Original Article

Fruits and vegetables, 5+ a day: are we getting the message across?

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Fruit and vegetables have important health promoting properties. The 5+ a day programme aims to promote awareness of the need to eat more of these foods. This paper presents and discusses the results of two surveys designed to determine the success of the 5+ a day programme across New Zealand. Household surveys were carried out by a marketing research company in 1999 and 2000. The 1999 questionnaire focused on awareness and understanding of the 5+ a day campaign. The 2000 questionnaire focused on attitudes to health and on intakes of fruits and vegetables. Data were collected from households nationwide (1999 survey $N = 200$, 2000 survey $N = 520$). Spontaneous consumer awareness of messages promoting the need to eat more fruit and vegetables was high. Seventy-one percent of all respondents identified the 5 servings a day message from the 5+ a day logo regardless of whether they had seen it before. The meaning of the hand in the logo was less clear with only 2.5% identifying the 'serving size' element of the logo. Fruit and vegetable intakes of respondents were influenced by demographic factors: gender, ethnicity, education and occupation (all $P \leq 0.05$). Positive attitude towards the relationship between fruit, vegetables and health was influenced by similar factors and in turn affected fruit and vegetable intakes. The 5+ a day message is well recognised and understood. Portion size is less well understood. The 5+ a day message promotes positive attitudes towards healthy eating which are associated with healthier eating habits, but some groups within society may need further attention.

Key Words: fruits, vegetables, health promotion, nutrition survey, social marketing

Introduction

Fruits and vegetables have long been considered good for our health. In 1990 the importance of eating a diet rich in fruits and vegetables for the prevention of chronic diseases was acknowledged by the World Health Organisation (WHO) by setting target intakes for these foods.[1] The quantity of fruit and vegetables recommended (400g daily) was based upon the level of fruit and vegetable intakes observed in those Southern European countries where the prevalence of chronic diseases was low. The estimated size of an individual portion of fruit or vegetables was 80g yielding a message to eat at least 5 portions of fruit and vegetables daily. Over the past decade, a plethora of studies has observed a negative association between fruit and vegetable intakes and the risk of chronic disease and putative mechanisms have been suggested.[2,3] As a result, the '5-a-day' message is promoted internationally by governments, health agencies and charities. The important public health question is 'to what extent is this message received, understood and implemented by consumers?'

Despite the known health benefits of diets rich in fruits and vegetables and the increasing global burden of chronic disease, intakes of these foods remain poor both within New Zealand, Australia, Europe and USA.[4-8] In the early 1990s a promotional programme '5+ a day' was introduced in New Zealand with the aim of increasing fruit and vegetable intakes on the basis of potential health benefits. Initially, the target audience for the 5+a day message was schoolchildren and preschoolers, but the campaign has been extended to expose the wider population to the 5+ a day message.

A 5+ a day logo was developed in 1994 as a means of identifying the 5+ a day programme and to widen consumer awareness of the need to eat at least five portions of fruit and vegetables daily. Eye catching colours were used to draw attention to the logo and a hand was depicted to help children conceptualise the amount of the foods they needed to eat to count as a portion (Fig. 1). This solution to the problem of estimating portion size was seen as a simple and practical way of making a distinction between child and adult portion sizes – a portion being the amount of food that fits into the palm of the individual's hand.

In 1999 and 2000 the 5+ a day campaign employed a marketing research company to collect data on the awareness, knowledge and compliance with the 5+ a day message. This paper will present and discuss the findings of that research.

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Figure 1. Five plus a day logo.

Subjects and Methods

The 1999 and 2000 surveys were carried out independently of each other using questionnaires with only minor duplication of questions. The 2000 questionnaire was considerably shorter than the 1999 questionnaire. In both instances, household shoppers were recruited using quota sampling methods. The 1999 survey obtained a sample of households with children living at home: 50% with children 5-15 years and 50% with children <5 years or >16 years. In the 2000 survey quotas were set for recruitment on the basis of ethnicity to obtain a population representative sample. Individuals from the following population bases were surveyed in the two studies: Auckland, Wellington, Christchurch, Hamilton, Hawkes Bay, Dunedin. In addition, individuals from a number of large regional towns (North and South Islands) were also included in the 2000 survey.

The 1999 survey used a face to face administered questionnaire with prompt cards to collect data on recognition of the *5+ a day* logo, understanding of the logo, attitudes to consuming fruit and vegetables, fruit and vegetable intakes, fruit and vegetable purchasing patterns and opinions on the promotion of *5+a day* in schools and in the community. Respondents were identified as the main person responsible for their household's shopping. In contrast, the 2000 survey used a telephone interview (random digit dialling) to collect information on: the respondents' intakes of fruit and vegetables and those of their <5 year old children and 5-15 year old children; the respondent's attitude to eating fruits and vegetables and spontaneous opinions on the best ways to find out how to keep fit and healthy. Respondents were individuals above 18 years of age who were the main or joint household shopper. Both surveys collected demographic data.

Exclusion criteria

Individuals who worked or had close relatives who worked in the advertising, public relations, marketing, health/medical industry or market research fields were excluded from the studies.

Statistical analysis

Data handling

The data obtained for the current analysis had been coded by the research group who collected the data, therefore, the current analysis has been carried out within the constraints of the dataset provided. Questions on awareness, knowledge and opinions on the 5+ a day programme were open-ended whereas questions on attitudes to fruit, vegetables and health had structured Likert scale responses and demographic questions had closed category responses.

Open ended questions e.g. on observations, reasons and opinions generated several possible responses to each question. In addition, each respondent may have given more than one response to each open question. For such questions the frequency of a particular response will be presented as a percentage of the total number of respondents and is presented in the text as 'unprompted' or 'spontaneous' responses.

Statistics

Simple descriptive statistics (parametric and nonparametric, as appropriate) have been used to characterise the sample. Linear regression analyses were performed to determine relationships between demographic variables and fruit and vegetable intakes, demographic variables and positive attitudes to fruit and vegetable consumption and between positive attitudes to fruit and vegetable consumption and fruit and vegetable intakes. Analysis of variance or appropriate non parametric tests have been used to determine between group differences. No comparison between the two years has been attempted because of the differences in the populations surveyed and the data collection tools used.

Results

Demographic characteristics of respondents from both surveys are presented in table 1.

Table 1. Demographic characteristics of respondents to the two surveys

Demographic variable	1999 Survey *N* = 200 Household shoppers	2000 Survey *N* = 520[1] Main/joint household shoppers
Gender		
Males	5.5	36.0
Females	94.5	64.0
Ethnicity		
NZ European	15.5	58.1
Maori	7.0	18.7
Pacific Islander	9.0	17.1
Asian	14.0	1.5
Mixed Ethnicity/ Other	9.0	4.6
Not stated	45.5	0.0
Education		
University Degree	25.0	20.8
University entrance/trade cert	28.5	30.2
Secondary	37.5	41.3
No Secondary	9.0	6.9
Other/not stated	0.0	0.8
Occupation		
Housewife	39.0	0.0
Professional/Managerial	29.5	21.5
Skilled trade	13.5	17.7
Unskilled	9.5	12.7
Not working	8.5	2.1
Not stated	0.0	46.0
Household income		
<$15,000	15.5	12.9
$15,000 – 20,000	7.0	10.0
$20,001 – 30,000	9.0	9.6
$30,001 – 40,000	14.0	11.3
$40,001 – 50,000	9.0	7.7
$50,001 – 60,000	10.5	7.9
$60,001 – 80,000	7.5	6.2
>$80,000	12.5	8.8
Not stated	15.0	25.6

[1]Age was positively skewed towards higher age groups. The modal age group was 30-39, but the median grouping was 40-49 years. Age was not recorded in 1999 survey. Figures presented are percentage of respondents.

1999 Survey

Knowledge of nutritional programs

In response to a question on awareness of health and nutrition programmes the most frequently cited spontaneous response was the *5+ a day* campaign (stated by 16.5% respondents). Other programmes included the Heart Foundation 'Pick the Tick' programme (13%), Weight Watchers (5%) and the Iron/Beef campaign (2%). Sixty two percent of respondents said that they were aware of 'other programmes', but were unable to identify them specifically. When asked to describe the messages promoted by these programmes 11.5% subjects answered 'Healthy eating', 9.5% said 'Eat at least 5 fruit and vegetables a day' and 4% said 'Eat more fruit and vegetables'. Small numbers of subjects (1-2%) also suggested messages regarding low fat/low cholesterol, weight loss, exercise, pick the tick etc. Television was the most frequently cited source of awareness of these programmes (20%), followed by magazines (5.5%), *5+ a day* posters at fruit and vegetable shops, other printed media (4%) and 'Pick the Tick' on supermarket goods (3.0%).

Awareness of 5+-a-day logo

When shown a flash card with the *5+ a day* logo on it 87.5% subjects said that they had seen the logo before. When asked where they had seen the logo, without further prompting, 52.0% said that they had observed it at the supermarket or grocery store, 48.6% on television, 18.3% in magazines, 16.6% in the doctors' waiting room, 13.7% at school and 13.7% at the fruit and vegetable store.

Understanding of the 5+-a-day logo - message

When all individuals were asked what the meaning of the logo was, regardless of whether they had previously seen the logo, subjects unprompted replies included: 'Eat 5-a-day' (70.5%); 'Eat fresh fruit and veges' (20.5%); 'Develop healthy eating habits' (11.0%); 'Eating fresh fruit and veges will keep you healthy' (9.5%); '5-a-day is the minimum' (7.5%) and 2% said that one serving fits into the palm of your hand.

Understanding of the 5+-a-day logo – portion size

When subjects who had not mentioned the hand which appears in the logo (in response to the previous question) were asked what the hand means, 7.8% correctly reported that one serving fits into the palm of the individual's hand. Forty-six percent responded that it meant that we should 'eat more fresh fruit and veges each day'. Other respondents either didn't know (37.8%) or guessed incorrectly. When asked 'what constitutes a serving of fresh fruit and vegetables?' 60.5% subjects said 'one piece of fruit', 11.5% said 'what fits into the palm of your hand'. Various other household measures were also suggested. Of these, the most frequent suggestions were 'spoonful' (11.0%) and 'one cup' (11.0%).

Knowledge of portion size estimate for children

When asked 'Do you measure a serve size for your child (ren) in the same way that you measure one for yourself?', 57% subjects stated that they would not measure a serving of fruit and vegetables for children and adults in the same way. When individuals with children under 16 years of age, who had answered that they would not measure servings of fruit for children in the same way as adults, were asked how they would gauge the size of a serving of fruit and vegetables for a child only 4.5% mentioned 'what fits into the palm of their hand'. More common responses included: 'the amount that the child feels he can eat' (27.7%), 'less than an adult' (23.2%), 'half the amount of an adult' (13.0%), 'a big spoon scoop' (7.1%) and 'four mouthfuls' (7.1%).

Attitude to 5+-a-day advertising

Over a third of respondents said that they saw the *5+ a day* logo often enough to remind them of the *5+ a day* message, but almost a third said that they needed further reminding. Suggestions regarding the best place to display the logo to act as a reminder included the grocery store or supermarket (54.0%), television (30.0%), on the fridge – as a fridge magnet (22.0%), fruit and vegetable store (21.5%) and school canteens and classrooms (17.0%). These responses reflected respondents opinions on the best places that they had seen the *5+ a day* logo displayed: television (59.5%), magazines (41.0%), school health curriculum (33.0%) and *5+ a day* week (41.0%).

5+a day promotion in schools

Over half of the respondents with school age children reported that their child had either brought information home from school about the *5+ a day* programme or had mentioned to their parents the importance of eating fruits and vegetables. Eighteen percent of these parents recalled their child telling them about the need to eat *5+ a day*, 10.5% about the need to eat fruit and vegetables, 8.8% about eating for a healthy lifestyle and 6.1% reported seeing something about *5+ a day* in the school newsletter. Out of the whole group of 200 subjects 83.5% agreed or strongly agreed that *5+ a day* should be promoted in schools. Only 3.5% of respondents disagreed with this. Reasons for promoting *5+ a day* in schools included the need to encourage children to eat healthily (40%), the influence that children have on their parents' purchases (19%), the need to start young (10%) and the importance of reducing junk food intakes (6.5%). Two thirds of respondents also felt that *5+ a day* should be promoted in the community setting. When asked what else could be done to encourage people to eat more fruit and vegetables, the most frequently cited means of encouraging people to eat *5+ a day* was to bring the price down.

Fruit and vegetable intakes

The self-reported mean number of portions of fresh fruit and vegetables eaten by respondents on the day prior to the interview was 4.2 (SD 2.27). The effects of income, ethnicity, education, occupation, number of children in household and attitude to fresh fruit and vegetables on fresh fruit and vegetable intakes were determined using regression analysis. Total intakes of fresh fruit and vegetables were predicted by educational status of the respondent and the total number of children in the household such that higher educational attainment (+0.657 portions/d, $P<0.001$) and greater number of children in the household (+0.438 portions/d, $P = 0.001$) were associated with increased fruit and vegetable consumption.

Reported fresh fruit and vegetable intakes were not associated with awareness of the *5+ a day* campaign (aware 4.7(2.5) portions/d, N = 155; unaware 4.1 (2.5) portions/d, N = 33, P = 0.18). Similarly, respondents who had previously seen the *5+ a day* logo did not have greater fruit and vegetable intakes than those who had not (seen logo 4.2 (2.3) portions/d, N = 165; not seen logo 3.9 (1.8) portions/d, N = 19, P = 0.44). A linear by linear association was observed such that those individuals who consumed no or few vegetables also tended to consume no or few fruits. Similarly those with moderate or high consumption of vegetables also had moderate or high intakes of fruit.

Attitude towards healthy eating

An index of positive attitude towards eating fresh fruit and vegetables was determined from reported agreement (indicated using a 5 point Likert scale) with 10 statements about fresh fruit and vegetable consumption and health. Multiple regression analysis was used to determine the influence of demographic factors on positive attitude towards fresh fruit and vegetables. Being male was associated with a less positive attitude to fresh fruit and vegetables (-0.354 units, P <0.05) while increasing income and more professional occupation were associated with more positive attitude (+0.014units, P <0.01 and +0.126 units, P <0.05 respectively). Data on gender effects should be interpreted with caution given the small number of males in this sample. Positive attitude towards fresh fruit and vegetables was associated with greater fruit and vegetable intakes in a univariate analysis (+1.7 portions/d per 1 unit increase in positive attitude index, P <0.001).

2000 Survey

The demographic characteristics of the respondents are presented in Table 1.

Reported intake of fresh fruit and vegetables

The mean self-reported usual fresh fruit and vegetable intake in this group was 4.1 (4.0) servings/d. The most frequently reported reasons for not reaching 5 portions of fresh fruit and vegetables daily were 'not having enough time to buy it' (19.2%) and 'preferring other foods' (13.1%). Reported fresh fruit and vegetable intakes were higher in females than males (f 4.2(1.7) portions/d, m 3.6(1.7) portions/d, P <0.001), increased with age (0.17 portions/d per increasing year of age) and were higher in NZ Europeans compared to other ethnicities (P <0.05), higher in individuals with tertiary level education compared to other education groupings (P <0.05) and higher in individuals with more professional occupation (P <0.001) Income was not related to fruit and vegetables in a linear fashion. Fruit and vegetable intake data are presented in table 2.

Couples will all children living away from home had the highest fruit and vegetable intakes 4.5 (1.7) while single adult respondents either living with parents, flatting with friends or living with their children had the lowest fresh fruit and vegetable intakes: 3.6 (1.6) portions/d, 3.6 (1.8) portions/d, 3.8 (1.9) portions/d, respectively, (P <0.05).

Table 2. Effect of demographic factors on intakes of and attitudes to fruit and vegetables – 2000 survey

	N =	Intake portions/d	N =	Attitude
All subjects	520	4.01 (1.90)	520	3.52 (0.39)
Gender				
Male	187	3.57 (1.69) [1]	139	3.45 (0.41)[2]
Female	333	4.19 (1.69)	285	3.56 (0.37)
Education				
Secondary or below	219	3.88 (1.73) [3]	176	3.49 (0.38)[3]
University entrance/trade cert	157	3.87 (1.84)	130	3.53 (0.40)
Tertiary	108	4.38 (1.47)	91	3.62 (0.34)
Occupation				
Professional/ managerial	46	4.61 (1.64)[1]	38	3.69 (0.31)[1]
Skilled trade	66	4.09 (1.77)	58	3.57 (0.33)
Unskilled	93	3.46 (1.63)	74	3.44 (0.33)
Not working	66	3.62 (1.59)	57	3.36 (0.43)
Ethnicity				
NZ European	302	4.28 (1.67)[4]	254	3.60 (0.36)[2]
NZ Maori	97	3.67 (1.72)	74	3.45 (0.36)
Pacific	89	3.40 (1.63)	74	3.38 (0.38)
Asian	8	2.25 (0.71)	5	3.22 (0.29)
Other	24	3.88 (1.73)	17	3.42 (0.59)
Household income				
<$15,000	67	3.69 (1.88)	46	3.42 (0.46)
$15,001 - $20,000	52	4.17 (1.63)	42	3.53 (0.42)
$20,001 - $30,000	50	3.64 (1.91)	44	3.54 (0.36)
$30,001 - $40,000	59	4.25 (1.62)	50	3.58 (0.31)
$40,001 - $50,000	40	3.95 (1.41)	31	3.56 (0.47)
$50,001 - $60,000	41	4.32 (1.60)	35	3.54 (0.32)
$60,001 - $80,000	32	3.94 (1.68)	28	3.58 (0.37)
>$80,001	46	4.26 (1.67)	42	3.51 (0.45)

[1] between groups comparison significant at P<0.001, by ANOVA
[2] between groups comparison significant at P<0.01, by ANOVA
[3] between groups comparison significant at P<0.05, by ANOVA
[4] between groups comparison significant at P<0.05, by Kruskal Wallace
Figures are mean (sd)

Reported children's intakes

Reported intakes of under 5 year old children (as reported by the adult respondent) were also influenced by the respondent's gender (Male respondent, child intake 2.5 (2.1); female respondent, child intake 3.9 (1.9) portions/d, P<0.01) whilst the intakes of older children (5-15 years) were influenced by the respondent's ethnicity (P<0.01) with NZ European children consuming more fruits and vegetables than other ethnicities.

Positive attitude to fruits and vegetables

Positive attitude to fresh fruits and vegetables was influenced by demographic characteristics: ethnicity, education, occupation and gender (Table 2). Positive attitude was greater in females compared to males (P <0.01), in respondents with tertiary education compared to those without (P<0.05), in professional compared to non-professional vocations (P <0.001) and in NZ Europeans compared to other ethnicities (P <0.01).

Effect of positive attitude to fruit and vegetables on food intakes

Stronger positive attitude to fruit and vegetable intakes was associated with higher reported intakes of fruit and vegetables by respondents (+1.7 portions/d per unit of

increasing attitude, $P<0.001$) their 5-15 year old children (+1.48 portions/d, $P<0.001$) and under 5 year old children (+1.7 portions/d, $P<0.01$).

Discussion

Awareness of the 5+ a day message

These surveys demonstrate spontaneous consumer awareness of campaigns which promote the importance of eating fruit and vegetables for health. Specifically, awareness of the *5+ a day* campaign is high, as demonstrated by recognition of the *5+ a day* logo by respondents. This is likely a reflection of the multisectoral strategy employed by the campaign which includes a variety of settings for promoting the 5+ a day message including schools, food retailers and health practitioner clinics and the multi media approach to marketing the '5+ a day brand'. In this cohort, respondents cited television, magazines and supermarkets as the main sources of their information about healthy eating campaigns and *5+ a day* in particular. Point of purchase (POP) information (supermarket displays, shelf labels etc.) has previously been shown to increase consumer knowledge, but few studies have demonstrated that this translates to an effect on food purchases.[9] Such displays must compete with advertisements for energy dense, nutrient poor foods produced by food manufacturers with huge marketing budgets. However, one study from the USA which evaluated a 12-week intervention with 5 -a-day point of purchase information in supermarkets reported a 9% increase in sales over those observed at control stores which did not have the POP displays, suggesting that such displays can influence fruit and vegetable purchases.[10]

Use of media such as television and magazines is an effective means of targeting large numbers of people with health messages. However, public confidence in health professionals has been undermined by sensationalist and premature reporting of research findings and by the growing complexity of health science, which lead to conflicting messages and confusion of viewers. For this reason, the field of nutrition has often received a 'bad press' for a lack of consistent and clear messages. However, the advice to eat more fruit and vegetables has never varied, is positive, clear and uncomplicated.[11] This may explain the observed success of media campaigns to get the *5+ a day* message across both in the current study in New Zealand and overseas.[12,13]

Increasing awareness of a health message is of course only a first step in the campaign to improve health. Nonetheless, this is an important step for achieving behaviour change. Data from the National Cancer Institute (USA) demonstrated a significant increase in awareness of the national 5-a-day programme between 1991 (2%) and 1997 (17.8%). The authors report that message awareness was associated with significantly higher combined fruit and vegetable intakes in both baseline and follow-up studies (approx 1.5 daily servings more than in non aware subjects).[13] Awareness of the *5+a day* message was associated with a non significant trend towards greater fruit and vegetable intakes in respondents who were aware of the campaign or recognised the campaign logo. In the current study the lack of statistical significance may be due to the small number of respondents who were not aware of the *5+ a day* message (12%). A pre and post campaign comparison of fruit and vegetable intakes would have provided a better indication of the programme's effect on fruit and vegetable intakes, but these data are unavailable.

Understanding of portion size.

A factor which is often problematic in assessing fruit and vegetable intakes and in promoting dietary change is that of portion size.[14] As previously mentioned, individuals have difficulty conceptualising an 'average portion' of fruit and vegetables and also in describing the amount of fruit and vegetables they usually eat. In the current study the size of a portion of fruit and vegetables for a child was described by parents in terms of individual pieces and by a variety of household measures or other comparators. Although most parents identified differences between a child's portion and an adult's portion, less than 5% reported a key theme of the NZ *5+ a day* campaign 'that a portion is the amount of a food that fits into the palm of the hand'. Recognition of this message from the logo was also poor (2%). Given the accurate interpretation and understanding of the need to eat at least five portions of fruit and vegetables each day, from the logo and other advertising, the reason for the lack of understanding of the portion size element is unclear. This part of the 5+ a day message may be promoted less vigorously than the message to eat 5 portions a day or alternatively the concept of a handful may not help conceptualise portion size any better than existing household measures. There is also the possibility that children, who receive direct information at school about the *5+ a day* message, may be more familiar with the palm of the hand portion size than the adult respondents reported here. Research into fruit and vegetable consumption has demonstrated that the use of portion size estimations considerably improve quantification of fruit and vegetable intakes.[15,16] Therefore, further research should be undertaken to clarify the use of palm size as an indicator of portion size particularly in light of the popularity of this estimator in the lay health media.

Marketing the 5+ a day message

As discussed above, awareness of the 5+ a day message was high in this group. Importantly, there was no evidence that consumers had become saturated by this message. The majority supported the continued promotion of 5+ a day in schools for a variety of reasons including recognition of the need to instil good eating habits in childhood and the ability of children to influence parents' purchases. The main incentive that respondents indicated could increase fruit and vegetable intakes was to reduce prices, but 2/3 of respondents indicated that manager's specials had little or no affect on their food purchases. Uptake of such offers may be influenced more by personal taste and family preferences than by the cost of the food product. Cost and availability are two of the most often cited external influences on fruit and vegetable intakes and the most intractable.[17] A recent survey of nutrition and activity of New Zealanders confirms that cost and convenience are issues frequently perceived as barriers to eating more fruit and vegetables. In that study

34% and 30% of respondents, respectively thought that fruit and vegetables were too expensive.[18] However, while for some individuals the cost of eating more fruit and vegetables may indeed be prohibitive recent research suggests that perceived and actual barriers to fruit and vegetable consumption differ considerably.[17] One study of low income consumers demonstrated that while a certain amount of fruit and vegetables can be afforded, the cost of increasing intakes is seen to be prohibitive. The authors suggest that other factors such as motivation may be more important than cost in some cases.[19]

Factors affecting intake of fruit and vegetables

Survey methodology

In both surveys self-reported intakes of fresh fruit and vegetables were approximately 4 portions/day. In evaluating this intake level it should be remembered that these are self reported intakes assessed using a single question about usual fruit and vegetable intakes. Given the obvious focus of the questionnaires used in the two surveys on *fresh* fruit and vegetables, it is possible that reported intakes are subject to positive reporting bias, i.e. the reported intakes are a reflection of what the respondent thought he/she should eat rather than what he/she actually eats. The intake and attitudes sections of the questionnaire asked specifically about *fresh* fruit and vegetables and did not include processed foods. Taken together these considerations suggest that reported intakes of the respondents may be overestimated to some extent. In investigating the effect of demographic and attitude factors on fresh fruit intakes the data have been treated as being true and accurate at least in so far as they allow intakes to be graded. Readers from outside New Zealand should also note that the NZ *5+ a day* programme allows the inclusion of potatoes.

Demographic factors

Demographic factors are known to influence fruit and vegetable intakes. Consumption tends to be lower in men, in less educated individuals, in more manual occupations and in non-European New Zealanders.[5] These trends were reflected by the data collected in the 1999 and 2000 surveys reported here. In addition, it was observed that single individuals (not married or in de facto relationships) had lower intakes of fruit and vegetables than couples or families. This could be a result of lifestyle differences and in the case of single parent families may be due to income and accessibility issues. In the current study positive attitude to fresh fruit and vegetables derived from ranked responses (Likert scale) to statements about fruit, vegetables and health was also influenced by demographic factors. In both studies positive attitude was greater in women, individuals with higher education and either income or occupation (a marker of income).

Attitudes

Attitudes to health constructs have been reported to predict behaviour better than beliefs because they take into consideration the strength of importance of a belief to the individual.[20] Therefore, it is not surprising that the same factors that influenced attitude also influenced reported intakes. In fact, positive attitude was associated with greater intake of fruit and vegetables in both studies and in the 2000 survey was positively associated with reported fruit and vegetable intakes of respondents' children. In the current study the children's intakes were reported by the respondents and not the children themselves. However, in a study which collected data from both mothers and from their children a significant positive association was also observed between children's fruit intakes and the mothers' attitude to diet and health relationships, mothers' fruit intake and mothers' nutritional knowledge.[21] In that study different factors were found to influence children's intakes of vegetables, with taste being a clear predictor. These studies are encouraging because they suggest that positive parental attitude to fruit and vegetables influences children's intakes of these foods from an early age. The importance of this is that habits learned in childhood carry on into adulthood and may affect morbidity in later life.[22-24] The 5+ a day campaign through its social marketing approach may contribute to improved fruit and vegetable eating behaviours by increasing nutritional knowledge and positive attitudes to fruits and vegetables in both adults and children.

Conclusion

The *5+ a day* campaign is widely recognised by New Zealanders and the need to eat more fruits and vegetables well understood. Despite this, attitudes to and compliance with advice to eat more fruits and vegetables are affected by demographic influences suggesting that additional efforts should be concentrated on certain groups within society such as men, low income families and less edu-cated individuals. The influence of parental attitudes and intakes on children's intake of fruit and vegetables reinforces the importance of the 5+ a day campaign's social marketing approach for the benefit of the whole of society.

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Original Article

Fruits and vegetables, 5+ a day: are we getting the message across?

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水果和蔬菜，每天 5＋：我们注意到了吗？

水果和蔬菜有重要的促进健康的作用，一天 5+计划目的就是提高人们多吃这些食物的意识。此篇文章介绍并讨论了设计来确定 5+计划在新西兰是否成功的两个调查。家庭调查由一家销售调研公司在 1999 年和 2000 年进行。1999 年的调查问卷主要集中在是否知道和了解每天 5+活动。而 2000 年的调查问卷主要集中在对健康的态度以及水果和蔬菜的摄入量。数据是从全国的家庭中广泛搜集的。消费者自发的多吃水果和蔬菜的意识提高了，71％的被调查者证实了不管他们以前是否见过，每天 5＋的信息是从每天 5＋计划标志中看到的。标志中手的意思不大清楚，只有 2.5%将其识别为标志的“服务大小”。被调查者水果和蔬菜的摄入量都受到人口统计学因素：性别、种族、教育和职业的影响。对水果蔬菜和健康之间关系的积极态度也受到同样因素的影响并依次影响了水果和蔬菜的摄入量。每天 5＋计划的信息得到了很好的认可和理解。一部分理解的稍微差一点。每天 5＋计划的广告促进了对于健康饮食的积极的态度，这是与健康的饮食习惯相关联，但仍有一些组别需要进一步关注。

关键词：水果 蔬菜 促进健康 营养调查 社会营销