
Pulp Fiction—The Facts Harvested

A study of New Zealanders' physical activity and nutrition

Preliminary Report

Prepared for: Cancer Society of New Zealand Inc.

Client Contact: Carolyn Watts, Jane McLennan
Authors: Charles Sullivan, Judy Oakden, Jane Young, Martin Lau, Rob Lawson
ACNielsen Contacts: Judy Oakden, Jane Young
Date: April 2004
Ref No: 1401720

Table of Contents

Executive Summary	4
Needs Assessment.....	17
Research Design.....	18
Overview of the Groups.....	21
Awareness: Fruit and Vegetable Intake and Health	24
Awareness: Cancer Prevention and Healthy Eating.....	28
Barriers and Benefits.....	33
Interventions.....	40
Fruit versus Vegetable Intake and Related Differences	48
Weight Control and Physical Activity	52
Demographic Profile	57
Appendix I – ACNielsen Quality Assurance	58
Appendix II – Margins Of Error	59
Appendix III – Path Modelling	61
Appendix IV – Derivation of major groups (Don't But Might, Do Now, Don't & Won't) ...	69
Appendix V – References	71

Opinion Statement

ACNielsen certifies that the information contained in this report has been compiled in accordance with sound market research methods and principles, as well as proprietary methodologies developed by, or for, ACNielsen. ACNielsen believes that this report represents a fair, accurate and comprehensive analysis of the information collected, with all sampled information subject to normal statistical variance.

Acknowledgements

Acknowledgements

The Cancer Society of New Zealand, SPARC and the research team are indebted to Dr Ed Maibach (formerly of Porter Novelli International and now at the National Cancer Institute, USA), for allowing the use of the intellectual framework and questionnaire that provided the basis for this study.

A large, multi-disciplinary team of people and organisations throughout New Zealand worked closely together on this project.

The research project was contracted to ACNielsen (Antoinette Hastings, Judy Oakden, Jane Young and Martin Lau) in collaboration with Dr Charles Sullivan of Capital Research. Professor Rob Lawson, from the Marketing Department at the University of Otago, undertook the path modelling.

The research team worked closely throughout the course of the study with the Cancer Society of New Zealand Working Group. We wish to thank them for their exceptional contribution over many months to a project demanding real partnership. The Working Group was Dr Caroline Horwath and Louise Mainvil (both University of Otago, Department of Human Nutrition), Rhonda Pritchard (Psychologist), Paula Dudley (5+ A Day), Sally Logan-Milne (Milanz), Glenda Hughes (Collingwood Promotions), and Carolyn Watts and Jane McLennan (both Cancer Society of New Zealand).

This Cancer Society project was only possible because of initial work for SPARC by Deb Hurdle, Grant McLean, and Dr Kate Scott (Wellington School of Medicine) together with Sally Logan-Milne's development of the conceptual basis.

And most importantly a huge thank you to those New Zealanders (over 8,000 of you) who took the time to tell us about your experiences and perspectives of physical activity and nutrition. You have provided us with valuable insights that will help the Cancer Society and SPARC to support healthy eating and physical activity in New Zealand now and into the future.

Executive Summary

Background and objectives

The Cancer Society undertook a major survey in partnership with SPARC. One focus of this wide-ranging study was to better understand opportunities to change the behaviour of those not meeting the Ministry of Health's fruit and vegetable intake targets (three vegetable and two fruit servings per day).

The key objectives of this report are to:

- Summarise major descriptive results from the survey relevant to fruit/vegetable intake and cancer prevention
 - Take a first step in informing relevant stakeholders about the wide range of information available for further analysis (e.g., segmentation of audiences which can target groups to increase fruit and vegetable intake)
 - Highlight immediately apparent awareness needs or information gaps, while acknowledging that further work is needed to identify how to change behaviour.
-

Research method

The survey was conducted as a mail survey between 29 May and 31 July 2003. We received 8163 completed, useable responses from 14,000 randomly selected households contacted, a credible response rate of 61%. The questionnaire was comprehensive, with over 300 questions derived from a similar study conducted by the American Cancer Society (led by a leading social marketer, Dr Edward Maibach).

For the first time in New Zealand, the study provides unusually detailed information from a large sample not only on behaviour, but also on attitudes, motivations and the perceived benefits from eating fruit and vegetables.

This report summarises major descriptive results. Further analysis (e.g. segmentation) is planned to prepare for a campaign promoting healthy eating.

Continued on next page

Executive Summary, continued

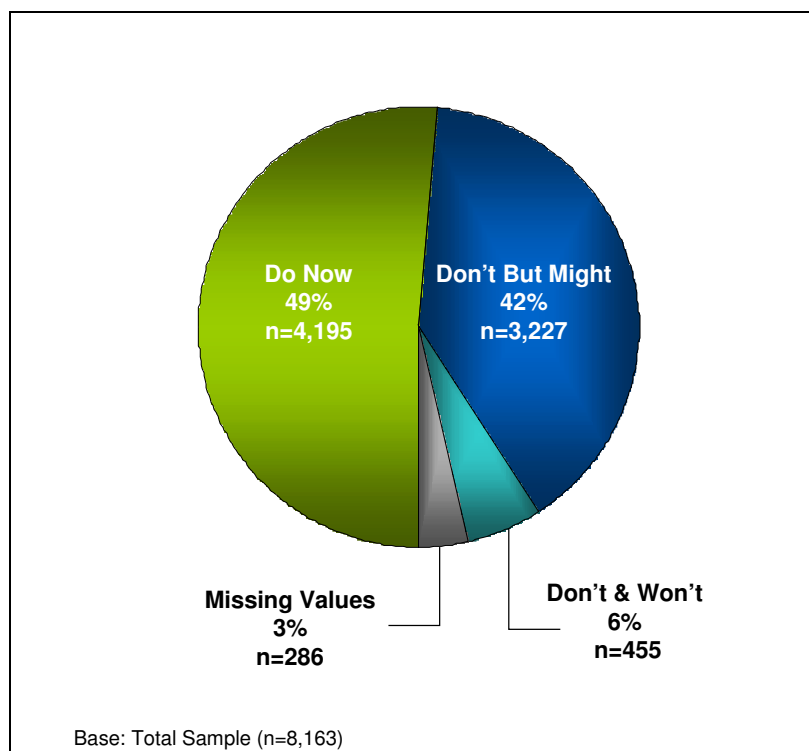
Intake and general awareness

About half of the adult population do not currently consume the recommended intake of 3 vegetable servings and 2 fruit servings per day. This is the level of consumption that provides some protection from heart disease and cancer.

Focus of this report

This report focuses on the Don't But Might group. As the following chart shows, it excludes:

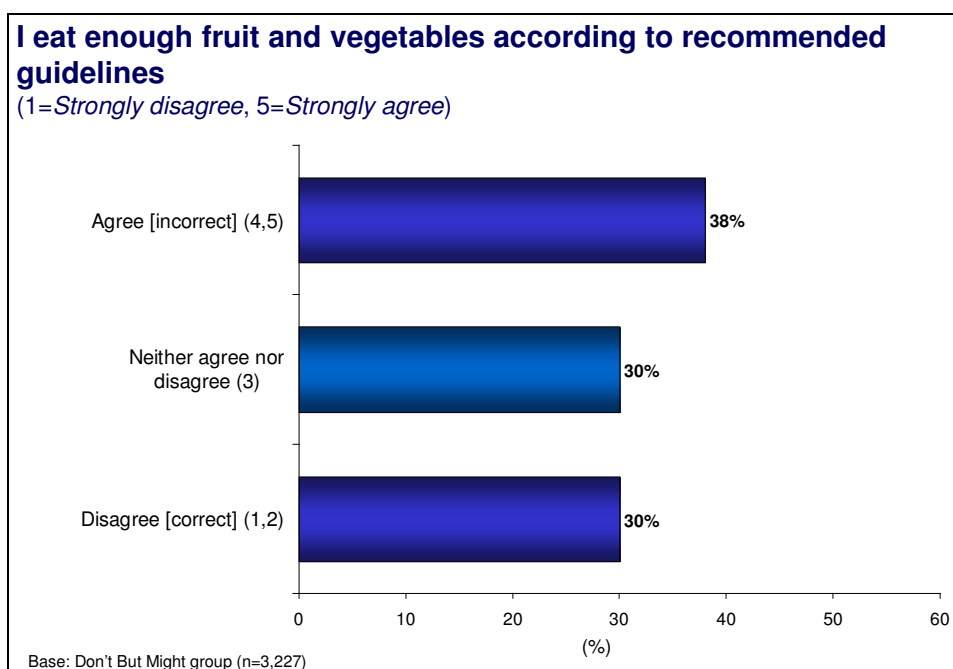
- Those already eating three servings of vegetables and two of fruit daily (the Do Now group), and
- The 6% who appear most resistant to change (the Don't & Won't group who fail to meet both intake levels now, and also state that they have no intention of reaching either target in the next six months).



Continued on next page

Executive Summary, continued

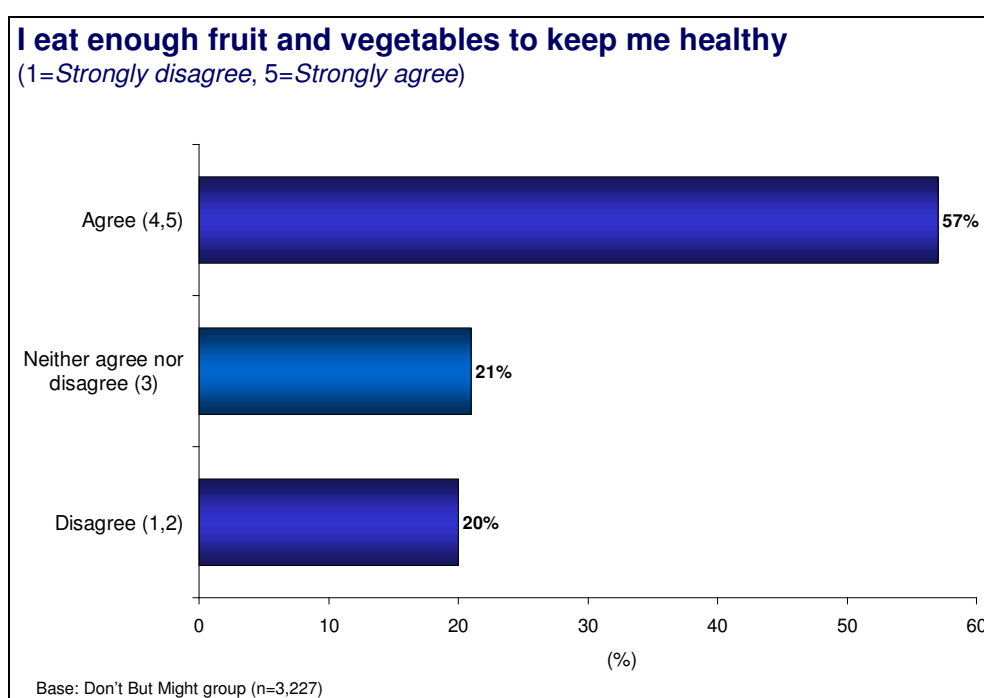
Four in ten (38%) of the Don't But Might group agree with the statement "I eat enough fruit and vegetables according to recommended guidelines" despite their intake falling short of current Ministry of Health recommendations. As the chart that follows shows, only 30% correctly disagree with that statement. Note that many in the Don't But Might group may be uncertain what the recommended guidelines are (30% neither agree nor disagree with the statement).



Continued on next page

Executive Summary, continued

Similarly, despite their fruit and vegetable intake falling short of Ministry of Health recommendations by definition, a majority (57%) of those in the Don't But Might group agree with "I eat enough fruit and vegetables to keep me healthy".



The lack of fruit and vegetable consumption is not because the respondents see fruit and vegetables as irrelevant to their health. A clear majority (88%) agree that eating fruit and vegetables helps them live a healthy life.

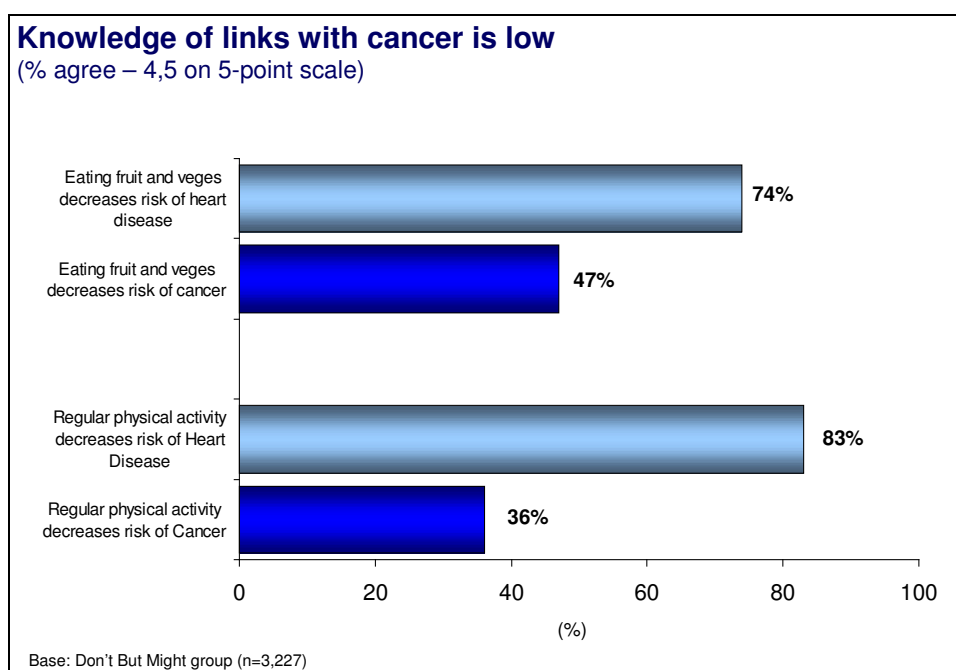
Continued on next page

Executive Summary, continued

Awareness of protective factors

Three quarters of the Don't But Might group know of the link between fruit and vegetable consumption and heart disease prevention. However, far fewer (under half) are aware that fruit and vegetable consumption decreases the risk of cancer.

An even greater difference occurs in the understanding of the protective nature of physical activity. Only a third (36%) of the Don't But Might group agree that regular physical activity decreases the risk of cancer, whereas the majority (83%) agree that it decreases the risk of heart disease.



Continued on next page

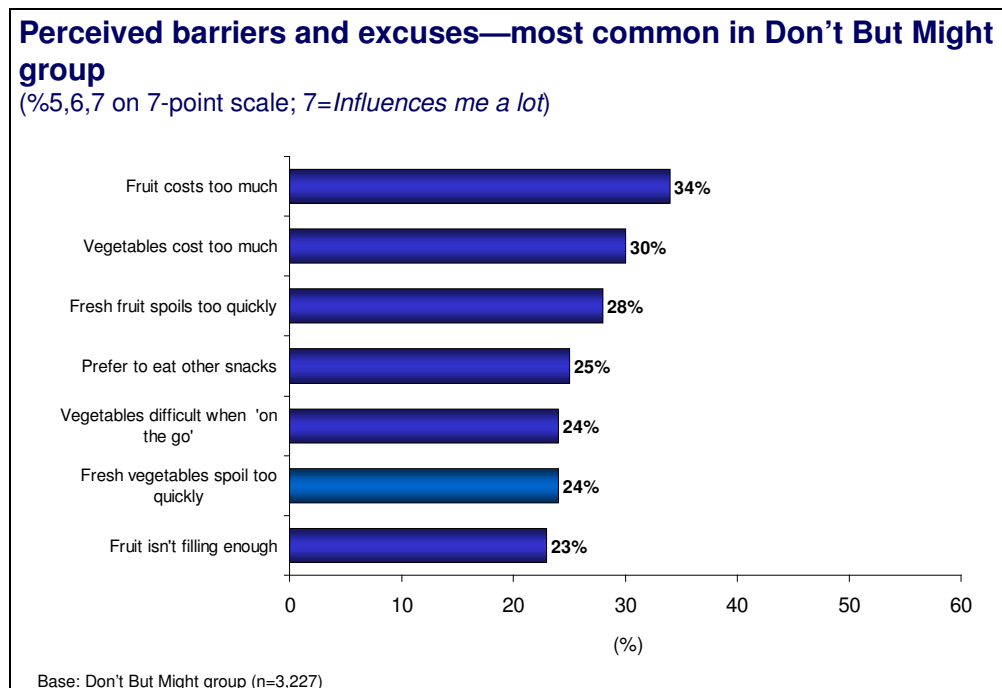
Executive Summary, continued

It is important to note that changing only awareness (about fruit/vegetable intake and its health impacts) is unlikely to change the behaviour of most of the Don't But Might group up to the recommended intake levels. However, the lower levels of awareness found are sufficiently prevalent to suggest that raising awareness is likely to be one very useful initial step towards changing fruit and vegetable intake. In addition to increasing awareness, a wider range of other issues needs to be considered for a comprehensive behaviour change campaign.

Perceived barriers, benefits and motivations

The distinctive strengths of this study lie not in estimates of fruit and vegetable intake or obesity levels and so on (which are well covered in the recent New Zealand Health Survey), but rather in the large numbers of questions designed to show opportunities for driving behavioural change. In this study, major groups of questions concern barriers, motivations, perceived benefits, and reaction to possible interventions.

The most commonly reported perceived barriers to eating more fruit and vegetables are shown in the graph below. Cost and convenience are recurrent themes.

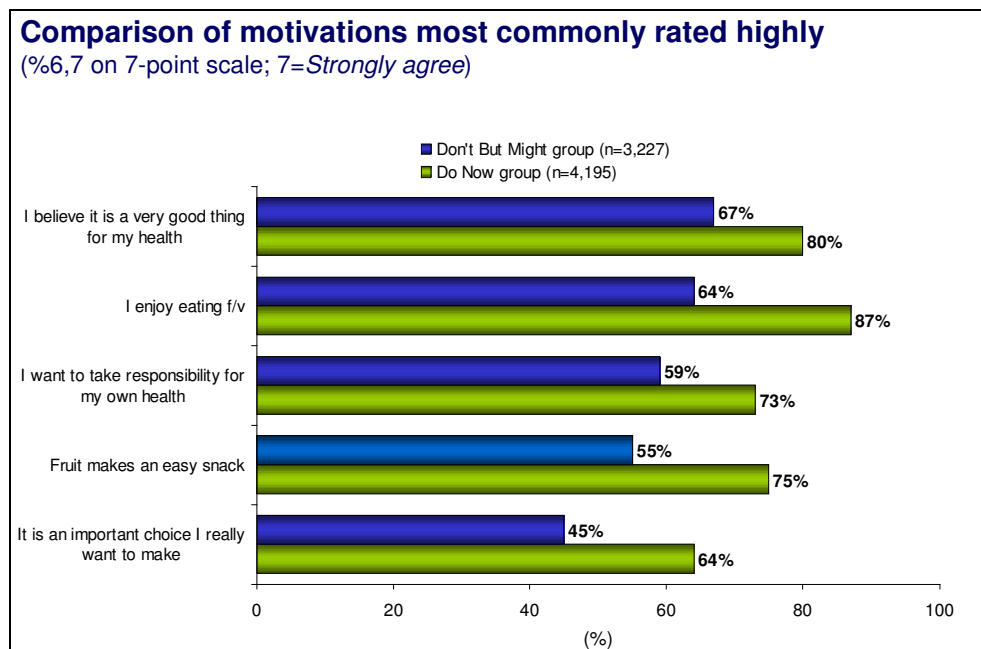


Continued on next page

Executive Summary, continued

Perceived benefits of eating fruit and vegetables were rated with respect to both personal **importance** and also **likelihood**. The benefits most commonly rated important by the Don't But Might group are “feeling good about themselves”, “having more energy”, and “live a longer life”. The majority of respondents also expect that they are likely to experience these benefits if they eat at least five servings of fruit and vegetables daily.

The next graph shows the motivations for eating fruit and vegetables most commonly rated highly by the Don't But Might group. With each of these motivations, those already eating three servings of vegetables and two of fruit (Do Now group) show high agreement with each statement more often. Most of these motivations are "intrinsic" types of motivation (related to inherent factors with satisfaction coming from the behaviour itself such as “I believe it is a very good thing for my health”) rather than "extrinsic" (e.g. “I want others to approve of me”, or “Others will be upset at me if I didn't”). Few in the Don't But Might group (less than 15%) rate these extrinsic motivations highly.



Executive Summary, continued

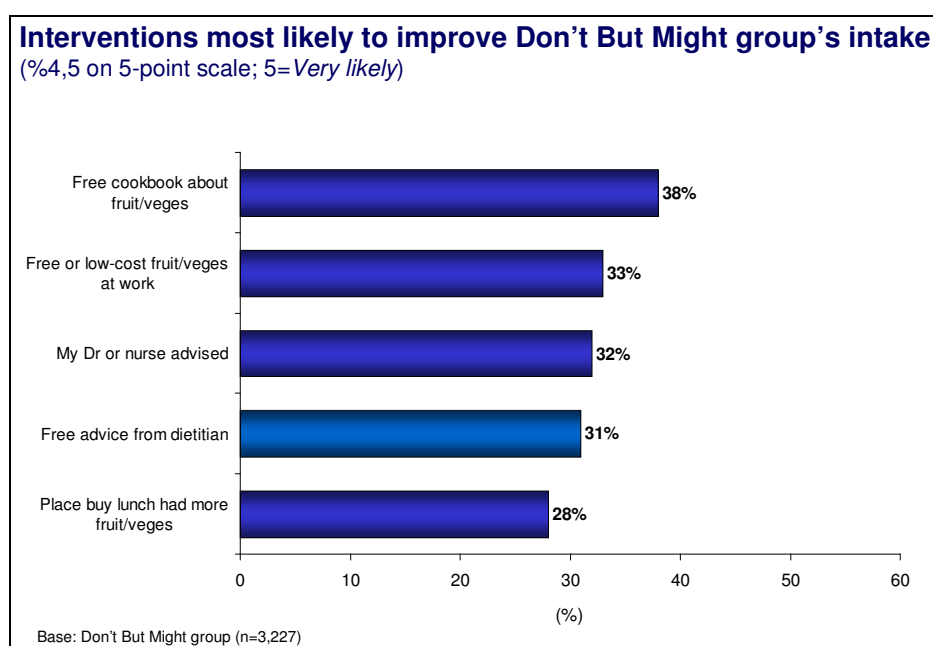
Changing eating habits

Several questions and analyses addressed changing fruit and vegetable intake more directly.

First, a statistical model (path model) analysed variables most closely associated with higher fruit and vegetable intake. Higher intrinsic motivations (such as believing fruit and vegetables to be very good for your health) are significantly associated with higher intake whereas higher extrinsic motivations (such as seeking approval from others) are not. Increasing intrinsic motivations seems a reasonable target for action.

Consistent with overseas research, the path model also suggests that increasing confidence to eat fruit and vegetables is another promising approach. Only one in three of the Don't But Might group are highly confident that they could start to eat at least five servings of fruit and vegetables daily and continue for at least a month. Increasing this confidence (or self-efficacy) is important to achieve and maintain behavioural change in a variety of health promotions.

Second, the questionnaire asked respondents how likely they would be to eat more fruit and vegetables in response to ten diverse interventions. More than a quarter of the Don't But Might group rate the interventions shown in the following graph as likely to result in higher intake of fruit and vegetables.

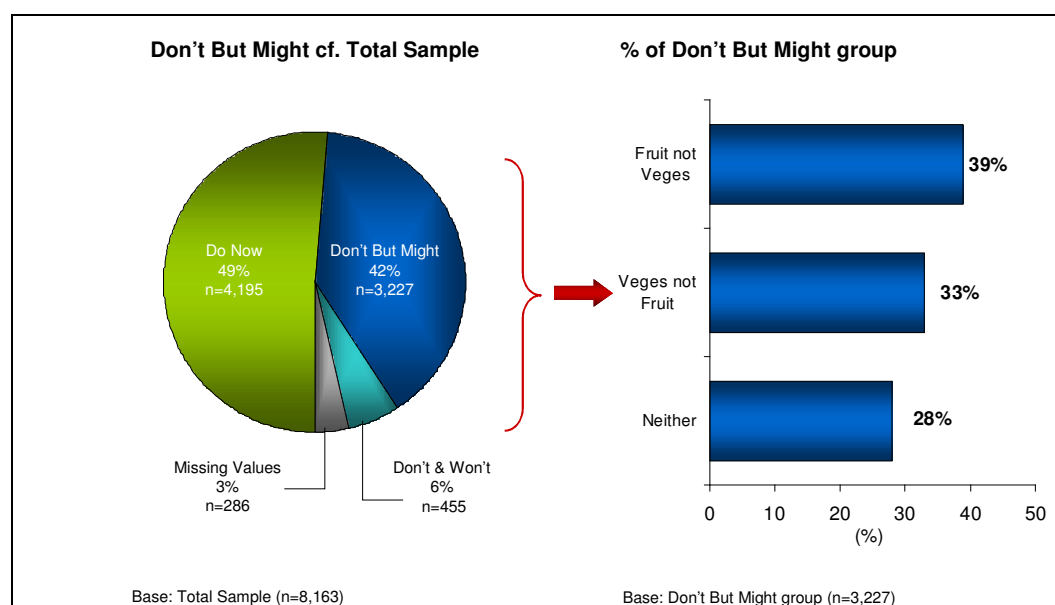


Continued on next page

Executive Summary, continued

Third, we carefully compared the three behavioural subgroups within the Don't But Might group:

- Those not eating enough vegetables, but enough fruit (“Fruit Not Veges” in the graph below)
- Those not eating enough fruit, but enough vegetables (“Veges Not Fruit”)
- Those not eating enough of either (“Neither”).



Within the Don't But Might group it is possible that those not eating enough fruit (Veges Not Fruit) might require very different approaches to change behaviour than those not eating enough vegetables (Fruit Not Veges).

There are clear ethnic differences between these subgroups. The majority (85%) of the Veges Not Fruit subgroup are New Zealand European compared with only 67% of the Fruit Not Veges subgroup. Conversely, Māori, Pacific peoples, and Asians are more common in the Fruit Not Veges subgroup than in Veges Not Fruit.

Continued on next page

Executive Summary, continued

Fourth, in changing health-related behaviours, it is often useful to know about the stage of readiness to change in an individual or population group. We asked if respondents consistently ate two or more servings of fruit a day (and a parallel question about three or more servings of vegetables) and classified their readiness to change into the standard five stages:

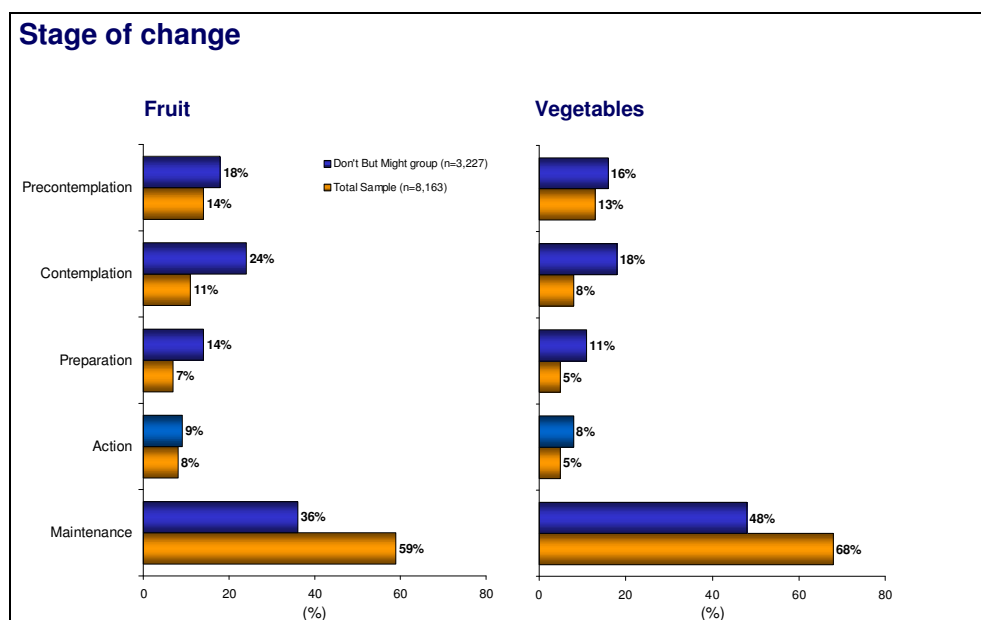
- No, and I do not intend to in the next 6 months (*Precontemplation*)
- No, but I intend to in the next 6 months (*Contemplation*)
- No, but I plan to in the next 30 days (*Preparation*)
- Yes, I have been, but for less than 6 months (*Action*)
- Yes, and I have been for more than 6 months (*Maintenance*).

Our Don't But Might group excludes those who already meet both fruit and vegetable intake recommendations (as well as those at the other extreme). This makes it important to view the stages of change for the full sample as well as the Don't But Might group (hence both are shown in the graph below).

For both fruit and vegetables, the graph reminds us that the most common stage among those in the Don't But Might group is already Maintenance—that is, many of them are already consistently achieving one of the target levels of intake. Most of the others in the Don't but Might group are at the earliest stages (Precontemplation and Contemplation) rather than in stages closer to Maintenance.

Continued on next page

Executive Summary, continued



Obesity

Low fruit and vegetable intake is also a risk factor for obesity. The self-reports of weight and height used in this study probably underestimate obesity¹ slightly (e.g. in comparison to the 2002/03 New Zealand Health Survey). Nevertheless, the Don't But Might group defined by fruit and vegetable intake clearly includes a disproportionate number of the obese (20% of the Don't But Might group are obese compared with 14% of the Do Now group).

Ethnicity

Ethnicities other than New Zealand European are disproportionately higher in the Don't But Might group. Conversely more New Zealand Europeans are in the Do Now group (83% compared with 71% in the Don't But Might group).

¹ Obesity was defined by a Body Mass Index (BMI) of 30 or more, calculated from self-reported height and weight. The same cutoff of 30 was used for all ethnic groups.

Executive Summary, continued

Recommendations

Bearing in mind the objectives of this preliminary report, the major descriptive results already indicate several productive next steps and suggestions for moving forward.

1. Overall analysis must consider a wide cross-section of the adult population. Some campaigns, similarly, must and can target a wide group. New Zealand adults generally acknowledge that eating fruit and vegetables helps them live a healthy life, but around half (48%) do not translate this into appropriate behaviour. That is, around half the adult population fails to meet current Ministry of Health recommendations with respect to fruit and vegetable intake (i.e. at least three servings of vegetables and two of fruit daily).
2. More focused targeting of subgroups within this wide cross-section is advisable, that is, **segmentation**. Several different approaches to segmentation are feasible given the wide-ranging data collected in this study from a large sample. This research also provides research tools for highly targeted work with subgroups.
3. Include a focus on the clear **awareness problems**:
 - Many of those not eating enough fruit and vegetables wrongly believe that they are eating enough to keep them healthy or enough according to recommended health guidelines
 - Awareness of the protective effects of fruit/vegetable intake and adequate physical activity is well established for heart disease, but not for cancer.
4. Consider building **intrinsic motivations** and also **confidence/self-efficacy** (to eat at least five servings of fruit and vegetables daily) in particular. These appear to be useful steps towards healthy eating habits.
5. In addition, build on the results concerning the motivations, **perceived benefits, perceived barriers, and interventions** as a foundation for a social marketing campaign promoting fruit and vegetable intake. (This would complement the campaign being developed by SPARC for physical activity based on this same study.)

Continued on next page

Executive Summary, continued

6. Do not overlook the contribution that eating fruit and vegetables can make to reducing obesity, particularly together with adequate physical activity. Nearly half the obese population (45%) along with a quarter of those who are of normal weight or overweight **neither**
- undertake sufficient physical activity (30 minutes, five days a week), nor
 - eat the recommended servings of fruit and vegetables daily.

Because this study provides detailed information on both physical activity and eating habits, it will provide strong input to any campaign targeting obesity. (At the Minister's request, the Cancer Society has presented the government with a business case outlining why it cannot afford not to invest in increasing the fruit and vegetable intake of New Zealanders.)

Needs Assessment

Background The Cancer Society, established in 1929, is a non-profit organisation receiving no direct Government financial support. Its overarching aim is to minimise the impact of cancer on New Zealanders.

Objectives The relationship between fruit and vegetable consumption and cancer risk reduction is well established. Therefore the Cancer Society wishes to better understand those not meeting the Ministry of Health's fruit and vegetable consumption targets. The intent of this report is to:

- Summarise major descriptive results from the survey relevant to fruit/vegetable intake and cancer prevention
- Take a first step in informing relevant stakeholders about the wide range of information available for further analysis (e.g., segmentation of audiences which can target groups to increase fruit and vegetable intake)
- Highlight immediately apparent awareness problems or information gaps, while acknowledging that further work is needed to identify how to change behaviour.

Subsequent report

A further analysis of the data and subsequent reporting is already planned to identify opportunities for improving the fruit and vegetable consumption of New Zealanders through a greater understanding of factors influencing behaviour.

Research Design

Methodology Overview Full details of the methodology are described in a separate Technical Report available online².

Questionnaire

The starting point for the SPARC questionnaire was the questionnaire used in the American Cancer Society study (Porter Novelli, 2002). The questionnaire has over 300 questions within these major sections:

- Attitudes and opinions (including health values, social norms)
- Your health (self-assessments of health in general, weight, recent health problems, health advice received, importance of possible benefits from good eating habits and physical activity)
- Health behaviour (confidence/self-efficacy, alcohol consumption, smoking)
- Physical activity (motivations, social support, likelihood of benefits, perceived barriers, environmental factors, response to interventions, current behaviour and intentions)
- Nutrition (motivations, social support, likelihood of benefits, barriers, response to interventions, current behaviour and intentions, diverse background issues)
- Getting health and physical activity information (trust in information sources, Internet use)
- About yourself (personal and household demographics, including height and weight).

Changes were made by adapting the American questionnaire to suit the New Zealand audience.

The questionnaire was pre-tested with 22 respondents and the feedback from the pre-testing was incorporated into a final draft version for piloting. One hundred respondents were recruited in Auckland and Rotorua to pilot the survey. Around half the pilot questionnaires were returned in time to improve the final questionnaire; 67 were returned in total.

The final questionnaire is available online (www.cancernz.org.nz).

Continued on next page

² www.sparc.org.nz/news/290104_obstacles_to_action.php#reports

Research Design, continued

Sampling

The random selection of 14,000 households was drawn from the electoral roll. Those of Māori descent identified in the electoral roll and addresses of those aged under 25 years were oversampled to partially counter the typically lower response from these groups.

Mailout (29 May – 31 July 2003)

- The mailout process involved a number of contacts with the selected households:
- A **prenotification letter** was sent out prior to the main questionnaire to inform the household of the pending survey
- The **questionnaire** was then sent with a token incentive (pen) and a freepost envelope to send the completed questionnaire back
- Approximately a week later, a ‘thank you’ **postcard** was sent to all households to thank those who have completed the survey and to remind those who had not yet completed and returned their questionnaire
- A **replacement questionnaire** was sent three weeks later for those who had not returned the questionnaire
- Three weeks later again, a **final replacement questionnaire** was couriered to households that had not yet returned a questionnaire.

Continued on next page

Research Design, continued

Response rate

The final response rate of completed, usable questionnaires is 61%. Details provided in the separate Technical Report also include comparisons of the changing composition of responses over the two-month survey period. For example, the proportion of respondents eating fewer than three servings of vegetables a day increased from 29–31% in three early weeks to 39–45% in the last two weeks).

Weighting

The results are weighted by age, gender, and ethnicity to the New Zealand population. Details are contained in a separate Technical Report available online (Sullivan et al., 2003).

Analysis

This report presents key initial results only, with a focus on **awareness/knowledge** about fruit and vegetable consumption. More complex analyses (e.g. a detailed segmentation) will be considered later. Several of the analyses relate to the target behaviours of three or more servings of vegetables daily and two or more servings of fruit. These targets are consistent with the Ministry of Health recommendations.

Margins of error

The margin of error is around 2.4% for results about the “Don’t But Might” group (3227 respondents) that this report focuses on, and 1.5% for results from the full sample (8163 respondents). Details are in Appendix II.

Overview of the Groups

Identifying the Don't But Might group

Analysis began with an initial split of the sample by their (self reported) daily fruit and vegetable intake (and readiness to change). Intake was assessed by questions about total daily consumption on average, rather than 24 hour diet recall or lengthy lists of fruit and vegetables. The three resulting groups are:

Do Now Those already eating three or more servings of vegetables **and** two or more servings of fruit per day, on average

Don't & Won't Those **not** already eating three or more servings of vegetables and two or more servings of fruit per day, and showing **no intention** of meeting either target in the next six months

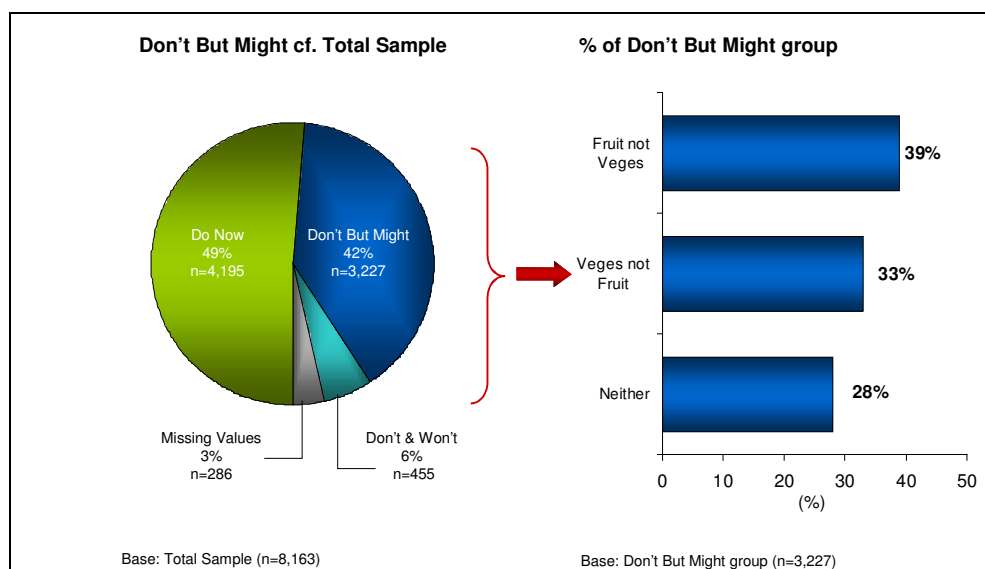
Don't But Might The remainder (excluding those not providing responses about their daily vegetable or fruit intake or intentions).

Given that deriving these groups involved responses to four questions, details are provided separately in Appendix IV. The demographic breakdown of these groups can be found on page 57.

Subgroups

The Don't But Might group, which this report focuses on as the main target for action, comprises three subgroups:

- Those eating enough fruit but not enough vegetables ("Fruit Not Veges")
- Those eating enough vegetables but not enough fruit ("Veges Not Fruit")
- Those not eating enough of either ("Neither").



Overview of the Groups, continued

The following two tables show the extent to which the Fruit Not Veges subgroup eat enough fruit but not enough vegetables, and so on. Those in the Neither subgroup do not eat enough fruit or enough vegetables according to the recommended guidelines. Note the large percentages just meeting or just under the recommended levels (e.g. 56% in the Fruit Not Veges subgroup report exactly two servings of fruit per day, and 66% of the Veges Not Fruit subgroup report one serving of fruit per day).

Table 1: Servings of fruit eaten on average per day*

%	[E7]	Fruit Not Veges (n=1223)	Veges Not Fruit (n=1125)	Neither (n=879)
I don't eat fruit		-	6	4
Less than 1 serving per day		-	28	41
1 serving per day		-	66	55
2 servings per day		56	-	-
3 servings per day		32	-	-
4 servings per day		8	-	-
5 or more servings per day		4	-	-

*The full question was: "On average, how many '**servings**' of fruit (fresh, frozen, canned or stewed) do you eat per day? Do **not** include fruit juice or dried fruit." This was followed by a box defining "serving".

Table 2: Servings of vegetables eaten on average per day**

%	[E9]	Fruit Not Veges	Veges Not Fruit	Neither
I don't eat vegetables		0	-	2
Less than 1 serving per day		5	-	19
1 serving per day		29	-	40
2 servings per day		66	-	39
3 servings per day		-	61	-
4 servings per day		-	27	-
5 or more servings per day		-	12	-

*The full question was: "On average, how many '**servings**' of vegetables (fresh, frozen, canned) do you eat a day? Do **not** include vegetable juices." This was followed by a box defining "serving".

Overview of the Groups, continued

Overall measurement of fruit and vegetable intake appears sufficiently reliable for a survey with social marketing/segmentation objectives. Key results are reasonably close to provisional results from a major recent prevalence survey, the New Zealand Health Survey (Ministry of Health, 2003). The same questions were used to measure fruit and vegetable intake in both surveys. The questions were originally developed for the 1997 National Nutrition Survey. Specifically, 49% of our full sample report eating at least three servings of vegetables each day and two servings of fruit (compared with 42% in the NZ Health Survey). It is not surprising that results from the NZ Health Survey are a little lower (and presumably more accurately measure prevalence). First, their response rate is a little higher (74% compared with 61%). Second, our survey obviously focused on nutrition and hence those with poor eating habits may have disproportionately chosen not to respond.

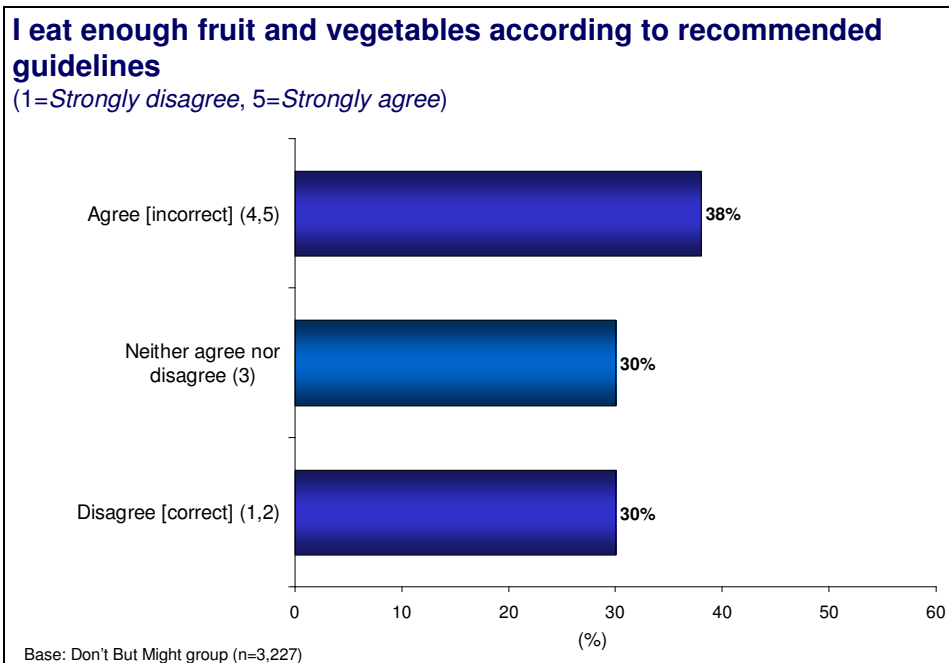
An important implication of this is that our graph above probably understates the size of the key Don't But Might group by several percentage points.

Awareness: Fruit and Vegetable Intake and Health

Awareness of recommended intake levels

By definition all those in our Don't But Might group fail to eat three servings of vegetables or two servings of fruit daily (or fail on both counts). Yet only 30% of them correctly disagree with the statement "I eat enough fruit and vegetables according to recommended guidelines".

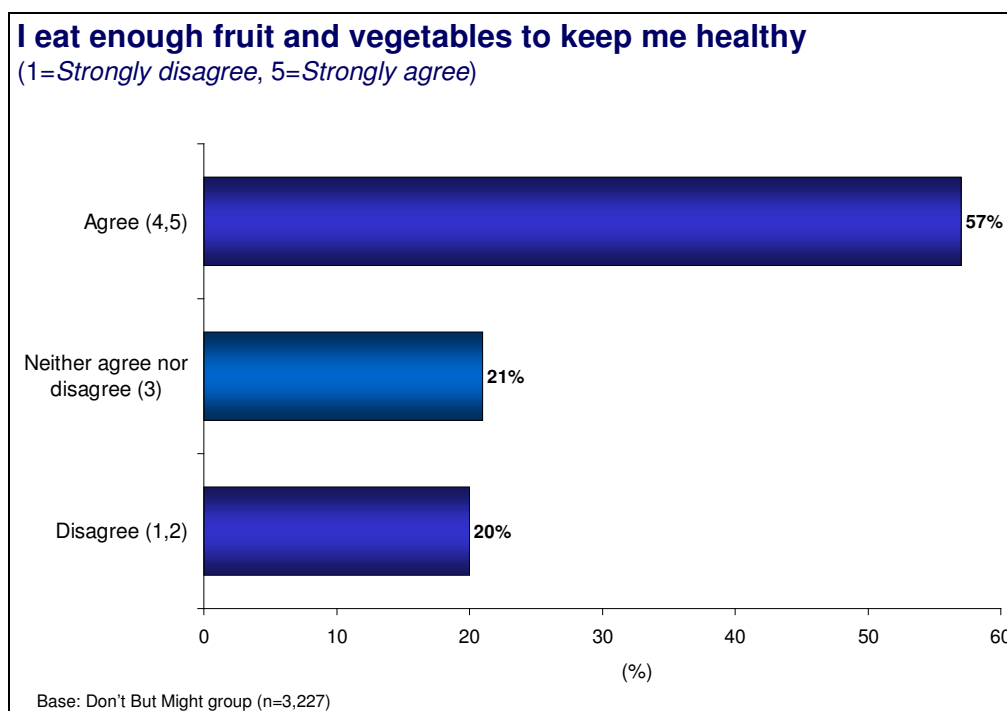
A clear majority seem unaware that their intake falls short of current recommended health guidelines. Many in the Don't But Might group may be uncertain what the recommended guidelines are (30% neither agree nor disagree that they eat enough fruit and vegetables according to recommended guidelines). But four in ten (38%) agree with the statement despite their self-described daily intake falling short of current Ministry of Health recommendations.



A majority in the Don't But Might group (57%) also agree that they eat enough fruit and vegetables to keep themselves healthy (further confirming low awareness of the recommended guidelines), as the following chart shows.

Continued on next page

Awareness: Fruit and Vegetable Intake and Health, continued



A clear majority (88%) agree that eating fruit and vegetables helps them live a healthy life. Thus respondents clearly see fruit and vegetables as relevant to their health, despite not consuming recommended daily intakes of fruit or vegetables or both.

Awareness: Fruit and Vegetable Intake and Health, continued

Awareness of recommended intake: demographic differences

Within the Don't But Might group, several demographic differences are present.

- Compared to their younger counterparts, those aged 50 years and over (55%) more frequently believe their fruit and vegetable intakes are sufficient to meet recommended guidelines, as do those describing themselves as New Zealand European (40% compared with 25% Māori)
- Those aged 50 years and over also more commonly state that they eat enough fruit and vegetables to keep them healthy (78% compared with 57% for all the Don't But Might group). New Zealand Europeans (58%) and Asians (59%) also state they eat enough fruit and vegetables to keep them healthy more commonly than Māori (46%).

Frozen versus Fresh

Frozen vegetables can be an important part of a healthy balanced and nutrient rich diet. Studies have found that frozen vegetables at time of consumption generally have a similar nutritional composition to that of their fresh counterparts by the time the fresh vegetables have undergone normal transport and storage conditions (Athar & Taylor, 2000; Favell, 1998).

The Ministry of Health's Food and Nutrition Guidelines 2003 state that servings of vegetables and fruit can include fresh, frozen, canned, juiced and dried varieties. However, only one serving of vegetable or fruit juice or dried fruit counts as a serve (Ministry of Health, 2003).

Amongst the total sample, views are divided about the health value of frozen vegetables. Only 30% agree with the statement "Frozen vegetables are as healthy as fresh vegetables". Nearly four in ten (37%) disagree, and a further one-third neither agree nor disagree.

This suggests that there may be a knowledge gap about the genuine health benefits of frozen vegetables (although our question wording is not ideal for assessing this). Closing this knowledge gap may be a trigger to increasing intake (because of the convenience of frozen vegetables).

Awareness: Fruit and Vegetable Intake and Health, continued

Does Fruit Juice or Dried Fruit Count? Just under half (45%) of the Don't But Might group count dried fruit as a serving of fruit, while a third (34%) count fruit juice as a serving of fruit. These results are similar to those for the Do Now group. (These questions were asked early in the questionnaire, well before the definitions of servings used for intake questions.)

Table 3: Do they count fruit juice or dried fruit as a serving of fruit?

% 4 or 5 on a 5-point scale (5=Strongly agree) [A2l,m]*	Don't & Won't (n=455)	Don't But Might group (n=3227)	Do Now (n=4195)
I would count 100% fruit juice as a serving of fruit	32	34	31
I would count dried fruit (raisins, dried apricots etc) as a serving of fruit	40	45	49

*These ratings are from Section A, question 2 (items l and m).

To the extent that respondents do consume fruit juice or dried fruit, there are some inconsistencies in our analysis with respect to the current Ministry of Health intake recommendations. This is because our intake questions (E6, E8 in the questionnaire) excluded juices and dried fruit for comparability with the National Nutrition Survey (Russell et al., 1999), whereas the current nutrition recommendations do count one serving of fruit juice or dried fruit (Ministry of Health, 2003).

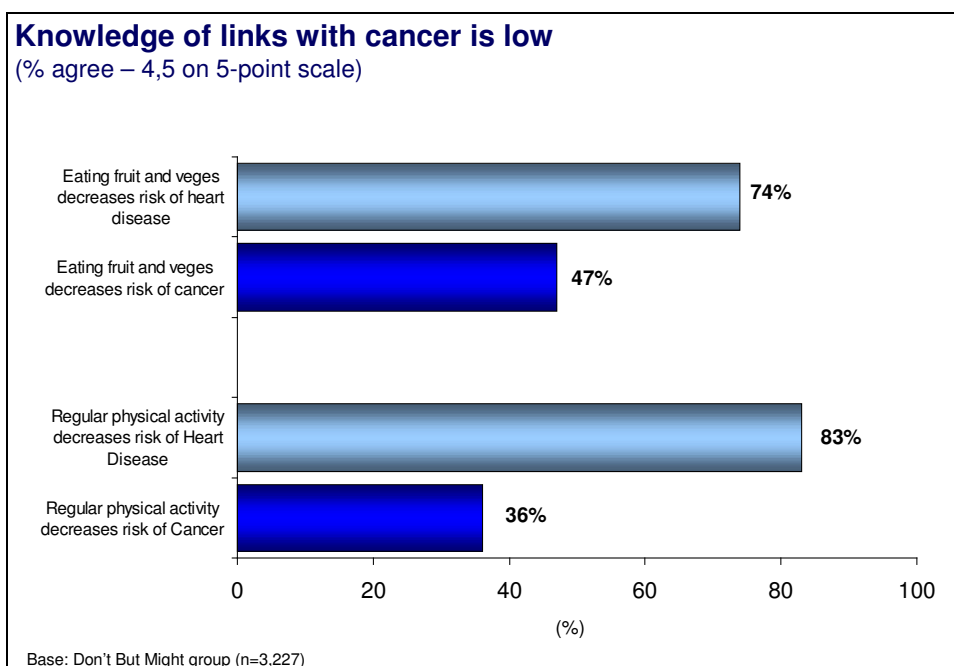
It is likely that the numbers of individuals classified as achieving target levels of intake would be higher if the measurement question was consistent with the recommendations.

Awareness: Cancer Prevention and Healthy Eating

Awareness: Cancer versus Heart Disease Substantially more of the Don't But Might group are aware that eating fruit and vegetables and undertaking regular physical activity reduce the risk of heart disease than are aware of the link reducing the risk of cancer.

Specifically, three quarters of the Don't But Might group (74%) agree that eating fruit and vegetables helps decrease the risk of heart disease compared with about one half (47%) who agree that this decreases the risk of cancer.

An even greater difference in knowledge is apparent with respect to the effects of regular physical activity. Over eight in 10 (83%) of the Don't But Might group agree that regular physical activity decreases the risk of heart disease whereas under four in ten (36%) agree that regular physical activity decreases the risk of cancer.



Continued on next page

Awareness: Cancer Prevention and Healthy Eating, continued

Cancer prevention: demographic differences in awareness

A difference in knowledge of cancer prevention also exists between subgroups of the Don't But Might group:

- Knowledge that eating fruit and vegetables reduces the risk of cancer is lowest amongst those aged 16 to 24 years (35%). Asians (58%) more often agree that eating fruit and vegetables reduces the risk of cancer than New Zealand Europeans (46%) or Māori (39%).
- Knowledge that regular physical activity also reduces the risk of cancer is lower among those aged 16 to 24 years (29%) and those aged 65 and over (29%) in comparison to those 50 to 64 years (41%), and among Māori (29%) compared with Pacific peoples (44%) and Asians (48%).

Cancer, fruit and vegetables, and physical activity

Within the Don't But Might group, those who know that fruit and vegetables lower the risk of cancer are also likely to know that regular physical activity also reduces the risk of cancer.

More specifically, 68% of those who agree (rate 4 or 5 on a 5-point scale) that eating fruit and vegetables decreases the risk of cancer also agree that regular physical activity does the same (Table 4).

Of those who disagree that eating fruit and vegetables decreases the risk of cancer, 90% are also unaware of the benefit of regular physical activity in cancer risk reduction.

Table 4: Knowledge about lowering risk of cancer

%	[A2e,f]*	Eating fruit and vegetables decreases the risk of cancer		
		Disagree (1 or 2)	Neither agree nor disagree (3)	Agree (4 or 5)
	Regular physical activity decreases the risk of cancer			
	Disagree (1 or 2)	90	7	8
	Neither agree nor disagree (3)	8	87	24
	Agree (4 or 5)	2	6	68

*These ratings are from Section A, question 2 of the questionnaire (items e and f)

Continued on next page

Awareness: Cancer Prevention and Healthy Eating, continued

Although this section focuses on awareness and identifies that there is a lack of awareness of the Ministry of Health's recommended daily intake of fruit and vegetables, we make an important caveat. It is vital to note that changing awareness alone is unlikely to change the behaviour of most of the Don't But Might group up to the recommended intake levels. However, the lower levels of awareness found are sufficiently prevalent to suggest that raising awareness is likely to be a very useful initial step towards changing fruit and vegetable intake. In addition to increasing awareness, a wider range of other issues need to be considered for a comprehensive behaviour change campaign.

Trust in information sources

If information is to be provided to counter the awareness problems demonstrated, it is useful to know the extent to which possible information sources are trusted. Of the various health professionals rated as a source for health and physical activity information, those rated highest by the Don't But Might group are:

- Their doctor
 - Dietitian
 - Their doctor's nurse.
-

Continued on next page

Awareness: Cancer Prevention and Healthy Eating, continued

Table 5: Trust in health information sources

% 4 or 5 on a 5-point scale (5=Trust a lot) [F1]			
Please indicate how much you would trust each of the following sources for health and physical activity information.	Don't & Won't	Don't But Might	Do Now
Your doctor	69	80	79
Heart Foundation	52	71	74
Dietitian	46	66	68
Your doctor's nurse	51	61	61
Diabetes New Zealand	46	60	64
Cancer Society	46	58	64
Your local hospital	42	53	53
Your local Public Health Unit	33	48	45
Other health professional (e.g. physiotherapist)	33	47	49
SPARC	27	45	49
Pharmacist/chemist	38	45	47
Your local District health Board	23	37	34
The Ministry of Health	22	37	37
Regional Sports Trust	22	35	37
Naturopath or homeopath	20	32	36

Awareness: Cancer Prevention and Healthy Eating, continued

From their responses to a simple checklist, about half of the Don't But Might group seem reasonably interested in learning more about nutrition or physical activity. Not surprisingly, the Don't & Won't group clearly have least interest in such health information.

Table 6: Health information sources most interested in

% marking as a health area they are “most interested in learning more about” [F2]	Don't & Won't	Don't But Might	Do Now
Physical activity/exercise	33	48	43
Nutrition/food choice	28	50	49
Weight control	25	42	38

Barriers and Benefits

Perceived barriers to eating fruit and vegetables

Respondents were asked to indicate the level of influence of diverse barriers (“possible things that keep people from eating fruit and vegetables each day”). These were rated on a 7-point scale where 1 means *Doesn't influence me at all* and 7 means *Influences me a lot*.

When asked about barriers in this way, between a fifth and a third of those in the Don't But Might group give relatively high ratings (5,6, or 7) for:

- Fruit costs too much (34%)
- Vegetables cost too much (30%)
- Fresh fruit spoils too quickly (28%)
- I prefer to eat other snacks (25%)
- Vegetables are difficult to eat when I am on the go (24%)
- Fresh vegetables spoil too quickly (24%)
- Fruit isn't filling enough (23%).

This indicates that there are no dominating barriers strongly influencing a majority of the Don't But Might group. The following table confirms this and shows differences in perceived barriers for the Do Now group.

Continued on next page

Barriers and Benefits, continued

Table 7: Influence of barriers that keep people from eating fruit and vegetables

% 5, 6, or 7 on a 7-point scale (7=Influences me a lot) [E5]	Don't & Won't	Don't But Might	Do Now
Fruit costs too much	33	34	25
Fresh fruit spoils too quickly	32	28	18
Vegetables cost too much	25	30	23
I prefer to eat other snacks (like chips and biscuits)	32	25	10
Fresh vegetables spoil too quickly	25	24	14
Vegetables are difficult to eat when I'm on the go	23	24	12
Fruit isn't filling enough	22	23	10
They don't give me quick energy like a chocolate bar does	22	19	10
I'm not a good cook	14	17	9
Vegetables aren't filling enough	17	16	6
Fruit and vegetables are not available where I work	13	16	9
I can't get good quality fruit and vegetables at my local shops	12	16	9
Vegetables take too much time to prepare (clean, cut up, cook)	14	13	5
Fruit is difficult to eat when I'm on the go	11	13	5
I don't like most vegetables	24	12	3
I don't like most fruit	22	11	3
Fruit takes too much time to prepare (clean, cut up, cook)	13	11	4
The supermarket I go to most doesn't carry a lot of different fruit and vegetable	7	10	7
My family doesn't like vegetables	12	7	3
My family doesn't like fruit	9	7	2

Continued on next page

Barriers and Benefits, continued

Other measures for the total sample indicate the level of other potential barriers to increasing fruit and vegetable intake.

- The perceived presence of pesticides on fruit and vegetables may be a hindrance for many. Of the full sample of 8163 respondents, 43% agree with the statement “I am concerned about the amount of pesticides on my fruit and vegetables”. One third (34%) neither agree nor disagree while 21% are not concerned about pesticides. Results for the Don’t But Might group are very similar.
- Few rely on dietary supplements as a substitute to fruit and vegetables. When asked, only 5% of the full sample agree with “I don’t need to eat a lot of fruit and vegetables because I take multivitamin tablets” whilst 80% disagree. Results for the Don’t But Might group are very similar.

Furthermore, the possible lack of awareness of the health benefits of frozen vegetables mentioned above (p.26) may be a barrier for some.

Health values

The benefits people may perceive from eating fruit and vegetables depend substantially on the importance they attach to various aspects of health. All three groups (Don’t but Might etc.) commonly consider living a healthy life, and reducing risk of cancer or heart disease important. Not surprisingly, fewer in the Don’t & Won’t group attach importance to health.

- Almost equal numbers of the Don’t But Might group consider it **important** to lower the risk of heart disease (78%) and cancer (76%) (Table 8). However, as noted previously (p. 28) the Don’t But Might group has low awareness that **both** fruit and vegetable consumption and regular physical activity lower the risk of cancer (whereas awareness of this link is higher for heart disease).
- Not surprising are the large differences in importance placed on healthy eating. Those in the Do Now group are more concerned, with 83% agreeing that having healthy eating habits is very important to them.

Continued on next page

Barriers and Benefits, continued

Table 8: Health values

% 4 or 5 on a 5-point scale (5= <i>Very important</i>) [A3]	Don't & Won't	Don't But Might	Do Now
How important to you is it that <u>you</u> ...			
Live a healthy life	73	88	94
Do things to lower your risk of heart disease	65	78	85
Do things to lower your risk of developing cancer	62	76	84
Make changes in your daily routine in order to prevent health problems	50	73	81
Follow recommended health guidelines	39	54	67

% 4 or 5 on a 5-point scale (5= <i>Strongly agree</i>) [A1p]	Don't & Won't	Don't But Might	Do Now
Having healthy eating habits is very important to me	49	68	83

Just 10% of the total sample go out of their way to buy organic vegetables. Results are consistent across the groups (Don't & Won't, Don't But Might, Do Now).

Table 9: Attitudes towards organics

% 4 or 5 on a 5-point scale (5= <i>Strongly agree</i>) [A1t]	Don't & Won't	Don't But Might	Do Now
I go out of my way to buy organically grown fruit and vegetables	8	10	11

Vegetarianism does not have a major impact on the results. Only 3% of the total sample (n=8163) consider themselves to be vegetarians.

Continued on next page

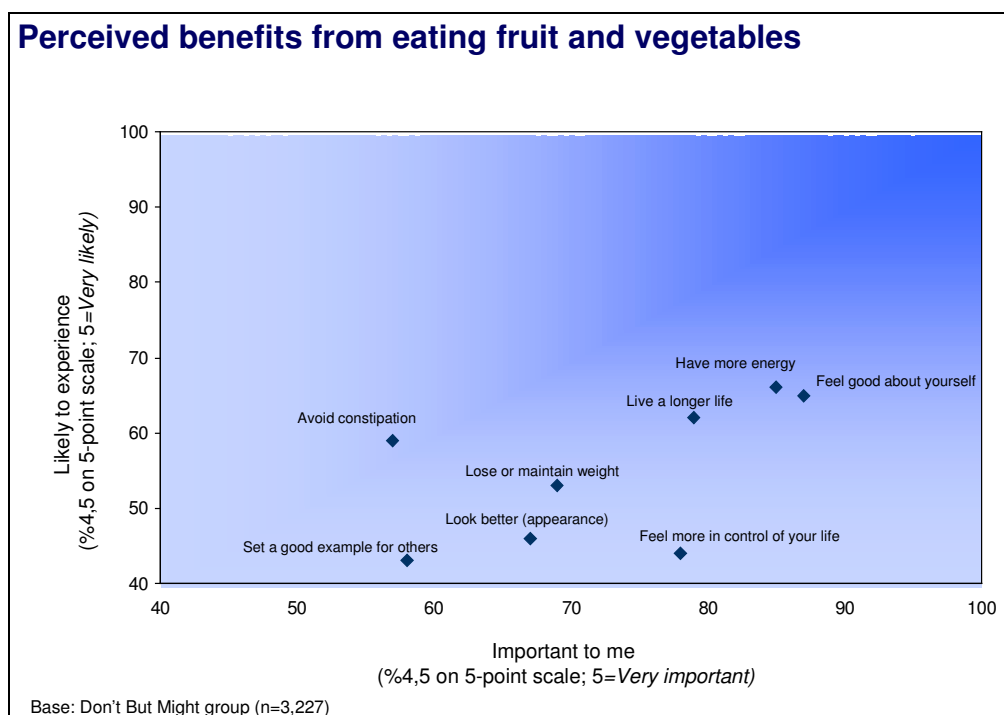
Barriers and Benefits, continued

Benefits

A wide range of perceived benefits (other than the health values already reported) were each rated twice: first, in terms of personal **importance**; second, in terms of the **likelihood** of receiving these benefits if respondents ate at least five servings of fruit and vegetables daily. The scatterplot following shows that, although a majority rate each of these benefits as important, in general fewer believe they are likely to experience these from eating fruit and vegetables.

Of most importance to those in the Don't But Might group are "Feeling good about themselves", "Having more energy", and "Living a longer life". These were also rated as benefits likely to be experienced by a majority of respondents.

Least commonly important to respondents were "Setting a good example for others" and "Avoiding constipation" (but note that the latter was one of the highest in terms of likelihood to experience ratings).



Barriers and Benefits, continued

Motivations Perceived benefits contribute to people's motivations. In addition to the questions about perceived benefits, we also asked some questions more directly about motivations.

Motivations for eating fruit and vegetables among "Do Now" are, not surprisingly, generally higher than both the Don't But Might group and the Don't & Won't group.

Amongst the Don't But Might group, clear agreement is most common for:

- Believing eating fruit and vegetables is a very good thing for their health
- Enjoying eating fruit and vegetables
- Wanting to take responsibility for their own health
- Fruit making an easy snack.

Note that the motivations rated highest are largely "intrinsic" type motivations, that is, motivations related to inherent factors with satisfaction coming from the behaviour itself. In contrast, the four with the lowest levels of agreement (at the bottom of the following table) are all "extrinsic" (e.g. my family wants me to, I feel pressure from others to eat healthier).

Continued on next page

Barriers and Benefits, continued

Table 10: Motivations for eating fruit and vegetables

<i>% 6 or 7 on a 7-point scale (7=Strongly agree)</i>	[E1]		
When I eat fruit and vegetables, it is because...	Don't & Won't	Don't But Might	Do Now
I believe it is a very good thing for my health	42	67	80
I enjoy eating fruit and vegetables	45	64	86
I want to take responsibility for my own health	39	60	73
Fruit makes an easy snack	37	55	75
It is an important choice I really want to make	21	44	65
I want to get more vitamins	23	44	53
Not doing so puts me at a great health risk	24	38	49
I want to be a good role model for my children	18	32	40
It is consistent with my life goals	17	32	50
I would feel guilty or ashamed about myself if I didn't	10	14	19
My family wants me to	9	12	12
I want others to approve of me	2	7	7
I feel pressure from others to eat healthier	6	7	6
Others will be upset at me if I didn't	6	6	6

Interventions

This section covers several results more directly relevant to behavioural change: stages of change, interventions, confidence about making changes (“self-efficacy”), and path modelling.

Stage of Change

The stages of change model specifies an ordered set of stages of readiness to change into which people can be classified and identifies the factors that can facilitate movement from one stage to the next. To the extent that behaviour change follows a stage process, we can then identify the predominant stage or stages in a population and focus resources on those issues most likely to move people to the next stage (e.g. from no intention of changing, to contemplating change). That is, interventions or “treatments” can be matched to individuals because people in different stages have different needs (Horwath, 1999, pp.281–2).

Separate questions measured the stages of change for fruit and vegetable eating. We asked if respondents consistently ate two or more servings of fruit a day (and a parallel question about three or more servings of vegetables) then classified their answers into five stages:

- No, and I do not intend to in the next 6 months (*Precontemplation*)
- No, but I intend to in the next 6 months (*Contemplation*)
- No, but I plan to in the next 30 days (*Preparation*)
- Yes, I have been, but for less than 6 months (*Action*)
- Yes, and I have been for more than 6 months (*Maintenance*).

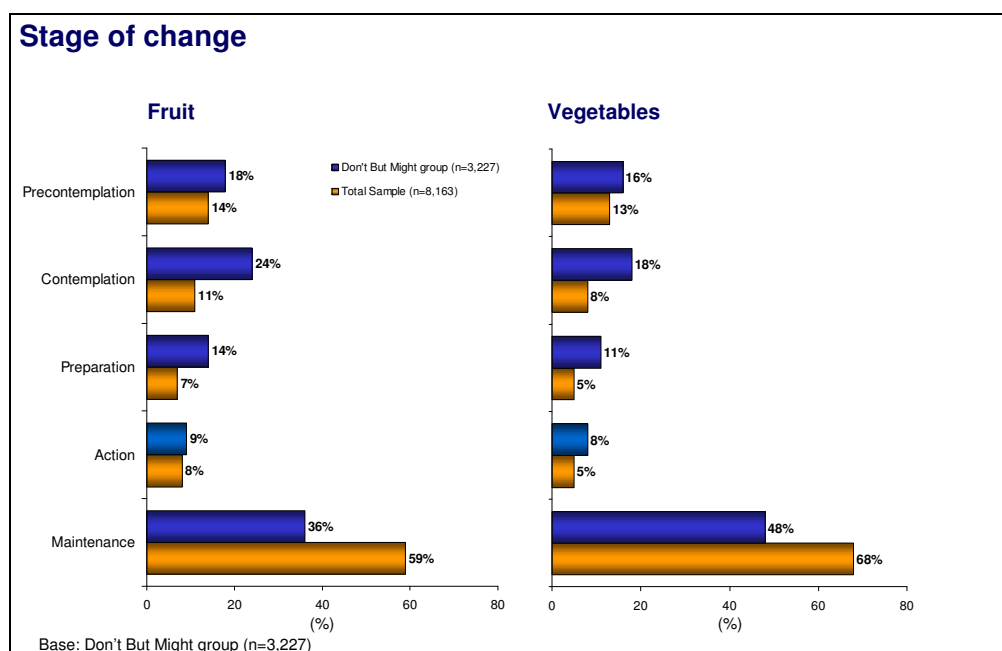
Continued on next page

Interventions, continued

Note that we have already used stages of change when defining our three major groups (Don't & Won't, Don't But Might, Do Now). The Don't & Won't group are in the Precontemplation stage for both fruit and vegetable intake.

Our Don't But Might group excludes those with healthy intakes already of both fruit and vegetables (as well as Precontemplators at the other extreme for both). This makes it important to view stages of change for the full sample as well as the Don't But Might group. The graph following shows substantial proportions at the earliest stages (Pre-contemplation and Contemplation), least ready to consistently achieve target levels of intake.

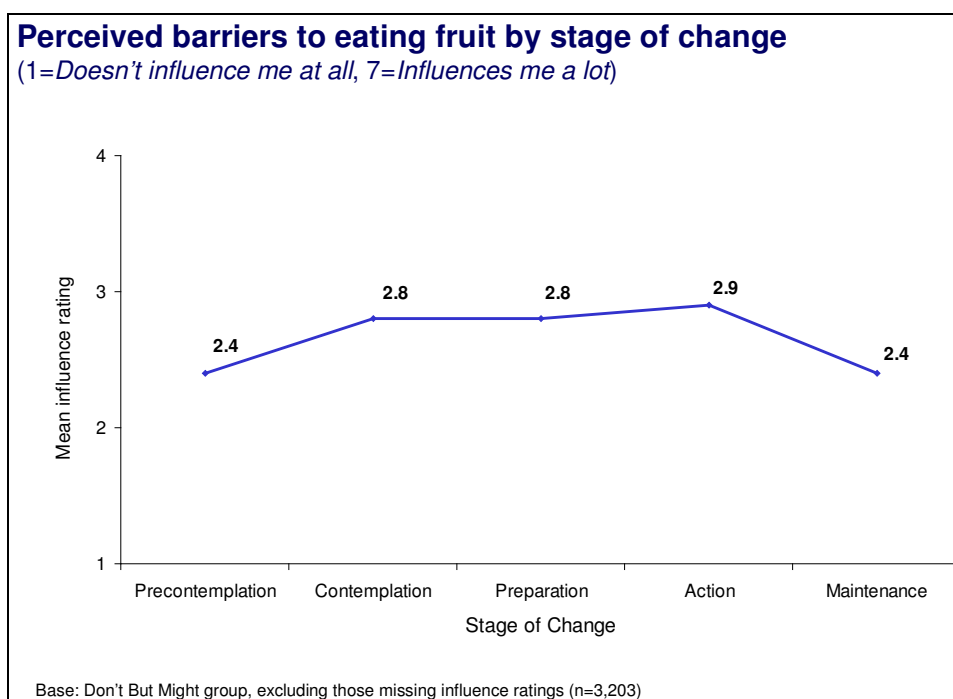
For both fruit and vegetables, the graph reminds us that the most common stage among those in the Don't But Might group is already Maintenance—that is, many of them are already consistently achieving one of the target levels of intake. Most of the others in the Don't but Might group are at the earliest stages (Precontemplation and Contemplation) rather than in stages closer to Maintenance.



Continued on next page

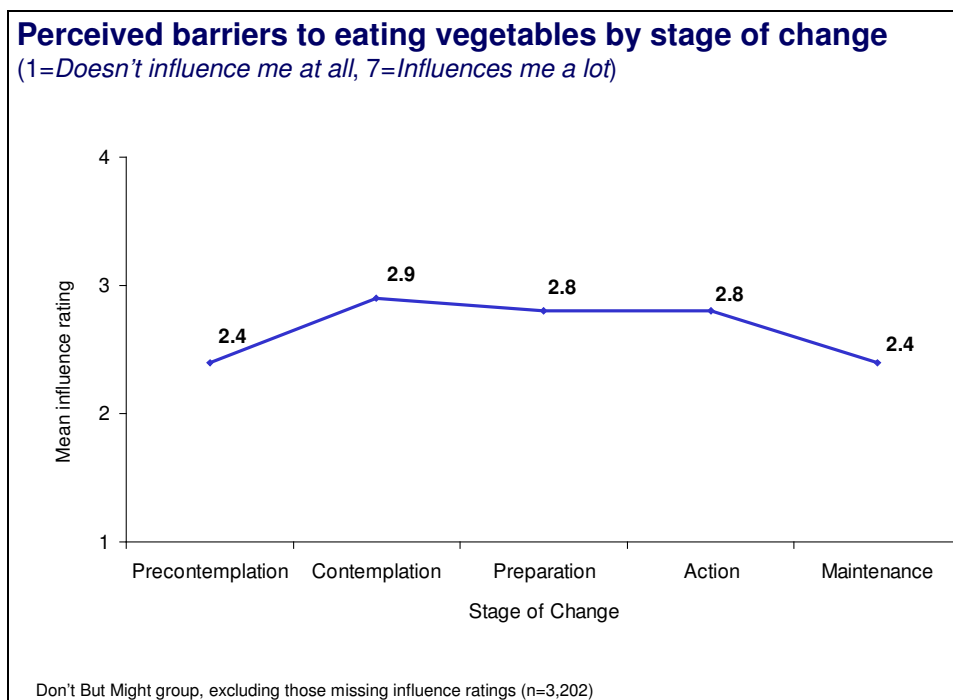
Interventions, continued

It is important not to make simplistic assumptions about the stages, for example that barriers are highest for all those in Precontemplation and steadily lower for all subsequent stages of change. As the following charts show, this is not the case—the average influence rating of barriers is higher for Contemplators than for Precontemplators for both fruit and vegetables. This pattern makes sense because barriers may often be more influential and salient for those contemplating change in the behaviour than for those not contemplating.



Continued on next page

Interventions, continued



Interventions We asked directly how likely respondents would be to eat more fruit and vegetables in response to several possible interventions. Those in the Don't But Might group most commonly consider the following interventions likely to increase their fruit and vegetable intake:

- If they could get a free cookbook about fruit and vegetables
- My employer offered free or low-cost fruit and vegetables at work
- My doctor or nurse told me it would improve my health
- If they could get free advice from a dietitian
- If the place they bought their lunch had more fruit and vegetables.

Note the consistently lower responsiveness to the interventions from the Don't & Won't group. This confirms the value of analysing this group separately.

Continued on next page

Interventions, continued

Table 11: Interventions promoting fruit and vegetable eating

% 4 or 5 on a 5-point scale (5=Very likely) [E6]			
	Don't & Won't	Don't But Might	Do Now
I could get a free cookbook about fruit and vegetables	21	38	31
My employer offered free or low-cost fruit and vegetables at work	22	34	26
My doctor or nurse told me it would improve my health	25	32	28
I could get free advice from a dietitian	13	31	26
The place I buy my lunch had more fruit and vegetables	10	28	20
Fruit and vegetables came in more convenient packages (pre-washed, cut-up)	11	25	13
I could collect bar codes from fruit and vegetables which go into prize draws	18	23	18
There was more information on TV about how to prepare or cook fruit and vegetables	11	22	16
I could get a free pamphlet on how to prepare fruit and vegetables	9	17	13
I could call a toll-free number to get advice from an expert on how to prepare or cook fruit and vegetables	5	9	7

Continued on next page

Interventions, continued

- Confidence in being able to make changes (Self-efficacy)** Don't But Might group members often have low confidence or self-efficacy with only around one third highly confident (rating 9 or 10 on a 10-point scale) that for one month they could:
- Try a new fruit or vegetable to see if they like it (38%)
 - Eat at least five servings of fruit and vegetables a day (32%)
 - Eat a low-fat diet (30%).

Table 12: Confidence/ Self-efficacy

% 9 or 10 on a 10-point scale (10=Extremely confident) [C1]			
Assume that you <u>want</u> to do each of the following... Beginning this week and continuing for at least <u>ONE month</u> , how confident are you that you could ...	Don't & Won't	Don't But Might	Do Now
Try a new fruit or vegetable this month to see if you like it	20	38	51
Maintain a healthy weight, or begin to lose excess weight	32	36	50
Be physically active at least 5 days per week for at least 30 minutes a day	34	35	47
Eat at least five servings of fruit and vegetables a day	8	32	69
Eat a low-fat diet (eating less fried foods, chips, mayonnaise, cream, etc)	22	30	49
Try a new physical activity to see if you like it	17	27	32

International research suggests that such confidence or self-efficacy is often very important in behaviour change. Unless people are confident that they can succeed in changing their behaviour, why should they try?

Continued on next page

Interventions, continued

The relatively low levels of confidence among the Don't But Might group with respect to eating five or more servings of fruit and vegetables a day suggest that changing confidence levels might be included among initial campaign targets. Established methods for developing confidence about changing behaviour include (Bandura 1998; Maibach & Cotton 1995):

- **Mastery experiences.** The most effective way of creating a strong sense of confidence is usually through mastery experiences, for example, repeated successes in a "safe" setting away from potential discouragement by other people. Successes might be things like experiencing how easy and quick it is to make a simple salad, through to things like taking a piece of fruit for lunch every day for a week.
- **Vicarious experiences (social models).** Seeing people similar to themselves succeed by sustained effort can raise observers' beliefs that they too can succeed. The behaviour and ways of thinking demonstrated can teach skills and coping strategies.
- **Persuasion.** Persuasive messages may help people make greater efforts and sustain them. For example, health messages may direct attention to successful aspects of failed behaviour attempts.

Continued on next page

Interventions, continued

Focusing on major influences (path modelling)

Given the very large number of factors and questions involved in the study, it is helpful to have some guidance as to which factors might have the greatest influence on increasing fruit and vegetable consumption. To do this, we followed the American Cancer Society example (Porter Novelli, 2002) of using path modelling (a type of regression analysis).

Consistent with the American Cancer Society results, self-efficacy (i.e. confidence about being able to eat at least five servings of fruit and vegetables every day) has a strong relationship with overall intake. Additionally, intrinsic types of motivation (e.g. because they believe it is very good for their health) are significantly associated with higher intake levels whereas extrinsic motivations (e.g. to get approval from others) are not.

These results suggest that increasing **self-efficacy** and **intrinsic motivation** are likely to be useful approaches to increasing fruit and vegetable intake.

Intrinsic motivation is particularly related to differences in health expectancies and other perceived benefits, and hence these might be targeted to increase intrinsic motivation. With regard to perceived benefits, the overall survey data suggests that benefits such as “having fun” and “feeling good about yourself” are the most important aspects to which a campaign could be directed.

Self-efficacy is particularly related to several perceived barriers, and hence work on reducing these perceived barriers may help to increase self-efficacy.

Ling and Horwath (2001) provide a useful suggestion from previous studies that benefits/intrinsic motivation (pros) and barriers (cons) may be more relevant at different stages:

Results from a number of studies suggest that intervention should target increasing the pros to get people to think about change, followed by decreasing the cons to allow the behaviour to change. (p.262)

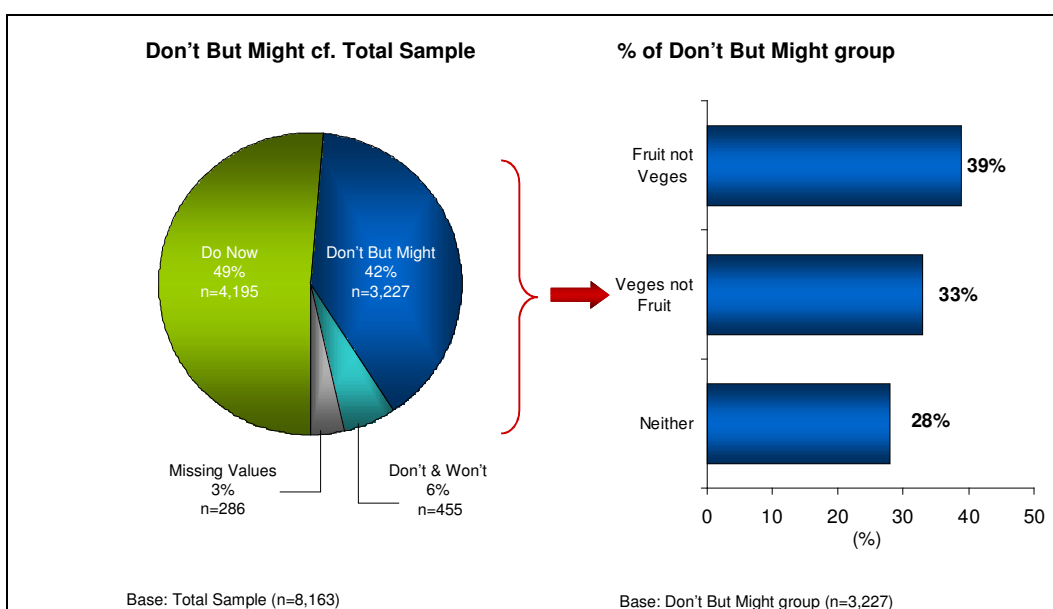
Details of the path modelling results are contained in Appendix III.

Fruit versus Vegetable Intake and Related Differences

Fruit versus vegetable intake

The Don't But Might group is not dominated by those not eating enough fruit nor by those not eating enough vegetables. Rather, similarly sized groups exist of each of the three logically possible combinations:

- enough fruit but not enough vegetables (“Fruit Not Veges”),
- enough vegetables but not enough fruit (“Veges Not Fruit”), and
- not enough of either (“Neither”).



Continued on next page

Fruit versus Vegetable Intake and Related Differences, continued

Other Differences within Don't But Might group

We carefully checked whether differences between these three subgroups within the Don't But Might group were striking for particular questions. In general, differences between the subgroups were typically small for the issues included in the this questionnaire and suggest strongly that other ways of segmenting the Don't But Might group are likely to be more useful for the Cancer Society. However, those purely marketing fruit, for example, would obviously choose to take a different view and a different approach to using the data. The few exceptions, where large differences between the subgroups were apparent, are described next.

Awareness of recommended guidelines

Within the Don't But Might group, those who eat Neither enough fruit nor enough vegetables were more commonly aware that their intake did not meet recommended guidelines. That is, around half (49%) disagree with the statement "I eat enough fruit and vegetables according to recommended guidelines" compared with 25% and 21% for the other two subgroups. This is consistent with them having broader awareness of a simple guideline such as "5+ A Day" combining fruit and vegetable intake rather than the separate targets for fruit and vegetables.

Conversely, those in the Don't But Might group who eat enough fruit (but not vegetables), or enough vegetables (but not fruit) more often incorrectly agree (4,5 on 5-point scale) with this statement (46% and 43% respectively).

Table 13: Awareness about recommended guidelines and their intake

% 4 or 5 on a 5-point scale (5=Strongly agree) [A11]			
I eat enough fruit and vegetables according to recommended guidelines	Vegetables Not Fruit (n=1125)	Fruit Not Vegetables (n=1223)	Neither (n=879)
Disagree (1 or 2)	25	21	49
Neither agree nor disagree (3)	31	31	29
Agree (4 or 5)	43	46	21

Continued on next page

Fruit versus Vegetable Intake and Related Differences, continued

Confidence/self-efficacy

Those who eat neither enough fruit nor enough vegetables are less likely to be confident they can eat at least five servings of fruit and vegetables daily than those in the other two subgroups (Veges Not Fruit and Fruit Not Veges). This is a logical pattern of results because their current behaviour will generally be further from this combined target of five servings. Thus, building confidence/self-efficacy may be a particularly important part of changing the behaviour of the Neither subgroup.

Table 14: Confidence eating 5 servings fruit and vegetables every day

<i>% on a 10-point scale (10=Extremely confident)</i> [C1]			
How confident are you that you could eat at least five servings of fruit and vegetables every day?	Veges Not Fruit	Fruit Not Veges	Neither
1=Not at all confident	3	3	10
2 or 3	7	7	18
4 or 5	18	16	25
6 or 7	20	22	18
8 or 9	26	26	14
10=Extremely confident	27	25	13

Social support

Those in the Neither subgroup are clearly more likely to say they do not receive enough encouragement (47%) than the other two subgroups.

Table 15: Encouragement to eat fruit and vegetables

<i>% on a 7-point scale (7=Too much)</i> [E3]			
Overall, would you say the amount of encouragement you get is...	Veges Not Fruit	Fruit Not Veges	Neither
Not enough (1, 2 or 3)	32	25	47
About right (4)	59	63	43
Too much (5,6 or 7)	5	8	8

Differences related to fruit versus vegetable intake, continued

Ethnicity

The majority (85%) of the Veges Not Fruit subgroup are New Zealand European compared with only 67% of the Fruit Not Veges subgroup. Conversely, Māori, Pacific peoples, and Asians are more common in the Fruit Not Veges subgroup than in Veges Not Fruit.

Table 16: Ethnicity of subgroups within the Don't But Might group

Which ethnic group do you belong to? [G6]	Veges Not Fruit	Fruit Not Veges	Neither
New Zealand European	85	67	61
Māori	8	15	19
Pacific peoples	2	8	11
Asian	3	10	10
Other	8	9	8

Weight Control and Physical Activity

Obesity

Low fruit and vegetable intake is a recognised risk factor for obesity (WHO, 2003). Around one-fifth of the Don't But Might group self-report a weight and height indicating that they are obese. This is slightly but significantly higher than the one in seven (14%) of those already eating three servings of vegetables and two servings of fruit per day. Around half of the Don't But Might group are either overweight or obese.

Obesity was defined by a Body Mass Index (BMI)³ of 30 or more. "Overweight" is used to describe people with a BMI of 25 or more (but less than 30).

BMI	Weight status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and above	Obese

Note that some studies classify obesity differently for different ethnicities. For example, the 2002/03 New Zealand Health Survey has higher BMI cut-offs for Māori and Pacific peoples (32 instead of 30 for obese; 26 instead of 25 for overweight; Ministry of Health, 2003). The SPARC/Cancer Society study uses the same cut-offs for all ethnicities, using the obesity classification cut-offs from the US Center for Disease Control (2003) which are consistent with those used by WHO⁴.

Our results are close enough to other estimates of obesity prevalence to conclude that BMI as measured is useful for the main purposes of this study (e.g. segmentation). Nevertheless, we recognise that this survey very probably undercounts obesity a little. Our full sample suggests a total obesity rate of 17%, whereas provisional results from the NZ Health Survey (Ministry of Health, 2003) suggests 21% (despite using the higher BMI cut-offs for Māori and Pacific peoples). The SPARC/Cancer Society survey classified a further 30% as overweight (compared with 35% in the NZ Health Survey).

Continued on next page

³ BMI = weight in kilograms divided by height in metres squared (kg/m²)

⁴ WHO (2003, p.69) also noted: In recent years, different ranges of BMI cut-off points for overweight and obesity have been proposed, in particular for the Asia-Pacific region. At present available data on which to base definitive recommendations are sparse."

Weight control, continued

Causes of lower obesity/overweight rates in this survey include:

- Self-report of height and weight rather than measurement in the NZ Health Survey
 - 7% in this survey did not provide the height and weight information required to calculate BMI. A higher proportion of these people might be obese
 - Obese/overweight people might disproportionately have not responded to this survey, because of its focus on physical activity and nutrition.
-

Impact of two protective factors amongst the full sample

Of course, obesity is determined by many other factors too. Given that physical activity was the other focus of the study, the next analysis also takes into account whether respondents are sufficiently active (for 30 minutes a day, five days a week) and have been so for at least six months. **This analysis is for the full sample (n=8163), not just the Don't But Might group.**

Obesity is twice as prevalent (24%) among those both insufficiently active and with inadequate fruit and vegetable intake, compared with those who sustained adequate levels for at least six months on both these protective factors (11%).

The following table profiles the different BMI groups by these two protective factors. A significantly lower proportion of obese respondents (19%) do these preventative behaviours compared with those who are normal weight (31%) or overweight (31%).

Nearly half (45%) of the obese respondents have not established either of the preventative behaviours (adequate fruit and vegetable consumption and regular physical activity for at least six months). In contrast, significantly fewer (27%) of those with a normal or overweight BMI do neither of the preventative behaviours.

Continued on next page

Weight control, continued

Table 17: Weight status by amount of fruit/vegetable intake and physical activity

%			
Physical activity and vegetable/fruit intake (maintained for at least 6 months) [D20, E8, E10]	Normal (n=3393)	Overweight (n=2413)	Obese (n=1241)
Do both: 5×30mins physical activity per week & 3+2 vegetable/fruit	31	31	19
Do neither: Neither 5×30mins physical activity per week nor 3+2 vegetable/fruit	27	27	45
Do some: 5×30mins physical activity per week but not 3+2 vegetable/fruit	21	19	14
Do some: Do 3+2 vegetable/fruit but not 5×30mins physical activity per week	21	23	22

Weight gain/loss Four in ten (41%) of the Don't But Might group are trying to lose weight. This is similar to the Do Now group but clearly higher than the Don't & Won't group (29%).

Table 18: Weight gain or loss sought

%			
Are you trying to ...	Don't & Won't	Don't But Might	Do Now
Gain weight	6	5	3
Lose weight	29	41	40
Neither of these	65	54	56

Continued on next page

Weight control, continued

The following table shows the extent to which overweight and obese respondents are more likely to report trying to lose weight. More with an obese BMI in the Don't But Might and Do Now groups may be trying to lose weight than in the Don't & Won't group.

Table 19: Weight gain or loss sought by weight status

%	[B3]	Don't & Won't		
Are you trying to ...		Normal (n=205)	Overweight (n=139)	Obese (n=68)
Gain weight		7	5	1
Lose weight		18	34	46
Neither of these		75	61	52
%		Don't But Might		
Are you trying to ...		Normal (n=1349)	Overweight (n=975)	Obese (n=605)
Gain weight		8	3	0
Lose weight		25	49	68
Neither of these		67	48	31
%		Do Now		
Are you trying to ...		Normal (n=1913)	Overweight (n=1345)	Obese (593)
Gain weight		5	1	0
Lose weight		24	52	72
Neither of these		70	47	27

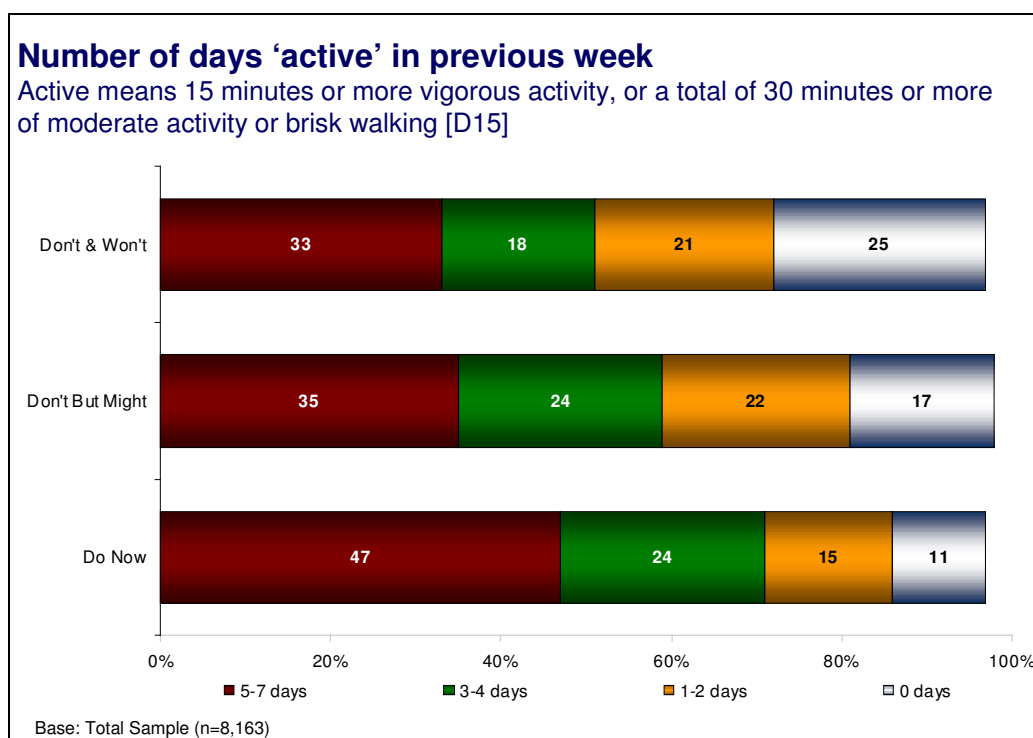
Continued on next page

Weight control, continued

Physical Activity in last 7 days

Nearly half (47%) of the Do Now group are “regularly active”. That is, they did 30+ minutes of moderate activity (or 15 minutes of vigorous) each day for five or more days of the last week.

Fewer of the Don't But Might group (35%) are regularly active. Furthermore, many of the Don't But Might group (39%) are only active 2 days or less per week.



Demographic Profile

Demographics The following table profiles the different groups within the population. We include the unweighted base number of respondents, *n*, for each demographic subgroup within the Don't But Might group because these subgroups are commonly compared in the report.

Table 20: Gender, age, ethnicity, marital status

Gender [G1]	Don't & Won't %	Don't But Might %	<i>n</i>	Do Now %
Male	72	53	1437	41
Female	28	47	1790	59
Age [G7]				
16 – 24	15	19	443	14
25 – 34	19	22	588	16
35 – 49	31	31	1089	28
50 – 64	18	16	737	24
65+	17	11	370	18
Ethnicity [G6]				
NZ European	79	71	2325	83
Māori	11	13	384	8
Asian	6	8	183	5
Pacific	4	7	131	3
Other	9	8	419	7
Marital Status [G4]				
Single	22	26	657	17
Married/living with partner	65	61	2094	72
Separated/divorced	5	6	275	4
Widowed	4	4	125	5
Other	4	3	74	2

Appendix I – ACNielsen Quality Assurance

Quality Assurance

ACNielsen is committed to the principles of Total Quality Management, and in 1995 achieved certification under the International Standards Organisation ISO 9001 code.

The company maintains rigorous standards of quality control in all areas of operation. Furthermore, ACNielsen is routinely and regularly subjected to **independent external auditing** of all aspects of its survey operations.

ISO 9001

In terms of this project, all processes involved are covered by our ISO 9001 procedures.

Code of Ethics

All research conducted by ACNielsen conforms with the Code of Professional Behaviour of the Market Research Society of New Zealand

Appendix II – Margins Of Error

Precision in general

Because we have only taken a sample of New Zealand adults, any results represented for this population will have a margin of error.

Weighting has to be taken into account when considering margins of error. Results here are weighted to correct for the probability of selection and sample imbalances (e.g. age, gender, ethnicity) as described in detail in the Technical Report. Such weighting typically results in margins of error distinctly larger than those for a simple random sample of the same size.

Indicative margins of error

The indicative margins of error provided below are those that would apply for a simple random sample of the “effective sample size” shown. As described in the weighting section of the Technical Report, the effective sample size (for the full sample) is approximately half the actual (unweighted) sample size. This does not take sample stratification or weighting non-linearities into account, but these are not expected to have had a major effect.

For the rim-weighting procedure used, more precise margin of error calculations would be time-consuming and hence expensive; incurring these extra costs was not seen as worthwhile given that the focus of the study is on segmentation rather than, for example, prevalence estimates.

Continued on next page

Appendix II – Margins Of Error, continued

Table 21: Indicative margins of error

	Don't & Won't	Don't But Might	Do Now	Full sample
Actual sample size	455	3227	4195	8163
Effective sample size (approx.)	228	1614	2098	4082
Estimate in report				
50%	6.5%	2.4%	2.1%	1.5%
40% or 60%	6.4%	2.4%	2.1%	1.5%
30% or 70%	6.0%	2.2%	2.0%	1.4%
20% or 80%	5.2%	2.0%	1.7%	1.2%
10% or 90%	3.9%	1.5%	1.3%	0.9%
5% or 95%	2.8%	1.1%	0.9%	0.7%

Note: 95% confidence level used.

Appendix III – Path Modelling

The purpose of the structural equation modelling was agreed as identifying the main influences on behaviour, to which attention might be directed in developing promotional initiatives. The model is a replication of one constructed for the US study (Porter Novelli, 2002) which focuses on three mediating variables – extrinsic and intrinsic motivation, and self-efficacy. The US results emphasised the relative importance of intrinsic motivation compared to extrinsic and, along with other literature, the importance of self-efficacy. Verification of these influences and the items that contribute most to determining levels of motivation and self-efficacy were the major objective of the modelling, since these suggest behaviour change.

The modelling has been conducted using the average of questions E7 and E9 (the questionnaire is available online at www.cancernz.org.nz) as the dependent variable to represent fruit and vegetable consumption. These questions are not direct measures of behaviour but scales that gauge the usual number of fruit and vegetable servings consumed on a daily basis.

In contrast to the US study, the whole sample was used for the analysis rather than focusing on any limited range of fruit and vegetable intake. This is preferred because the influences to be selected as a basis for promotional guidelines must be shown to discriminate between all levels of consumption if we are to have confidence in their ability to have an impact on behaviour. Furthermore, the US approach resulted in a negative correlation between physical activity and fruit/vegetable intake that proved questionable rather than useful (as explained separately in the Technical Report for the New Zealand study; Sullivan et al., 2003, p.31).

A further difference with the US study is that the New Zealand survey did not collect specific information of likes and dislikes of individual products which were then aggregated into an overall variable demonstrating preferences. In the US study, this did have significant positive relationships with both self-efficacy and fruit and vegetable behaviours. The decision not to collect this data in New Zealand was taken for other reasons than this modelling (mainly concerns about questionnaire length). But it should be noted that two questions that address overall likes and dislikes for fruit and vegetables were replicated in the survey and these are included in the analysis as potential barriers to consumption.

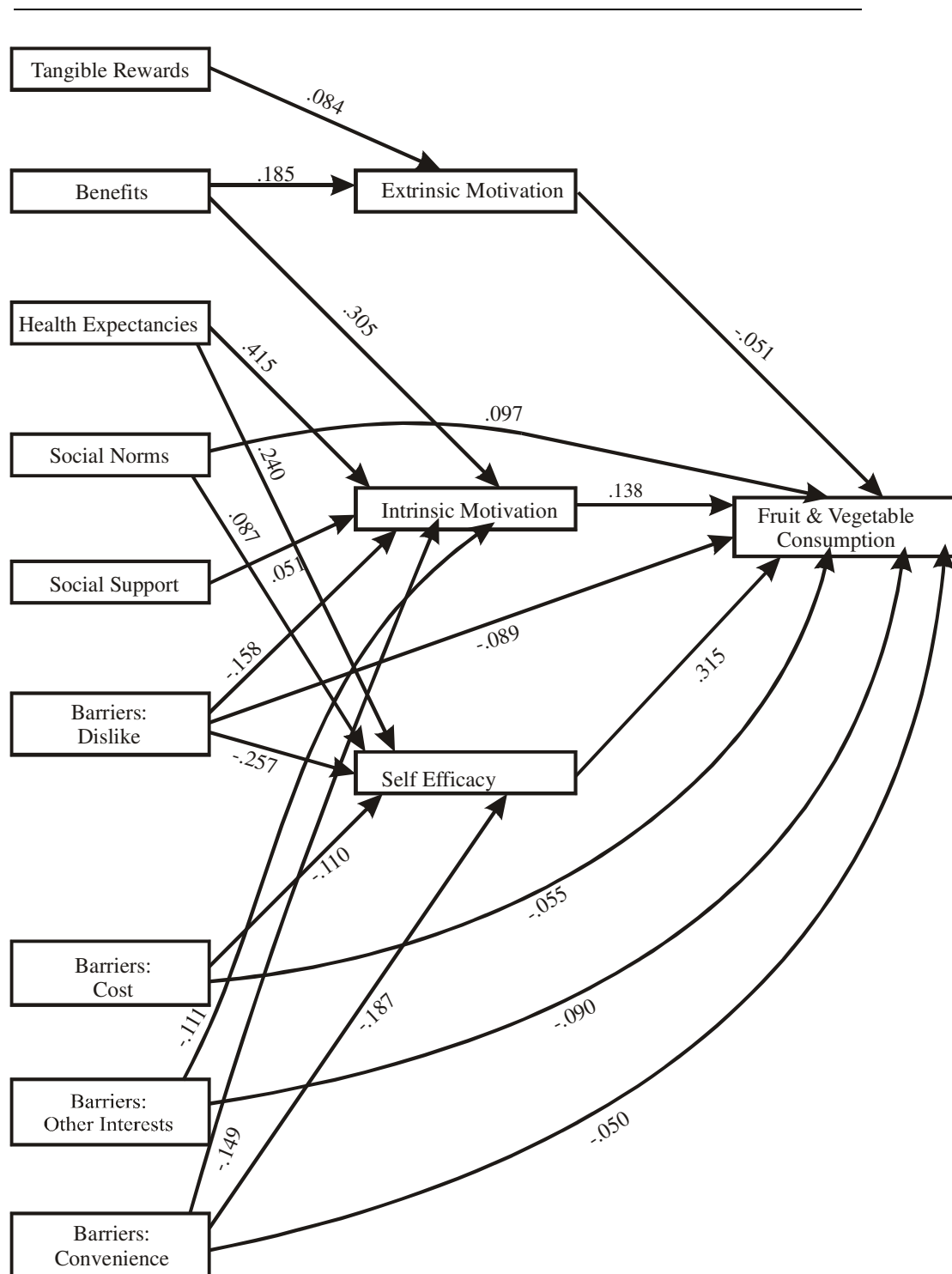
Continued on next page

Appendix III – Path Modelling, continued

A summary of the statistically significant relationships is given on the following diagram. The figures beside each path are standardised coefficients, which enable direct comparisons of the influence of each variable; i.e. a coefficient of 0.20 is twice as influential as a coefficient of 0.10. The coefficients with minus values describe inverse relationships that may reduce levels of fruit and vegetable consumption. The overall measures of “goodness of fit” for the model are within of the acceptable range for scientific research but they are not outstandingly good. In other words, the model is an adequate but not good representation of the data.

Continued on next page

Appendix III – Path Modelling, continued



Continued on next page

Appendix III – Path Modelling, continued

Eight variables are shown as directly impacting on the levels of fruit and vegetable consumption. The most important of these are the two mediating variables of self-efficacy (0.315) and intrinsic motivation (0.138). This is consistent with the analysis conducted on levels of physical activity for the other study sponsor (SPARC). This is reassuring, in that theoretically one would hope to identify similar influences as determinants of behaviours that contribute to achieving a healthy lifestyle. One variable included in the survey relating to access barriers (being able to obtain fruit and vegetables of the right variety and quality) is not reported in the diagram above because it had no significant relationship with any other item. In order of magnitude, the other variables that are shown as having a direct influence on fruit and vegetable consumption are:

1. Social Norms (.097). Social norms are designed to capture the influence of other peoples' behaviour on the respondent. The model also shows that they have an influence on intrinsic motivation with regard to fruit and vegetable consumption. Basically, a belief that others eat more fruit and vegetables is translated into a positive influence on the individual's own consumption. It is also possible that this relationship simply reflects the practical effects of shared meals and food provision within the household. That is, one of the three estimates making up the social norms variable is the respondent's estimate of the percent of the family members who eat five or more servings of fruit and vegetables a day. Shared meals including plenty of fruit and vegetables will naturally tend to result in the whole family having higher intake (other things being equal), and vice versa.
2. Barriers: Other interests (-.090). This variable represents competing food interests that people might hold e.g. for convenience or comfort foods. As expected it has a negative influence both on intrinsic motivation and directly on behaviour.
3. Barriers: Dislike (-.089). Dislike captures taste as a reason why the respondent may not eat fruit and vegetables (including the influence of their family not liking fruit or vegetables). It has a small negative influence on consumption but has the single largest influence on self-efficacy. This is entirely logical. It is clear that dislike of fruit and vegetables will have a major impact on a person's belief that they can modify their behaviour.

Continued on next page

Appendix III – Path Modelling, continued

4. Barriers: Costs (-.055). Costs are also linked to self-efficacy in an expected way. The smaller size of the coefficients (both directly to behaviour and to self-efficacy) compared to other barriers such as the other interests and dislike is important to note. Modifying perceptions regarding tastes or convenience should have a more significant effect on behaviour than controlling prices.
5. Extrinsic Motivation (-0.51). Extrinsic motivation captures the pressure to conform to others as an influence on behaviour. Theoretically it should be linked to social norms, social support as well as variables like tangible rewards. The negative relationship with behaviour is not logically consistent and is most probably the result of correlation with other items in the dataset. Extrinsic motivation does not have an important role in the overall model and the direction specified in this relationship should not impact on any strategic decisions taken on the basis of the survey results.
6. Barriers: Convenience (-.050). Relates to issues such as preparation and cooking time for fruit and vegetables as a perceived barrier to consumption. Like other barriers, the major role of convenience in the model is shown through its negative influence on self-efficacy and intrinsic motivation.

The most important of all the variables in the model is self-efficacy. This is the belief that you have some control over the behaviour, or in other words, a person feels empowered or confident to change behaviour. The major determinants of self-efficacy are Health Expectancies in raising it, and the barriers mentioned above in reducing it. The Health Expectancies refer to the beliefs regarding positive health benefits that will occur from fruit and vegetable consumption. Improving a person's understanding of positive health outcomes (e.g. reducing cancer risks) will result in increased self-efficacy.

Consistent with the US study (Porter Novelli, 2002), intrinsic motivation is far more important than extrinsic motivation in determining levels of fruit and vegetable consumption. The important constructs that raise intrinsic motivation are concerned with health outcomes. Health Expectancies are closely related to Benefits which are outcomes like having energy, maintaining weight and feeling good about yourself. Factors that reduce levels of intrinsic motivation are the barriers that were measured in the survey as described above.

Continued on next page

Appendix III – Path Modelling, continued

Suggested Promotional Initiatives

The results from the structural equation modelling suggest two clear strategic directions to potentially raise levels of fruit and vegetable consumption.

The first, and possibly slightly less difficult, is to raise levels of intrinsic motivation through education regarding health expectancies and the perceived benefits of increasing intake. With regard to the latter, the overall survey data suggests that benefits such as “having fun” and “feeling good about yourself” are the most important aspects to which a campaign could be directed. This is important to recognise. Other benefits, such as maintaining weight, are not necessarily viewed as an end in themselves but rather as a means to an end. Maintaining weight may well help a person feel they are more attractive or feel good about themselves and the promotion should distinguish between the ends and the means by which they are achieved.

The second approach would be to attempt to negate the influence of some of the many barriers that are shown to be significant in reducing levels of intrinsic motivation and self-efficacy. Although it is possible to envisage promotions, or programmes, that might work effectively on some individual barriers, such as changing perceptions of individual foods through education about cooking methods and recipes, it seems obvious that many of the barriers are far more uncontrollable and less likely to respond to promotional campaigns than efforts to educate people regarding health expectancies and benefits. For example, the most important barrier with a direct effect on consumption was “other interests”. Preferences for convenience and comfort foods are not easily changed and they are supported by a wide array of other lifestyle factors. Positioning fruit and vegetables to meet these needs may, in some cases be possible, but persuading a person to reassign such priorities through impersonal promotional channels is a very difficult task.

Continued on next page

Appendix III – Path Modelling, continued

Path modelling details

Estimation used the asymptotically distribution-free method as implemented in AMOS version 4, with unweighted data.

Key Goodness of Fit Statistics for Model:

Fit Measure	Default model
Discrepancy	3433.203
Degrees of freedom	70
P	0.000
Number of parameters	50
Discrepancy / df	49.046
RMR	0.655
GFI	0.918
Adjusted GFI	0.859
Parsimony-adjusted GFI	0.535
Normed fit index	0.560
Relative fit index	0.340
Incremental fit index	0.565
Tucker-Lewis index	0.345
Comparative fit index	0.563
RMSEA	0.076
RMSEA lower bound	0.074
RMSEA upper bound	0.078
P for test of close fit	0.000

Measures Used

- a. Health expectancies: weighted average of questions A1n, A2b, A2d and A2f (weights from A3)
- b. Social norms: average of questions A5a, A5b and A5c
- c. Self efficacy: average of C1e and C1g
- d. Extrinsic motivation: average of E1e, E1f, E1h and E1j
- e. Intrinsic motivation: average of E1b, E1d, E1g, E1i and E1l
- f. Social support: average of E2a to E2h
- g. Benefits: weighted average E4a to E4h (weights from B6)
- h. Dislike barriers: average of E5o, E5p, E5q and E5r
- i. Other interests barriers: average of E5e and E5f
- j. Cost barriers: average of E5a, E5b, E5c and E5d
- k. Access barriers: average of E5i and E5j
- l. Convenience barriers: average of E5k, E5l and E5s
- m. Tangible benefits (interventions): average of E6a to E6j

Continued on next page

Appendix III – Path Modelling, continued

Reliability scores for measures in both physical activity and fruit and vegetable models

Physical Activity Variables	α	Fruit and Vegetable Variables	α
Health Expectancies	.82	Health Expectancies	.84
Social Norms	.73	Social Norms	.78
Self Efficacy	.59	Self Efficacy	.60
Extrinsic Motivation	.87	Extrinsic Motivation	.75
Intrinsic Motivation	.81	Intrinsic Motivation	.84
Social Support	.87	Social Support	.88
Benefits	.94	Benefits	.92
Tangible Rewards	.92	Tangible Rewards	.93
Other interest barriers	.76	Other interests	.74
Excuse barriers	.74	Access	.74
Time barriers	.74	Cost	.90
Environmental Availability	.87	Convenience	.83
Physical Comfort barriers	.85	Dislike	.85

Appendix IV – Derivation of major groups (Don't But Might, Do Now, Don't & Won't)

The numbers of respondents (unweighted) for the major groups, including the Don't But Might group shown in the body of the report are as in the table below.

Table 22: Base sample sizes (unweighted) for major groups

Group	Respondents
Do Now	4195
Don't But Might	3227
Don't & Won't	455
Missing values	286
Total	8163

The total of **8163** respondents comprises all those for whom adequate information is available (e.g. age, gender) for weighting up to Census totals.

The Do Now group is derived from the two key questions on fruit and vegetable intake (questions E7 and E9). The shaded rectangle within the table below shows those reporting that they eat both two or more servings of fruit and three or more servings of vegetables per day. The numbers within the shaded rectangle total **4195**.

Table 23: Derivation of the Do Now group

E7. On average, how many "servings" of fruit (fresh, frozen, canned or stewed) do you eat per day? Do not include fruit juice or dried fruit.

E9. On average, how many "servings" of vegetables (fresh, frozen, canned) do you eat per day? Do not include vegetable juices.

[Both questions were followed by boxes defining "servings", with examples].

Vegetable servings per day	I don't eat fruit	Fruit servings per day						Not answered	Total
		<1	1	2	3	4	5+		
I don't eat vegetables	12	15	3	2	0	0	1	1	34
Less than 1 serving	25	141	52	33	13	3	3	4	274
1 serving	18	228	353	243	80	23	16	16	977
2 servings	22	170	311	509	272	71	38	5	1398
3 servings	20	203	481	920	717	272	164	15	2792
4 servings	13	83	225	401	383	308	164	11	1588
5 or more servings	19	54	86	154	133	95	484	10	1035
Not answered	0	8	5	12	5	2	8	25	65
Total	129	902	1516	2274	1603	774	878	87	8163

Continued on next page

Appendix IV – Derivation of major groups (Don't But Might, Do Now, Don't & Won't), continued

It would then have been possible to simply describe the remainder (apart from the 127 missing values from those not answering both these questions) as failing to meet recommended intake levels. However, two further questions were used to split off a small group who indicated a lack of readiness to change with respect to both fruit and vegetable intake. These two questions were:

- E8. Do you consistently eat 2 or more "servings" of fruit a day?
- E10. Do you consistently eat 3 or more "servings" of vegetables a day?

The response option to these questions indicating the lowest stage of readiness to change was "No, and I do not intend to in the next six months". The Don't & Won't group comprises the **455** respondents who chose this response option for both these questions (in addition having indicated their failure to meet recommended intake levels on questions E7, E9).

A further 159 respondents failed to answer the stage of change questions (E8, E10), in addition to the 127 missing values mentioned earlier with respect to the intake questions (E7, E9). This results in a total of **286** missing values (159+127=286).

The Don't But Might group therefore comprises the remaining 3227 (=8163-4195-455-286) who:

- answered all four questions (E7, E8,E9,E10); and
 - indicated that their daily intake levels do not reach both the recommended levels (2 servings of fruit and 3 servings of vegetables) in questions E7, E9; and
 - indicated that they "might" change by choosing a response option above the very lowest in at least one of the stage of readiness to change questions (E8, E10).
-

Appendix V – References

Athar, N. & Taylor, G. 2000. Nutritional analysis of Bolero peas at different stages of processing and storage. Crop and Food Research Confidential Report No. 148. New Zealand Institute for Crop and Food Research Limited. April 2000.

Bandura, A. 1998. Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13, 623-649.

Center for Disease Control. 2003.
<http://www.cdc.gov/nccdphp/dnpa/bmi/calc-bmi.htm>. Accessed 27 May 2003.

Favell, D.J. 1998. A comparison of vitamin C content of fresh and frozen vegetables. *Food Chemistry* 62, 59-64.

Horwath, C.C. 1999. Applying the transtheoretical model to eating behaviour change: challenges and opportunities. *Nutrition Research Reviews*, 12, 281–317.

Ling, A.M.C. & Horwath, C. 2001. Perceived benefits and barriers of increased fruit and vegetable consumption: Validation of a decisional balance scale. *Journal of Nutrition Education*, 33, 257-265.

Maibach, E.W. & Cotton, D. 1995. Moving people to behaviour change: a staged social cognitive approach to message design. In Maibach, E., & Parrott, R.L. (Eds.). *Designing health messages: Approaches from communication theory and public health practice*. California: Sage Publications.

Ministry of Health, 2003. *A Snapshot of Health: Provisional results of the 2002/03 New Zealand Health Survey*. Wellington. Ministry of Health.

Ministry of Health 2003. Food and nutrition guidelines for healthy adults: A background paper. Wellington. Ministry of Health.

Porter Novelli. 2002. *NuPA Target Audience Report #1 (Women in Motion 40-54)*. Prepared for the American Cancer Society (Draft).

Continued on next page

Appendix V – References, continued

Russell, D., Parnell, W. & Wilson, N. 1999. *NZ food: NZ people. Key results of the 1997 National Nutrition Survey*. Wellington: Ministry of Health.

Sullivan, C., Oakden, J., Young, J., Butcher, H., & Lawson, R. 2003. Technical report (Obstacles to Action: A Study of New Zealanders' Physical Activity and Nutrition).
www.sparc.org.nz/news/290104_obstacles_to_action.php

WHO. 2003. *Diet, nutrition and the prevention of chronic diseases; Report of a joint WHO/FAO expert consultation*. Geneva: WHO Technical Report Series 916.
