of these claims (Van Buul & Brouns, 2013).

2.2.3 Nutrient Profiling

Nutrient profiling is a tool of the Department of Health in South Africa to improve and encourage the formulation of products. This provides a holistic view of all the components and ingredients in the food product; thus it enables a consumer to assess the nutritional quality of a single food product (Van Der Bend *et al.*, 2014). Nutrient profiling can reduce the risk of consumers that are misled as it evaluates the food product holistically and not one isolated nutrient or component and it can ensure the customer that the food product is effectively regulated. Non-governmental organizations, the food industry, and the government should utilise nutrient profiling to assist consumers in the food product choices to ensure healthier food choices (Van Der Bend *et al.*, 2014).

2.3 Moderators of claim effectiveness and the prevalence of label use

Consumers react in various ways to claims on the labels of food products. The way the customers are influenced depends on the customer's subjective perception (Ikonen *et al.*, 2019). The influence nutritional information on food labels has on consumers was investigated in various studies, which includes the manner in how the consumer reacts towards the information (which includes the processing and evaluation of the information) and how the food label information influenced the consumers' purchasing choice. Theoretically, consumers should be able to make a better and more informed decision if there is an increase in the detail of information on food labels, but consumers are struggling to analyse the nutritional information due to various factors. These various factors will be discussed in this chapter.

2.3.1 Backbone of a consumer's attitude and perception towards nutrition labels

The Engel, Kollat, and Blackwell (EKB) model has been developed to indicate the decision-making process of a consumer (Figure 5). The backbone of the process to the ultimate decision of food products was constructed by combining various models, including Engel, Kollat, and Blackwell's (Engel *et al.*, 1978) model from Grunert & Wills (2007) and Jacobs *et al.*, (2010) (Figure 5).

There are five stages namely (1) problem recognition (need), (2) search, (3) evaluation of alternatives, (4) choices, and (5) the outcomes (Darley *et al.*, 2010). Consumers first have a reason or need to purchase a specific product. Their need or reason then results in searching. The search for nutritional information can be active or accidental (Grunert & Wills, 2007). A consumer only

utilises information if they are exposed to it, then a consumer's likelihood of exposure increases if they search for nutritional information. The search step is influenced by the specific experience and the interest in food and nutrition-related information as well as the self-assessed knowledge of nutrition (Erasmus *et al.*, 2010). Subsequent behaviour can only be obtained if the consumer perceives the information (Engel *et al.*, 1978). Consumers can perceive information subconsciously or consciously, but conscious perception has a more powerful effect on an individual's behaviour (Grunert & Wills, 2007). A consumer's perception then leads to the understanding of nutritional information, where a consumer then links meaning to what is perceived. The difference between perception and understanding is that perception is whether consumers read and take up the information and then understanding is whether a consumer goes through inferences (Grunert & Wills, 2007). It is important to differentiate between objective and subjective understanding when a consumer's understanding is being analysed (Pärson & Vancic, 2020). Objective understanding is if a consumer understands the information in the same way as the intended meaning, whereas subjective understanding is when a consumer understands the information, but also incorporates their judgment into the meaning. Consumers also use pre-existing knowledge to analyse nutritional information and use it to infer the meaning (Grunert & Wills, 2007). The perception of nutritional information also influences whether the consumer likes the overall label. Consumers may tend to like a label as they find it simple, easy to understand, and use or they may like the format, colour, font size, and symbols (Grunert & Wills, 2007). Liking is indirectly linked to understanding because if a consumer likes a food product's label they might use it and this might lead to a more positive evaluation, this is called peripheral information processing. The effect of liking, understanding, and inferences lead to the final step of utilisation. Utilisation can be divided into two categories namely direct and indirect effects and also between one-time and extended effects. Indirect effects include all the other competitors and food products. The direct, one-time effects are based on a specific product choice in a specific purchase context, while direct, extended effects are effects that accumulate information and this may be remembered even though the label was altered (Grunert & Wills, 2007).

South Africa is a developing country that is influenced by other socio-economic conditions such as high poverty rates, ignorance and the lack of knowledge about the nutritional content of food, and undernourishment which is associated with social inequality in comparison to developed countries (Schnettler *et al.*, 2015). The cultural context (ethnic group), country, subcultures, and consumer segments (including socio-economic psychographic, professional, and demographic factors) also influence a consumer's perception as this influences their lifestyle choices and development (Van Buul & Brouns, 2013). Subjective norms are the social pressure to partake or not partake in the behaviour, thus a consumer will be influenced by the judgments of others (Latiff *et al.*, 2016). Nocella and Kennedy (2012) state that there is insufficient systematic research to observe to what extent an 'average consumer' understands health claims, both qualified (claims with a lower level of scientific evidence) and unqualified claims (claims with a high level of scientific evidence).

Internal and external factors influence the entire process of a consumer's purchasing decision process (search, perception, understanding, and utilisation of nutritional information), such as interest in nutritional information, nutritional knowledge, socio-demographics, and the format of the label (Grunert & Wills, 2007). The three steps namely integration, evaluation, and decision were added to the model (Grunert *et al.*, 2010). It is possible that consumers may not utilise nutrition labels, although they state that they do, as the nutrition claims may be misunderstood (Grunert & Wills, 2007). Certain consumers do see nutrition labels as an important source of information. Nevertheless, food labels can confuse consumers or can overwhelm them, and consequently, they ignore them during their purchasing process and decisions. Consumers may be confused due to comprehensibility and readability. It is important to encourage nutritional knowledge to reduce the chances of barriers that influence the effectiveness of claims. After all, the ultimate aim of claims on food products is that less healthy food products should have a negative impact on customers whereas healthy products should be promoted (Talati *et al.*, 2016).

Various studies mention factors that influence the way they utilise, readability, and comprehensibility of label information. These factors include the demographic characteristics, font size, time constraints, influence of price or taste of the customer's choices, and insufficient nutritional knowledge (Van der Merwe *et al.*, 2014; Van der Colff *et al.*, 2016; Koen *et al.*, 2018b; Tod *et al.*, 2021).

Internal and external factors influence the backbone structure of the consumer's perception, understanding, and utilisation of food labels. The internal influences include (1) demographics (age, gender, marital status, and income); (2) situational (such as income, food cost, time constraints, and type of food product); (3) social (exercise options, dietary and body size norms, and education); (4) behavioural influences (knowledge, attitude towards the processing of information, interest, understanding, and familiarity); (5) other influences on the understanding claim. The external influences include the label format and information, claim format, food fraud, and claim regulation, and brand and product attributes. The internal and external influences will influence the overall effectiveness of the nutritional claims and consequently a consumer's purchasing choice.

2.3.2 Internal influences

The use of nutrition labels is different across subgroups and individuals in the population (Campos *et al.*, 2011). Studies indicated that a consumer's understanding of health-related claims can be influenced by various factors such as demographic characteristics; knowledge, interest, and familiarity; lexical aspects and wording; and their attitude towards the processing of information (Nocella & Kennedy, 2012). Studies found that consumers have a restricted understanding of health or nutrition claims and this may cause misunderstanding (Gorton *et al.*, 2010). Some consumers treat claims sceptically as they believe it is a way of marketing (Mhurchu & Gorton, 2007).

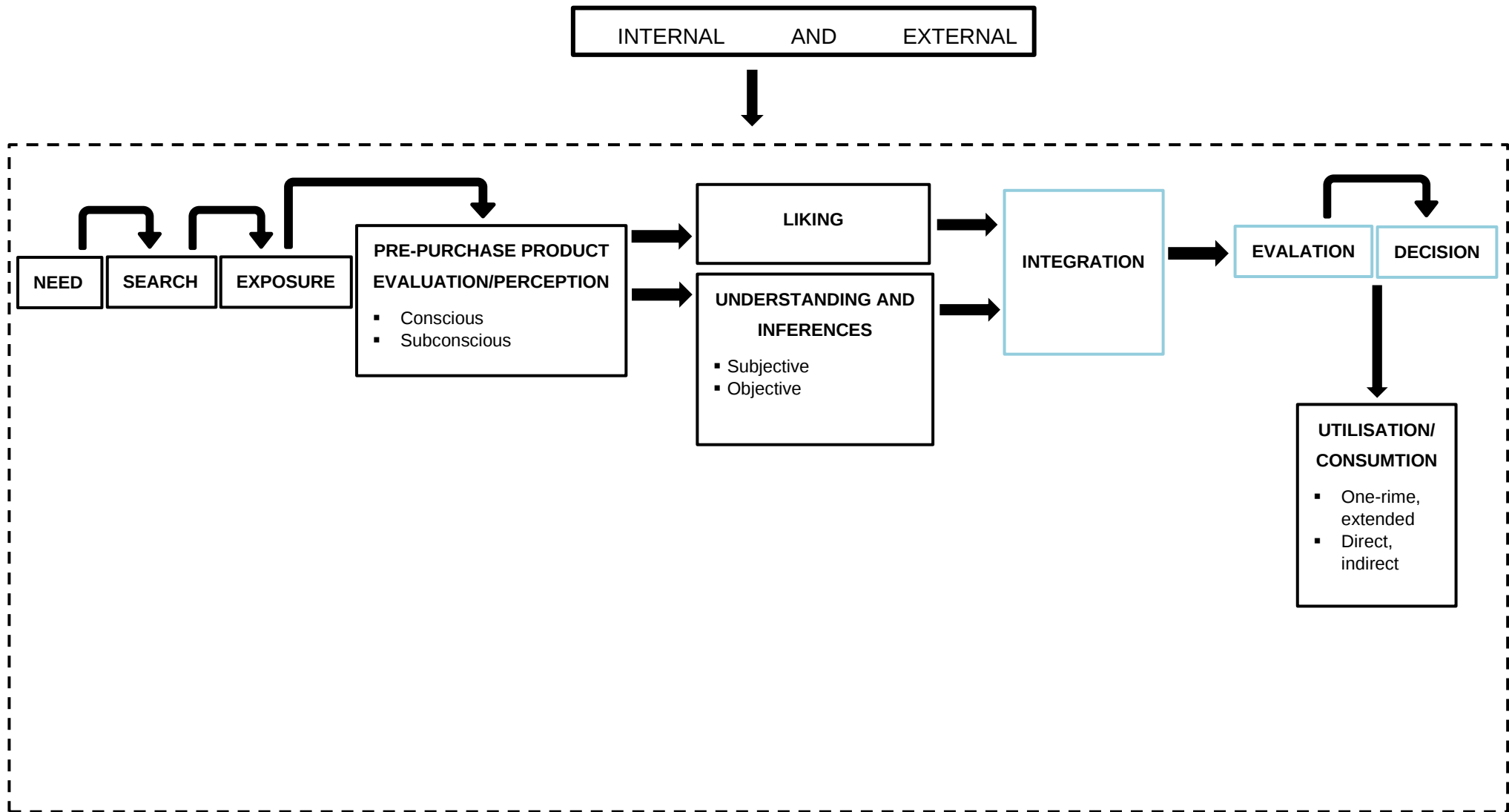


Figure 5 The adapted Engel, Kollat, and Blackwell (EKB) (Engel et al., 1978) model to indicate the process and stages of a consumer's decision-making.

Previous research also indicated that consumers struggle to distinguish between nutrition and health claims (Kaur *et al.*, 2017). The eco-social model of the determinants of food purchasing behaviour can be: biological (gender and age), behavioural (dietary habits), social (exercise options, dietary and body size norms, education, and food quality), and structural factors (food cost) (Ehrlich & Joubert, 2014). The models combined lead to the internal influences of (1) demographics (age, gender, marital status, language, and income); (2) situational factors (such as income, food cost, time constraints, and type of food product); (3) social (exercise options, dietary and body size norms, and level of education); (4) behavioural influences (knowledge, attitude towards the processing of information, interest, understanding, and familiarity) and (5) other influences on understanding claims.

2.3.2.1 Demographic characteristics

Demographic factors for instance age, gender, marital status, and income influence a consumer's interpretation and acceptance of health claims on food packaging (Nocella & Kennedy, 2012). These characteristics influence the ability of consumers to retrieve and process the nutritional information on the label of the product (Dimara & Skuras, 2005).

Age

The age of an individual influences their outlook on specific things such as dietary choice, food quality, nutritional knowledge, and various other viewings.

Elder consumers are more focused on proactive health-related claims such as fortified products for joint support, additional vitamins and minerals, and immune-boosting products (Nocella & Kennedy, 2012). Older people are more likely to have a more positive attitude toward the evaluation of functional food labels compared to younger individuals (Ares & Gámbaro, 2007). It was also observed that elderly and middle-aged consumers are more likely to be health-oriented than younger consumers, as they are more prone to health-related diseases (Siegest *et al.*, 2008).

Younger individuals indicated that disease prevention claims are more important to them, while older individuals tend to be interested in both disease prevention and short-term health benefits, but the short term was more important (Ares *et al.*, 2009). Consumers feel that some of the claims are irrelevant to them, for instance, younger consumers feel that a product that reduces the risk of osteoporosis is irrelevant to them (Talati *et al.*, 2016). The respondents born between 1981 and 1996 (age between 24 and 41 years) are classified as Generation Y. Generation Y are considered as the transitions between parental supervision and full independence as they are becoming the heads of the households. They are also more likely to purchase pre-packaged food products than purchase food products that require cooking (Sloan, 2005; Richards *et al.*, 2006).

The current study will evaluate whether there is a significant difference between the age of the consumers and the particular diet the age group follows as this may influence their perception of nutritional information on food labels.

Gender

Women tend to pay more attention to health-related claims than men as they are more likely to be concerned about a healthy diet and they feel that they have a bigger sense of responsibility towards providing their family with healthy foods (Rozin *et al.*, 1999). Women also tend to have a more positive attitude toward the evaluation of functional food labels (Ares *et al.*, 2009). Ares *et al.*, (2009) found that women are also increasingly willing to try the new products. It was found that there is a significant difference between gender and reading food labels and the results revealed that females are more likely to read a label compared to a male. Women tend to read food labels more often and with increasing attention as they pay attention to food components such as sugar and fat (Satia *et al.*, 2005). However, there is a shift in gender roles and responsibilities in households (Jacobs *et al.*, 2010). It is possible that new studies can indicate that men and women both have a big responsibility towards the health of their families and themselves.

Marital status

Marital status can also influence the way consumers make their food choices. The utilisation of a food label and the nutritional information are influenced by the marital status of a consumer, as consumers tend to change their food purchasing behaviour before and after marriage (Cheah *et al.*, 2015). Singles tend to be less conscious in nutritional label checking compared to married people (McClean-Meyinsse, 2001). Nevertheless, a study conducted by Cheah *et al.*, (2015) found that there was no relationship between the utilisation of a nutrition label and the marital status of a consumer.

2.3.2.2 Situational factors

Situational factors include the customer's income, food cost, time available for food choices, and type of food product (Jacobs *et al.*, 2010).

Income and food cost

Income is closely linked to food cost because there is a relationship between the income you receive and the percentage you spend on household groceries. Nevertheless, there may be exclusions to this, as certain consumers are price sensitive. Consumers that focus on price should gain nutritional knowledge to choose a relatively high nutritional value food product at a relatively low and affordable cost (Jacobs *et al.*, 2010).

Time constraint

It is possible that consumers may not read the FOP and BOP labels due to the limited time that consumers spend reading the nutritional information and claims on food labels (Wansink *et al.*, 2003). Gorton *et al.*, (2010) noted that consumers only look at food labels for less than four seconds and this may be inefficient to process information extensively.

Type of food product

Newman *et al.* (2016) found that the effectiveness of various types of labels, to transfer information, is context-dependent. A claim is product specific, for instance, Dimara and Skuras (2005) completed a study and found that consumers sought specific information on wine and it was found that the year of bottling was the most important followed by the location of the grape production (vineyards), aging years, certification, grape variety, bottling area, spirit grade, serving instructions, number of produced bottles and organic cultivation of grapes.

2.3.2.3 Social factors

Social factors include the customer's exercise habits, dietary and body norms, and education.

Exercise

A consumer's activity level may influence the food choice and how they perceive food labels. For instance, energy may be an important motive to exercise, and physically active men may find it more important to increase their energy intake (Salazar *et al.*, 2019). Consumers that exercise found a food product with the claim high in protein more important than non-exercising consumers. Physically active consumers may be aware of the various benefits of specific nutrients such as protein for muscle recovery after exercise and muscle growth (Salazar *et al.*, 2019).

Dietary status and body norms

A consumer's dietary status may influence their purchasing choices and dietary preferences (Donga & Patel, 2018). A consumer that has high cholesterol may put more effort into selecting low cholesterol foods. Manisha (2010) also noted that diabetic consumers tend to read the sugar level in a food product.

Body norms are a major influence on the choices consumers make in their food products. A simple example is the 'Banting diet' where this method reduces obesity by avoiding starch, fat, and sugar in all foods. This diet of low-fat, high-carbohydrate regained popularity in 2016 as the low carbohydrate, high fat (LCHF) of Tim Noakes. If a consumer is following this particular diet, it may result in them specifically looking for foods that are low in carbohydrates and high in fat. The body-positive movement may also influence how consumers perceive claims on food labels and their purchasing behaviour.

Education

Studies found that there is a positive relationship between the usage of health claims and individuals that have better education (Nocella & Kennedy, 2012). Nevertheless, participants that have a Master's or Doctoral level noted that they are struggling to interpret "scientific" words (Todd *et al.*, 2021). It has also been observed that individuals with better education have more knowledge on the interaction between disease and eating habits, thus they have a higher understanding of health-related claims (Ippolito & Mathios, 1991).

2.3.2.4 Behavioural factors

Behavioural factors consist of nutritional knowledge and interest, familiarity, and dietary habits. A consumer's knowledge, interest, and the label format influence their perception, consequently liking, understanding and inferences and ultimately influence their usage of the nutritional information (Grunert & Wills, 2007; Grunert *et al.*, 2010).

Nutritional knowledge and interest

Studies indicated that consumers are undoubtedly interested in health-related claims (Calfee and Pappalardo, 1991; Ippolito & Mathios, 1991; Wansink, 2003), but there is a difference in the attention given to various products (Grunert & Wills, 2007). Schnettler *et al.* (2015) found that consumers mainly purchase FFs for improved bodily functions and disease prevention. If customers are increasingly interested in FF and health-related claims, they can gain nutritional knowledge to improve their diet choices and reduce the risk of diseases. Consumers that have an interest and knowledge in nutrition and consumers that know about the relationship between nutrition and diet–diseases are more likely to use nutritional labels (Campos *et al.*, 2011).

Socio-demographic characteristics also influence the customers' nutritional knowledge (Nocella & Kennedy, 2012). Consumers that have more interest and knowledge in nutritional information, understand and interpret health-related claims correctly, therefore this influences the nutritional quality of their diet. Consumers' knowledge of nutritional information and disease prevention may reduce the chance of misperception of health-related claims (Andrews *et al.*, 2000). Knowledge also influences other factors such as attitudes and motivation, which consequently influence the consumer's understanding (Nocella & Kennedy, 2012). A consumer with an increase in awareness and knowledge of food labels will be more likely to invest more time to read a specific label before purchasing the product (Latiff *et al.*, 2016).

Talati *et al.*, (2016) conducted a study and found that consumers are ignoring health-related claims due to various factors. Labels and claims can mislead consumers and encourage an incorrect assessment of the healthiness of the food product. This can increase the consumption of unhealthy foods (Roberto *et al.*, 2012). A lack of knowledge on food claims, nutrition, and the health aspect of a specific nutrient can be misleading to the customer. Thus, food manufacturers must provide well-substantiated, not misleading, and understandable claims to reduce the risk of confusion (Roberto *et al.*, 2012). Research that investigated the influence of the naming of ingredients on the consumer's perception of healthiness and purchase decision is also limited, for instance, wholewheat and palm oil (Ares *et al.*, 2009). Food manufacturers can utilise this gaining of knowledge to improve the way health-related claims are communicated as it is becoming a key driver in the food choices of consumers (Nocella & Kennedy, 2012).

Consumers may also have nutrient centrism, which is the mindset a consumer has when a specific name of a nutrient is included in the food product's title or the nutrient claim description. This may cause further confusion as consumers assume that the product is healthier (Schuldt & Pearson,

2015). For instance, if a protein bar contains the word “Pro” it may lead to nutrient centrism as a consumer believes that the protein will be beneficial to them, but they do not consider the amount of sugar, energy, sodium, and saturated fats in the product.

If a consumer misunderstands and finds that a label might be misleading, it can invalidate the immense effort, human and financial resources that were invested in health claims in the food industry (Nocella & Kennedy, 2012).

Familiarity

Ikonen *et al.*, (2019) found that even though consumers know what is healthier, they do not necessarily always follow healthier behaviour. Consumers may purchase food products due to routine purchasing and this may lead to consumers not reading and evaluating the food labels.

Dietary habits

Dietary habits have a significant influence on the purchasing choice and the consumer's label reading habits. Consumers with a healthier lifestyle and diet habits tend to use nutritional labels more frequently (Campos *et al.*, 2011).

2.3.2.5 Other influences on understanding claims

If a consumer understands the nutritional information on a food label, it will ensure effective communication and consequently healthier, informed food choices (Jacobs *et al.*, 2010). Consumers tend to understand specific key terms, but consumers get more confused if the information is more complex (Grunert & Wills, 2007). Lexical issues are the difficulty of the consumer to understand scientific terms and although the consumer may have an idea what the term means, they don't know the exact meaning of such claimed natural products, thus a consumer may not like a specific label as they cannot relate (Mariotti *et al.*, 2010). Lexical issues and wording such as 'connective tissues', 'metabolism', 'nitric oxide' can confuse consumers as they may find it difficult to understand (Mariotti *et al.*, 2010). This might lead to confusion as consumers do not understand specific information. The last two origins of confusion are based on the interpretation of health claims. Certain consumers may disregard the multifactorial nature of food-related illnesses and they can think that a minimal healthy diet is adequate to prevent health-related diseases, thus manufacturers should direct specific health claims to the correct target group (Mariotti *et al.*, 2010).

Claims can be misleading and confusing to consumers. Occasionally consumers get confused because health claims can also occur because of effects such as the magic-bullet, health halo, and framing effects. Consumers may be confused as the healthy attributes are emphasized on the packaging, but the unhealthy ingredients are not emphasized (Harris *et al.*, 2011). For instance, an energy bar may be high in protein, but the amount of sugar and fat might not be emphasized. This phenomenon is called health halos as the consumer generates an opinion of a product based on only one healthy attribute (Wansink *et al.*, 2003; Chandon, 2012). The health halo and the magic

bullet effect were confirmed to be present in various studies. Ikonen *et al.*, (2019) found that three types of labels influence the customer's healthfulness perception of less healthy products, therefore FOP may lead to a potential halo effect. The magic bullet effect can occur if consumers assign incorrect health benefits to a specific product, for instance, margarine that is low in cholesterol will help to fight against cardiovascular disease (Roe *et al.*, 1999). Therefore, one beneficial claim about a particular nutrient may result in consumers that allocate similar beneficial values on other properties, and also perceive the overall healthfulness as more positive (Roe *et al.*, 1999). A consumer may also be confused if they think that if they increase their intake of a specific product with a health claim the stronger the effect will be. For example, a high in fibre and protein claim that states it will kick start your weight management journey may be interpreted as you only need this product to start your weight loss journey (Mariotti *et al.*, 2010).

Consumers also mentioned that they believe there is a lack of clarity about the terms "low" and "high" in health-related claims (Talati *et al.*, 2016). In Talati *et al.*, (2016) study, it was found that consumers were confused about whether claims are regulated or not and this might also be a source of confusion for customers. Consumers should be educated on what the requirements are to make a "high in" or "low in" claim on a food label.

2.3.3 External influences

The external factors include the food label format and information, claim format, food fraud, regulation, brand, and product attributes. Consumers are influenced by various factors such as brands, the location of the claim, and the shape or type of the packaging.

2.3.3.1 Label format and information

The format of the label and how the information is presented on the label influence the consumer's understanding and perception of the food claims.

Studies indicated that written nutritional information has a more powerful effect on healthiness perceptions, liking, and willingness to purchase a food product compared to a product with more numerical information (Viswanathan, 1996). It was also found that a customer's confidence, attitude, and perceived health benefits in health claims increased when a visual representation was included.

The format and the content of the wording may influence how a consumer understands a health-related claim (Ares *et al.*, 2009). Kleef *et al.* (2007) found that labels that did not allow a quick inspection lead to overwhelming consumers as they described it as too complex and technical. A shorter nutrition claim and a more attribute-specific claim on food products were found to have increasing persuasiveness for certain consumers (Wansink, 2003). Wansink (2003) also found consumers are less likely to lose interest in the information if the claim is shorter, and alternatively, the consumer's understanding of the information provided improves. Additionally, it was found that consumers prefer less complex scientific words and less alarming words for instance "cancer" on

health-related claims (Kapsak *et al.*, 2008). Another barrier is the font size, as consumers mentioned that small font sizes were one of the factors that influence the likeliness of label use (Todd *et al.*, 2021).

Health claims may go beyond scientific truth for instance a claim stated: “lipids provide energy to the body”, which is technically accurate, but consumers may also summarize it as “lipids are energizing” (Mariotti *et al.*, 2010). This is due to the limited time that consumers take to read the information and claims on food labels (Wansink, 2003). Labels that utilise scientific or compound names are not recommended as they may have a negative impact on the perception of the consumer (Ares *et al.*, 2009). Consumers prefer simplified FOPLs to understand nutritional information better, even though the FOPLs may differ relating to ease of use and adequate information (Grunert & Wills, 2007). The utilisation of the term ‘can’ as a prefix to a health-related claim was perceived by consumers as being more certain than the prefix ‘may’. The term ‘can’ also helps to transfer an increasingly positive relationship between the product, specific nutrient, and disease prevention (Food Standards Agency, 2007).

The label format and design can also influence the probability of a consumer purchasing a product. It was found that symbols and colours are highly effective as it draws attention and assist in comprehension (Antúnez *et al.*, 2015). Specific consumers regard red and green as too aggressive and overconfident. Consumers also prefer short and easy-to-read nutritional information with bold, bright colours or symbols (Koen *et al.*, 2018b). Colours such as blue, yellow, blue, specific shades of red and green are related to health, while pink, purple, and other specific shades of green are linked to unhealthy and artificial food products (Wąsowicz *et al.*, 2015).

The shape and design of the packaging can influence the consumer’s perception of a food product. The overall acceptance of the nutritional information and claims can be influenced by the type of packaging as it can be linked with a specific attribute of a product for instance an unhealthy sugar-based drink in a can may be perceived as more unhealthy than the same sugar-based drink in a carton (Van Buul & Brouns, 2013).

The placement of the specific nutritional information and the claims on the packaging, either FOP or BOP, also influences the effectiveness of the nutrition and health claims (Van Buul & Brouns, 2013). It was found that FOP claims are generally more effective than BOP claims (Van Kleef *et al.*, 2007).

It is crucial to obtain a better understanding of the relationship between consumer characteristics and the various label types (Ikonen *et al.*, 2019). Ikonen *et al.*, (2019) suggested that future research should analyse the manufacturer’s perspective and focus on label design with the following research question: “How are consumers influenced by packaging carrying multiple (different forms of) front-of-package nutrition labels simultaneously? What about in combination with other labels not directly related to health (for example organic-production claims or allergen information)?”

2.3.3.2 Claim format

The various formats of claims and the way in which the nutritional information is presented will influence the trustworthiness.

Consumers considered FOPLs as more unbiased compared to health claims as they believe that the FOPLs are being developed and monitored by third parties such as the government and not by food producers (Talati *et al.*, 2016). Consumers did however distrust certain aspects of FOPLs (HSR and Daily Intake Guide) as they believe that the food manufacturer reduced the serving size to obtain lower values for the nutritional components (Talati *et al.*, 2016). Consumers also found it more difficult to understand Daily Intake Guide followed by MTL and HSR, as it contains more information and this results in a more complex format (Talati *et al.*, 2016).

Customers' perception and overall acceptance of a FF with health claims depend on the particular benefit of the product (Schnettler *et al.*, 2015). It is important that the manufacturer understands their market and analyse how they might react to certain claims and nutritional information (Ikonen *et al.*, 2019).

2.3.3.3 Brand and product attributes

Loyal and habitual, better known as routine purchasing, customers trust certain brands and these brands have a strong influence on the likelihood that they would accept a functional ingredient and a claim on a product (Van Buul & Brouns, 2013; Ikonen *et al.*, 2019). It was found that consumers pay less attention to nutritional information on branded products (Ikonen *et al.*, 2019). Thus, is it less likely that a consumer will be influenced by familiar products and brands compared to consumers that evaluate a new product. Consumers can perceive a branded product as healthier, as they are less influenced when they formed an opinion previously about a specific product or brand (Ikonen *et al.*, 2019).

2.3.3.4 Food fraud and claim regulation

Food fraud and the way food claims are being regulated influence the trustworthiness of food labels. A study showed that more than 50% of omega-3 fatty acid claims in South Africa do not comply with the requirements for Docosahexaenoic Acid (DHA) and Eicosapentaenoic Acid (EPA). Research also indicated that certain manufacturers can dilute protein powder, such as whey and other protein blends, in supplements, without any complication for label compliance (Naidoo *et al.*, 2018). If claims and foods are not properly regulated consumers can be less likely to trust the nutritional information and claims provided and this may result in them not purchasing and consuming certain food products that are healthier (Siegest *et al.*, 2008).

2.3.4 Ultimate utilisation

Ultimate utilisation refers to when a consumer goes through the entire decision-making process and then makes the final decision to purchase and use a product based on the label information (Grunert & Wills, 2007).

A consumer can only develop a need or search for a product with specific health benefits and claims if they understand claims and nutritional information (Van Buul & Brouns, 2013). Ease and trust encourage the use of health-related claims as it influences the consumer's willingness to incorporate and evaluate these claims before they make a purchasing decision (Talati *et al.*, 2016). Therefore, a health claim's effectiveness can be improved if it is communicated in a way that the customer can understand the benefits of the food product to their health. The claim should also be communicated to the right target market on the right product.

2.4 Improving the effectiveness of claims

Future research and the effective implementation of the findings from the research may improve the effectiveness of claims. Future research should analyse previous research studies to evaluate the gaps and it should be targeted at a specific consumer group.

2.4.1 Previous research

Various studies were conducted to assess the effect of nutritional information and claims on a consumer's preference and purchasing choice.

- Jacobs *et al.*, (2010) identified the information which South African, Potchefstroom, consumers utilised on food labels and why they tend to not read food labels. The connection between the information and the consumer's understanding and their ability to make healthier choices was investigated. This study found that the most frequently read information included the expiry date, followed by the ingredient list and nutritional information. The font size of the information was identified as the main contributor to the utilisation of information and the product attributes, for example, price and taste, were found to be more important than the nutritional content (Jacobs *et al.*, 2010). The nutritional information that the respondents tend to look for included content about fat and cholesterol, which might be linked to weight concerns and diet-related diseases. Demographic characteristics (such as nutritional knowledge and education) and situational factors (limited time to purchase foods) also influence the tendency of consumers to read labels (Jacobs *et al.*, 2010). Demographics influence the ability of consumers to identify and understand health symbols and nutrient content claims, which may lead consumers that be unable to identify false and permissible nutrient claims (Van der Merwe *et al.*, 2012).

- Talati *et al.*, (2019) conducted a study to evaluate consumers' perceptions of five FOP nutrition label formats namely the HSR, MTLs, Nutri-Score, RI, and WLs across 12 countries (Argentina, Australia, Bulgaria, Canada, Denmark, France, Germany, Mexico, Singapore, Spain, the United Kingdom, and the United States of America) by using an online survey. The project aimed to evaluate the perception of the participants and identify which nutrition label formats confused or

coerced the participants. The perceptions that were assessed include trust, liking, comprehensibility, and the need for a food label to be mandatory. Participants ranked the Nutri-Score as the top FOPL and the respondents indicated that they believe nutritional labelling should be mandatory. This study included 12 countries and it was concluded that the Nutri-Score was the most successful FOPL.

- Van Buul and Brouns (2013) included the evaluation of how nutritional claims and the inclusion of functional ingredients influence a consumer's perception and consequently the purchasing intent. The consumers in the study indicated that the food products with approved and valid nutritional claims helped them to reach their overall health goals.

- Kaur *et al.*, (2017) conducted a systematic review of experimental studies that have been conducted in a retail setting on adults to evaluate the effect of health-related claims on food labels and the influence on their purchasing decisions. The first aim of the study was to evaluate the likelihood of choosing a product with a health-related claim compared to a product without a health-related claim. The second aim of the study was to evaluate the change in food consumption and the preference of food products (Kaur *et al.*, 2017).

This lead to the current study question on how South African consumers perceive multiple nutritional claims on a food product and how this influences their purchasing decisions. This study included the evaluation of FOPLs, nutritional claims, and other nutrition information to evaluate the effect of multiple claims on a consumer's perception of a food product.

2.4.2 Implication

This research can enable marketers and public policy-makers to improve their understanding of factors, both internal and external to the consumer, that influence the effectiveness of nutritional information and nutritional claims.

Food manufacturers can not completely control the internal factors such as the consumers' interpretation of health claims, purchasing behaviours, or choices as these factors are influenced by the socio-demographic characteristics, familiarity, attitudes, and the consumers' knowledge (Nocella & Kennedy, 2012). These consumer factors are influenced by the life course of each individual. Therefore, it is essential to understand the target consumers to increase the effectiveness of health-related claims (Nocella & Kennedy, 2012). Nevertheless, food manufacturers can control external factors, to a certain extent. The way the nutritional claims are communicated is influenced by factors such as the ingredients, visual aids, positioning, type of communication (verbal compared visual), non-scientific or scientific communication, and lexical aspects (Nocella & Kennedy, 2012). These factors can be completely controlled by policy-makers and manufacturers (Nocella & Kennedy, 2012).

Various contributors can influence how the nutritional information is communicated. Food manufacturers have control over how the communication is transferred onto the packaging and they can control to some extent how it is communicated to the consumer. The public policymakers can

set standards to encourage healthier ingredients and to drive the implementation of claims to encourage healthier food choices.

2.4.2.1 Public policy-makers

Nutritional claims on food products can provide beneficial information to a consumer and the legislation aims to protect consumers from misleading, false, or inaccurate information (Nocella & Kennedy, 2012).

Public policy-makers should incorporate both detailed nutritional information and an overall health indicator with an interpretative aspect (Ikonen *et al.*, 2019). Another potential regulatory approach can be that all food products should be evaluated by nutrient profiling and if it passes nutrient profiling a logo can be added. Public policy-makers should also launch campaigns to gain consumers' trust in how nutritional claims and information are regulated.

2.4.2.2 Food manufacturers

Food manufacturers should invest in the development phase of food products and the decision of the type of nutritional information that can be included, as it has a direct influence on sales and it has a broader impact on the brand (Ikonen *et al.*, 2019). These manufacturers should then utilise pictures, colours, and different languages to improve the communication and consumers' understanding of nutritional information on food labels. Manufacturers must understand that a specific claim links to a certain product category (Van Buul & Brouns, 2013).

2.4.3 Marketers and supermarkets

Food labelling is influenced by the various label types, design factors, formatting, and layout of the label. It can influence the outcome and effectiveness of claims, as this influences a consumer's perception of a specific food product (Ikonen *et al.*, 2019). A responsible marketer, as well as a responsible food manufacturer, should be attentive to labels as it may increase sales of more unhealthy food products as well (Ikonen *et al.*, 2019). A marketing strategy should be implemented to assist customers to understand the utilisation of nutritional information on food products and the strategy should be based on a specific product and a relevant target market (Kleef *et al.*, 2007). If nutritional information is presented effectively, it can provide an opportunity to manufacturers to enhance a food product's image and consequently increase sales (Harris *et al.*, 2011). Some consumers believe that health claims are primarily marketing messages that were created by food producers and it is not an informative nutritional statement to communicate a specific health value of the product (Mariotti *et al.*, 2010). Therefore, it is essential to improve the nutritional knowledge of consumers and inform them on how the information is regulated. This can be done by explaining nutritional terms to customers in-store (Jacobs *et al.*, 2010).

Marketers, food manufacturers, consumer groups, and educators should improve communication between the manufacturer and the consumers by addressing the lack of nutritional

knowledge and understanding in food health-related claims. This can be achieved by developing information remedies to target particular segments of possible and intended consumers (Nocella & Kennedy, 2012). Dietary and nutritional knowledge can also be encouraged and improved by effective advertising (Brennan *et al.*, 2008). Supermarkets can also provide pamphlets to consumers in their shopping bags about nutritional fun facts or puzzles on pamphlets that can encourage children to gain nutritional knowledge.

2.5 Data collection methods

Data can be collected through various research methods such as document studies, focus groups, interviews, observations, and surveys (Paradis *et al.*, 2016; Busetto *et al.*, 2020).

Document studies, also known as content analysis, is when a study obtains data by reviewing written materials (Busetto *et al.*, 2020). A document study was not suitable for the current study as the perception of South African consumers was evaluated and written materials were only used as resources.

Focus groups are interviews that include six to eight people with an experienced moderator, to obtain information regarding the participants' experiences and expertise (Busetto *et al.*, 2020). A focus group study was not a suitable data collection method as this was a foundation study to obtain an overview of the perception and purchasing intent of South African consumers and no particular setting or group of people was required to obtain the data. Therefore interviews as a data collection method were also not utilised as it provides insights into a consumer's subjective experiences, opinions, and motivations (Busetto *et al.*, 2020). A follow-up study can include interviews to evaluate the motivations and opinions of consumers.

Observations can be either non-participant or participant observations to review the actual behaviour or obtain data from a specific setting (Busetto *et al.*, 2020). The current study is also a foundation study for other studies, therefore a specific setting in a specific store or region was not chosen. A suggestion is that a follow-up study includes observations to evaluate the consumer's in-store perception and purchasing behaviour.

A survey was used in the current study in the form of an online questionnaire and a deductive and inductive approach was used. The quantitative method design included hedonic scales and close-ended questions with a deductive approach, as well as the qualitative method design, which included open-ended questions with an inductive approach (Graneheim *et al.*, 2017). This design was used as it is effective to obtain data from participants in various regions and in a limited amount of time (Graneheim *et al.*, 2017).

Chapter 3

Influence of multiple nutritional claims

This study is a foundation for future studies, as it evaluates the nutritional knowledge and nutritional information preference of South African consumers. This study did not aim to obtain information of a specific region or community, as it evaluated random South African consumers. The study contributed to this specific study field in South Africa as it will be the first, as far as it is known, a study that evaluates whether a consumer's perception is influenced by more nutritional and ingredient claims on a food label. This study was a self-reported study and not an observational consumer study, therefore the actual purchasing behaviour of consumers was not evaluated.

The other influences, such as price, store locator, time constraints, and brand, on the consumer's perception and purchasing intent, was not evaluated in this study. The survey was conducted in an artificial context and therefore it may limit the external validity. It is also uncertain whether the food product choice with or without (control) a nutritional claim in the survey, which was a milkshake, will be similar in a real-world setting with different products such as protein bars, wine, cereal, and other food products.

As this study's sample size does not represent the wider population of South Africa, care should be taken when generalising. Therefore, future research should be performed on a larger scale to include a wider range of consumers in South Africa, or the study should be region or store-specific.

3.1 Problem statement

We are what we eat, as the statistics of diabetes, raised blood pressure, obesity, cardiovascular diseases, and related NCDs deaths are evidence of this (World Health Organization (WHO), 2018). It is becoming increasingly important to evaluate what we eat due to the outbreak of the pandemic Coronavirus in 2019, as we need to build a strong immune system to fight against the virus. It is also important to improve the current lifestyle of South Africans to improve the cost and availability of health care. COVID-19 is driving the 'Food as Medicine' movement, as consumers will buy specific foods for specific health benefits or reduce the risk of diseases (Ift.org, 2021). This movement aims to teach people the power of food to enable them to identify foods that are nutritious and inform them on how food transforms and influences their health (Ift.org, 2021). As the 'Food as Medicine' movement encourages consumers to understand what they eat, it will become even more important to highlight health benefits on food labels to enable consumers to make healthier informed decisions.

3.2 Aim of Investigation

Food labelling provides information to consumers which may influence a consumer's purchasing decision, consumer behaviour, and lifestyle (Latiff *et al.*, 2016). The study aimed to evaluate the influence of the use of multiple nutritional claims on the South African consumers' perception and purchasing decisions of food products.

Objective one was to determine the food product label reading habits and the current nutritional knowledge of consumers. Objective two was to assess the importance of specific nutritional information and claims on food labels. Objective three was to ultimately conclude on whether more nutritional claims and ingredient claims influence a consumer's perception of a food product and the purchasing behaviour or intent.

3.3 Methodology and Materials

A purposely developed semi-structured questionnaire was randomly distributed via LinkedIn, Facebook, and Instagram and was completed on an online platform, REDCap: 10.6.28 (2021). The online questionnaire contained a mixed-method approach by using a qualitative and quantitative method design. The quantitative method design included hedonic scales and close-ended questions (deductive research), as well as the qualitative method design, included open-ended questions (inductive research). The open-ended questions were analysed by finding similarities and themes which were then coded in MS Excel and it was converted to quantitative data. This is a convergent mixed methods design as the study compared the findings from both qualitative and quantitative data sources (Wisdom & Creswell, 2013).

Participants were recruited with random, snowballing sampling (Naderifar *et al.*, 2017). The participants were required to be South African consumers who understand English. A minimum number of participants required was calculated with a confidence level of 95%, an error margin of 7%, and the 2021 South African Population of 60 million.

N = population size

e = Margin of error (percentage in decimal form)

z = Z-score

P = response distribution (50%)

$$Sample\ size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

$$Sample\ size = \frac{\frac{1.96^2 \times 0.5(1-0.5)}{0.07^2}}{1 + \left(\frac{1.96^2 \times 0.5(1-0.5)}{0.07^2 \times (6 \times 10^7)}\right)}$$

$$Sample\ size = 196$$

The semi-structured questionnaire consisted of five sections. Section one obtained basic information about the respondent for example their age, gender, and current diet. Section two analysed the respondent's personal preference and labels reading habits for example the first factor they evaluate before they decide to purchase a product. Section three evaluated the respondent's knowledge of nutritional information on the food label for example what they understand under the terms such as

organic and genetically modified foods (GM-foods). Section four evaluated whether consumers value certain nutritional information more than others. Section five evaluated the influence of more nutritional and ingredient claims on a respondent's perception and purchasing intent.

The semi-structured questionnaire went through rigorous review when it was constructed and was trailed before it was distributed.

Statistical analysis

The sample size of 205 South African consumers was obtained, with an error margin of 6.8% and a confidence level of 95%.

The quantitative data was analysed by using MS Excel to capture the data and STATISTICA 14: TIBCO Software Inc. (2020). *Data Science Workbench, version 14*. <http://tibco.com>. was used to analyse the data. The relation between nominal variables was investigated with contingency tables and the appropriate chi-square tests were used to determine the strength of agreement. This was used to evaluate the significant difference between the influence of nutritional information on a consumer's perception and the demographical, social, and behavioural factors. This was also used to determine the association between whether consumers have seen and actively sought nutritional logos and HLs before they purchase a food product. The relationships between continuous response variables and nominal input variables, such as the different diets, were analysed by using a one-way analysis of variance (ANOVA) with a confidence level of 95%. The differences were considered significant when the p -value was $p < 0.05$. The multiple comparisons test, namely Fisher Least Significant Difference (LSD) Method was done post hoc to determine where significant differences occurred among the levels of the age factor involved compared to the particular diet.

The qualitative data was analysed by using MS Excel to capture the data, where the open-ended questions were sorted by looking for similarities or differences, subsequently finding themes, and developing categories by coding.

3.4 Ethical consideration

The ethical considerations are classified as low-risk. The permission of the Research Ethics Committee at Social, Behavioural and Education Research (SBER) was obtained from Stellenbosch University (FESCAGRI-2021-21762) before the distribution of the purposefully developed online questionnaire. The respondents were able to free-willingly be entered into a lucky draw by adding their email address to one of the questions, to stand a chance to win one of five Checkers vouchers worth R250 each. The winners were randomly chosen via an online random number selector and the participants remained anonymous.

3.5 Results

The purposeful questionnaire's data were analysed to evaluate whether South African consumers' perceptions and purchasing decisions are influenced by the use of multiple nutritional claims. The

internal and external influences were evaluated and the effect these factors have on the consumer's perception and purchasing intent of a food product with nutritional claims compared to a product without nutritional claims.

3.5.1 Internal influences

The demographic factors of the participants varied as the ages ranged from 18 to 71 years (standard deviation = 13.11, mean = 37.40 years). The majority of the respondents were females (78.05%) and the majority of the participants noted their home language as Afrikaans (58.54%) and English (33.17%) (Table 4). Most of the respondents noted their highest level of education is a degree (37.07%), followed by a diploma (22.93%), grade 12 (20.98%), and a master's degree (13.17%) (Table 4).

The behavioural factors namely knowledge, interest, familiarity, and dietary habits were evaluated. The majority of the respondents mentioned that they don't count calories (83.41%) (Table 4). Only a few of the respondents noted that they follow a particular diet and most participants that follow a diet noted that they follow a Banting diet (25.00%), followed by a vegetarian (18.75%), vegan (9.38%), ketogenic (6.25%), and other diets (40.63%) (Table 4). The other participants noted that they followed a flexitarian diet, pescatarian, high protein, and low carbohydrate diet.

The social factors such as the physical activity level of the respondents indicated that the majority of the participants practised sport or exercise three to four times per week (33.66%) (Table 4). Cardiovascular exercises (running, jogging, rope jumping, and burpees) (31.69%) and walking (33.69%) were practised the most often (Table 4). This was followed by strength exercises (push-ups, sit-ups, and weight lifting) (18.58%), sports (swimming, dancing, cycling, tennis, football, rugby, and kickboxing) (9.84%), and flexibility (Pilates, yoga, stretching, and tai chi) (5.46%) (Table 4). The other sports or exercises that the participants practised were noted as aerobics, hiking, stair climbing, and full-body workouts.

The frequency table, Table 4, indicated the internal factors namely demographic, behavioural and social factors that influence a consumer's perception of the nutritional information of food labels. The variables are listed with the subdivisions and the frequency of the participants' choices with the percentages are listed. There was no significant difference between the influence (encourage, discourage, and not encourage nor discourage) of nutrient claims compared to ingredient claims on a consumer's perception ($p < 0.05$, degrees of freedom (df) = 4, $\chi^2 = 82.01$).

Table 4 Internal (demographical, social, and behavioural) factors of the participants that influence the consumer's perception

Variable	Frequency (n)	Percentage (%)
Gender		
Male	43	20.98
Female	160	78.05
Prefer not to say	2	0.98
Language		
Afrikaans	120	58.54
English	68	33.17
Xhosa	4	1.95
Other	13	6.34
Highest level of education		
Other	7	3.41
Grade 9	2	0.98
Grade 12	43	20.98
Diploma	47	22.93
Degree	76	37.07
Master's degree	27	13.17
Doctoral degree	3	1.46
Do they count calories		
Yes	34	16.59
No	171	83.41
Follow particular diet		
Yes	32	15.61
No	173	84.39
Particular diet		
Vegan	3	9.38
Other	13	40.63
Banting	8	25.00
Ketogenic	2	6.25
Vegetarian	6	18.75
Exercise frequency		
Never	22	10.73
Less Often	40	19.51
1 to 2 times a week	60	29.27
3 to 4 times per week	69	33.66
5+ times a week	14	6.83
Exercise type		
Cardiovascular	58	31.69
Walking	58	31.69
Strength	34	18.58
Sport	18	9.84
Flexibility	10	5.46
Other	5	2.73

A one-way ANOVA, with a standard error of 95%, was conducted to evaluate whether there is a significant difference between the particular diet and the age (years) of the participants (Figure 6). There was a significant difference between the two internal factors as $p=0.01331$ and $F=3.8516$ ($p<0.05$), therefore the null hypothesis was rejected and the age groups differ compared to the diet that the consumers follow. A Fisher's least significant difference (LSD) test was conducted to evaluate the extent of variation. Figure 6 indicates that the participants' age that follows the Banting

diet (a) (mean age=49.88 years) differs significantly from the age of the participants that follow the vegetarian diet (c) (mean age=29.50 years) and the vegan diet (bc) (mean age=31.00 years) respectively. The participants with an average age of 41.5 years follow the ketogenic diet (abc) and this does not differ significantly from any of the diets namely vegan (bc) (mean age=31.00 years), Banting (a) (mean age=49.88 years), vegetarian (c) (mean age=29.50 years), and other diets (ab) (mean age=41.77 years) (Figure 6).

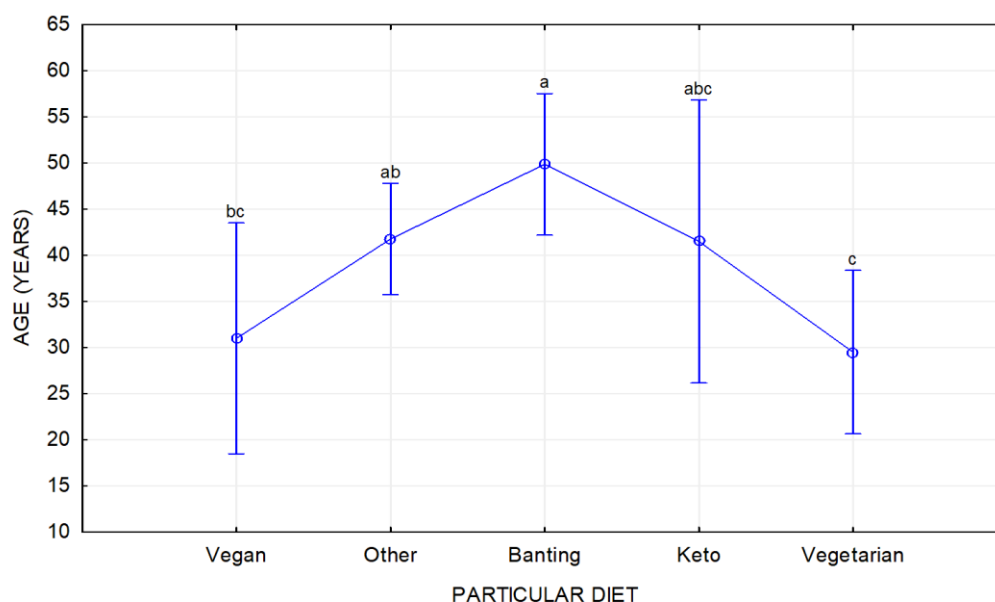


Figure 6 Fisher's LSD test which compares the particular diet to the age (years) of the participants.

Table 5 indicates the influence of the internal factors (demographical, social, and behavioural factors) compared to whether consumers are encouraged, discouraged, or neither encouraged nor discouraged to purchase a product with more nutrient content and ingredient claims respectively. The relation between nominal variables was investigated with contingency tables and appropriate chi-square tests were used to determine the strength of agreement. There was no statistically significant difference ($p > 0.05$) on whether more nutrient claims encourage, discourage, or neither encourage nor discourage a consumer for nutrient content claims compared to the demographical factors namely gender, language, education level, a particular diet, and the specific type of exercise they practice. There was also no significant difference ($p > 0.05$) between all the demographical factors and whether ingredient claims influence a consumer's perception. Whether more nutrient claims encourage, discourage, or neither encourage nor discourage a consumer is statistically significant for counting calories ($p = 0.03$, $p < 0.05$). Whether more nutrient claims encourage, discourage, or neither encourage nor discourage a consumer is statistically significant for how often a consumer exercises or practice a sport ($p = 0.01$, $p < 0.05$).

Table 5 The significance of the internal factors influences on the perception (encourage, discourage or not encourage nor discourage) of the respondents on more nutritional content and ingredient claims

Factors	Factor division	Nutrient content claims			Ingredient claims		
		Chi-square (χ^2)	df	p-value	Chi-square (χ^2)	df	p-value
Gender	Male	1.80	2	0.41	4.62	2	0.10
	Female						
Language	Afrikaans	6.29	4	0.18	5.08	4	0.28
	English						
	Xhosa						
	Other						
Level of education	Other	9.14	8	0.33	8.27	8	0.41
	Grade 9						
	Grade 12						
	Diploma						
	Degree						
	Master's degree						
Particular diet	Doctoral degree	3.04	4	0.55	1.69	4	0.79
	Vegan						
	Other						
	Banting						
	Ketogenic						
Count calories	Vegetarian	6.73	2	0.03*	3.31	2	0.19
	Yes						
Exercise frequency	No	19.01	8	0.01*	7.98	8	0.44
	1 to 2 times a week						
	3 to 4 times a week						
	5+ times a week						
	Less often						
What type of exercise	Never	13.63	10	0.19	17.39	10	0.07
	Cardiovascular						
	Flexibility						
	Sport						
	Strength						
	Walking						
	Other						

* Significant difference ($p < 0.05$)

The participants' nutritional knowledge and perception of nutritional terms were evaluated. The majority of the participants noted that they believe palm oil causes deforestation (39.02%) (Table 6), followed by those that believe it is not sustainable (15.61%) and is unhealthy (13.66%). Some of the respondents also noted that they don't know what it is (12.20%) and some also don't care about palm oil (9.27%), therefore it cannot influence their purchasing choice. The majority of the respondents also noted that organic means that it is chemical or pesticide-free (61.46%), followed by a safer product (12.68%), is environmentally friendly (11.22%) and is more nutritious (10.24%) (Table 6). More participants noted that they support GM-foods (44.34%) and they don't support Monosodium Glutamate (MSG) (32.68%). The reason for not supporting MSG, is because it is considered unhealthy (64.77%), followed by that it is perceived to be hazardous to one's health (19.32%) and not natural (10.23%) (Table 6). The majority of the consumers noted that they know what 'milk-free' means as they said it is the absence of cow's milk (87.32%). They also perceive sweeteners (63.41%) as more healthy compared to added sugar (36.59%). Only 47.80% of the participants were able to give an accurate definition of the term Nutrient Reference Value (NRV) (Table 6).

3.5.2 External influences

Various external factors influence the tendency of a consumer to read, analyse, and then make an informed decision on whether to purchase a specific food product.

Only 5.85% of participants said that they don't read labels of food products that they buy for the first time due to reasons such as time constraints, and lack of knowledge. They also noted that price is more important than the information provided on the label and they don't care about the nutritional information on the label of a food product. While, 16.10% of participants said that they don't read labels of food products that they've bought before due to routine food buying, followed by time constraints, inadequate knowledge to understand, price is more important and due to a lack of interest.

The majority of participants indicated that they trust all the information presented on food labels (39.51%), while the others noted that they don't trust all the information (29.27%) or that it depends on other factors (27.80%). The reason for the lack of trust was noted to be the brand type, ingredients listed, lack of regulation, nutritional information, price, and E-numbers.

The majority of the participants noted that the first factor they look at before purchasing a product is the price (47.80%), followed by the ingredient list (20.00%), manufacturing date, expiry or best before date (13.17%), nutritional table (12.20%), recipe suggestions (1.95%), allergens (1.95%), other label information (2.44%) and storage instructions (0.49%).

Table 6 Nutritional knowledge and perception of nutritional terms of the participants

Nutritional knowledge and perception of nutritional terms	Frequency (n)	Percentage (%)
Palm oil controversy		
Don't know what it is	25	12.20
Not sustainable	32	15.61
Causes deforestation	80	39.02
Violates human rights	5	2.44
Reduces product quality	14	6.83
Don't care	19	9.27
It is unhealthy	28	13.66
Illegal	1	0.49
Other	1	0.49
Organic meaning		
Chemical/ Pesticide-free	126	61.46
Safer product	26	12.68
More nutritious	21	10.24
Environmental friendly	23	11.22
Don't care	6	2.93
Other	3	1.46
Supporting of GM-foods		
Yes	91	44.39
No	81	39.51
Don't care	22	10.73
Don't know what GM-foods are	11	5.37
Supporting of MSG		
Yes	67	32.68
No	88	42.93
Don't care	26	12.68
Don't know MSG	24	11.71
Reasons supporting MSG		
Harmful if consumed in excess	13	19.40
Improves taste	43	64.18
Naturally present in foods	5	7.46
Improves texture	5	7.46
Other	1	1.49
Reasons not supporting MSG		
Hazardous to health	17	19.32
Not sure	2	2.27
Unhealthy	57	64.77
Not natural	9	10.23
Allergy	1	1.14
Other	2	2.27
Milk-free meaning		
Absence of cow's milk	179	87.32
Absence of alternative 'milk'	26	12.68
Sugar versus Sweeteners on health		
Added sugar	75	36.59
Sweeteners	130	63.41
Nutrient Reference Value (NRV) meaning		
Don't know	66	32.20
Provided accurate definition	98	47.80
Provided slightly accurate definition (not sure)	41	20.00

The importance of specific information on food labels and how often the participants look at the specific information was evaluated by obtaining the average values from the hedonic scale (1=Never, 2=Sometimes, 3=Often, 4=Always) (Figure 7). The Spider Plot, Figure 7, indicates the frequency of the type of information that the participants read or analyse before they purchase a food product for the first time. Participants indicated that they always look at the price (mean=3.571), and they often look at the expiry date or manufacturing date (mean=3.410), product picture (mean=3.200), ingredient list (mean=2.712), cooking instructions (mean=2.668), nutritional table (mean=2.610), product weight (mean=2.624), storage instructions (mean=2.546), and nutritional claims such as high in protein (mean=2.488). The participants sometimes look at HLs (mean=2.278), serving suggestion (mean=2.254), the origin of the product (mean=2.068), packaging composition (mean=1.995), and allergens (mean=1.976).

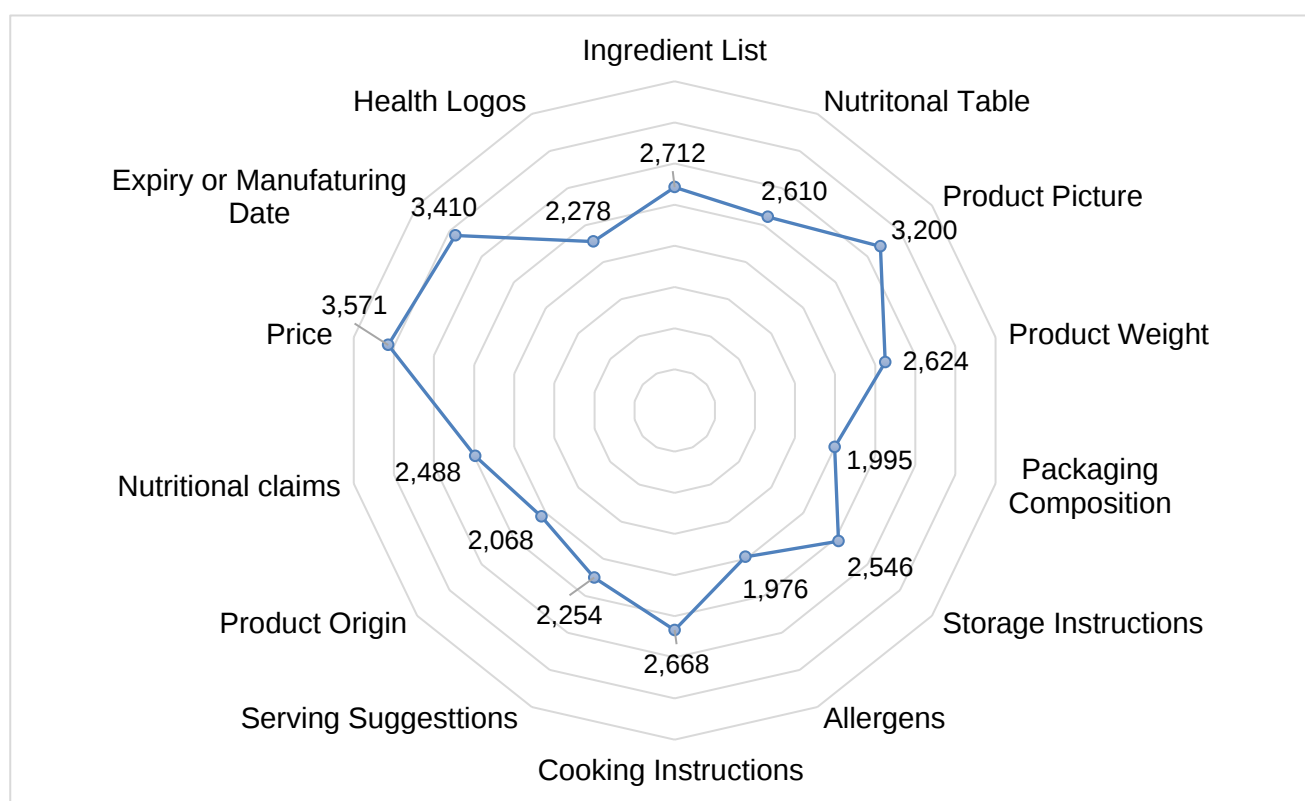


Figure 7 The average hedonic scale values (1=Never, 2=Sometimes, 3=Often, 4=Always) on the information that they read or analyse before they purchase a product for the first time.

The importance of various nutrient and ingredient attributes were evaluated where the average values of the hedonic scale were calculated (1=Not important, 2=Slightly important, 3=Important, 4=Very Important) (Figure 8). The Spider Plot, Figure 8, indicates the importance of specific nutrient and ingredient attributes and information on food labels. The majority of the food attributes were found to be slightly important, and the attributes that were found to be important are sugar-free (mean=2.746), high-in-dietary-fiber (mean=2.741), high-in-omega 3 or 6 (mean=2.722), high-in-protein (mean=2.620), added vitamins (mean=2.620), and no artificial colours, preservatives, flavours (mean=2.610), and. Egg-free (mean=1.483) was found to be not important at all by the participants.

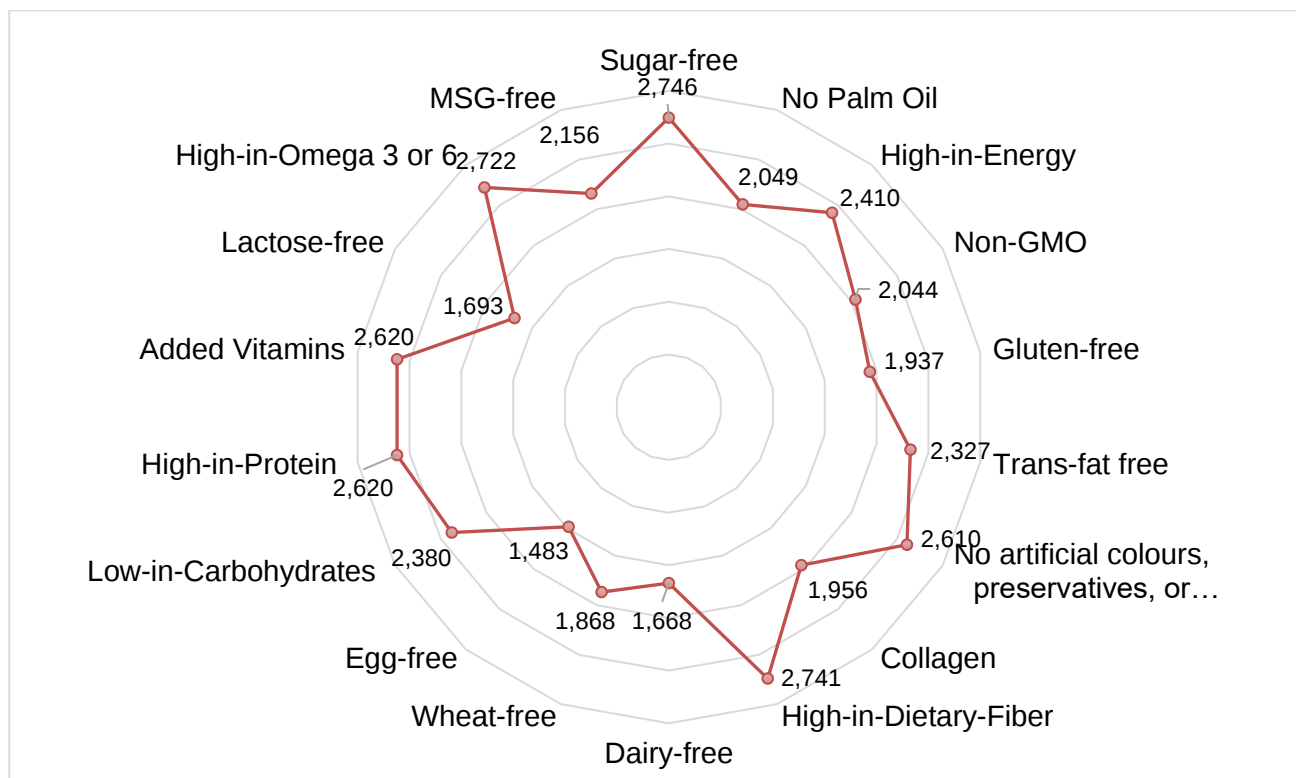


Figure 8 The average hedonic scale values (1=Not important, 2=Slightly important, 3=Important, 4=Very Important) on the importance of various nutrient and ingredient attributes.

Table 7 indicates the types of nutritional logos and HLs the consumers have seen before compared to whether they actively seek these nutritional logos and HLs before they purchase a food product. All the nutritional logos and HLs were found significantly different in terms of whether the consumers have seen the logos before and whether they actively look for the logos before they purchase a food product ($p < 0.01$). Consumers have seen the HLs before, but they don't necessarily seek the HLs before they purchase a food product. All the logos except GI Foundation SA (Graph) ($p = 0.002$) and Diabetes SA ($p = 0.004$) were statistically highly significant ($p < 0.001$). The GI Foundation SA (Round Logo) ($\chi^2 = 57.17$) has the highest Maximum Likelihood (ML) chi-square value, followed by the MTL ($\chi^2 = 44.25$) and RI ($\chi^2 = 33.69$). The ML technique aims to estimate the model and to test the hypotheses about these parameters (van Opheusden *et al.*, 2020). The MTL p -value of $p < 0.000$ translates to the ML ratio equal to 44.25, which suggests a very clear difference in whether the participants seek and see the HL named MTL.

Table 7 The types of nutritional logos and Health Logos (HLs) the consumers have seen before compared to whether they actively seek these nutritional logos and HLs before they purchase a food product

Type of nutritional logo and Health Logo (HL)	Logo	Factor division	ML Chi-square	p-value
Reference Intake (RI)		Seen Seek	33.69	0.000***
GI Foundation SA (Graph)		Seen Seek	9.88	0.002**
Multiple Traffic Light (MTL)		Seen Seek	44.25	0.000***
Warning Labels (WLs)		Seen Seek	22.85	0.000***
Nutri- Score		Seen Seek	18.16	0.000***
Diabetes SA		Seen Seek	8.16	0.004**
GI Foundation SA (Round Logo)		Seen Seek	57.17	0.000***

Eat Well Live Well		Seen	21.14	0.000***
		Seek		
Heart and Stroke Foundation SA		Seen	26.08	0.000***
		Seek		
None		Seen	0.01	0.94
		Seek		

* $p < 0.05$, $df=1$

** $p < 0.01$, $df=1$

*** $p < 0.001$, $df=1$

The consumers were asked whether they would consume a specific product without any nutritional claims and then they were asked whether they believe that the food product with nutritional claims is healthier than the food product without these claims. The two products were the same, but the second product contained HLs and nutritional information (nutrient content and ingredient claims) highlighted on the FOP and BOP. The below Stacked Column graph indicates the percentage of the consumers that noted that they believe the product is healthier due to the specific nutritional claims on the food product. Some respondents noted they would consume the food product without nutritional claims (40.49%). Sixty-six percentage (66.27%) of the respondents then noted that they believe that the product is now healthier because of the nutritional claims compared to the product without claims. The respondents were then further asked why they believe that the product with claims is healthier. They were then asked to select the reasons why they believe that the product with claims is healthier. The noted that it is due to the following claims: low-fat (40.98%), RI (26.34%), HSFSa (25.85%), Eat Well Live Well (23.90%), Diabetes SA (18.05%), GI Foundation (round logo) (18.05%), high in protein (16.59%), no-added preservatives (14.15%), very high in Vitamin C (13.17%), source of Vitamin B and Iron (11.71%), and vegetarian (4.39%) (Figure 9).

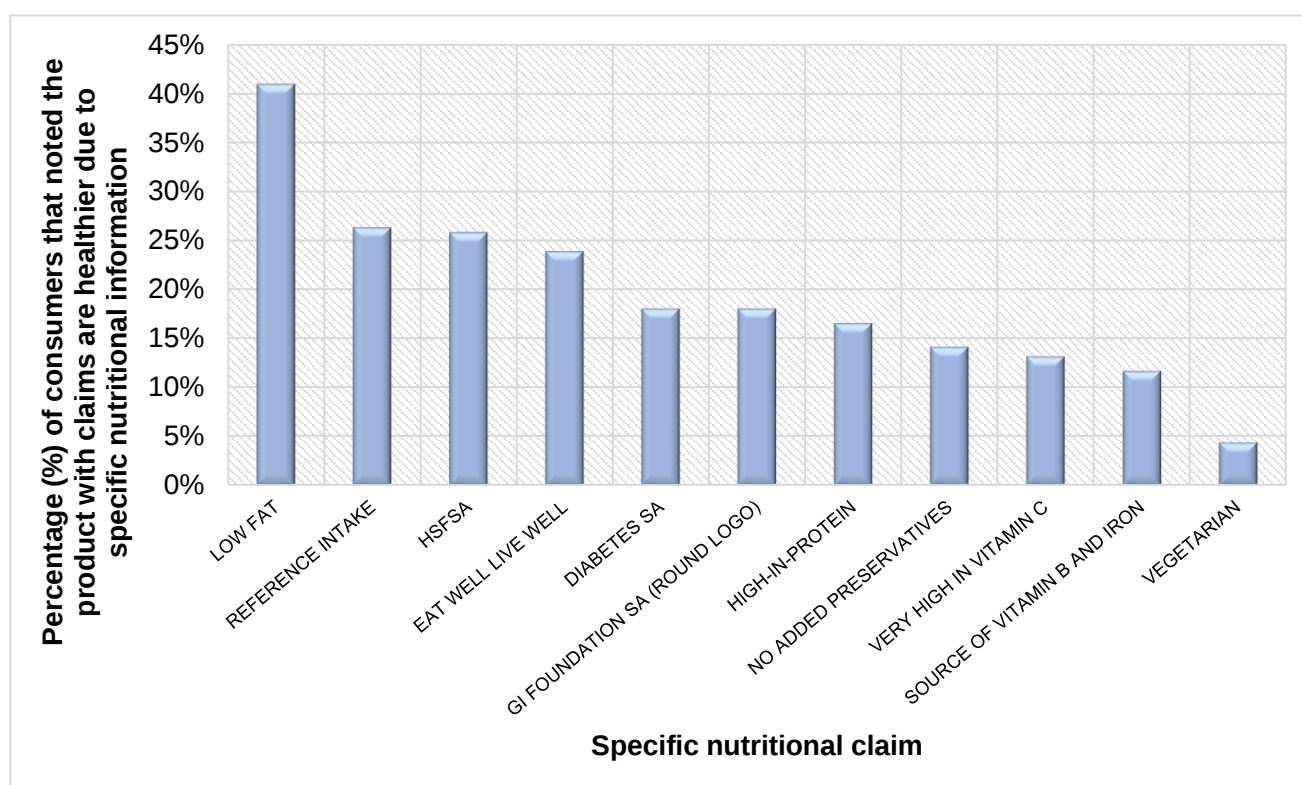


Figure 9 The specific nutritional claims why consumers (%) believe that a product with nutritional claims is healthier compared to a food product without nutritional claims and HLs.

3.6 Discussion

The study provided a holistic understanding of the influence of internal and external factors on consumers' perception of nutritional information and the influence their perception has on their purchasing choices of food products.

3.6.1 Internal influences

The internal influences are the (1) demographics (age, gender, marital status, language, and income); (2) situational factors (such as income, food cost, time constraints, and type of food product); (3) social (exercise options, dietary and body size norms, and level of education); and (4) behavioural influences (knowledge, attitude towards the processing of information, interest, understanding, and familiarity).

3.6.1.1 Demographic factors

Demographical factors may influence a consumer's tendency to use the information on a food label. There was no significant difference between the gender ($p=0.41$, $\chi^2= 1.80$) or language ($p=0.18$, $\chi^2= 6.29$) compared to whether consumers are encouraged, discouraged, or neither encouraged nor discouraged by more nutrient content claims (Table 5). There was also no significant difference between whether consumers are encouraged, discouraged, or neither encouraged nor discouraged by more ingredient claims compared to gender ($p=0.10$, $\chi^2= 4.62$) or language ($p=0.28$, $\chi^2= 5.08$) (Table 5). Therefore, the demographical factors do not influence the consumer's decision to buy products with more nutrient content and ingredient claims.

Although there was no significant difference between the language and the influence of more nutrient content and ingredient claims ($p>0.05$), the majority of the consumers in this study noted their home language is Afrikaans (58.54%) and English (33.17%) (Table 4). Therefore, it can be beneficial to study a larger population that includes more respondents from all eleven languages. The other languages that were noted were Sesotho, Gujarati, IsiZulu, Sepedi, Northern Sotho, and IsiNdebele. Although English is the sixth most common language spoken in households in South Africa, English is the most common language on food labels (Statista, 2021). Languages such as Portuguese, German, Arabic, and French can be found on food products in South Africa, but there is a lack of visibility of other African languages on food labels. This is due to the large exporting market of food products in South Africa. The inclusion of at least one of the South African languages should be investigated to ensure that South Africans understand the nutritional information and to encourage the consumption of healthier foods. As online shopping is also becoming more popular in South Africa, the option of multiple languages on the online stores should be addressed. This can reduce the language barrier and consequently improve the knowledge and understanding of nutritional information on food products.

3.6.1.2 Situational factors

A few consumers (5.85%) noted that they don't read labels of food products that they buy for the first time due to reasons such as time constraints, lack of knowledge, price is more important than the information provided on the label and they don't care. They also noted that price is more important than the information provided on the label and they don't care about the nutritional information on the label of a food product. While, 16.10% of participants said that they don't read labels of food

products that they've bought before due to routine food buying, followed by time constraints, inadequate knowledge to understand, price is more important and due to a lack of interest. Situational factors such as time constraints and the type of food product influence how a consumer evaluates a product. This is aligned with a study conducted by Fernandez *et al.*, (2012) that found that consumers only look at labels for less than four seconds and it was concluded that four seconds is insufficient to process information extensively. The limited time spent reading labels results in consumers that do not interpret the nutritional information and therefore they are not influenced by the nutritional information (Wansink *et al.*, 2003). Consumers can also do routine purchasing where they would not consciously read the label, as they have seen it before.

Although a lower percentage of participants in this study indicated that they don't read food labels, from the literature it is clear that consumers who experience time constraints or purchase products routinely, may tend to evaluate the FOP information to a lesser extent.

3.6.1.3 Social factors

Social factors such as physical activity level, type of sport or exercise participating in, dietary norms, and the level of education may influence the consumer's perception and the type of nutritional claims that a consumer actively looks for on a food product.

There was no significant difference between the consumers' highest level of education ($p=0.33$, $\chi^2= 9.14$) and whether consumers are encouraged, discouraged, or neither encouraged nor discouraged by more nutrient content claims (Table 5). There was also no significant difference between whether consumers are encouraged, discouraged, or neither encouraged nor discouraged by more ingredient claims compared to the consumers' highest level of education ($p=0.41$, $\chi^2= 8.27$) (Table 5).

The majority of the respondents exercise three to four times per week (33.66%) and the sport or exercise type that was the most practised were both cardiovascular exercises (36.69%) and walking (36.69%) (Table 4). There was no significant difference between the types of exercise and whether the consumers are encouraged, discouraged, or neither encouraged nor discouraged by more nutrient content claims ($p=0.19$, $\chi^2= 13.63$) and ingredient content claims ($p=0.07$, $\chi^2= 17.39$) (Table 5). There was also no significant difference between the frequency of exercise and whether the consumers are encouraged, discouraged, or neither encouraged nor discouraged by more ingredient claims ($p=0.44$, $\chi^2= 7.98$) (Table 5). A significant difference was found in how often consumers exercise and the influence of more nutrient content claims ($p=0.01$, $\chi^2= 19.01$) (Table 5). The consumers that exercise one to two times per week were found to be the most encouraged by more nutrient content claims (76.67%), compared to the other exercising frequency categories namely never (40.91%), less often (67.50%), three to four times per week (60.87%), and more than five times per week (71.43%). This may due to consumers that don't have enough time to exercise or practice a sport more often, therefore they will search for food products that assist them with maintaining their overall health such as "low, or virtually free or free from energy" or "kilojoule

controlled". Salazar *et al.* (2019) also noted that energy may be an important motive for exercisers to increase their energy and to maintain a specific level of energy while they exercise. Exercisers may also look for specific nutrients such as protein for muscle recovery after exercising and for muscle growth (Salazar *et al.*, 2019).

A significant difference was found between whether consumers are calorie conscious and the influence of more nutrient content claims ($p=0.03$, $\chi^2=6.73$) (Table 5). Both the groups, that count calories and don't count calories, are equally encouraged by more nutrient content claims (64.74%). Nevertheless, the consumers that don't count calories tend to be less discouraged by the nutrient content claims (1.75%) compared to consumers that count calories (11.76%). Therefore, a nutrient content claim will tend to negatively influence a calorie-conscious consumer more compared to a non-calorie-conscious consumer. This may be due to specific claims such as high in energy can be a decision-making factor when a food product is purchased. A consumer that feels they need energy will purchase the high in energy food product, but a calorie-conscious consumer may tend to not purchase the high in energy food product as they try to reduce their calorie intake. Van Kleef *et al.*, (2007) also noted that this may be due to a nutrient content claim such as high in energy that can inform consumers that they need to complete a specific physical activity level to burn the calories in the serving size.

The majority also noted that they don't follow a particular diet (84.39%) (Table 4). The participants that follow a particular diet noted that they follow a Banting diet (25.00%), followed by a vegetarian (18.75%), vegan (9.38%), ketogenic (6.25%), and other diets (40.63%) (Table 4). The other participants noted that they follow a flexitarian diet, pescatarian, high protein, and low carbohydrate diet. There was no significant difference in the particular diet the consumers followed and the influence (encourage, discourage, or neither encourage nor discourage) of more nutrient content ($p=0.55$, $p>0.05$) and ingredient claims ($p=0.79$, $p>0.05$) (Table 5). A study by Anastasiou *et al.*, (2019) noted that the results of a relationship between a particular diet and the use of a food label were inconsistent. This may be due to emerging diets such as the flexitarian diet, where a consumer occasionally includes meat or fish and doesn't specifically exclude any particular food groups.

The variance between the age groups and the consumers that follow a particular diet was evaluated (Figure 6). The Banting diet differs significantly from the age of the participants that follow the vegetarian diet and the vegan diet respectively ($p=0.01331$, $p<0.05$). The participants' age that follows the ketogenic diet (mean age=41.5 years) does not differ significantly from any of the diets namely vegan (mean age=31.00 years), Banting (mean age=49.88 years), vegetarian (mean age=29.50 years), and other diets (mean age=41.77 years). Evidence suggested that the low-carbohydrate high-fat (LCHF) diets, or known as the Banting diet may be an effective way to manage NCDs (Pujol-Busquets *et al.*, 2020). This is possibly why more of the consumers follow the Banting diet. This diet aims to assist weight loss and to improve the metabolic health of a consumer. The LCHF diet was established in the early 1970s as was first called the Atkins Diet and later on it

became more popular in the late 1990s. This diet of LFHC regained popularity in 2016 as the LCHF of Tim Noakes. The Banting diet is followed by slightly older consumers (mean age=49.88), whereas younger consumers followed the vegan (mean age=31.00) and vegetarian diet (mean age=29.50) (Figure 6). Younger consumers tend to follow the movements and trends quicker and the movement to plant-based is growing worldwide as the growth of the diet was 31.3% between 2017 and 2019 in the United States alone (Forgrieve, 2021). The majority of the participants (65.4%) indicated that they don't believe a food product that is labelled as 'vegan' or 'vegetarian' tastes worse than a food product that is not labelled 'vegan' or 'vegetarian'. The plant-based trend has already created a movement with manufacturers and retailers to add additional products that claim to be vegan or vegetarian and this is expected to grow in the coming years. The mean age group of each diet can assist manufacturers in the way they should promote the specific nutritional claims to their target market. This trend may be shifted with the progress and development of plant-based foods that encourage healthier food consumption and show alternative methods to prepare food to improve the taste. The health perception may influence consumers in the way they perceive labels and the type of claims they actively search for (Todd *et al.*, 2021).

Studies found that there is a positive correlation between the usage of health claims and individuals that have better education (Nocella & Kennedy, 2012). Nevertheless, participants that have a Master's or Doctoral level noted that they are struggling to interpret "scientific" words (Todd *et al.*, 2021). It has also been observed that individuals with better education have more knowledge on the interaction between disease and eating habits, thus they have a higher understanding of health-related claims (Ippolito & Mathios, 1991). Although the majority of the consumers obtained a degree as the highest level of education in this study (Table 4), there was no significant difference between the level of education and the influence of more nutrient content ($\chi^2= 9.14$, $p=0.33$, $p>0.05$) and ingredient claims ($\chi^2= 8.27$, $p=0.41$, $p>0.05$) (Table 5). Therefore, the level of education does not have a direct influence on the perception of multiple nutritional claims.

3.6.1.4 Behavioural factors

The behavioural factors (knowledge, attitude towards the processing of information, interest, understanding, and familiarity) that influences a consumer's perception were evaluated.

The consumers' nutritional knowledge and their perception of nutritional terms were also evaluated. The majority of the participants noted that they believe that palm oil causes deforestation (39.02%) (Table 6), followed by that they believe it is not sustainable (15.61%) and it is unhealthy (13.66%). Some of the respondents also noted that they don't know what it is (12.20%) and some also don't care about palm oil (9.27%), therefore it cannot influence their purchasing choice. The hedonic scale (1=Not important, 2=Slightly important, 3=Important, 4=Very Important) indicated that the factor will be increasingly important and increasingly a determining factor when a consumer needs to purchase a food product (Figure 8). The consumers also noted that palm oil as an ingredient is slightly important and this will not be the determining factor when a product is purchased

(mean=2.049) (Figure 8). Palm oil is generally perceived as an oil that is unsustainable due to deforestation and therefore manufacturers started to move away from palm oil or use Roundtable on Sustainable Palm Oil (RSPO). The certification body (RSPO) aims to make sustainable palm oil the norm and transform the market (RSPO.org, 2021).

The majority of the respondents also noted that the term organic is a product that is chemical or pesticide-free (61.46%), followed by a safer product (12.68%), environmentally friendly (11.22%), and more nutritious (10.24%) (Table 6). The consumers in the current study have knowledge of what organic is, but this study did not elaborate on the influence and importance of the organic claim. Harris *et al.* (2011) evaluated the consumers' willingness to purchase an organic food product and found that consumers are not willing to purchase a food product with the claim organic as it is too expensive.

More participants noted that they support GM-foods (44.34%) and they don't support MSG (32.68%). A study found that 48% of Americans don't perceive GM-food as a health risk and there is no difference between GM-foods and non-GM-foods. The study also found that consumers believe that GM-foods will increase the global food supply and may result in more affordable food prices and therefore consumers are more willing to accept GM-foods (Funk & Kennedy, 2016). The South African consumers may be gaining knowledge on GM-foods, which may result in the acceptance of GM-foods. The reasons they mentioned why they don't support MSG, is because it is unhealthy (64.77%), followed by that it is hazardous to one's health (19.32%) and not natural (10.23%) (Table 6). MSG is widely used as a food-additive in commercial foods to add to the Umami flavour and the over the last few years its application increased (Niaz *et al.*, 2018). Metabolic disorders, obesity, neurotoxic effects, Chinese Restaurant Syndrome, and detrimental effects on a consumer's reproductive organs were linked to MSG (Zanfirescu *et al.*, 2019). Therefore, as it's being used in more food products, it aligns with the consumers' perception that it is unhealthy and hazardous. Nevertheless, MSG also occurs in natural food products with a high protein content such as fish, meat, and vegetables (tomatoes, cheeses, algae, soy, and mushrooms) (Stańska & Krzeski, 2016; Butnariu & Sarac, 2019). Consumers should be informed of the maximum amount of MSG that can be consumed daily, to enable them to monitor their MSG intake and to maintain a healthy diet.

The consumer perceives sweeteners (63.41%) as more healthy compared to added sugar (36.59%). This may be due to the movement from sugary drinks to sugar-free drinks, and other processed foods that claim sugar-free. The Health Promotion Levy (HPL), otherwise known as the sugar tax, was implemented in South Africa in 2018 on sugary beverages (Diabetes South Africa., 2021). The tax is applied to the amount of sugar added to a sugary beverage. The first 4 grams per 100 ml are classified as levy free and afterward, every gram costs 2.1 cents in 2018 and 2019 2.21 cents (Diabetes South Africa., 2021).

The consumers' nutritional knowledge and their perception of nutritional terms may influence the tendency to seek and evaluate nutritional information, as consumers that actively seek attributes

such as MSG-free, GM-free, or sugar-free will specifically purchase a food product that does not contain, MSG, GMO, or added sugar.

Only 47.80% of the participants were able to give an accurate definition of the term NRV. The other consumers noted that they don't know what NRV is (32.20%) and the others provided an inaccurate answer (20.00%) (Table 6). Therefore, more than half of the consumers are not able to use the NRV to obtain information on how much of a food product contributes to their daily nutritional intake. Borra (2006) also found that consumers were aware of the information provided on food labels, but many were confused about the percentage Daily Value, which is similar to the NRV. Consumers need to be educated on nutritional terms to enable them to evaluate the nutritional information on a food product to make healthier, informed decisions. This is possible a starting point where manufacturers and retailers can inform consumers what NRV is and the benefits of understanding and utilising the term.

The attitude towards the processing of information and the familiarity was evaluated by indicating the types of nutritional logos and HLs that the consumers have seen before compared to whether the consumers actively seek these nutritional logos and HLs before they purchase a food product. The nutritional logos and HLs (RI, MTL, WLS, Nutri-Score, GI Foundation SA (Round Logo), Eat Well Live Well and HSFSA) were found highly significantly different in terms of whether the consumers seen the logos before and whether they actively look for the logo's before they purchase a food product ($p < 0.001$) (Table 7). The logos namely GI Foundation SA (Graph) and Diabetes SA were statistically significant ($p < 0.01$) (Table 7). Therefore, consumers have seen the nutritional and HLs, but they don't necessarily look for the logo before they purchase a food product, therefore the logo does not influence a consumer and it is not a determining factor for purchasing a food product. This may be due to time constraints, a lack of nutritional knowledge to associate a specific health benefit to an HL, and not being interested.

3.6.2 External influences

The external factors include the food label format and information, claim format, food fraud, and claim regulation, and brand and product attributes.

Consumers rarely take sufficient time to read, interpret and process nutritional claims on food products. The consumers were asked what attribute of a food product they look for, first before they decide to purchase a product. The majority of the participants noted that the first factor they look at the product price (47.80%), followed by the ingredient list (20.00%), manufacturing date, expiry or best before date (13.17%), nutritional table (12.20%), recipe suggestions (1.95%), allergens (1.95%), other label information (2.44%), and storage instructions (0.49%). This corresponds with how often consumers look at specific information of a product where the price was the looked at always (mean=2.571) (Figure 7). Jacobs *et al.* (2010) also found that consumers don't read food labels as product attributes such as price is more important than the nutritional content of food products. Consumers that focus on price should gain nutritional knowledge to choose a relatively high nutritional value food product at a relatively low cost (Jacobs *et al.*, 2010). Various other studies

also found that habitual consumers do not utilise food labels and they would likely be more concerned about the product price (Signal *et al.*, 2008; Jacobs *et al.*, 2010). Therefore, price and the affordability of food influence the consumer's perception and consequently dietary choices. This is evident in the study from Harris *et al.*, (2011) as consumers indicated that they are less willing to purchase a product with an organic claim as it is too expensive. Consumers should be educated on evaluating a food label to enable them to use the information provided and then choose a product with a relatively low price and relatively high nutritional value.

The current study found that consumers look at the expiry date more frequently, followed by the ingredient list and the nutritional information, which corresponds to the study of Jacobs *et al.* (2010). Consumers are more willing to read the ingredient list than the nutritional information. This may possibly be due to the dietary requirements and norms of consumers such as vegan, vegetarian, sugar-free, and other ingredients they exclude from their diets.

The label format and the interpretative aids such as colour may lead to a risk of excluding necessary nutritional information and this may then be less trusted by the consumer (Talati *et al.*, 2019). Consumers also find it difficult to interpret the NIP and they prefer nutritional information to be less complex and they prefer a single FOPLs on all food products, instead of various FOPLs currently on South African food labels (Koen *et al.*, 2018b). Thus, the use of one single FOPL can be more effective. Koen *et al.*, (2018b) found that South African consumers prefer simpler and understandable FOPLs with a clear indication of the link between a health benefit and a specific nutrient or ingredient. Consumers also prefer short and easy-to-read FOPLs with bold, bright colours (Koen *et al.*, 2018b). HLs can be one of the most effective FOPLs as it is a small, bright logo that is regulated and implemented by institutes such as HSFA, Diabetes South Africa, GI Foundation SA, and the Tiger Brands movement of Eat Well Live Well. The current study evaluated whether consumers have seen the nutritional logos and HLs before compared to whether they actively seek the nutritional logos and HLs before they purchase a food product. A cross-sectional exploratory study from Hutton and Gresse (2020) also investigated the perception of five FOPLs namely RI, MTL, Nutri-Score, health endorsement logo, and WLs. It was found that the health endorsement logo, which is similar to the HSFA logo, GI Foundation, Diabetes SA, and Eat Well Live Well, had the most positive responses (Hutton & Gresse, 2020). Whereas the RI logo had the most negative responses. The participants found that the RI logo is the most difficult to understand. Hutton and Gresse (2020) did not evaluate whether a consumer seeks the nutritional logos before the purchase a food product. The findings from Hutton and Gresse (2020) that note that the RI logo was found to be the most difficult, differs from the current study as the majority of the respondents have seen the RI before (78.02%) and 39.02% actively seek the RI before they purchase a food product. The current study also noted that the nutritional logos and HLs were found significantly different in terms of whether the consumers have seen the logos before and whether they actively seek the logos before they purchase a food product ($p < 0.01$). Although the consumers may know what the logo looks like as they prefer simpler and understandable logos, they don't actively look for any of the

logos before they purchase a food product. This may be due to inadequate nutritional knowledge on what the specific nutritional logos and HLs entails and the benefits it has on a consumer's health. A consumer should understand an HL to enable them to analyse the health benefits of the specific product. Therefore the consumers' nutritional knowledge and knowledge on what the specific logo entails should be improved. A lack of nutritional knowledge may decrease engagement with the information on food labels (Tod *et al.*, 2021).

A visual overload may also result in individuals not understanding the label and consequently, they might not purchase the specific product. Nevertheless, if the same product without a claim and with the same price is placed next to a product with a claim such as high in protein, it can influence the consumer's perception and purchasing intent through subconscious evaluation.

Less information on food labels seems to be more effective, but the majority of the respondents noted that they are mostly encouraged if there are more nutrient claims (65.37%) presented on a food label as well as when there is more ingredient claims (65.85%) present on a food label. The participants noted that they are encouraged by more nutritional claims, but this might be a problem for manufacturers due to space constraints on food labels and this can result in only specific nutritional information being presented on the packaging. The specific type of nutritional claims (nutrient content and ingredient) that is ideal for South African consumers should still be determined (Tod *et al.*, 2021). This study evaluated whether the consumer believes that a specific product with specific nutritional claims is healthier compared to the same product without the nutritional claims. The majority of the consumers (54.63%) noted that they believe the product with nutritional claims is healthier compared to the same product without nutritional claims. It was found that consumers believe that the product is healthier due to the importance of the nutritional information in the following descending order: low-fat, RI, HSFSa, Eat Well Live Well, Diabetes SA, GI Foundation (round logo), high in protein, no added preservatives, very high in vitamin C, source of vitamin B and Iron, and vegetarian that were mentioned on the product FOP and BOP label (Figure 9). This substantiates the finding that consumers have seen and sought the RI (seen before=79.02%, seek=39.02%) and the HSFSa (seen before=78.54%, seek=28.78%) more than other nutritional logos such as GI Foundation (round logo), Eat Well Live Well, and Diabetes SA. Most of the consumers noted that they believe the product is healthier due to it being low in fat. This corresponds to the study from Gorton *et al.* (2010) where the consumers also noted that a product stating 97% fat-free is healthy. Consumers will associate health with specific nutritional logos or information, for instance, if a consumer is calorie-conscious and only look at kilojoule-controlled food products and not at other nutritional information, it can influence their perception of nutritional information and their purchasing choice.

Consumers should be encouraged to read labels and to improve their nutritional knowledge, while the manufacturer should know the importance of specific claims, specific nutritional information on a food label, and the effect of the number of claims and information on the consumer's perception of purchasing decisions. Effective communication between the manufacturer and the consumers will

lead to clear, trustworthy nutritional information to hopefully direct the consumer towards healthier food choices. Nutritional claims and information on pre-packaged foods can be a cost-effective intervention to achieve the goals of the WHO for 2025 to improve the nutritional status of the population and to reduce NCDs and deaths (Department of Health, 2020). This information can be used by manufacturers and regulatory bodies to improve nutritional knowledge and communicate the importance of nutritional information on food labels to consumers to improve the efficiency of nutritional information. This may then enable a consumer to make an informed decision as they can interpret and understand specific nutritional information.

Chapter 4

Conclusions

Adapting food labels may seem like an easier intervention than the other interventions to reduce the prevalence of NCDs, however, this is challenging due to the internal and external influences of South African consumers. Improving the communication of nutritional information on food products is a much bigger intervention to reduce the prevalence of NCDs, as it requires all consumers to interpret and understand the nutritional information, to consequently make better food choices.

A consumer's choice of a food product can be subconsciously influenced by internal factors (demographical, situation, social, and behavioural factors) and external factors (label format and information, claim format, food fraud, regulation, brand, and product attributes). The results indicated that more nutrient claims and ingredient claims encourage the consumers to purchase a food product, but the consumers are not necessarily looking for HLs and other nutritional visual representations before they purchase a food product. There was a significant difference between the influence of more nutrient content claims on a consumer's perception, whether it encourages, discourages, or neither encourages nor discourages them, and the frequency of practicing a sport or exercise ($p=0.01$). as well as whether consumers count calories ($p=0.03$). The majority of the consumers have knowledge about health terms, but there was confusion regarding the term nutritional reference value (NRV) as only 47.80% were able to define the term correctly. The majority of the participants (54.63%) also noted that they believe the same product with nutritional claims is healthier than the same product without nutritional claims. It was found that they believe it is more healthy because of the low-fat claim, followed by the Reference Intake, Heart and Stroke Foundation South Africa (HSFSA), Eat Well Live Well, Diabetes SA, GI Foundation (round logo), high in protein, no added preservatives, very high in vitamin C, source of vitamin B and Iron, and vegetarian.

This study and the findings may assist food manufacturers to develop food labels that will communicate accurate information, differentiate and promote the brand values by adding nutritional claims to encourage consumers to purchase healthier food products. Effective communication can lead consumers that have nutritional knowledge to consequently make healthier, informed food choices and assist with achieving the nutritional goals and reduce the prevalence of NCDs.

Recommendations

Consumer perception and claims effectiveness need to be analysed in observational studies where time constraints during the purchasing process are analysed. Future studies should focus on a specific product category and a specific target consumer such as on-the-go protein bars to evaluate the perception of consumers on convenient food products with nutritional claims.

Further research should incorporate observational studies to observe the attitude and processing of the nutritional information on food labels in a real-life environment such as supermarkets or grocery stores. Further research can also be done with an observational study in South Africa on the inclusion of the most effective claims to observe the maximum amount of effective claims in a specific time frame that consumers look at food labels.

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Addendum A: Questionnaire

Do a lot of claims on food products influence your purchasing choice?

Dear Prospective Participant

My name is Anri van Wyk, a postgraduate researcher at Stellenbosch University. I would like to invite you to participate in a questionnaire, contributing towards the completion of my research project.

This questionnaire will take approximately 20-25 minutes to complete. It will contain a combination of questions that are in line with the purpose of this study. The purpose is to evaluate the influence of multiple nutritional claims on consumers' perception and purchasing decisions of food products.

Your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way. You are also free to withdraw from the study at any point, even if you agree to participate.

You can enter into a lucky draw by providing your email address. All email addresses will remain confidential and will not be included in the dataset or the report. Please note that you are required to complete the questionnaire to be entered into the lucky draw.

RIGHTS OF RESEARCH PARTICIPANTS:

You have the right to decline to answer any questions. You can exit the survey at any time without giving a reason. You are not waiving any legal claims, rights, or remedies because you participate in this research study. If you have questions regarding your rights as a research participant, contact [REDACTED] at the Division for Research Development.

Your information and response to the survey will be protected by double authentication of passwords as online storage will be utilized.

If you have any questions or concerns about the research, please contact the researcher Anri van Wyk, on [REDACTED] and/or the supervisor, Dr. M Krügel on [REDACTED]

Please print-screen and save the text as a PDF document to save a copy of this text.

I agree to take part in this survey.	☐ Yes ☐ No
I confirm that I have read and understood the information provided for the current study.	☐ Yes ☐ No
Indicate your level of English proficiency?	☐ No Proficiency (Cannot speak, understand, read, write and comprehend) ☐ Beginner (Simple communication) ☐ Early Intermediate (Varied communication) ☐ Intermediate (Can communicate, but needs support) ☐ Fluent (Speak, understand, read, write and comprehend English with no trouble) ☐ Advanced (Communicates in complex situations)
Choose which nationality and residency scenario describes yours best:	☐ South African citizen and currently living in South Africa ☐ South African citizen and currently NOT living in South Africa ☐ Not a South African citizen, only here for traveling or business ☐ Not a South African citizen and not currently a visitor in South Africa
What is your home language?	☐ English ☐ Afrikaans
Choose the language that you speak the majority of the time.	☐ Xhosa ☐ Other

Clarify the 'OTHER' home language

What is your gender?

☐ Female
☐ Male
☐ Prefer not to say

What is your age?

What is your highest level of education?

Choose one of the following.

☐ Never attended School
☐ Primary School
☐ Grade 9
☐ Grade 12
☐ Diploma
☐ Degree
☐ Master's degree
☐ Doctoral degree
☐ Other

Clarify 'OTHER' level of education

Do you follow a particular diet currently?

☐ Yes
☐ No

What particular diet do you follow currently?

Choose one of the following.

☐ Vegetarian
☐ Vegan
☐ Banting
☐ Keto
☐ Other

Clarify what 'OTHER' diet/s you follow currently.

Do you count calories or kilojoules (kJ) to monitor your energy intake?

☐ Yes
☐ No

How often do you practice a sport or take exercise per week?

☐ Never
☐ Less often
☐ 1 to 2 times a week
☐ 3 to 4 times a week
☐ 5+ times a week

Which type of sport or exercise do you participate in most often?

Choose one of the following options.

☐ Cardiovascular (running, jogging, rope jumping, burpees)
☐ Strength (push-ups, sit-ups, weight lifting)
☐ Sport (swimming, dancing, cycling, tennis, football, rugby, kickboxing)
☐ Flexibility (Pilates, yoga, stretching, tai chi)
☐ Walking
☐ Other

Clarify the 'OTHER' type of sport or exercise

SECTION 2: Personal preferences and label reading habits

Do you actively seek health benefits from foods, before you buy a food product?

Choose one of the following.

*Health benefits are the positive effects that food has on your health.

- ☐ Yes, I actively seek out foods or follow a diet for health benefits
☐ Somewhat, I try to eat healthy in general
☐ No, health benefits are not a factor in my food choices

What is the FIRST FACTOR you look at before you decide to buy a food product?

Choose one of the following options.

- ☐ Ingredient list
☐ Price
☐ Manufacturing date, expiry date, or best before
☐ Nutritional table
☐ Recipe suggestions
☐ Storage instructions
☐ Allergens/warnings about the health risk
☐ Other

Clarify the 'OTHER' factors you first look at before you decide to buy a food product.

Do you read the labels of food products that you have bought before?

- ☐ Yes
☐ No
☐ Sometimes

Why don't you read food labels of food products that you have bought before?

Choose one of the following.

- ☐ Routine food buying
☐ Price is more important
☐ Time constraints (It takes too long)
☐ I don't care
☐ Don't have enough knowledge to understand
☐ It's too complex
☐ Other reasons

Clarify the 'OTHER' reasons why you don't read food labels that you have bought before.

The below picture is an example of a Front-of-Pack label with the name, description, volume, pictorial representations, or other claims on the front side that faces the consumer in a retail store.



The above picture is an example of a Front-of-Pack Label.

How often do you read the Front-of-Pack label before buying a food product that you have bought before?

- ☐ Never
- ☐ Sometimes
- ☐ Often
- ☐ Always

The below picture is an example of a Back-of-Pack label with the nutritional information (Energy (kJ)), Protein content, Fat et cetera), storage instructions, and ingredient list.

The Back-of-Pack label does not face the consumer in a retail store and the consumer needs to move/turn around the food product to see this information.



The above picture is an example of a Back-of Pack Label.

How often do you read the Back-of-Pack label before buying a food product that you have bought before?

- ☐ Never
- ☐ Sometimes
- ☐ Often
- ☐ Always

Do you read the labels of food products that you buy the FIRST time?

- ☐ Yes
- ☐ No
- ☐ Sometimes

Why don't you read food labels of food products that you buy for the FIRST time?

Choose one of the following.

- ☐ Price is more important
- ☐ Time constraints (It takes too long)
- ☐ I don't care (Lack of interest)
- ☐ Don't have enough knowledge to understand
- ☐ It's too complex
- ☐ Other reasons

Clarify the 'OTHER' reasons why you don't read food labels when you buy it for the FIRST time.

The below picture is an example of a Front-of-Pack label with the name, description, volume, pictorial representations, or other claims on the front side that faces the consumer in a retail store.



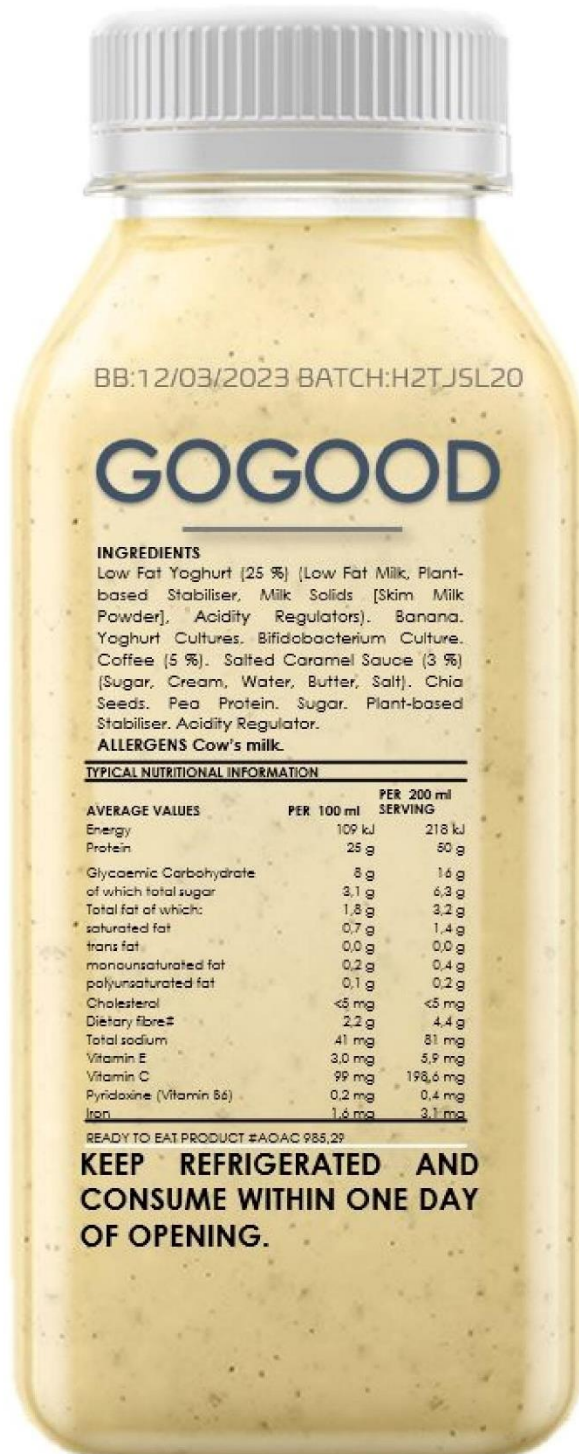
The above picture is an example of a Front-of-Pack Label.

How often do you read the Front-of-Pack label before buying a food product for the FIRST time?

- ☐ Never
- ☐ Sometimes
- ☐ Often
- ☐ Always

The below picture is an example of a Back-of-Pack label with the nutritional information (Energy (kJ), Protein content, Fat et cetera), storage instructions, and ingredient list.

The Back-of-Pack label does not face the consumer in a retail store and the consumer needs to move/turn around the food product to see this information.



The above picture is an example of a Back-of Pack Label.

How often do you read the Back-of-Pack label before buying a food product for the FIRST time?

- ☐ Never
- ☐ Sometimes
- ☐ Often
- ☐ Always

How often do you read/ view the following information on the food product's packaging before you buy it for the FIRST time?

	Never	Sometimes	Often	Always
Ingredient list	☐	☐	☐	☐
Nutritional table (indicate the energy, protein, fat, sodium et cetera)	☐	☐	☐	☐
Picture on packaging	☐	☐	☐	☐
Product weight	☐	☐	☐	☐
Packaging composition (whether it is recyclable)	☐	☐	☐	☐
Storage instructions	☐	☐	☐	☐
Allergens	☐	☐	☐	☐
Cooking instructions	☐	☐	☐	☐
Serving suggestions	☐	☐	☐	☐
Origin of the product	☐	☐	☐	☐
Claims (such as high-in-protein, reduced sugar, low carbohydrates et cetera)	☐	☐	☐	☐
Price	☐	☐	☐	☐
Expiry date/ Best Before date/ Sell by date	☐	☐	☐	☐
Health logos (below are examples such as Heart and Stroke Foundation, Glycaemic Index Foundation, Diabetes SA, Eat Well Live Well)	☐	☐	☐	☐

Examples of Health Logos



SECTION 3: General label and ingredient knowledge

Palm oil is generally used in food products, but there is a big controversy around palm oil. Why would you believe there is a controversy?

Choose one of the following.

- ☐ It is unhealthy
- ☐ Causes deforestation/ loss of habitats
- ☐ Violates human rights
- ☐ Reduces the quality of the product
- ☐ It is illegal
- ☐ It is not sustainable
- ☐ I don't know what palm oil is
- ☐ I don't care
- ☐ Other

Clarify the 'OTHER' reasons why you believe there is a controversy on palm oil?

What does 'organic' mean to you?

Choose the box that you feel applies.

- ☐ Chemical/ Pesticide-free
- ☐ Product is safer
- ☐ Better for the environment
- ☐ More nutritious
- ☐ I don't care
- ☐ I don't know what it means
- ☐ Other

Clarify what 'OTHER' understanding you have regarding organic.

Are you supporting the idea of Genetically-Modified foods (GM-foods/ GMO-foods)?

- ☐ Yes
- ☐ No
- ☐ I don't know what GM-foods/ GMO-foods are
- ☐ I don't care about it

Are you supporting the idea of Monosodium Glutamate (MSG) as an added ingredient in food products?

- ☐ Yes
- ☐ No
- ☐ I don't know what MSG is
- ☐ I don't care about it

Choose one of the most important reasons why you are supporting MSG as an added ingredient in food products.

- ☐ It improves the texture of food
- ☐ It improves the taste and flavour of food
- ☐ It's naturally present in tomatoes, peas, and other foods, therefore it is healthy
- ☐ It's only harmful if you consume it in excess amounts
- ☐ Other reasons

Clarify the 'OTHER' reasons why you support MSG as an added ingredient in food products.

Provide a reason why you are not supporting MSG as an added ingredient in food products.

What do you believe is meant by 'milk-free'?

Choose the box that you feel is the most important.

- ☐ Absence of alternative 'milk' derived from plants, such as rice, almond, or soya
- ☐ Absence of cow's milk in any form

It is important for me to increase my protein intake.

- ☐ Yes
- ☐ No

What would the most important reason be to choose a food product that has a high-in-protein claim?

Choose one of the following.

- ☐ Build muscles
 - ☐ Because I like it
 - ☐ Muscle recovery
 - ☐ Gives me energy
 - ☐ Convenience (practical, easy to carry and store)
 - ☐ Satiating effect of protein
 - ☐ Natural content (natural or organic)
 - ☐ The packaging is appealing
 - ☐ Social image (because it's trendy or my friends like it)
 - ☐ This is what I usually eat
 - ☐ It is affordable
 - ☐ Other
-

Clarify the 'OTHER' reasons you buy food products that claim to be high-in-protein.

Dietary fiber is important for my health.

- ☐ Yes
 - ☐ No
-

Why would you consume more dietary fiber?

Choose the box that you feel is the most important.

- ☐ Helps with weight management
 - ☐ Prevents diabetes
 - ☐ Improves the texture/taste of food products
 - ☐ Improves digestion
 - ☐ Prevents overeating
 - ☐ Prevents colorectal cancer
 - ☐ Other
-

Clarify what 'OTHER' reason you have for consuming more dietary fiber.

Do you believe protein bars/cereal bars are HEALTHIER than chocolates?

- ☐ Yes, it contains protein that has various health benefits
 - ☐ No, the amount of sugar is the same in protein/cereal bars and in chocolates
 - ☐ No, there is more sugar in protein/cereal bars than in chocolates
 - ☐ Sometimes, it depends on the other ingredients
 - ☐ Sometimes, because of other reasons
-

Clarify what 'OTHER' reasons why you believe protein/cereal bars are sometimes HEALTHIER than chocolates.

Which do you consider to be healthier?

- ☐ Added sugar
 - ☐ No sugar, but added sweeteners (such as sucralose, aspartame etcetera)
-

Do you believe that a food product that is labeled as 'vegan' or 'vegetarian' tastes worse than a food product that is not labeled as 'vegan' or 'vegetarian'?

- ☐ Yes
 - ☐ No
-

What do you understand under the term 'Nutrient Reference Value percentage (NRV %)?

SECTION 4: Importance of claims on food labels

Do you trust all the information on food labels?

- ☐ Yes
- ☐ No
- ☐ It depends
- ☐ I don't read food labels

What influences your trust in the information on food labels?

Choose the box that you feel is the most important.

- ☐ Brand
- ☐ Price
- ☐ Origin of the product
- ☐ Ingredients listed
- ☐ E-numbers in ingredients
- ☐ Nutritional information
- ☐ It is not properly regulated
- ☐ Other

Clarify what 'OTHER' factors influence your trust in the information on food products.

Do you believe that claims (such as high-in-protein and source of vitamins) on food labels are advantageous?

- ☐ Yes
- ☐ No

Rate the following phrases or components based on how you would answer the following statement:

To what extent are the following claims on food labels important to you?

	Not important	Slightly important	Important	Very important
No added sugar (sugar-free)	☐	☐	☐	☐
No palm oil	☐	☐	☐	☐
High-in-energy	☐	☐	☐	☐
Non-GMO	☐	☐	☐	☐
Gluten-free	☐	☐	☐	☐
Trans fat-free	☐	☐	☐	☐
No artificial colours, preservatives, flavours	☐	☐	☐	☐
Contains collagen	☐	☐	☐	☐
High-in-dietary fiber	☐	☐	☐	☐
Dairy-free	☐	☐	☐	☐
Wheat-free	☐	☐	☐	☐
Egg-free	☐	☐	☐	☐
Low in carbohydrates	☐	☐	☐	☐
High-in-protein	☐	☐	☐	☐
Added vitamins	☐	☐	☐	☐
Lactose-free	☐	☐	☐	☐
High-in-Omega 3 or 6	☐	☐	☐	☐
MSG-free	☐	☐	☐	☐

The below images are required to answer the following questions:



Which of the nutritional logos/information formats have you seen before on food labels?

- ☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ I have not seen any of the logos before

The below images are required to answer the following questions:



Which of the above logos do you specifically search for before you buy a food product?

- ☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ I have not seen any of the logos before
☐ None

SECTION 5: Consumer preference

Do more NUTRIENT claims (such as high-in-protein/high-in-energy) encourage or discourage you to buy a food product?

- ☐ Encourage
☐ Discourage
☐ Neither

Why are you not either encouraged nor discouraged by more NUTRIENT claims?

- ☐ I don't look for claims when I'm purchasing food products
☐ I don't care about claims
☐ Other

Clarify 'OTHER' reasons why you are neither encouraged nor discouraged by more NUTRIENT claims?

Why do more NUTRIENT claims ENCOURAGE you to buy a food product?

Choose one of the following.

- ☐ I read and understand the claims and the benefit of the claims on my health
☐ It helps me to make better (healthier) food choices
☐ I look for specific benefits and attributes (such as high in protein)
☐ Other

Clarify 'OTHER' reasons why you are ENCOURAGED to buy a food product with more NUTRIENT claims.

Why do more NUTRIENT claims, on one food label, DISCOURAGE you to buy a food product?

Choose one of the following.

- ☐ I don't get time to read and understand all the information on the packaging
☐ It confuses me
☐ I don't look at the claims/statements on labels before I purchase food products
☐ I only care about the price/affordability
☐ I only buy what I usually buy
☐ Other

Clarify 'OTHER' reasons why you are DISCOURAGED to buy a food product with more NUTRIENT claims.

Do more INGREDIENT claims (such as sugar-free, reduced salt, palm oil-free, and lactose-free) encourage or discourage you to buy a food product?

- ☐ Encourage
☐ Discourage
☐ Neither

Why are you not either encouraged nor discouraged by more INGREDIENT claims?

- ☐ I don't look for claims when I'm purchasing food products
☐ I don't care about claims
☐ Other

Clarify 'OTHER' reasons why you are neither encouraged nor discouraged by more INGREDIENT claims?

Why do more INGREDIENT claims ENCOURAGE you to buy a food product?

Choose one of the following.

- ☐ I read and understand the claims and the benefit of the claims on my health
☐ It helps me to make better (healthier) food choices
☐ I look for specific benefits and attributes (such as high in protein)
☐ Other

Clarify 'OTHER' reasons why you are ENCOURAGED to buy a food product with more INGREDIENT claims.

Why do more INGREDIENT claims, on one food label, DISCOURAGE you to buy a food product?

Choose one of the following.

- ☐ I don't get time to read and understand all the information on the packaging
- ☐ It confuses me
- ☐ I don't look at the claims/statements on labels before I purchase food products
- ☐ I only care about the price/affordability
- ☐ I only buy what I usually buy
- ☐ Other

Clarify 'OTHER' reasons why you are DISCOURAGED to buy a food product with more INGREDIENT claims.

The below image is required to answer the following questions:



Would you consume the above product of the 'Salted Caramel and Coffee Milkshake' for specific health reasons?	☐ Yes ☐ No ☐ Not sure
Why would you consume the specific food product for health benefits? Choose the box that you feel is the most important.	☐ High in sugar for energy ☐ Coffee contains antioxidants, which are good for you ☐ Milk contains calcium and protein ☐ Other reasons
Clarify 'OTHER' reasons why you would consume this product for health benefits.	_____
Why would you NOT consume the specific food product for health benefits? Choose the box that you feel is the most important.	☐ High in Sugar ☐ Contains caffeine from coffee ☐ Fat content is too high ☐ Salt content is too high ☐ Other reason
Why are you not sure whether you would consume the above product of the 'Salted Caramel and Coffee Milkshake' for specific health reasons?	_____
Clarify 'OTHER' reasons why you would not consume this food product for health benefits.	_____

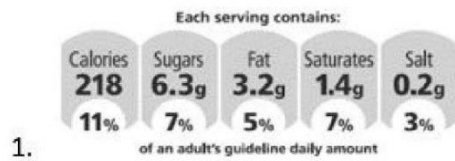
The below image is required to answer the following questions:



Do you believe that the 'Low fat salted caramel and coffee milkshake' is healthier than the previous 'Salted caramel and coffee milkshake'?

☐ Yes
☐ No

The below images are required to answer the following questions:



Why would you say is the 'Low fat salted caramel and coffee milkshake' healthier than the previous 'Salted caramel and coffee milkshake'?

The above health logos on the food label are listed. Please choose the health logos that you feel make this food product healthier.

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ None

Why would you say is the 'Low fat salted caramel and coffee milkshake' healthier than the previous 'Salted caramel and coffee milkshake'?

Choose the claims that you feel make this food product healthier.

- ☐ Low fat
- ☐ Very high in Vitamin C
- ☐ High-in-protein
- ☐ Source of Vitamin B and Iron
- ☐ No added preservatives
- ☐ Vegetarian
- ☐ Other reasons
- ☐ None of these reasons

Clarify 'OTHER' reasons why you would consume this product for health benefits.

Why would you say the 'Low fat Salted caramel and coffee milkshake' is NOT healthier than the previous 'Salted caramel and coffee milkshake'?

Hereby, if you say 'YES', you are willing to enter your email address to enter the lucky draw to stand a chance to win one of 5 Checkers vouchers worth R250 each.

- ☐ Yes
- ☐ No

Please enter your email address

Note that the email address will only be used for the purpose of communication if you have won the lucky draw and the email address will not be used in the report.

Addendum B: Survey Flyer

HAVE YOUR SAY!

Do a lot of claims on food products influence your purchasing choice?
Take part in the survey!
Complete the survey and stand a chance to win!

WIN!
One of 5 Checkers vouchers
worth R250 each

Duration:
±20-25 minutes

Complete the survey online!

SCAN THE CODE!



OR CLICK HERE TO BEGIN THE SURVEY
<https://redcap.sun.ac.za/surveys/?s=XJDARTCDXD>

From:
14 June 2021 – 23 July 2021

Please note that you can complete this survey anonymously

