

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

The Effects of Front-of-Pack  
Nutrition Information and Product Claims on  
Consumers' Product Evaluations and Choice Behaviour

A thesis presented in partial fulfilment of the requirements for the degree  
of Doctor of Philosophy in Marketing  
at Massey University, Palmerston North, New Zealand

Ninya Bernadette Maubach

2010



## **Abstract**

Enabling consumers to recognise foods' nutritional profiles is important because energy overconsumption is a significant contributing factor to a worldwide obesity epidemic. Parents especially need to be able to recognise which foods are healthy options for their children to eat regularly, and which are not, as childhood weight and dietary habits instilled while young have long-term implications for adult health. Policy makers are reluctant to regulate marketing of high fat, sugar and salt foods, but collectively the global food industry has implemented a suite of educational and informational interventions intended to help consumers control their weight. Foremost among these is the introduction of new front-of-pack nutrition labels and support for product claims that link nutrients to health-related outcomes.

The objective of this research was to determine whether detailed numeric or simple graphic front-of-pack nutrition labels influence how parents evaluate and choose between products, and could therefore contribute to public health objectives. Additionally, nutrition label performance in the context of product claims was also assessed.

There were two theoretical bases for this research; the first was the Elaboration Likelihood Model (ELM) of persuasion, which offers a general explanation of consumers' attitudinal reactions to new information. It states that motivation to engage with and ability to understand information determines how people process messages. The research also incorporated behaviour modification perspective, which stresses the role of external forces in shaping behaviour.

Reflecting these two theoretical perspectives, the research used both cognitive and behavioural experimental methodologies. One formative study, two attitudinal experiments and one choice experiment investigated whether:

- new nutrition label formats enhance consumers' ability to distinguish between foods with differing nutritional values; and
- different nutrition labels formats moderate the influence of varying levels of product claims on consumers' attitudes and choices.

The formative research revealed that parents often struggle to balance a raft of goals when grocery shopping. While they may hold good nutrition as an important consideration, practical issues such as time pressure, price, convenience and preferences are more salient concerns that militate against using nutrition information.

The two cognitive studies found that parents' attitudes towards children's breakfast cereals with varying nutritional profiles were unaffected by predominantly numeric labelling formats; this result was observed in two experiments, confirming the hypothesis that numeric information is not incorporated in product evaluations. Conversely, a graphical "Traffic Light" label did affect parents' attitudes towards the two breakfast cereals; attitudes towards a less healthy option were significantly lower. The research also confirmed that the current nutrition information panel does not affect consumers' product choices, but adding nutrition information to the pack fronts did change choice behaviour. Both front-of-pack labels affected parents' choices, but the Traffic Light label had a greater impact. That is, parents were less likely to choose a less healthy cereal when presented with a Traffic Light label.

The addition of nutrition-content and health claims did not affect parents' attitudes, but these pieces of information were used when choosing between competing options. In particular, claims had significant choice utility when only numeric nutrition information was available. However, parents were less likely to be swayed by product claims on a less healthy cereal when the Traffic Light label was presented.

In summary, this research suggests that nutrition labels that display information graphically help consumers evaluate energy-dense products more accurately. Given the aim of nutrition labelling is to help consumers make healthier food choices, simple, graphical formats seem more likely to achieve this objective than highly detailed, numeric formats.

## Acknowledgements

I would never have considered undertaking a PhD if it were not for Professor Janet Hoek's support and encouragement. Janet has been a generous mentor and provided me with amazing opportunities, and her support has had a profound effect on my personal development. I'm thankful for her faith in my abilities and for pushing me to achieve goals I would not otherwise have dreamed of.

My two co-supervisors, Dr Tim McCreanor and Professor Phil Gendall, also provided encouragement and shared their qualitative and quantitative methodological expertise. In the early stages of my thesis, Tim provided advice that guided the design my qualitative study and the development of my proposal. In the latter stages, Phil willingly stepped in to share his survey methods and question design knowledge. Both Phil and Tim were tremendous reviewers whose critiques helped improve my writing skills.

Many other people provided valuable feedback and suggestions at various stages of my PhD journey. Professor Debra Scammon provided helpful comments on my proposal. Assistant Professor Derek Rucker generously shared his expertise on the Elaboration Likelihood Model while I designed questionnaire used in Studies Two and Three. I would also like to acknowledge the feedback received from reviewers at ANZMAC Doctoral Colloquia: Associate Professor Gillian Sullivan-Mort and Associate Professor Chris Dubelar in 2006, and Professor Peter Danaher, Professor Phil Harris, and Dr Ernest de Run in 2007.

A research grant from the Physical Activity and Nutrition Group within the New Zealand Cancer Society enabled me to complete the final two studies. I am also grateful for the advice and assistance of Duncan Hedderley of the New Zealand Institute of Crop and Food Research, who shared his statistical expertise in the design and analysis of the final study.

Although I frequently promised my partner, Ben Healey, that I would beat him in the race to the PhD finish line, he knew my threats were idle. I thank Ben for his constant companionship, for challenging me to grow intellectually to meet his standard, and for making me sit down and type! He also provided essential practical assistance, designing

the survey website used in the final two studies and helping me to master all the helpful features built into Microsoft Word!

The first study was approved by the Massey University Human Ethics Committee Southern B, Application 06/47. The subsequent quantitative research phases were evaluated by peer review and judged to be low risk, and were recorded on the Low Risk Database of the Massey University Human Ethics Committee in 2008.

# Table of Contents

Abstract.....	i
Acknowledgements .....	iii
List of Figures.....	ix
List of Tables.....	x
List of Abbreviations .....	xii
List of Publications.....	xiv
1 Background and Objectives.....	1
1.1 Introduction.....	1
1.2 Problem Statement .....	1
1.3 Research Aim .....	6
1.4 Research Approach and Structure .....	7
2 Finding Solutions to the Obesity Epidemic.....	9
2.1 Introduction .....	9
2.2 New Zealand and Australian Trends in Adult and Child Weights.....	10
2.3 Consequences of Overweight and Obesity.....	13
2.4 Reducing Obesity Rates .....	16
2.4.1 Understanding Drivers of Weight Gain.....	17
2.4.2 Physical Activity .....	18
2.4.3 Nutrition .....	19
2.4.4 The Role Parents Play in Preventing Obesity.....	23
2.4.5 Summary.....	25
2.5 A Strategic Intervention Framework.....	26
2.5.1 Carrots: Marketing Behaviour Change to Consumers.....	27
2.5.2 Sticks: Legislating Behaviour Change .....	28
2.5.3 Promises: Educating to Change Behaviour .....	32
2.5.4 Variables that Mediate Behavioural Action .....	35
2.5.5 Summary.....	39
2.6 Conclusions .....	39
3 Theoretical Perspectives on Consumer Response to Information Disclosure	
Remedies .....	41
3.1 Introduction .....	41
3.2 Cognitive Theories of Consumer Behaviour.....	42

3.2.1	Attitudes Formation and Importance.....	43
3.2.2	The Elaboration Likelihood Model of Attitude Change .....	44
3.2.3	Do Attitudes Predict Behaviour?.....	56
3.3	Behaviour Modification Theories of Consumer Behaviour.....	60
3.3.1	Cognitive Variables in Behavioural Research.....	60
3.3.2	Behavioural Learning Theories.....	63
3.4	Conclusions.....	68
4	On-Pack Nutrition and Health Information.....	71
4.1	Introduction.....	71
4.2	Nutrition Information Labels .....	72
4.2.1	Nutrition Information Labels in Australia and New Zealand.....	74
4.2.2	Reasons for Use and Non-Use of Nutrition Information .....	82
4.2.3	The Effectiveness of Different Nutrition Label Formats .....	93
4.3	Nutrition-content and Health Claims .....	106
4.3.1	Introduction .....	106
4.3.2	Product Claims and the Food Code.....	107
4.3.3	Effects of Product Claims on Buyer Beliefs and Behaviour .....	109
4.4	Conclusions.....	114
5	Research Hypotheses and Design.....	116
5.1	Introduction.....	116
5.2	Front-of-Pack Labels Formats under Consideration in Australia and New Zealand .....	117
5.2.1	Percent Daily Intake Nutrition Labels.....	118
5.2.2	Traffic Light Nutrition Labels.....	120
5.2.3	Nutrition-content and Health Claims .....	121
5.2.4	Summary .....	122
5.3	Hypotheses .....	123
5.3.1	The ELM and Message Effectiveness.....	123
5.3.2	The Effect of Information on Behaviour.....	127
5.4	Research design.....	129
5.4.1	Phase One: Study One.....	130
5.4.2	Phase Two: Studies Two and Three .....	131
5.4.3	Phase Three: Study Four .....	132
6	Study One: Exploring Consumers' Food Purchase Decisions and Reactions to Nutrition Labels.....	133

6.1	Introduction .....	133
6.2	Study One Method.....	133
6.2.1	Demographic Profile of Participants and their Families .....	135
6.3	Study One Results .....	137
6.3.1	Influences on Behaviour while Grocery Shopping.....	137
6.3.2	Food away from home.....	141
6.3.3	Reactions to Front-of-Pack Nutrition Labels.....	143
6.4	Discussion .....	147
7	Measuring Consumers' Product Evaluations using the ELM: Studies Two and Three .....	150
7.1	Introduction .....	150
7.2	Study Two: Front of Pack Nutrition Information.....	151
7.2.1	Study Two Method .....	152
7.2.2	Study Two Results.....	166
7.3	Study Three: Front of Pack Nutrition Labels and Product Claims.....	176
7.3.1	Introduction .....	176
7.3.2	Study Three Method .....	177
7.3.3	Study Three Results.....	183
7.4	Discussion .....	195
8	Study Four: The Effect of Nutrition and Health Related Information on Choice Behaviour.....	200
8.1	Introduction .....	200
8.2	Study Four Method.....	202
8.2.1	Experimental Design .....	202
8.2.2	Survey Design .....	206
8.2.3	Analytic Procedure .....	208
8.3	Study Four Results .....	209
8.3.1	Multinomial Logit Regression Results .....	209
8.3.2	The Effect of Motivation and Ability on Choice .....	215
8.4	Discussion .....	221
9	Conclusions, Implications and Future Research.....	224
9.1	Introduction .....	224
9.2	Conclusions .....	226
9.3	Public Policy Implications.....	235
9.4	Limitations .....	238

9.5	Further Research .....	239
9.6	Summary .....	242
	References .....	244
Appendix 1	Information on Thesis Supplementary CD.....	277
Appendix 2	Traffic Light System Nutrient Thresholds .....	280
Appendix 3	Additional Data Tables for Study Two (§7.2).....	281
Appendix 4	Additional Data Tables for Study Three (§7.3).....	284
Appendix 5	Additional Data Tables for Study Four .....	287

## List of Figures

Figure 1 – New Zealand Adult Overweight (BMI > 25) and Obesity (BMI > 30) proportions by age group, 2006/07 .....	10
Figure 2 – Australian Adult Overweight (BMI > 25) and Obesity (BMI > 30) statistics by age group, 2007/08 .....	11
Figure 3 – Proportion of overweight and obese children by ethnicity in New Zealand 2006/07 .....	12
Figure 4 – Elaboration Continuum .....	45
Figure 5 – Flowchart depicting ELM Persuasion Pathways.....	50
Figure 6 – An example of a Nutrition Facts Panel (NFP) from the United States of America .....	73
Figure 7 – Example of current Nutrition Information Panel (NIP) format.....	75
Figure 8 – New Zealand and Australian Heart Foundation "Pick the Tick" logo .....	77
Figure 9 – Examples of Manufacturers' Summary Nutrition Logos.....	78
Figure 10 – Examples of Supermarket Labelling Systems from the United States.....	79
Figure 11 – Literacy and Numeracy Levels in New Zealand Adults in 1996 and 2006 .	89
Figure 12 – Examples of third-party Front-of-Pack logos from the United States.....	100
Figure 13 – Examples of Traffic Light Label formats.....	103
Figure 14 – Example of a Percent Daily Intake label.....	119
Figure 15 – Examples of other Traffic Light Label formats .....	121
Figure 16 – Example Hooplas Packet with Percent Daily Intake Label.....	154
Figure 17 – MTL Version of the Ability Show Card .....	160
Figure 18 – Images of the a) High Level Health and b) Nutrient-Content Product Claims .....	179
Figure 19 – Example “Hooplas Stars” with PDI label and Health Claim .....	203
Figure 20 – Schematic of Randomisation Process used in Study Four .....	206
Figure 21 – Instructions for Choice Experiment .....	207
Figure 22 – Utility Scores for Variable Combinations in Study Four.....	211
Figure 23 – Choice Patterns Across Groups of Respondents who Viewed Side Panel Zero, One or Two-Plus Times .....	217
Figure 24 – Choice pattern across groups with low, moderate and high confidence when using the NIP .....	220
Figure 25 - Combined Multiple Traffic Light with Percent Daily Intake format.....	240

# List of Tables

Table 1 – Some physical diseases related to excess weight ..... 13

Table 2 – Examples of marketing influences on food choice ..... 21

Table 3 – Typology of circumstances in which to use Education, Marketing, or Law .... 36

Table 4 – Postulates of the Elaboration Likelihood Model of Persuasion ..... 51

Table 5 - Advantages and Disadvantages of Revealed and Stated Preference Methods.. 68

Table 6 – Self-Reported Nutrition Label Usage in New Zealand and Australia..... 80

Table 7 – Example nutrition-content, general and high level health claims ..... 108

Table 8 – Daily nutrition reference values for adult New Zealanders ..... 119

Table 9 – Recommended steps in developing risk communications for consumers using  
the ELM..... 124

Table 10 – Participants’ Demographic Information, Study One ..... 136

Table 11 – Experimental Treatment Conditions for Study Two ..... 152

Table 12 – ‘Better’ and ‘Worse’ Nutrition Profiles used in Studies Two to Four ..... 153

Table 13 – Motivation measures from prior nutrition labelling studies..... 157

Table 14 – Beliefs about NIPs and self-reported usage, Study Two ..... 166

Table 15 – Nutrient content evaluation by nutrition profile and nutrition format, Study  
Two..... 170

Table 16 – Respondents’ Beliefs across Nutrition Label Formats by Nutrition Profile 171

Table 17 – Effect Vectors created for Discrete Variables, Study Two ..... 174

Table 18 – Full Model HRM Summary Statistics, Study Two ..... 174

Table 19 – Reduced Model HRM Summary Statistics and Coefficient Output Study Two  
..... 175

Table 20 – Experimental Treatment Conditions for Study Three ..... 178

Table 21 – Beliefs about NIPs and self-reported usage, Study Three..... 184

Table 22 – Proportion of respondents viewing the side panel image..... 185

Table 23 – Mean attitude by nutrition label format, product claim, and nutrition profile  
..... 186

Table 24 – Time to Answer Ability Questions, by FOP format..... 189

Table 25 – Nutrient content evaluation by nutrition format and nutrient profile ..... 190

Table 26 – Selected Comments from Study Three..... 192

Table 27 – Effect Vectors created for Discrete Variables, Study Three ..... 193

Table 28 – Full Model HRM Summary Statistics, Study Three ..... 193

Table 29 – Reduced Model HRM Summary Statistics and Coefficient Output Study Three .....	194
Table 30 – Enumeration of Attributes and Levels in Choice Experiment.....	204
Table 31 – Variable Combinations Used in Choice Experiment.....	204
Table 32 – Model of Fixed Effects.....	209
Table 33 – Change in Utility Associated with Changing Nutrition Profile from Worse to Better .....	213
Table 34 – Change in Utility Associated with Adding FOP Nutrition Labels Relative to the NIP-only .....	213
Table 35 – Change in Utility Associated with Adding Nutrition-content and Health Claims Relative to No Claim Condition.....	214
Table 36 – Self-Reported use of NIP, Study Four.....	216

## List of Abbreviations

Where relevant, the country is stated in brackets if not included in the title.

ABS	Australian Bureau of Statistics
AFGC	Australian Food and Grocery Council
AICR	American Institute for Cancer Research
AIHW	Australian Institute of Health and Welfare
ANA	Agencies for Nutrition Action (New Zealand)
ANZA	Association of New Zealand Advertisers
ANZFA	Australia New Zealand Food Authority (superseded by FSANZ)
BMI	Body Mass Index
BMP	Behaviour Modification Perspective
BNF	British Nutrition Foundation
CDC	Centers for Disease Control (United States)
CSPI	Center for Science in the Public Interest (United States)
DH	Department of Health (England)
DHA	Department of Health and Aging (Australia)
DRV	Daily Reference Value
ELM	Elaboration Likelihood Model of persuasion
FAO	Food and Agriculture Organization of the United Nations
FCQ	Food Choice Questionnaire
FIA	Food Industry Accord (New Zealand)
FIG	Food Industry Group (New Zealand)
FOE	Fight the Obesity Epidemic (New Zealand)
FOP	Front-of-pack (referring to placement of information)
FSA	Food Standards Agency (United Kingdom)
FSANZ	Food Standards Australia New Zealand
GAO	Government Accountability Office (United States)
GDA	Guideline Daily Amount
HEHA	Healthy Eating Healthy Action (New Zealand Government Policy)
HFSS	High fat, sugar and sodium (salt) foods
HRM	Hierarchical Multiple Regression
HSC	Health Select Committee

HSM	Heuristic-Systematic Model
IFIC	International Food Information Council Foundation (United States)
IOM	Institute of Medicine (United States)
kJ	Kilojoule (1 Calorie equals 4.18 kJ)
MAO	Motivation, Ability and Opportunity
MLR	Multinomial Logit Regression
MTL	Multiple Traffic Light label
MOH	Ministry of Health (New Zealand)
NCD	Non-Communicable Disease
NFP	Nutrition Facts Panel (United States NLEA mandated format)
NHF	National Heart Foundation (New Zealand)
NIP	Nutrition Information Panel (current Australian and New Zealand label format mandated by the Food Code)
NLEA	Nutrition Labeling and Education Act 1990 (United States)
ns	Not (statistically) significant
NZFGC	New Zealand Food and Grocery Council
NZNF	New Zealand Nutrition Foundation
NZTBC	New Zealand Television Broadcasters' Council
OAC	Obesity Action Coalition (New Zealand)
OECD	Organisation for Economic Co-operation and Development
PDI	Percent Daily Intake; equivalent to PDV
PDV	Percent Daily Value; equivalent to PDI
PHA	Public Health Association (New Zealand)
RAC	Responsible Advertising and Children (global industry alliance)
RDA	Recommended Daily Allowance
RDI	Recommended Dietary Intake / Reference Daily Intake
RANZ	Restaurant Association of New Zealand
SES	Socio-Economic Status
SPARC	Sport and Recreation Council (New Zealand)
SPDCM	Stated Preference Discrete Choice Modelling
TLL	Traffic Light Label
USDA	United States Department of Agriculture
USDHHS	United States Department of Health and Human Services
WCRF	World Cancer Research Fund
WHO	World Health Organization

# List of Publications

## *Journal Articles*

Maubach, N.B., & Hoek, J.A. (2010). A qualitative study of New Zealand parents' views on front-of-pack nutrition labels. *Nutrition & Dietetics*, 67, 90-96.

Maubach, N. B., Hoek, J. A., & McCreanor, T. N. (2009). An exploration of parents' food purchasing behaviours. *Appetite*, 53(3), 297-302.

## *Conference Papers*

Maubach, N. B., Hoek, J. A., Gendall, P. J., & Healey, B. J. (2009, 30 November-2 December). Motivation, ability and the influence of nutrition information formats. Paper presented at the *Australian and New Zealand Marketing Academy Conference*, Melbourne, Australia.

Received: Best Paper Award in the Consumer Behaviour track

Maubach, N.B., Hoek, J.A., Gendall, P.J., & Hedderley, D. (2009, 28-30 May). The effect of front-of-package nutrition information and product claims on consumers' attitudinal evaluations and choice behaviour. Paper presented at the *Marketing and Public Policy Conference*, Washington DC, USA.

Received: Best Student Paper Award

Received: Brenda M. Derby Memorial Prize

Maubach, N. B., & Hoek, J. A. (2008, 1-3 December). Alternative nutrition information disclosure formats: Using the elaboration likelihood model to investigate consumers' attitudinal responses. Paper presented at the *Australian and New Zealand Marketing Academy Conference*, Sydney, Australia.

Maubach, N. B., & Hoek, J. A. (2008, 15-16 July). The effect of alternative nutrition information formats on consumers' evaluations of a children's breakfast cereal. Paper presented at the *International Nonprofit and Social Marketing Conference*, Wollongong, Australia.

Received: Best Student Paper Award

Maubach, N. B., Hoek, J. A., & McCreanor, T. N. (2007, 3-5 December). Parents' views of nutrition information labels: An exploratory study. Paper presented at the *Australian and New Zealand Marketing Academy Conference*, Dunedin, New Zealand.