

Adult consumers' understanding and use of information on food labels: a study among consumers living in the Potchefstroom and Klerksdorp region

S. A. Jacobs

13024787

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Supervisor: Dr. H. De Beer
Co-supervisor: Ms. M. Larney

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YUNIBESITHI YA BOKONE-BOPHIRIMA
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ABSTRACT

Introduction: A need exists to assist South Africans to make better informed food choices. The food label has the potential to assist consumers during food purchasing; however, consumers should be able to understand and use the information provided on food labels. **Objective:** To investigate adult consumers' understanding regarding the information on food labels and to determine whether they use the information on food labels in making food choices. **Design:** A cross-sectional and descriptive research approach was followed and data were collected by means of questionnaires. Combined stratified and judgemental sampling methods recruited 174 respondents involved in the purchasing of household food products. **Setting:** Selected supermarkets in Potchefstroom and Klerksdorp in the North West Province, South Africa, were targeted. **Subjects:** Consumers of African descent and Caucasian consumers, 18 years or older, who are involved in the purchasing of household food products. **Results:** Information mostly used on food labels includes the expiry date, ingredient list and nutritional information, such as fat and cholesterol content. Consistently, greater use of "low in fat" and "low in cholesterol" nutrient content claims were cited. Difficulties associated with food labels were mainly indicated as the font size of the print, whereas reasons for not reading food labels were related to product attributes, demographic characteristics and situational factors. **Conclusions:** Findings indicate that the food choices of the majority of respondents who read food labels are influenced by the information on the food label, although respondents' understanding of the information revealed an inability to apply food label information to make food choices. Reasons for not reading food labels included opinions like the "taste and price are more important than the nutritional content of the food product", "experiencing time constraints", and "lack of education and nutritional knowledge". This study highlighted barriers in consumers' understanding and use of information on food labels. Improvements to the current food labels in South Africa are suggested, as well as guidelines for consumer education regarding the use of food labels.

Key words: Consumer; food label; understanding; use

OPSOMMING

Inleiding: 'n Behoeft bestaan om Suid-Afrikaners te help om beter ingeligte voedselkeuses te maak. Die voedsel etiket het die potensiaal om verbruikers te help tydens voedselaankope, alhoewel verbruikers in staat moet wees om die inligting op die etiket te verstaan en te gebruik.

Doelwit: Om volwasse verbruikers se begrip rakende die inligting op voedsel etikette te ondersoek, asook om te bepaal of verbruikers die inligting op voedsel etikette gebruik om voedselkeuses te maak. **Ontwerp:** 'n Deursnee en beskrywende navorsingsbenadering is gevolg en data is met behulp van vraelyste ingesamel. □

Gekombineerde gestratifiseerde en oordeelkundige streekproefmetode is gebruik om 174 respondente wat by voedselaankope vir huishoudings betrokke is te kies. **Omgewing:** Geselekteerde supermarkte in Potchefstroom en Klerksdorp in die Noordwes provinsie in Suid-Afrika is geteiken. **Streekproef:** Nie-blanke en blanke verbruikers van 18 jaar of ouer, wat by voedselaankope vir huishoudings betrokke is, is gebruik. **Resultate:** Daar is gevind dat die verval datum, die bestanddele lys en nutriënt inligting op voedsel etikette soos vet en cholesterol, die meeste gebruik word. Ooreenstemmend hiermee is gevind dat nutriënt inhoud aansprake soos “laag in vet” en “laag in cholesterol” meer dikwels gebruik word. Die skrif grootte van die inligting op die voedsel etiket is as □

struikelblok vir etiket gebruik uitgewys, terwyl produk verwante faktore, demografiese eienskappe en omstandigheds faktore redes was waarom verbruikers nie voedsel etikette gebruik nie. **Gevolgtrekking:** In die algemeen is daar gevind dat voedselkeuses van die meerderheid respondente wat etikette lees, deur die inligting op voedsel etikette beïnvloed word. Tog is □

gebrek aan begrip ten opsigte van inligting op voedsel etikette geïdentifiseer as □ rede waarom respondente nie oor die vermoë beskik om voedsel etikette tydens voedselkeuses te gebruik nie. Opinies dat die “smaak en prys van die produk belangriker is as die nutriënt inhoud”, “beperkte tyd tot beskikking”, en “gebrek aan opvoeding en nutriënt kennis”, is as redes genoem waarom respondente nie voedsel etikette lees nie. Struikelblokke rakende verbruikers se begrip en gebruik van inligting op voedsel etikette is in hierdie studie uitgelig. Aanbevelings ter verbetering van voedsel etikette in Suid-Afrika word gemaak en riglyne vir verbruikers opvoeding rakende die gebruik van voedsel etikette word voorgestel.

Sleutelwoorde: Begrip; gebruik; verbruiker; voedsel etiket

PREFACE

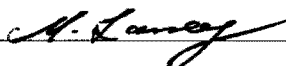
The article format was selected for this mini-dissertation. The study reported on in this mini-dissertation was planned and executed by three researchers and the contribution of each is listed in the table below. A statement from the co-authors is also included, confirming their role in the study and giving their permission for the inclusion of the article in this mini-dissertation. The article is to be submitted to the following journal: Public Health Nutrition. A copy of the guidelines for authors of the journal, Public Health Nutrition, is included in Annexure F.

Name	Role in the study
Ms S. A. Jacobs B. Hons. Consumer Studies	Responsible for the literature searches, data collection, statistical analysis and text drafting
Dr H. de Beer	Supervisor Critically reviewed paper
Ms M Larney	Co-supervisor

I declare that I have approved the above-mentioned article, that my role in the study as indicated above is representative of my actual, contribution and that I hereby give my consent that it may be published as part of the M mini-dissertation of Ms S. A. Jacobs.



Dr H. de Beer (Supervisor)



Ms M. Larney (Co-supervisor)

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CHAPTER 1

INTRODUCTION

1. Background and motivation

South Africa has a problem of chronic malnutrition rather than just acute malnutrition that persists in two extremes, from under- to over-nutrition (Wiles, 2006:1; Faber & Wenhold, 2007:398). The prevalence of malnutrition is cause for concern and it will persist, as many South Africans have insufficient knowledge to choose the right type and quantities of food (Spowart, 1998:ii). Therefore, a need exists to help South African consumers to make better food choices during food purchasing.

The need to assist consumers in choosing healthier food products is vital and the National Food Consumption Survey (NFCS), conducted in 1999, indicated that the majority of children consume a diet consisting mainly of starches such as maize, sugar and brown bread, which is deficient in energy and nutrient density (Labadarios *et al.*, 2005:104). Such a diet lacking in energy and nutrients increases vulnerability to infections and diseases and eventually leads to the loss of muscle tissue (Whitney & Rolfes, 2008:20). On the other hand, obesity, which is generally associated with over-nutrition, is a major risk factor for the development of chronic diseases such as hypertension and diabetes (Szykman *et al.*, 1997:228; Whitney & Rolfes, 2008:20; Labadarios *et al.*, 2005:104). In South Africa the prevalence of obesity has been found to exist in both men and women. According to Puoane *et al.* (2002), 29% of men and 56% of women in South Africa are obese. In 2007, Faber and Wenhold (2007:398) reported that women living in urban areas in particular were more obese than men.

In order to address the prevalence of under- and over-nutrition in South Africa, the Nutrition Society of South Africa (NSSA) initiated the formulation of food-based dietary guidelines (Love *et al.*, 2001:10). These dietary guidelines were formulated to be easily understood by consumers, irrespective of their culture or education. However, Wiles (2006:1) stated that these guidelines

can only be effective if consumers have adequate information available to help them make healthy food choices. The food label is an instrument that could be used to communicate nutritional information to consumers and assist them in choosing healthier food products (Grunert & Wills, 2007:385).

1.1.1 Food labels as an instrument to improve consumers' food choices

Food labels are intended to assist consumers in choosing nutritionally appropriate food by providing them with sufficient information related to the content of individual products at point of purchase (Grunert & Wills, 2007:385). Currently, food labels offer consumers more complete, useful and accurate information than ever before (Anon, 2005:2). South Africa's food labelling regulations (under the Foodstuffs, Cosmetic and Disinfectant Act 54 of 1972) are also being reviewed and a draft regulation was introduced in 2007 (De Villiers, 2009:13).

Although nutritional information included on food labels is not compulsory in terms of the draft food labelling regulation (South Africa, 2007:84), the ingredients present in the product should be listed in descending percentage. Therefore, even in cases where nutritional information is not presented on the food label, for example when no nutrition content or health claim is made (South Africa, 2007:84), consumers should be able to use the ingredient list on the food label to make informed food choices. When nutritional information is provided on the food label, it would assist consumers to identify the nutritional contribution in a serving size of a food product (Anon, 2005:2). Furthermore, the provision of nutrient content claims such as "fat free" or "low in sodium" on food labels can help consumers with special dietary needs to select food that is low or high in a specified nutrient (Legault *et al.*, 2004:957).

It is essential that the food label could be used as an instrument to assist consumers during food purchases (Tessier *et al.*, 2000:35; Higginson *et al.*, 2002a:92; Legault *et al.*, 2004:952; Satia *et al.*, 2005:400). However, the food label can only guide consumers during food choices and does not, by itself, provide a better or more critical understanding of nutrition principles or skills to use the provided information (Levy & Fein, 1998:214; Alfieri & Byrd-Bredbenner, 2000:119;

Anon, 2005:3). The intention of food labels to improve healthy food choices is dependent upon the ease with which consumers are able to understand and use the information on the label (Shine *et al.*, 1997:292; Wandel, 1997:212; Alfieri & Byrd-Bredbenner, 2000:119). Therefore, it is important to ensure the information is meaningful to consumers (Byrd-Bredbenner *et al.*, 2000:626).

1.1.2 Consumers' understanding and use of information on food labels

Consumers need to understand the information on a food label in order to use food labels effectively when making food choices. However, several studies have found that consumers experience difficulties understanding the nutritional information on the labels, especially the terminology used on labels (Shine *et al.*, 1997:294; Wandel, 1997:213; Cowburn & Stockley, 2005:23; Peters-Teixeira & Badrie, 2005:511). Klein (2005:73) also identified this problem to exist in the North West Province of South Africa. Klein investigated a sample of South African consumers' perception of food labels and how it influenced their purchasing behaviour. The results of Klein's study indicated consumers do not understand the terms and abbreviations used on food labels and, therefore, need to be educated regarding the reading and interpretation of information on the label.

French consumers have also previously been found to have difficulties with the reading and interpreting of information on the food label and pointed out that information should be printed in a larger letter size and that different colours should be used (Mannell *et al.*, 2006:166). In a survey conducted in South-West Central Scotland (Tessier *et al.*, 2000:39), the use of food labels was reported as being difficult, especially when interpreting the numerical values found on food labels. More recently, Grunert and Wills (2007:385) reviewed research studies conducted in Europe between 2003 and 2006 that investigated how consumers perceive, understand, like and use nutritional information on food labels. They concluded that consumers have a widespread interest in food labels, although this varies according to situations and product category. However, consumers might be interested in food labels, but this does not necessarily mean they

have sufficient nutritional knowledge to understand and use the information on food labels effectively (Higginson *et al.*, 2002b:151).

Previous studies found that consumers who frequently associated with the usage of food labels are educated females (Neuhouser, 1999:46; Satia *et al.*, 2005:392; Cowburn & Stockley, 2005:22) of a higher socio-economic class and income level (Wang *et al.*, 1995:374; Cowburn & Stockley, 2005:22; Hess *et al.*, 2005:112), as well as a greater awareness of health (Szykman *et al.*, 1997:231; Nayga *et al.*, 1998:109; Neuhouser *et al.*, 1999:46; Satia *et al.*, 2005:392; Cowburn & Stockley, 2005:22). Female consumers' use of food labels was often the focus of previous studies as they were considered the gatekeepers of the households' food choices and purchases (Alfieri & Byrd-Bredbenner, 2000:113; Anderson & Coertze, 2001:28; Wiles, 2006:2). Due to the changing of gender roles in the household (Nayga *et al.*, 1998:115; Fuller, 2001:44), male consumers' understanding and use of information on food labels should be researched, as they also have a responsibility for food purchasing and preparation.

1.2 Problem statement

A need exists to assist South Africans in making better informed food choices. The food label has the potential to assist consumers during food purchasing, although consumers should be able to understand and use the information provided on food labels to ensure optimal effectiveness. Since male consumers also have a responsibility for the purchasing of household food products, their understanding and use of food labels are as important as that of female consumers. Therefore, insight should be gained regarding adult consumers' understanding and use of information on food labels and how this affects their ability to make informed food choices.

1.3 Aim and objectives

1.3.1 The broad aim of this study is:

To investigate adult consumers' understanding regarding the information on food labels and to determine whether they use the information on food labels in making food choices.

1.3.2 Objectives

This research seeks to:

- Identify what information on food labels consumers use with respect to the ingredient list, nutritional information and nutrient content claims;
- identify difficulties consumers encounter when using food labels;
- explore consumers' reasons for not using food labels; and
- determine the relationship between consumers' understanding of the information on food labels and their ability to make informed food choices.

1.4 Demarcation of the field of study

The target population consisted of consumers of African descent and Caucasian consumers living in the Potchefstroom and Klerksdorp region of South Africa. Consumers 18 years or older, involved in the purchasing of household food products, were included, as these consumers were exposed to food labels during food purchases. However, consumers and spouses working in a health-related field were excluded, as it was expected from such consumers to have a greater understanding and awareness of the information on food labels.

1.5 Method of investigation

A cross-sectional and descriptive research approach was followed and data were collected outside selected supermarkets in the Potchefstroom and Klerksdorp region by means of questionnaires. Combined stratified and judgemental sampling methods were used to recruit 174 respondents involved in the purchasing of household food products.

1.6 Definition of terms

Consumer

- Is any person who purchases a product in order to satisfy a need and might also be the user or disposer of the purchased item (Solomon, 2004:8).

Consumer decision-making

- Is the process by which a consumer makes purchase decisions when multiple options are available and is based on cognitive and emotional influences, for example: family, advertisers, moods and situations that influence a purchase (Schiffman & Kanuk, 2007:G-3).

Food label

- A food label is defined as any words, trade mark, brand name or symbol which is placed on the container of a foodstuff, including labelling for the purpose of promoting its sale or disposal (South Africa, 2007:77).

Motivation

- Refers to the processes by which individuals are urged to take action and occurs when a need is aroused that the consumer wishes to satisfy (Solomon, 2004:114; Schiffman & Kanuk, 2007:83).

Nutrient content claim

- A claim made on the label of a food product which describes the level of a nutrient the product contains (South Africa, 2007:78).

Nutritional information

- The nutritional values of a food product as determined by chemical analysis (or microbiological analysis, when appropriate), which should be listed under the heading of “Nutritional information” on food labels (South Africa, 2007:84).

Understanding

- The ability to understand, to know or grasp the intended meaning or cause (Hawker & Waite, 2007:993). Also related to comprehension. Comprehension is the process by which the consumer makes sense of a stimulus so that it can be understood (Foxall *et al.*, 1998:82).

Use

- For the purpose of this research, use refers to the consumer’s reading, interpretation and evaluation of the information on food labels.

1.7 Conceptual framework

To illustrate consumers’ understanding and use of information on food labels, the conceptual frameworks of Balasubramanian and Cole (2002:114), Drichoutis *et al.* (2005:99) and Gracia *et al.* (2007:166) were adopted to develop a framework for this study (Figure 1). The framework presented in Figure 1 is based on consumers’ decision-making processes during purchasing decisions. Research on consumers decision-making (Schiffman & Kanuk, 2007:526) deals with the processes determining consumers’ product choices when multiple options are available and how the information from each alternative would affect their choice to purchase a product that best fulfils their needs. Therefore, when consumers are faced with a need or motivated to purchase a food product, the information on the food label and consumers’ evaluation thereof might influence their decision to purchase the product.

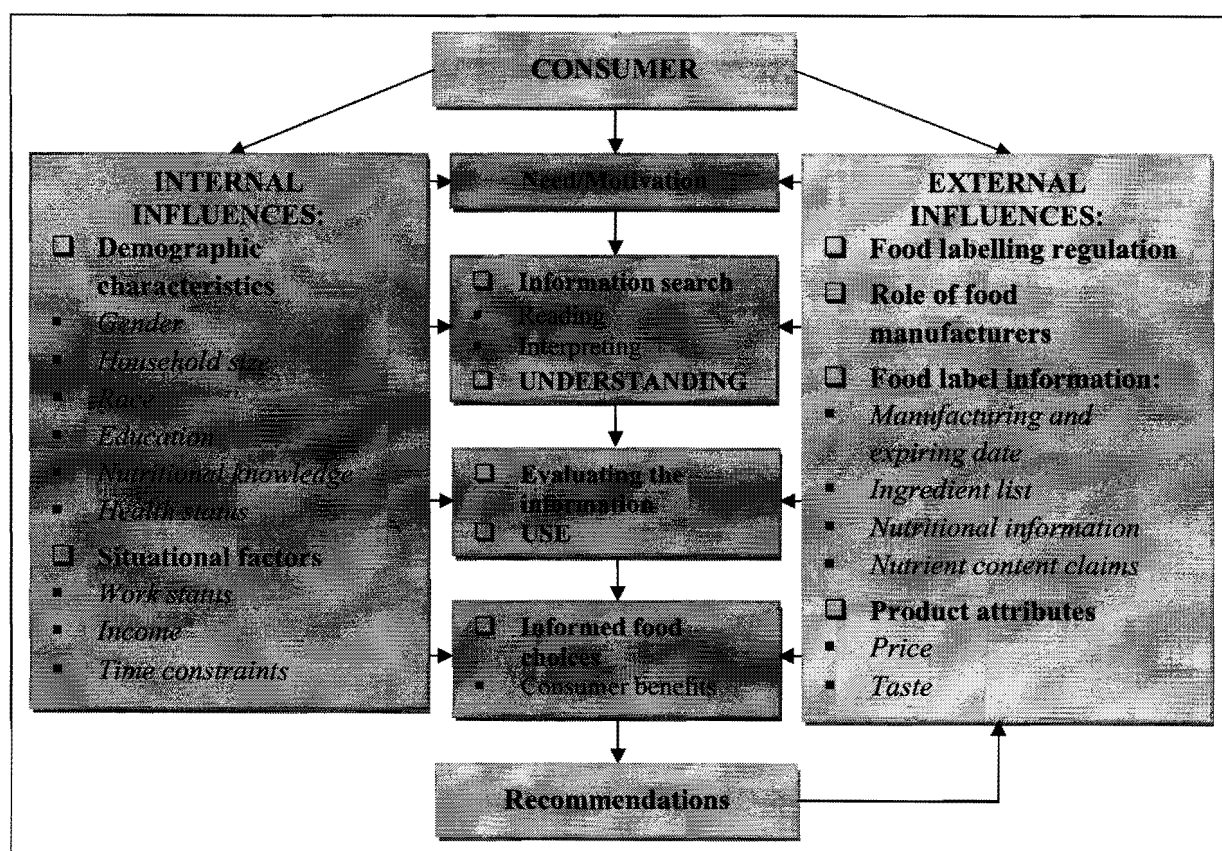


Figure 1 Conceptual framework of consumers' understanding and use of information on food labels as derived from Balasubramanian and Cole (2002:114); Drichoutis *et al.* (2005:99); Gracia *et al.* (2007:166) and Schiffman and Kanuk (2007:529).

Consumers' search for information on food labels might be active or accidental (Grunert & Wills, 2007:387), although it could be affected by the extent to which they understand the information on food labels. Consumers' understanding of information on food labels is dependent on their cognitive abilities to read and interpret the information on the label (Cowburn & Stockley, 2005:22). However, one can distinguish between consumers' subjective and objective understanding. In contrast to subjective understanding, which is the consumer's own subjective perception or meaning of the information, objective understanding refers to the consumer's interpretation of the information that is compatible with what was intended by the sender (Grunert & Wills, 2007:387).

Nevertheless, consumers' understanding of the information would determine how and if the food label's information is used during food choices. Furthermore, consumers' use of food labels specifically refers to their reading, interpretation and evaluation of the information on food labels.

Included in Figure 1 are internal influences (demographic characteristics and situational factors) and external influences (food labelling regulations, food manufacturers, food label information and product attributes). Contrary to the external influences that were included due to their role in determining the information provided on food labels (Balasubramanian & Cole, 2002:113), internal influences were considered, as they lie within the consumer. Hence, these internal and external influences would have a direct effect on consumers' understanding and use of food label information and ultimately on their ability to make informed food choices.

In addition, when consumers associate benefits with the use of food labels, they are further motivated to use such information during food choices (Nayga *et al.*, 1998:108; Drichoutis *et al.*, 2005:94). Therefore, consumers should be aware of the benefits of using food labels. This further implies that any difficulties consumers experience in understanding and using the information on food labels need to be determined. These difficulties should be determined so that recommendations could be made to food label regulators and food manufacturers regarding consumers' needs in terms of food labels.

1.8 Summary

A need exists to help South African consumers to make better food choices during food purchasing. The food label is an instrument that could be used to communicate nutritional information to consumers and assist them in choosing healthier food products. Therefore, the focus of this study was to investigate adult consumers' understanding of the information on food labels and to determine whether they use the information on food labels in making food choices.

It is important to access this information for both female and male consumers, as previous studies conducted on this topic included mainly female consumers. However, male consumers' understanding and use of food labels should also be determined, since they also have a responsibility for the purchasing of household food products. Therefore, it is hoped that the results of this study will provide useful insight regarding the information consumers use on food labels, the difficulties they experience when using food labels, but also an indication of their understanding of the information on food labels.

The following chapter provides a review of the literature on consumers' understanding and use of food labels. Thereafter, presented in an article format, is the methodology followed during the investigation, as well as a critical discussion of the results. Lastly, conclusions and recommendations drawn from the study are made.

1.9 References

- ALFIERI, L. & BYRD-BREDBENNER, C. 2000. Assessing the performance of women on nutrition labelling tasks. *American journal of health studies*, 16(3):113-123. Available: Academic Search Premier.
- ANDERSON, D. J. & COERTZE, D. J. 2001. Recommendations for an educational programme to improve consumer knowledge of and attitudes towards nutritional information on food labels. *South African journal of clinical nutrition*, 14(1):28-35. Available: SA e Publications.
- ANON. 2005. Using nutrition-related claims to build a healthful diet. *Food insight*: 2-3, Jan/Feb. Available: CINAHL Publications.
- BALASUBRAMANIAN, S. K. & COLE, C. 2002. Consumers' search and use of nutrition information: the challenge and promise of the nutrition labelling and education act. *Journal of marketing*, 66(3):112-127. Available: Business Source Premier.
- BYRD-BREDBENNER, C., WONG, A. & COTTEE, P. 2000. Consumer understanding of US and EU nutrition labels. *British food journal*, 102(8):615-629. Available: Emerald.
- COWBURN, G. & STOCKLEY, L. 2005. Consumer understanding and use of nutrition labelling: a systematic review. *Public health nutrition*, 8(1):21-28. Available: EBSOHost.
- DE VILLIERS, K. 2009. Label laws get teeth. *Milk & Juice*, 4(2):10-11, 13-15, June. Available: SA e Publications.
- DRICHOUTIS, A. C., LAZARIDIS, P., & NAYGA, R. M. 2005. Nutrition knowledge and consumer use of nutritional food labels. *European review of agricultural economics*, 32(1):93-118.
- FABER, M. & WENHOLD, F. 2007. Nutrition in contemporary South Africa. *Water SA*, 33(3):393-400. http://www.wrc.org.za/publications_watersa_jun07.htm. Date of access: 25 March 2008.
- FOXALL, G. R., GOLDSMITH, R. E. & BROWN, S. 1998. Consumer psychology for marketing. 2nd ed. London: International Thomson Business Press. 286p.
- FULLER, G. W. 2001. Food, consumers, and the food industry: Catastrophe or opportunity? New York: CRC Press. 295p.

- GRACIA, A., LOUREIRO, M. & NAYGA, M. R. 2007. Do consumers perceive benefits from the implantation of a EU mandatory nutritional labeling program? *Food policy*, 32:160-174. Available: ScienceDirect.
- GRUNERT, K. G. & WILLS, J. M. 2007. A review of European research on consumer response to nutrition information on food labels. *Journal of public health*, 15:385-399. Available: <http://www.citeulike.org/article/2173385> Date of access: 18 May 2009.
- HAWKER, S. & WAITE, S. 2007. Paperback Oxford dictionary & thesaurus. Oxford, New York: Oxford University Press. 1060p.
- HESS, S., YANES, M., JOURDAN, P. & EDELSTEIN, S. 2005. Trans-fat knowledge is related to education level and nutrition facts label use in health-conscious adults. *Topics in clinical nutrition*, 20(2):109-117. Apr/Jun. Available: Academic Search Premier.
- HIGGINSON, C. S., RAYNER, M. J., DRAPER, S. & KIRK, T. R. 2002a. The nutrition label – which information is looked at? *Nutrition and food science*, 32(3):92-99. Available: Emerald.
- HIGGINSON, C. S., RAYNER, M. J., DRAPER, S. & KIRK, T. R. 2002b. How consumers use nutrition label information. *Nutrition and food science*, 32(4):145-152. Available: Emerald.
- KLEIN, R. 2005. A South African study of consumers' perceptions of food labels and its relevance to their purchasing behaviour. North-West University, Potchefstroom Campus. (Mini-dissertation - M. Consumer Science) 115p.
- LABADARIOS, D., STEYN, N. P., & MGIJIMA, C. 2005. Review of the South African nutrition policy 1994-2002 and targets for 2007: achievements and changes. *Nutrition*, 21(1):100-108. Available: ScienceDirect.
- LEGAULT, L., BRANDT, M. B., MCCADE, N., ADLER, C., BROWN, A. M. & BRECHER, S. 2004. 2000-2001 Food label and package survey: an update on prevalence of nutrition labelling and claims on processed, packaged foods. *Journal of the American Dietetic Association*, 104(6):952-958, Jun. Available: ScienceDirect.
- LEVY, A. S. & FEIN, S. B. 1998. Consumers' ability to perform tasks using nutrition labels. *Journal of nutrition education*, 30(4):210-217, Jul/Aug. Available: Academic Search Premier.
- LOVE, P., MAUNDER, E., GREEN, M., ROSS, F., SMALE-LOVELY, J. & CHARLTON, K. 2001. South African food-based dietary guidelines: testing of the preliminary guidelines among

- women in KwaZulu-Natal and the Western Cape. *South African journal of clinical nutrition*, 14(1):9-19. Available: SA ePublications.
- MANNELL, A., BREVARD, P., NAYGA, R., COMBRIS, P., LEE, R. & GLOECKNER, J. 2006. French consumers' use of nutrition labels. *Nutrition and food science*, 36(3):159-168. Available: Emerald.
- NAYGA, R. M., LIPINSKI, D. E. & SAVUR, N. 1998. Consumer' use of nutritional labels while food shopping and at home. *The journal of consumer affairs*, 32(1):106-120. Available: Academic Search Premier.
- NEUHOUSER, M. L., KRISTAL, A. R. & PATTERSON, R. D. 1999. Use of food nutrition labels is associated with lower fat intake. *Journal of the American Dietetic Association*, 99(1):45-53, Jan. Available: ScienceDirect.
- PETERS-TEXEIRA, A. & BADRIE, N. 2005. Consumers' perception of food packaging in Trinidad, West Indies and its related impact on food choices. *International journal of consumer studies*, 29(6):508-514, Nov. Available: Business Source Premier.
- PUOANE, T., STEYN, K. BRADSHAW, D. LAUBSCHER, R., FOURIE, J., LAMBERT, V. & MBANANGA, N. 2002. Obesity in South Africa: the South African demographic and health survey. *Obesity research*, 10(10):1038-1048. Abstract in PubMed Central.
- SATIA, J. A., GALANKO, J. A. & NEUHOUSER, M. L. 2005. Food nutrition label use is associated with demographic, behavioural and psychosocial factors and dietary intake among African Americans in North Carolina. *Journal of the American Dietetic Association*, 105(3):392-403, Mar. Available: ScienceDirect.
- SCHIFFMAN, L. G. & KANUK, L. L. 2007. Consumer behavior. 9th ed. Upper Saddle River, N.J. : Pearson Prentice Hall. 561p.
- SHINE, A., O'REILLY, S. & O'SULLIVAN K. 1997. Consumer use of nutrition labels. *British food journal*, 99(8):290-296. Available: Emerald.
- SOLOMON, M. R. 2004. Consumer behavior: buying, having and being. 6th ed. Upper Saddle River, N.J. : Pearson/Prentice Hall. 621p.
- SOUTH AFRICA. 2007. Foodstuffs, cosmetics and disinfectants act, 1972 (Act 54 of 1972): regulations relating to the labelling and advertising of foodstuffs. (Proclamation no. R.642, 2007.) *Government Gazette*, 30075:505, 20 Jul. (Regulation gazette no. 8718.)

- SPOWART, S. J. 1998. A system of nutritional labelling to improve food choices and nutritional status of South African. North-West University, Potchefstroom Campus. (Thesis-PhD.) 115p.
- SZYKMAN, L. R., BLOOM, P. N. & LEVY, A. S. 1997. A proposed model of the use of package claims and nutrition labels. *Journal of public policy and marketing*, 16(2):228–241, Fall. Available: Business Source Premier.
- TESSIER, S., EDWARDS, C. & MORRIS, S. 2000. Use and knowledge of food labels of shoppers in a city with a high proportion of heart disease. *Journal of consumer studies and home economics*, 24(1):35–40, March. Available: Business Source Premier.
- WANDEL, M. 1997. Food labeling from a consumer perspective. *British food journal*, 99(6):212-219. Available: Emerald.
- WANG, G., FLETCHER, S. M. & CARLEY, D. H. 1995. Consumer utilization of food labelling as a source of nutrition information. *The journal of consumer affairs*, 29(2):368-380. Available: Academic Search Premier.
- WHITNEY, E. N. & ROLFES, S. R. 2008. Understanding nutrition. 11th ed. Australia: Wadsworth. 697p.
- WILES, N. L. 2006. The use and interpretation of the nutrition information on the food label of selected fat spreads by female consumers aged 25-45 years, living in Pietermaritzburg. University of Kwazulu-Natal, Pietermaritzburg. (Mini-dissertation – M. Science in Dietetics) 86p.

2.1 Introduction

The prevalence of malnutrition in South Africa is a major concern, as it affects the mortality of South Africans. According to Bradshaw *et al.* (2003:687), chronic diseases associated with over-nutrition and the adoption of a Western type of diet is among the main causes of premature mortality in South Africa. As diet and lifestyle factors could have fatal consequences, a need exists to help consumers make better food choices during food purchasing. The food label serves as a medium through which nutritional information could be communicated to consumers (Charlton *et al.*, 2004:802). The purpose of the nutritional information provided on the label is to assist consumers to make healthy food choices (Badham, 2002:92; Venter *et al.*, 2003:118). Nevertheless, consumers have been found to read the information on food labels without really understanding it (Higginson *et al.*, 2002a:151).

Consistent with the framework (Figure 1) proposed in Chapter 1, this chapter provides a review to explain consumers' understanding and use of information on food labels. In order to explain consumers' understanding and use of information on food labels, consumers' decision-making processes, as proposed by Schiffman and Kanuk (2007:528), were followed. The decision-making processes view consumers to be receptive to or actively searching for product information in order to choose the best alternative product that would satisfy their needs. Therefore, within this approach consumers' understanding and use of information on food labels (such as the ingredient list, nutritional information and nutrient content claims) are seen as a process of information searching, evaluating alternatives and making a decision based on the evaluation (Schiffman & Kanuk, 2007:529).

2.2 Consumers' search for information on food labels

The information consumers search for on food labels is related to their own needs and motivations (Jukes, 2000:2). Motivations are explained as the driving forces which urge consumers to fulfil any existing needs (Schiffman & Kanuk, 2007:83). This implies that, when consumers have a need or motivation to purchase a food product, the information on the food label and consumers' evaluation thereof might influence their decision to purchase the product. The higher consumers' perceived risk associated with the use of the product, the more involved the consumer would be in the search for and evaluation of product information (Schiffman & Kanuk, 2007:222). In other words, consumers who are concerned about the food they eat, for instance those with a diet-related disease such as diabetics, would be more motivated to search for food label information (Kim *et al.*, 2001:355).

Equally important as consumers' search for information on food labels is their prior understanding of the information on the food label, such as the nutritional information. Consumers with a prior understanding of product information would engage in a selective search, in comparison to novice users who would rely on the opinions of others and non-functional attributes, such as the price of the product (Solomon, 2004:304). It is, therefore, also understood that consumers' search for information on food labels is influenced by their understanding of the information.

According to Cowburn and Stockley (2005:22), consumers' understanding of the information on food labels is determined by their abilities to read, interpret and evaluate the information. Hence, it is highlighted that consumers' understanding or comprehension of product information involves cognitive processes (Schiffman & Kanuk, 2007:225). Cognitive processes such as repetition, imitating the behaviour of other or formal information processing and reasoning could be used by consumers to enhance their understanding of product information. These processes would influence how the information on food labels is obtained and also understood by the consumer. For example, when information is obtained through repetition, the consumer is repeatedly being exposed to the information and is not necessarily actively involved in the search

for information (Foxall *et al.*, 1998:77). Therefore, the search for information on food labels might be active or accidental (Grunert & Wills, 2007:387). With an active information search, there is processing and reasoning and, consequently, it requires an investment of time and cognitive energy by the consumer, for instance a consumer receiving information on how to use food labels from a health professional (Foxall *et al.*, 1998:79).

A distinction could also be made between consumers' subjective and objective understanding. In contrast to subjective understanding, which is the consumer's own subjective perception or meaning of the information, objective understanding refers to the consumer's interpretation of the information that is compatible with what was intended by the sender (Grunert & Wills, 2007:387). Although differences exist in the extent to which consumers would understand information on food labels, they should first experience a need or be motivated to search for information on food labels. Subsequent to their search, consumers would have to read and interpret the information on the food label in order to understand and use it effectively. This would also require an evaluation of the information on the food label so that alternative food products could be compared to each other. Consumers' evaluation of food label information will now be discussed.

2.3 Consumers' evaluation of the information on food labels

Consumers tend to use two types of information to evaluate products: a list of alternative products within a product category, and the criteria used to evaluate each product (Schiffman & Kanuk, 2007:534). Similarly, food labels could be used to make improved and balanced food choices by evaluating and comparing the content of alternative food products. When consumers evaluate information on food labels, it is understood that they have the necessary skills to read, interpret and understand the information. Even so, the extent to which the consumers would be able to use (and also evaluate) the information on food label depends on the quality and clarity of the information (DG SANCO, 2004:21).

As consumers can only absorb a certain amount of information at the point of purchase, it is important that a label does not contain unnecessary information (Hunt, 2000:15). When the information on the label is too complex and dense, it might become unreadable or difficult to understand by consumers (Przyrembel, 2004:360). Therefore, despite the advantage the information on food labels holds for consumers to assist in food choices, a lack of understanding of the information might cause consumers to ignore the information (Lin *et al.*, 2004:1965). This highlights the fact that, when consumers do not understand the information on a food label, the information would not be used to evaluate alternative food products in order to make informed food choices.

2.4 Informed food choices: Benefits consumers associate with the use of food labels

When consumers associate benefits with the use of food labels, they would be motivated to search for information on food labels to be able to make informed food choices. For the same reason, Solomon (2004:298) states that consumers' need to search for product information would only continue provided that the benefit gained from the acquired information does not exceed the cost. The time consumers spend searching for information on the label could be the perceived cost they associate with the use of food labels, whereas the benefit could be reflected in the ability to make an informed purchasing decision (Nayga *et al.*, 1998:108; Drichoutis *et al.*, 2005:94).

Nevertheless, if consumers perceive the use of food labels as beneficial to their health, they still require the ability to use the information on food labels during food choices (Nayga *et al.*, 1998:116). Therefore, nutritional education should be provided to motivate consumers in general to use food labels. Such an educational programme should highlight the benefits of using labels (better food choices and a healthier lifestyle) and empowering consumers with technical skills to interpret and incorporate the information into their meal planning (Lin *et al.*, 2004:1964). Indeed, food label usage could be promoted by highlighting the health advantages of making food choices based on the information on the labels. Furthermore, it is clear that consumers' use of

food labels is influenced by several internal, but also external, factors. These will be discussed in the following section.

2.5 Internal and external factors affecting consumers' understanding and use of information on food labels

Label usage by consumers has been broadly analysed in Europe (Cowburn & Stockley, 2005:22; Feunekes *et al.*, 2008:57), the United Kingdom (Abbott, 1997:44; Byrd-Bredbenner *et al.*, 2000:618; Hess *et al.*, 2005:112) and throughout the United States of America (Wang *et al.*, 1995:374; Szykman *et al.*, 1997:231; Nayga *et al.*, 1998:109; Neuhouser *et al.*, 1999:46; Lin *et al.*, 2004:1956; Satia *et al.*, 2005:393). The above mentioned studies have found the following determinants of food label usage among consumers: demographic characteristics, economic conditions, health awareness and status, time constraints, first-time food purchasing, responsibility towards household food purchasing, and perception of product attributes such as label format, price and taste. As illustrated in Figure 1, these determinants of food label usage were categorised according to internal and external influences to explain the affect they have on consumers' understanding and use of information on food labels. These influences will be discussed in the following section.

2.5.1 Internal influences: Consumers' demographic characteristics

Past studies have found a correlation between the increase in several chronic diseases, diet and lifestyle factors (Drichoutis *et al.*, 2005:93). Therefore, in Figure 1, internal influences which lie within consumers were considered as factors affecting consumers' understanding and use of information on food labels. These internal influences include demographic characteristics such as gender, household size, race, educational level, nutritional knowledge and health status, but also situational factors for example work status, income and time constraints. In the following section consumers' demographic characteristics will be discussed.

2.5.1.1 Gender

Compared to male consumers, females are generally found to be more interested in using the information on food labels (Neuhouser *et al.*, 1999:49; Satia *et al.*, 2005:399), especially information relating to portion size, total energy and energy derived from fat (Scott & Worsley, 1997:4; Neuhouser *et al.*, 1999:49). According to Scott and Worsley (1997:7), female consumers' interest in food labels could be as a result of the media's interest in women and their weight. However, the traditional role of female consumers as the gatekeeper of household food choices and purchases could motivate their interest in food labels (Alfieri & Byrd-Bredbenner, 2000:113; Wiles, 2006:2). Furthermore, their responsibility towards the well-being of their family also creates an awareness of the nutritional content of food (Wang *et al.*, 1995:377).

Apart from female consumers, male consumers have also been found to use the information on food labels, which could be a result of the change in gender roles due to shared housekeeping responsibilities (Nayga *et al.*, 1998:114). However, in contrast with female consumers, male consumers express a greater interest in the cholesterol information on food labels (Scott & Worsley, 1997:4; Neuhouser *et al.*, 1999:49), which might be motivated by the higher incidence of cardiovascular diseases among male consumers (Scott & Worsley, 1997:5).

2.5.1.2 Household size, race, educational level and nutritional knowledge

The food purchaser for larger households has been found more likely to read the information on food labels. This is due to the nutritional demands and dietary behaviour of the members of larger households being more complex than that of individuals living alone (Wang *et al.*, 1995:377; Wiles, 2006:64). Furthermore, the ethnic group to which the household belongs also influences their use of food labels. Wang *et al.* (1995:378) found that the head of a white household is more likely to obtain information from food labels than the household head of other races. Anderson and Coertze (2001:28) investigated white females' knowledge and attitudes towards nutritional information on food labels in South Africa during 1993. The authors concluded that white female consumers in South Africa lacked understanding of nutritional

labelling and identified an overall need to increase consumers' understanding of nutrition in order to encourage the use of food labels (Anderson & Coertze, 2001:28).

In a series of studies conducted in the United States by the Food and Drug Administration (FDA), non-white consumers were found to be less skilled at performing tasks using food labels (Levy & Fein, 1998:214). In this investigation, mock-up product labels were used to determine consumers' ability to assess the nutritional value, the recommended daily intake (RDI) as well as the implication of adding a product to their daily diet (Levy & Fein, 1998:211). The participants' prior nutritional knowledge and beliefs were found to affect the results, since the tasks required making nutritional and dietary judgments. Overall, the results indicated that participants who performed poorer on the required tasks were less educated than those who performed better (Levy & Fein, 1998:213). According to Anderson and Coertze's study (2001:34), consumers with a higher educational level also have a positive attitude toward the use of information on food labels, since they are well informed regarding nutrition. Hence, it could be hypothesised that a higher educational level leads to greater understanding of nutritional principles, which in turn improves consumers' ability to comprehend the nutritional information on food labels (Wang *et al.*, 1995:378; Hess *et al.*, 2005:115).

2.5.1.3 Health status

Consumers who follow a special diet are more likely to use the information on food labels than those who are not, as they are more informed about the relationship between diet and health (Kim *et al.*, 2001:355). However, a study conducted in South Africa on 150 female consumers to determine their use of nutritional information on food labels indicated that only 52% of the participants with pre-existing diet-related conditions ($n = 21$) claim to use food labels (Wiles, 2006:65). It was further suggested by the researcher that the findings could be due to the lack of or inadequacy of the dietary counselling provided to the participants when they were diagnosed with a specific medical condition. Consumers with specific dietary needs such as diabetes could benefit from using the information on food labels, although they might not necessarily have the

nutritional understanding to apply the information on the food label to their diet (Kessler & Wunderlich, 1999:557).

Satia *et al.* (2005:393) conducted a survey among African American consumers to determine their use of the nutritional information on food labels and the association with their dietary intakes. Results from this study indicated that label users have healthier dietary patterns, relating to lower fat and higher fruit and vegetable intake, compared to consumers who rarely or never use labels during food purchases (Satia *et al.*, 2005:400). It seemed that consumers with less healthy dietary behaviour found label information irrelevant and unimportant. Therefore, it was suggested that consumer education should encourage consumers to use the information on food labels to promote healthier diets (Lin *et al.*, 2004:1964).

2.5.2 Internal influences: Consumers' situational factors

Situational factors such as work status, income and time constraints have been found to have a direct influence on consumers' label usage behaviour (Figure 1). In a survey conducted with 200 consumers, unemployed consumers were found to be more likely to use food labels than employed consumers (Nayga, 2000:108). It was speculated that unemployed consumers have more time available during purchasing (Kim *et al.*, 2001:358), hence reflecting the influence of time constraints on the consumer's search for information on food labels (Nayga, 2000:108).

According to Drichoutis *et al.* (2005:107), a relationship exists between consumers' work status, time spent on food purchasing and their use of information on food labels. Earning a higher income is often associated with having less time available during food purchases and consequently limited time to use the information on the food label. Being well informed regarding nutrition and highly educated increases consumers' use of information of food labels (Drichoutis *et al.*, 2005:107). Anderson and Coertze (2001:29) also found that consumers are more likely to read the information on food labels at home than during the purchasing of food products. Thus, consumers are more willing to use the information on food labels when they are not experiencing time constraints.

2.6 External influences affecting consumers' understanding and use of food labels

From the previous section it is evident that consumers' understanding and use of information on food labels are determined by several internal consumer influences. However, external influences, such as food labelling regulations and food manufacturers, also affect consumers' understanding and use of information on food labels (Figure 1). This is due to their role in determining the information made available to consumers on the food label (Balasubramanian & Cole, 2002:113). When considering consumers' understanding and use of food labels, labelling regulations are particularly important, as they serve to regulate the type, format and truthfulness of information presented on the label. On the other hand, food manufacturers have the responsibility to develop food labels which meet the requirements of the food labelling regulation, while still addressing the needs of their target consumers. These two external influences will be discussed in the following section in order to explain their role in consumers' understanding and use of information on food labels.

2.6.1 External influences: Mandatory and voluntary requirements of food labelling regulations of South Africa

All aspects pertaining to food labelling and advertising in South Africa are regulated under R642 of the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972 (South Africa, 2007:68-145). According to this regulation, a label is defined as any words, trade mark, brand name or symbols that are placed on the container of a foodstuff, including labelling for the purpose of promoting its sale or disposal (South Africa, 2007:77). The main purpose of the food label is to ensure food safety, prevent the provision of misleading or confusing information, and to form the basis for consumer education (Badham, 2002:66; De Villiers, 2008:111). The revised food labelling regulations aim to control untruthful or misleading information on food labels (De Villiers, 2008:109). In the past, some of the food manufacturers in South Africa used marketing strategies to promote their products by providing consumers with misleading and unjust information. A good example of this misrepresentation was the "zero cholesterol" claim made by vegetable oil

manufacturers, when in fact all vegetable oils are cholesterol free, thus leaving the consumers to assume that certain vegetable oils are healthier than others (De Villiers, 2008:109). Therefore, the new draft food labelling regulations have been viewed by consumer groups and dieticians as progress towards encouraging a healthier nation (Comins, 2007).

2.6.1.1 Mandatory requirements for information on food labels

According to the revised food labelling regulations (South Africa, 2007:85-97), the following mandatory information that should be displayed on the labels of all pre-packaged food products in South Africa includes, among others, the:

- Name and address of the manufacturer, importer or distributor, as well as country of origin;
- Name of the food product, which provides a clear indication of the product and has a minimum height of 4 mm;
- Net contents of the container and batch identification to ensure traceability to the manufacturer;
- Instruction for storage, use and preparation;
- List of ingredients in descending order of mass or percentage inclusion in the products, thus the ingredient with the highest inclusion, by weight, should be listed first;
- Expiry date/shelf life indicated as the “best before” (BB) or “use by” date; in addition, a “sell-by” date may be provided voluntarily;
- Any additive, preservative or food colorant should be listed in the ingredient list, portrayed as the chemical name along with descriptive wording indicating its functionality, for example “additive”, “preservative” or “food colorant”;
- Ingredients that are potential allergens, such as egg, milk, crustaceans and molluscs, fish, peanuts, soybeans, tree nuts or wheat, should be recorded in the list of ingredients. If a product contains such ingredients, the label should also bear a warning “not suitable for people with (name of allergen) allergy”.

Mandatory requirements with respect to food labels are imperative in order to regulate and ensure a consistent food-labelling format. This is important, as previous research has found that

consumers have a need for standardised information on food labels (Anderson & Coertze, 2001:33), as it minimises confusion among consumers. Nevertheless, due to the diversity of food products in the market, the regulations make provision for voluntary information on food labels, such as nutritional information and relevant nutrition claims, which will be discussed in the following section.

2.6.1.2 Voluntary information on food labels

In order to assist manufacturers in the labelling of their food products, the law also permits the use of certain voluntary information, such as nutrition claims, on food labels. According to the food regulations (South Africa, 2007:78), a nutrient content claim refers to any wording used to indicate the level of nutrients a food product contains. However, as such claims are made voluntarily on food labels by the manufacturer, food manufacturers are restricted from providing inappropriate or false information (South Africa, 2007:99) to consumers, and the precise conditions under which such a claim may be made must be noted on the product (Table 2.1).

Table 2. 1 Examples of the conditions and wording for the use of nutrient content claims

Nutrient	Claim	Conditions for use
Total fat	Free	0.5 g per 100 g / 100 ml
	Low	3 g per 100 g (solids) / 1.5 g per 100 g (liquids)
Cholesterol	Free	5 mg per 100 g / 100 ml
	Low	20 mg per 100 g (solids) / 10 mg per 100 ml (liquids)
Sugar	Free	0.5 g per 100 g / 100 ml
Sodium	Free	5 mg Na per 100 g
	Low / very low	120 mg / 40 mg Na per 100 g
Total fibre	Source of	3 g per 100 g (solids) / 1.5 g per 100 ml (liquids)
Protein	Source of	1.5 g per 100 g (solids) / 2.5 g per 100 ml (liquids)
	High in	10 g per 100 g (solids) / 5 g per 100 ml (liquids)

This implies that a nutrient content claim, such as “low in cholesterol”, can only be made on a margarine product if it contains less than or 20 mg of cholesterol. Furthermore, words such as “enriched”, “with added” or “x%” may not be used as a substitute for the specified wording as depicted in Table 2.1 (South Africa, 2007:101), whereas descriptions of the product to be “nutritious”, “wholesome” or “healthy” are no longer allowed to be used on a label (South Africa, 2007:87; De Villiers, 2008:111). However, when a product is fortified, it may bear the fortification logo and, in such an instance, also a description of being “healthy” (South Africa, 2007:87).

The revised food regulations also specify that food products not considered essential in a healthy diet shall not be permitted to make any nutrient content claims or be advertised to children under the age of 16 (Sanpath, 2007:6; South Africa, 2007:99-100). Examples of such food products include: sugar-coated cereals, chocolate and biscuits, confectionaries as well as sweetened beverages (fruit nectars, energy and carbonated drinks). Furthermore, any cartoon or animated characters, token or gifts may not be used to encourage children to eat these food products and they should also contain a statement recommending moderate consumption thereof (South Africa, 2007:100). Parent’s food-purchasing decisions regarding breakfast cereals, cakes or snacks are greatly influenced by their children (Fuller, 2000:45). Therefore, placing restrictions on the advertising of such food to children could limit the purchasing and consumption of food products with limited nutrient value. Although such restrictions on food labelling might enhance public health, they do not necessarily motivate consumers to use the information on food labels. Nevertheless, nutrient content claims have an important role in the labelling of food products. Such information could be used to assist consumers with special dietary requirements to select food that is high or low in a specific nutrient (Legault *et al.*, 2004:957).

2.6.2 External influences: Manufacturers' involvement in the development of information on food labels

Manufacturers of food products are responsible for the design, graphics and content of food labels. When decisions regarding the information presented on the labels are made, the manufacturers of food products need to consider the relevant aspects covered by the regulations, consumer markets and marketing strategies (Jukes, 2000:3). Food manufacturers do have the responsibility to provide clear and consistent information on food labels, which is mandatory in terms of government regulations (Shine *et al.*, 1997:295). Thus it is essential for the manufacturer to have a good understanding of food labelling legislation and regulations in order to ensure validity, avoid unnecessary label changes and promote consistency across product categories (Hunt, 2000:13).

Space limitation is a further element that should be considered in the development of food labels. Hunt (2000:15) highlights the fact that unnecessary information does not assist consumers' buying decisions, and might even distract their attention from key information such as the nutritional value. The size limitation of the label, on the other hand, might cause the consumer to misinterpret a message, as only general information is provided (Hunt, 2000:15). Thus, the information provided on the label should be well balanced. It should address the needs of the individual consumer, and be easy to read and to understand at the point of purchase, yet assist consumers in their buying decisions while still conforming to the labelling regulations. Manufacturers play a key role in consumers' understanding and use of the food label, as they provide information regarding the content of the food. However, due to space limitations on the label, educational programmes should be developed to assist consumers in understanding the information on food labels and also to encourage the use of food label information.

2.6.3 External influences: Product attributes such as price and taste

Food product attributes such as price, taste and nutritional content are important determinants of consumers' perceived benefit of the use (Drichoutis *et al.*, 2005:100) and search for nutritional information on food labels (Nayga *et al.*, 1998:109). Research has shown that consumers who are price orientated are less interested in the nutritional quality of their food and, therefore, not interested in the nutritional information on food labels (Nayga *et al.*, 1998:117; Drichoutis *et al.*, 2005:107; Gracia *et al.*, 2007:170). Related to the behaviour of price-orientated consumers is the behaviour of consumers who regard the taste of products higher than the nutritional value, as they have also been found less likely to use the information on food labels (Drichoutis *et al.*, 2005:107). It therefore can be assumed that the higher consumers perceive the importance of nutrition and health, the more likely they will use the information on food labels.

Cowburn and Stockley (2005:21) conducted a systematic review of 103 studies performed throughout the world aimed at determining consumers' understanding and use of food labels. From this review the authors reported that consumers generally found nutritional information on food labels confusing, especially when it involves some numerical information. It was, however, added that consumers who generally read food labels are doing so to determine the contents of only specific nutrients, such as fat (Cowburn & Stockley, 2005:24). In terms of information on food labels, several studies have found that consumers experience difficulties in understanding the nutritional information on the labels, especially the terminology used, which often results in them ignoring the information (Shine *et al.*, 1997:294; Wandel, 1997:213; Higginson *et al.*, 2002b:96; Cowburn & Stockley, 2005:23; Peters-Teixeira & Badrie, 2005:511; Klein, 2005:73).

The Directorate General for Health and Consumer Protection (DG SANCO, 2004:3) of the European Commission initiated a study to analyse the potential impact of the introduction of mandatory nutrition labelling for all pre-packaged food products across Europe. From this study it was found that terminology such as energy, kilo-calories, fat, dietary fibre, recommended dietary amount and sugars were generally well understood, but that consumers have difficulty in understanding information such as cholesterol, saturated fat, sodium and kilojoules (DG

SANCO, 2004:20). Therefore, the consumer's level of understanding regarding food nutrients might play a key role in whether or not the nutritional information on the food label is used (Higginson *et al.*, 2002b:98).

South African consumers' understanding and use of nutritional information such as the ingredient list and the nutrient content claim could also be questioned. In Anderson and Coertze's (2001:29) study, the participants were asked to use the label information on four well-known South African breakfast cereal boxes to make an informed decision regarding the healthiest breakfast cereal option. It was found that participants were unaware of the descending order of the ingredients in the ingredient list (Anderson & Coertze, 2001:32). Furthermore, the participants were unable to identify the breakfast cereal with the highest iron content for which a nutrient content claim was present on the one cereal box (Anderson & Coertze, 2001:32). Consumers need to be able to use the information on food labels, such as the ingredient list, to avoid ingredients to which they are allergic and to purchase food of better nutritional quality (Mahgoub *et al.*, 2007:3). Ingredients should be listed on the label, as it is essential to consumers' purchasing decisions, as it provides an indication of the food product's expected quality and taste (Bruhn, 2000:5). Thus, it is important to determine the extent to which product attributes such as nutritional information, ingredient list and nutrient content claims influence consumers' use of information on food labels (Figure 1). More specifically, it is essential to determine consumers' understanding of the information on the food labels in order to encourage and educate consumers regarding the use of food labels.

2.7 Conclusion

From the above review it is understood that the effective use of food labels entails consumer skills such as the ability to read, interpret and evaluate the information on the label. Subsequently, such skills would facilitate consumers' understanding of the information and, therefore, also assist them in making food choices. Perceiving the use of food labels as beneficial to their health would also motivate consumers to use such information when making food choices. Consistent with Figure 1, this chapter highlights the fact that each consumer has a

unique set of determinants which affect his/her understanding and use of information on food labels. The identified determinants of food label usage were categorised according to internal (demographic characteristics and situational) and external influences (food labelling regulations, role of food manufacturers, food label information and product attributes).

Generally, educated females of a higher socio-economic class who have a greater awareness of health are associated with the use of food labels. Other demographic factors, such as household size and ethnic group, might also serve to indicate consumers' understanding and use of food labels. Even so, experiencing time constraints and financial implications are also believed to have a negative effect on food label use. However, influences in the consumer's external environment should also be considered due their role in determining the information made available on the label.

Therefore, the identified internal and external factors could be underlying reasons for consumers to use or not to use the information on food labels. The information on food labels that is used by consumers and difficulties they experience in understanding such information should be investigated so that recommendations could be made to food label regulators and manufacturers of food products regarding how the information on food labels should be presented. More importantly, these factors need to be investigated to address consumers' needs in terms of food labels and to motivate them to use such information, thereby also facilitating healthier food choices.

2.8 References

- ABBOTT, R. 1997. Food and nutrition information: a study of sources, uses and understanding. *British food journal*, 99(2):43-49. Available: Emerald.
- ALFIERI, L. & BYRD-BREDBENNER, C. 2000. Assessing the performance of women on nutrition labeling tasks. *American journal of health studies*, 16(3):113-123. Available: Academic Search Premier.
- ANDERSON, D. J. & COERTZE, D. J. 2001. Recommendations for an educational programme to improve consumer knowledge of and attitudes towards nutritional information on food labels. *South African journal of clinical nutrition*, 14(1):28-35. Available: SA e Publications.
- BADHAM, J. 2002. Regulations: labels & laws: diet & nutrition. *The South African journal of natural medicine*, 61(8):66-67,92, Dec.
- BALASUBRAMANIAN, S. K. & COLE, C. 2002. Consumers' search and use of nutrition information: the challenge and promise of the nutrition labelling and education act. *Journal of marketing*, 66(3):112-127. Available: Business Source Premier.
- BRADSHAW, D., GROENEWALT, P., LAUBSCHER, R., NANNAN, N., NOJILANA, B., NORMAN, R., PIETERSE, D., SCHNEIDER, M., BOURNE, D. E., TIMAEUS, I. M., DORRINGTON, R. & JOHNSON, L. 2003. Initial burden of disease estimates for South Africa, 2000. *South African medical journal*, 93(9):682-688. Available: SA Publications.
- BRUHN, C. M. 2000. Consumer needs. (In Blanchfield, R., ed. Food labelling. Boca Raton, FL : CRC Press. 5-13p.)
- BYRD-BREDBENNER, C., WONG, A. & COTTEE, P. 2000. Consumer understanding of US and EU nutrition labels. *British food journal*, 102(8):615-629. Available: Emerald.
- CHARLTON, K. E., BREWITT, P. & BOURNE, L. T. 2004. Source and credibility of nutrition information among black urban South African women, with a focus on messages related to obesity. *Public health nutrition*, 7(6):801-811. Available: EBSCOhost.
- COMINS, L. 2007. New food label laws 'will make SA healthier'. Available: http://www.iol.co.za/index.php?click_id=13&set_id=1&art_id=vn20070731043704332C765922
Date of access: 11 Apr. 2008.

- COWBURN, G. & STOCKLEY, L. 2005. Consumer understanding and use of nutrition labeling: a systematic review. *Public health nutrition*, 8(1):21-28. Available: EBSOhost.
- DE VILLIERS, K. 2008. The label has to say it all. *The dairy mail*, 109-113, Jun.
- DG SANCO (Directorate General for Health and Consumer Protection). 2004. The Introduction of Mandatory Nutrition Labeling in the European Union. Available: http://ec.europa.eu/food/food/labellingnutrition/nutritionlabel/impact_assessment.pdf Date of access: 4 Jun. 2008.
- DRICHOUTIS, A. C., LAZARIDIS, P. & NAYGA, R. M. 2005. Nutrition knowledge and consumer use of nutritional food labels. *European review of agricultural economics*, 32(1):93-118.
- FEUNEKES, G. I. J., GORTEMAKER, I. A., WILLEMS, A. A., LION, R. & VAN DER KOMMER, M. 2008. Front-of-pack nutrition labeling: testing effectiveness of different nutrition labeling formats front-of-pack in four European countries. *Appetite* 50:57-70, May. Available: ScienceDirect.
- FOXALL, G. R., GOLDSMITH, R. E. & BROWN, S. 1998. Consumer psychology for marketing. 2nd ed. London: International Thomson Business Press. 286p.
- FULLER, G. W. 2001. Food, consumers, and the food industry: catastrophe or opportunity? Boca Raton, FL : CRC Press. 295p.
- GRACIA, A., LOUREIRO, M. & NAYGA, M. R. 2007. Do consumers perceive benefits from the implantation of a EU mandatory nutritional labeling program? *Food policy*, 32:160-174. Available: ScienceDirect.
- GRUNERT, K. G. & WILLS, J. M. 2007. A review of European research on consumer response to nutrition information on food labels. *Journal of public health*, 15:385-399. Available: <http://www.citeulike.org/article/2173385> Date of access: 18 May 2009.
- HESS, S., YANES, M., JOURDAN, P. & EDELSTEIN, S. 2005. Trans-fat knowledge is related to education level and nutrition facts label use in health-conscious adults. *Topics in clinical nutrition*, 20(2):109-117. Apr/Jun. Available: Academic Search Premier.
- HIGGINSON, C. S., RAYNER, M. J., DRAPER, S. & KIRK, T. R. 2002a. How consumers use nutrition label information. *Nutrition and food science*, 32(4):145-152. Available: Emerald.

- HIGGINSON, C. S., RAYNER, M. J., DRAPER, S. & KIRK, T. R. 2002b. The nutrition label – which information is looked at? *Nutrition and food science*, 32(3):92-99. Available: Emerald.
- HUNT, M. 2000. Manufacturers' needs. (In Blanchfield, R., ed. Food labelling. Boca Raton, FL : CRC Press. 13-19p.)
- JUKES, D. 2000. Key issues in food labelling. (In Blanchfield, R., ed. Food labelling. Boca Raton, FL : CRC Press. 1-5p.)
- KESSLER, H. & WUNDERLICH, S. M. 1999. Relationship between use of food nutrition knowledge of people with diabetes. *The diabetes educator*, 25(4):549-559, Jul/Aug.
- KIM, S., NAYGA, R. M. & CAPPS, O. 2001. Food label use, self-selectivity and diet quality. *The journal of consumer affairs*, 35(2):346-363. Available: Academic Search Premier
- KLEIN, R. 2005. A South African study of consumers' perceptions of food labels and its relevance to their purchasing behaviour. North-West University, Potchefstroom Campus. (Mini-dissertation - M. Consumer Science) 115p.
- LEGAULT, L., BRANDT, M. B., MCCADE, N., ADLER, C., BROWN, A. M. & BRECHER, S. 2004. 2000-2001 Food label and package survey: an update on prevalence of nutrition labeling and claims on processed, packaged foods. *Journal of the American Dietetic Association*, 104(6):952-958, Jun. Available: ScienceDirect.
- LEVY, A. S. & FEIN, S. B. 1998. Consumers' ability to perform tasks using nutrition labels. *Journal of nutrition education*, 30(4):210-217, Jul/Aug. Available: Academic Search Premier.
- LIN, C. T. J., LEE, J. Y., & YEN, S. T. 2004. Do dietary intakes affect search for nutrient information on food labels? *Social science and medicine*, 59:1955–1967. Available: ScienceDirect.
- MAHGOUB, S.E., LESOLI, P.P., & GOBOTSWANG, K. 2007. Awareness and use of nutrition information on food packages among consumers in Maseru (Lesotho). *African journal of food agriculture nutrition and development*, 7(6):1-16. Available: Business Source Premier.
- NAYGA, R. M. 2000. Nutrition knowledge, gender and food label use. *The journal of consumer affairs*, 34(1):97-112, Summer. Available: Academic Search Premier.
- NAYGA, R. M., LIPINSKI, D. E. & SAVUR, N. 1998. Consumer' use of nutritional labels while food shopping and at home. *The journal of consumer affairs*, 32(1):106-120. Available: Academic Search Premier.

- NEUHOUSER, M. L., KRISTAL, A. R. & PATTERSON, R. D. 1999. Use of food nutrition labels is associated with lower fat intake. *Journal of the American Dietetic Association*, 9(1):45-53, Jan. Available: ScienceDirect.
- PETERS-TEXEIRA, A. & BADRIE, N. 2005. Consumers' perception of food packaging in Trinidad, West Indies and its related impact on food choices. *International journal of consumer studies*, 29(6):508-514, Nov. Available: Business Source Premier.
- PRZYREMBEL, H. 2004. Food labeling legislation in the EU and consumers information. *Trends in food science and technology*, 15(7-8):360-365, Jul.-Aug. Available: ScienceDirect.
- SANPATH, A. 2007. Taking nutrition seriously: guidelines on food labeling to tighten. *Daily news*: 6, 30 Jul. Available: SA Media.
- SATIA, J. A., GALANKO, J. A. & NEUHOUSER, M. L. 2005. Food nutrition label use is associated with demographic, behavioural and psychosocial factors and dietary intake among African Americans in North Carolina. *Journal of the American Dietetic Association*, 105(3):392-403, Mar. Available: ScienceDirect.
- SCOTT, V. & WORSLEY, A. 1997. Consumer view on nutrition labels in New Zealand. *Australian journal of nutrition & dietetics*, 54(1):1-14, Mar. Available: Academic Search Premier. Date of access: 22 May 2008.
- SCHIFFMAN, L. G. & KANUK, L. L. 2007. Consumer behavior. 9th ed. Upper Saddle River, N.J. : Pearson Prentice Hall. 561p.
- SHINE, A., O'REILLY, S. & O'SULLIVAN K. 1997. Consumer use of nutrition labels. *British food journal*, 99(8):290-296. Available: Emerald.
- SOLOMON, M. R. 2004. Consumer behavior: buying, having and being. 6th ed. Upper Saddle River, N.J. : Pearson/Prentice Hall. 621p.
- SOUTH AFRICA. 2007. Foodstuffs, cosmetics and disinfectants act, 1972 (act 54 of 1972): regulations relating to the labeling and advertising of foodstuffs. (Proclamation no. R. 642, 2007.) *Government gazette*, 30075:505, 20 Jul. (Regulation gazette no. 8718.)
- SZYKMAN, L. R., BLOOM, P. N. & LEVY, A. S. 1997. A proposed model of the use of package claims and nutrition labels. *Journal of public policy and marketing*, 16(2):228-241, Fall. Available: Business Source Premier.

- VENTER, C. S., SLABBER, M. & VORSTER, H. H. 2003. Labelling of foods for glycaemic index – advantages and problems. *South African journal of clinical nutrition*, 16(4):118-126. Available: SA Publications
- WANDEL, M. 1997. Food labeling from a consumer perspective. *British food journal*, 99(6):212-219. Available: Emerald.
- WANG, G., FLETCHER, S. M. & CARLEY, D. H. 1995. Consumer utilization of food labelling as a source of nutrition information. *The journal of consumer affairs*, 29(2):368-380. Available: Academic Search Premier.
- WILES, N. L. 2006. The use and interpretation of the nutrition information on the food label of selected fat spreads by female consumers aged 25-45 years, living in Pietermaritzburg. University of KwaZulu-Natal. (Mini-dissertation – M. Science in Dietetics) 86p.

Title page

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Consumers' understanding and use of information on food labels

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Authors:

Sunelle A Jacobs, Hanli de Beer, Ment Larney

Department of Consumer Sciences, North-West University, Potchefstroom Campus, South Africa

Correspondence:

Sunelle A Jacobs, Department of Consumer Sciences, North-West University, Potchefstroom Campus, Private Bag X 6001, Potchefstroom 2520, South Africa

E-mail: sunelle.jacobs@nwu.ac.za

Abstract

Objective: To investigate adult consumers' understanding of the information on food labels and to determine whether they use the information on food labels in making food choices.

Design: A cross-sectional and descriptive research approach was followed and data were collected by means of questionnaires. Combined stratified and judgemental sampling methods were used to recruit 174 respondents involved in the purchasing of household food products.

Setting: Selected supermarkets in Potchefstroom and Klerksdorp in the North West Province, South Africa.

Subjects: Consumers of African descent and Caucasian consumers, 18 years or older, who are involved in the purchasing of household food products.

Results: Information mostly used on food labels includes the expiry date, ingredient list and nutritional information such as fat and cholesterol content. Consistently, greater use of "low in fat" and "low in cholesterol" nutrient content claims were cited. Difficulties associated with food labels were indicated mainly as the font size of the print, whereas reasons for not reading food labels were related to product attributes, demographic characteristic and situational factors.

Conclusions: Findings indicated that food choices of the majority of respondents who read food labels are influenced by the information on the food label, although the respondents' understanding of the information revealed an inability to apply food label information to make food choices. Reasons for not reading food labels included "taste and price are more important than the nutritional content of the food product", "experiencing time constraints", and "lack of education and nutritional knowledge". This study highlighted barriers to consumers' understanding and use of information on food labels. Improvements to current food labels in South Africa are suggested, as well as guidelines for consumer education regarding the use of food labels.

Introduction

South Africa is a country with a wide diversity of cultures and a range of public health issues. These health issues are associated with infectious and chronic diseases, rapid urbanisation, lifestyle factors and the adoption of a western type of diet^{1,2}. Furthermore, many South Africans have insufficient knowledge to choose the right type and quantities of food³. Therefore, a need exists to help South African consumers to make better food choices during food purchasing.

The food label forms an integral part of consumers' decision-making processes, since it provides nutritional information that could assist them in making healthy food choices^{2,4}. Prior exposure to food labels also limits consumers' information search and consequently saves them time during food purchases⁵. Previous research has found that consumers read the information on food labels without really understanding it, which subsequently limits the effective use of food labels⁶.

At present, food labels offer consumers more complete, useful and accurate information than ever before⁷, although research has stated that food labels contain too much information, which makes it difficult for consumers to understand them⁴. Additionally, food labels are also viewed by consumers to be only a marketing ploy, rather than a means to communicate product quality or nutritional information⁸. In South Africa the current food labelling regulations (regulated under the Foodstuffs, Cosmetic and Disinfectant Act 54 of 1972) are being reviewed and the draft regulation aims to control untruthful or misleading information on food labels⁹. This is ensured by regulating the precise conditions for the wording to be used on food labels and stressing mandatory information that should be included, such as name, use-by date, ingredient list and possible causes of allergies⁹. The draft food labelling regulations have been viewed by consumer groups and dieticians as progress towards encouraging a healthier nation¹⁰. However, the food label can only guide consumers during food choices and does not by itself provide a better or more critical understanding of nutritional principles or skills to use the provided information^{7,11,12}.

In order to ensure effective food choices, consumers need to understand the information on the labels. Though, several studies found that consumers experienced difficulties understanding the nutritional information on the labels, especially the terminology¹³⁻¹⁶. This problem was also identified to exist in South Africa in a study that investigated consumers' perceptions of food labels and how it influenced their purchasing behaviour¹⁷. The participants were recruited mainly from selected supermarkets in Potchefstroom, located in the North West Province of South Africa. The results of this study indicate that consumers do not understand the terms and abbreviations used on food labels and that they need to be educated regarding the reading and interpretation of information on the label¹⁷.

Previous studies found that consumers who do frequently use food labels are educated females^{15,18,19} of a higher socio-economic class^{15,20,21} and have a greater awareness of health^{15,18,19,22,23}. Female consumers' use of food labels has often been the focus of previous studies, as these consumers were considered to be the gatekeepers of the household's food choices and purchases^{12,24,25}. However, over the years, changes in gender roles and household responsibilities have become evident^{23,26}, and therefore the understanding and use of information on food labels by male consumers should also be included in studies.

To illustrate consumers' understanding and use of information on food labels, the conceptual frameworks of Balasubramanian and Cole²⁷, Drichoutis *et al.*²⁸ and Gracia *et al.*²⁹ were adopted to develop a decision-making framework for the present study (Figure 1). Consumers' decision-making entails the processes that influence their product choices when multiple options are available, and how the information from each alternative might affect their product choice³⁰. Therefore, when consumers are faced with a need or are motivated to purchase a food product, the information on the food label and the consumer's evaluation thereof might influence their decision to purchase the product. The higher the consumer's perceived risk associated with the use of the product, the more involved the consumer would be in the search for and evaluation of product information³⁰. This implies that consumers differ in their motivation to search for or use information on food labels.

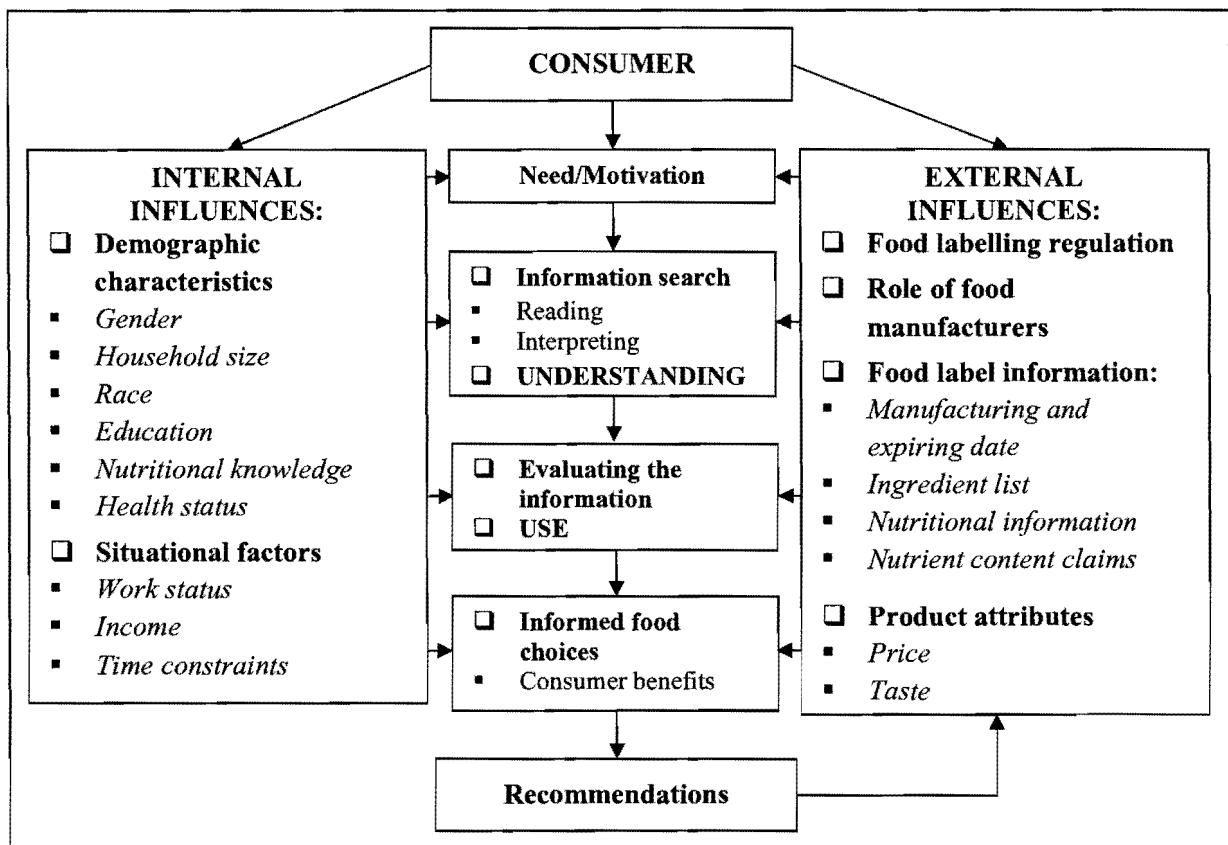


Figure 1 Conceptual framework of consumers' understanding and use of information on food labels, as derived from Balasubramanian and Cole²⁷, Drichoutis *et al.*²⁸, Gracia *et al.*²⁹ and Schiffman and Kanuk³⁰.

Therefore, consumers' search for information on food labels might be active or accidental⁵, although it would be affected by the extent to which they understand the information. Consumers' understanding of information on food labels is dependent upon their cognitive abilities to read and interpret the information on the label¹⁵. However, one can distinguish between consumers' subjective and objective understanding. In contrast to subjective understanding, which is consumers' own subjective perception of the meaning of the information, objective understanding refers to consumers' interpretation of the information being comparable to what was intended by the sender⁵. Nevertheless, consumers' understanding of the information would determine how and if the information on food labels is use when food choices are made. Furthermore, consumers' use of food labels specifically refers to their reading,

interpretation and evaluation of the information on food labels, which would also determine the importance that consumers associate with this information.

Included in Figure 1 are internal influences (demographic characteristics and situational factors) and external influences (food labelling regulations, food manufacturers, food label information and product attributes). The external influences were included due to their role in determining the information provided on food labels²⁷, and internal influences that lie within the consumer were also considered. These internal and external influences would have a direct effect on consumers' understanding and use of food label information and ultimately on their ability to make informed food choices.

This study investigated adult consumers' understanding of the information on food labels and determined whether they use the information on food labels in making food choices. Research in South Africa addressing this issue is minimal, although it is required especially when considering consumers' limited nutritional knowledge to make healthy food choices³ and the amendment to the food labelling regulations. Therefore, the study's objectives were to identify what information consumers use on food labels, as well as what difficulties they experience when using food labels, and then to explore their reasons for not using food labels. The relationship between consumers' understanding of the information on food labels and their ability to make informed food choices was also investigated. Difficulties associated with the understanding and use of food labels should be determined so that recommendations can be made to food label regulators and food manufacturers regarding consumers' needs in terms of food labels.

Methods

Research design and sampling

A cross-sectional and descriptive research approach was followed. The study was conducted in two neighbouring cities, Klerksdorp and Potchefstroom, which are located in the North West Province of South Africa. Potchefstroom is known for its academic environment, while

Klerksdorp is associated with a mining community³¹. The use of these two cities increased the socio-economic diversity of the target population. A stratified and judgemental sampling method was used to choose a representative sample, consisting of male and female consumers of African descent and Caucasian consumers 18 years or older. Only consumers involved in the purchasing of household food products were included, as these consumers were exposed to food labels while purchasing food.

A proportional stratified sample was obtained by formulating stratum fractions according to location, race and gender (Table 1), using census data provided by Statistics South Africa³². The sample contained the following profiles: 28% (49 respondents) and 72% (125 respondents) of the respondents were drawn from Potchefstroom and Klerksdorp respectively (Table 2).

Table 1 Census of Potchefstroom and Klerksdorp according to location, gender and race³².

Location	Total population	Race	Gender (%)	
			Male	Female
Potchefstroom	120 172	African descent	37	35
		Caucasian	14	14
Klerksdorp	366 629	African descent	45	42
		Caucasian	6	7

Table 2 Respondents from Potchefstroom and Klerksdorp included in the sample.

Location	Total respondents	Race	Gender			
			Male (n)	(%)	Female (n)	(%)
Potchefstroom	49 (28%)	African descent	18	37	18	37
		Caucasian	5	10	8	16
Klerksdorp	125 (72%)	African descent	51	41	47	37
		Caucasian	11	9	16	13

Data collecting

Supermarkets were chosen as the appropriate site for data collection, since consumers encounter food labels during the purchasing of food products¹³. Potential respondents were approached after they had completed their purchases, as this could contribute to a reflection of their label information experiences. Shoprite, Checkers and Pick 'n Pay supermarket chain stores were chosen, as these supermarkets comprise 80% of the supermarket sector in South Africa³³. A telephone directory was used to compile a list of all such supermarkets located in the Potchefstroom and Klerksdorp region. The managers of the supermarkets were approached about the aim of the study and asked for permission to conduct the study.

Data were collected throughout the day and week, during non-peak hours (9 am–12 am and 2 pm–4 pm) of the day, by means of questionnaires that were completed through face-to-face encounters. Due to the relatively low level of literacy of the South African population, this method is widely used in South Africa³⁴. The researcher was assisted by a Tswana-speaking fieldworker, who explained and/or translated the questions to the respondents who were not fluent in English or Afrikaans. A table and chairs were placed at the entrance to the supermarket to assist the researcher and the respondents for the duration of the data collection.

Before completing the questionnaires, the respondents were informed fully about the research aim, their right to withdraw from the study at any point, as well as their anonymity and the confidential use of all the data gathered. The respondents each received a pamphlet that provided them with additional information on food labels to encourage them to use the information on food labels before purchasing food products. The study was approved by the Ethics Committee of the North-West University, Potchefstroom Campus, no. NWU-0056-08-S1.

Questionnaire development

The questionnaire contained 35 items, consisting of both open and closed-ended questions. The process of setting the questions and the formulation of statements was initiated through a review

of relevant literature used by previous studies relating to consumers' understanding and use of information on food labels^{11,16,17,19,22,24,25}. The questionnaire was divided into three sections and took approximately 15 minutes to complete.

Section A contained relevant demographic and food-purchasing behaviour questions to ensure the recruitment of respondents according to the study's aim. Section B focused on the first three objectives of the study, which were to determine the respondents' use of information on food labels, identify difficulties they may experience when using food labels and explore reasons why they do not use the information on food labels. Section C of the questionnaire aimed to determine the relationship between the respondents' understanding of the information on food labels and their ability to make informed food choices. The respondents were asked to perform labelling tasks in relation to three label samples that tested their abilities to: (i) use the ingredient list, (ii) associate food nutrients with a food product when presented with a food label and (iii) compare the nutritional information of different food products. The responses to the latter were marked and scores were awarded based on the level of correctness, with points being awarded for correct answers and no points being awarded for either an incorrect answer or a "don't know" response.

The questionnaire was carefully translated from English into Afrikaans by a person proficient in both languages to reflect the same information as in the original text. A pilot test was also conducted prior to the main study to evaluate the clarity of all the questionnaire items³⁵ and to ensure that the length of the questionnaires did not discourage respondents.

Data analysis

The closed-ended questions were analysed with the help of the Statistical Consultation Services of North-West University, Potchefstroom Campus. These questions were pre-coded and analysed by means of SPSS (Statistical Package for the Social Sciences) and S-Plus. The following statistical methods were used:

- 1) Descriptive statistics, which included summary statistics (e.g. mean and standard deviations), frequency tabulation and contingency tables. Bar charts and boxplots were used for graphical representation.
- 2) Testing relationships in contingency tables computed by means of the effect size w . The effect size is defined as $w = \sqrt{\frac{\chi^2}{n}}$ and was interpreted as: a small effect $w = 0.1$, a medium effect $w = 0.3$ and a large effect $w = 0.5$ ³⁶. A relationship with $w \geq 0.5$ is considered as important.
- 3) The effect size used to compare group means was $d = \frac{|\bar{x}_1 - \bar{x}_2|}{s_{\max}}$ where $\bar{x}_1$ and $\bar{x}_2$ are the sample means of the two groups and $s_{\max} = \max(s_1, s_2)$, in which s_1 and s_2 are the sample standard deviation of the group. Ellis and Steyn³⁶ give the following guidelines for interpretation: $d = 0.2$ (a small effect), $d = 0.5$ (a medium effect) and $d = 0.8$ (a large effect). A large effect size indicates an important difference between the groups.

Open-ended questions were analysed by means of content analysis in order to analyse and organise these questions within the aim of the study. As described by Denscombe³⁷, analysis was done by reading the responses to these open-ended questions and identifying categories relevant to the study. Identified categories were analysed in terms of their relationship with each other³⁷ and use to describe responses to these questions.

Results and discussion

Demographic characteristics of the sample

A total of 174 respondents participated in the study. The sample population was chosen according to a stratified sampling scheme (Table 2), which ensured a proportional representation in terms of race and gender for the study population. Respondents were primarily under the age of 45 years (74.9%), with 33.7% from the 25 to 34-year-old age group. Food purchasing was found to be performed largely on a weekly basis and between 30 and 60 minutes were usually

spent in-store. Most of the households (40.6%) spent R500–R999 on food purchases per month, with only 25.7% spending less than R500 and 33.9% spending more than R1 000. High blood pressure and obesity were the most frequently observed health condition among the 54.9% of the sample reporting a diet-related health condition. About 30% of the respondents had a grade 10 or lower level of education, whereas 70.7% had a grade 12 or higher level of education, and 45.7% of the sample were employed full time. Only 6.9% of the represented households were people who lived alone, while 57.7% had two to four people living at home and 34.8% had five or more people.

The frequency of label reading was determined by dividing the respondents into three groups in terms of those who “always”, “sometimes” and “never” read food labels. The results obtained, not indicated in table format showed that 24.7% of all the respondents indicated that they “always” read the information on food labels, whereas 42.0% of the respondents read food labels “sometimes” and 33.3% of the respondents indicated that they “never” read information on food labels. These results are verified by other studies¹⁵, which indicate that most consumers claim to look at food labels often or at least sometimes. For the purpose of this discussion, the “always” group is referred to as group A, the “sometimes” group as group B and the “never” group as group C.

The effect size (see section on data analysis) was used to quantify the relationship between the frequency of label reading of the three respondent groups and their demographic characteristics (gender, household size, race, education and health status), as well as situational factors (work status and income). The only relationship found to be important was between educational level and frequency of label reading, which had a medium effect ($w = 0.299$). This implies that, as the respondent’s level of education decreased, so did the frequency of not reading food labels, and 54.9% of the respondents with a grade 10 or lower level of education were found “never” to read food labels (Figure 2).

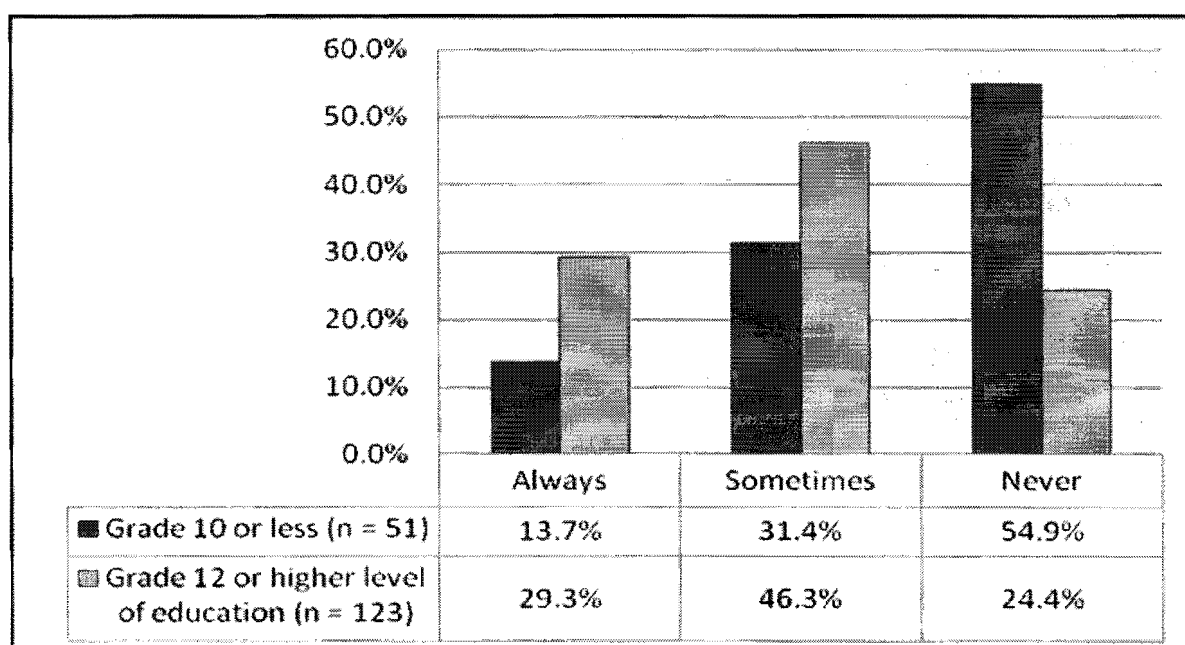


Figure 2 Relationship between respondents' frequency of food label reading and educational level.

It was found that respondents with an educational level lower than grade 10 were more likely “never” to read food labels compared to respondents with a grade 12 or higher educational level, who are most likely to read food labels. These findings could be as a result of the respondents’ awareness of nutrient content, which does increase with extended years of education²⁸. The positive relationship found between frequency of reading food labels and educational level is consistent with the findings of Satia *et al.*’s¹⁹ study among African American respondents, and Neuhouser *et al.*’s¹⁸ study that consisted mostly of white respondents. Contrary to their findings, however, no relationship was found between frequency of label reading and gender, in the present study.

Respondents’ motivations to read food labels

Consumers are expected to have different motivations to search for or use the information on food labels (Figure 1), as determined by the perceived risk they associated with the use of the product. Therefore, it was anticipated that the motivation of respondents who “always” read food

labels might differ from the motivation of respondents who only “sometimes” read food labels. To evaluate this statement, the responses of group A and group B were compared, as the respondents in these groups indicated that they do read food labels. The results as portrayed in Table 3 indicate that 92.8% of group A “always” read food labels to determine the nutritional content of the food product or when purchasing a food product for the first time. Conversely, 76.7% of group B indicated that they “always” read food labels when purchasing a food product for the first time.

Table 3 Respondents’ motivations for reading food labels. Questions ranked according to option 1 (Always) and values are express as % of group A or B.

Motivations for reading food labels	Always	Sometime	Never
GROUP A - which represents 24.7% of all respondents			
To identify the nutrient content of a food product	92.8	4.8	2.4
When purchasing a food product for the first time	92.8	2.4	4.8
When checking nutrient claims made on the label	83.3	4.8	11.9
In-store while doing food shopping	74.4	7.0	18.6
At home as this is more convenient	59.5	14.3	26.2
When following a special diet for medical reasons	47.6	40.5	11.9
GROUP B - which represents 42.9% of all respondents			
When purchasing a food product for the first time	76.7	13.7	9.6
In-store while doing food shopping	71.2	12.4	16.4
When checking nutrient claims made on the label	70.8	20.8	8.4
To identify the nutrient content of a food product	69.4	15.3	15.3
At home as this is more convenient	54.8	16.4	28.8
When following a special diet for medical reasons	27.4	61.7	10.9

Even though 26.2% of group A and 28.8% of group B were found “never” to read the information on food labels at home, 92.8% of group A and 76.7% of group B, indicated to read food labels before purchasing a food product for the first-time (Table 3). Evidently, first-time food purchasing does have a significant influence on consumers’ motivation to read food labels^{15,16,24}.

The comparison of respondents who indicated that they do read food labels as represented in Table 3 shows clearly that group A does have the strongest motivation, as per the reasons mentioned above why they read food labels. It can further be stated that group A are more involved in the search for and evaluation of information on the food label due to the fact that they associate a higher risk with a product's use. The motivation that respondents might have to use food labels was further explored by asking an open-ended question, "Why do you read food labels?" These responses were then categorised according to product- and health-related factors (Table 4).

Table 4 Open-ended question "Why do you read food labels?"

Category	Examples of statements
Product-related factors	
✓ Nutritional content	<i>"so that I can understand how many proteins there are or vitamins"</i> <i>"to know the fat content...also ingredient list"</i> <i>"to know what the product contains...such as preservatives and food colorants"</i>
✓ Quality	<i>"check for product's quality, freshness and energy intake"</i> <i>"some have expired so it is safe to check the "best before" date"</i>
Health-related factors	
✓ Concerned about weight	<i>"to maintain weight...especially new products"</i> <i>"to find out how it will affect my health and weight"</i>
✓ To choose nutritious food	<i>"have a baby...must read so that I know what I'm feeding my child"</i>
✓ Diet-related conditions	<i>"wife has diabetes...I am self allergic to nuts...check ingredients"</i> <i>"has someone with diabetes in the family"</i> <i>"is diabetic and has high cholesterol"</i>

Consistent with Table 3, the respondents mentioned that they read food labels to determine the nutritional content (especially fat, vitamins and protein content) of products. The quality of the product was also found to be important information motivating respondents to read food labels (Table 4). Some respondents mentioned that weight concerns motivated their food label reading,

so as to assist them in choosing nutritious food or food products appropriate for individuals with diet-related diseases. This highlights the fact that consumers should be made aware of the benefits of reading food labels, for instance the ability to choose more nutritious food, as such benefits motivate label-reading behaviour.

Identifying information that respondents use on food labels: expiry date, ingredient list, nutritional information and nutrient content claims

The importance consumers associate with the use of the expiry date, ingredient list, nutritional information and nutrient content claims was determined by asking whether such information is “very important”, “moderately important” or “unimportant”. As shown in Table 5, both groups A and B regarded the expiry date as “very important”. These results are consistent with the respondents’ motivations for using food labels to determine the quality of the product, as presented in Table 4. Such information therefore is important in their search for products with the longest shelf life, as it serves as an indication of freshness¹⁶. Consequently, food manufacturers should ensure that the expiry date appears clearly on all food products¹⁷.

Although 83.3% of group A and 59.1% of group B indicated use of the ingredient list on food labels, only 48.7% of them specified that they use the ingredient list to avoid certain ingredients, such as additives and preservatives (13.1%), tartrazine (10.3%) and MSG (6.3%). Due to the low responds rate the above mentioned results were not included in Table 5, though it were speculated that consumers are not concerned about the ingredients in their food or that they do not understand the terms used in the ingredient list.

Nutritional information such as fat (81.4%) and cholesterol (81%) were found to be “very important” to group A (Table 5). With regards to nutrient content claims, both groups considered claims such as “low in fat” and “low in cholesterol” to be very important information on food labels. Though, “low in fat” claims were only regarded as “very important” by 67.1% of group B, in contrast to 79.1% of group A.

Table 5 Respondents' use of specific information on food labels. Values are express as %.

Information on food label	GROUP A (n 43)			GROUP B (n 73)		
	Very important	Moderately important	Unimportant	Very important	Moderately important	Unimportant
Expiry date	97.7	2.3	0	94.4	2.8	2.8
List of ingredients	83.3	16.7	0	59.1	25.4	15.5
<i>Nutritional information</i>						
Total fat information	81.4	11.6	7.0	55.6	30.6	13.8
Cholesterol information	81.0	7.0	12.0	56.2	28.8	15.0
Fibre information	76.2	4.8	19.0	52.1	26.0	21.9
Vitamins and minerals information	73.9	19.1	7.0	72.6	16.4	11.0
Grams of protein	69.0	19.0	12.0	48.6	33.3	18.1
MDR (Minimum Daily Requirements)	66.6	12.0	21.4	31.9	30.6	37.5
Grams of carbohydrates	65.1	25.6	9.3	49.3	32.9	17.8
<i>Nutrient content claims</i>						
Low in cholesterol	80.9	4.8	14.3	56.2	23.3	20.5
Low in fat	79.1	9.3	11.6	67.1	17.8	15.1
Low in sugar	66.7	19.0	14.3	54.8	21.9	23.3
Low GI (Glycaemic Index)	65.1	4.7	30.2	40.3	30.5	29.2
High in fibre	65.1	16.3	18.6	49.3	28.8	21.9

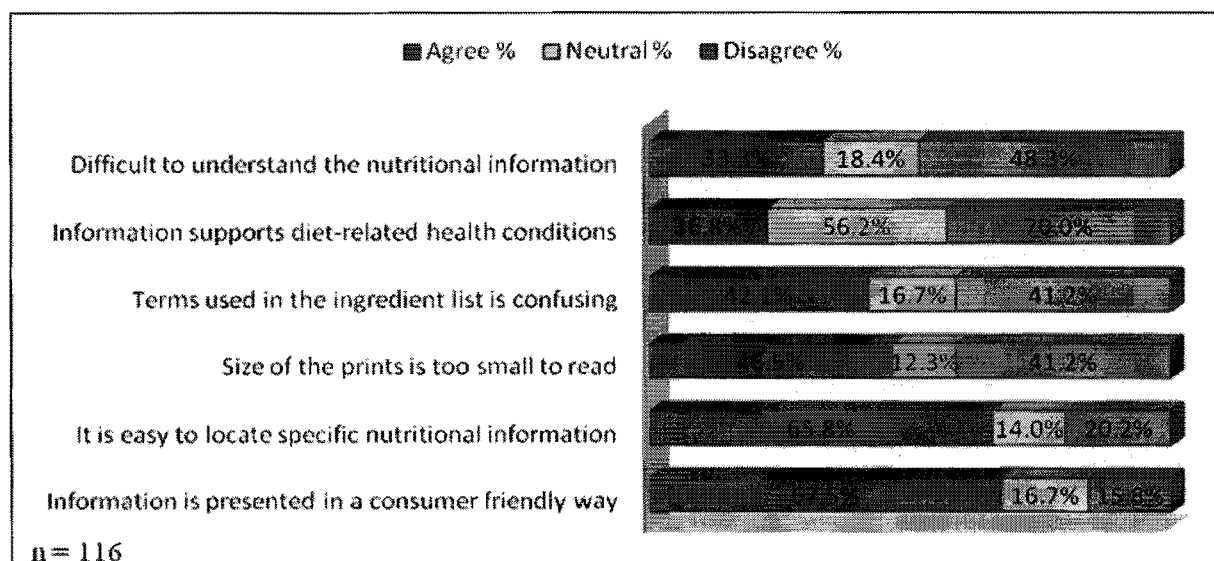
From Table 5 it would seem that claims such as “low GI” and “high in fibre” are less important to both groups as compared to fat and cholesterol information. The unimportance respondents associated with such information could be because it is less well known or less well understood by consumers³⁸. Regardless, the importance respondents associated with the fat and cholesterol information on food labels could possibly be as a result of overall weight and diet awareness among respondents.

Lin *et al.*³⁹ reported that respondents who attempted to maintain weight and follow a diet low in fat or cholesterol had a higher probability of searching for information on food labels. This primary interest in the fat content of the product could indicate consumers’ lack of understanding of nutrients in general and therefore their inability to evaluate the food label⁴. Interestingly, 72.6% of group B reported the use of vitamin and mineral information as being more important than information such as the ingredient list, fat or cholesterol information (Table 5). Only 31.9% of this group reported the MDR (minimum daily requirement) information as being very important, confirming their inability to evaluate and understand nutritional information on food labels.

Identifying difficulties that respondents encounter when using food labels and their reasons for not using food labels

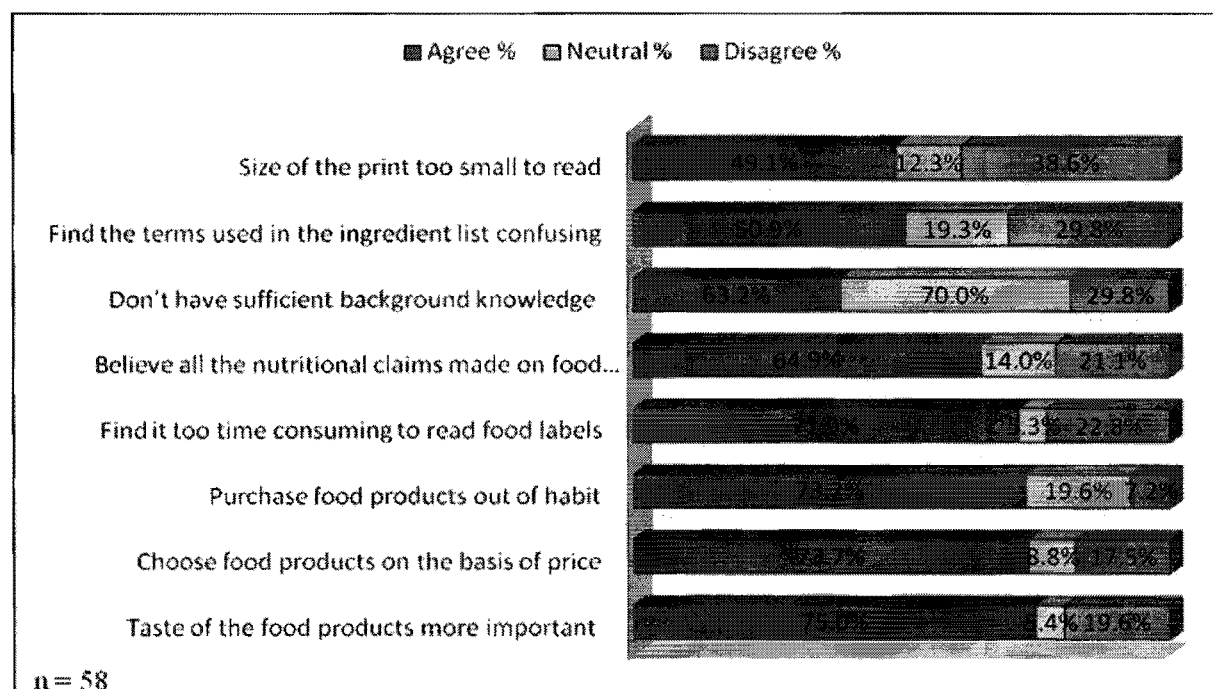
A total of 67.5% of the respondents who read food labels (groups A and B) regarded the information to be consumer friendly or easy to use, and 65.8% had no difficulty in finding specific nutritional information on the label (Table 6). The fact that 70% of the respondents indicated that food labels do not support their diet-related health conditions is of concern, as food labels should specifically assist such consumers during food purchases. Difficulties were further experienced by groups A and B with regard to the letter size used on food labels. The results indicated that 46.5% of the respondents experienced difficulties using the information on food labels due to the size of the letters, which are too small to read. Except for the terms used in the ingredient list, which were found to be confusing to 42.1%, no other difficulties associated with the use of food labels were reported by either group A or B.

Table 6 Difficulties respondents encountered when using food labels (group A and B). Questions ranked according to option 1 (Agree).



The reasons why respondents do not read the information on food labels were determined by evaluating the responses of group C, as this group indicated that they “never” read food labels. These responses are shown in Table 7. It seems that 75% of the respondents think the taste of the product is more important than the nutritional content, followed by purchasing food on the basis of price (73.7%), out of habit (73.2%) and that food labels are too time consuming to read (71.9%). That the taste of the product is regarded as being more important than the nutritional content indicates a lack of interest in the nutritional content of the purchased food, or a belief that food of greater nutritional value might have an inferior taste²⁸. Previous studies have also found that habitual shoppers do not use food labels and are more concerned about the price of the food product^{24,29,40}. Therefore, respondents who purchase food out of habit are generally more price conscious. However, this could also be related to the time constraints they experience when purchasing food, which will explain why the respondents in this study found food labels too time consuming to read.

Table 7 Reasons why respondents do not read the information on food labels (group C).
Questions ranked according to option 1 (Agree).



Reasons respondents gave for not reading food labels were further explored by means of an open-ended question: “Why don’t you read food labels?” (Table 8). Routine purchases, price considerations and time constraints were again mentioned. Evidently, the price and affordability of food products had an influence on the respondents’ dietary practices^{2,29}. It was also noticed that some respondents avoided reading food labels due to a lack of interest, which perhaps means that these consumers do not see the relationship between reading labels and improved quality of their diet⁴¹.

Consistent with Figure 1, external influences associated with product attributes, such as taste and price of the product, had a great influence on the respondents’ use of food labels. Therefore, it should be communicated to consumers that more nutritious food products are not necessarily more expensive. In contrast to the external influences, internal influences, such as situational factors like experiencing time constraints, might also explain why routine food purchases are often undertaken without considering the information on the food label.

Table 8 Open-ended question: “Why don’t you read food labels?”.

Category	Example of statements
✓ Routine food purchasing	<i>“pick what I want” “past experience...know what the product contains”</i>
✓ Price concerns	<i>“usually go for the cheapest product” “purchases basic food products... have a large household”</i>
✓ Time constraints	<i>“takes too long... just look at the colour” “it takes up time and normally don’t have time to read”</i>
✓ Lack of interest	<i>“not interested...when I like a product I will purchase it don’t care what the product contains” “buy food based on the brand name...also taste”</i>
✓ Insufficient knowledge or reading skills	<i>“don’t have enough knowledge to understand...struggle with the size of the letters on the label” “can’t read...only went to school until Grade 5”</i>

Other reasons the respondents had for not reading food labels included insufficient knowledge or reading skills to read and interpret the information on the food label (Table 8). These reasons are due to internal factors influencing the use of food labels and are related to demographic characteristics (Figure 1), more specifically level of education and nutritional knowledge. In support of these results, a New Zealand study also found the understanding of nutritional information on food labels to be a barrier to the use of food labels⁴⁰. Having weaker reading skills could be the reason why consumers disregarded the nutritional information on food labels and suggests that the language and terminology used on food labels have a direct effect on consumers’ food choices⁴². These results support the conceptual framework (Figure 1), in which consumers’ understanding of the information on food labels seemed to be dependent on their cognitive abilities to read and interpret the information. Furthermore, it emphasises that education is the most important demographic characteristic influencing consumers’ understanding and use of food labels, but also that the information on food labels should be presented in such a way as to assist consumers with limited reading abilities.

Relationship between respondents' understanding of the information on food labels and their ability to make informed food choices

The respondents were asked to perform labelling tasks concerning three label samples that tested their abilities to: (i) use the ingredient list, (ii) associate food nutrients with a food product when presented with a food label and (iii) compare the nutritional information of different food products. The outcome of this is presented in Figure 3, with results grouped according to respondents who “always” (group A), “sometimes” (group B) or “never” (group C) read food labels. The results from the statistical summary indicated that group A attained an average score of 55.5%, in comparison to 44.1% for group B and 36.3% for group C.

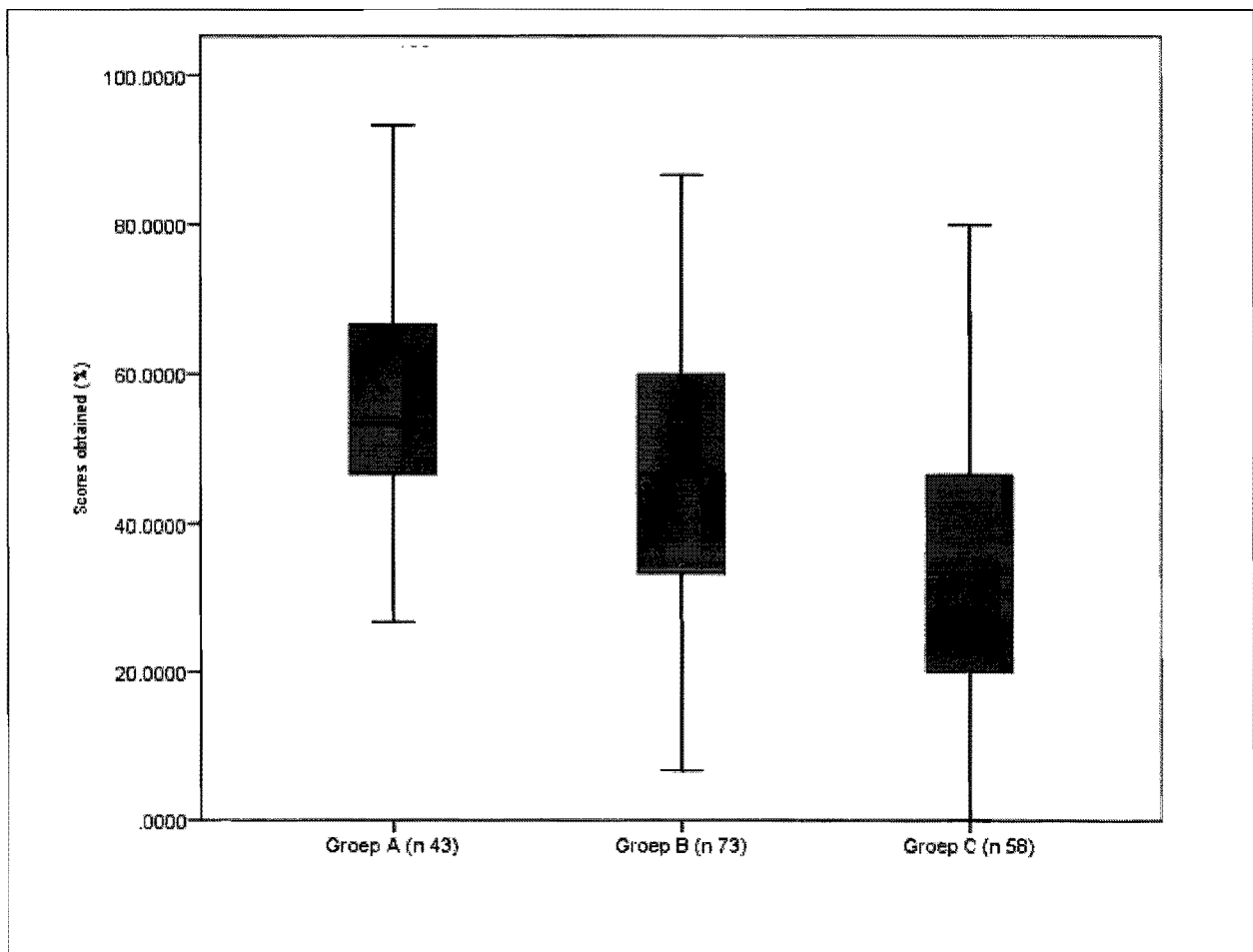


Figure 3 Boxplot illustration of the scores for the label-reading tasks.

The standard deviation spread between the three groups was also comparable (group A = 18.0; group B = 19.2; group C = 21.4). Effect sizes (see section on data analysis) were used to measure the relationship between the respondents' understanding of the information on food labels and their ability to use food labels in order to make informed food choices. A medium effect ($d = 0.59$) was found between group A and B, compared to a small to medium effect ($d = 0.36$) between group B and C. However, a large effect ($d = 0.89$) was found between group A and group C. This means that respondents who "always" read food labels are more likely to achieve a higher score in the labelling tasks compared to respondents who only "sometimes" or "never" read food labels. Therefore, as the respondents' reading of food labels increased, so did their understanding and their ability to use the information on food labels to make informed food choices, which is consistent with the finding of a South African study conducted by Anderson and Coertze²⁴. However, low scores with regard to the labelling tasks were recorded overall, which suggests that the respondents have insufficient understanding of the information on food labels to assist them in making their food choices.

The relationship between the respondents' educational levels and demographic characteristics (gender, household size, race, education and health status) was also compared with the scores of the label-reading tasks. This relationship was quantified by means of effect size (see section on data analysis). The only relationship that was found to have an important effect was between the respondents' level of education and their understanding of the information on the food labels, as shown in Figure 4. Respondents with a grade 10 or lower level of education attained a mean score of 32.0%, compared to the mean score of 49.0% of respondents with a Grade 12 or higher level of education. The d value in this case was 0.86 indicating a large effect between the groups.

These results indicate that, for this sample, respondents with a higher educational level have a greater understanding of the information on food labels. These findings are similar to those of a study conducted in Greece²⁸, although they are inconsistent with the Anderson and Coertze²⁴ study, in which age and level of income were found to have a significant influence on the respondents' level of nutritional knowledge, whereas level of education was not shown to have a significant influence. These differences may be due to the fact that the typical demographic

characteristics of their sample were white middle-income consumers with a grade 10 level of education.

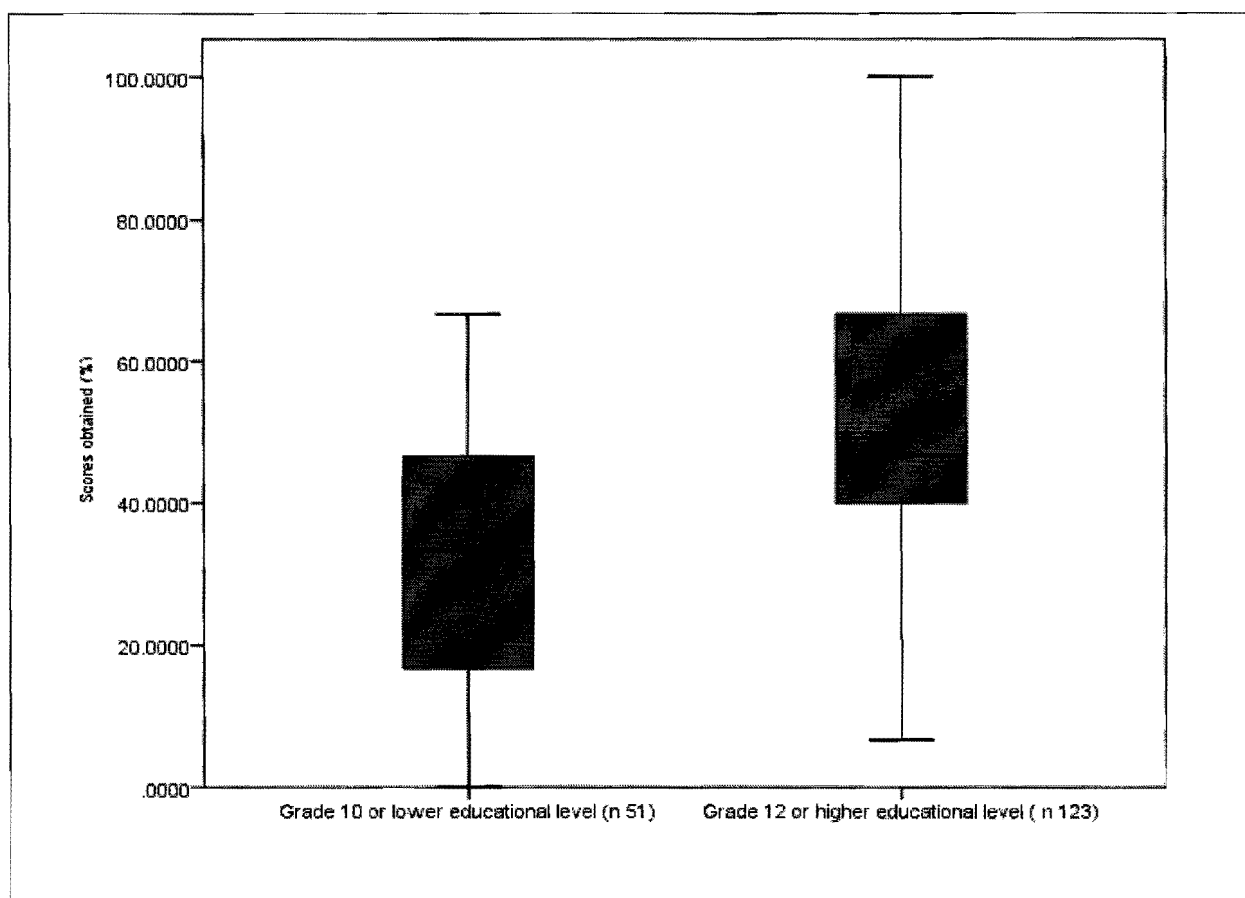


Figure 4 Boxplot illustration of relationship between the scores for the label-reading tasks and the respondents' educational levels.

Recommendations to improve the information on food labels and communicate nutritional information on the food label

Respondents were asked how the nutritional information on food labels could be improved and better communicated to consumers. A summary of these responses are presented in Table 9. Consistent with the findings of Klein¹⁷, respondents felt the information would be easier to read if more colours, pictures, languages and a larger font size are used. Some mentioned that attempts should be made to improve the understanding of information, such as nutrients or terms

used on food labels. In a French study conducted in supermarkets in four different income categories, the respondents also suggested that nutritional information was written in print too small for them to read and, consistent with the findings of this study, suggested that food labels could be improved by using different colours of print as well as explaining the nutritional terms and values used⁴¹.

Table 9 Open-ended question: “Suggestions to improve and communicate the information on food label to consumers”.

Category	Examples of statements
Improve readability of information	
✓ Using colour and pictures	<i>“use pictures or symbols to help people who can’t read” “make information attractive...especially important information”</i>
✓ Including more languages	<i>“more languages...difficult to understand” “write in language people can understand”</i>
✓ Using larger font size	<i>“think bigger writing should be used so that older people can manage to read it”</i>
Improve understanding of information	
✓ Explain importance	<i>“give information on what nutrients should be used or avoided for certain type of health conditions”</i>
✓ Easier terminology	<i>“give explanation for terms” “easy as possible and understandable” “use key words...use terms that is easy to understand”</i>
Communicate importance of food labels by:	
✓ Provide education in schools	<i>“schools should teach children how to eat healthier” “create awareness under school children”</i>
✓ Communicate through the media	<i>“through television... at home I have more time to listen and read information...especially after 5 pm” “teach people what is protein, fat etc. through the media and advertising”</i>
✓ Provide information in-store	<i>“provide information in-store near the product” “store staff should provide personal assistance in the store”</i>
✓ Targeting specific groups	<i>“create awareness among people with cholesterol or health diseases” “educate or target people with allergies in the community” “making clearer to older people or those who have lack of education”</i>

With regard to how nutritional information could be communicated to consumers, the most frequently suggested format for nutritional education activities was as follows: schools, media (especially television) and in-stores by store personnel (Table 9). A suggestion was also made that specific groups (such as consumers with diet-related diseases) should be targeted and provided with an educational workshop in order to educate them on the importance of food labels. Similar sources of nutritional education were also identified in a study conducted among black urban women living in Pretoria and Cape Town, in which further recommendations were made that nutritional information, should be consistent and disseminated in a practical and affordable manner². Since respondents in the present study also indicated store personnel as a source of nutritional information, staff should be made aware of the importance of nutrition and be provided with the necessary skills in order to assist consumers when using food labels. Therefore, nutritional education on the use of food labels should be offered at schools, to the general public at point-of-purchase, and through the media²⁴.

Conclusion

This study aimed to investigate adult consumers' understanding of the information on food labels and to determine whether they use the information on food labels in making food choices. The conceptual framework (Figure 1) could be used to illustrate the results of the present study. These results draw attention to the fact that food choices of the majority of respondents are influenced by the information on the food label. However, scores from the labelling tasks indicated that respondents did not necessarily have an understanding of how to use food labels.

Different motivations were found to encourage the use of food labels, although first-time food purchases seemed to be the single most important motivation. This highlights the importance of the role of food manufacturers in ensuring that products are provided with food labels that comply with the country's official regulations. Furthermore, respondents indicated that the expiry date and ingredient list were used most. The frequent use of nutritional information related to the fat and cholesterol content of the product was also cited. This might be due to weight- and diet-related disease concerns and could also explain the great interest in "low in fat" and "low in cholesterol" nutrient content claims. However, the great interest in fat and

cholesterol information and relatively low interest in the use of nutrient content claims, such as “low GI”, “low in sugar” and “high in fibre”, could provide support for the findings that consumers have an inadequate understanding of the nutritional information on food labels, or that they do not know what information to evaluate on the label when making food choices.

Although food labels were generally regarded as easy to use, respondents disagreed with the statement that food labels are supportive of their diet-related health needs. The reasons given for not reading food labels were further related to internal and external influences. External influences affecting the use of food labels seem to be associated with product attributes, such as the taste and price of the product. The importance placed on the price of the product could imply that a need exists to educate consumers regarding the use of food labels to assist them in choosing food products with greater nutritional value at a lower cost. Internal influences were associated with situational factors, such as experiencing time constraints, and demographic characteristics, such as level of education and nutritional knowledge.

To strengthen the practical relevance of this study, it is recommended that food label regulators and manufacturers include the use of colours, pictures and different languages on food labels to support consumers in their use thereof. The use of colour and pictures on food labels could also address language barriers and the illiteracy experienced in South Africa. To further assist in the understanding of food labels, additional information, such as explanations of nutritional terms, could be provided in-stores.

Due to the relatively small sample size, care should be taken when generalising the results of this study to the wider population of South Africa. Thus, it is recommended that further research in this field of study should be performed on a larger scale that includes more consumers, supermarkets and provinces in South Africa. It is also recommended that more objective methods of data collection, such as observations, should be implemented to determine how consumers use food labels in real-life situations. Nevertheless, the findings of the present study are of value to food labelling regulators and manufacturers, as suggestions for improving current food labels are made. In addition, guidelines are also provided to those involved in the field of consumer

education for the implementation of an educational medium to inform consumers regarding the use of food labels.

References

1. Bradshaw D, Groenewalt P, Laubscher, R *et al.* (2003) Initial burden of disease estimates for South Africa, 2000. *S Afr Med J* **93**, 682-688.
2. Charlton KE, Brewitt P & Bourne LT (2004) Source and credibility of nutrition information among black urban South African women, with a focus on messages related to obesity. *Public Health Nutr* **7**, 801-811.
3. Spowart SJ (1998) A system of nutritional labelling to improve food choices and nutritional status of South African. PhD Thesis, North-West University, Potchefstroom Campus.
4. Jones G & Richardson M (2007) An objective examination of consumers perception on nutrition information based on healthiness ratings and eye movements. *Public Health Nutr* **10**, 238-244.
5. Grunert KG & Wills JM (2007) A review of European research on consumer response to nutrition information on food labels. *J Public Health* **15**, 385-399. <http://www.citeulike.org/article/2173385> (accessed May 2009).
6. Higginson CS, Rayner MJ, Draper S *et al.* (2002) How consumers use nutrition label information. *Nutr Food Sci* **32**, 145-152.
7. Anon (2005) Using nutrition-related claims to build a healthful diet. *Food Insight* 2-3, Jan/Feb.
8. Coveney J (2007) Food and trust in Australia: building a picture. *Public Health Nutr* **11**, 237-245.
9. De Villiers K (2009) Label laws get teeth. *Milk & Juice* **4**, 10-11, 13-15.
10. Comins L (2007) New food label laws 'will make SA healthier'. http://www.iol.co.za/index.php?click_id=13&set_id=1&art_id=vn20070731043704332C765922 (accessed April 2008).
11. Levy AS & Fein SB (1998) Consumers' ability to perform tasks using nutrition labels. *J Nutr Educ* **30**, 210-217.

12. Alfieri L & Byrd-Bredbenner C (2000) Assessing the performance of women on nutrition labeling tasks. *Am J Health Studies* **16**, 113-123.
13. Shine A, O'Reilly S & O'Sullivan K (1997) Consumer use of nutrition labels. *Br Food J* **99**, 290-296.
14. Wandel M (1997) Food labeling from a consumer perspective. *Br Food J* **99**, 212-219.
15. Cowburn G & Stockley L (2005) Consumer understanding and use of nutrition labeling: a systematic review. *Public Health Nutr* **8**, 21-28.
16. Peters-Teixeira A & Badrie N (2005) Consumers' perception of food packaging in Trinidad, West Indies and its related impact on food choices. *Inter J Consum Studies* **29**, 508-514.
17. Klein R (2005) A South African study of consumers' perceptions of food labels and its relevance to their purchasing behaviour. M Mini-dissertation, North-West University, Potchefstroom Campus.
18. Neuhouwer ML, Kristal AR & Patterson RD (1999) Use of food nutrition labels is associated with lower fat intake. *J Am Diet Assoc* **99**, 45-53.
19. Satia JA, Galanko JA & Neuhouwer ML (2005) Food nutrition label use is associated with demographic, behavioural and psychosocial factors and dietary intake among African Americans in North Carolina. *J Am Diet Assoc* **105**, 392-403.
20. Wang G, Fletcher SM & Carley DH (1995) Consumer utilization of food labelling as a source of nutrition information. *J Consum Aff* **29**, 368-380.
21. Hess S, Yanes M, Jourdan P *et al.* (2005) Trans-fat knowledge is related to education level and nutrition facts label use in health-conscious adults. *Top Clin Nutr* **20**, 109-117.
22. Szykman LR, Bloom PN & Levy AS (1997) A proposed model of the use of package claims and nutrition labels. *J Public Policy Mark* **16**, 228-241.
23. Nayga RM, Lipinski DE & Savur N (1998) Consumer' use of nutritional labels while food shopping and at home. *J Consum Aff* **32**, 106-120.
24. Anderson DJ & Coertze DJ (2001) Recommendations for an educational programme to improve consumer knowledge of and attitudes towards notional information on food labels. *S Afr J Clin Nutr* **14**, 28-35.

25. Wiles NL (2006) The use and interpretation of the nutrition information on the food label of selected fat spreads by female consumers aged 25-45 years, living in Pietermaritzburg. M Mini-dissertation, University of KwaZulu-Natal.
26. Fuller GW (2001) Food, consumers, and the food industry: catastrophe or opportunity? Boca Raton, FL : CRC Press.
27. Balasubramanian SK & Cole C (2002) Consumers' search and use of nutrition information: the challenge and promise of the nutrition labelling and education act. *J Mark* **66**, 112-127.
28. Drichoutis AC, Lazaridis, P & Nayga R M (2005) Nutrition knowledge and consumer use of nutritional food labels. *Eur Rev Agric Econ* **32**, 93-118.
29. Gracia A, Loureiro M & Nayga MR (2007) Do consumers perceive benefits from the implantation of a EU mandatory nutritional labeling program? *Food Policy* **32**, 160-174.
30. Schiffman LG & Kanuk LL (2007) Consumer behavior. 9th ed. Upper Saddle River, N.J. : Pearson Prentice Hall.
31. PCC (Potchefstroom City Council) (2007) Integrated development plan 2006 to 2010. http://www.potch.co.za/council/keydocs/budget2008/integrated_dev_plan_07_10.pdf (accessed April 2008).
32. STATS SA (Statistic South Africa) (2008) Community Survey 2007. Pretoria.
33. Weatherspoon DD & Reardon T (2003) The rise of supermarkets in Africa: implications for agrifood systems and the rural poor. *Dev Policy Rev* **21**, 33-355.
34. Babbie E & Mouton J (2001) The practice of social research. South African ed. Cape Town: Oxford University Press Southern Africa.
35. Rubin A & Babbie ER (2005) Research methods for social work. 5th ed. Belmont: Brooks/Cole.
36. Ellis SM & Steyn HS (2003) Practical significance (effect sizes) versus or in combination with statistical significance (p-values). *Manage Dynam* **12**, 51-53.
37. Denscombe M (2007) The good research guide: for small-scale social research projects. 3rd ed. Maidenhead: Open University Press.
38. Higginson CS, Rayner MJ, Draper S *et al.* (2002) The nutrition label – which information is looked at? *Nutr Food Sci* **32**, 92-99.

39. Lin CTJ, Lee, JY & Yen ST (2004) Do dietary intakes affect search for nutrient information on food labels? *Soc Sci Med* **59**, 1955–1967.
40. Signal L, Lanumata T, Robinson J *et al.* (2007) Perceptions of New Zealand nutrition labels by Mā ori, Pacific and low-income shoppers. *Public Health Nutr* **11**, 706-713.
41. Mannell A, Brevard P, Nayga R *et al.* (2006) French consumers' use of nutrition labels. *Nutr Food Sci* **36**, 159-168.
42. Boehl T (2007) Linguistic issues and literacy barriers in nutrition. *J Am Diet Assoc* **107**, 383.

CHAPTER 4

CONCLUSION AND RECOMMENDATIONS

4.1 Introduction

This chapter provides conclusions regarding the accomplishment of the research objectives and the empirical findings of this study. Possible implications and recommendations for those involved in the field of food labels (government, food industry, health workers and consumer educators) are discussed. Attention is also drawn to the limitations and significance of the research procedure. A summary of these aspects is presented at the end of the chapter in conjunction with suggestions for future research.

4.2 Conclusion

The broad aim of this study was to investigate adult consumers' understanding of the information on food labels and to determine whether they use the information on food labels in making food choices. To focus and guide the study within the field of consumer behaviour, an adopted conceptual framework (Figure 1) was used. Therefore, the decision-making process of the consumer was incorporated in this framework to assist in the comprehension and interpreting of consumers' understanding and use of food labels. In this framework, understanding and use of information on food labels was explained to be influenced by consumers' needs and motivation to purchase food products. These needs and motivation determined consumers' search for and evaluation of information on food labels, as well as the benefits they associated with the use of food labels. Internal and external influences identified through the literature that affect consumers' understanding and use of food labels were also included in the conceptual framework.

To address the study's aim, the first objective was to determine what information consumers use on food labels, and attention was drawn to the ingredient list, nutritional information and nutrient content claims found on food labels. The results indicated that the expiry date and the ingredient

list were used most by consumers and were associated with their need to determine product quality. It seemed that the ingredient list is not being used efficiently, as the respondents did not use the ingredient list to avoid certain ingredients. Concerns were raised regarding their understanding of the terminology in the ingredient list. Nevertheless, fat and cholesterol information were regarded as important information on food labels. The respondents also regarded nutrient content claims, such as “low in fat” and “low in cholesterol”, as being very important information. Further investigation by means of an open-ended question highlighted that the importance associated with fat and cholesterol information was motivated by weight and health concerns.

Notwithstanding the fact that fat and cholesterol information is valuable in assisting consumers to make food choices, it could also mean that consumers mostly use this information on food labels because it is often referred to in the mass marketing of food products. Consequently, consumers have a limited understanding of other information provided on food labels, such as GI (glycaemic index), sugar and fibre claims. As explained in Figure 1, consumers’ use of food labels is dependent on their understanding of the information on the labels, which also includes their ability to read, interpret and evaluate the information. Therefore, the second and third objectives were to identify the difficulties consumers experienced when using food labels and to explore their reasons for not using food labels. Although food labels were generally regarded as being easy to use, difficulties were associated with the small font size, and some respondents indicated that the information on the label was not supportive of their diet-related health needs. This is of concern, as it is especially important for these consumers to be able to use food labels when making food choices.

Reasons for not reading food labels appeared to be related to internal and external influences. External influences associated with the product attributes, such as the taste and price, were regarded as being more important than the nutritional content. The importance placed on the taste of the product could imply that consumers do not associate health benefits with the use of food labels and that it should be communicated to consumers that highly nutritious food products are not necessarily more expensive. In addition, there is a need to educate consumers regarding

the use of food labels to assist them in choosing food products with more nutritional value at a lower cost.

Contrary to external influences, internal influences were mainly found to reflect consumers' reasons for not reading food labels. The latter were identified as being the result of situational factors, such as experiencing time constraints. This might also explain why routine food purchases are often undertaken without considering the information on the food label. Other internal factors for not reading food labels were related to demographic characteristics. These included insufficient knowledge or reading skills necessary to read and interpret the information on the food label. This further implies that the language and terminology used on food labels have a direct effect on consumers' food choices. In support of these findings, educational level was also found to be the single most important demographic characteristic influencing consumers' understanding and use of food labels in this study.

Regardless of the difficulties associated with label use, it was found that the respondents were motivated to use labels to determine the nutritional content of the food product when purchasing a food product for the first time, or when in-store during food purchases. Other factors that motivated label use included product-related factors, such as nutritional content and quality of the product, as well as health-related factors associated with weight control.

Food choices of the majority of respondents in this study were found to be influenced by the information on the food label, since 24.7% of the respondents indicated that they "always" read food labels and 42.0% indicated "sometimes". Only 33% indicated that they "never" read food labels. However, these results were inconsistent with the respondents' understanding of the information on the food labels, as was determined through the labelling tasks. These labelling tasks were focused on the fourth objective of the study, namely to determine the relationship between consumers' understanding of the information on food labels and their ability to make informed food choices. Since relatively low scores ("always" = 55.5%, "sometimes" = 44.1% and "never" = 36.3%) were recorded in these labelling tasks, it can be concluded that the

respondents' objective understanding of the information on food labels reveals an unsatisfactory ability to use food labels in making food choices.

4.3 Implications and recommendations

The following implications of consumers' understanding and use of food labels were identified during this study:

- Difficulties are experienced in understanding some terminology found in the ingredient list and nutritional information table;
- too small font size being used on food labels, which negatively affects consumers' use of food labels;
- the information on food labels is not regarded as being supportive of diet-related health conditions;
- level of education has an important role in determining consumers' understanding and use of information on food labels; and
- a low level of understanding of the information on food labels is evident, which affects consumers' ability to use food labels in making healthy food choices.

To encourage consumers' use of food labels, those involved in the provision of labelling on food products, such as the government and food industry, need to assist consumers in their understanding of the information on food labels. Therefore, it is recommended that additional information be provided on the labels, such as an explanation of nutritional terms and guidelines for the use of food labels. To further assist consumers' understanding of food labels, such information should also be readily available in-stores. This is important, as it was found that consumers have a tendency to use food labels in-store when purchasing food products. Store personnel could also be a valuable asset in promoting healthier food choices and should, therefore, be able to assist consumers when they experience difficulties reading the information on the food label. However, the government needs to draw the attention of food industries to the permitted size of the font that may be used on food labels and to ensure endorsement of the food-labelling regulations. Consumers have a preference for the use of colours, pictures and different

languages on food labels. The implementation of such facets could also serve as a means of addressing the language barriers experienced when using food labels in South Africa.

Since level of education was found to be an important influence in consumers' understanding and use of food labels, health workers and consumer educators have an essential role to play in consumers' understanding and use of food labels. It is recommended that consumers should be equipped with the necessary skills to read food labels from an early age. This raises the importance of implementing nutrition education programmes in schools, where the basic principles needed to understand food labels could be addressed, along with the use of hands-on activities in order to learn what information to search for and evaluate on food labels. A constant message of health awareness and the benefits of using food labels to guide healthy food choices should be communicated through the media. Attention should also be focused on educational programmes targeted specifically at consumers with diet-related disease conditions. Such educational programmes should address the principles of nutrition as this would assist consumers in using the information on food labels in their daily diet.

4.4 Limitations and future research

In this study, a cross-sectional and descriptive research approach was followed and data were collected by means of questionnaires, which were completed through face-to-face encounters. Due to time and monetary constraints, the sample used consisted of a relatively small number of the target group living in the Potchefstroom and Klerksdorp region of South Africa. Supermarkets were used as data-collection site. This had the limitation of a low response rate, because respondents were likely to decline participation due to the restricted time they had available whilst shopping. Therefore, care should be taken when generalising the results of the study to the wider population of South Africa.

Regardless of these limitations, the use of combined stratified and judgemental sampling methods ensured the recruitment of a representative sample of consumers of African descent and Caucasian consumers involved in the purchasing of household food products. Therefore, the

findings of this study provide valuable insight into these consumers' use and understanding of the information on food labels. However, it is recommended that this type of research should be performed on a larger scale that includes more supermarkets and provinces in South Africa. This would assist in maximising the generalisability of the results to the different cultural groups in South Africa and to the country as a whole.

Results of the labelling tasks indicated that consumers do not necessarily understand the information on food labels, regardless of the frequency with which these consumers use food labels. It is suggested that more objective methods of data collection, such as observations, be used to determine whether consumers really use food labels, and what type of food products they choose. Some aspects were not addressed by the current study, but could be concluded from the results, such as the specific colours and pictures that should be used on food labels. When considering South African's cultural diversity, it would be feasible to investigate such aspects before they are implemented in food labels, particularly because of cultural differences attached to the meaning of colours and pictures or symbols. It is further recommended that focus groups and interviews be used when investigating consumers' preferences for the use of specific colours and pictures on food labels. The reasons for this are that such methods permit the use of probing techniques whereby underlying meanings and associations could be determined.

RESEARCH METHODOLOGY

1. Research approach

A cross-sectional and descriptive research approach was followed, as it has the advantage of being cost effective while still providing an accurate account of a particular social phenomenon (Neuman & Kreuger, 2003:22). Therefore, this research approach was chosen as it allows the researcher to describe consumers' understanding and use of information on food labels and to determine how this affects their ability to make informed food choices.

2. Study population

The target population consisted of consumers of African descent and Caucasian consumers, 18 years or older living in the Potchefstroom and Klerksdorp region of South Africa. Only consumers involved in the purchasing of household food products were included, as these consumers were exposed to food labels while making food purchases. However, consumers and spouses working in a health-related field were excluded, as it was expected that these consumers would have a greater understanding and awareness of the information on food labels. Inclusion and exclusion criteria were ensured by including screening questions in the questionnaire, as discussed in the questionnaire development section.

3. Study location

The study was conducted in two neighbouring cities, Klerksdorp and Potchefstroom, which are located in the North West Province of South Africa. Potchefstroom is known for its academic environment, while Klerksdorp is associated with a mining community (PCC, 2007:7). Thus the inclusion of these two cities increased the socio-economic diversity of the target population.

Supermarkets were chosen as the appropriate site for data collection, since consumers encounter food labels while purchasing food products (Shine *et al.*, 1997:292). Potential respondents were approached after they had completed their purchases, as this could contribute to a reflection on their experiences of label information. Shoprite, Checkers and Pick 'n Pay supermarket chain stores were chosen as the site for data collection, as these supermarkets comprise 80% of the supermarket sector in South Africa (Weatherspoon & Reardon, 2003:337). Hence, it was assumed that the inclusion of these supermarkets would be an effective way to ensure that consumers from a diverse socio-economic background were recruited.

A telephone directory was used to compile a list of all the mentioned supermarkets in Potchefstroom and Klerksdorp. The list comprised six supermarkets, three in each of the two regions. The managers of these supermarkets were approached about the aim of the study and asked for permission to conduct the study (Annexure B). Except for the Shoprite supermarket in Klerksdorp, all the identified supermarkets gave consent for participation in the study.

4. Sample size and sampling

The sample size needed for this study was determined by examining previous studies that had a similar research aim and method of data collection. The respondents used in these studies varied between 82 (Peters-Teixeira & Badrie, 2005:509), 132 (Tessier *et al.*, 2000:36), 150 (Wiles, 2006:37), 200 (Shine *et al.*, 1997:292; Nayga, 2000:101), 361 (Mannell *et al.*, 2006:162) and 400 (Gracia *et al.*, 2007:166). Based upon these findings, a sample size of 150 to 200 respondents was needed to attain the research aim of the study.

A stratified sampling scheme was used to choose a representative sample. Census data provided by Statistics South Africa (Stats SA, 2008) was used to formulate the stratum fractions according to location, race and gender (Table 1). A proportional stratified sample was obtained and 28% (49 respondents) and 72% (125 respondents) of the sample were allocated from Potchefstroom and Klerksdorp respectively (Table 2). In addition, the respondent total was divided equally amongst the identified supermarkets in each town.

Table 1 Census of Potchefstroom and Klerksdorp according to location, gender and race (Stats SA, 2008).

Location	Total population	Race	Gender (%)	
			Male	Female
Potchefstroom	120 172	African descent	37	35
		Caucasian	14	14
Klerksdorp	366 629	African descent	45	42
		Caucasian	6	7

Table 2 Respondents included in the samples from Potchefstroom and Klerksdorp.

Location	Total respondents	Race	Gender			
			Male (n)	(%)	Female (n)	(%)
Potchefstroom	49 (28%)	African descent	18	37	18	37
		Caucasian	5	10	8	16
Klerksdorp	125 (72%)	African descent	51	41	47	37
		Caucasian	11	9	16	13

A judgemental sampling method was employed to recruit the respondents. This sampling method was selected as an informative sample can be drawn on the basis of the researcher's own judgement (Neuman, 2003:213; Babbie, 2008:204) and according to the predetermined stratum fraction to enhance the representativeness of the sample. In addition, Blaikie (2004:205) states that a judgemental sampling method enables a researcher to deal with cases normally difficult to reach in a particular population. Therefore, this sampling method was even further appropriate as there is no formally recorded data of adult consumers living in the North West Province who are responsible for regular household food purchases. Since a random sample was not employed, no p-values were reported in the statistical analysis, but effect sizes were used instead. These are discussed further in the data analysis section.

5. Data collection

Data were collected by means of questionnaires, completed in face-to-face encounters. This is an accepted method often used in South Africa as a result of the large variation in the literacy level of the South African population (Babbie & Mouton, 2001:249). This method requires the researcher to read the questions to the respondent and record the respondent's answers (Babbie & Mouton, 2001:249; Rubin & Babbie, 2005:290). The researcher was assisted by a Tswana-speaking fieldworker, who explained and/or translated the questions for the respondents who were not fluent in English or Afrikaans. Completing the questionnaires through face-to-face encounters was feasible in this study for the following reasons: the presence of the researcher avoided confusion in interpreting questionnaire items, as these could be clarified for the respondent (Rubin & Babbie, 2005:291; Babbie, 2008:293); non-verbal communication and visual aids could be used successfully; and sensitive questions and issues such as the respondent's race or literacy level could be observed and recorded by the researcher without offending the respondent (Rubin & Babbie, 2005:291).

The following guidelines suggested by Rubin and Babbie (2005:292-294) were followed in order to ensure that the researcher did not affect the respondent's answers: The researcher dressed in a fashion similar to that of the respondents and communicated in a friendly and relaxed manner, without being too casual or clinging. The researcher was familiar with the questionnaire, its content and order, and thus was able to read the questions without error and/or clarify misunderstood questionnaire items. Responses to open-ended questions were recorded exactly and, when needed, comments were made in order to clarify the interpretation of the respondent's answer. Furthermore, whenever necessary to probe for responses to open-ended questions, care was taken to use neutral and the same probes each time.

In order to enhance the representativeness of the sample, data were collected throughout the day and week during non-peak hours (9 am–12 am and 2 pm–4 pm). Tables and chairs were placed at the entrance to the supermarkets to assist the researcher and the respondents for the duration of

the data collection. When respondents agreed to partake in the study and had signed a letter of informed consent (Annexure C), three screening questions were asked to ensure the inclusion of respondents who were responsible for purchasing food for a household, respondents older than 18, and to ensure that neither the respondents nor their spouses worked in a health-related field, as explained above. The questionnaire contained 35 items (Annexure D), which took approximately 15 minutes to complete. After the questionnaire was completed, each respondent was handed a pamphlet that provided additional information on food labels (Annexure E) to encourage them to use the information provided on food labels before purchasing food products.

The use of a judgemental sampling method might introduce a certain amount of sample bias, since data would only be obtained from those respondents who agreed to partake in the study. However, sample bias was reduced by the inclusion criteria, which were predetermined for the sampling process. The questionnaires were also completed outside the supermarkets, which could have decreased participation by potential respondents as they might not have had the time to partake in the study. Nevertheless, it was important to conduct the study at the supermarkets, as explained above. In order to enhance participation, respondents were recruited after they had completed their purchases.

6. Questionnaire development

The questionnaire was developed from a review of relevant literature used by previous studies relating to consumers' understanding and use of the information on food labels (Szykman *et al.*, 1997:238; Levy & Fein, 1998:211; Satia *et al.*, 2005:394; Anderson & Coertze, 2001:31; Peters-Teixeira & Badrie, 2005:511; Klein, 2005:32; Wiles, 2006:38) and contained mainly closed-ended questions. A few open-ended questions were included to reflect on the richness and complexity of the views held by the respondents (Denscombe, 2007:166) on food labelling. In contrast to open-ended questions, closed-ended questions were used to provide for the uniformity of responses and to facilitate quantitative data analyses (Babbie, 2008:272). Measures were taken to ensure that all response categories of the closed-ended questions were exhaustive and mutually exclusive. This was achieved by including all possible responses and combining the

response categories where necessary (Babbie, 2008:273). The questionnaire was also carefully translated from English into Afrikaans by a person proficient in both languages to preserve the original meaning.

The questionnaire (Annexure D) was divided into three sections. Section A contained four screening questions, which were used to recruit only appropriate respondents according to the study's aim (Annexure D, questions 2, 4, 10 & 11). The following independent variables regarding demographics and food-purchasing behaviour were also included in section A: gender, race, amount of money available each month to spend on food for the household, frequency and duration of food purchasing, health status, highest education level, employment status, marital status and household size.

Section B focused on the first three objectives of the study, which were to determine the respondents' use of the information on food labels, to identify difficulties they may experience when using food labels, and to explore reasons why they do not use the information on food labels. In order to identify if the respondents used the information on the food labels, they were asked to indicate whether or not they read information on food labels. The motivation for reading food labels was also determined. This was undertaken by requesting the respondents to relate to a situation and indicate whether they read the information on food labels. The variables were in-store, when buying a product for the first time, at home, to identify the nutrient content of a product, when verifying nutritional claims and/or when following a special diet for medical reasons. The respondents were instructed to choose from three options, namely "always", "sometime" and "never".

In order to identify the information the respondents used on the food labels, the following were included in the questionnaire: the expiry date ("best before", "use by" and/or "sell by" date), ingredient list, nutritional information (grams of carbohydrates and proteins, fat, cholesterol, vitamin, mineral, fibre, MDR (minimum daily requirements)) and nutrient content claims, such as "low in fat", "low in cholesterol", "low in sugar", "high in fibre" and "low GI" (glycaemic index). The respondents' use of the above-mentioned information was verified by providing

them with the following response options: “very important”, “moderately important” and “unimportant”. Next, the respondents’ use of the ingredients in the ingredient list was determined by asking, “Do you use the information in the ingredient list to avoid certain ingredients?” If this was the case, the respondents had to indicate which ingredients they preferred to avoid.

Closed-ended questions were further included to explore difficulties the respondents may experience when using the information on food labels. These questions included the following variables: difficulty in understanding and locating the information on food labels, understanding the terms, and appropriateness of the letter size used on the label. The respondents were provided with three response options, namely “agree”, “neutral” and “disagree”.

Possible reasons for not using the information on the food labels were explored by asking the following open-ended question, “Why don’t you read food labels?” The following closed-ended questions were also included: food labels are too time consuming to read, do not have enough knowledge to understand, find the terms confusing, choose food product on the basis of price and taste, believe all the claims on the food label, and purchase food products out of habit. The respondents’ suggestions for how the information on food labels could be improved and how the nutritional information on food labels could be communicated to consumers were also asked.

Section C of the questionnaire was aimed at determining the relationship between the respondents’ understanding of the information on food labels and their ability to make informed food choices. This section was based on the fourth objective of the study and was considered important to include in the questionnaire as it would give an indication of the respondents’ objective understanding of the information on food labels (Figure 1). Food label samples were shown to the respondents and they were asked to perform the following tasks: Firstly, the respondents’ understanding of and ability to use the ingredient list to make food choices were evaluated by asking them to indicate what ingredient the product contained the most of. They had to choose from five possible answers. Secondly, the respondents were presented with a food label and asked to select from five possible answers the nutrient they associate with the specific food product. Thirdly, the nutritional information of the food product used in the previous

question was shown to the respondents and they were asked to indicate what nutrient the product contained the most of. These two questions were included in section C to determine whether the respondents had a basic understanding of food nutrients, were able to associate food nutrients with different food groups and were able to identify the different nutrients.

Fourthly, the respondents were asked to compare the nutrient information of two products from the same product category, such as butter and margarine. The respondents were requested to compare the nutrients in these samples and were asked to choose the healthier product. Fifthly, the respondents' ability to use the nutritional information per 100 g was also determined by requesting them to identify the nutritional value provided in a serving size of a product. Lastly, a set of eight statements was given to the respondents to determine their understanding of preservatives, carbohydrates, sugars, fats and the relationship between food nutrients and diet-related diseases such as diabetes and high blood cholesterol.

7. Pilot test

The questionnaire was pilot tested and revised prior to the main study in order to ensure clarity of all the questionnaire items (Raune, 2005:141) and to attend to the length of the questionnaires to prevent respondents from becoming discouraged. A small group of respondents (20) who closely represent the target population was asked to complete the questionnaire (Raune, 2005:141). These respondents were asked to express their opinions of the questionnaire, thereby ensuring that all the questions were understood and unambiguous. By conducting the pilot test, certainty was also attained that the respondents did not feel threatened if they did not know the answers to the questions in the questionnaire (Neuman & Kreuger, 2003:271).

The questionnaire was completed under the exact circumstances as required by the research methodology at three of the supermarkets that formed part of the research study. No problems were detected, apart from the fact that some respondents had difficulty understanding the five-point scale. Therefore, it was decided that it would be better to use a three-point scale, as it is easier to understand.

8. Data analysis

The closed-ended questions were analysed with the help of the Statistical Consultation Services of the North-West University, Potchefstroom Campus. These questions were pre-coded and analysed by means of SPSS (Statistical Package for the Social Sciences) and S-Plus. The following statistical methods were used:

- 1) Descriptive statistics, which included summary statistics (e.g. mean and standard deviations), frequency tabulation and contingency tables. Bar charts and boxplots were used for graphical representation.
- 2) Testing relationships in contingency tables computed by means of the effect size w . The effect size is defined as $w = \sqrt{\frac{\chi^2}{n}}$ and was interpreted as: a small effect $w = 0.1$, a medium effect $w = 0.3$ and a large effect $w = 0.5$ (Ellis & Steyn, 2003:52). A relationship with $w \geq 0.5$ is considered as important.
- 3) The effect size used to compare group means was $d = \frac{|\bar{x}_1 - \bar{x}_2|}{s_{\max}}$ where $\bar{x}_1$ and $\bar{x}_2$ are the sample means of the two groups and $s_{\max} = \max(s_1, s_2)$, in which s_1 and s_2 are the sample standard deviation of the group. Ellis and Steyn (2003:52) give the following guidelines for interpretation: $d = 0.2$ (a small effect), $d = 0.5$ (a medium effect) and $d = 0.8$ (a large effect). A large effect size indicates an important difference between the groups.

Open-ended questions were analysed by means of content analysis in order to analyse and organise these questions within the aim of the study. As described by Denscombe (2007:237), analysis was done by reading the responses to these open-ended questions and identifies categories relevant to the study. Identified categories were analysed in terms of their relationship with each other (Denscombe, 2007:237) and used to describe responses to these questions.

9. Validity and reliability

Validity, which is the extent to which an empirical measurement adequately reflects the content it was intended to measure, was attended to through content and face validity (Babbie, 2008:160). Content validity relates to the degree to which a measure covers the range of meanings included in the concept (Babbie, 2008:161). Closely related to content validity is face validity, which is based on the judgement of the scientific community that the indicator really measures the construct (Neuman, 2003:183). Therefore, experts in the field of consumer behaviour and statistical research methods evaluated the questionnaire to ensure the face and content validity thereof. The questionnaire was also pilot tested prior to data collection to ensure the attainment of the research aim and objective.

According to Babbie (2008:157), the reliability of the method of data collection refers to its potential to yield the same result each time when applied repeatedly. Hence, only willing consumers who are responsible for the purchasing of the household groceries were recruited. The questionnaires were also completed in the presence of the researcher, who could provide assistance with the interpretation of questions and avoid misunderstanding of the information.

10. Ethical considerations

According to Raune (2005:19), the foremost aim of informed consent is to give respondents the freedom of choice to partake in a study or not. Therefore, the respondents were informed fully of the research aim, what was expected from them and how long it would take to complete the questionnaire. The respondents were also assured of anonymity, the confidential use of all data gathered and their right to withdraw from the study at any point. The study was approved by the Ethics Committee of the North-West University, Potchefstroom Campus, no. NWU-0056-08-S1.

11. References

- ANDERSON, D. J. & COERTZE, D. J. 2001. Recommendations for an educational programme to improve consumer knowledge of and attitudes towards notional information on food labels. *South African journal of clinical nutrition*, 14(1):28-35. Available: Academic Search Premier.
- BABBIE, E. 2008. The basics of social research. 4th ed. Belmont: Thomson/ Wadsworth learning. 549p.
- BABBIE, E. & MOUTON, J. 2001. The practice of social research. South African ed. Cape Town: Oxford University Press Southern Africa. 674p.
- BLAIKIE, N. 2004. Designing social research. USA: Blackwell Publishing Inc. 338p.
- DENSCOMBE, M. 2007. The good research guide: for small-scale social research projects. 3rd ed. Maidenhead: Open University Press. 349p.
- ELLIS, S. M. & STEYN, H. S. 2003. Practical significance (effect sizes) versus or in combination with statistical significance (p-values). *Management dynamics*, 12(4):51-53. Available: SA ePublications.
- GRACIA, A., LOUREIRO, M. & NAYGA, M. R. 2007. Do consumers perceive benefits from the implantation of a EU mandatory nutritional labeling program? *Food policy*, 32:160-174. Available: ScienceDirect.
- KLEIN, R. 2005. A South African study of consumers' perceptions of food labels and its relevance to their purchasing behaviour. North-West University, Potchefstroom Campus. (Mini-dissertation - M. Consumer Science) 115p.
- LEVY, A. S. & FEIN, S. B. 1998. Consumers' ability to perform tasks using nutrition labels. *Journal of nutrition education*, 30(4):210-217, Jul/Aug. Available: Academic Search Premier.
- MANNELL, A., BREVARD, P., NAYGA, R., COMBRIS, P., LEE, R. & GLOECKNER, J. 2006. French consumers' use of nutrition labels. *Nutrition and food science*, 36(3):159-168. Available: Emerald.
- NAYGA, R. M. 2000. Nutrition knowledge, gender and food label use. *The journal of consumer affairs*, 34(1):97-112. Summer. Available: Academic Search Premier.
- NEUMAN, W. L. 2003. Social research methods: qualitative and quantitative approaches. 5th ed. Boston: Allyn & Bacon. 584p.

- NEUMAN, W. L. & KREUGER, W. L. 2003. Social work research methods: qualitative and quantitative approaches. Boston: Allyn & Bacon. 624p.
- PCC (POTCHEFSTROOM CITY COUNCIL). 2007. Integrated development plan 2006 to 2010. http://www.potch.co.za/council/keydocs/budget2008/integrated_dev_plan_07_10.pdf
Date of access: 15 Apr. 2008.
- PETERS-TEXEIRA, A. & BADRIE, N. 2005. Consumers' perception of food packaging in Trinidad, West Indies and its related impact on food choices. *International journal of consumer studies*, 29(6):508-514, Nov. Available: Business Source Premier.
- RAUNE, J. M. 2005. Essentials of research methods. USA: Blackwell Publishing. 239p.
- RUBIN, A. & BABBIE, E. R. 2005. Research methods for social work. 5th ed. Belmont: Brooks/Cole. 789p.
- SATIA, J. A., GALANKO, J. A. & NEUHOUSER, M. L. 2005. Food nutrition label use is associated with demographic, behavioural and psychosocial factors and dietary intake among African Americans in North Carolina. *Journal of the American Dietetic Association*, 105(3):392-403, Mar. Available: ScienceDirect.
- SHINE, A., O'REILLY, S. & O'SULLIVAN K. 1997. Consumer use of nutrition labels. *British food journal*, 99(8):290-296. Available: Emerald.
- STATS SA (Statistic South Africa). 2008. Community Survey 2007. Pretoria.
- SZYKMAN, L. R., BLOOM, P. N. & LEVY, A. S. 1997. A proposed model of the use of package claims and nutrition labels. *Journal of public policy and marketing*, 16(2):228-241, Fall. Available: Business Source Premier.
- TESSIER, S., EDWARDS, C., & MORRIS, S. 2000. Use and knowledge of food labels of shoppers in a city with a high proportion of heart disease. *Journal of consumer studies and home economics*, 24(1):35-40, March. Available: Business Source Premier.
- WEATHERSPOON, D. D & REARDON, T. 2003. The rise of supermarkets in Africa: implications for agrifood systems and the rural poor. *Development policy review*, 21(3):33-355. Available: Blackwell Publishing.
- WILES, N. L. 2006. The use and interpretation of the nutrition information on the food label of selected fat spreads by female consumers aged 25-45 years, living in Pietermaritzburg.

University of KwaZulu-Natal, Pietermaritzburg. (Mini-dissertation – M. Science in Dietetics)
86p.

2

The Manager

Dear Sir/Madam

SUBJECT: REQUESTING PERMISSION TO CONDUCT RESEARCH STUDY

I am a student studying towards a master's degree in Consumer Science at the North-West University, Potchefstroom Campus. My research aim is to determine consumers' understanding and use of information on food labels. During a sampling procedure, your store was identified as a suitable location to collect data needed for this study.

I hereby request permission to fill in questionnaires outside your store during the following dates. It will also be appreciated if space could be allocated for the placement of tables and chairs near the main entrance of the supermarket. This space is requested as it will be more convenient for the customer to be seated during the completion of the questionnaires. In order to minimize further inconvenience to your store or the customers, the researcher would only approach customers after they have completed their purchases. Furthermore, customers would only be recruited if they are willing to partake in the study. If you have any queries regarding the present study, please do not hesitate to contact me.

Your sincerely,

Sunelle A. Jacobs
(M Consumer Science student)

Dr. H. De Beer
(Study leader)

TITLE OF THE RESEARCH STUDY:

Adult consumers' understanding and use of information on food labels: a study among consumers living in the Potchefstroom and Klerksdorp region.

Dear Mr. /Mrs. /Miss.

Date .../ .../2008

THE AIM AND NATURE OF THE RESEARCH STUDY:

The aim of this research study is to investigate adult consumers' understanding regarding the information on food labels and to determine whether they use the information on food labels during food purchases. Questionnaires will be used to gather data for this study which will be completed at selected supermarkets in the Potchefstroom and Klerksdorp region.

RESEARCH PROCEDURE:

- 1) You will be asked to complete a questionnaire which is aimed at determining your use and understanding of food labels.
- 2) The questionnaire will take approximately 15 minutes to complete.
- 3) The researcher will be present at all time during the completion of the questionnaire to assist in any difficulties you may experience.
- 4) All data gathered during this study will be handled and stored confidentially and only the members of the research study will have access to the data. Data published in thesis or journals will not contain any information which may result in the identification of respondents. Therefore, your anonymity is assured.
- 5) It is possible that you may not derive any benefit personally from your participation in the study, although the knowledge gained by means of the study may benefit other persons or communities.

- 6) By agreeing to take part in the study, you are also giving consent that data generated to be used by the researcher for scientific purposes as they see fit, with the caveat that it will be confidential and that your name will not be linked to any of the data.

POSSIBLE BENEFITS OF THE STUDY

The present study shall provide knowledge regarding adult consumers' understanding and use of information on food labels which will then be utilized to identify an educational medium through which nutritional information on food labels could be communicated to consumers. Nevertheless, this study can also help establish consumer education programs aimed at promoting healthy food choices.

INFORMATION

Should you require more information, please do not hesitate to contact Sunelle Jacobs, (Masters Degree student) at 084 499 212 or Dr. Hanli de Beer (study leader) at 018 299 2483.

WITHDRAWAL OF PARTICIPATION

Participation in the study is completely voluntary and you are free to withdraw from the study at any time, without stating reasons and you will in no way be harmed by so doing. However, you are kindly requested not to withdraw from the study without careful consideration.

DECLARATION OF CONSENT

I, the undersigned _____ (Full names and surname) have read through the information provided about the research study and declare that I fully understand the content thereof. I was given the opportunity (if so preferred) to discuss any aspects of the study with the researcher and hereby voluntarily agree to participate in the study. I

would hereby like to exempt the University or any employee or any student of the University from any liability which I might incur during this study.

I furthermore waive my right to institute any claims whatsoever against the University which may arise during the running of the study or the conduct of any person involved in the study, except for claims arising from the negligent conduct of the University or its employees or students.

Signature of the respondent: _____

Signed at _____ on the _____ day of _____ 2008

Signature of witness 1: _____

Signed at _____ on the _____ day of _____ 2008

Signature of witness 2: _____

Signed at _____ on the _____ day of _____ 2008

Streng Vertroulik / Strictly Confidential

Supermark / Supermarket:

Deelnemer / Participant no.

Vraelys / Questionnaire

Die doel van hierdie vraelys is om u begrip en gebruik van voedsel-etikette te bepaal. Die vraelys word anoniem beantwoord en sal ongeveer 10-15 minute van u tyd in beslag neem. / This questionnaire is aimed at determining your understanding and ability to use food labels. The questionnaire is completed anonymously and will take approximately 10-15 minutes of your time.

Beantwoord asseblief die vraelys deur 'n "X" in die blokkie van u keuse te plaas. / Please answer this questionnaire by marking the block of your choice with a "X".

Afdeling A / Section A

1) Geslag / Gender	1 Manlik / Male			2 Vroulik / Female		
2) Ouderdom / Age	1 18-24	2 25-34	3 35-44	4 45-54	5 55-64	6 65 of ouer / or older
3) Ras / Race	1 Blank / White		2 Swart / Black		3 Ander / Other	
4) Is u verantwoordelik vir die maandelikse aankope van voedsel vir die huishouding? / Are you responsible for the purchasing of food for the household each month?						
1 Ja / Yes			2 Nee / No			
5) Indien u antwoord ja by vraag 4 is, hoeveel geld is maandeliks beskikbaar vir u huishouding se voedselaankope? / If you answered yes to question 4, how much money do you have available each month to spend on food for your household?						
1 Minder as / Less than R499		2 R500-R999		3 R1000-R1500		4 Meer as / More than R1500
6) Op ☐ gemiddelde basis besoek u die voedselwinkel op ☐ ... / On average do you visit the food store on a...						
1 Daaglikse basis / Daily basis		2 Weeklikse basis / Weekly basis			3 Maandelikse basis / Monthly basis	
7) Op ☐ gemiddelde basis, hoeveel tyd bestee u in die winkel tydens voedselaankope? / On average how much time do you spend in the store during your food shopping?						
1 5-15 Minute / Minutes		2 15-30 Minute / Minutes		3 30-60 Minute / Minutes		4 Meer as 60 minute / More than 60 minutes

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8) Het u of enige gesinslid gesondheidsprobleme wat in ag geneem moet word tydens voedselaankope? / Do you or any household member have any health problems to consider during food purchasing?					
1 Ja / Yes			2 Nee / No		
9) Indien u antwoord ja by vraag 8 is, spesifiseer asseblief alle moontlikhede. / If you answered yes to the question 8, please specify all possibilities.					
1 Diabetes / Diabetes		2 Hoë bloeddruk / High blood pressure		3 Hoë cholesterol / High Cholesterol	
4 Oorgewig / Obesity		5 Allergieë / Allergies		6 Ander / Other	
10) Werk u of u eggenoot / metgesel in ☐ gesondheidsverwante veld? / Do you or your spouse/partner work in a health related field?					
1 Ja / Yes			2 Nee / No		
11) Het u enige formele opvoeding ontvang oor die belangrikheid van ☐ gesonde dieet? / Do you have any formal education with regards to the importance of a healthy diet?					
1 Ja / Yes			2 Nee / No		
12) Indien u antwoord ja by vraag 11 is, spesifiseer asseblief. / If you answered yes to question 11, please specify.					
.....					
13) Hoogste opvoedkundige vlak is... / Highest education level is...					
1 Graad 10 of minder / Grade 10 or less		2 Graad 12 / Grade 12		3 Kollege / College	
				4 Universiteit / University	
14) Huidige beroepstatus is... / Current employment status is...					
1 Voltyds werknemer/kontrak / Full-time employed/contract		2 Eie onderneming / Self-employed		3 Deeltydse werknemer / Part-time employed	
4 Werkloos / Unemployed		5 Huisvrou / Housewife		6 Student / Student	
				7 Afgetree / Retired	
15) U huwelikstatus is... / Your marital status is...					
1 Enkellopend / Single		2 In ☐ verhouding / In a relationship		3 Deel woning met metgesel / Living with a partner	
				4 Getroud / Married	
				5 Geskei / Divorced	
16) Hoeveel lede insluitend uself woon in u huishouding? / How many members including yourself live in your household?					
1 Woon alleen / Live alone		2 Twee / Two		3 Drie / Three	
				4 Vier / Four	
				5 Vyf / Five	
				6 Ses of meer / Six or more	

Streng Vertroulik / Strictly Confidential

17) Het u kinders? / Do you have children?			
1 Ja / Yes		2 Nee / No	
18) Indien u antwoord ja by vraag 17 is, hoeveel kinders 17 jaar of jonger woon in die huis? / If you answered yes to question 17, how many children 17 years or younger live in the house?			
1 Een kind / One child	2 Twee kinders / Two children	3 Drie kinders / Three children	4 Vier kinders / Four children
5 Vyf kinders / Five children		6 Ses of meer kinders / Six or more children	7 Geen / None
Afdeling B / Section B			
19) Lees u voedsel etikette? / Do you read food labels?			
1 Altyd / Always	Antwoord asseblief vrae 20-26. Vervolg by vraag 29 / Please answer questions 20-26 then continue at question 29		
2 Soms / Sometimes	Antwoord asseblief vrae 20-26. Vervolg by vraag 29 / Please answer questions 20-26 then continue at question 29		
3 Nooit / Never	Los vrae 20-26. Begin by vraag 27 / Please skip questions 20-26. Start at question 27		
20) Waarom lees u voedsel etikette? / Why do you read food labels?			
.....			
.....			
21) Wanneer sal u meer geneig wees om voedsel etikette te lees? Merk asseblief die toepaslike opsie teenoor elke stelling. / When are you more likely to read food labels? Please mark the applicable option next to each statement:			
Stellings / Statements	Altyd / Always	Soms / Sometimes	Nooit / Never
a) In die winkel tydens voedselaankope om te help met aankoopbesluite. / In the store while doing food shopping to assist with purchasing decisions.	1	2	3
b) Wanneer u ☐ voedselproduk vir die eerste keer aankoop. / When buying a food product for the first time.	1	2	3
c) Tuis, aangesien dit meer gerieflik is. / At home as this is more convenient for me.	1	2	3
d) Om die voedingsstofsamstelling van ☐ spesifieke voedselproduk te identifiseer. / To identify the nutrient content of a specific food products.	1	2	3
e) Om die voedingsaansprake voor op die verpakking te kontroleer bv. "laag in vet". / When checking nutrition claims made on the front of the package such as "low in fat".	1	2	3
f) Wanneer u of ☐ gesinslid ☐ spesiale dieet moet volg vir mediese redes. / When you or a family member must follow a special diet for medical reasons.	1	2	3

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22) Hoe belangrik beskou u die volgende inligting op die voedsel-etiket? Merk asseblief die opsie wat u opinie die beste beskryf. / How important do you regard the following information on food labels? Please mark the option that best describes your opinion.			
Stelling / Statements	Baie Belangrik / Very Important	Matig Belangrik / Moderately Important	Onbelangrik / Unimportant
a) Vervaldatum soos: / Expiry date such as: "best before", "use by" and/or "sell-by" date	1	2	3
b) Lys van bestanddele / List of ingredients	1	2	3
c) Koolhidrate in gram / Grams of carbohydrates	1	2	3
d) Proteïene in gram / Grams of proteins	1	2	3
e) Totale vetinligting / Total fat information	1	2	3
f) Cholesterolinligting / Cholesterol information	1	2	3
g) Vitamiene en minerale inligting / Vitamins and minerals information	1	2	3
h) Veselinligting / Fibre information	1	2	3
i) MDR (Minimum Daaglikse Behoeftes) / MDR (Minimum Daily Requirements)	1	2	3
Nutriëntinhoudaansprake soos / Nutrient content claims such as:			
j) Laag in vet / Low in fat	1	2	3
k) Laag in cholesterol / Low in cholesterol	1	2	3
l) Laag in suiker / Low in sugar	1	2	3
m) Hoog in vesel / High in fibre	1	2	3
n) Lae GI (Glukemiese Indeks) / Low GI (Glycaemic Index)	1	2	3
23) Gebruik u die inligting in die bestanddeellys om sekere bestanddele te vermy? / Do you use the information in the ingredient list to avoid certain ingredients?			
1 Ja / Yes		2 Nee / No	
24) Indien u antwoord ja by vraag 23 is, dui asseblief die bestanddele aan wat u verkies om te vermy. / If you answered yes to the question 23, please indicate the ingredients that you prefer to avoid.			
1 Tartrasien / Tartrazine	2 Monosodium glutamaat (MSG) / Monosodium glutamate (MSG)	3 Voedselkleursel / Food colouring	4 Melkprodukte / Milk products
5 Ander / Other	6 Additiewe en preserveermiddels / Additives and preservatives	7 Sojaproteïene / Soy proteins	8 Eierprodukte / Egg products

Streng Vertroulik / Strictly Confidential

25) Merk asseblief die opsie wat u opinie die beste beskryf wanneer u inligting op voedsel-etiket gebruik. / Please mark the option that best describes your opinion when using the information on food labels.			
Stellings / Statements	Stem saam / Agree	Neutraal / Neutral	Stem nie saam / Disagree
a) U vind dit moeilik om nutriëntinligting in die nutriëntinligtingstabel te verstaan. / You experience difficulty understanding the nutrition information table.	1	2	3
b) Dit is maklik om ☐ voedingstof in die voedingstofstabel te vind. / It is easy to locate a nutrient in the nutrition information table.	1	2	3
c) Die terme in die bestanddelelys maak u deurmekaar. / You find the terms used in the ingredients list confusing.	1	2	3
d) U vind die lettertype op die voedsel-etiket te klein om te lees. / The size of the letters on food labels is too small to read.	1	2	3
e) Die inligting op die voedsel-etiket is op ☐ verbruikersvriendelike wyse voorgestel. / The information on the food label is presented in a consumer friendly way.	1	2	3
f) U vind dat die inligting u spesiale gesondheidstoestande ondersteun. / You find the information supportive of your special health conditions.	1	2	3
26) Waarom lees u <u>nie</u> voedsel-etiket <u>nie</u> ? / Why don't you read food labels?			
.....			
27) Indien u <u>nie</u> voedsel-etiket lees <u>nie</u> , is dit omdat... Dui asseblief met 'n "X" aan of u saamstem of nie saamstem nie met die redes. / If you do not read food labels, was it because... Please indicate with a "X" whether you agree with the reasons or not.			
Stellings / Statements	Stem saam / Agree	Neutraal / Neutral	Stem nie saam / Disagree
a) U vermy dit om voedsel-etiket te lees, want dit neem te veel tyd. / You avoid reading food labels, as you find it too time consuming to read.	1	2	3
b) U het nie genoeg agtergrondkennis om die nutriëntinligting op voedsel-etiket te verstaan nie. / You do not have sufficient background knowledge to understand the nutrition information on the food label.	1	2	3

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Vraag 27 vervolg / Question 27 continues	Stem saam / Agree	Neutraal / Neutral	Stem nie saam / Disagree
Stellings / Statements			
c) Die terme in die bestanddeellys maak u deurmekaar./ <i>You find the terms used in the ingredients list confusing.</i>	1	2	3
d) U vind die lettertype op die voedsel-etiket te klein om te lees./ <i>You find the font size of the print on the food labels too small to read.</i>	1	2	3
e) U kies voedselprodukte op grond van prys en nie voedingswaarde nie./ <i>You choose food products on the basis of price and not the nutritional content.</i>	1	2	3
f) U glo die smaak van die produk is belangriker as die nutriëntwaarde./ <i>You believe the taste of the product is more important than the nutritional value.</i>	1	2	3
g) U glo die nutriëntinhoudaansprake op die voorkant van die verpakking en vergelyk dit nie met die voedingstofinligting op die etiket nie./ <i>You believe the nutritional claims on the front of the package and do not verify it with the nutritional table at the back of the package.</i>	1	2	3
h) U koop voedselprodukte uit gewoonte en lees nie die voedingstofinligting op die etiket nie./ <i>You purchase food items out of habit without reading the nutritional information on the label.</i>	1	2	3
28) Voedsel-etiket kan verbeter word deur.... / Food labels can be improved by...			
.....			
.....			
29) Verskaf asseblief u opinie of voorstel hoe die voedingstofinligting op voedsel-etiket aan verbruikers gekommunikeer kan word. / Please give your opinion or suggestion with regards to how nutritional information on food labels could be communicated to consumers.			
.....			
.....			

Afdeling C / Section C

Beantwoord die volgende paar vrae deur die voorbeelde A, B en C te gebruik. /

Answers the last few questions by using the attached samples A, B and C.

30) Kyk na die bestanddelelys van voorbeeld A. Watter van die volgende bestanddele bevat die produk die meeste? Merk asseblief net een. / Look at the ingredients list of sample A. Which of the following ingredients does the product contain the most? Please mark only one.

1	2	3	4	5
Sojaproteïen / Soy protein	Vleis (Vark, kalkoen en hoender) / Meat (pork, turkey and chicken)	Smaak versterkers/ Flavour enhancers	Stysel/ Starch	Weet nie/ Don't know

31) Kyk weer na voorbeeld A. Watter bestanddeel assosieer u met die produk? Kies asseblief net een. / Look again at sample A. Which of the following nutrients do you associate with this product? Please select only one.

1	2	3	4	5
Vet / Fat	Proteïene / Proteins	Energie / Energy	Koolhidrate / Carbohydrates	Weet nie / Don't know

32) Kyk na die voedingstabel van voorbeeld A. Van watter voedingstof bevat die produk die meeste? Kies asseblief net een. / Look at the nutritional information of sample A. Of which nutrient does this product contain the most? Please select only one.

1	2	3	4	5
Vet / Fat	Proteïene / Proteins	Energie / Energy	Koolhidrate / Carbohydrates	Weet nie / Don't know

33) Vergelyk die voedingstofinligting van voorbeelde B en C. Watter een van voorbeelde B of C dink u is die gesondste? / Compare the nutritional information of samples B and C. Which sample, B or C, do you think is the healthiest?

1	2	3
B	C	Weet nie / Don't know

34) Kyk na voorbeeld B. Hoeveel vet (gram) bevat dit per 100 g? / Look at sample B. How much fat (gram) does it contain per 100 g?

1	2	3	4	5
0,5	76	16	0,3	Weet nie / Don't know

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35) Dui asseblief aan of u saamstem of nie saamstem nie met die volgende stellings. Merk asseblief net een opsie. / Please indicate if you agree or disagree with the following statements. Please mark only one response to each statement.

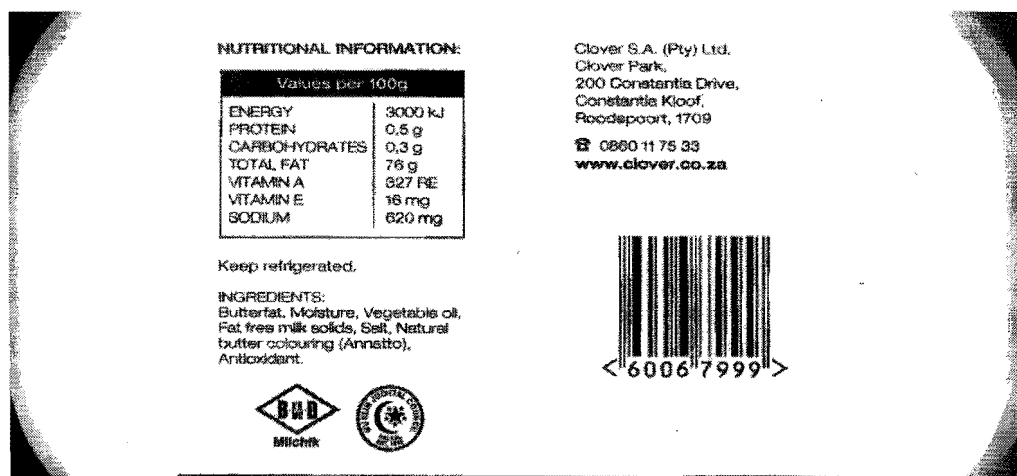
Stelling / Statement	Stem saam / Agree	Weet Nie / Don't know	Stem nie saam / Disagree
a) Preserveermiddels hou gesondheidsrisiko's in en moet vermy word. / Preservatives imply health risks and must be avoided.	1	2	3
b) Koolhidrate, proteïene en vet is makronutriënte in voedsel. / Carbohydrates, proteins and fat are macronutrients found in food.	1	2	3
c) Suiker bevat geen koolhidrate nie. / Sugar contains no carbohydrates	1	2	3
d) Alle vet is sleg en moet eerder vermy word. / All types of fat are bad and must be avoided.	1	2	3
e) Versadigde vette is gesonder as onversadigde vette. / Saturated fats are healthier than unsaturated fats.	1	2	3
f) Indien ☐ persoon aan hoë cholesterol ly moet hy/sy produkte laag in versadigde vette vermy. / If a person is suffering from high cholesterol he/she should avoid food products low in saturated fat.	1	2	3
g) Mense wat diabete is mag nie voedsel eet wat koolhidrate bevat nie. / People with diabetes may not consume food that contains carbohydrates.	1	2	3
h) GI verwys na die voedsel se vermoë om bloed glukose vlakke te beïnvloed. / GI refers to the food potential to influence blood glucose levels.	1	2	3



Sample A



Sample B



Sample C



THE RIGHT THING TO DO: READ FOOD LABELS

- The suggested serving size of this product is 2 biscuits
- Serving size information makes it easier to determine quantity of nutrients you will consume.

- The body needs fat every day.
- However, use saturated fats sparingly, rather choose products containing monounsaturated and polyunsaturated fats.

NUTRITION INFORMATION

* Serving size = 2 Biscuits (20.8g approx)

Typical value	per 100 g	per Serving*
Energy	1923 kJ	400kJ
Protein	4.5g	0.9g
Total Fats	20.0g	4.2g
Saturated fat	8.8g	1.8g
Total Carbohydrates	67.5g	14.0g
of which Sugars	31.9g	6.6g
Sodium	210mg	43.7mg

INGREDIENTS: Wheat Flour, Sugar, Hydrogenated Vegetable Fat (palm), Invert sugar Syrup, Skimmed Milk Powder (cow milk), Salt, Sodium Bicarbonate (E500), Flavourings (Vanilla, Butter)

- Nutritional information must be provided per 100g or 100ml of the product.
- Use this information to compare nutritional information (content) between different brands of the same product.

Be a better consumer

- All food labels are required by law to contain contact detail of the manufacturer.
- When nutritional information is not provided on the food packaging, do not hesitate to contact the manufacturer and ask for nutritional information.

- All ingredients are listed in descending order of mass.
- This means that this product contains mostly flour, sugar and fats.
- The sugar and the fat mainly contribute to the energy value of the product.

Directions to Contributors

Public Health Nutrition

(Revised October 2008)

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Papers should be accompanied by a statement of acceptance of the conditions laid down in the Directions to Contributors. The statement should affirm that the submission represents original work that has not been published previously, that it is not currently being considered by another journal, and that if accepted for *Public Health Nutrition* it will not be published elsewhere in the same form, in English or in any other language, without the written consent of the Nutrition Society. It should also confirm that each author has seen and approved the contents of the submitted manuscript.

The submission must include a statement reporting any conflicts of interest, all sources of funding and the contribution of each author to the manuscript. If there are no conflicts of interest this must be stated. If the work was funded, please state "This work was supported by (for example) The Medical Research Council [grant number xxx (if applicable)]". If the research was not funded by any specific project grant, state "This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors." On submission the author will be asked to submit this information during the submission process and should not include it as part of the manuscript. This enables double-blind reviewing. If accepted, the paragraph will then be published as part of the manuscript. This journal adheres to the Committee on Publication Ethics (COPE) guidelines on research and publications ethics <http://www.publicationethics.org.uk/guidelines>.

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Form of full papers submitted for publication. Full papers should be no more than 4000 words long. The onus of preparing a paper in a form suitable for sending to press lies with the author. Authors are advised to consult a current issue in order to make themselves familiar with the *Public Health Nutrition* as to typographical and other conventions, layout of tables etc. Authors are encouraged to consult the latest guidelines produced by the International Committee of Medical Journal Editors (ICMJE), which contains a lot of useful generic information about preparing scientific papers <http://www.icmje.org/> and also the CONSORT guidelines for reporting results of randomised trials <http://www.consort-statement.org/>.

Authors are invited to nominate up to four potential referees who may then be asked by the Editorial Board to help review the work.

Typescripts should be prepared with 1.5 line spacing and wide margins (2 cm), the preferred font being Times New Roman size 12. At the ends of lines words should not be hyphenated unless hyphens are to be printed. Page and line numbering are required.

Spelling should generally be that of the *Concise Oxford Dictionary* (1995), 9th ed. Oxford: Clarendon Press. Papers should normally be divided into the following parts:

(a) **Title page:** authors' names should be given without titles or degrees and one forename may be given in full. The name and address of the institution where the work was performed should be given, as well as the main address for each author.

The name and address of the author to whom correspondence should be sent should be clearly stated, together with telephone and fax numbers and email address. Other authors should be linked to their address using superscript Arabic numerals.

The title page should also contain a shortened version of the paper's title, not exceeding forty-five letters and spaces in length, suitable for use as a running title in the published paper.

Authors are asked to supply three or four key words or phrases on the title page of the typescript.

The title page should be submitted online as a separate cover letter. This enables double-blind reviewing.

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(f) *Discussion*: while it is generally desirable that the presentation of the results and the discussion of their significance should be presented separately, there may be occasions when combining these sections may be beneficial. Authors may also find that additional or alternative sections such as 'conclusions' may be useful.

(g) *Acknowledgments*: these should be given in a single paragraph after the discussion and include the following information: source of funding, declaration regarding any conflicts of interest and a brief statement as to the contribution(s) of each author. **On submission the author will be asked to submit this information during the submission process and should not include it as part of the manuscript. This enables double-blind reviewing.**

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1. Setchell KD, Faughnan MS, Avades T *et al.* (2003) Comparing the pharmacokinetics of daidzein and genistein with the use of ¹³C-labeled tracers in premenopausal women. *Am J Clin Nutr* 77, 411–419.
2. Barker DJ, Winter PD, Osmond C *et al.* (1989) Weight in infancy and death from ischaemic heart disease. *Lancet* ii, 577–580.
3. Forchielli ML & Walker WA (2005) The role of gut-associated lymphoid tissues and mucosal defence. *Br J Nutr* 93, Suppl. 1, S41–S48.
4. Bradbury J, Thomason JM, Jepson NJA *et al.* (2003) A nutrition education intervention to increase the fruit and vegetable intake of denture wearers. *Proc Nutr Soc* 62, 86A.
5. Frühbeck G, Gómez-Ambrosi J, Muruzabal FJ *et al.* (2001) The adipocyte: a model for integration of endocrine and metabolic signaling in energy metabolism regulation. *Am J Physiol Endocrinol Metab* 280, E827–E847.
6. Han KK, Soares JM Jr, Haidar MA *et al.* (2002) Benefits of soy isoflavone therapeutic regimen on menopausal symptoms. *Obst Gynecol* 99, 389–394.
7. Uhl M, Kassie F, Rabot S *et al.* (2004) Effect of common Brassica vegetables (Brussels sprouts and red cabbage) on the development of preneoplastic lesions induced by 2-amino-3-methylimidazo[4,5-f]quinoline (IQ) in liver and colon of Fischer 344 rats. *J Chromatogr* 802B, 225–230.
8. Hall WL, Vafeiadou K, Hallund J *et al.* (2005) Soy isoflavone enriched foods and inflammatory biomarkers of cardiovascular risk in postmenopausal women: interactions with genotype and equol production. *Am J Clin Nutr* (In the Press).
9. Skurk T, Herder C, Kraft I *et al.* (2004) Production and release of macrophage migration inhibitory factor from human adipocytes. *Endocrinology* (Epublication ahead of print version).
10. Skurk T, Herder C, Kraft I *et al.* (2005) Production and release of macrophage migration inhibitory factor from human adipocytes. *Endocrinology* 146, 1006–1011; Epublication 2 December 2004.
11. Bradbury J (2002) Dietary intervention in edentulous patients. PhD Thesis, University of Newcastle.
12. Ailhaud G & Hauner H (2004) Development of white adipose tissue. In *Handbook of Obesity. Etiology and Pathophysiology*, 2nd ed., pp. 481–514 [GA Bray and C Bouchard, editors]. New York: Marcel Dekker.
13. Bruinsma J (editor) (2003) *World Agriculture towards 2015/2030: An FAO Perspective*. London: Earthscan Publications.
14. Griinari JM & Bauman DE (1999) Biosynthesis of conjugated linoleic acid and its incorporation into meat and milk in ruminants. In *Advances in Conjugated Linoleic Acid Research*, vol. 1, pp. 180–200 [MP Yurawecz, MM Mossoba, JKG Kramer, MW Pariza and GJ Nelson, editors]. Champaign, IL: AOCS Press.
15. Henderson L, Gregory J, Irving K *et al.* (2004) *National Diet and Nutrition Survey: Adults Aged 19 to 64 Years*. vol. 2: *Energy, Protein, Fat and Carbohydrate Intake*. London: The Stationery Office.
16. International Agency for Research on Cancer (2004) *Cruciferous Vegetables, Isothiocyanates and Indoles*. IARC Handbooks of Cancer Prevention no. 9 [H Vainio and F Bianchini, editors]. Lyon, France: IARC Press.
17. Linder MC (1996) Copper. In *Present Knowledge in Nutrition*, 7th ed., pp. 307–319 [EE Zeigler and LJ Filer Jr, editors]. Washington, DC: ILSI Press.
18. World Health Organization (2003) *Diet, Nutrition and the Prevention of Chronic Diseases. Joint WHO/FAO Expert Consultation*. WHO Technical Report Series no. 916. Geneva: WHO.
19. Keiding L (1997) *Astma, Allergi og Anden Overfølsomhed i Danmark – Og Udviklingen 1987–1991 (Asthma, Allergy and Other Hypersensitivities in Denmark, 1987–1991)*. Copenhagen, Denmark: Dansk Institut for Klinisk Epidemiologi.

References to material available on websites should include the full Internet address, and the date of the version cited. Thus:

20. Department of Health (1997) Committee on Toxicity of Chemicals in Food Consumer Products and the Environment. Statement on vitamin B₆ (pyridoxine) toxicity. <http://www.open.gov.uk/doh/hef/B6.htm>
21. Kramer MS & Kakuma R (2002) *The Optimal Duration of Exclusive Breastfeeding: A Systematic Review*. Rome: WHO; available at http://www.who.int/nut/documents/optimal_duration_of_exc_bfeeding_review_eng.pdf
22. Hooper L, Thompson RL, Harrison RA *et al.* (2004) Omega 3 fatty acids for prevention and treatment of cardiovascular disease. *Cochrane Database of Systematic Reviews*, issue 4, CD003177. <http://www.mrw.interscience.wiley.com/cochrane/clsystrev/articles/CD003177/frame.html>
23. Nationmaster (2005) HIV AIDS – Adult prevalence rate. http://www.nationmaster.com/graph-T/hea_hiv_aid_adu_pre_rat (accessed June 2005).

Mathematical modelling of nutritional processes. Papers in which mathematical modelling of nutritional processes forms the principal element will be considered for publication provided: (a) they are based on sound biological and mathematical principles; (b) they advance nutritional concepts or identify new avenues likely to lead to such advances; (c) assumptions used in their construction are fully described and supported by appropriate argument; (d) they are described in such a way that the nutritional purpose is clearly apparent; (e) the contribution of the model to the design of future experimentation is clearly defined.

Units. Results should be presented in metric units according to the International System of Units (see Quantities, Units, and Symbols (1971) London: The Royal Society, and Metric Units, Conversion Factors and Nomenclature in Nutritional and Food Sciences (1972) London: The Royal Society – as reproduced in *Proceedings of the Nutrition Society* (1972) 31, 239–247). SI units should be used throughout the paper. The author will be asked to convert any values that are given in any other form. The only exception is where there is a unique way of expressing a particular variable that is in widespread use. Energy values must be given in Joules (MJ or kJ) using the conversion factor 1 kcal = 4.184 kJ. If required by the author, the value in kcal can be given afterwards in parentheses. Temperature is given in degrees Celsius (°C). Vitamins should be given as mg or µg, not as IU.

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Statistical treatment of results. Data from individual replicates should not be given for large experiments, but may be given for small studies. The methods of statistical analysis used should be described, and references to statistical analysis packages included in the text, thus: Statistical Analysis Systems statistical software package version 6.11 (SAS Institute, Cary, NC, USA). Information such as analysis of variance tables should be given in the paper only if they are relevant to the discussion. A statement of the number of replicates, their average value and some appropriate measure of variability is usually sufficient.

Comparisons between means can be made by using either confidence intervals (CI) or significance tests. The most appropriate of such measures is usually the standard error of a difference between means (SED), or the standard errors of the means (SE or SEM) when these vary between means. The standard deviation (SD) is more useful only when there is specific interest in the variability of individual values. The degrees of freedom (df) associated with SED, SEM or SD should also be stated. The number of decimal places quoted should be sufficient but not excessive. Note that pH is an exponential number, as are the log(10) values often quoted for microbial numbers. Statistics should be carried out on the scalar rather than the exponential values.

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Nomenclature of vitamins. Most of the names for vitamins and related compounds that are accepted by the Editors are those recommended by the IUNS Committee on Nomenclature. See *Nutrition Abstracts and Reviews* (1978) 48A, 831–835.

<i>Acceptable name</i>	<i>Other names*</i>
<i>Vitamin A</i>	
Retinol	Vitamin A ₁
Retinaldehyde, retinal	Retinene
Retinoic acid (all- <i>trans</i> or 13- <i>cis</i>)	Vitamin A ₁ acid
3-Dehydroretinol	Vitamin A ₂
<i>Vitamin D</i>	
Ergocalciferol, ercalciol	Vitamin D ₂ calciferol
Cholecalciferol, calciol	Vitamin D ₃
<i>Vitamin E</i>	
α-, β- and γ-tocopherols plus tocotrienols	
<i>Vitamin K</i>	
Phylloquinone	Vitamin K ₁
Menaquinone-n (MK-n)†	Vitamin K ₂
Menadione	Vitamin K ₃ menaquinone, menaphthone
<i>Vitamin B₁</i>	
Thiamin	Aneurin(e), thiamine
<i>Vitamin B₂</i>	
Riboflavin	Vitamin G, riboflavine, lactoflavin
<i>Niacin</i>	
Nicotinamide	Vitamin PP
Nicotinic acid	
<i>Folic Acid</i>	
Pteroyl(mono)glutamic acid	Folacin, vitamin B _c or M
<i>Vitamin B₆</i>	
Pyridoxine	Pyridoxol
Pyridoxal	
Pyridoxamine	
<i>Vitamin B₁₂</i>	
Cyanocobalamin	
Hydroxocobalamin	Vitamin B _{12a} or B _{12b}
Aquocobalamin	
Methylcobalamin	

Adenosylcobalamin	
Inositol	
Myo-inositol	Meso-inositol
Choline	
Pantothenic acid	
Biotin	Vitamin H
Vitamin C	
Ascorbic acid	
Dehydroascorbic acid	

*Including some names that are still in use elsewhere, but are not used by the *British Journal of Nutrition*.

†Details of the nomenclature for these and other naturally-occurring quinones should follow the Tentative Rules of the IUPAC-IUB Commission on Biochemical Nomenclature (see *European Journal of Biochemistry* (1975) 53, 15–18).

Generic descriptors. The terms **vitamin A**, **vitamin C** and **vitamin D** may still be used where appropriate, for example in phrases such as 'vitamin A deficiency', 'vitamin D activity'.

Vitamin E. The term **vitamin E** should be used as the descriptor for all tocol and tocotrienol derivatives exhibiting qualitatively the biological activity of α -tocopherol. The term **tocopherols** should be used as the generic descriptor for all methyl tocols. Thus, the term **tocopherol** is not synonymous with the term **vitamin E**.

Vitamin K. The term **vitamin K** should be used as the generic descriptor for 2-methyl-1,4-naphthoquinone (menaphthone) and all derivatives exhibiting qualitatively the biological activity of phyloquinone (phytylmenaquinone).

Niacin. The term **niacin** should be used as the generic descriptor for pyridine 3-carboxylic acid and derivatives exhibiting qualitatively the biological activity of nicotinamide.

Vitamin B₆. The term **vitamin B₆** should be used as the generic descriptor for all 2-methylpyridine derivatives exhibiting qualitatively the biological activity of pyridoxine.

Folate. Due to the wide range of C-substituted, unsubstituted, oxidized, reduced and mono- or polyglutamyl side-chain derivatives of pteroylmonoglutamic acid that exist in nature, it is not possible to provide a complete list. Authors are encouraged to use either the generic name or the correct scientific name(s) of the derivative(s), as appropriate for each circumstance.

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See *Metric Units, Conversion Factors and Nomenclature in Nutritional and Food Sciences* (1972) paras 8 and 14–20. London: The Royal Society.

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