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Which nutrition information do shoppers want on food labels?

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Two surveys examined supermarket shoppers' views of food label nutrition information terms. Approximately four out of five of the respondents were women. The first study, conducted among 941 shoppers in Sydney, Melbourne and Adelaide showed that information about cholesterol, fats, additives and health claims was perceived to be most important among 15 items of food label information. Extensive differences between the perceptions of members of different demographic groups were observed.

Principal components analysis of the ratings data derived three components which were named Positive Nutrition, Additives and Cholesterol, Calories and Claims. Women had significantly higher scores on all three components.

The second study of 631 shoppers in Sydney examined their ratings of the usefulness of 25 food and nutrition terms. The results confirmed the findings from the first study; information about negative as well as positive food constituents was perceived to be most useful and important. The study showed:

1 Divergence between consumers' and experts' views of the usefulness of label information; consumers were less interested in energy content, dietary fibre and more interested in a variety of other constituents such as cholesterol and flavourings.
2 Differences in desired label information between groups of consumers according to their gender, educational background, and other demographic characteristics.
3 Principal components analysis of the ratings broadly confirmed the findings of the first study: attitudes toward food label information were distributed along five components named Positive Nutrients, Additives, Fats, Salt and Sugars, and, Unfamiliar Concepts. Several statistically significant but small demographic differences were found.

The studies' findings suggest that there is a need for food product labels which more fully reflect consumers' perceptions of foods, especially information about "additives" and "negative nutrients. Negotiation is required between the different perspectives of consumer groups, regulators, nutrition educators and industry personnel about label design and content.

Introduction

There is a great deal of interest in food labels on the part of consumers, regulatory bodies and nutritionists. In the USA, the Nutrition Labeling and Education Act has mandated a revised form of nutrition information panel whilst the EC has issued a directive about the need for adequate nutrient labelling[1,2]. Among researchers, many workers have assessed consumer reactions to a variety of nutrient information formats[3-14]. Most of these studies have been limited to the presentation of the narrow range of nutrient information prescribed by Codex Alimentarius, ie energy, fat, carbohydrate, protein, salt content, and occasionally, vitamin and mineral content.

Some investigators, however, have examined consumers' responses to more varied types of nutrition information on food labels[15-21]. These workers used quite different questions to assess, essentially, the perceived importance of the various nutrients. It is clear that fat, cholesterol, sugars and calories (with dietary fibre, salt/sodium) have been among the chief interests of many consumers in several countries.

Food opinion surveys, over the past two decades, have shown that consumers are interested in many aspects of food and nutrition. Several of them lie outside the orthodox nutrition agenda For example, many consumers are highly concerned about food additives and contaminants such as pesticide residues as well as some environmental effects of food production[15,16,22-38]. These concerns appear to co-exist in consumers' minds with more orthodox views about the dangers of high fat and salt diets for example[39].

More recently, several clusters of consumers' concerns about food and health have been identified, including concerns about: safety and quality; additives; disease; general food system problems and regulatory concerns, as well as concern for helpless people and animals[40]. Groups of consumers are likely to interpret food labels and nutrient meanings in different ways according to these and related standpoints. For example, Crawford and Baghurst have shown that the concept of fat is closely related by men to heart disease but for women it is linked more to personal appearance[41]. Similarly, 'calories' have been associated with weight control and 'energy' with health and vigour[39,42].

Since most food labels are inspected during shopping[21,43] it is important to assess shoppers' views of label information. To date, research has concentrated on consumers' views of nutrients. Few opportunities have been provided to gauge shoppers' perceptions of the relative importance of nutrients, other food constituents and health messages on food product labels. In addition, their responses to novel types of health and nutrition information which might be put on food labels have not been examined. This information is required before major revisions of food label regulations are made. Therefore two studies, were conducted in order to assess consumers' views of label information items and

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the interrelationships between them. The first study assessed their views of ideal label information. The second study was a broad replication which assessed shoppers' perceptions of the usefulness of information items.

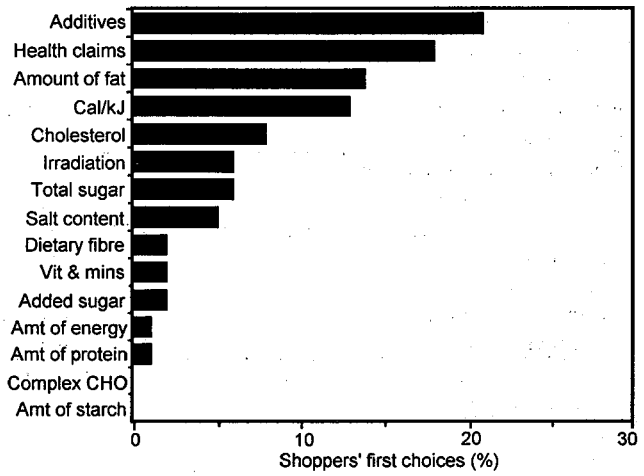
Study 1

Aim: To examine shoppers' desires for particular kinds of nutrition and health information on the 'ideal' food label.

Method

A short questionnaire was designed after discussions with small groups of consumers and after inspection of the food labelling literature. Respondents were asked whether they wanted each of 15 possible types of nutrition and food information on food labels (Figure 1, Table 2 for full details of the items; responses were Yes, No, Not sure) and to select the two most important items from this list.

Figure 1. Study 1: Shoppers' choices of the most desired health information for food labels.



In addition questions were asked about the respondents' views and use of current nutrition information on food labels and their concerns about food and health issues (reported elsewhere) as well as their demographic characteristics.

The study was conducted during March and April 1991, among clustered samples of supermarket shoppers in Sydney, Adelaide and Melbourne. Care was taken to select numbers of supermarkets according to the approximate market shares of the main retail chains. Sixty shoppers were randomly selected from each supermarket during peak shopping times according to a predetermined protocol (available from the author and similar to that reported elsewhere[44]). The shoppers' voluntary cooperation was elicited and the general purpose of the survey was explained. They were invited to complete the questionnaire at home and to return it via a free-post envelope. Their names and addresses were recorded so that up to two reminders could be sent to non-respondents at two weekly intervals thereafter. In all, 600 shoppers were selected from ten supermarkets in Sydney, 220 from four in Adelaide and 480 from eight in Melbourne.

The shoppers' ratings of the desirability of the items on food labels were subjected to principal components analysis[45,46] in order to examine the interrelationships between the shoppers' perceptions of the items. An alternative technique, non-ordinal multidimensional scaling[47-49] was also used to examine these relationships. The two techniques yielded broadly similar findings but for the sake of simplicity only the results of the principal components analyses will be reported here. Details of the multidimensional scaling findings are available from the author. The respondents' scores on each of the principal components were calculated[46] and their dependence on several demographic variables Sex, Age, Presence/Absence of children under 18 years, Educational level (see Table 1) and Employed/Unemployed status were examined through a series of multiple regression analyses[46].

Results

Response rate and demographic characteristics.

Nine hundred and forty one shoppers returned completed questionnaires, a response rate of approximately 75%. The demographic characteristics of the pooled sample are shown in Table 1.

Table 1. Demographic characteristics of the samples.

Study 1 Sydney, Adelaide, Melbourne (n=941, response rate 75%)			**Study 2, Sydney** (n=631, resp. rate 74%)	
Sex	**n**	**%**	**n**	**%**
Women	729	77.8	550	87.2
Men	208	22.2	70	11.1
Not stated			11	1.2
Age groups				
18-32	310	34.0	208	33.8
33-44	310	34.0	195	31.4
over 44	293	32.1	214	34.8
Marital Status				
Single/divorced/sep	307	32.9	142	22.5
Married/de facto	626	67.0	484	76.7
Not stated	8	0.8	5	0.8
Educational groupings				
Year 8-10	360	38.3	268	42.4
Year 11/12/Tech qual	300	31.9	200	31.7
Tertiary	266	28.3	152	24.1
Not stated	15	1.6	11	1.8
Dependents under 18 years				
No	497	52.8	272	43.1
Yes	418	44.4	335	53.1
Not stated	26	2.8	24	3.9
Shopping Status				
Main shopper	587	62.4	484	76.7
Joint shopper	263	27.9	101	16.0
Not main shopper	85	9.0	42	6.7
Not stated	6	0.6	4	0.9
Employment categories				
In paid work	634	67.4	346	54.8
Unpaid work in home	286	30.4	260	41.2
Not stated	21	2.2	25	4.4

The most important and desired food label information.

Additives, health claims, cholesterol, irradiation and the amount of fat were seen to be the most important items of the listed food label information, and, the amounts of starch, complex carbohydrates, energy and protein were perceived as the least important items (Figure 1).

Overall, the percentages of respondents who rated the items as desirable closely paralleled the choice data. Bivariate analyses of the desirability ratings revealed several statistically significant differences between the demographic groups.

More women than men wanted the total amount of sugar, and the amounts of added sugar, dietary fibre, salt and starch, as well as health claims, and details of irradiation status on food labels (Table 2).

The youngest age group was least interested in the amount of starch or whether the food had been irradiated. (Amount of starch: 55% of 18-32 year olds, 64% of 33-44 year olds, 71% of 44 years and older, $p < 0.001$; irradiation status: 73% of 18-32 year olds, 84% of 33-44 year olds, 87% of 44 years and older, $p < 0.0004$.).

Table 2. *Study 1:* Health information wanted by shoppers on food labels: Sex and Educational Group Differences

Information	% Women	% Men	P
	721	203	
Number of calories or kilojoules	86	76	*
Health claims (eg. reduced fat)	94	87	***
Amount of fat	93	89	NS
Amount of added sugar	89	80	**
Total amount of sugar	87	76	****
Details of additives	95	91	NS
Details of vitamins and minerals	84	80	NS
Amount of starch	66	54	**
Amount of complex carbohydrate	73	65	NS
Amount of dietary fibre	86	71	****
Amount of protein	84	76	**
Whether food has been irradiated	83	77	*
The salt content of the product	91	83	***
Amount of cholesterol	90	88	NS
Amount of energy in the product	69	67	NS

Information	Education Groups			
	<16yr	<18yr	Tert	P
	353	300	[266]	
Number of calories/ kilojoules	86	84	80	NS
Health claims (eg reduced fat)	97	93	88	***
Amount of fat	93	92	92	NS
Amount of added sugar	88	86	85	NS
Total amount of sugar	87	83	82	NS
Details of additives	93	92	97	NS
Details of vitamins and minerals	84	80	85	NS
Amount of starch	74	58	54	****
Amount of complex carbohydrate	77	67	68	*
Amount of dietary fibre	87	77	82	**
Amount of protein	87	78	81	**
Whether food has been irradiated	86	75	83	****
Salt content of the product	88	88	91	NS
Amount of cholesterol	90	89	89	NS
Amount of energy in product	72	66	66	NS

Respondents were asked: 'Getting down to details, what health information would you like to see on food products? Circle one answer next to each item. Circle ? if you are Not Sure.' Then followed the list of items above; the responses Yes, No and ? were headed "Do you want it?'

The figures in bold at the head of each column are the numbers of respondents in each group. The figures in the columns are the percentages of each group endorsing the items.

*p<0.05; **p<0.01; ***p<0.001; ****p<0.0001.

The tertiary educated group reported least interest in health claims, and, the amounts of starch, complex carbohydrate, dietary fibre and protein. However, the least and most educated groups expressed the greatest interest in irradiation status (Table 2).

Interrelationships between shoppers' perceptions of food label information.

The principal components analysis yielded three components which accounted for 49.9% of the intercorrelation matrix variance. Items to do with "Positive Nutrition" loaded on the first component, "Negative Nutrition" items on the second and "Cholesterol, Claims and Calories" items on the third (Table 3). Calories/kilojoules loaded on both the Positive Nutrition and the Cholesterol, Claims and Calories factors to moderate extents. Inspection of the multi-dimensional scaling findings confirmed this and suggested that calories/kilojoules were seen by women as having links to positive nutrients (as "energy") as well as links to Fat (as "fattening").

The regression analyses showed that the demographic factors explained minimal amounts of the variance in the component scores. However, women had higher scores than men on all three components (Table 6).

Table 3. *Study 1:* Summary of the principal components analysis of shoppers' ratings of desired label content.

Positive Nutrition	
Amount of complex carbohydrate	74
Amount of protein	74
Details of vitamins and minerals	69
Amount of starch	67
Amount of dietary fibre	65
Amount of energy in the product	62
Number of calories or kilojoules	43
Eigenvalue (% variance)	**5.13 (34.2)**
Cronbach's alpha	**0.83**
Negative Nutrition	
Amount of added sugar	70
Total amount of sugar	69
Salt content of the product	62
Amount of fat	59
Details of additives	53
Whether the food has been irradiated*	41
Amount of cholesterol	38
Eigenvalue (% variance)	**1.33 (8.9)**
Cronbach's alpha	**0.72**
Cholesterol, Claims, Calories	
Amount of cholesterol	60
Health claims (eg reduced fat, natural, no additives)**	59
Amount of fat	52
Number of calories or kilojoules	50
Eigenvalue (% variance)	**1.01 (6.8)**
Cronbach's alpha	**0.59**

* Cronbach's alpha =0.75 if this item deleted. **Cronbach's alpha =0.61 if this item deleted.

Discussion

The high demand for information about fats, calories and cholesterol confirm findings from previous surveys of consumers' responses to label information[15-21]. In addition the widespread demand for information about additives, irradiation status and health messages is consistent with the results of a number of surveys of consumers' health concerns[20,22-24,26-36,40]. The strong preference for health claims on labels was supported by the finding from Study 2 in which respondents indicated that examples of seven health (and nutrient) claims (eg 'low cholesterol') were 'helpful'[43].

The results show that there is interest in 'orthodox' nutrition issues such as fat and salt intake but these are accompanied by interest in other issues (eg additives, irradiation, perhaps calories/kilojoules) which are not part of the 'orthodox' nutritional agenda. In addition important nutritional concepts such as complex carbohydrate, protein, starch and energy appeared to be of little relevance to the shoppers.

This interest in negative ingredients is consistent with the work of Payne et al who found consumers check labels (on household chemicals) first for things that may harm them[50]. Regulatory authorities may need to consider whether they should include such information into new food label designs.

The support for health claims which are currently not allowed in many countries (eg Australia, New Zealand, the European Community), again supports the information processing viewpoint espoused by several workers[4,50,51]. Health claims quickly draw attention to key product attributes or benefits. The prominence of health claims on the third 'Cholesterol, Claims and Calories' component suggests they are associated in consumers' minds with warnings about 'negative' nutrients less familiar. The

lesser interest of the tertiary educated in health claims and the greater interest of early school leavers in health logos demonstrated in Study 2[43] suggests they may have greater utility for people with less knowledge of, or confidence about, food ingredients.

Two items on the current Codex label were not popular: energy and protein, nor were two synonyms of carbohydrate - complex carbohydrate and starch. This suggests either that these are redundant terms which should be removed, or, that regulatory authorities should investigate ways of raising the public's awareness of their importance.

The derivation of three principal components suggests that label designers should take into account consumers' wishes for information about food constituents which yield benefits ("Positive Nutrition") as well as those which are perceived to pose some risk to them ("Negative Nutrition", "Cholesterol, Claims and Calories"). The similar loadings of several items on the same component suggests that consumers do not discriminate finely between them. Consumer knowledge may be a rough and ready affair.

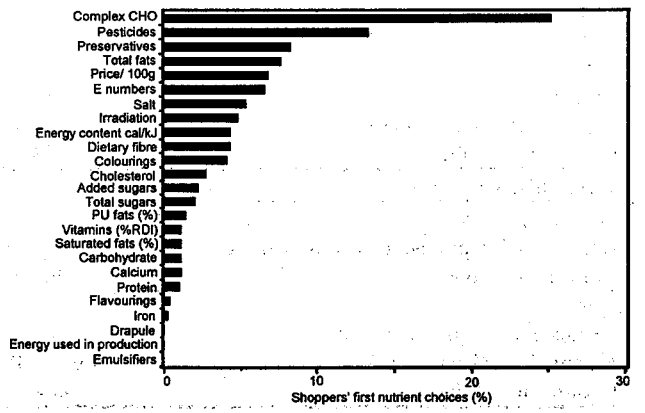
Study 2

Aims: Study 1 examined shoppers' wishes for a small range of nutritional terms on food labels. The main aim of the second study was to examine shoppers' perceptions of the usefulness and importance of a wider range of information about nutrients and other food constituents . This included proposed label information as well as information which is often present on food labels.

Method

A short questionnaire included questions about the usefulness of 25 nutritional terms (Figure 2), as well as questions about the respondents' use and understanding of health messages and ingredients lists (reported elsewhere[49]) and demographic information. After rating the usefulness of the nutritional terms the respondents chose up to three most important items from the list.

Figure 2. *Study 2:* Shoppers' first choices of nutrient label information.



The questionnaires were administered to 900 shoppers at 15 supermarkets in Sydney during May and June 1991, using similar methods to those employed in Study 1. As in the first study the resulting data were examined via contingency table analyses, principal components and multidimensional scaling analyses of the inter-item correlation matrices, followed by regression analyses of the respondents' scores on the principal components.

Results

Response rate and demographic characteristics.

Six hundred and thirty one shoppers returned completed questionnaires, a response rate of approximately 74 percent The respondents were demographically similar to those of Study 1 (Table 1).

The shoppers' views of the usefulness and importance of nutrition information.

Again, the shoppers indicated that they found some items of food information more useful than others. Cholesterol, pesticides, preservatives, additives, total sugars and total fats headed the list of 'very useful' information whilst details of emulsifiers, complex carbohydrates, energy used in production and drapule were least popular. (Drapule is a fictitious term included to assess acquiescence set - the tendency to agree with items irrespective of their meaning.) These aggregate ratings were similar to the rankings which were derived from shoppers' choices of the most important items out of the list of 25 items (Figure 2). The rank order of these was similar to that found in Study 1.

Generally, women indicated that food and nutrition information was more useful than men did (Table 4); a similar gender difference to that found in Study 1. For example, more women rated over half of the items as "very useful". Similar sex differences were observed in the choices of important nutrient information of men and women. More men chose cholesterol, total fats, total sugars and price per hundred grams as items of most importance.

Table 4. *Study 2:* Shoppers' views of the usefulness of nutrition information on food labels (% 'Very Useful'): Sex, Age and Education Group differences.

Food constituents	Sex			Age Groups			
	F 545	M 70	p	18-34 207	34-44 195	>44 215	p
Calcium	39	23	**	37	33	42	NS
Carbohydrate	32	28	NS	31	27	36	NS
Complex carbohydrate	27	23	NS	27	21	32	**
Cholesterol	66	63	NS	56	63	77	*****
Colourings	53	29	***	53(18)	58(14)	43(24)	**
Dietary fibre	50	30	**	43	48	51	NS
Emulsifiers	28	16	*	26(31)	26(15)	29(25)	***
Energy content (calories/kJ)	43	32	NS	45	37	43	NS
"E" (food additives) numbers	48	28	****	42(29)	51(15)	45(19)	***
Energy used in production	9	6	NS	9	8	10	*
Total Fats	57	53	NS	51	55	65	**
Flavourings	47	29	**	48	48	n	NS
Iron	36	21	*	34(20)	32(9)	39(19)	**
Irradiation of food	40(16)	38(30)	**	32	44	45	**
Pesticide use in growing food	64	53	****	58	65	66	NS
Preservatives	66	39	****	62	67	60	NS
Protein	43	33	NS	41(14)	37(7)	48(13)	*
Polyunsaturated fats (%)	54	44	NS	44	51	62	****
Saturated fats(%)	51	45	NS	41	50	59	***
Drapule	8	6	NS	8	4	11	**
Salt	58	47	NS	53	55	61	NS
Total sugars	60	37	***	59	55	59	NS
Added sugars	65	39	****	62	62	63	NS
Vitamins (% RDI)	45	30	*	48	38	44	NS
Price/100g	38	39	NS	33	37	43	NS

(continued on next page)

Table 4. (continued)

Food constituents	Education Left Sch. Before 16 years 262	Left Sch. at 18 or Tech/ Trade 198	Tert Educ. 149	p
Calcium	43	30	37	*
Carbohydrate	35	27	30	NS
Complex carbohydrate	30	25	22	**
Cholesterol	71	61	61	NS
Colourings	46	53	57	NS
Dietary fibre	59	42	35	****
Emulsifiers	27	29	22	NS
Energy content (cal/kJ)	44	37	41	NS
"E" (food additives) numbers	46(18)	44 (21)	46 (27)	**
Energy used in production	10 (44)	8 (64)	9 (57)	****
Total Fats	61	54	53	NS
Flavourings	42	48	49	NS
Iron	39	34	29	NS
Irradiation of food	36	41	45	***
Pesticide use ingrowing food	67	58	64	NS
Preservatives	64	59	65	NS
Protein	49	37	35	*
Polyunsaturated fats (%)	62	46	44	****
Saturated fats (%)	58	43	46	***
Drapule	12	5	3	**
Salt	62	54	52	NS
Total sugars	63	54	54	NS
Added sugars	67	58	60	NS
Vitamins (% RDI)	50	37	37	**
Price/l00g	39	37	37	NS

The question the respondents answered was as follows: 'Some of the items listed below appear on food labels. How useful would such information be to you? (Circle one answer for each item.)' Then the items were listed together with the response categories: Not, Quite, Very, Not Sure. They were headed by the question: 'How Useful?'.

The figures in bold at the head of each column are the numbers of respondents in each group. The figures in the columns are the percentages of each group endorsing the 'very useful' rating; those in brackets are the percentages endorsing the 'not useful' rating - they are listed where there was a statistically significant group difference but no observed difference in the 'very useful' rating.

The perceived usefulness of information about cholesterol, polyunsaturated, saturated and total fats increased with age (Table 4). Information about irradiation, dietary fibre and 'E' numbers was seen to be most useful by people over 34 years of age. In contrast, colourings information was least useful for people over 44 years. Finally, more people between 34 and 44 years perceived information about colourings, emulsifiers, iron and protein as useful.

Information about complex carbohydrate, 'E' numbers, energy used in production, protein, polyunsaturated and saturated fats, vitamins and drapule was rated as more useful by early school leavers. Irradiation details were more valued by the more educated groups (Table 4).

Interrelationships between shoppers' perceptions of food constituents.

Five components were derived which accounted for 62.7% of the inter-item correlation variance. On the first component were items which are often associated with health, so it was called "Positive Nutrients". It was similar to the Positive Nutrition component found in the first study. The second, third and fourth components appeared to be related to "Additives", "Fats" and "Salt and Sugar" respectively, whilst the fifth seemed to relate to unfamiliar aspects of food, especially price/100g and the energy used during production of the product (Table 5). It was named "Unfamiliar Concepts".

Table 5. *Study 2:* Summary of the principal components analysis of shoppers' ratings of perceived usefulness of nutrient items for food labels.

Positive Nutrients	
Protein	77
Vitamins (% Recommended Dietary Intakes)	71
Carbohydrate	70
Iron	68
Dietary fibre	65
Calcium	64
Complex Carbohydrate	61
Energy content (Calories/kJ)	54
Total Fats	35
Eigenvalue (% variance)	**9.76(39.0)**
Cronbach's alpha	**0.90**
Additives	
Colourings	78
Flavourings	74
"E" (food additive) Numbers	72
Preservatives	68
Emulsifiers	68
Irradiation of food	56
Pesticide use in growing food	54
Drapule	38
Complex Carbohydrate	35
Eigenvalue (% variance)	**2.18 (8.7)**
Cronbach's alpha	**0.87**
Fats	
Saturated Fats (%)	78
Polyunsaturated fats (%)	78
Cholesterol	61
Total Fats	52
Drapule*	40
Complex Carbohydrate	38
Eigenvalue (% variance)	**1.47(5.9)**
Cronbach's alpha	**0.84**
Salt and sugar	
Added sugars	79
Total sugars	78
Salt	70
Total Fats	37
Vitamins	35
Eigenvalue (% variance)	**1.19 (4.8)**
Cronbach's alpha	**0.85**
Unfamiliar Concepts	
Price/100g** 68	
Energy used in production and packaging	66
Irradiation of food	46
Drapule	37
Pesticide use in growing food	36
Eigenvalue (% variance)	**1.08 (4.3)**
Cronbach's alpha	**0.64**

*Cronbach's alpha = 0.85 if this item deleted. **Cronbach's alpha = 0.71 if this item deleted.

Again, the multiple regression analyses showed that the demographic factors had minimal effects upon these components (Table 6). The maximum amount of variance explained by demographic factors was 5.3% of the Fats score predicted by Age. Age and Educational Level were negatively (jointly) related to Positive Nutrients, but Age was positively associated to the perceived utility of information about Fats and Unfamiliar Concepts. The presence of children under 18 years in the home was positively related to the perceived usefulness of information about Additives; and, people who were not in paid employment

outside the home were more likely to be interested in information about Salt and Sugar.

Table 6. Prediction of principal component scores in studies 1 and 2 showing standardised regression coefficients

Study 1	
Positive Nutrition	0.08 Sex; R^2=0.4%, p<0.05
Negative Nutrition	0.09 Sex; R^2=0.9%, p<0.006
Cholesterol, Claims and Calories	0.07 Sex; R2=0.5%, p<0.04
Study 2	
Positive Nutrients	-0.11 Age - 0.11 Educational Level; R^2=1.8%, p<0.009
Additives	0.17 Dependents; R^2=2.8%, p<0.0001
Fats	0.23 Age; R^2=5.3%, p<0.00001
Salt and Sugar	0.08 Employment status; R^2=0.8%, p<0.04
Unfamiliar Concepts	0.16 Age; R^2=2.4%, p<0004

Discussion

These findings support and extend those from Study 1. In particular the rankings of usefulness and importance were similar to those observed in Study 1.

The women's ratings appeared to reflect the needs of their husbands and children. They rated as 'Very useful' many of those items which are particularly related to men's cardiovascular health (total fats, cholesterol) and children's wellbeing ('E' numbers, flavourings, preservatives). Fewer of them rated calcium and iron as highly. Yet these are nutrients which are particularly associated with women's health. This suggests that more needs to be done to emphasise the importance of nutritional self care for women.

Again, the age group differences suggest that life stage factors may influence these perceptions. People between 34 and 44 years of age, who are most likely to have growing children, emphasised the importance of iron, protein and colourings. Jussame and Judson have shown similar heightened awareness of children's nutrition among parents in Kobe, Japan and Seattle, USA[56].

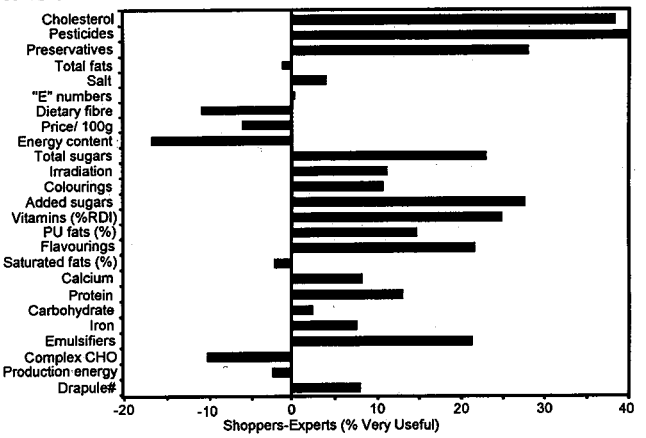
The higher evaluations of the early school leavers may stem from their poorer educational backgrounds. Perhaps they are more aware of, or willing to acknowledge their need for information than more educated people. The findings are also in agreement with the results of an accompanying food and health concerns survey which showed that more of the early school leavers were more concerned about most issues (reported elsewhere[40]). However, a note of caution is advisable here. More early school leavers (and older respondents) also rated 'drapule' (an imaginary substance) as 'very useful' compared to the other groups. (This was not observed for other gender and marital status comparisons.) It may be that older, less educated people are more susceptible to acquiescence set - the tendency to agree with questionnaire items irrespective of their meaning. Thus, the real educational group differences may be somewhat less than those observed here. More investigation is required.

Although these bivariate analyses showed that gender, and possibly age and education, had quite extensive influence on the shoppers' perceptions of the usefulness of individual items of information about food constituents, the regression analyses of the component scores suggest that demographics are relatively minor predictors of shoppers' general views of food constituents. Other factors such as personality traits[57] and personal values[58-60] may be better predictors of these attitudes.

Overall, however, the contingency table analyses do suggest that that social roles and lifestage responsibilities exert some influence over people's perceptions of food constituents. Thus women with children and husbands evaluated those dietary constituents which are relevant to their dependents (eg salt, colourings, sugars) more highly than others. Similarly married men were more aware of nutrients related to women's and children's wellbeing (eg iron and calcium). This influence of 'vested interests' on perceptions has been shown before in non-nutritional contexts[61].

In order to examine possible differences between shoppers' views and those of 'experts' the shoppers' ratings were compared with those of 55 specialists (mainly nutritionists, food technologists and regulators) from another study in which the same item list was used[62]. This revealed a fairly sharp division of opinion (Figure 3). More shoppers' considered information about cholesterol, pesticides, preservatives, irradiation, added sugars, vitamins and flavourings, among others, to be "very useful". In contrast more 'experts' thought dietary fibre, energy content and complex carbohydrate were very useful items of information. The ratings of 'drapule' suggest that shoppers are more prone to acquiescence set than the experts. However, it should be noted that many of the shopper-expert differences were of far greater magnitude and in the opposite direction to the 'drapule effect' shown in Figure 3.

Figure 3. Study 2: Differences between Shoppers' and Experts' views on nutrients.



Clearly, nutrition educators and related specialists have some way to go to accommodate consumers' views as well as to persuade them of the importance of certain nutritional concepts (eg. energy content and dietary fibre).

Finally, the interrelationships exhibited by the principal components analysis confirm that dietary constituents are not finely distinguished by consumers and that "positive" nutrients are distinguished from other "negative" food constituents such as "additives", salt and sugars, and fats.

The low loadings of the fictitious ingredient, drapule, on the "Additives" "Fats" and the "Unfamiliar Concepts" components further suggests that consumers may hold relatively undefined perceptions about the items on these components. For example, the important health differences between polyunsaturated and saturated fats are not reflected by the high positive loadings given to both on the Fats component; in shoppers' minds fats are fats.

General discussion

Both studies have confirmed the perceived importance of certain food constituents, especially, cardiovascular 'negative' nutrients and 'additives'. The findings, along with those from other research[15-21] raise the issue of how much regulatory authorities should take these long established consumer perceptions into account in label design. Some of the perceptions are not reflected by current labels or shared by nutritionists. The problem for regulators is to adjudicate the conflicting interests of nutritionists, food technologists and various groups of consumers. Balancing lay perspectives with the narrower concerns of expert groups is always difficult but perhaps the primacy of consumers'

perspectives should be foremost since labels are intended for use by them.

The demographic effects observed in both studies appear to reflect the social roles, responsibilities and interests of people in various lifestages. These findings are consistent with previous findings about the ways that personal interests influence people's perceptions of health[61] and other aspects of lifestyle[60]. For example, shoppers engaged in child-rearing were more interested in issues related to children (eg Additives, and Positive Nutrients); whilst older people were more interested in fats related to cardiovascular risk.

Two aspects of language use are underlined by the study findings. First, previous studies have used a variety of terms to elicit responses about food label information as did the present studies which used the terms 'want', 'usefulness' and 'importance' as key opinion elicitors. Yet all the studies have yielded broadly similar findings, such as the high priority of cholesterol, fats and 'additives' for consumers. This suggests that all these studies (including the present ones) have tapped enduring global consumer viewpoints about key food and nutrition issues, irrespective of differences in their elicitation language. Further, the general rejection of the fictitious 'drapule' strongly suggests that the rating scales used in the present studies were unlikely to have been seriously affected by acquiescence bias (although early school leavers did appear to be more susceptible to it).

At a more detailed level, the low ranking of 'energy content (calories/ kilojoules)' in contrast to 'calories/ kilojoules' in Study I illustrates that the two are not synonymous in shoppers' minds. In the same study 'calories/kJ' had a higher loading on the negative "Cholesterol, Calories Claims" component than it did on the Positive Nutrition factor on which "energy content (calories/ kilojoules) also loaded. In Study 2 'energy content (calories/kJ)' had a moderately positive loading on the "Positive Nutrients" component but failed to appear on any of the "negative" components. The multidimensional scaling analysis of the women's inter-item correlation matrix confirmed this finding: 'calories/kJ' was positioned away from apparently similar energy concepts such as 'fats' and 'energy content (calories/kJ)'.

These findings are supported by an earlier study which showed that perceptions of calories and energy were unrelated in people's minds[39]. Calories are likely to be perceived in relation to appearance and weight control[41,42,52]; whilst energy appears to be linked to notions of health and vitality[39,42]. This has implications for nutritional labelling since the meaning of many nutritional concepts depends on an adequate understanding of daily energy intakes. For example, some nutrition labelling schemes rely on the concept of nutrient intake per unit of energy intake[5,6]. The public's understanding of these concepts requires more investigation; they are likely to be part of wider social psychological phenomena known as social representations[53-55].

Conclusions

These studies have shown that consumers' value information about 'negative' nutrients and food constituents as well as "positive" nutrients. Some of this information is not presented on current food labels. Conversely, consumers attach low value to several items of information (eg protein, carbohydrate) which are often displayed on labels.

Further, the findings suggest that there may be distinct groups of men and women who want quite different sets of information on food labels. Further investigation is required to identify both the consumer groups and the social and psychological factors which influence their label information requirements.

Consumers' demands for health information on food labels present several challenges for nutritionists, industry and government which might be resolved through continuing negotiation of the needs of these groups and by implementation of long-term, continuing, broadly based nutrition education programs.

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Which nutrition information do shoppers want on food labels?

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顧客需要食品標明那些營養資料

摘要

作者進行了兩個調查，以了解超級市場顧客對食品標明營養資料的觀點。約五分四的調查對象是婦女。第一個調查了雪梨（ Sydney ）、墨爾本（ Melbourne ）和阿特雷德（ Adelaide ）的 941 位顧客，從這個調查看出，在 15 項食品標明資料中，膽固醇、脂肪、添加劑和健康要求是最重要的。不同人群的觀點有很大差異。

第二個調查了雪梨（ Sydney ） 631 位顧客，從 25 種食品的調查結果確認了第一次調查的發現，看出了標明負性和正性食品成份是最有用和最重要的。這個調查顯示：① 顧客和專家間的觀點有所不同；顧客對食品的能量、食物纖維興趣較少，而對其它成份如膽固醇和調味品則興趣較大。② 有關標明資料的要求，不同性別、教育背景和不同人群有不同的觀點。③ 從食品主要成份的分析廣泛確認了第一個調查的發現：即食品標明的營養資料應包括五種成份、正性營養素、添加劑、脂肪、鹽和糖等。作者發現幾種成份有統計顯著性，但不同人群觀點的差異較少。

最後作者指出了食品標明營養資料是需要的，因爲這樣可更全面地給予顧客對食品，特別對添加劑和負性營養素的觀念。有關標簽的設計和內容，在顧客、管理者、營養教育者和產業技術工人間的不同觀點，通過協商解決是需要的。

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