

Original Article

Consumers' concerns about food and health in Australia and New Zealand

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Three studies were conducted in Australia and New Zealand to examine consumers' ratings of food and health concerns, the influence of sociodemographic factors on them, and the interrelationships between perceived concerns. Similar results were found in both countries. Principal-components analyses yielded several factors that suggested consumers in both countries perceived food and health issues along several key dimensions. These were related to concerns about food safety, food system issues, health, the environment and animal and human welfare. Generally, women expressed more concern than did men about most issues, while young people and highly educated people expressed least concern. These differences suggest that familiarity, perceived control and personal resources may have some influence on expressed concerns. However, other psychological influences remain to be identified since only small amounts of variance in the key dimensions were explained by the demographic variables. Comparisons of the rankings of the issues in the two New Zealand studies, administered 2 years apart, showed that they were very similar ($\rho = 0.91$, $P < 0.0001$) despite the use of different response scale wording. This supports the view that the population's evaluation of food issues may be enduring and suggests they are relatively independent of differences in elicitation questions.

Key words: consumers, food, health, perceptions, survey, Australia, New Zealand.

Introduction

Many consumers are interested in the relationships between food and health (especially nutritional and safety aspects).^{1–7} Frequently, their interest centres on the apparent threats posed by foods and their reduction through food avoidance and dietary modifications; for example, white sugar is avoided by many because it is perceived to be dangerous for health.⁸ Recently, Wandel emphasized the constancy of consumers' food safety concerns over time and across countries.⁹

Consumers are often encouraged to reduce the threats associated with over- or under-consumption of some foods by health and nutrition authorities in the form of 'dietary guidelines'.¹⁰ The notions of threat and threat reduction are important concepts in consumer decision-making behaviour that have been debated in the human nutrition literature, although without firm conclusions.^{11–14} The design and reading of product labels appear to be influenced by this concept.¹⁵

To date, studies of health-related food concerns have reflected the narrowly focused disciplinary or commercial interests of the investigators. For example, there have been studies of consumers' interests in additives,¹⁶ pesticides,^{17,18} fattening and slimming foods,¹⁹ and aspects of cardiovascular nutrition,²⁰ to name a few. However, the broad nature of consumers' concerns, which encompass all of these areas, as well as others, has largely been ignored.

A wider selection is required

A key problem with studies of single or limited food issues is that it is not possible to discern any general trends that may enable the prediction of consumers' concerns over time. As a result, it is difficult to understand the apparent perfidy in con-

sumer opinion which often beguiles the outside observer. For example, public concerns about 'additives' may be in fashion today but overshadowed by 'cholesterol' or irradiation scares tomorrow. In part, this is likely to be due to promotion of specific issues at irregular intervals by the mass media, but this begs the question why some issues 'come alive' but not others.

The individual difference psychometric paradigm suggests that many human perceptions such as food concerns may overlap or correlate with each other to varying extents.²¹ It follows that the manifest concerns expressed by consumers (or those articulated in the mass media) may be expressions of deeper latent dimensions of concern that underlie specific expressed concerns. According to this view, individual concerns may not exist separately from each other (in consumers' minds) but are likely to form 'clusters' of similar concerns.

This model has not, so far, been tested in the food–health area. We need to know more about consumers' ratings of a variety of food-related health concerns and how similar these are perceived to be. This would facilitate the provision of useful information in the form of more relevant food product labels, food and health education, and it might enable food industry sectors to anticipate probable consumer responses to technological innovations. If educators are to facilitate

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Accepted 10 September 1999

assimilation of knowledge by consumers, the information they provide should be as relevant as possible to their existing experiential and cognitive schema.

The main aim, then, of the studies reported here was to examine consumers' perceptions of a relatively wide range of possible health-related food concerns and their interrelationships. The first general research hypothesis, based on the psychometric paradigm, is that consumers' specific concerns about food and health will be intercorrelated to yield groups of similar concerns. If the structure of food and health concerns is robust, it should be generalizable from one population to another (i.e. one Western country to another) since consumers in similar food systems are likely to experience similar problems. Thus, Study 1 was conducted in Australia and Study 2 was an attempt to approximate and extend its findings in New Zealand. Two years later, a replication of this second study was carried out in New Zealand. Therefore, we hypothesize that the structure and order of concerns should be broadly similar in Australia and New Zealand.

Influences on concerns

At present, there is no theory that specifically addresses influences on consumers' food concerns. However, for general risk perception, the fear which may be associated with a phenomenon such as irradiation (a perceived threat) is inversely related to 'familiarity' with, and 'perceived personal control' over, the phenomenon.^{22,23} Thus, people may rate car driving as relatively safer than other activities because of their familiarity with driving and high levels of perceived control over driving outcomes. In fact, car driving is relatively more dangerous than many activities that may be more feared by drivers (e.g. flying in jet planes; see Delin and Lee for comparisons of actual and perceived food safety risks²⁴). We may hypothesize that more concern will be expressed about phenomena (threats) which are unfamiliar. For example, there will be more concern about food additives than about consumption of too much fat because additives are less amenable to personal control than is fat.

It should be noted that familiarity is not synonymous with perceived personal control. For example, most shoppers are familiar with the prices of foods but they have relatively little control over them. Familiarity, however, appears to be a necessary condition for personal control (the ability to influence exposure).

It is likely that members of different social categories, such as gender, age and educational groups, may differ in their familiarity with, and control over, food and health issues.

Gender

Food and health issues are generally more the province of women than of men;^{25,26} women usually have more responsibility for several aspects of everyday food preparation and consumption. For example, in Australia 80% of the main food shoppers are women.²⁷ Further, most food preparation activities and child care activities are undertaken by women.^{28,29} During food shopping women often have to balance the price of foods with their acceptability, health deficits and benefits for different family members. This familiarity with complex decision making, over which they may have varying degrees of control, suggests that as a group, com-

pared to most men, women will be more aware of higher levels of threat and concern. Therefore, women are likely to be more concerned about more food-health issues than are men because they often have greater responsibilities for complex decision-making in these areas than do most men.

Age groups

Some issues, such as the links between food and disease, are more salient to some age groups. For example, the elderly and middle-aged tend to experience more life-threatening and morbid conditions that are not fully under their control than do most young people.³⁰ Therefore, we hypothesized that middle-aged and older people will be more concerned about illness and food issues than younger people.

Educational groups

People with higher levels of education should be more familiar with more issues and more able to control their outcomes than less educated people.³¹ Furthermore, because less educated people often perform the 'dirty' work in society (for example, spraying pesticides on crops) they may directly experience more food-related health problems such as illnesses associated with cheaper, poorer quality foods; therefore, we hypothesized that higher levels of education should be associated with lesser levels of concern about most issues.

Methods

Study 1: Australia

A list of 28 possible sources of concern about food and health was constructed from an examination of the literature and small group interviews. Although far from exhaustive, this list covers a broader range of health and related food concerns than has been examined previously (Table 1).

Respondents were asked: 'What sorts of things concern or worry you about food and health? Read through the list of issues below and indicate how much each issue concerns or worries you. Circle one answer for each issue. Circle ? if you are not sure.' Under the heading 'How concerned are you?', four possible responses were printed next to each issue: Not, Quite, Very (Concerned) and ? (Not Sure).

The list formed half of a four-page questionnaire that also included sections about the importance of specific and general food-label information as well as the social demographic characteristics of the respondents. Respondents' educational level was assessed as either Low (left school before 16 years of age), Middle (attended High School until 16-18 years of age), or High (completed tertiary education to Bachelor's level or equivalent). Age was categorized into two groups: (i) 18-45 years; and (ii) over 45 years.

During 1991 the survey was administered to random samples of 60 subjects selected during peak shopping times from each of 20 supermarkets in Sydney (eight supermarkets), Melbourne (eight) and Adelaide (four) according to a protocol described in Worsley³² and Worsley *et al.*³³ The supermarkets were selected to represent affluent and nonaffluent areas of these cities in approximately equal proportions. Questionnaires were given to the respondents at the supermarkets. They were asked to complete them at home and return them in postage-free envelopes as soon as possible. Approximately 68% ($n = 941$) did so.

Table 1. Study 1: Summary of principal components analysis (with varimax rotation) of the Australian food and health concerns data together with sex and education group comparisons

	Loading	Sex			Education				Age		
		Women <i>n</i> = 720	Men <i>n</i> = 205	<i>P</i>	Low <i>n</i> = 354	Middle <i>n</i> = 297	High <i>n</i> = 263	<i>P</i>	45yrs <i>n</i> = 646	>45yrs <i>n</i> = 288	<i>P</i>
Safety quality (0.80)											
Clean handling of food in shops	69	73	62	***	76	69	64	***	69	74	*
Storage of dairy products	68	50	40	**	55	48	37	****	45	53	
Cost of basic foods	63	64	51	****	68	60	54	***	61	63	
Quality of fruit sold in shops	61	46	37	**	48	41	39	**	44	43	
Harmful bacteria in food (e.g. salmonella)	54	73	69		78	72	64	**	69	80	**
Lack of vitamins in food	43	46	33	***	51	41	35	***	43	47	
Eigenvalue (% variance)	7.71 (26.7)										
Additive–safety of prepared foods (0.71)											
Chemical additives in foods	71	76	67	**	75	73	71		73	75	
Irradiation of foods	67	59	45	****	61	52	50	**	51	66	
Safety of take-away foods	58	54	47		55	50	50		52	54	
Safety of drinking water	48	59	52	**	65	54	53	**	55	64	***
Uncertainty about what is in foods	41	56	52	**	58	53	54		57	53	
Quality of processed food	38	47	39		48	44	42		45	47	
Eigenvalue (% variance)	1.92 (6.9)										
Food system problems (0.67)											
Amount of food packaging	67	46	39	*	42	37	53	**	44	44	
TV advertising of junk foods to children	54	55	46	*	51	49	60	*	52	55	
Waxing of oranges and apples	54	47	33	***	50	42	38	***	41	52	***
Ownership of retail food companies	47	22	24	***	28	22	18	**	19	31	****
Eigenvalue (% variance)	1.41 (5.0)										
Heart disease and cancer concerns (0.69)											
Links between food and heart disease	84	57	49	*	60	52	53	**	55	58	
Links between food and cancer	83	61	53	*	64	55	57	**	57	64	
Eating too many fatty foods	38	61	50	***	60	52	62		58	59	
Honesty of food labels	36	70	67		67	67	73		70	60	**
Eigenvalue (% variance)	1.28 (4.6)										
Food imports (0.64)											
Importing of foreign food products	71	53	52		59	55	41	****	46	67	*****
The safety of imported foods	52	57	52		62	56	46	***	51	66	*****
The transport of foods over long distances	48	36	26	*****	42	33	23	*****	31	42	****
Enforcement of food regulations	39	63	58		66	62	54	*	58	69	**
Eigenvalue (% variance)	1.18 (4.2)										
Animal welfare (0.58)											
Driftnet fishing	82	62	54	***	62	60	59		59	62	
Animal cruelty in food production	72	53	35	***	53	47	44	***	48	51	
Eigenvalue (% variance)	1.14 (4.1)										
Concern for the helpless (0.52)											
Starvation in other countries (eg. Africa)	79	50	42	****	52	45	46		45	54	**
Poverty in Australia	68	59	49	**	65	56	47		53	67	***
Eigenvalue (% variance)	1.07 (3.8)										

Note: The numbers in brackets after the factors are Cronbach's alpha scores; the numbers in column one are factor loadings, the numbers in the other columns are the percentages of respondents in each group who responded 'very concerned'. Several items loaded two factors. Generally, these items are listed on the factor on which they had the higher loading. Statistical significance is indicated thus: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, **** $P < 0.0001$, ***** $P < 0.00001$.

Study 2: New Zealand

This study was designed as a partial replication of the first study. The aims were similar to those of Study 1: to examine the rankings of concerns and differences between social categories of responders. The survey instrument was modified to suit local conditions in New Zealand. It included a range of safety, ecological, equity and other items.

The instrument was sent by mail to a random sample of adult New Zealanders drawn from the general Electoral Roll during 1992. The person who did most of the food shopping in the household was asked to complete the questionnaire. The instructions and response scales were similar to those used in the Australian study. The instrument was part of a survey booklet that included sections on food, cardiovascular and labelling issues. The response rate was 65% ($n = 859$). Similar analyses to those used in the first study were performed on the data.

Study 3: New Zealand

The preceding survey (with some item changes) was replicated in 1994 by postal administration to another random sample of New Zealanders. The essential aim of this study was to test the second hypothesis that the structure and order of concerns should be broadly similar in Australia and New Zealand. However, we also wanted to examine the stability of the responses over the time since the first New Zealand survey and with a modification to the main question. Most of the items remained the same but the instructions to subjects were changed, as follows: 'What sort of things are important to you about food and health? Read through the list of issues below and indicate how much you think about each issue. Circle one answer for each issue. If you are not sure please circle '?' Then under the heading 'How often do you think about each issue?', there were four alternatives: 'Not', 'Quite', 'Very' (often) and '?'. The response rate was 65% ($n = 859$).

Data analysis

The data sets were analysed via descriptive statistics (frequency and simple contingency table analyses) as well as by principal components and multiple regression analyses.^{34,35} Non-metric ordinal multidimensional scaling analyses were also conducted, the results of which are available from the authors.

Results

Study 1: Australia

Comparisons of the demographic characteristics of the respondents with those from other shopping surveys showed that they were representative of peak time shoppers:^{26,34} approximately 80% of them were women; and they tended to be younger than the general population in the New Zealand studies. The main findings are given below.

Some issues were associated with far more concern (or worry) than others (Table 1). These were predominantly safety issues but also included regulatory matters (honesty of food labels, enforcement of food regulations) as well as ecological (driftnet fishing) and equity issues (poverty in Australia, the cost of basic foods). The links between food and disease (specifically heart disease and cancer) were of middle ranking concern only.

Many differences between the sexes were apparent; generally more women expressed greater concern than did men, supporting the fourth hypothesis (Table 1).

On 16 items tertiary educated people expressed less concern than did less educated people, particularly those who left school before 16 years of age, supporting the sixth hypothesis (Table 1). However, the tertiary educated expressed more concern about two issues: the TV advertising of 'junk foods' to children and the amount of packaging. On eight issues related to chemical additives, the safety of takeaway foods, eating too many fatty foods, the quality of processed foods, uncertainty about what is in foods, driftnet fishing, the honesty of food labels, and starvation in other countries, there were no statistically significant education group differences.

Older people tended to express more concern about clean handling of food in shops, harmful bacteria in food, safety of drinking water, waxing of fruit, ownership of retail food companies, food imports, the safety of food imports, transport of food over long distances, starvation overseas and poverty in Australia, but less concern about the honesty of food labels (Table 1). Not many of these issues appear to be directly relevant to the greater morbidity experienced by older people so, generally, the fifth hypothesis was not supported.

The principal components analysis yielded seven factors with eigenvalues greater than unity which accounted for 56.1% of the matrix variance (Table 1). These were provisionally named (in descending order of explained variance): 'safety-quality' (a general factor concerned with the safety of the basic food supply); 'additives-safety' (dominated by additives and irradiation and concerns about the safety of processed foods); 'food system problems' (things beyond the control of individual consumers that only industry or government can fix); 'heart disease and cancer concerns'; 'food imports' (and issues related to foods brought from long distances); 'animal welfare concerns'; and 'concern for the vulnerable' (such as the poor and starving, and children).

Multiple regression analyses of the factor scores showed that the demographic variables together accounted for less than five per cent of the variance in the individual scores. However, some statistically significant relationships between the two sets of variables were observed. These were consistent with the demographic group differences shown in Tables 1 and 2. For example, in the first study (conducted in Australia), women had higher scores than men on all of the factors except 'heart disease and cancer concerns', and 'food imports', for which there were no statistically significant sex differences. Higher educated respondents exhibited lesser concern on 'safety-quality' and 'food imports' but greater concern about 'food system problems' (which included TV advertising of junk food to children and the amount of food packaging). Finally, concern about 'food imports' was positively related to the age of the respondents. Further details of these analyses and those of the second study are available from the authors.

Multidimensional scaling of the item intercorrelations yielded broadly similar findings. For example, analysis of the women's data accounted for 80% of the variance in three dimensions (stress = 0.17). Dimension 1 (58% of variance) contrasted safety issues with concerns for the environment and the vulnerable; Dimension 2 (12%) contrasted health and

Table 2. Study 2: Summary of principal components analysis (with varimax rotation) of the New Zealand food and health concerns data together with sex and education group comparisons

	Loading	Sex			Education			Age			
		Women <i>n</i> = 715	Men <i>n</i> = 141	<i>P</i>	Low <i>n</i> = 380	Middle <i>n</i> = 151	High <i>n</i> = 320	<i>P</i>	45yrs <i>n</i> = 495	> 45yrs <i>n</i> = 364	<i>P</i>
Safety quality (0.67)											
Clean handling of food in shops	71	84	78		83	83	82		81	84	
The correct storage of food	66	63	54	**	64	61	80		58	66	
Enforcement of food regulations	62	67	64		68	65	67		62	72	*
Food label information	47	54	45	*	52	59	51		55	50	
The safety of imported food	43	70	66		73	73	64		67	73	
Lack of flavour in fruit and vegetables	39	39	36		42	35	37		40	36	
Eigenvalue (% variance) 5.79 (20.7)											
Heart disease and cancer concerns (0.68)											
The links between food and heart disease	78	53	43	***	56	52	46		50	54	
The links between food and cancer	70	52	43	**	55	50	47		50	52	
Eating too many foods high in fat and salt	59	63	51	***	59	64	63		57	67	**
Food additives	50	65	46	***	60	62	63		60	64	
Eigenvalue (% variance) 1.67 (6.0)											
Food system problems (0.68)											
Lack of home-grown foods	69	38	32	*	44	39	29	**	30	46	***
The number of people who can't cook	60	26	12	**	28	25	18	**	16	34	**
Multinational ownership of food companies	57	34	32		41	27	29	***	25	45	***
Exporting local food resources	45	28	23	**	32	30	21	**	22	33	**
Eigenvalue (% variance) 1.45 (5.2)											
Abuse of nature (0.63)											
Overuse of land for food	59	12	12		12	16	12		12	13	
Fluoridation	52	27	24		32	28	19	***	26	26	
Energy costs of food production	49	19	15		23	22	11	***	16	22	
Animal cruelty in food production	44	56	44	***	54	61	51		55	53	
Eigenvalue (% variance) 1.24 (4.4)											
Contamination-wastage (0.57)											
Pesticide residues in food	66	79	71		78	83	75		74	83	**
Exploitation of the sea for food	66	50	53		53	45	52		50	52	
Food wastage	41	63	53	**	68	62	55	**	56	70	**
Eigenvalue (% variance) 1.22 (4.4)											
Food costs (0.55)											
The cost of basic food	77	66	59	*	73	69	54	***	66	64	*
Price controls on food	63	49	39	**	58	49	33	***	45	49	***
Eigenvalue (% variance) 1.16 (4.1)											
Shopping-access difficulties (0.40)											
Time spent buying foods	61	15	7	*	14	15	12		16	10	**
The amount of packaging	63	45	39		41	43	49	***	44	45	
Access to Maori foods	48	7	6		7	9	5	***	12	13	
Eigenvalue (% variance) 1.14 (4.1)											
Concern for the vulnerable (0.47)											
Starvation in other countries	79	54	42	***	55	50	49		45	61	***
Poverty in New Zealand	57	57	53	*	61	56	50		53	61	
Eigenvalue (% variance) 1.00 (3.6)											

Note: The numbers in brackets after the factors are Cronbach's alpha scores; the numbers in column one are factor loadings, the numbers in the other columns are the percentages of respondents in each group who responded 'very concerned'. Several items loaded on two factors. Generally, these items are listed on the factor on which they had the higher loading. Statistical significance is indicated thus: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, **** $P < 0.0001$, ***** $P < 0.00001$.

safety issues with animal welfare, food imports and irradiation and additives; and Dimension 3 (10%) separated food system problems from the more personal disease concerns. The analysis of the men's data and of the New Zealand data, revealed similar solutions.

Study 2: New Zealand

The demographic characteristics of the respondents were similar to those from other shopping surveys: approximately 73% of the respondents were women.

Again, safety issues dominated the consumers' concerns, followed by concerns for 'others' (animals and poor people) and then disease–food links (heart disease ranked 14 and cancer ranked 16). System 'problems', which tend to be beyond the control of individual shoppers, such as fluoridation, food packaging, multinational ownership and energy costs of food production, received the lowest ratings, the safety of imported food being a notable exception (Table 2). Thus, control and individual relevance appear to be of importance.

As in Study 1, more women expressed greater concern than did men (significantly so on over half of the items, supporting the fourth hypothesis (Table 2)).

Again, the over-45-year-olds expressed greater concern about a range of issues including the enforcement of food regulations, consumption of high-fat foods, lack of home grown foods, number of people who can't cook, multinational ownership of food companies, the export of local food resources, pesticide residues, food wastage, cost of basic food, price controls and starvation overseas. However, more younger people expressed concern about time spent shopping.

As in the Australian study, highly educated people tended to be least concerned about food issues (Table 2). There were statistically significant differences on 11 items; on only one, food packaging, did the high education group express more concern than the less educated groups (as in Australia).

The principal components analysis of the correlations between the respondents' ratings derived eight factors with eigenvalues equal to or greater than unity. These accounted for 52% of the variation. They were provisionally named (in order of percentages of variance explained): 'safety–quality', 'heart disease and cancer concerns', 'food system problems', 'abuse of nature', 'contamination–wastage', 'food costs', 'shopping–access difficulties', and 'concern for the vulnerable' (Table 2). 'Abuse of nature' and 'contamination–wastage' were difficult to interpret. They refer to issues, such as fluoridation and exploitation of the sea for food, that have been hotly debated in New Zealand in recent years.

The regression analyses of the factors confirmed that demographic variables accounted for little factorial variance. Only in connection with 'food system problems' and 'food costs' did the demographic variables account for more than 5% of the variance, education and age being the main statistically significant predictors.

Study 3: New Zealand

The percentages of respondents endorsing the 'think about very often' category were much lower than those who endorsed the 'very concerned' category in Study 2 (Table 3). However, the rankings of the same items in the two studies were highly similar. Spearman's ρ (rho) between the two sets

of the highest response categories shown in Table 3 was 0.91 ($P < 0.001$).

Discussion

Consumers' specific concerns about food and health will be intercorrelated to yield groups of similar concerns.

The first hypothesis was supported by the results of the multivariate analyses. In both of the main studies, consumers' concerns clustered on a small number of similar, interpretable components or dimensions. This suggests that the complexity of manifest food and health concerns can be reduced to a small number of themes. These might be raised into consciousness via questioning or through mass media coverage.

The structure and order of concerns should be broadly similar in Australia and New Zealand.

Although approximately half of the items in the New Zealand studies differed from those used in the Australian study, the second hypothesis was substantially supported since similar patterns of concern were found in both countries.

Both sets of factors derived from the principal component analyses exhibited considerable similarity. For example, 'safety–quality' was the prime factor in Studies 1 and 2 and 'heart disease and cancer concerns', 'food system problems',

Table 3. Rank order of New Zealand shoppers' concerns about food and health by percentages rating the issues as 'very concerned' in 1992 and as 'think about very often' in 1994

Issues	1992 (%) (n = 859) [†]	1994 (%) (n = 862) [†]
1 Clean handling of food in shops	83	62
2 Pesticide residues in food	77	43
3 The safety of imported foods	69	32
4 The cost of basic foods	65	54
5 Enforcement of food regulations	64	32
6 Food wastage	61	42
7 The correct storage of food	61	49
8 Eating too many foods high in salt and fat	61	54
9 Food additives	60	41
10 Poverty in New Zealand	55	33
11 Food label information	53	35
12 Animal cruelty in food production	52	26
13 Starvation in other countries	51	31
14 The links between food and heart disease	51	35
15 Exploitation of the sea for food	50	36
16 The link between food and cancer	49	26
17 Price controls on foods	45	26
18 The amount of food packaging	43	31
19 Lack of flavour in fruit and vegetables	38	25
20 Lack of home grown foods	37	21
21 Multinational ownership of food companies	32	16
22 Exporting local food resources	26	19
23 Fluoridation	25	21
24 The number of people who can't cook	23	17
25 Energy costs for food production	17	8
26 Time spent buying foods	13	22
27 Overuse of the land for food	11	6
28 Access to Maori foods	6	6

[†]Numbers of respondents in groups.

and 'concern for the vulnerable' (or helpless) were common to both studies.

The main differences appear to result from the inclusion of different, locally relevant items in the New Zealand studies. Thus 'price controls' loaded with 'the cost of basic food' on food costs, and 'time spent buying foods' and 'access to Maori food' loaded with 'the amount of food packaging' on the 'shopping-access difficulties' factor. The two difficult to interpret factors, provisionally named 'abuse of nature' and 'contamination-wastage', were both saturated with items unique to the New Zealand studies. The 'abuse of nature' factor taps into the strong emphasis on ecological matters in New Zealand and particular debates over land use and fluoridation of water supplies that have been the subjects of long and heated community debate. 'Contamination-wastage' may also tap strong community debate about the contamination of foods by additives and pesticides and of fish and sea foods by toxic algal blooms and industrial practices. Clearly, further work is required in order to clarify the meaning of these factors.

In both countries it is apparent that respondents were very concerned about threats to their personal safety and health but also about the welfare of others such as the environment, animals, and less fortunate people. The food system itself forms a focus of concerns for substantial proportions of these samples. Since these samples were essentially random, the concerns expressed here provide an indication of the main themes of interest held by Australian and New Zealand shoppers.

Some issues such as 'driftnet fishing', 'animal cruelty' and 'harmful bacteria in food' are brought to the public's attention mainly through the mass media. Other concerns such as 'the cost of basic foods' or the 'honesty of food labels' are more in the realm of daily, direct experience. Future research could examine the contribution of the mass media to the public's perceptions of food and health issues.

The relative stability of the perceived food concerns between Australia and New Zealand, and within New Zealand between 1992 and 1994 suggests that the basic dimensions of concern have at least quasi-independence from the effects of the mass media. For example, the high ranking given to 'driftnet fishing' (Study 1) occurred in the absence of publicity. In contrast, despite extensive continuing publicity the links between food and cancer, and between food and heart disease achieved only middle rankings.

The existence of general dimensions of food concern may help explain the apparent changes that can occur in the public's food and health concerns. Although consumers may express concern about one issue (e.g. irradiation) at one time and then appear to drop it in favour of another (e.g. the safety of fast foods) at another time, these may be manifestations of deeper stable concerns about personal safety and wellbeing. This has implications for the ways in which consumer organizations and the food industry deal with and anticipate consumer dissatisfaction. The basic causes of consumer concern need to be addressed as well as the 'presenting' symptoms.

More concern will be expressed about phenomena (threats) which are unfamiliar and less amenable to personal control

The third hypothesis received weak support from the find-

ings. For example, most of the consumers' major concerns in all three studies are examples of issues with which many are familiar and which they manage on a daily basis (e.g. dirty shops and unsafe imported foods can be avoided). In contrast, many of the items lower down the rankings are beyond the daily awareness and power of most consumers (i.e. the ownership of food companies). Others, however, are certainly familiar if not under the control of individual consumers (e.g. the amount of food packaging).

The issues presented in the three studies combine familiarity and perceived control. In future work, respondents' perceptions of both control and familiarity should be assessed directly so that this relationship can be clarified. Moreover, it may be necessary to articulate the personal control concept more finely. Although shoppers may not have much control over honesty in food labels, for example, they may be personally affected by dishonest or ambiguous labels, as is suggested by the greater concern expressed about this issue by younger consumers. As a result of an ambiguous label, they may waste money and time, and could end up with a product quite different from the one they intended to buy. Personal control, then, implies personal influence over a range of possible outcomes of purchasing or other food-related decision-making on the part of consumers. Certainly, many of the consumers' most important concerns were related to their daily cognition or the decision-making of consumers.

Women are more likely to be concerned about more food-health issues than are men

Generally, this hypothesis was supported. This suggests that the more involvement in the provision of food and health a group has, the more likely it is to be concerned about food and health issues. The finding was further supported by other findings from the Australian study (not reported here) which showed that parents of dependent children were more concerned about a number of child-related issues. However, women appeared to be no more concerned about heart disease and cancer than men. This may be because men are relatively more aware of these issues than others. This anomaly requires further investigation.

Middle-aged and older people will be more concerned about illness and food issues than will younger people

The issues with which older people were more concerned were not always ones in which they could be expected to have direct health or morbidity interests (e.g. their greater concerns about food imports). Other factors, such as resistance to the adoption of new technologies (or believing the old ways are still the best ways) as well as different sets of personal values, may be associated with these older age cohorts.

Higher levels of education should be associated with lesser levels of concern about most issues

In both Australia and New Zealand, highly educated people tended to be less concerned about most issues (except about 'food system problems', specifically packaging and children's TV advertising). This could be interpreted as support for the familiarity hypothesis. However, higher education is often associated with greater material resources, which may

protect highly educated people from the exigencies faced by the less well off. That is, higher education is associated with greater perceptions of control over outcomes, which has been demonstrated in the literature on locus of control.³⁷ It is noteworthy that the two issues, TV advertising of junk foods and packaging, in which tertiary graduates expressed more concern are often promoted by consumer associations, many members of which are tertiary graduates.

The replication of Study 2 (Study 3) in which a different response scale was used provides further substantiation of the above findings. Over the years, many attempts have been made to measure subjects' perceptions of the nutrient composition of foods and related issues.³⁸ Despite the use of different response scales, similar findings have emerged from most studies about the importance of negative nutrients in most consumers' minds. The present finding of a high correlation between the rankings of food and health issues in Studies 2 and 3 confirms this generalization. It suggests that the rankings of concerns described here are relatively independent of the interrogative forms used in their elicitation. In other words, rankings of concern and intercorrelations between expressed concerns are likely to be more reliable indicators of population support for issues than simple rating percentages.

Although it is clear from the analyses of the first two studies that social category membership is associated with different levels of concern about food and health issues, the demographic variables accounted for relatively little variance in the component scores. The explanation of individual differences in food and health concerns remains largely to be explained. Some clues may be found in the nature of the small number of 'dimensions of concerns' identified in the factor analyses. For example, the 'safety-quality' and 'additives-safety' factors (Study 1) are self-related views ('me and mine') while the 'food system problems', 'animal welfare' and 'concern for the vulnerable' factors are 'other-directed'. They suggest that consumers may differ in their perceptions according to their personal values (e.g. self-directed vs universalist or community values). Evidence in support of this view has been reported elsewhere.³⁷⁻⁴⁰ Various consumer psychology models suggest that psychological variables such as personality traits, personal values^{41,42} and shopping styles⁴³ may enable greater understanding of food and health concerns.

Implications

These findings have implications for several groups. They can remind nutritionists and nutrition educators that consumers view nutrition issues in a very broad context of food and health. They also suggest that different groups of consumers are likely to be interested in particular groups of issues, only one of which specifically refers to nutrition. Nutrition and health educators may be more 'successful' if they attend to this broad range of issues.

Food policy regulators and food industry professionals might benefit if they were to regard consumer concerns as legitimate 'needs and wants' which should be met via products and government services.

Finally, food system theorists and practitioners could well take note of Wandel's conclusion:

People responsible for communication about food will therefore be wise to increase their knowledge, not only in the area of risk assessment, but also concerning the different factors and processes affecting consumers' perceptions and strategies regarding food and health risks.⁹

Conclusion

Consumers' interest in food and health issues is broad but appears to be based upon a small number of underlying dimensions of interest which are related to personal safety and health, empathy with others, and food system factors beyond the control of consumers.

Consumers' concerns are related to their membership of particular social categories such as sex, age and education groups. The responsibilities, resources and decision-making associated with these social categories are likely to result in differing levels of expressed concern.

Expressed consumer concerns appear to be the product of interplays of underlying orientations towards the self and the social world. The roles of familiarity and perceived control require further explanation along with the notion of involvement. More examination of the sources of food and health concerns is required, particularly their psychological bases.

Acknowledgements. The authors would like to thank Ms S Murphy and Ms G Skrzypiec for technical assistance, and the Commonwealth Department of Health and Community Services and the New Zealand National Heart Foundation for financial support.

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