FOOD STANDARDS
Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

Supporting document 3

FSANZ Reanalysis: Consumers and nutrition content claims. A study of responses to vitamin, mineral and other claims

P293 – Nutrition, Health & Related Claims

Executive summary

FSANZ has commissioned two studies into nutrition content claims. The second study, reported here, addressed the key research question: are consumers' nutrition evaluations and likelihood of purchase influenced by nutrition content claims on products of lower nutritional quality?[1] The content claims used in the study were about vitamins, minerals and biologically active substances ('micronutrients') in relation to four foods: ice cream, frozen lasagne, fruit drink and potato chips. Four evaluation measures were used to determine if the presence of nutrition content claims had a significant effect on nutrition evaluations and likelihoods to purchase the products. Each of the four products used as experimental stimuli had one 'familiar' or one 'unfamiliar' micronutrient claim, as well as a control group (no micronutrient content claim), and the results for both claim groups were combined so the analyses examine the impact of claim presence versus claim absence.

For respondents overall, a series of multivariate analyses were conducted to determine the effects of sociodemographic characteristics on four outcomes:

- purchase intent
- nutrition attitude
- perception of overall level of benefit to people
- perception of overall level of health benefit.

The key finding is that the presence of a micronutrient claim was not associated with consumers' purchase intents or nutrition evaluations (nutrition attitude, overall level of benefit to people, overall level of health benefit).

[1]Products of 'lower nutritional quality' refers to foods that do not meet the nutrient profiling scoring criterion that has been proposed to limit the use of general and high level health claims to foods that satisfy this criterion.

In Table 1 below, statistically significant associations are indicated with ticks. Most predictors were statistically significant, and seven were significant against all four outcomes.

Table 1: Statistically significant predictor variables, all respondents

Predictor	**Outcome**			
	Purchase intent	***Nutrition attitude***	***Overall level of benefit to people***	***Overall level of health benefit***
Micronutrient claim				
Age group (*)		✓	✓	✓
Gender (*)		✓	✓	✓
Country (*)	✓	✓	✓	✓
Dependents (*)	✓	✓		
Household income (*)	✓	✓	✓	✓
Educational level (*)	✓	✓	✓	✓
Health concerns (*)		✓	✓	✓
Nutritional knowledge	✓	✓	✓	✓
Motivation to read nutrition labels	✓	✓	✓	✓
Knowledge of micronutrient functions	✓	✓	✓	✓
Familiarity with micronutrients				
Daily fruit and veg intake	✓	✓	✓	✓

(*) indicates a predictor that uses one or more dummy variables

Contents

1 Introduction

1.1 Background

In 2008, FSANZ designed and commissioned research into the effect of nutrition content claims on evaluations of breakfast cereal and biscuits. The main finding of the 2008 consumer research was that nutrition content claims did not enhance nutrition evaluations of the test products. The study also found that while purchase intent was not generally impacted by nutrition content claims, in the case of a fibre claim on a breakfast cereal, purchase intent was lower than for the same product without a nutrition content claim (Roy Morgan Research, 2008).

The 2008 research was carried out to inform the development of the nutrition, health and related claims standard under Proposal P293. In particular, it explored the impact of nutrition content claims on products of lower nutritional quality, a class of foods where concerns about the use of nutrition content claims was highlighted in submissions to the standards development process. The research explored the impact of several common macronutrient content claims. The research and other evidence contributed to the decision of the Board to not require nutritional profiling for nutrition content claims.

The Ministerial Council's review request of the Proposal expressed concern that this research was limited by exploring the impact of nutrition content claims for only well-known macro-nutrients (fat, sugar and fibre), and for not examining impacts of nutrition content claims about vitamins, minerals, and biologically active substances (referred to collectively as micronutrients in this report) on consumer evaluations. In addition, the findings were extrapolated to these nutrient groups not explicitly tested.

In response, FSANZ designed and commissioned a second consumer study, i.e. this study, to address the key research question: are consumers' nutrition evaluations and purchase intents influenced by micronutrient content claims on products of lower nutritional quality?[2] The micronutrient content claims used in this second consumer study were about vitamins, minerals and biologically active substances in relation to four foods: ice cream, frozen lasagne, fruit drink and potato chips. Four evaluation measures were used to determine if the presence of micronutrient content claims had a significant effect on nutrition evaluations and intentions to purchase the products.

The study was designed by FSANZ, and the data collection and initial analysis was performed by Roy Morgan Research Pty Ltd (Roy Morgan Research, 2009). The report was peer reviewed by two international social scientists with experience in food choice research.

This report presents the results of the reanalysis of the data from this second consumer study. This report has been peer reviewed by an external social scientist with experience in food choice research.

1.2 Study design

1.2.1 Study overview

The study used a between-groups experimental design to measure the impact of a range of micronutrient content claims across four food products (Table 2). Each micronutrient content claim was also classified as a familiar or unfamiliar claim based on expert assessment of the

[2]Products of 'lower nutritional quality' refers to foods that do not meet the nutrient profiling scoring criterion that has been proposed to limit the use of general and high level health claims to foods that satisfy this criterion. The 11 April 2008 Final Assessment Report that details this is available from http://www.foodstandards.gov.au/foodstandards/proposals/proposalp293nutritionhealthandrelatedclaims/index.cfm and Attachment 6 (General Level Health Claims (Part 1 includes the nutrient profiling scoring criteria)) is the most relevant document.

public's knowledge of the particular micronutrient. Three-dimension digital images were professionally designed to approximate real-world products. More detail on the stimuli used is given in section 2.2.

For each of the four food products, participants were randomly assigned to a control group or to one of two experimental groups. The control group were exposed to product stimuli with no micronutrient content claim, while those in the experimental groups were exposed to product stimuli with a single micronutrient content claim. The micronutrient content claims could not be randomised across products as this would create nonsensical and noncompliant claims.

Table 2: Micronutrient content claims by product

Product	Familiar claim	Unfamiliar claim
Ice cream	Source of Calcium	Source of Phosphorus
Frozen lasagne	Source of Iron	Source of Selenium
Fruit drink	Contains Antioxidants-flavonoids	Contains Beta-cryptoxanthins
Potato chips	Good source of Vitamin C	Good source of Niacin

1.2.2 Stimulus materials

The study used an online survey method, where respondents were exposed to virtual three-dimensional food packages, specially constructed for this study, and answered an online survey. Apart from the micronutrient claim manipulation, the packaging contained the normal mandated and commercially provided information that is included on the real packages of the four types of food. This information includes branding, pictures, size, serving suggestions, manufacturer address and contact details storage instructions, best before/use-by dates, ingredient list, and the nutrition information panel (NIP). These aspects were held constant across treatment and control stimuli products, so only the claim information was manipulated. However, each respondent only viewed one version of each of the four products.

The visual stimuli presented to respondents are provided in Appendix 5. The images reproduced in this report are smaller than those presented to respondents.

1.3 Sampling

A stratified random sample of main grocery buyers, aged 18 years and older, was drawn from an online research panel maintained by Research Now. Quotas were set on the basis of experimental condition, product type, gender and country (Australia, New Zealand). A total of 8340 people across both countries were invited to participate, leading to a dataset containing 1127 respondents. This represents an overall response rate of 13.5%. There were fewer New Zealand respondents invited, with the outcome that there are fewer New Zealand respondents in the dataset (313 compared to 814 Australian respondents). The response rate for Australia was 15.2% and the New Zealand response rate was 10.4%.

1.4 Study Measures

This report contains the FSANZ reanalysis of the micronutrient content claim data, previously analysed by Roy Morgan Research in 2009. Page 9 of that Roy Morgan Research report references various sources used as the base to construct the outcome and predictor variables.

1.4.1 Outcome variables

The study used four outcome variables ("outcomes"), which are outlined below in Table 3. As the interest is in these outcomes overall, rather than for each food product individually, the results for all four food products have been combined into one composite result, for each outcome. The method used to construct each of the outcomes is described below. For ease of illustration, the questions for ice cream have been given. For the other three food products, the phrase "ice cream" was replaced with the appropriate term, either "frozen meal", "fruit drink", or "potato chips".

Table 3: Outcomes: type of measure and range

Outcome	Type of measure	Lowest possible value	Highest possible value
Purchase intent (Appendix 1)	Mean	1 (Low purchase intent)	7 (High purchase intent)
Nutrition attitude (Appendix 2)	Mean	1 (Negative nutrition attitude)	7 (Positive nutrition attitude)
Perception of level of overall benefit to people (Appendix 3)	Mean	0 (No types of people benefit)	5 (All 7 specified types of people definitely benefit)
Perception of level of overall health benefit (Appendix 4)	Mean	0 (No health benefits)	5 (All 14 specified health benefits are definitely a benefit)

Purchase intent: respondents rated each of the four food products on two questions that asked about intent to purchase. First, respondents were asked "*How likely is it that you would purchase this ice cream?*" Respondents were then asked "*Assuming this ice cream has a cost that is similar to others on the market, how likely is it that you would purchase this ice cream?*" Both questions used a rating scale that ranged from 1 to 7, anchored at the extreme ends only. The score category 1 was anchored to "Not at all likely" and the score category 7 was anchored to "Very likely". The value for the outcome is the mean score from the four sets of these two questions.

Nutrition attitude: respondents rated each of the four food products on two questions that asked about the nutritiousness of the particular food. First, respondents were asked "*How would you rate the nutritiousness of this ice cream?*" Respondents were then asked "*What is your overall attitude towards the nutrition content of this ice cream?*" Both questions using a rating scale that ranged from 1 to 7, anchored at the extreme ends only, and the anchors were different. The first question was anchored at "Poor" for 1 and "Good" for 7, whereas the second question was anchored at "Unfavourable" for 1 and "Favourable" for 7. The value for the outcome is the mean score from the four sets of these two questions.

Perception of level of overall benefit to people: for each of the four food products, respondents were asked "*Below is a list of some types of people. For each one, do you think they would or would not benefit from eating this ice cream as a regular part of the diet?*"[3] Respondents were then given a randomised list of 7 specified types of people to rate: Women, Men; Children; Pregnant women; Older people; People trying to lose weight; People with particular health problems. The same rating scale was used for all 7 types, with four rating scale options plus a "Don't know" category. The options were: "Yes, would definitely benefit", "Yes, would somewhat benefit", "No, would probably not benefit", and "No, would definitely not benefit". The scale for each item was scored from 1 to 5, so that a higher score reflected a higher perception of benefit, with "Don't know" responses scored as 3. The value for the outcome is the mean score from the four sets of these 7 people type ratings.

Perception of level of overall health benefit: for each of the four food products, respondents were asked "*Do you think the following types of health benefits would result from eating this ice cream as a regular part of the diet?*"[4] Respondents were then given a randomised list of 14 specified health benefits to rate: Healthy bones and teeth; More energy from food; Healthy blood cells; Preventing cold or flu; Protection of the body's cells from some types of damage; Good eyesight; Healthy pregnancy; Healthy kidney function; A reduced risk of cancer; Healthy blood pressure; Healthy thyroid function; A reduced risk of diabetes; Healthy immune function; Healthy digestion. The same rating scale was used for all 14 health benefits, with four rating scale options plus a "Don't know" category. The options had similar wording to those used for rating the people types, and these were: "Yes, a definite benefit", "Yes, somewhat of a benefit", "No, not really a benefit", and "No, definitely not a benefit". As for the people types, the scale for each item was scored from 1 to 5, so that a higher score reflected a higher perception of benefit, with "Don't know" responses scored as 3. The value for the outcome is the mean score from the four sets of these 14 health benefit ratings.

1.4.2 Predictor variables

Each of the four outcomes was regressed against the same set of predictor variables, which are shown in Table 4 below. Exact p-values are reported, and results have been interpreted as statistically significant where the p-value is less than 0.05. Interpretation of statistically significant findings is provided.

[3] For the fruit drink, the question referred to drinking rather than eating.
[4] Again, the fruit drink question referred to drinking rather than eating.

Table 4: Predictor variable descriptions

Variable	Type
Claim presence	Dichotomous categorical (0-No claim, 1-Claim)
Age group	Recoded into 2 dummy variables (Low: 18-34 years, Middle: 35-54 years)with "55+ years" as reference
Gender	Dichotomous categorical (0-Male, 1-Female)
Country	Dichotomous categorical (0-New Zealand, 1-Australia)
Has dependents	Dichotomous categorical (0-None, 1-One or more)
Household income	Household income quintiles with the lowest quintile as reference, plus a "no income provided" dichotomous variable(0-Provided income information, 1-Did not provide income information)
Education	Dichotomous categorical (0-Secondary, 1-Higher than secondary,) plus an "education level provided" dichotomous variable (0-Response not codeable, 1-Valid response)
Health concerns	Recoded into 3 dummy variables (specific concerns only, general concerns only, both specific and general concerns) with None as reference
Nutritional knowledge	Recoded into 2 dummy variables (Moderate: 10-12 answers correct, High: 13-14 answers correct), with the lowest number of correct scores as the reference category (<=9 correct)
Motivation to read nutrition labels	Recoded into 2 dummy variables (Moderate: 3.5 to 6.5 mean score, High: 7 mean score), with the lowest mean score as the reference category (1 to 3)
Knowledge of micronutrient functions[5]	Mean score averaged across the 8 questions
Familiarity with micronutrients	Mean score averaged across the 8 questions
Daily fruit and veg intake	Mean score averaged across the 2 questions

Detail on the construction of the non-sociodemographic variables is given below.

1.4.2.1 Demographics

Age was collected using three age bands (excluding "Can't Say"), and the dummy variables are based purely on these bands.

Income was collected using 14 categories, excluding "Don't know" and "Prefer not to answer". The analysis used quintiles to reduce the number of income dummy variables, because the income categories were more amenable to quintile analysis, with the income categories over $50,000 each representing large percentages of respondents that could not be reflected in a quartile breakdown. The quintiles are:

- up to $30,000
- $30,001 to $50,000
- $50,001 to $70,000
- $70,001 to $100,000
- Greater than $100,000

In addition to these quintiles, just over 16% of the respondents did not provide a household income; 3% selected a "Don't know" response and 13.1% chose "Prefer not to answer". These respondents have been coded into a "Did not provide income details" dummy that is included with the set of income dummy variables. This resulted in a total of 5 income-related dummy variables, with the "up to $30,000" omitted as the reference category.

[5] "Don't know" has been recoded to the lowest familiarity level.

Highest educational attainment was coded into a dummy variable. However, because 4% of respondents did not provide their educational attainment, relating to a mixture of "Other (unspecified)", "None of the above" and "Prefer not to answer" responses, a second dummy has been created to indicate whether the respondent provided a codeable response to the education question. This had the advantage of increasing the available sample size for the analyses, as well as showing whether failure to provide an educational qualification had a significant effect on the regression results.

1.4.2.2 Health concerns

Health concerns were identified by asking respondents "*Do any of the following apply to you or any members of your household?*" and providing the following list:

- Food allergy
- Other health concerns such as asthma, diabetes, migraine
- Digestive concerns such as coeliac disease, irritable bowel syndrome
- Health concerns such as heart disease, high blood pressure or cholesterol
- On a specific diet
- Watching my weight or others' weight generally
- Watching my health or others' health generally
- Pregnancy or breast feeding
- Religious or ethical beliefs that influence dietary choices
- Vegetarian or vegan diet
- Any others? IF YES, PLEASE SPECIFY:
- None
- Prefer not to answer

If the respondent marked any of the first five items, they were coded as having a specific health concern. If the respondent marked any of the next 6 items they were coded as having a specific health concern. Where the respondent had a code against each type, they were recoded as having both general and specific health concerns.

1.4.2.3 Nutritional knowledge

Nutritional knowledge was scored from the correct answers to the question "*Please indicate if you think the following statements are true or false*" (To assist the reader of this report, the statements that are true are shown in bold).

- Milk and milk products like cheese and yoghurt are the best sources of iron
- Meat, chicken, fish and eggs should make up the largest part of our diet
- **A diet high in fruits and vegetables and low in salt may help prevent high blood pressure**
- **Salt-reduced foods are healthier than similar foods containing a lot of salt**
- **Dietary fibre can help prevent constipation**
- Meat, chicken and fish are the best sources of calcium
- **Fruit and vegetables are a good source of fibre**
- **Orange and other citrus fruits are a good source of vitamin C**
- **Meat, kidney and liver are good sources of iron**
- **Protein is used for tissue building and repair**
- **Dark green vegetables such as spinach are a good source of vitamin A**
- **Iron is used for making red blood cells**
- **Saturated fats are found in butter**
- A diet high in saturated fat can help prevent heart disease

The statement order was randomised. Each correct response was given a score of 1, so the maximum score is 14. Very few respondents had 8 or fewer correct answers.

1.4.2.4 Motivation to read nutrition labels

Motivation to read nutrition labels was based on two questions. First, respondents were asked: *Thinking now about the nutritional information on food packages, how interested are you in nutritional information on food packages?* Respondents were then asked: *Thinking about nutrition labels on products, how much do you care about reading nutrition labels?* Both questions were asked using a rating scale that ranged from 1 to 7, anchored at the extreme ends only, and the anchors were different. The first question was anchored at "Not at all interested" for 1 and "Very interested" for 7, whereas the second question was anchored at "Not at all" for 1 and "Very much" for 7. "Don't know" responses were scored as 1, which is the minimum interest level possible on the scales. Because a mean of <3.5 therefore indicates a relative lack of interest in reading nutrition labels, scores of less than 3.5 were coded to "Low" motivation, scores between 3.5 and 6.5 were coded to "Moderate" motivation and scores of 7 (the highest possible score) to "High" motivation.

1.4.2.5 Knowledge of micronutrient functions

Knowledge of micronutrient functions was self-reported, based on responses to the question "*How would you rate your knowledge of the functions of the following micronutrients?*" A randomised list of 8 micronutrients was presented, and respondents rated each one using the same 7-point rating scale. The scale was only anchored at the extremes and the anchors were "Not at all knowledgeable" for 1 and "Extremely knowledgeable" for 7. The micronutrients rated were the ones used in the study, of which only a subset would have been viewed by most respondents. The micronutrients presented were: Beta-cryptoxanthins; Niacin; Antioxidants (e.g. flavonoids); Vitamin C; Calcium; Iron; Phosphorus; Selenium. The mean rating across the 8 micronutrients was then calculated for use as the predictor variable.

1.4.2.6 Familiarity with micronutrients

Familiarity with micronutrients was collected very similarly to the knowledge of micronutrients. Respondents were asked "*How would you rate your familiarity with the following micronutrients?*" and then presented with a randomised list of the same 8 micronutrients. A 7-point rating scale was also used for this question, anchored only at the extremes, with a rating of 1 meaning "Not at all familiar" and a rating of 7 meaning "Extremely familiar". The mean rating across the 8 micronutrients was then calculated for use as the predictor variable.

1.4.2.7 Daily fruit and veg intake

Daily fruit and veg intake was based on two questions. The first question asked respondents "*Thinking about serves of vegetables you eat each day. One serve amounts to half a cup of cooked vegetables, or one cup of salad vegetables. How many serves do you usually eat each day?*" and the second question was "*Thinking about serves of fruit you eat each day. One serve amounts to one medium piece of fresh fruit, two small pieces of fresh fruit, half a cup of canned fruit, or half a cup of fruit juice. How many serves do you usually eat each day?*" For both questions, the response options were given as the number of serves, from "1 serve or less" to "6 serves or more" and each question allowed respondents to indicate if they didn't consume vegetables/fruit. No consumption was coded to 0 serves. The mean number of serves across the two questions was then calculated for use as the predictor variable.

1.4.3 Statistical analysis method

For all four outcomes, an ordinary least squares multiple regression has been used as the analysis method, as the assumptions underlying this parametric analysis were met in each case. Appendices 1 through 4 contain the technical detail and results used to identify the most appropriate regression technique for each outcome, based on whether the main assumptions for ordinary least squares regression were met.

2 Which sociodemographic and cognitive/ behavioural factors impact consumer purchase intent and product evaluations?

2.1 Impact of group assignment (exposure to claim), sociodemographic and cognitive and behavioural measures on purchase intent

An ordinary least squares multiple regression was run to examine the impact of the predictor variables on overall purchase intent, and the results are given in Table 5 below. Significant predictor variables have been formatted with bold text for easy identification. Statistical significance has been defined as $p<0.05$.

Table 5: Impact of predictor variables on purchase intent

Predictor variable	Unstandardised coefficients		Standardised coefficients	t	p
	B	Std. Error	Beta		
(Constant)	3.973	.310	-0.026	12.829	.000
Claim presence	-.083	.089	0.032	-.933	.351
Age group: Low	.111	.126	-0.026	.881	.378
Age group: Middle	-.079	.114	-0.057	-.693	.488
Gender: Female	-.185	.095	0.188	-1.949	.052
Country: Australia	**.629**	**.097**	**0.127**	**6.492**	**.000**
Has dependents	**.401**	**.099**	**-0.012**	**4.058**	**.000**
Household income: in 2nd quintile	-.047	.142	-0.039	-.335	.738
Household income: in 3rd quintile	-.170	.154	-0.098	-1.107	.268
Household income: in 4th quintile	**-.391**	**.147**	**-0.097**	**-2.656**	**.008**
Household income: in 5th quintile	**-.392**	**.154**	**-0.088**	**-2.537**	**.011**
No household income provided	**-.358**	**.146**	**-0.068**	**-2.451**	**.014**
Education: Higher than secondary	**-.204**	**.093**	**-0.014**	**-2.201**	**.028**
Valid education response	-.100	.213	-0.08	-.470	.639
Health concerns: General only	-.302	.154	0.027	-1.962	.050
Health concerns: Specific only	.116	.166	-0.027	.698	.485
Health concerns: Both general and specific	-.082	.136	-0.053	-.601	.548
Nutritional knowledge: Moderate	-.160	.133	-0.153	-1.207	.228
Nutritional knowledge: High	**-.464**	**.138**	**0.103**	**-3.357**	**.001**
Motivation to read nutrition labels: Moderate	**.310**	**.157**	**-0.009**	**1.982**	**.048**
Motivation to read nutrition labels: High	-.029	.169	0.161	-.169	.866
Knowledge of micronutrient functions	**.188**	**.063**	**-0.008**	**2.989**	**.003**
Familiarity with micronutrients	-.009	.059	-0.131	-.150	.881
Daily fruit and veg intake	**-.202**	**.046**	**-0.026**	**-4.393**	**.000**

The adjusted R^2 for the model is 0.125, indicating that the model accounted for 12.5% of the variance in overall purchase intent. Given this is a small amount of purchase intent explained by the model, the result suggests either (1) that there were more important variables that explain purchase intent, omitted from our model, and/or (2) purchase intent is an extremely complex variable which is influenced by numerous other variables, each of which only have a small effect.

The interpretation of the table results is that coefficients with a negative sign were associated with lower purchase intent, whereas coefficients with no sign (are positive) were associated with higher purchase intent. Because the model included all the variables in the table, the results for each individual predictor were the effect of that predictor after all other predictors were taken into account.

The key finding for the study is that the presence of a micronutrient content claim on a product (ice cream, frozen lasagne, fruit drink, potato chips) did not influence purchase intent.

As is evident from the table, there were ten statistically significant predictor variables:

- Compared to people living in New Zealand, living in Australia was associated with higher purchase intent for these four products
- The presence of dependents was associated with higher purchase intent
- Compared to people in the lowest income quintile, those in the two highest income quintiles, or who did not provide income information, gave lower purchase intent (3 predictors)
- Compared to people with lower education, higher education was associated with lower purchase intent
- Compared to people with low nutrition knowledge, high nutrition knowledge was associated with lower purchase intent
- Compared to people with low motivation to read nutrition labels, only moderate motivation was associated with higher purchase intent
- Higher micronutrient knowledge was associated with higher purchase intent
- Higher daily fruit and veg intake was associated with lower purchase intent.

2.2 Impact of group assignment (exposure to claim), sociodemographic and cognitive and behavioural measures on nutrition attitude

An ordinary least squares multiple regression was run to examine the impact of the predictor variables on overall nutrition attitude, and the results are given in Table 6 below. Significant predictor variables have been formatted with bold text for easy identification. Statistical significance has been defined as $p<0.05$.

Table 6: Impact of predictor variables on nutrition attitude

	Unstandardised coefficients		Standardised coefficients	t	p
Predictor variable	**B**	**Std. Error**	**Beta**		
(Constant)	4.390	.284		15.438	.000
Claim presence	.025	.081	0.009	.309	.757
Age group: Low	**-.243**	**.115**	**-0.075**	**-2.121**	**.034**
Age group: Middle	**-.252**	**.103**	**-0.089**	**-2.436**	**.015**
Gender: Female	**-.275**	**.086**	**-0.091**	**-3.180**	**.002**
Country: Australia	**.583**	**.089**	**0.186**	**6.588**	**.000**
Has dependents	**.253**	**.090**	**0.086**	**2.803**	**.005**
Household income: in 2nd quintile	-.033	.130	-0.009	-.258	.797
Household income: in 3rd quintile	-.180	.141	-0.044	-1.279	.201
Household income: in 4th quintile	**-.579**	**.134**	**-0.157**	**-4.332**	**.000**
Household income: in 5th quintile	**-.491**	**.140**	**-0.131**	**-3.498**	**.000**
No household income provided	**-.516**	**.133**	**-0.136**	**-3.874**	**.000**
Education: Higher than secondary	**-.197**	**.085**	**-0.07**	**-2.326**	**.020**
Valid education response	-.037	.195	-0.005	-.191	.849
Health concerns: General only	**-.367**	**.140**	**-0.104**	**-2.615**	**.009**
Health concerns: Specific only	.168	.152	0.042	1.103	.270
Health concerns: Both general and specific	-.225	.124	-0.08	-1.817	.069
Nutritional knowledge: Moderate	**-.277**	**.122**	**-0.098**	**-2.270**	**.023**
Nutritional knowledge: High	**-.554**	**.127**	**-0.196**	**-4.375**	**.000**
Motivation to read nutrition labels: Moderate	**.294**	**.144**	**0.105**	**2.038**	**.042**
Motivation to read nutrition labels: High	-.069	.155	-0.024	-.443	.658
Knowledge of micronutrient functions	**.189**	**.057**	**0.173**	**3.310**	**.001**
Familiarity with micronutrients	-.023	.054	-0.022	-.421	.674
Daily fruit and veg intake	**-.178**	**.042**	**-0.124**	**-4.274**	**.000**

The adjusted R^2 for the model is 0.173, indicating that the model accounted for 17.3% of the variance in overall nutrition attitude. Given this is a small amount of nutrition attitude explained by the model, the result suggests either (1) that there were more important variables that explain nutrition attitude, omitted from our model, and/or (2) nutrition attitude is an extremely complex variable which is influenced by numerous other variables, each of which only have a small effect.

The interpretation of the table results is that coefficients with a negative sign were associated with more negative nutrition attitude, whereas coefficients with no sign (are positive) were associated with more positive nutrition attitude. Because the model included all the variables in the table, the results for each individual predictor were the effect of that predictor after all other predictors were taken into account.

The key finding for the study is that the presence of a micronutrient content claim on a product (ice cream, frozen lasagne, fruit drink, potato chips) did not influence nutrition attitude.

As is evident from the table, there were fifteen statistically significant predictor variables:

- Compared to people aged over 55 years, those younger and middle aged people had a more negative nutrition attitude on these four products
- Compared to men, women had a more negative nutrition attitude
- Compared to people living in New Zealand, living in Australia was associated with a more positive nutrition attitude
- The presence of dependents was associated with a more positive nutrition attitude
- Compared to people in the lowest income quintile, those in the two highest income quintiles, or who did not provide income information, had a more negative nutrition attitude (3 predictors)
- Compared to people with lower education, higher education was associated with a more negative nutrition attitude
- Compared to people with no health concerns, those with only general health concerns had a more negative nutrition attitude
- Compared to people with low nutrition knowledge, those with moderate or high nutrition knowledge had a more negative nutrition attitude (2 predictors)
- Compared to people with low motivation to read nutrition labels, only moderate motivation was associated with a more positive nutrition attitude
- Higher micronutrient knowledge was associated with a more positive nutrition attitude
- Higher daily fruit and veg intake was associated with a more negative nutrition attitude.

2.3 Impact of group assignment (exposure to claim), sociodemographic and cognitive and behavioural measures on perception of overall level of benefit to people

An ordinary least squares multiple regression was run to examine the impact of the predictor variables on the overall level of benefit to people perceived to arise from consumption of the food products, and the results are given in Table 7 below. Significant predictor variables have been formatted with bold text for easy identification. Statistical significance has been defined as $p<0.05$.

Table 7: Impact of predictor variables on perception of overall level of benefit to people

	Unstandardised coefficients		Standardised coefficients	t	p
Predictor variable	**B**	**Std. Error**	**Beta**		
(Constant)	2.63	0.158		16.643	.000
Claim presence	0.079	0.046	0.048	1.728	0.084
Age group: Low	**0.14**	**0.064**	**0.077**	**2.174**	**0.03**
Age group: Middle	0.047	0.058	0.03	0.81	0.418
Gender: Female	**-0.135**	**0.049**	**-0.08**	**-2.771**	**0.006**
Country: Australia	**0.217**	**0.05**	**0.125**	**4.372**	**.000**
Has dependents	0.053	0.051	0.032	1.044	0.297
Household income: in 2nd quintile	-0.027	0.073	-0.013	-0.368	0.713
Household income: in 3rd quintile	-0.121	0.079	-0.053	-1.537	0.125
Household income: in 4th quintile	**-0.308**	**0.075**	**-0.149**	**-4.088**	**.000**
Household income: in 5th quintile	**-0.314**	**0.079**	**-0.151**	**-3.976**	**.000**
No household income provided	**-0.242**	**0.075**	**-0.114**	**-3.234**	**0.001**
Education: Higher than secondary	**-0.149**	**0.048**	**-0.096**	**-3.14**	**0.002**
Valid education response	0.06	0.109	0.016	0.55	0.582
Health concerns: General only	**-0.249**	**0.079**	**-0.127**	**-3.168**	**0.002**
Health concerns: Specific only	0.025	0.085	0.011	0.295	0.768
Health concerns: Both general and specific	-0.125	0.069	-0.08	-1.805	0.071
Nutritional knowledge: Moderate	**-0.171**	**0.068**	**-0.109**	**-2.533**	**0.011**
Nutritional knowledge: High	**-0.37**	**0.071**	**-0.235**	**-5.231**	**.000**
Motivation to read nutrition labels: Moderate	**0.186**	**0.08**	**0.119**	**2.335**	**0.02**
Motivation to read nutrition labels: High	0.016	0.086	0.01	0.182	0.855
Knowledge of micronutrient functions	**0.124**	**0.032**	**0.206**	**3.848**	**.000**
Familiarity with micronutrients	-0.036	0.03	-0.064	-1.2	0.23
Daily fruit and veg intake	**-0.071**	**0.023**	**-0.089**	**-3.019**	**0.003**

The adjusted R^2 for the model is 0.144, indicating that the model accounted for 14.4% of the variance in perceived overall level of benefit to people. Given this is a small amount of overall level of benefit to people explained by the model, the result suggests either (1) that there were more important variables that explain overall level of benefit to people, omitted from our model, and/or (2) overall level of benefit to people is an extremely complex variable which is influenced by numerous other variables, each of which only have a small effect.

The interpretation of the table results is that coefficients with a negative sign were associated with perceptions of less overall benefit to people, whereas coefficients with no sign (are positive) were associated with perceptions of more overall benefit to people. Because the model included all the variables in the table, the results for each individual predictor were the effect of that predictor after all other predictors were taken into account.

The key finding for the study is that the presence of a micronutrient content claim on a product (ice cream, frozen lasagne, fruit drink, potato chips) did not influence the perceived overall level of benefit to people from consuming these products.

As is evident from the table, there were thirteen statistically significant predictor variables:

- compared to people aged over 55 years, the youngest people perceived a larger level of overall benefit to people from consumption of these four products
- compared to males, females perceived a smaller level of overall benefit to people
- compared to people living in New Zealand, living in Australia was associated with perceiving a larger level of overall benefit to people
- compared to people in the lowest income quintile, those in the two highest income quintiles or those who did not provide income information perceived a smaller level of overall benefit to people (3 predictors)
- compared to people with lower education, higher education was associated with perceiving a smaller level of overall benefit to people
- compared to people with no health concerns, those with only general health concerns perceived a smaller level of overall benefit to people
- compared to people with a low nutritional knowledge, those with moderate or high nutritional perceived a smaller level of overall benefit to people (2 predictors)
- compared to people with low motivation to read nutrition labels, only moderate motivation was associated with perceiving a larger level of overall benefit to people
- higher self-reported micronutrient knowledge was associated with perceiving a larger level of overall benefit to people
- higher daily fruit and veg intake was associated with perceiving a smaller level of overall benefit to people.

2.4 Impact of group assignment (exposure to claim), sociodemographic and cognitive and behavioural measures on perception of overall level of health benefit

An ordinary least squares multiple regression was run to examine the impact of the predictor variables on the overall level of health benefit perceived to arise from consumption of the food products, and the results are given in Table 8 below. Significant predictor variables have been formatted with bold text for easy identification. Statistical significance has been defined as $p<0.05$.

Table 8: Impact of predictor variables on perception of overall level of health benefit

	Unstandardised coefficients		Standardised coefficients	t	p
Predictor variable	**B**	**Std. Error**	**Beta**		
(Constant)	2.615	0.149		17.557	.000
Claim presence	0.051	0.043	0.033	1.179	0.239
Age group: Low	**0.136**	**0.061**	**0.08**	**2.238**	**0.025**
Age group: Middle	0.04	0.055	0.027	0.735	0.463
Gender: Female	**-0.203**	**0.046**	**-0.129**	**-4.436**	**.000**
Country: Australia	**0.189**	**0.047**	**0.116**	**4.052**	**.000**
Has dependents	0.02	0.048	0.013	0.425	0.671
Household income: in 2nd quintile	0.02	0.068	0.011	0.298	0.766
Household income: in 3rd quintile	-0.04	0.074	-0.019	-0.534	0.594
Household income: in 4th quintile	**-0.223**	**0.071**	**-0.115**	**-3.134**	**0.002**
Household income: in 5th quintile	**-0.18**	**0.074**	**-0.092**	**-2.416**	**0.016**
No household income provided	**-0.149**	**0.07**	**-0.075**	**-2.114**	**0.035**
Education: Higher than secondary	**-0.132**	**0.045**	**-0.091**	**-2.955**	**0.003**
Valid education response	-0.029	0.103	-0.008	-0.282	0.778
Health concerns: General only	**-0.239**	**0.074**	**-0.13**	**-3.232**	**0.001**
Health concerns: Specific only	0.001	0.08	0	0.011	0.991
Health concerns: Both general and specific	**-0.131**	**0.065**	**-0.09**	**-2.007**	**0.045**
Nutritional knowledge: Moderate	**-0.268**	**0.064**	**-0.182**	**-4.201**	**.000**
Nutritional knowledge: High	**-0.383**	**0.067**	**-0.259**	**-5.75**	**.000**
Motivation to read nutrition labels: Moderate	**0.192**	**0.075**	**0.131**	**2.551**	**0.011**
Motivation to read nutrition labels: High	0.047	0.081	0.032	0.579	0.563
Knowledge of micronutrient functions	**0.079**	**0.03**	**0.141**	**2.617**	**0.009**
Familiarity with micronutrients	-0.031	0.028	-0.059	-1.099	0.272
Daily fruit and veg intake	**-0.062**	**0.022**	**-0.083**	**-2.795**	**0.005**

The adjusted R^2 for the model was 0.134, indicating that the model accounted for 13.4% of the variance in perceived overall level of health benefit. Given this is a small amount of overall level of health benefit explained by the model, the result suggests either (1) that there were more important variables that explain overall level of health benefit, omitted from our model, and/or (2) overall level of health benefit is an extremely complex variable which is influenced by numerous other variables, each of which only have a small effect.

The interpretation of the table results is that coefficients with a negative sign were associated with perceptions of less overall health benefit, whereas coefficients with no sign (are positive) were associated with perceptions of more overall health benefit. Because the model included all the variables in the table, the results for each individual predictor were the effect of that predictor after all other predictors were taken into account.

The key finding for the study is that the presence of a micronutrient content claim on a product (ice cream, frozen lasagne, fruit drink, potato chips) did not influence the perceived overall level of health benefit derived from consuming these products.

As is evident from the table, there were fourteen statistically significant predictor variables:

- compared to people aged over 55 years, the youngest people perceived a larger level of overall health benefit from consumption of these four products
- compared to males, females perceived a smaller level of overall health benefit
- compared to people living in New Zealand, living in Australia was associated with perceiving a larger level of overall health benefit
- compared to people in the lowest income quintile, those in the two highest income quintiles or those who did not provide income information perceived a smaller level of overall health benefit (3 predictors)
- compared to people with lower education, higher education was associated with perceiving a smaller level of overall health benefit
- compared to people with no health concerns, those with general health concerns or both general and specific health concerns perceived a smaller level of overall health benefit (2 predictors)
- compared to people with a low nutritional knowledge, those with moderate or high nutritional perceived a smaller level of overall health benefit (2 predictors)
- compared to people with low motivation to read nutrition labels, moderate motivation was associated with perceiving a larger level of overall health benefit
- higher self-reported micronutrient knowledge was associated with perceiving a larger level of overall health benefit
- higher daily fruit and veg intake was associated with perceiving a smaller level of overall health benefit.

3 Conclusions and discussion

3.1 Summary of micronutrient content claim findings

The findings for each outcome are summarised in Table 9 below, and statistically significant associations are indicated. Where the predictor was measured using a series of dummy variables (e.g. age group, household income, educational level), the presence of a tick represents a statistically significant finding for at least one dummy variable for that predictor. Most predictors were statistically significant, and seven were significant against all four outcomes. The two that failed to reach any statistical significance were the **presence of a micronutrient claim** and **familiarity with micronutrients**.

Table 9: Statistically significant predictor variables, all respondents

Predictor	**Outcome**			
	Purchase intent	Nutrition attitude	***Overall level of benefit to people***	***Overall level of health benefit***
Micronutrient claim				
Age group		✓	✓	✓
Gender		✓	✓	✓
Country	✓	✓	✓	✓
Dependents	✓	✓		
Household income	✓	✓	✓	✓
Educational level	✓	✓	✓	✓
Health concerns		✓	✓	✓
Nutritional knowledge	✓	✓	✓	✓
Motivation to read nutrition labels	✓	✓	✓	✓
Knowledge of micronutrient functions	✓	✓	✓	✓
Familiarity with micronutrients				
Daily fruit and veg intake	✓	✓	✓	✓

3.2 Is there an effect of micronutrient content claims?

The study shows **no effect** of these particular micronutrient content claims, labelled on these four products, on:

- Purchase intent
- Nutrition attitude
- Perception of level of overall benefit to people
- Perception of overall level of health benefit.

3.3 Study limitations

While the response rate for the study is relatively low, the results are in line with those found in the earlier FSANZ study.

Each respondent saw one version of each of the four food products. While the “intent to purchase” questions were purposely ordered to precede the various nutritional quality questions for each of the four products, to avoid priming, this control would only be present for the first food product. The responses to the “intent to purchase” questions for subsequently presented products may have been primed. Because the respondent was asked to think about nutritional quality in some detail for the first food product, they likely continued to consider products presented later in the same light. The effect on the study results will be that the intent to purchase and nutrition attitude responses will be non-primed only for the first product presented to each respondent.

4 References

Roy Morgan Research (2008) An investigation into the impact of Nutrition Content claims on packaging in relation to consumer purchase intention, nutrition attitude and health benefits.

Appendix 1: Purchase intent: distribution

Overall purchase intent, which is the mean of the four product purchase intents,[6] was examined for its suitability as a continuous dependent variable in an ordinary least squares (OLS) multiple regression. The reliability analysis of the 4 purchase intent items gave a Cronbach's alpha of 0.739, indicating that respondents' scores on the items were highly correlated and that it was appropriate to merge the ratings. A normal Q-Q plot was used to check for normality. As shown in Figure 1, the distribution of the mean purchase intent scores suggested that a normal distribution was a reasonable assumption for the population. For this reason, an OLS multiple regression was performed.

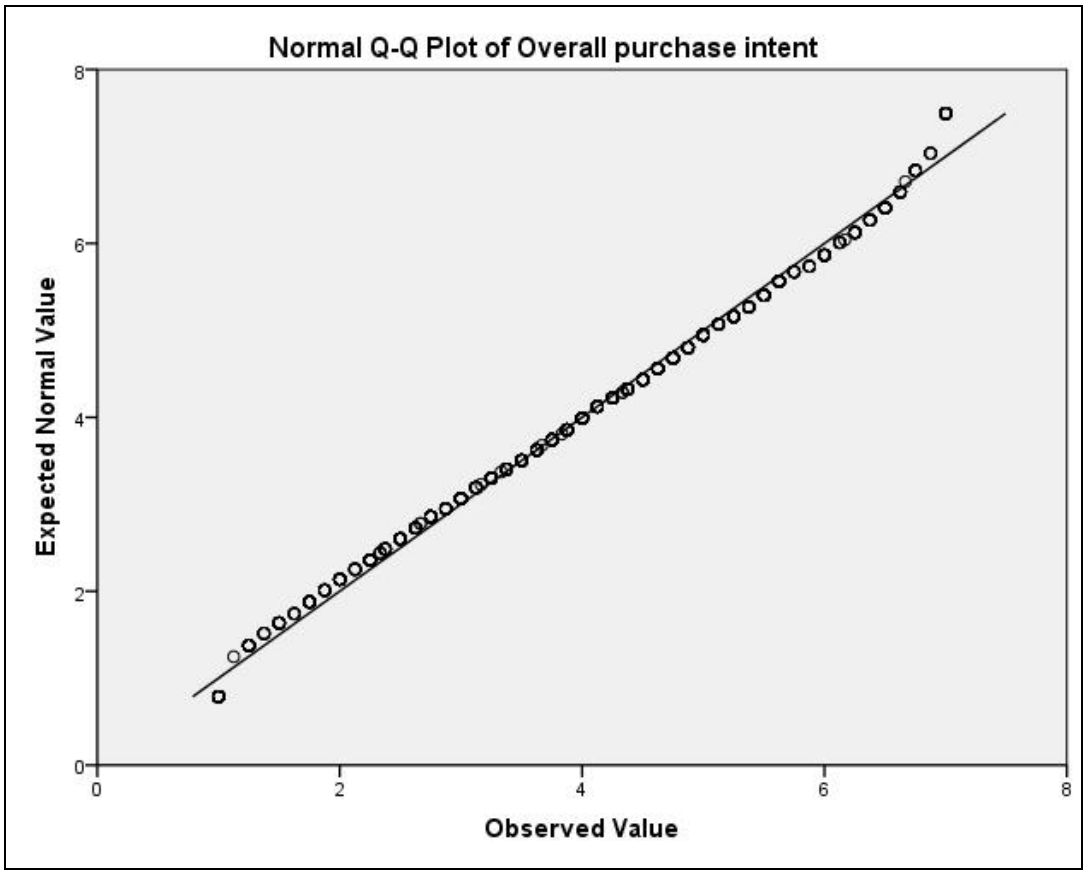

Figure 1: Distribution of overall purchase intent (mean scores)

An examination of the studentised residuals plotted against the predicted purchase intent mean scores showed that the assumption of constant variance of the predictor variable was met. While some studentised residuals exceeded the range -2 to 2, this type of result is not unexpected given the sample size (1127). The plot of this relationship is shown in Figure 2.

[6] Each product had two purchase intent questions, which had already been averaged by for each food product, so the calculation is based on comparing the 4 summary items. A more detailed description of the method to construct this variable is provided in the body of the report.

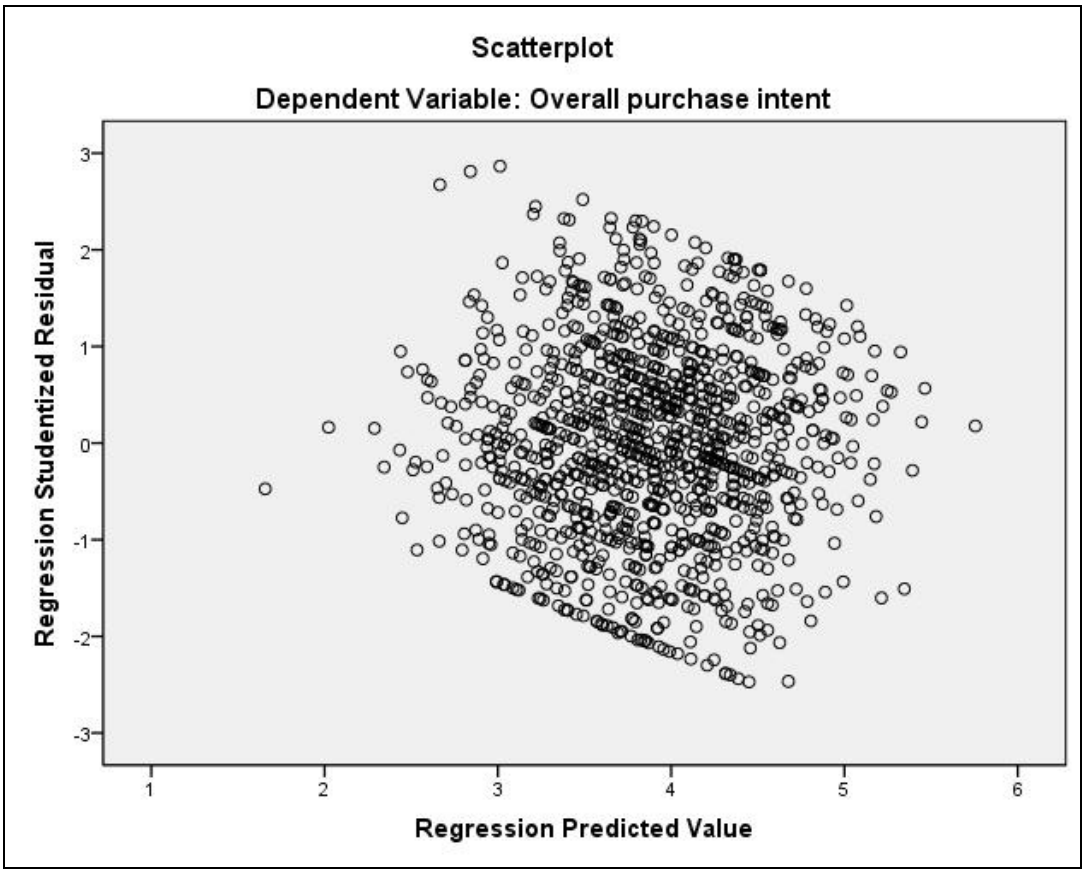

Figure 2: Plot of studentised residuals versus predicted values of purchase intent (mean scores)

Appendix 2: Nutrition attitude: distribution

Overall nutrition attitude, which is the mean of the four product nutrition attitude questions,[7] was examined for its suitability as a continuous dependent variable in an ordinary least squares (OLS) multiple regression. The reliability analysis of the 4 nutrition attitude items gave a Cronbach's alpha of 0.774, indicating that respondents' scores on the items were highly correlated and that it was appropriate to merge the ratings. A normal Q-Q plot was used to check for normality. As shown in Figure 3, the distribution of the mean nutrition attitude scores suggested that a normal distribution was a reasonable assumption for the population. For this reason, an OLS multiple regression was performed.

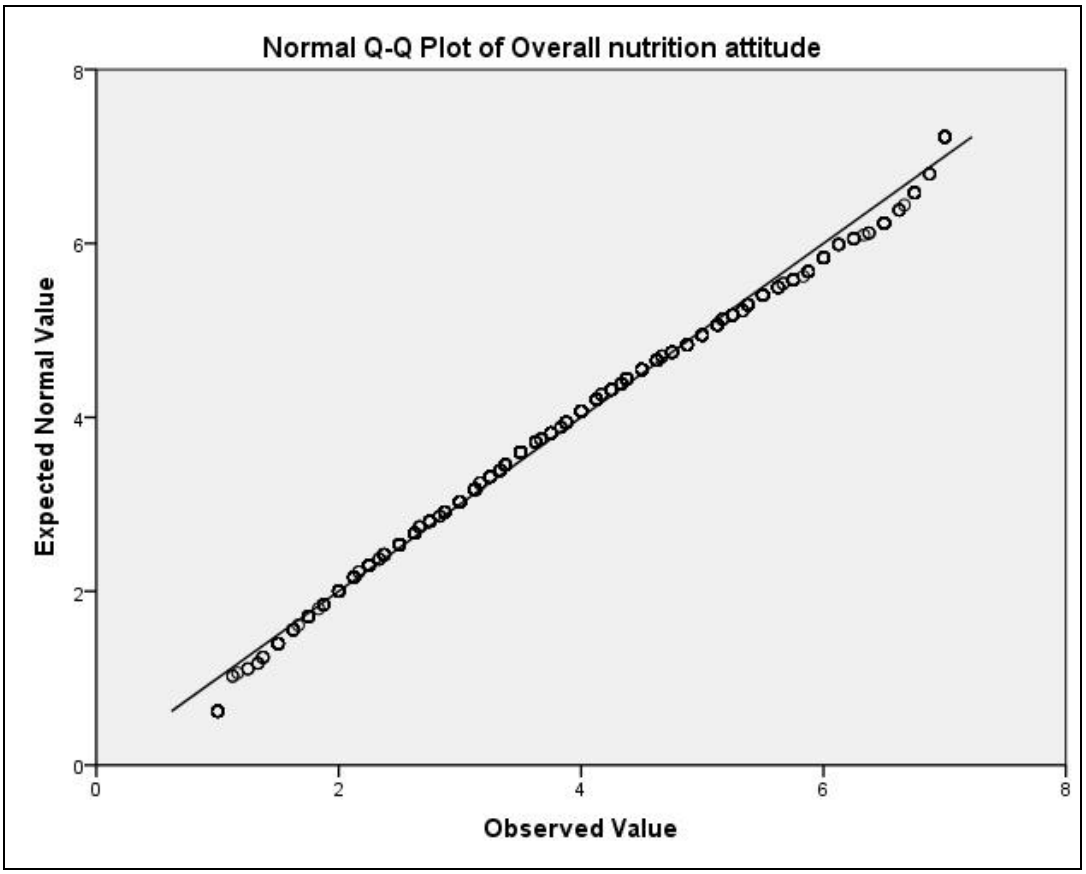

Figure 3: Distribution of overall nutrition attitude (mean scores)

An examination of the studentised residuals plotted against the predicted nutrition attitude mean scores showed that the assumption of constant variance of the predictor variable was met. While some studentised residuals exceeded the range -2 to 2, this type of result is not unexpected given the sample size (1127). The plot of this relationship is shown in Figure 4.

[7] Each product had two nutrition attitude questions, which had already been averaged by for each food product, so the calculation is based on comparing the 4 summary items. A more detailed description of the method to construct this variable is provided in the body of the report.

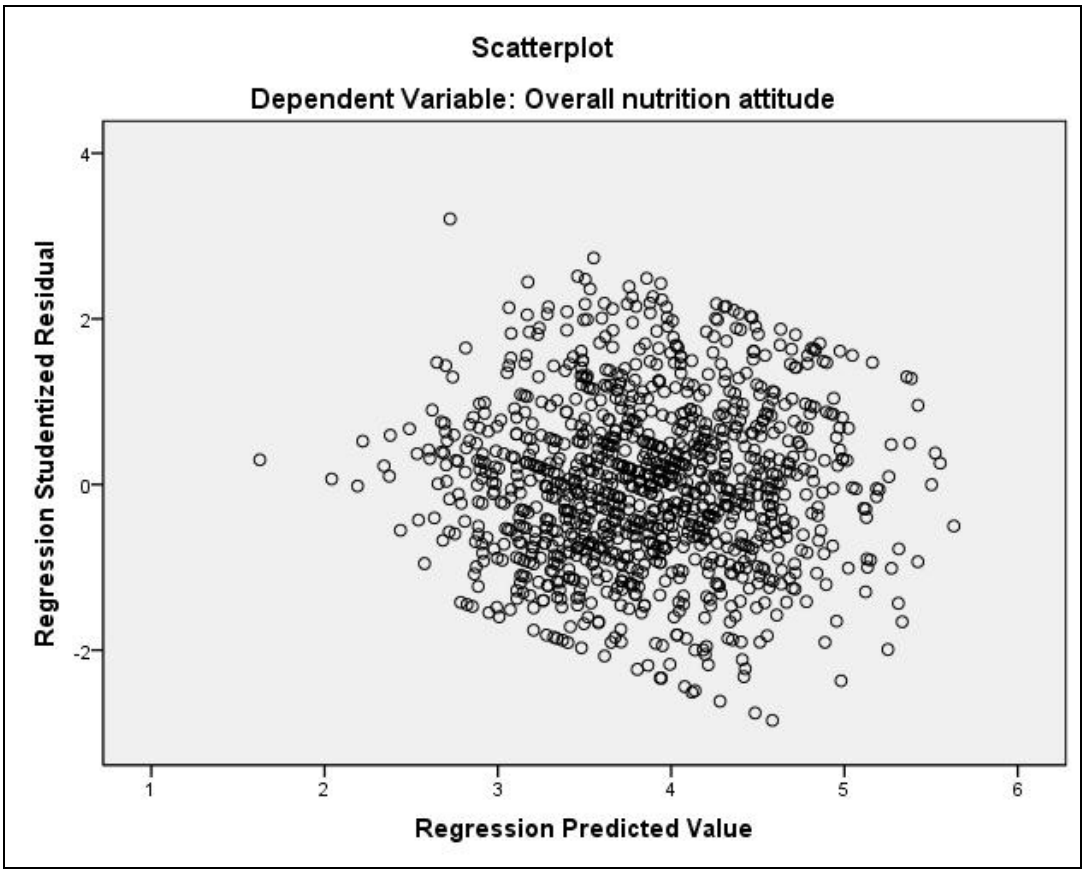

Figure 4: Plot of studentised residuals versus predicted values of nutrition attitude (mean scores)

Appendix 3: Perception of level of benefit to people: distribution

Level of benefit to people, which is the mean of the 28 items[8] was examined for its suitability as a continuous dependent variable in an ordinary least squares (OLS) multiple regression. The reliability analysis of the 28 items gave a Cronbach's alpha of 0.953, indicating that respondents' scores on the items were highly correlated and that it was appropriate to merge the ratings. A normal Q-Q plot was used to check for normality. As shown in Figure 5, the distribution of the mean level of benefit to people scores suggested that a normal distribution was a reasonable assumption for the population. For this reason, an OLS multiple regression was performed.

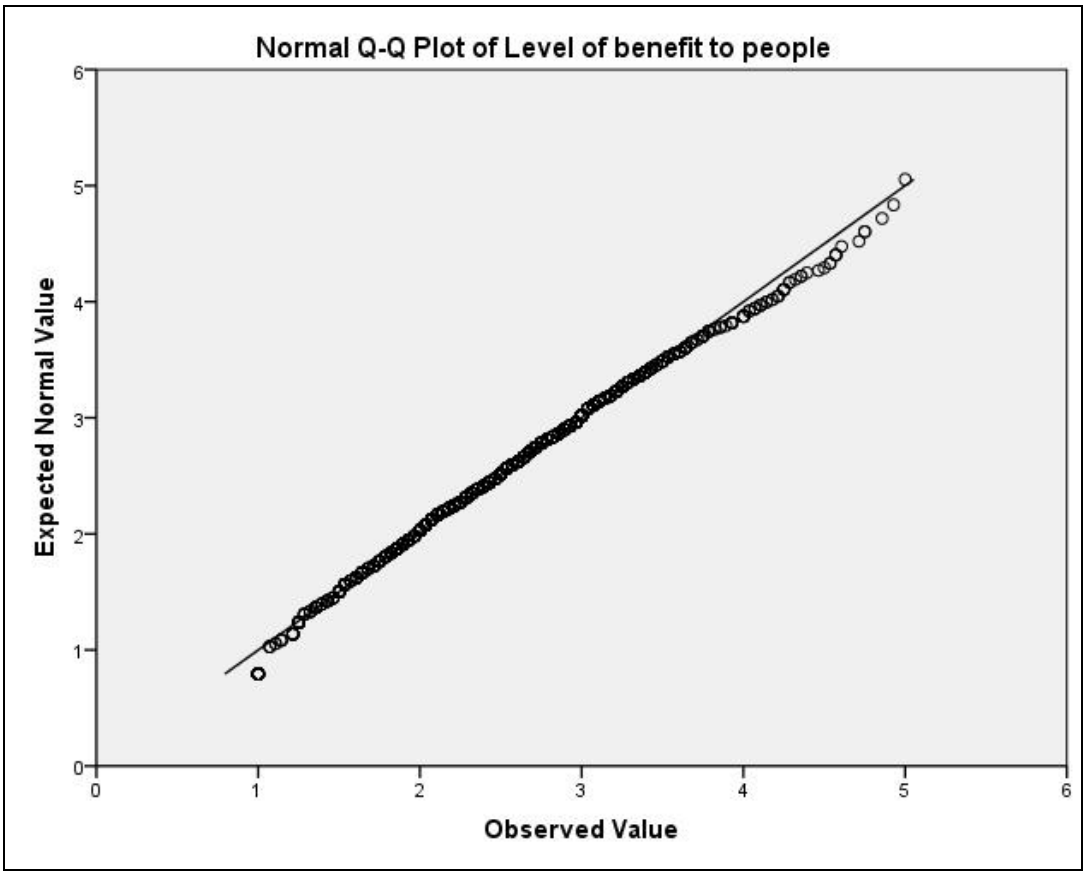

Figure 5: Normal Q-Q plot of level of benefit to people (mean scores)

An examination of the studentised residuals plotted against the predicted level of benefit to people mean scores showed that the assumption of constant variance of the predictor variable was met. While some studentised residuals exceeded the range -2 to 2, this type of result is not unexpected given the sample size (1127). The plot of this relationship is shown in Figure 6.

[8] Each product had 7 questions on benefit to specified people, and there were 4 food products, so this is the mean of 28 questions. A more detailed description of the method to construct this variable is provided in the body of the report.

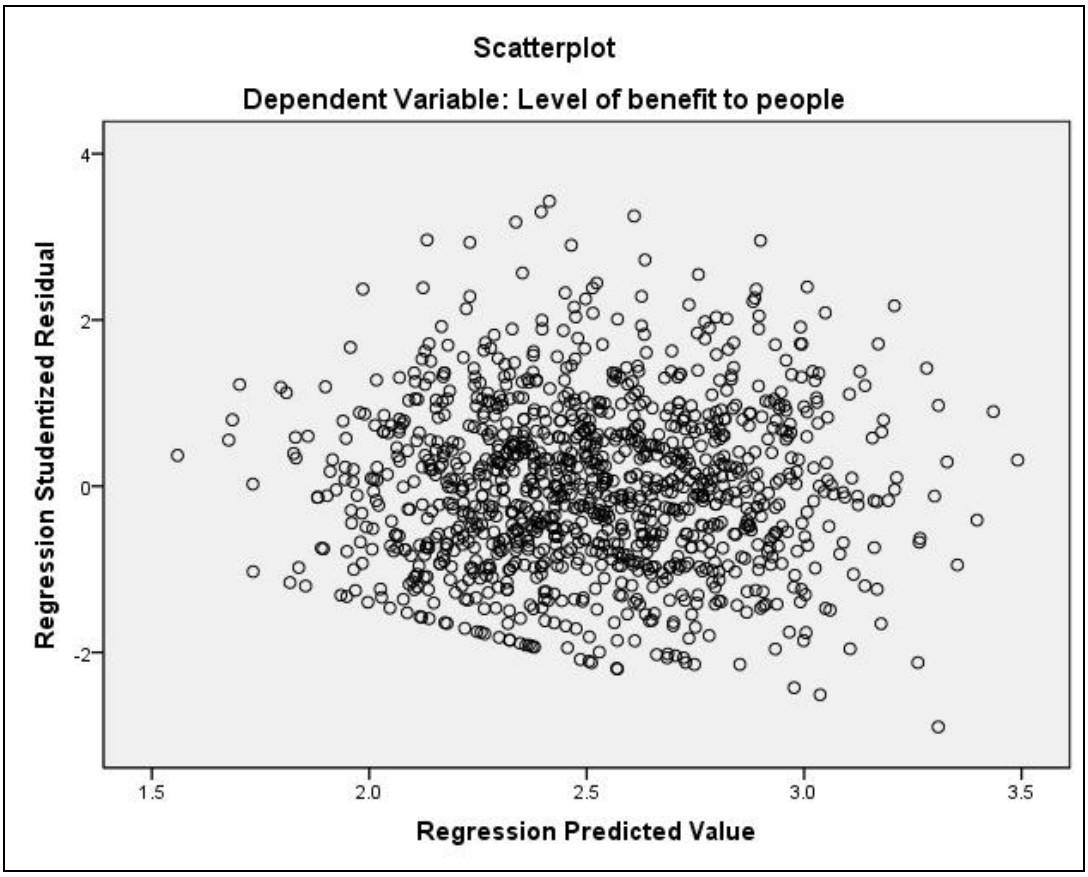

Figure 6: Plot of studentised residuals versus predicted values of level of benefit to people (mean scores).

Appendix 4: Perception of level of health benefit: distribution

Level of health benefit, which is the mean of the 56 items[9] was examined for its suitability as a continuous dependent variable in an ordinary least squares (OLS) multiple regression. The reliability analysis of the 56 items gave a Cronbach's alpha of 0.980, indicating that respondents' scores on the items were highly correlated and that it was appropriate to merge the ratings. A normal Q-Q plot was used to check for normality. As shown in Figure 7, the distribution of the mean level of health benefit scores suggested that a normal distribution was a reasonable assumption for the population, although there was movement from normality for higher mean scores. For this reason, an OLS multiple regression was performed.

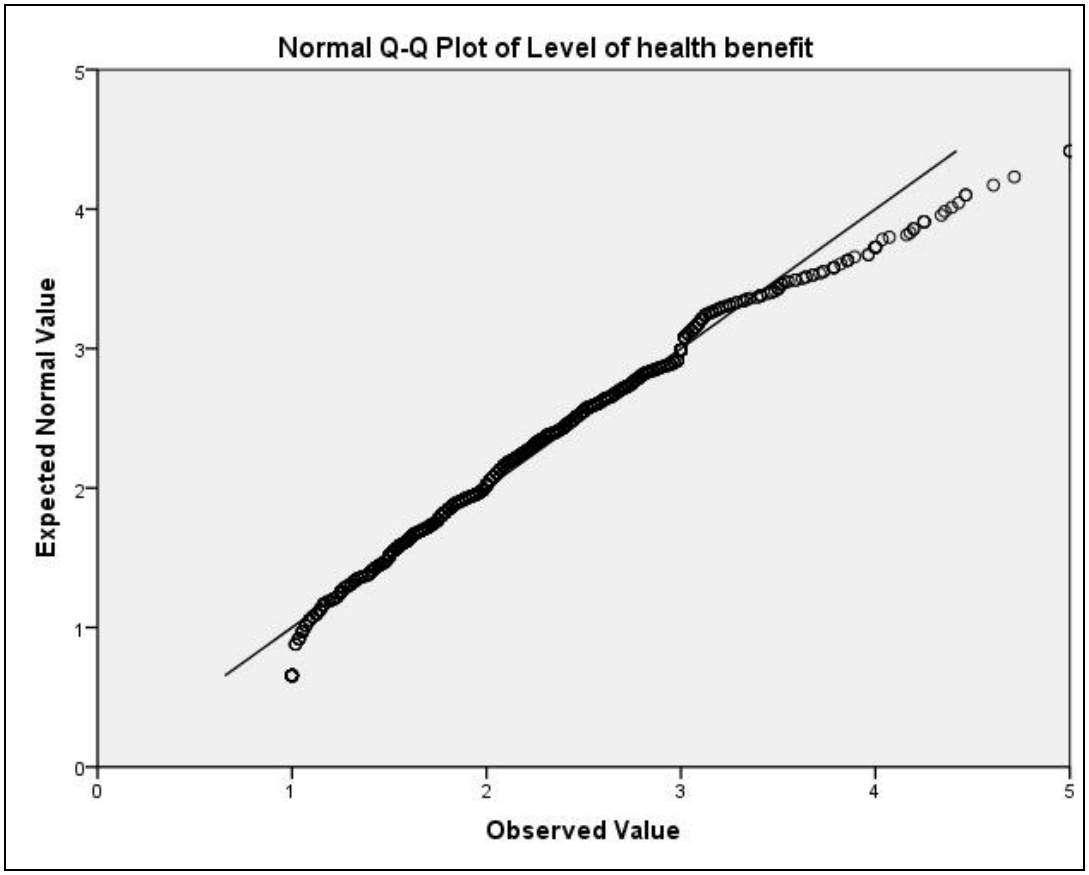

Figure 7: Normal Q-Q plot of level of health benefit (mean scores)

An examination of the studentised residuals plotted against the predicted level of overall health benefit mean scores showed that the assumption of constant variance of the predictor variable was met. While some studentised residuals exceeded the range -2 to 2, this type of result is not unexpected given the sample size (1127). The plot of this relationship is shown in Figure 8.

[9] Each product had 14 questions on specific health benefits from consumption, and there were 4 food products, so this is the mean of 56 questions. A more detailed description of the method to construct this variable is provided in the body of the report.

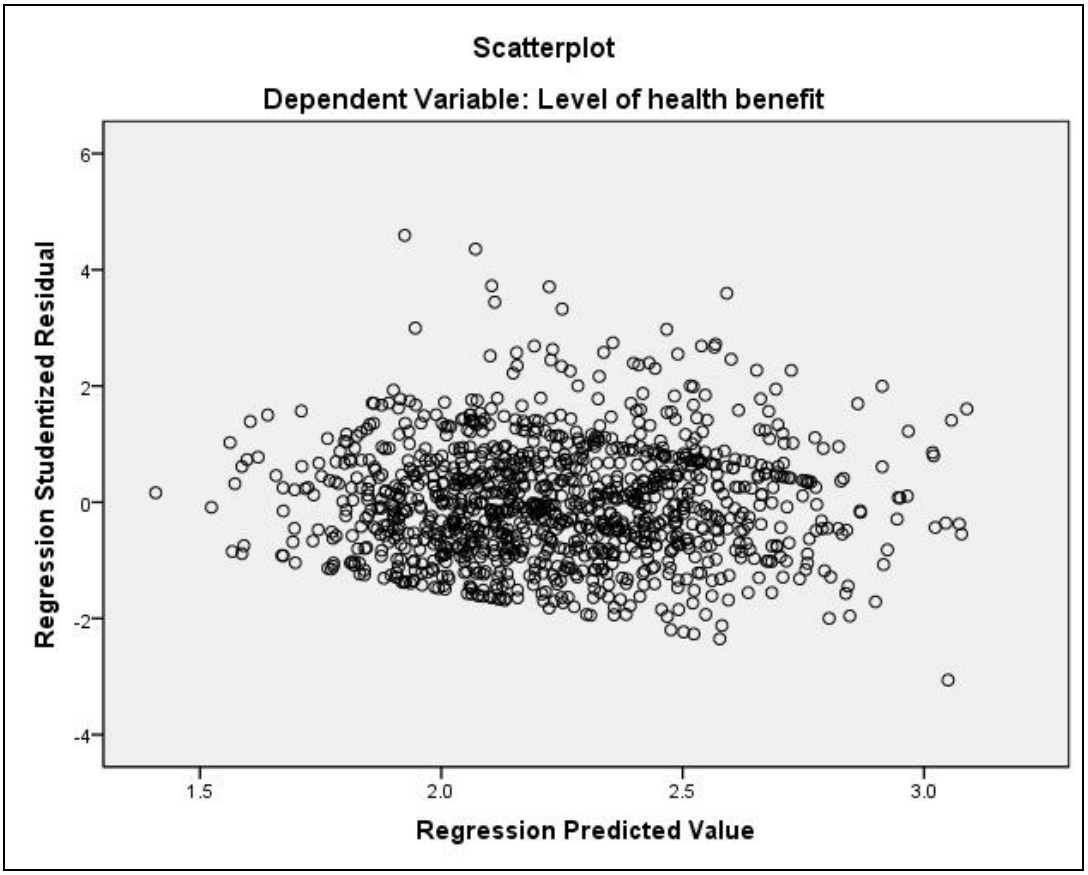

Figure 8: Plot of studentised residuals versus predicted values of level of health benefit (mean scores).

Appendix 5: Product stimuli images

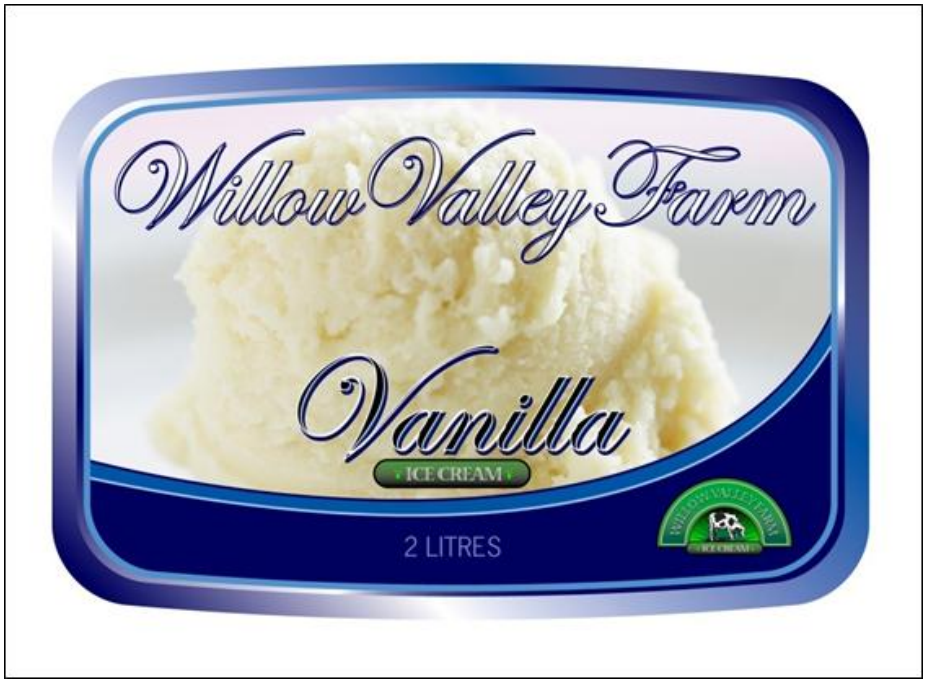

Figure 9: Control picture, top of pack, image for ice cream

Figure 10: Calcium micronutrient content claim, top of pack, image for ice cream

Figure 11: Phosphorus, micronutrient content claim, top of pack, image for ice cream

Figure 12: Control picture, front of pack, image for frozen lasagne

Figure 13: Iron micronutrient content claim, front of pack, image for frozen lasagne

Figure 14: Selenium micronutrient content claim, front of pack, image for frozen lasagne

Figure 15: Control picture, front of pack, image for fruit drink

Figure 16: Antioxidants-flavonoids micronutrient content claim, front of pack, image for fruit drink

Figure 17: Beta-cryptoxanthins micronutrient content claim, front of pack, image for fruit drink

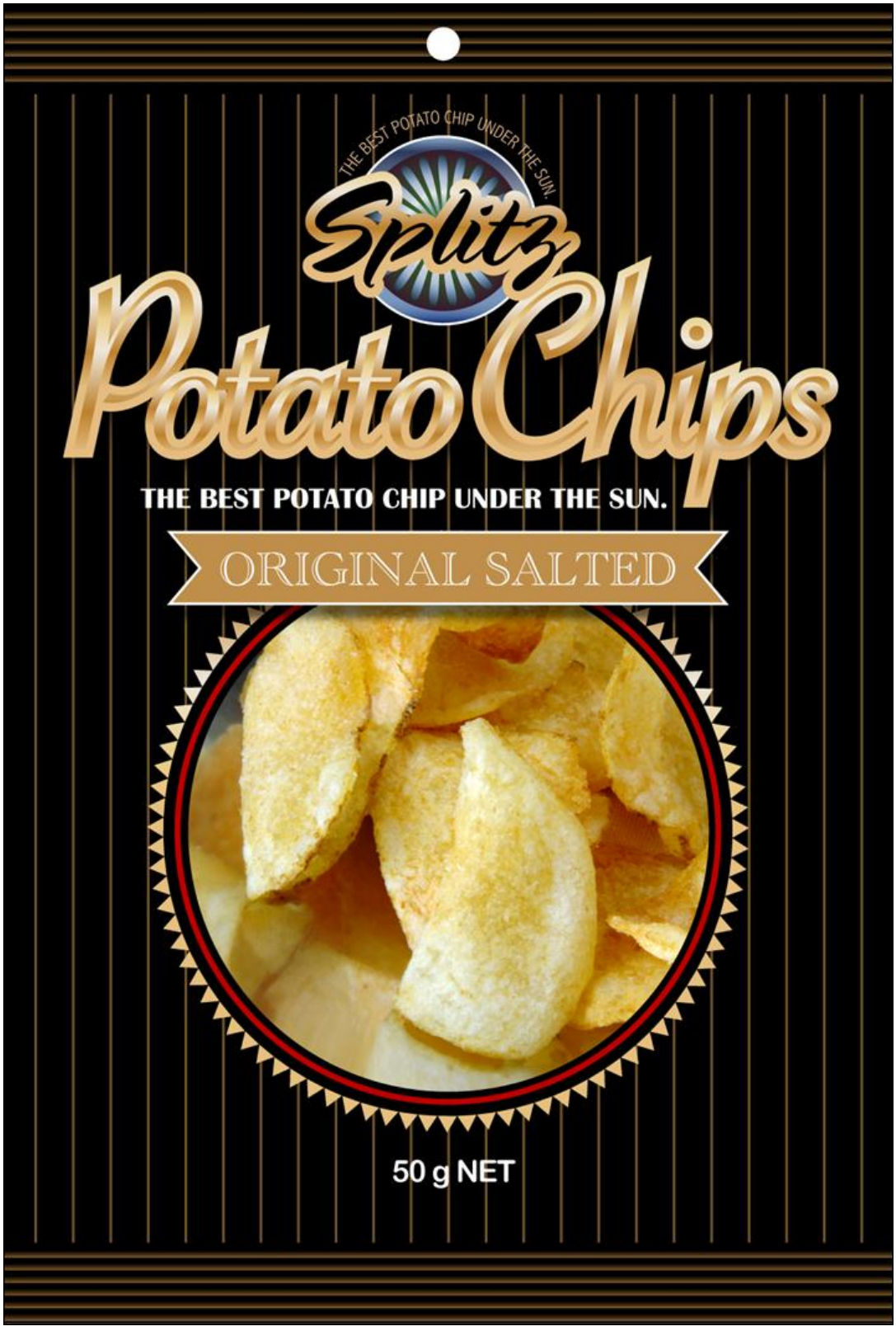

Figure 18: Control picture, front of pack, image for potato chips

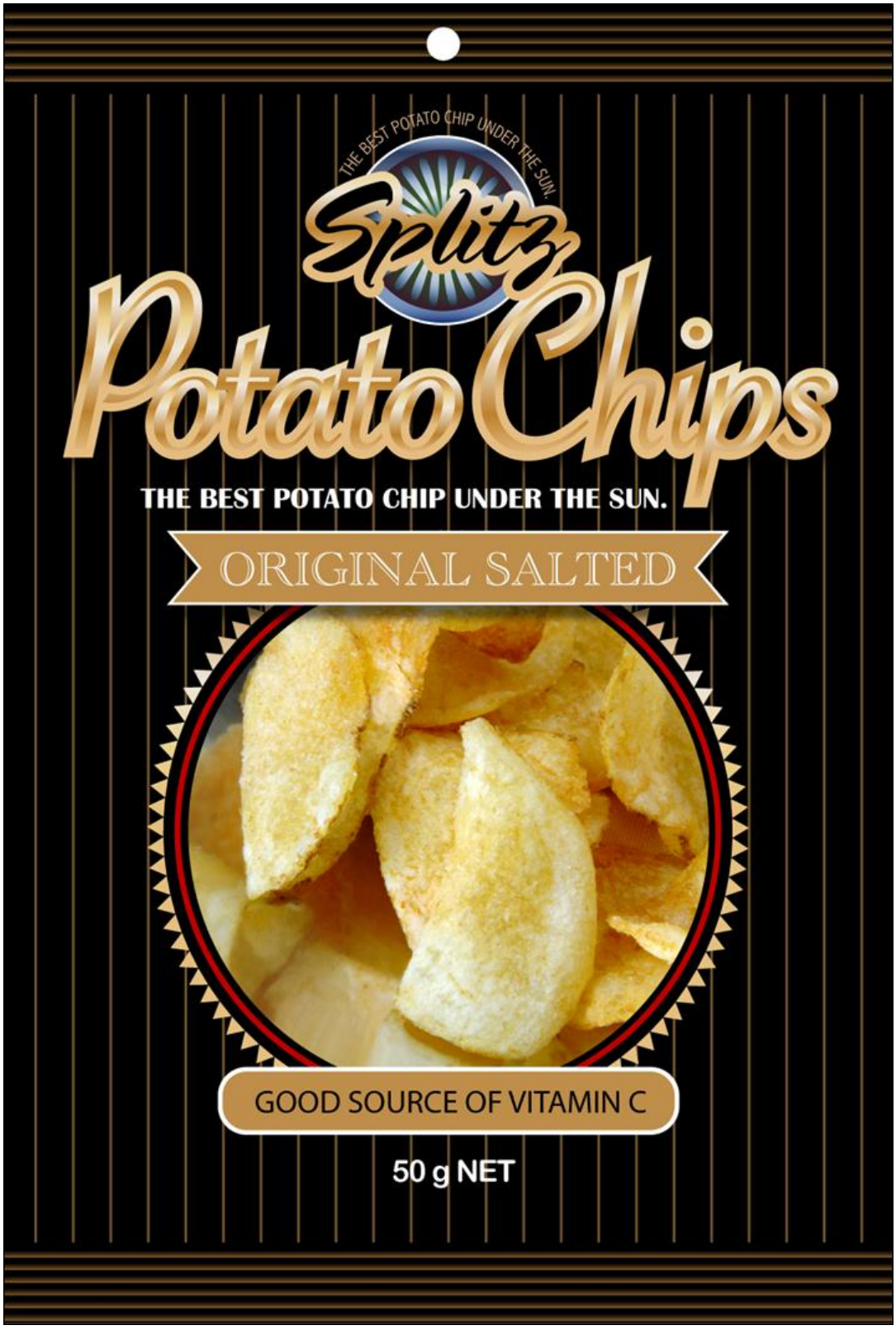

Figure 19: Vitamin C micronutrient content claim, front of pack, image for potato chips

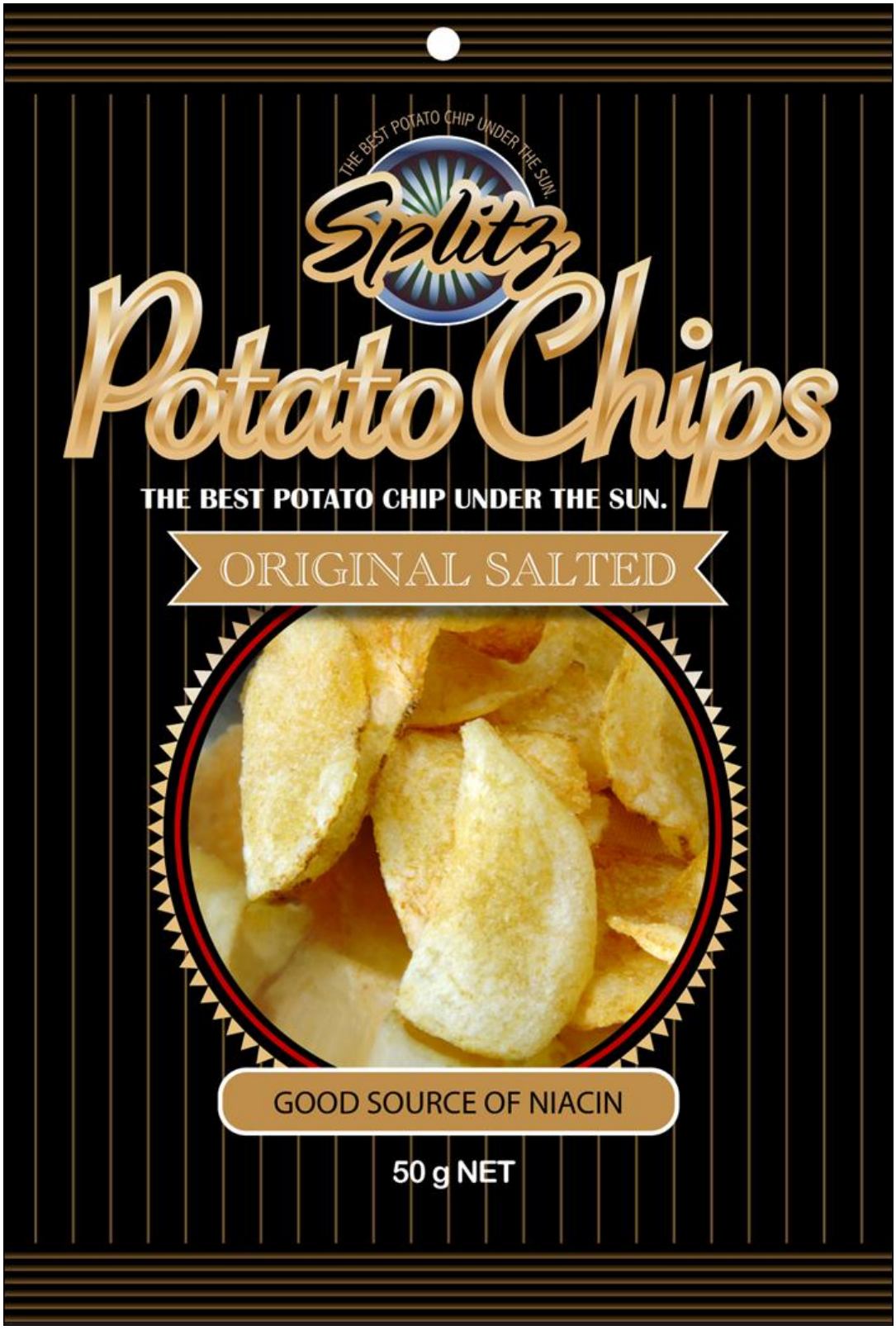

Figure 20: Niacin micronutrient content claim, front of pack, image for potato chips