# Horticulture Innovation Australia

# **Final Report**

## **Health Claims in Food Advertising**

**Civic Creative** 

Project Number: VG14035

#### VG14035

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## EXECUTIVE SUMMARY

When we started our investigation, we realised that 'advertising' (as per our original mandate) can be interpreted very broadly. The terminology we found more frequently used was expressed as an 'intervention', which could include all manner of communications including pamphlets, posters, public relations, sampling, events, school education programs and retail promotions. Even packaging can be a form of advertising, and indeed often it is a well-executed retail presence that has a significant bearing upon consumer purchase.

We rapidly realised that too narrow a lens would exclude many important reports as to the success or failure of different interventions.

So, in the interest of a more complete report, we opted to take a wider view.

We did this by reviewing the literature in three categories:

- 1. National diet programs
- 2. Regional and localised programs
- 3. Specific commodity programs

#### **National Diet Programs**

We didn't have the space to include every campaign, but reviewed ones from Australia, Canada, Denmark, the USA and the UK.

The results of these national diet campaigns is mixed. If they are reviewed in terms of the objective of altering eating behaviours so the broad population eats the recommended serves of fruit and vegetables, none, barring one, have achieved this.

Only the Danish '6 om Dagen' campaign seems to have attained this goal.

Alternatively, from a strictly vegetable demand point of view, many have achieved a moderate shift to an increased intake.

The UK 'Food Dudes' program is the other stand-out, in terms of its success in changing children's eating habits.

Both of these have been running for a long time and retained the same campaign branding.

They have become so pervasive they could be called a movement rather than a program. Indeed, Food Dudes has been judged to be so successful that it is now being adopted in other countries.

The lessons that are suggested by these results are:

- Short-term campaigns are not the solution. To change behaviours requires consistent and long-term campaigns.
- Advertising is only one component. These campaigns require a full range of activities and a substantial community commitment.



#### **Regionalised and Localised Programs**

Examples of a range of different programs were reviewed, from statewide to schools to supermarket interventions.

Most were successful in achieving some increase in fruit and vegetable intake. Some were more oriented towards awareness, and weren't so measurably successful with regard to changing behaviours.

Some common features stood out:

- Marketing services should be involved in the set up and naming of a program right from the outset;
- Success depends on engaging all stakeholders in the community, be they parents, children, schools, medical service practitioners, local government and nongovernment organisations;
- Continuity beats changing the program every couple of years;
- Specific goals help define targets and help provide direction to all stakeholders.

#### **Specific Commodity Programs**

We undertook an extensive review of commodity programs, both in Australia and overseas. We examined ABARES 2014 agricultural statistics, and were somewhat disappointed to find that 'vegetable production has increased steadily (less than 2% per annum), which is consistent with the Australian population growth of about 1.7% over the same period; implying that per capita consumption of vegetables has remained stagnant.

'Consumption of vegetables is estimated to be 162 kilograms per capita annually. However, there is still substantial room for growth with about 90% of Australians not consuming the recommended daily allowance of vegetables.'<sup>1</sup>

While we didn't cover every commodity program that has been undertaken, we covered a wide range. From an Australian vegetable perspective, there doesn't appear to be incontrovertible evidence of sustained success on a national basis. The results of the WA 'Fresh Potatoes' campaign have polarised opinions. Protagonists point to increased awareness and demand. Detractors question the benefits, both short and long-term.

Beyond potatoes, we needed to evaluate non-vegetable commodities, including avocados and mushrooms, to find Australian examples which endorsed specific commodity campaigns.

The American system of check-offs (levies) being applied to marketing, and the requirement to evaluate these every five years, has driven grower organisations to seek the services of agricultural economists. They have, in turn, applied the science of econometrics to the analysis of effectiveness. In many cases a Benefit-Cost ratio (BCR) was calculated with regard to the efficiency of these programs, and results were notably positive. There seems little doubt that, where the growers are motivated to fund marketing efforts over a sustained period, it has proved beneficial.

<sup>&</sup>lt;sup>1</sup> AusVeg and HAL: 'Australian vegetable industry Strategic Investment Plan 2012 – 2017'. 2012.



#### Conclusion

Our investigations have resulted in eight key learnings:

- 1. Advertising alone appears to be insufficient to change consumption;
- 2. More subtle and proactive strategies need to be introduced to facilitate sustainable change;
- 3. Visibility and prominence at the point of purchase is vital;
- 4. Schools and workplaces are key environments to showcase variety and choice;
- 5. Cost effective, convenient packaging including single serves encourages healthy snacking;
- 6. Positive role models can strongly influence consumer behaviour;
- 7. Children whose unhealthful food consumption is less entrenched present the greatest opportunity for dietary change to embrace vegetables;
- 8. A tool kit of strategies is required to counter the far-reaching influence of years of powerful unhealthful food marketing.

In addition it became clear to us that there are two ways of looking at vegetable marketing promotion: From top-down and bottom-up.

Top-down would include dietary/obesity programs, where the promotion of a better healthy lifestyle for health reasons is the broader context but includes higher vegetable intake as part of an overall package. Bottom-up is the promotion of vegetables by the industry to the greater community. Programs that effectively 'brand' certain foods fall into this category and include vegetables/fruits/fungi like potatoes, avocados or mushrooms.

While there are, no doubt, benefits are inherent in both approaches, the 'bottom-up' may not be practical for many growers, especially in the more niche markets (eg kale or snow peas).

These growers, and society as a whole, would benefit from the active promotion of the value of vegetables in totality in combating obesity and associated diseases.

Two international programs stood out as being extremely successful: the Danish '6 om dagen' and the English 'Food Dudes'. We would recommend further examination of these and consideration of application to the Australian industry and public.



# SECTION ONE: INTRODUCTION AND BACKGROUND

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### **1.1 Introduction**

We were briefed to assess health claims and health based messaging campaigns to determine whether there is evidence that these can have a positive and lasting impact on the consumption of healthful foods, specifically fresh fruit and vegetables (frequently referred to as FV).

Our investigations were undertaken over the nine-and-a-half week period commencing February 9 through to April 16.

Academia has invested thousands of man hours researching the subject from all manner of perspectives including health (obesity, diet, nutrition), industry (producer, industry bodies including HIA) and consumer (media consumption, competition, demography and psychographics). We have attempted to cover as wide a range as possible in the time allocated.

We focussed much of our effort on the three leading markets, United States, United Kingdom and Australia. Somewhat surprisingly, with so much academic analysis, methodology is frequently under question so content is thin while hypotheses are rife.

Australia is one of the most sophisticated in its activities, in its analytics and reporting.

We would like to thank the following for their kind input:

- Dr Harry Kaiser, the Gellert Family Professor of Applied Economics and management at Cornell University.
- Dr Christina Pollard, Food and Nutrition Policy Advisor, Research Associate, Department of Health WA, Curtin University
- Mr Richard Mulcahy, CEO AusVeg
- Mr Chris Rowley, Former Chair of the International Fruit and Vegetable Alliance and industry authority.
- o Mr David Chenu, GM Marketing, Horticulture Innovation Australia
- o Ms Robbie Davis, CEO Potatoes South Australia
- o Mr Greg Seymour, CEO Mushroom Growers Australia
- Mr Anthony De Pietro, CEO Premier Fruits
- o Mr Mike Brownlee, Independent Researcher
- Mr Will Gordon, Industry Services Manager, Horticulture Innovation Australia
- Mr Byron de Kock, Vegetable Program Implementation Manager, Horticulture Innovation Australia
- Mr Bradley Mills, Industry Services Manager, Horticulture Innovation Australia

Our investigation, although comprehensive, could never claim to be the definitive piece. At the time of our investigations we learnt of two significant new broad based interventions about to be launched in North America. In Canada, `About half your plate` is just going to market, and in the United States the Partnership of Healthier America has just announced its launch of FNV, a brand focussed on increasing consumption and sales of fruit and vegetables among teens and mothers.



Equally, the number of influences on what people eat that are recorded in ecological frameworks are testament to the complexity and difficulty for both sceptics and proponents to argue their respective cases ( see chart below from School of Public Health Minnesota, USA<sup>2</sup>)



An ecological framework depicting the multiple influences on what people eat.

Source: University of Minnesota (Story et al [2005])

<sup>&</sup>lt;sup>2</sup> Story M; Kaphingst KM; Robinson-O'Brien R; Glanz K. '*Creating Healthy Food and Eating Environments: Policy and Environmental Approaches*'. Annual Review of Public Health, 2008, 29: 253-72



There are a large number of initiatives that have been documented: from relatively simple interventions to broad based campaigns.

The literature of the efficacy of FV promotion doesn't necessarily differentiate as to what it defines as advertising. It could be a flier handed out as part of an intervention in a supermarket, it could be a poster, a website, a PR campaign or a teaching program within schools.

All of this has value, as much of it has been examined from an empirical perspective, and provides an insight into efficacy.

Accordingly, we have included as many of these studies as possible, in the interests of including as much as we could find in the time frame.

Moreover, the literature covers a wide range of interests, in terms of motivation for the studies undertaken.

This reflects the different interest groups and their motivations:

- 1. Growers: to improve the demand for their produce, with resultant increased purchases of their products and/or increases in prices.
- 2. Retailers: to increase the volumes of a high-margin segment of their food offering.
- 3. Department of Agriculture: Federal and State. To build a higher level of demand for agricultural products.
- 4. Departments of Health: Federal and State. To improve the health of the community by eating more fruit and vegetables as a daily habit. This is most frequently within the context of obesity programs.
- 5. Industry Boards eg Mushroom Growers Australia. To increase the demand for their members produce.
- 6. Non-Government Organisations eg. The Cancer Council. To improve the health of the community.

While these entities may have different motivations, they share a belief in the need for consumers to change their eating behaviour, and to persuade them to eat more fruit and vegetables.

We have grouped the analysis into four major sections:

- 1. National diet programs;
- 2. Regional/localised interventions;
- 3. Specific vegetable promotions;
- 4. General comments on the effectiveness of different strategies.



## SECTION TWO: NATIONAL DIET PROGRAMS



## 2.1 Introduction

At the time of writing, the following countries have run national campaigns to encourage the daily consumption of vegetables and fruit<sup>3</sup>:

- 1. Argentina: '5 al dia'
- 2. Australia: 'Go for 2&5'
- 3. Brazil: '5 ao dia'
- 4. Canada: 'Fruit and Veggies Mix it Up'
- 5. Chile: '5 al dia'
- 6. Denmark: '6 om dagen'
- 7. France: '10 Par Jour'
- 8. Germany: '5 am Tag'
- 9. Hungary: '3 x 3'
- 10. Italy: 'Frutta nelle Scuole'
- 11. Japan: '5 A Day'
- 12. Mexico: '5 x Dia'
- 13. Netherlands: '2 x 2'
- 14. New Zealand: '5+ a Day'
- 15. Norway: '5 m Dagen'
- 16. Peru: '5 al dia Peru'
- 17. Poland: '5 Porcji'
- 18. South Africa: '5 a Day for Better Health Trust'
- 19. Spain: '5 al Dia'
- 20. Sweden: '5 om Dan'
- 21. Switzerland: '5 am Tag'
- 22. United Kingdom: '5 A Day Just Eat More'
- 23. United States: 'Fruits & Veggies More Matters'
- 24. Uruguay: '5 Por Dia'
- 25. Venezuela: 'Cinco al Dia'

Wikipedia<sup>4</sup> attribute this movement to a recommendation by the World Health Organisation in 2003<sup>5</sup>, and published 'Fruit and Vegetables For Health' in 2004 following a conference in Kobe<sup>6</sup>.

Some countries had already instituted a campaign (Western Australian Fruit and Vegetable Campaign was initiated in 1990 and New Zealand's '5+ a Day' was founded in 1994), but it appears that the 2003/4 WHO/FAO initiative was the catalyst for global adoption.

The WHO document provides the following introduction to their joint initiative with the FAO:

<sup>6</sup>Fruit and vegetables are important components of a healthy diet, and their sufficient daily consumption could help prevent major diseases, such as cardiovascular diseases and certain cancers. Approximately 16.0 million (1.0%) disability adjusted life years

<sup>&</sup>lt;sup>3</sup> <u>http://www.5aday.co.nz/kids-zone/5plus-a-day-around-the-world.aspx</u>

<sup>&</sup>lt;sup>4</sup> <u>http://en.wikipedia.org/wiki/5\_A\_Day</u>

<sup>&</sup>lt;sup>5</sup> <u>http://www.who.int/dietphysicalactivity/publications/f&v\_promotion\_initiative\_report.pdf</u>

<sup>&</sup>lt;sup>6</sup> <u>http://www.who.int/dietphysicalactivity/fruit/en/</u>

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(DALYs, a measure of the potential life lost due to premature mortality and the years of productive life lost due to disability) and 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption.

'Moreover, insufficient intake of fruit and vegetables is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of ischaemic heart disease deaths and about 9% of stroke deaths globally.

'A recently published WHO/FAO report recommends a minimum of 400g of fruit and vegetables per day (excluding potatoes and other starchy tubers) for the prevention of chronic diseases such as heart disease, cancer, diabetes and obesity, as well as for the prevention and alleviation of several micronutrient deficiencies, especially in less developed countries.'<sup>7</sup>

In the Australian context:

'Diet is arguably the single most important behavioural risk factor that can be improved to have a significant impact on health. As the quality and quantity of foods and drinks consumed has a significant impact on the health and wellbeing of individuals, society and the environment, better nutrition has huge potential to improve individual and public health and decrease healthcare costs. Optimum nutrition is essential for the normal growth and physical and cognitive development of infants and children. In all Australians, nutrition contributes significantly to healthy weight, quality of life and wellbeing, resistance to infection, and protection against chronic disease and premature death.

'Suboptimal nutrition is associated with ill health. Many diet-related chronic diseases such as cardiovascular disease, type 2 diabetes and some forms of cancer are major causes of death and disability among Australians. More than one-third of all premature deaths in Australia are the result of chronic diseases that could have been prevented. Many of these are mediated by overweight and obesity. The prevalence of type 2 diabetes is increasing and is expected to become Australia's leading cause of disease burden by 2023. Cancer is Australia's leading broad cause of disease burden (19%), followed by CVD (16%). The most recent available estimate for the total cost of poor nutrition was more than \$5 billion per year, based on 1990 costings. Given that the cost of obesity alone was estimated to be \$8.283 billion per year in 2008, the current cost of poor nutrition in Australia is now likely to greatly exceed the 1990 estimates.'<sup>8</sup>

#### 2.1.1 WHO 2004 Report: 'Effectiveness of Interventions and Programmes Promoting Fruit and Vegetable Intake'

<sup>&</sup>lt;sup>7</sup> World Health Organisation; '*Fruit and Vegetable Promotion Initiative*': A Meeting Report, 25-27/08/2003. Introduction

<sup>&</sup>lt;sup>8</sup> National Health and Medical Research Council: *'Eat for Health. Australian Dietary Guidelines.'* Canberra, 2013



The initiating conference contained a large amount of evidence that is listed on the WHO website<sup>9</sup>, in particular a presentation into 'Effectiveness of Interventions and Programmes Promoting Fruit and Vegetable Intake'<sup>10 11</sup>.

In this, the authors noted:

'In some developed countries, including Australia, Nordic countries, the United Kingdom of Great Britain and Northern Ireland, and the United States of America, fruit and vegetable promotion initiatives ('5 a Day' type campaigns, or nutrition education and information approaches) have been established for several years.'

Appendix One lists further details of selected programs listed in the article.

The aim of this project was to 'summarise evidence of the effectiveness of fruit and vegetable promotion interventions and programs worldwide.' The primary outcome measured was the 'change in fruit and/or vegetable intake' and the secondary outcome measured was the change 'in rates of non-communicable diseases and risk factors'.

The study reviewed 3499 unduplicated records from the literature and contacts with experts. This was whittled down to 48 independent studies: 16 of the studies were of intake among children and 32 among adults.

#### 2.1.2 WHO Report: Results for Children's Studies

The reviewers were conservative in their conclusions, noting that **none** of the 16 studies among children 'showed a detrimental effect on fruit and vegetable consumption'.

However, of the 16 studies:

- a large majority (11 almost 70%) had statistically significant positive effects in terms of increasing the intake of fruit and vegetables.
- Of the remainder, 2 had no significant effect/no significant change, 2 had no difference at follow up and 1 show a significant increase in both the intervention group and the control group.
- The studies among primary school age children were all positive
- Only two of the four studies among older, secondary school age, children showed no
  effects of intervention.

The report noted that 'a multi-component, focused approach seems to be the most effective in increasing fruit and vegetable consumption in children', including:

- Specific fruit and vegetable messages ('not embedded in a "healthy eating' message, but with particular attention to fruit and vegetables;
- Hands-on skill-building ('as opposed to passive learning');
- Active provision of F&V at lunch
- Involvement of parents, teachers and peers

**Appendix Two** contains the detailed summaries of the results that were listed in the appendix of the WHO paper.

<sup>&</sup>lt;sup>9</sup> <u>http://www.who.int/dietphysicalactivity/fruit/en/</u>

<sup>&</sup>lt;sup>10</sup> <u>http://www.who.int/dietphysicalactivity/publications/f&v\_promotion\_effectiveness.pdf?ua=1</u>

<sup>&</sup>lt;sup>11</sup> Pomerleau J, Lock K, Knai C, Mckee M '*Effectiveness of Interventions and programmes promoting fruit and vegetable intake*' Background paper for the joint FAO/WHO Workshop on Fruit and Vegetables for Health, 1-3 September 2004, Kobe, Japan.



#### 2.1.3 WHO Report: Results for Adult Studies

The review of Adult programs concluded that 'most interventions led to an increase in intake compared to control groups'.

The studies were classified according to the respondents: general population of an area; worksites; health care settings; low income populations; churches and supermarkets or other retail settings.

General population	3 out of 4 positive
Worksites	7 significantly positive, 4 no significant effect
Health Care	8 significantly positive, 1 no significant effect
Low-income	All 5 positive
Churches	All 3 positive
Supermarkets	1 significantly positive, 1 no significant effect

#### 2.1.4 WHO Report: Conclusion

The WHO report conformed to strict quality standards.

The results clearly indicate that in most cases interventions led to an increase in consumption of fruit and vegetables.

It seems clear from these results that, where undertaken with a full program of support, campaigns to promote a responsible diet with the consumption of fruit and vegetables can be effective.

### 2.2 Australian 'Go for 2&5 Campaign' 2005 - 2008

*The Go for 2&5* social marketing campaign was originally developed by the Western Australian Department of Health in March 2002. It was later (2005) adopted by Commonwealth, state and territory health jurisdictions (with the exception of Victoria) as an approach to increase fruit and vegetable consumption. The campaign was a collaborative effort between government and the private sector.

In this section, while the emphasis is on the national campaign, it is sometimes not feasible to separate out the mention of the WA campaign. The latter is, however, covered in more detail in Section Three.

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The campaign included:

- Mass media advertising
- Website
- Public relations events
- Publications
- School and community
   activities



It's easy to find a way to get some extra fruit and vegies in your day.

The primary target market was the family's grocery buyer and meal preparer, especially with young children. The secondary target audience was listed as 'children aged 5-12 years and youth aged 13-17 years'.<sup>12</sup> Morgan includes as a secondary market those who act as influencers: for example, health professionals, growers, retailers, educators and government.<sup>13</sup>

#### 2.2.1 Effectiveness: Emily Morgan 2009

Morgan cites a number of articles to conclude that the Go for 2&5 was a very successful campaign: 'Evidence from Western Australia and Queensland shows that implementation of the campaign increases both awareness of the recommended servings of fruit and vegetables and actual consumption. It has been estimated that an investment of approximately \$1 million per year for up to three years of the campaign achieves average increases in consumption of fruit and vegetables of half to one serve per day across a state.<sup>114</sup>

Morgan continues: 'In Western Australia, fruit and vegetable consumption increased by 0.8 servings per person per day (0.2 servings of fruit and 0.6 servings of vegetables, or 75g) over the three year intervention period. The campaign was found to have the most profound impact on male low consumers of fruit and vegetables.<sup>15</sup>

'In Queensland, an evaluation completed halfway through Phase one of a four year campaign revealed an increase of 0.4 servings per person per day (0.1 servings of fruit and 0.3 servings of vegetables). It is anticipated that the results of this campaign will continue to improve as the campaign completes Phase one and progresses into Phase 2.<sup>16</sup>

#### 2.2.2 Effectiveness: Woolcott Research 2007

In 2007 the Department of Health and Ageing of the Australian Federal Government appointed Woolcott Research to undertake research into the effectiveness of the national Go for 2&5 campaign.

The campaign had only run from the end of April to July 2005.

<sup>&</sup>lt;sup>12</sup> Woolcott Research Pty Ltd, 'Evaluation of the National Go For 2&5 Campaign'. January 2007

<sup>&</sup>lt;sup>13</sup> Morgan E, 'Fruit and Vegetable Consumption and Waste in Australia'. Vic Health and Deakin University, 2009

<sup>&</sup>lt;sup>14</sup> Morgan references Miller M, Pollard C, Hendrie D, and Rowley C: *'The Case for Enhanced Investment in Go for 2&5 in South Australia'*, Adelaide: Department of Health and Primary Industries and Resources South Australia

<sup>&</sup>lt;sup>15</sup> Morgan references Pollard C, Miller M, Daly A, Crouchley K, O'Donoghue K, Lang A & Binns C: '*Increasing Fruit and Vegetable Consumption: Success of the Western Australian Go for 2&5f Campaign'* Public Health Nutrition, 11(3), 314-320

<sup>&</sup>lt;sup>16</sup> Morgan here cites Gellweiler, K: ' *Go for 2&5 Fruit and Vegetable Campaign Results – Phase 1*' Brisbane, Queensland Health, 2006



Woolcott undertook three separate national telephone surveys. The first was prior to the launch of the Go for 2&5 campaign, and provided a benchmark. The second was undertaken following the television campaign, but prior to the end of the total campaign. The third was undertaken at the end of the entire campaign.

In each case the telephone interviews were conducted among two target audiences: Parents of children aged 0-17 years; and children aged 9-12 years.

#### Parents: Vegetables

The results can be summarised as follows:

• While stated levels of vegetable consumption were higher than that of fruit consumption, a relatively low proportion (approximately 10%) indicated that they consumed the recommended number of serves of vegetables a day. A quarter were only eating one serve of vegetables a day, with similar proportions eating two serves and three serves.

	Baseline N=1200	Follow up 1 N=591	Follow up 2 N=1001
	%	%	%
Less than one serve per day	1	1	2
One serve per day	23	27	16 a
Two serves per day◆	27	26	24
Three serves per day◆	24	23	25
Four serves per day◆	15	12	19 a
Five or more serves per day◆ Nett	10	8	12
Mean Serves of vegetables per day	2.6	2.5	2.9 a
<ul> <li>Note: This includes the few respondents who indicat a Significant difference over baseline study</li> </ul>	ted half a serving short o	f the servings mentioned	

#### Table 2.2A Individual Vegetable Consumption: Woolcott Research 2007

- Following the campaign, there was a significant decrease in the percentage of respondents claiming to consume one serve of vegetables a day and a significant increase in those claiming to consume four serves a day.
- This was reflected in perceived amount of vegetable consumption required to maintain good health, as in Table 2.2B below

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	Baseline N=1200	Follow up 2 N=1001
	%	%
One serve per day	9	6 a
Two serves per day	22	19
Three serves per day	25	22
Four serves per day	18	16
Five or more serves Nett	24	32
Five serves per day	19	28 a
Six or more serves per day	5	4
Other	0	0
Don't know	2	2
This question not included in Follow up 1 'a' Means significant difference over baseline study		

## Table 2.2B Perceived Amount of Vegetable Consumption Required to Maintain GoodHealth: Woolcott Research 2007

• The predominant influence on parents' decisions to try to increase vegetable consumption was a desire for better health, as per Table 2.2C below.

# Table 2.2C Major Influences in the Decision to Increase Vegetable Consumption:Woolcott Research 2007

	Baseline N=331	Follow up 2 N=266
	%	%
Health related reasons	76	80
Advertising	8	13 a
To influence others/family/ encourage children	6	6
It's common knowledge/ I just know you should eat a lot of veggies	4	4
Availability	4	0
Advice from others	4	6
Base: Respondents who increased family vegetable consumption		

• When asked whether they had 'seen, read or heard any advertising campaigns about food and health or physical activity in the last few months', 59% in the Baseline survey said they had. This rose to 66% at the end of the campaign.



- This was higher for Western Australian respondents. Probably due to the running of the Go for 2&5 campaign in that state for a number of years prior, as well as a 'Find 30' physical activity campaign recently.
- In terms of what they recalled, the table below shows definite attribution to the 'Go for 2&5' campaign elements, and the effectiveness of television advertising.

Table	2.2D Major Unp	rompted Description	of Food/health/Physical	<b>Activity Campaigns</b>
Seen,	Read or Heard	(Parents): Woolcott F	Research 2007	

	Baseline N=710	Follow up 2 N=661
	%	%
Messages from national 'Go for 2&5' campaign(Nett)	17	38 a
'Go for 2&5' TVCs Nett	2	16 a
'Go for 2&5' press/magazines Nett	4	6 a
'Go for 2&5' cinema Nett	0	1
Healthy eating Nett	20	16 a
Be more active Nett	21	16 a
Physical activity campaigns Nett	25	16 a
Overweight and obesity Nett	14	7 a
Food and beverage company advertising Nett	6	5 a
Other health related campaigns Nett	1	2
Messages from weight loss companies Nett	4	2 a
Specific types of fruit Nett	1	1
Pasa: Pospandants who increased family vegetable consumption		
'a' Significant difference		

- In terms of prompted recall, the study found significant increases in awareness, especially immediately following the television campaign. Even in the baseline campaign, 21% of parents indicated that they had seen the TV commercial. This was attributed primarily to the WA campaign having run for some years plus some false association to other similar health campaigns in other states. However, there was a substantial jump to 70% in the study immediately after the flighting of the TV campaign, which dropped back to 63% at the end of the campaign (indicating the fall off in TV awareness).
- 29% of parents who claimed to have seen the 'Go for 2&5' campaign in the Baseline study believed that the campaign prompted them to take action. This increased to 44% in the first follow up study, which dropped off insignificantly to 42% at the end of the campaign.
- The most common action claimed to have been taken was to increase the amount of fruit and vegetables they ate and to buy more fruit and vegetables when shopping



#### **Children: Vegetables**

- The authors noted that there was no overall change over the campaign in the number of days when vegetables were consumed. (This doesn't address the amount of vegetables each day, however.)
- The sample of children aged 9-12 'clearly understood that eating fruit and vegetables is important'.
- Boys were less likely to rate it as very important.
- Very few of both genders suggested that the right number of serves of vegetables for good health was five or more (16%) at the Baseline study, but this increased significantly to 33% by the end of the campaign.
- Western Australian respondents, as with adults, were more likely to indicate that 5 or more serves per day are required for good health eating.

## Table 2.2E Prompted Recall of Go for 2&5 Advertising Campaign – Kids: Woolcott Research 2007

	Baseline N=300 %	Follow up 1 N=96 %	Follow up 2 N=250 %
Aware of advertising	24	89 a	83
Not aware of advertising	74	11 a	16
Don't Know	2	-	1
${}^{\hat{\theta}}a'$ Indicates significant difference over baseline study			

• In terms of action resulting from the campaign, there was a significant increase in the claim of eating more fruit and vegetables: from 24% at Baseline to 57% in the Follow up 1 study, dropping down to 49% at the end of the campaign a couple of months later.

#### Conclusions

Here is the report's conclusion verbatim:

'The Go for 2&5® campaign has been successful in generating awareness, both amongst parents of 0 to 17 year olds, and 9 to 12 year old children. It has also increased knowledge – particularly in the area of the recommended consumption level of vegetables.

'Encouragingly, these improvements translated through to a significant decrease in low level vegetable consumption (one serve) and a corresponding increase in mid level consumption (four serves) amongst parents. However, these changes did not result in a significant increase in the proportion of parents who ate the recommended five or more serves of vegetables per day between surveys. As such, the base of awareness and knowledge that has been built by the national campaign (on top of an already successful campaign in Western Australia) may prove fruitful in generating behavioural change on a national level in the longer term.'

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- 1. So, there was a measurable increase in vegetable consumption that was attributed to the campaign.
- 2. From a health point of view, a longer-term, consistent campaign would be required to achieve the kind of results experienced in the WA campaign.

# 2.2.3 HAL Submission to The House Standing Committee on Health and Ageing 2008<sup>17</sup>

The submission provided context and acknowledged the WHO Fruit and Vegetable Promotion Initiative. It stated: 'At an Australian Government level the National Public Health Partnership's Strategic Intergovernmental Nutrition Alliance (SIGNAL) developed both Eat Well Australia (EWA) and the National Aboriginal and Torres Strait Island Nutrition Strategy and Action Plan (NATSINSAP). Both these strategies were endorsed by the Australian Health Ministers Council on 1 August 2001, where increasing fruit and vegetable promotion was identified as a priority initiative.'

The submission noted that a number of steps were undertaken, including the aim 'to increase fruit and vegetable consumption by at least one serve per person over a five-year period using the Go for 2&5® campaign as a basis for building a national approach to the issue.'

SIGNAL, through the National Public Health Partnership, provided funding for the Increasing Fruit and Vegetable Consumption Project: 'The project, led by the Western Australian Department of Health was directed at developing a national approach to increasing fruit and vegetable consumption through the extension of the Go for 2&5® campaign.'

The Western Australian Department of Health subsequently licensed the campaign to the Australian Government, State and Territory Health Departments. It also established a licensing agreement with Horticulture Australia Limited to enable private sector organisations to participate in the campaign in a uniform manner 'that promoted a collaborative, coordinated and cooperative approach towards increasing fruit and vegetable consumption in Australia.'

The submission notes that 'The national Go for 2&5® campaign was launched by the Australian Government on 28 April 2005. The campaign message was reinforced by activities undertaken by other State and Territory Governments (with the exception of Victoria which has undertaken complementary activities under its "Go for Your Life" banner).'

The submission notes that the Go for 2&5 is a 'highly effective social marketing campaign. Every evaluation that has been conducted has shown high levels of visibility; increased levels of awareness of the health message and increased intention to change dietary behaviour. In short consumers are not only hearing the eat fruit and vegetables message, but are actively following up this message and taking appropriate action.'

<sup>&</sup>lt;sup>17</sup> Chris Rowley 'HAL Submission to The House Standing Committee on Health and Ageing – Inquiry into Obesity in Australia' 2008



It summarised the Woolcott research (summarised above), and the need for a longer-term, consistent campaign.

It also noted: 'HAL's own research<sup>18</sup> conducted over the period of the Australian Government campaign reinforced the fact that the campaign was able to positively impact on demand. The HAL study found the campaign had increased consumption by 11,602 tonnes nationally (.136 serves per capita per day over the duration of the campaign) over the nine week period of the advertising campaign, generating \$52.9 million in retail sales.'

The submission noted that the positive improvement was across all product categories assessed, including shelf stable, snacks, canned and frozen product, as well as fresh. So there was no evidence of one cannibalising another.

The submission went on to reference the evaluation of the initial four-week phase of the Queensland government campaign 'that immediately followed the Australian government campaign'. 'The Queensland result highlighted an increased consumption of .261 serve per capita per day over four weeks of the campaign, equating to \$9.4 million in increased retail sales.'

The submission also referenced Pollard et al [2007], quoting from that article as follows: 'There was a population of net increase of 0.8 in the mean number of servings of fruit and vegetables per day over three years (0.2 for fruit (1.6 in 2002 to 1.8 in 2005) and 0.6 for vegetables (2.6 in 2002 to 3.2 in 2005)...'

#### Conclusion of the Submission

'The Go for 2&5® campaign provides a unique opportunity to address this serious issue. It is a campaign that was built by government in line with national nutrition policy. Its approach is simple and to the point and its health messages are supported by science. The national campaign framework provides the opportunity to forge strong partnerships between the government and private sector and for both to work cooperatively to deliver health messages that can make a real difference.'

#### 2.2.4 Rekhy and McConchie: Have they delivered on the goals?

Rekhy and McConchie<sup>19</sup> examined a number of interventions promoting consumption of vegetables. Their review included the Go for 2&5 campaign. While recognising that the Go for 2&5 campaign did result in increased consumption of fruit and vegetables, their comment regarding the forces bringing the campaign to an end reveal the difficulties in pursuing such a broad-based initiative:

'The national "Go for 2&5" campaign supported by the Commonwealth Government of Australia ended in 2007 due to withdrawal of federal government funding and subsequent exit of HAL from the coordinating role. It continued in some states in subsequent years, supported

<sup>&</sup>lt;sup>18</sup> 'Building a national approach to fruit and vegetable consumption.' Horticulture Australia Limited. November 2006

<sup>&</sup>lt;sup>19</sup> Rekhy R and McConchie R: '*Promoting consumption of fruit and vegetables for better health. Have campaigns delivered on the goals?*' Appetite 79 (2014) pp. 113-123



by the respective state departments of health and the not-for-profit organisations with an interest in public health; however, it was not backed by support from the fruit and vegetable industry. Lack of industry participation is purported to be attributed to the highly fragmented nature of the fruit and vegetable sector; the non-existence of a vegetable marketing levy to support a generic promotion campaign; licensing issues related to the use of "Go for 2&5" brand; the health driven focus as opposed to a consumption driven initiative; and insufficient involvement of the retail sector (a significant stakeholder in the value chain) in the programme. State government health sector resource allocations and priorities also changed over time and as a result new programmes were rolled out at national and state levels. Given that only 5.6% of Australian adults met the daily recommended intake for fruit and vegetable consumption in 2011-2012, the campaign has fallen short of its targeted goal.<sup>20</sup>

#### 2.2.5 'Go for 2&5' Campaign: Conclusions

The overwhelming evidence shows that the 'Go for 2&5' campaign was effective in increasing the consumption of vegetables (and fruit), both on a regional and national level. This impact on consumer behaviour has been described as 'modest'<sup>21</sup>, but the increase has not, to our knowledge, been disputed.

### 2.3 Australia 'Measure Up' Campaign 2008-2010

In 2008 the Australian Government launched a mass-media campaign called 'Measure-Up' to focus on obesity and associated risks of lifestyle related chronic disease. The campaign was evaluated by King et al (2013)<sup>22</sup> in relation to the response in New South Wales.

The introduction references Colagiuri et al (2010)<sup>23</sup> that the cost of obesity and overweightness has been estimated at \$21 billion annually.

The authors stated: 'In 2008, the Australian Government launched the first nation-wide massmedia campaign aimed at reducing the prevalence and impact of chronic disease by raising awareness of the relationship between waist measurement, physical activity, healthy eating and obesity risk among adults. This 'Measure-Up' campaign (<u>www.measureup.gov.au</u>) represented a considerable investment (approximately \$AUD30 million over a 4-year period) from both national and state Governments.'

The campaign used television, magazines and radio advertisements to communicate its messages.

<sup>&</sup>lt;sup>20</sup> Rekhy and McConchie [2014] p. 114

<sup>&</sup>lt;sup>21</sup> Rekhy and McConchie [2014] p. 114

<sup>&</sup>lt;sup>22</sup> King EL, Grunseit AC, O'Hara BJ and Bauman AE: *'Evaluating the effectiveness of an Australian obesity mass-media campaign: how did the 'Measure-Up' campaign measure up in New South Wales'.* Health Education Research, 2013 pp. 1-11

<sup>&</sup>lt;sup>23</sup> Colagiuri S, Lee CM, Colagiuri R, Magliano D, Shaw JE, Zimmet PZ and Caterson ID: *'The cost of overweight and obesity in Australia'*. Med J Aust 2010; 192 pp 260-4.

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They aimed to evaluate:

- Whether the campaign achieved sufficient reach of the main messages
- Whether it increased knowledge of the link between waist size and chronic diseases
- Did it result in respondents' "increased confidence" to make changes to their diet and physical activity

From a vegetable consumption point of view, there is mention within one of the two television commercials of the steps that should be taken: 30 minutes or more exercise a day/ 2 serves of fruit and 5 of vegetables a day.

The results, from a vegetable awareness perspective, were not good. Knowledge of the recommended 5 serves of vegetables increased from 26.6% to 29.6%, which was statistically significant. But the mean rating of the importance of eating 5 serves of vegetables only rose from 7.9 prior to the campaign to 8.0 post campaign. And the mean score of being confident about increasing vegetable consumption in the future stayed the same at a low 2.0.

The authors acknowledge this: 'there were no notable changes seen in self-reported physical activity or healthy nutrition behaviours, or in confidence that these could change. This is a limitation: the campaign created a waist-awareness climate, but did not, by itself, influence antecedent obesogenic behaviours, at least not in the short term.'

**Conclusion:** Bundling up a number of messages in one communication leads to poor conveyance of the minor messages. In this case people remembered the major creative message of waistline, but did not take on board the need to eat more vegetables. This demonstrates the preference for simpler approaches such as the 'Go for 2&5' campaign in terms of vegetable consumption.

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# 2.4 Australian 'Swap It, Don't Stop It' Campaign 2011- 2013

The 'Swap It, Don't Stop It' campaign was launched by the Federal Government in March 2011 and ended on 31 March 2013 with a promised \$30.5 million in funding.

It followed the 'Measure Up' campaign, and was an attempt to provide small and simple steps towards a healthier lifestyle.

It was positioned as 'a new phase of [the Australian Government's] Measure Up campaign to show Australians how they can take steps to help reduce their waist measurement and improve overall health and wellbeing.'<sup>24</sup>



'The first phase of the **Measure Up** campaign was successful in explaining **why** Australians need to keep their waist measurement in check. It has now evolved into a new campaign designed to show Australians **how**.'

Unfortunately, it was deemed necessary to have a new name and campaign visual device that was completely different to the Measure Up campaign...losing all the work that had been done to build Measure Up.

The question that should be asked is why couldn't the Measure Up campaign be extended into 'How To Measure Up', adding continuity and consistency, rather than starting again from scratch.

Commentators on the campaign were critical. The Sydney Morning Herald ran an article, which noted: 'A taxpayer-funded national obesity campaign, *Swap It, Don't Stop It*, has had a minimal impact in preventing obesity, a new evaluation has shown.'<sup>25</sup>

In commenting on the SMH article, advertising news and commentary site, Mumbrella: 'This is not the first time the Swap It campaign has been criticised in the Sunday papers. The Sunday Telegraph ran a story in November last year that suggested the campaign was a waste of tax-payer money and should be scrapped.'<sup>26</sup>

More comprehensive findings are listed below:

<sup>&</sup>lt;sup>24</sup> Australian Government: 'Factsheet about the Swap It, Don't Stop It Campaign', March 2011

<sup>&</sup>lt;sup>25</sup> Whyte S: 'Obesity campaign results on the thin side', Sydney Morning Herald, 12 August 2012

<sup>&</sup>lt;sup>26</sup> <u>http://mumbrella.com.au/government-anti-obesity-campaign-less-effective-than-expected-109104</u> 13 Aug 2012

#### Table 4.6

# Key findings from the waves 5 and 6 evaluation report of the Swap It, Don't Stop It campaign

Response:	Wave 1 (baseline)	Wave 5	Wave 6	
Recall of advertising about lifestyle, healthy weight and chronic disease	72%	67%*	65%*	
Spontaneous recall of the 'Swap It' campaign	-	16%	19%	
Spontaneous message recall 'swaps framework'	-	88%	91%	
Taken at least one action because of the campaign	-	32%	36%	
This campaign makes me more likely to try to improve my health	-	65%	65%	
Attempted to decrease fast or snack food consumption in the last six months	44%	42%	48%	
Agreement with statements regarding behaviours of importance i	n preventing cl	nronic disea	ise	
Maintaining a healthy weight	85%	85%	83%	
Doing 30 minutes of physical activity per day	81%	78%*	77%*	
Eating five serves of vegetables every day	68%	67%	62%*	
Maintaining a waist measurement of no more than 80cm (female) or 94cm (male)	55%	57%	59%	
Agreement with statements about health, lifestyle and chronic disease				
I am going to change my lifestyle to become healthier	70%	74%	75%	
Making small changes to what you eat or how physically active you are will decrease your risk of chronic disease	-	94%	94%	

Note: \* Data are statistically different from the baseline recorded in October 2008.

Source: The Social Research Centre, ANPHA, Evaluation of the Swap It, Don't Stop It Social Marketing Campaign (Wave 6), February 2012. Available from <<u>http://www.anpha.gov.au/internet/anpha/publishing.nsf/Content/campaigns</u>>

The table above was included in the Auditor-General Audit Report on the Administration of Commonwealth Responsibilities Under the National Partnership Agreement on Preventative Health<sup>27</sup>.

The evaluation of the 2011 Autumn and Spring rounds of the Swap It, Don't Stop It campaign comprised two waves of post-campaign tracking surveys. The surveys comprised telephone interviews with national samples of adults aged 25-65 years old, residing in private houses.

<sup>&</sup>lt;sup>27</sup> Commonwealth of Australia: 'The Auditor-General Audit Report No. 12 2012-13 Performance Audit: Administration of Commonwealth Responsibilities under the National Partnership Agreement on Preventive Health'. 2012

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It should be noted that these are referenced as Waves 5 and 6. Waves 1-4 were undertaken during the Measure Up campaign. Wave 1 is the baseline. It is argued that 'some of the data' is comparable as the same company undertook the research for all the waves.

The figures notated with asterisks are those that are statistically different from the baseline responses

it is disappointing that a significantly lower percentage of respondents in Wave 6, compared to the baseline of Wave 1, felt that eating five serves of vegetables a day was important in preventing chronic disease.

In fact, all the significant differences are **declines** from the baseline level, illustrating the danger of changing campaigns too frequently.

**Conclusion:** Although the 'Swap It, Don't Stop It' campaign was seen as a progression from the 'Measure Up' campaign, it looked and sounded totally different. So, creatively it started from scratch. It would have been stronger to have retained the 'Measure Up' campaign and let continuity and consistency build its message. From a vegetable consumption perspective, not a good result, it would seem.

### 2.5 'Shape Up Australia' 2013 to present day

In February 2013 the Australian Government launched Shape Up Australia to follow on from the Swap It, Don't Stop It campaign. Like its predecessors, the Shape Up Australia campaign aimed to improve people's health and wellbeing,



The Shape Up campaign is described as a progression from the previous two campaigns. From a consumer's point of view, however, it is clear that each has distinct imagery and a different name. So, effectively, each one starts from scratch. In the context of the fact that

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advertising is cumulative, and builds its effect over time, changing campaigns in this fashion is not the best use of the funds available.

Like the Swap It campaign, here the emphasis is both on exercise and diet:



The campaign website is still active at the time of writing, and has this entry under the 'Tools' menu:

'The Shape Up app is designed to help you get healthy and stay healthy with easy to follow, tasty meal plans based on the Australian Dietary Guidelines. Simply download the app and set up a profile to access 12 weeks of daily meal plans and healthy recipes tailored to your needs. You can mix up your plan at any time, by swapping recipes this allows the app to recommend healthy alternatives and ensure you're still eating the right number of serves from the five food groups. The app can also coordinate your shopping list, keep track of your weight and how much physical activity you do each day.

The Shape Up app offers:

- A twelve week meal plan that allows you to swap meals around to meet your taste preferences;
- A daily meal plan tailored to the recommended intake of the five food groups for you;
- A shopping list;
- An activity tracker that helps you to monitor your levels of physical activity;
- A weight tracker to help you monitor your weight.

The Shape Up app will help you to eat for health and live today for tomorrow.'

#### **Conclusion:**

Emphasis appears to have moved away from the simpler message of 2&5 used previously, with a most likely concurrent reduced effect on demand for vegetables.

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### 2.3 Canada 5-TODAY Program 2003-4

The purpose of the 5-TODAY project was to promote the consumption of fruit and vegetables by school-aged children.

The effectiveness of this was evaluated in a master's thesis by Jennifer House in 2005.<sup>28</sup>

The 5-TODAY program ran in in grade five and six classes in a British Columbia pilot project. One simple message was chosen as the 5-TODAY target: increased fruit and vegetable consumption.

Objectives of the evaluation were:

- To determine the students' fruit and vegetable intake and measure changes in intake during the duration of the program;
- To measure changes in the students' knowledge, attitudes and perceptions regarding fruit and vegetables during the duration of the 5-TODAY program;
- To identify way in which teachers who implement the 5-TODAY program believe it can be improved.

The evaluation involved analysing 10 Vancouver schools, divided into three intervention levels:

- Liaison schools provided with an external expert facilitator and resources
- · Champion schools with a 'champion' from within the school and resources
- Usual Practice schools to serve as a control group

The evaluation of the pilot program concluded that it was not successful in increasing fruit and vegetable consumption. This was due to the inability of the schools to implement the program in a consistent fashion with enough resources. It was also due to the fact that the intervention was limited to the classroom environment, and failed to include the home environment.

The report noted that nutrition programs should target the school environment, and include parents and communities.

#### Conclusion

By this analysis, the 5-TODAY program is judged to be unsuccessful in that it lacked continuity and inclusivity (with all community stakeholders) to be effective.

<sup>&</sup>lt;sup>28</sup> House J: 'Effectiveness of the 5-TODAY Program at Increasing Fruit and Vegetable Consumption in Grade Five and Six Children' Thesis submitted for Master of Science degree at The University of British Columbia, April 2005

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# 2.4 Canada Half Your Plate Campaign 2015 to present

The most recent national initiative in Canada, the Half Your Plate campaign was rolled out in January 2015 after a successful social media launch mid-2014 by the Canadian Produce Marketing Association.

The initiative encourages Canadians to eat more fruit and vegetables through simple, practical steps.

The wider launch was expressed by the hosting of four events – Vancouver, Toronto, Montreal and Twitter Party – to introduce Canadians more broadly to Half Your Plate.

The campaign includes major retailers – WalMart came on board mid-2014 – as well as the Canadian Cancer Society, the Canadian Public Health Association and the Heart and Stroke Foundation

As a background, a recent study showed:



- While Canada's Food Guide recommends that adult females consume 7-8 servings and adult males 8-10, Canadian females are only eating 4.3 servings and male only 3.5 servings.
- More than one quarter of Canadians don't believe they have enough time to prepare fresh produce to eat. This prevents them from consuming more.

The Half Your Plate program is a simple approach to these problems with a practical way to ensure that you meet your daily requirements.

We contacted Vanessa Sherry, Communications Manager at the CPMA regarding the background to this program. She responded that the research and data that they collect is specifically for their members, so she couldn't, unfortunately, share them with us.

Vanessa noted that the campaign is still in its infancy, but said: 'I will keep in touch with any successes we have!'



### 2.5 UK Food Dudes 1992-Present

The Food Dudes program was developed by the Bangor Food and Activity Research Unit (BFARU) at the School of Psychology, Bangor University, in 1992.

The program was 'designed to investigate children's food preferences and establish a method of helping children to like eating fruit and vegetables.



'In early research, children between the ages of 2-7 years took part in studies conducted in homes, schools and nursery settings, in the course of which the distinctive Food Dudes approach was developed. It was found to be extremely effective at boosting children's consumption of fruit and vegetables with long-lasting effects.

'Following these initial successes, the BFARU went on to develop a stand-alone package to enable primary schools themselves to implement the programme across the full age range of school pupils, from 4-11 years old.'<sup>29</sup>

The National Social Marketing Centre (NSMC) in the UK have published a ShowCase of the success of the Food Dudes program. 'It has been shown to be consistently effective at changing the eating habits of 4- to 11-year-olds.'<sup>30</sup>

The NSMC describe three elements:

- `DVD adventures featuring hero figures, `Food Dudes', who like fruit/vegetables and provide social models for children to imitate;
- Small rewards to ensure children begin to taste new foods;
- Repeated tasting of fruit and vegetables so that children develop a liking for these foods'.



The program isn't reserved for school involvement. 'Food Dudes letters and homepacks provide ongoing home support to ensure the behaviour change transfers from school to family and is maintained over time.<sup>31</sup>

<sup>29</sup> http://www.fooddudes.co.uk/about-us.aspx

<sup>&</sup>lt;sup>30</sup> National Social Marketing Centre: 'ShowCase Food Dudes' [2011] <u>http://www.thensmc.com/sites/default/files/Food%20Dudes%20FULL%20case%20study.pdf</u>

<sup>&</sup>lt;sup>31</sup> National Social Marketing Centre: 'ShowCase Food Dudes' [2011]

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The Bangor team noted that a lot of poor eating habits are established at an early age. Changing them at this stage makes it more likely that they will take a better diet into adulthood.

Key insights were:

- Children are motivated by positive recognition, praise and rewards.
- They relate to positive role models, especially if the role models are part of a group, are older and if there is a clear reward or benefit in emulating the role models.
- Language is important as it can lock in behaviours, and can be used in a positive manner so that children re-categorise themselves as fruit and vegetable likers.

Based on academic research, a small pilot intervention program was implemented. Initially with a small group of fussy eaters in home, it was expanded to include nursery and primary schools.

The pilot included DVD adventures featuring the Food Dudes as positive role models. These were slightly older children who gain superpowers from eating fruit and vegetables and combat the evils of junk food. They save the 'Life Force' from the 'Junk Punks', who are plotting to take away the world's energy by depriving it of fruit and vegetables.

The program adopted the philosophy of the 3 Rs:



All studies confirmed that the program was extremely successful:

- In the home-based study, children's consumption of fruit rose from 4% to 100%, and vegetables from 1% to 83%;
- After six months, the figures were still 100% for fruit and at 58% for vegetables;
- In primary schools the consumption of fruit by five to six year olds more than doubled from 28% to 59% over six months, while that of vegetables rose from 8% to 32%.

From the initial pilot program, the BFARU developed a standalone package for primary schools to implement the program themselves.

In 2005 the program was piloted over a two year period in Dublin. It was shortly after extended to 150 schools. In 2007 it was been adopted by the Irish Government and made available to every primary school in Ireland. In 2009 implementation began in England and also was trialling in Italy. It has since been taken up by California and Utah.

It has won a World Health Organisation best practice award (2006) and the Gold Medal at the Chief Medical Officer's Public Health Awards (2010).

**Conclusion:** Undoubtedly one of the most successful interventions for children, with consistent results across four countries.



### 2.6 UK 5 A DAY Program 2003

The 5 A DAY program was a local community initiative launched in 2003 aiming to encourage people in 66 program areas to eat at least five portions of fruit or vegetables a day.

The program was funded by the Big Lottery Fund, which provided £150,000 over two years to 66 Primary Care Trusts (PCTs). These worked across their local communities, addressing barriers to adoption and to contribute to four factors:

- Increasing consumption of fruit and vegetables;
- 2. Increasing awareness and knowledge;
- 3. Changing attitudes and beliefs;
- 4. Increasing access to fruit and vegetables.

The evaluation was undertaken by TNS Social research on behalf of The Big Lottery Fund's Evaluation & Research Team and was published in 2006.<sup>32</sup>



It was multi-faceted, involving four stages and collecting a combination of qualitative and quantitative data.

- 1. Pre-test survey
- 2. Process review
- 3. Case studies
- 4. Post-test survey

The evaluation 'suggests an overall increase in fruit and vegetable consumption', with improvements particularly evident amongst program area respondents who started from a lower base: males, younger people and those 'classified as living in areas of deprivation'.

However, the report was unable to reach definitive conclusions because of a lack of knowledge of whether respondents had exposure to specific activities, and whether the control group weren't exposed to widespread communications that could have affected them.

#### Conclusion

Considered to be a 'phenomenal' success by the British Dietetic Association in conveying the 5 a day message<sup>33</sup>.

The nature of the program – with 66 organisations defining their own activities - made it very difficult to evaluate statistically (especially since the control group might have been influenced by those activities).

The report conveyed a sense of achievement, without being able to define it, other than mentioned above.

<sup>&</sup>lt;sup>32</sup> Bremmer P, Dalziel D, Evans L: 'Evaluation of the 5 A DAY Programme: Final Report' TNS Social, April 2006

<sup>&</sup>lt;sup>33</sup> Cocoozza P: 'The five-a-day disaster: why the numbers don't add up' The Guardian, 15 May 2014
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# 2.7 UK School Fruit And Vegetable Scheme 2000-2008

The background is well summarised in the introduction to the first evaluation of the scheme undertaken in 2005<sup>34</sup>, which, for clarity, we have designated the Pilot Scheme.

'The Government's national '5 A DAY' programme forms part of the strategy to raise awareness of the health benefits of fruit and vegetable consumption, and to improve access to fruit and vegetables. One aspect of the '5 A DAY' programme is the School Fruit and Vegetable Scheme (SFVS)1, which provides a free piece of fruit or a vegetable to children aged four to six years, each school day.



'The scheme was originally piloted in more than 500 schools throughout England in 2000 and 2001, to examine the practicalities of the scheme before rolling it out nationally. It was expanded region by region with funding from the Big Lottery Fund. Since April 2004, the Department of Health has been funding the SFVS which is now operating throughout England, and will distribute around 440 million pieces of fruit and vegetables each year to over two million children in 18,000 schools.'

The Pilot Scheme evaluation was followed by two further studies, in 2007 and 2010, which will be referenced later.

## 2.7.1 Pilot Scheme Study Results

The initial Pilot Scheme study reviewed 55 participant schools and compared these to a comparison (control) group of 45 schools which didn't receive intervention. It took place in three phases: Phase 1 in March 2004, Phase 2 in June 2004 and Phase 3 in November 2004.

In terms of consumption of vegetables, the Pilot Scheme Study found:

- 'Mean consumption of vegetables was 1.60 portions. There was a significant difference between boys and girls in relation to vegetable consumption (although the difference was significant only at the ten per cent level). Children in Year 2 ate significantly fewer vegetables (1.46 portions) compared with children in Year 1 (1.68) or Reception (1.67).
- 'As at Phases 1 and 2, there was no difference in overall consumption of vegetables between the intervention and comparison groups.' However, the authors noted in their report of the baseline survey that children in the comparison group ate significantly more portions of vegetables at lunchtime. 'It seems that, when compared with the North East, either standard school dinners in Yorks and Humber have a higher

<sup>&</sup>lt;sup>34</sup> Schagen S, Blenkinsop S, Schagen I, Scott E, Teeman D, White G, Ransley J, Cade J, Greenwood D: *'Evaluation of The School Fruit and Vegetable Pilot Scheme: Final Report*' National Foundation for Educational Research and University of Leeds, June 2005



vegetable content, or staff there are more successful in encouraging children to eat vegetables.

- 'There was a significant difference between the intervention group (3.65) and the comparison group (3.26) in relation to total fruit and vegetable consumption, which reflects the impact of the SFVS on fruit consumption evident in Phase 3, although the difference was less than it was in Phase 2 (3.95 compared with 3.28). In Phase 3, pupils in the intervention group consumed more portions of fruit and vegetables at school than pupils in the comparison group (1.34 and 1.18 portions respectively). They also consumed more portions of fruit and vegetables at home than pupils in the comparison group (1.70 and 1.53 portions).
- It may be considered disappointing that the difference in consumption at school is relatively small (no bigger than the difference in consumption at home), given that the fruit and vegetables consumed at school include the SFVS fruit. However, there are two important points which need to be borne in mind. First, the average for the intervention group includes all of the children in the North East, and by the time of the Phase 3 survey, one third of them (those who had moved from Year 2 to Year 3) would no longer be receiving SFVS fruit. Second, at the time of the baseline survey, before the introduction of the SFVS, children in the comparison group were eating more fruit at school than children in the intervention group (Teeman et al., 2004a). There was a particularly large difference at morning break, and we hypothesised that some schools in Yorks and Humber were engaged in independent or local initiatives to promote fruit consumption, either by providing free fruit or by having a 'fruit only' breaktime policy.8 The fact that children in the North East are now eating more fruit and vegetables at school than those in Yorks and Humber therefore suggests a greater impact of the SFVS than a simple comparison of Phase 3 means might imply.
- 'In accordance with previous findings, consumption of fruit and vegetables decreased with age: children in Year 2 consumed significantly less fruit, juice and vegetables than children in Year 1 and Reception (3.12, 3.61 and 3.70 portions respectively), which reflects the differences in consumption of fruit and vegetables separately. The difference at Phase 3 is particularly large, due to the fact that the former Year 2 pupils were no longer involved in the SFVS.'

#### **Conclusions of Evaluation of Pilot Scheme**

The findings showed that the SFVS did significantly increase the consumption of fruit by children in the scheme, but did not have any wider impact on diet. Moreover, increased consumption was not sustained when children exited participation in the scheme.

However, the authors postulated that this disappointing result might be a function of time, and with more exposure, students might increase their consumption of fruit and vegetables.



## 2.7.2 Further Evaluation of the School Fruit and Vegetable Scheme: 2007<sup>35</sup>

The follow up evaluation was based on the same methodology as the Pilot Scheme Study. In terms of the general consumption of fruit and vegetables, the following was recorded:

- Consumption of fruit and vegetables had increased significantly since the previous study conducted two years earlier. Children were eating an average of 4.41 portions per day, compared with 3.65 in 2004. Overall, 44 per cent of pupils were reaching the '5 A Day' goal, compared with 32 per cent in 2004. This change was mainly due to a large increase in consumption of vegetables (from 1.61 to 2.14); the increase in fruit, although significant, was much smaller (1.65 to 1.82 portions).
- All children were eating more fruit and vegetables than in 2004, although Year 3 children were still eating less than younger children, both at home and at school. This reflects the consistent finding from the earlier study, which showed that children eat less fruit and vegetables as they grow older. Over time, the scheme does not seem to have counteracted this effect; the gap in fruit and vegetable consumption between children in Years 2 and 3 was slightly greater in 2006, despite a general increase in consumption overall for all three cohorts.
- The general increase in fruit and vegetable consumption applied to children having packed lunches and school dinners. However, packed lunch children had a larger increase in fruit, whereas children on school dinners had a much larger increase in vegetables. School dinner children also ate significantly less snacks and desserts than in 2004. A further analysis of consumption at lunch time confirmed the hypothesis that there had been an improvement in school dinners in the North East; children on school dinners had doubled their fruit consumption, more than doubled their vegetable consumption and also reduced the quantity of snacks and desserts consumed.

## **Conclusions of Further Evaluation of The School Fruit and Vegetable Scheme: 2007**

This study was designed specifically to explore the issue of sustained impact: would the scheme have a greater impact on those who had been involved longer?

Certainly average consumption rose from 3.65 portions to 4.41 portions. For Year 3 children this general increase compensated for the decrease that occurs with age: they are eating as much as they did in Year 1, but not as much as current Year 1 students.

# 2.7.3 The Third Evaluation of the School Fruit and Vegetable Scheme 2010<sup>36</sup>

<sup>&</sup>lt;sup>35</sup> Blenkinsop S, Teeman D, Schagen S, Scott E, Bradshaw S, Chan D, Ransley J, Cade J, Greenwood D, Thomas J: 'The Further Evaluation of The School Fruit and Vegetable Scheme'. National Foundation for Educational Research and University of Leeds, May 2007

<sup>&</sup>lt;sup>36</sup> Teeman D, Lynch S, White K, Scott E, Waldman J, Benton T, Shamsan Y, Stoddart S, Ransley J, Cade J, Thomas J: '*The Third Evaluation of the School Fruit and Vegetable Scheme*'. National Foundation for Educational Research and Leeds University. February 2010

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The main aim of this further study was to explore the longer-term impact of the SFVS once it had been implemented throughout England and operating in schools for at least four years. The data was collected in 2008 to be compatible with that in earlier evaluations.

## **Conclusions of the 2010 Study**

Children in 2008 were eating more vegetables than in 2004 (although there was no increase in fruit consumption).

The authors also concluded that the differences in consumption patterns at school did not carry over into the home environment (suggesting that a wider campaign needs to be addressed)

# 2.8 UK Change4Life Movement 2009 to present day

In 2009 the UK government launched Change4Life as 'a lifestyle revolution'<sup>37</sup>.

Change4Life is 'the social marketing part of Healthy Weight, Healthy Lives cross-governmental strategy for England'. In its first year it targeted families with children aged 5-11, who were at greatest risk of becoming overweight or obese.

Achieving and maintaining a healthy weight requires that parents help their children to:

- reduce their intake of fat, particularly saturated fat;
- 2. reduce their intake of added sugar;
- 3. control portion size;
- eat at least five portions of fruit and vegetables per day;
- establish three regular mealtimes each day;
- reduce the number of snacks they eat;
- do at least 60 minutes of moderateintensity activity per day; and
- 8. reduce time spent in sedentary activity.



<sup>&</sup>lt;sup>37</sup> HM Government 'Change4Life One Year On'. February 2010



As part of the evaluation plan for the Change4Life campaign, a large-scale tracking study was run to evaluate awareness of, and response to, the campaign and its impact on attitudes and behaviours. The tracking study was carried out by the British Market Research Bureau (BMRB). The survey commenced in November 2008, when a baseline of key measures was established, and the full study ran from January 2009.

There were three high-level themes to the evaluation programme:

- Monitoring campaign exposure and visibility to target audience.
- Investigating the impact on families.
- Tracking the development of a social movement.

#### **Extrapolations Made From the Tracking Study Data**

Over 1 million mothers in 2010 claimed to have changed something in their children's lifestyles as a result of Change4Life. This was calculated as follows:

- Total number of mothers with children aged 0–11 in England: 4.59 million.
- Percentage of mothers aware of Change4Life advertising in final quarter of 2009: 77%
   = 3.53 million mothers.
- Percentage of those who claim to have changed something as a result of Change4Life: 30% = 1.06 million mothers.

About 180,000 more mothers were calculated to have adopted all eight of the Change4Life behaviours. This was calculated as follows:

- Total number of mothers with children aged 0–11 in England: 4.59 million.
- Percentage of mothers claiming their children did all eight behaviours at baseline: 16% = 734,400.
- Percentage of mothers claiming their children did all eight behaviours one year later: 20% = 918,000.
- Additional mothers now claiming their children have adopted all eight behaviours = 183,600. All calculations compare the end of 2009 data to the baseline (end of 2008) to factor out seasonality.

#### Conclusion

Although no vegetable consumption statistics are available, it seems clear from the evaluation:

- The campaign is considered to be a significant success;
- It is difficult to separate out the individual components, but there was a significant increase in the percentage of mothers whose children did all eight behaviours, suggesting, at the least, a 4% increase in fruit and vegetable consumption.

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## 2.9 Denmark '6 a Day' 1999 to present day

6 a day is a partnership between the public sector, with representatives from government agencies and non-governmental health organizations together with the fruit and vegetable industry.

It consisted of a media campaign and educational material, with worksite interventions and an extensive school program

It was launched in 1999 as a five year project, which has been extended and continues today.



The 6 a day campaign's aim is to increase consumption of fruit and vegetables in the overall population, ideally to a level of 600 grams or 6 serves of fruit and vegetables a day.<sup>38</sup>

IFAVA explains the reason for '6' instead of '5' a day: 'It is no secret that a communication of the recommendation played an important role in defining the recommendation. The number 6 in Danish is pronounced "sex", and anecdotal evidence suggests that this makes it easier to remember, especially for men!

The recommendation of 6 a day or 600 grams fruit and vegetables daily, is based on review of evidence on fruit and vegetables preventative effect on a number of chronic diseases. The expert group that defined the recommendation was composed of both scientists and people with communications backgrounds.'

As can be seen from the illustrated posters, the orientation has been incorporated into the personality of the campaign.





<sup>38</sup> http://www.ifava.org/about-ifava/our-members/denmark/



Rekhi and McConchie [2014] note that this campaign has been very successful: 'Between 1995 and 2004, the Danish National Survey of Dietary Habits and Physical Activity reported that vegetable and fruit consumption for the 4- to 10-year-old group increased by 29% and 58% respectively. For the 11- to 75-year-old group, vegetable and fruit consumption increased by 41% and 75% respectively, during the same period (Danish National Centre for Social Research, 2005). For the period 2003–2008, the average intake of vegetables for adults (18–75 years old) was reported to be 162 g per person per day, while the average intake of fruit for this group stood at 283 g per person per day (Danish National Centre for Social Research, 2009). This equals 445 g per person per day, higher than the minimum WHO recommended level of 400 g per person per day, demonstrating the success of the Danish campaign in increasing fruit and vegetable consumption above the recommended minimum WHO levels.<sup>39</sup>

**Conclusion:** Considered to be a success by the Danish Veterinary and Food Administration, as evidenced by its continued application. Testament to the use of communications expertise combined with a strong alliance of the public sector, NGOs and producer representatives.

## 2.9 USA '5 A Day Better Health' Program 1991-2006

The USA '5 A Day Better Health' program was launched nationally in 1991 by the National Cancer Institute (NCI) and the Produce for Better Health Foundation.

It's goal was to increase consumption of fruit and vegetables to 5-9 servings a day for all Americans. Also to make 5 A Day the most recognised, respected and practiced dietary program in the USA.<sup>40</sup>

The rationale for 5-9 servings was illustrated in the following table:



<sup>&</sup>lt;sup>39</sup> Rekhy and McConchie [2014] p. 117

<sup>&</sup>lt;sup>40</sup> DiSogra L and Taccone F: '5 A Day for Better Health Program USA'. Presentation to WHO, Geneva, Switzerland, August 26,2003

# Recommended Daily Servings of Fruits and Vegetables as part of a healthy, active lifestyle, as per the US Dietary Guidelines, 2000

	Vegetables	Fruits	Total
Children, aged 2 to 6	3	2	5
Children over 6, teenage girls and most women	4	3	7
Teenage boys and most men	5	4	9
Source: DiSogra [2003]			

Originally this program was trialled in California via a grant from the National Cancer Institute (NCI) in 1988. Following its success, the NCI and Produce for Better Health Foundation (PBH) launched it nationally.

The partnership grew to include the Centers for Disease Control and Prevention, United States Department of Agriculture, American Cancer Society, Produce Marketing Association, National Alliance for Nutrition and Activity, California Department of Health Services, United Fresh Fruit and Vegetable Association and the Association of State and Territorial Directors of Health Promotion and Public Health Education.

In 2003 it was the largest public-private partnership for nutrition and health in the USA.

The results of the program recorded by DiSogra and Taccone [2003] were:

- Increase in awareness from 22% in 1992 to 40% in 2002
- Increase in consumption of half a serving between 1992 and 1996
- In 2003:
  - o awareness of 5 A Day was 44% among women and 22% among men
  - awareness of gender specific recommendation was 14% among women and 3% among men
  - $\circ$  40% of women and 29% of men were eating at least 5 A Day
  - $\circ$  13% of women and 4% of men were eating recommended amounts

Rekhy [2014] notes that: 'Supporting research highlighted that one of the barriers to increasing consumption included meeting quantified targets in terms of daily number of serves.'<sup>41</sup>

**Conclusion:** One of the earliest US national programs. Helped increase awareness and bring together a wide range of stakeholders. Limited success in terms of meeting objectives.

<sup>&</sup>lt;sup>41</sup> Rekhy [2014] p117

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# 2.10 USA Fruits & Veggies – More Matters 2007 to Present Day

The July 2007 issue of Today's Dietitian announced the launch in an article entitled 'Fruits & Veggies – More Matters: Bringing New Life to an Old Nutrition Message'.

The article noted that the initiative was launched by the Produce for Better Health Foundation (PBH) and the Centers for Disease Control and Prevention (CDC).



'According to Elizabeth Pivonka, PhD, RD, president and CEO of PBH, the plan is for Fruits & Veggies—More Matters to eventually replace the familiar, 15-year-old 5-A-Day For Better Health Program, which will be phased out by the end of 2008. However, the mission remains the same: get Americans to eat more fruits and vegetables. The new Fruits & Veggies—More Matters brand was also developed to be consistent with the latest Dietary Guidelines for Americans, which recommends various numbers of servings of fruits and vegetables depending on an individual's calorie needs—ranging from four to 13 servings (or 2 to 61/2 cups) per day.<sup>42</sup>

Produce for Better Health Foundation launched a consumer website in March 2007 aimed at educating Gen X mums about the campaign and the benefits of eating more fruits and vegetables. The website offers nutrition information, selection and storage advice, recipes, shopping and meal planning advice, tips for increasing produce consumption, and an abundance of other useful information about fruits and vegetables. Over 300 short informational videos demonstrate how to check different fruits and vegetables for ripeness, outline proper storage methods, present healthy and quick recipes, and offer other fun and useful tidbits about fruits and vegetables.

The Fruits & Veggies—More Matters campaign stresses that it's easy to eat more fruits and vegetables because all forms (fresh, frozen, canned, dried and 100 percent juice) are nutritious.

<sup>&</sup>lt;sup>42</sup> Aronson D: '*Fruits & Veggies – More Matters: Bringing New Life to an Old Nutrition Message*'. Today's Dietitian, July 2007, Vol. 9, No. 7, P 30



Aronson's article continues: 'As most dietitians know, only approximately 10% of Americans consume the level of fruits and vegetables recommended by the Dietary Guidelines. The mission of Fruits & Veggies—More Matters is to change people's behaviour over the long term and improve the health status of the nation. This, of course, was also the mission of 5-A-Day, but the new initiative seeks to address underlying weaknesses of 5-A-Day and redirect education efforts more effectively. Some key differences are that Fruits & Veggies—More Matters does the following:

- targets the mom, who is still the primary healthcare and food gatekeeper for the family;
- features a Web site that is more interactive, encouraging users to share information;
- offers practical and specific advice regarding meal planning, shopping, and tips;
- is less prescriptive and more descriptive;

• more clearly applies to a wider range of foods, such as those based on fruits or vegetables like tomato sauce and 100% fruit juice; and

• relays a message that is more emotionally based than fact-based.'

### **Results:**

So...how has it done? Corinna Hawkes, in a recent Background Paper for the International Conference on Nutrition [2013] wrote: 'In the US, a recent cross-sectional study of the effects of "More Matters" found that only 2% of the 3021 adults surveyed were aware of the campaign and the 7-13 fruit and vegetable serving recommendations (Erinosho et al., 2012). However, participants were more likely to consume over 5 servings of fruits and vegetables per day if they were aware of the campaign.<sup>43</sup>

This seems at odds with the PBH figures on awareness quoted in Rekhy and McConchie [2014]: 'Importantly, brand awareness of the "Fruits & Veggies – More Matters" slogan and logo has increased from 11% in 2007 to 26% in 2012 (Produce for Better Health Foundation, 2013b)<sup>44</sup>

The PBH also reported that, while fruit and vegetable consumption between 2004 and 2009 stayed constant (at 1.81 cups per person a day), there was a modest increase in daily consumption by children (7% for up to 6 year olds and 5% for 6 to 12 year olds)

#### **Conclusion:**

It would appear that the campaign results are modest, despite considerable effort. If anything, it suggests that efforts to reach younger minds that are not yet set in their ways may be more fruitful than trying to change those of adults.

<sup>&</sup>lt;sup>43</sup> Hawkes C: 'Promoting healthy diets through nutrition education and changes in the food environment: an international review of actions and their effectiveness'. Background Paper for the International Conference on Nutrition, FAO, 2013

<sup>&</sup>lt;sup>44</sup> Rekhy [2014] p117d

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# 2.11 USDA: My Plate 2011

On June 2, 2011 the US Department of Agriculture changed its imagery for the US dietary guidelines. 'My Plate' replaced 'My Pyramid'. The latter had, in 2005, replaced the Food Guide Pyramid (originally introduced by the USDA in 1992).

This is how they introduced the new concept on their website.<sup>45</sup>

'MyPlate is a new generation icon with the intent to prompt consumers to think about building a healthy plate at meal times and to seek more information to help them do that by going to ChooseMyPlate.gov. The MyPlate icon emphasizes the fruit, vegetable, grains, protein foods, and dairy groups. Later in 2011, MiPlato was launched as the Spanishlanguage version of MyPlate.

'ChooseMyPlate.gov provides practical information to individuals, health professionals, nutrition educators, and the food industry to help consumers build healthier diets with resources and tools for dietary assessment, nutrition education, and other user-friendly nutrition information. As Americans are experiencing epidemic rates of overweight and obesity, the online resources and tools can empower people to make healthier food choices for themselves, their families, and their children.

'MyPlate illustrates the five food groups that are the building blocks for a healthy diet using a familiar image – a place setting for a meal. Before you eat, think about what goes on your plate or in your cup or bowl.'<sup>46</sup>

My plate as a program appears to be more of an informational site than a program. It is included here as it formed the basis for the Canadian 'Half Your Plate' campaign.







<sup>45</sup> http://www.choosemyplate.gov/about.html

<sup>46</sup> Ibid

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## 2.12 USA: FNV Campaign 2015





While it is in the process of being launched, and therefore cannot be evaluated, it is worth including some detail of a recent program launched in the USA.

Late in February 2015, at the Building a Healthier Future Summit, a collaboration of companies, celebrities, athletes and foundations launched FNV—a brand focused on increasing consumption and sales of fruits and vegetables among teens and moms.



FNV – shorthand for fruits and vegetables – is an opportunity to change the conversation around fresh produce. The Produce Marketing Association (PMA) is a founding funder of the campaign and will work alongside the Partnership for a Healthier America (PHA) to inform implementation.

'The marketing objective outlined by the campaign's expert advertising agency emphasizes the need to build more emotional resonance between consumers and our products – fruits and veggies. The campaign works to create a connection between the teenaged target audience by igniting passion and provoking action – all through a 'team-inspired' experience that promotes a community built around produce.

'The PMA Board of Directors believes this initiative can help drive demand and ultimately increase consumption for fresh produce. Because of that, the PMA Board has approved a \$1 million investment to support this campaign on behalf of the membership and will appoint a marketing taskforce comprised of fresh produce industry executives to help guide

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implementation. This initiative aligns with PMA's strategic commitment to provide you with marketing opportunities and resources through successful efforts like eat brighter!<sup>™</sup> and now FNV, with the objective of helping your business grow. Marketing is, after all, the association's middle name.

'FNV will launch in its first two markets in spring 2015. It will also spread nationally via digital and social networks, and support from well-known celebrities and athletes. With success, it's our hope that more markets will feel the effect of the campaign in the future.'



## 2.13 Summary and Conclusions

 'The Go for 2&5® campaign was successful in generating awareness. It also increased knowledge – particularly in the area of the recommended consumption level of vegetables. This led to a significant decrease in low level vegetable consumption (one serve) and a corresponding increase in mid level consumption (four serves) amongst parents.

So, there was a substantial increase in vegetable consumption that was attributed to the campaign.

- 2. The positive analysis of the 'Go for 2&5' campaign led HAL to recommend this as the right campaign to combat obesity in its Senate submission.
- 3. The 'Measure Up' campaign, with its bundling of a number of messages in one communication led to poor conveyance of the minor messages. In this case people remembered the major creative message of waistline, but did not take on board the need to eat more vegetables. This demonstrates the preference for simpler approaches such as the 'Go for 2&5' campaign in terms of vegetable consumption.
- 4. Although the 'Swap It, Don't Stop It' campaign was seen as a progression from the 'Measure Up' campaign, it looked and sounded totally different. So, creatively it started from scratch. It would have been stronger to have retained the 'Measure Up' campaign and let continuity and consistency build its message. From a vegetable consumption perspective, not a good result, it would seem.
- 5. The same concern has to be applied to the 'Shape Up' campaign. And emphasis again has moved away from the simpler message of 2&5 used previously, with a most likely concurrent reduced effect on demand for vegetables.
- 6. The Canadian 5-TODAY program was limited in application, and that served to undo its effectiveness: any campaign needs continuity and inclusivity (across the social spectrum) to be effective.
- 7. The UK's Food Dudes program is inspirational. The results appear to be considerable and impressive. Undoubtedly one of the most successful interventions for children, with consistent results across four countries. Worth consideration for any country considering an anti-obesity program for the new generation.
- 8. The UK 5 A DAY program was ambitious in its extensiveness, but, unfortunately didn't lend itself to conclusive analysis. Considered to have been a phenomenal success, however, by some.
- 9. The UK School Fruit and Vegetable Scheme did have partial success. Children in 2008 were eating more vegetables than in 2004 (although there was no increase in fruit consumption). The authors also concluded that the differences in consumption patterns at school did not carry over into the home environment (suggesting that a wider campaign needs to be addressed).
- 10. The UK Change4Life Movement has received enthusiastic commendations. From its extrapolations, it would appear to have increased the number of people eating vegetables. The concept of a 'Movement' seems appropriate to the task.
- 11. Denmark's '6 a Day' is a very catchy and broadminded campaign. It appears to have succeeded in achieving very high results compared to most of the other national diet campaigns. It has been running continuously since 1995, and involves all of the community and community organisations.



- 12. The US's '5 A Day Better Health' campaign was a significant partnership between major stakeholders, but had limited success in converting eating habits, despite increasing awareness.
- 13. With regards to the US's 'fruit and veggies more matters' campaign, it would appear that the campaign results are modest, despite considerable effort. If anything, it suggests that efforts to reach younger minds that are not yet set in their ways may be more fruitful than trying to change those of adults.

In conclusion, the results of these national diet campaigns are mixed.

If they are reviewed in terms of the objective of altering eating behaviours so the broad population eats the recommended serves of fruit and vegetables, none, barring one, have achieved this.

Only the Danish '6 om Dagen' campaign seems to have attained this goal.

Alternatively, from a strictly vegetable demand point of view, many have achieved a moderate shift to an increased intake.

The UK 'Food Dudes' program is the other stand-out, in terms of its success in changing children's eating habits.

Both of these programs have been running for a long time and retained the same campaign branding.

They have become so pervasive they could be called a movement rather than a program.

The lessons that are suggested by these results are:

- Short-term campaigns are not the solution. To change behaviours requires consistent and long-term campaigns.
- Advertising is only one component. These campaigns require a full range of activities and a substantial community commitment.



# SECTION THREE: REGIONAL AND LOCALISED CAMPAIGNS



# **3.1 Introduction**

This section covers interventions that sit between the National Diet Campaigns and the Commodity focused promotions.

We have already provided some information of such interventions in the Introduction to Section Two, in reference to the work done by Pomerleau et al [2004]. The appendices contain details of these.

In our investigations, we found that there are a considerable number of such interventions, and this section lists some individual research papers, as well as some that review a large number and summarise their results.

While they don't necessarily employ all the resources (such as media advertising, public relations and such like), they provide insight into the effectiveness of localised and regional programs.

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# 3.2 Western Australia

## 3.2.1 Western Australian Fruit and Vegetable Campaign: 1990-1994

This section is based on a paper by Margaret Miller and Christina Pollard published in 2005<sup>47</sup>.

The authors note that, at that time: 'Health industry campaigns promoting fruit and vegetables were a new endeavour'. The paper underscores the importance of a coordinated approach of government and industry in tackling this objective. The Department of Health in Western Australia (DOH) worked with Primary Product Promotions (PPP), a non-profit organisation of WA primary producers, allied industry groups and the State Government. 'Its main purpose was to support its members on a fee-for-service basis to promote and market fresh WA produce.'

*Fruit'n 'Veg With Every Meal* was the initial message that was used in the first phase of the campaign. This was replaced with a more specific message: *2 Fruit 'n 5 Veg Every Day* to emphasis the minimum recommended intake.

Multiple promotional strategies were utilised:

- Television advertising
- Radio advertising
- Press advertising
- Billboard advertising
- Public relations activities
- Point-of-sale promotions
- Cookbooks and recipe cards
- Publications
- Community activities
- Sponsorships
- Work-site activities
- School activities

The table below shows the use of each of these in the different phases of the campaign.

'Process and impact evaluation were undertaken for most strategies. A telephone survey of a random sample of 250 adults was undertaken after each phase of television advertising to determine awareness of the campaign, attitudes, knowledge of the recommended intakes and action to increase fruit and vegetable intake.'

Table from Miller and Hollard [2007] Showing Campaign Activities 1990-94

<sup>&</sup>lt;sup>47</sup> Miller M and Pollard C: '*Health working with industry to promote fruit and vegetables: a case study of the Western Australian Fruit and Vegetable Campaign with reflection on effectiveness of inter-sectoral action*'. Australian and New Zealand Journal of Public Health, 2005, 29, No 2

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Campaign activities	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
	Feb 1990	May 1991	Nov 1991	Sept 1992	June 1993
Industry collaboration	1	~	~	¥	~
Industry working group		~	<ul> <li>✓</li> </ul>	¥	
Mass media advertising					
Television	~	~	✓	*	~
Radio		~		~	✓
Press		~	~	~	~
Public relations activities and unpaid media	4	~	~	<b>v</b>	~
Publications					
Consumer general information leaflets			~	~	
Consumer self-help kit	<b>~</b>	~	~	v	
Recipe cards	<ul> <li>✓</li> </ul>	<b>~</b>	~	~	~
Budget recipe leaflets			~		
Campaign Information Bulletin to health, education and industry professionals	~	~	~	V	V
Cookbooks	· · · ·				
Fruit 'n' Veg With Every Meal	¥	V		~	~
Fruit 'n' Veg Snack 'n' Pack			~	✓	~
Point-of-sale promotions					
Displays	v	~	~	~	~
Food demonstrations	~	~	<b>v</b>	~	✓
Seasonal promotions			~	~	~
Schools activity book/kits	~		~	~	~
Fruit 'n' Veg Week			~	V .	~
Worksite promotion			~	V	
General practitioner kits	~				
Lunchbar promotion	~			-	
Sports and arts sponsorships	÷		1	~	~
Regional community activities	~	~	V .	~	~

## Results

While there are no detailed results in the reference article, another article by Pollard<sup>48</sup> lists the following:

'Evaluation pre-post campaign showed the campaign was successful in increasing the proportion of the target group aware of recommended intakes of fruit, from 39 to 53 per cent and vegetables from 65 to 93 per cent, and increasing the proportion of low consumers of vegetables that believed that they should eat more vegetables from 50 to 63 per cent. The proportion of 25 to 65 year old women in Perth eating at least two servings of fruit per day increased significantly from15 to 22 per cent. There was no significant change in vegetable intake. The mean intake of fruit consumed by 25 to 65 year old Perth adults increased by 13g compared to a decrease of 41g in the national average, and the mean intake of vegetables increased by 52g compared to a decrease of 13g in the national average.'

## Conclusion

The primary result was an increase in awareness of recommended intake of vegetables, but no significant increase in those achieving recommend intake levels of vegetables. However, mean intake levels did increase, in contrast to national declines.

<sup>&</sup>lt;sup>48</sup> Pollard C: '*Report HG06158: Documenting the outcomes of the Go for 2&5*® *Program*'. Horticulture Australia Ltd. April 2008

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## 3.2.2 'Go for 2&5' Campaign: 2002 - 2005

From our reading of the literature in this field, this campaign appears to have been very successful in terms of increasing vegetable consumption. Some commentators have depicted it as being less successful, but this is because they are measuring it against a very difficult (anti-obesity) objective: that is, changing behaviour within the target audience and converting them to a diet regimen which includes two serves of fruit and five serves of vegetables daily.

While it may not have achieved the latter, it certainly increased consumption of vegetables, and that was within a limited time frame.

We later (Section Five) elaborate on the learnings that we have gleaned from the literature across the field: suffice it to say that consistency and continuity are crucial.

The 'Go for 2&5' campaign launched in March 2002 and was implemented for just over three years...until June 2005.

The campaign included a comprehensive range of tactics:

- Television advertisements
- Press advertisements
- Radio advertisements
- Public relations events
- Publications, including cookbooks
- Point-of-sale promotions
- School activities
- Community activities
- Website



# 3.2.2 Pollard et al: 'Increasing fruit and vegetable consumption: success of the Western Australian Go for 2&5® campaign'

The campaign had a colourful logo made from fruit and vegetables and the television and print campaign featured animated characters, based on well-known television personalities. These were extended into other print formats.





The initial advertising proposition in 2002 was clear and simple: *'It's easy to get an extra serving of vegies into your day'*. This was followed in 2003 by the more intrusive question: *'How many servings of vegies did you really eat today?'*.

An extensive evaluation of this campaign was published by Pollard et al in 2007<sup>49</sup>. They used two independent surveys to evaluate the impact of the campaign.

A Campaign Tracking Survey (CTS), which monitored the following:

- Advertising
- Awareness
- Knowledge
- Perceptions
- Attitudes towards fruit and vegetable consumption
- Self-reported intake.

The second survey was the Health Department's Health & Wellbeing Surveillance System (HWSS), which provided data on self-reported fruit and vegetable intake.

The strategy was to use advertising to act as a catalyst and assist in the movement from increased knowledge to changes in behaviour for fruit and vegetable consumption

Pollard et al depicted this in the following diagram:



#### Results

The CTS results are summarised in Appendix Five. Major results were:

<sup>&</sup>lt;sup>49</sup> Pollard et al [2007]



- Spontaneous recall of the campaign reached 62.4% in 2005 after three years, and prompted awareness reached 90.2%. A year after the campaign finished these figures dropped to 42.2% and 77.7% respectively, demonstrating the importance of continuity;
- Knowledge of the correct number of servings of vegetables increased from 20.4% to 43.9% over the three years. In contrast to the decline in awareness, this figure increased to 47.2% twelve months after the campaign finished;
- The belief that 'I should eat more vegetables' increased from 35.2% prior to the commencement of the campaign to 42.2% after three years, but dropped back to 40.3% after 12 months of inactivity.

The HWSS showed:

- Total mean daily vegetable intake by Western Australian adults over 18 years increased by a significant amount of 0.6 servings over the campaign period.
- The increase in vegetable intake was observed across all consumption levels but was most pronounced for males with very low consumption.

#### Here are the results verbatim:

'The Go for 2&5\_® social marketing campaign was successful in reaching the target audience and achieving the campaign communication objectives of increasing awareness of the recommended servings of fruit and vegetables, and encouraging increased consumption, particularly of vegetables. Awareness of the recommended intake and self-reported vegetable consumption among Western Australian adults increased significantly and the proportion of adults consuming less than two servings of vegetables declined. The impact of the campaign was greatest amongst male low consumers of fruit and vegetables.

'The net effect, in terms of population increases in self reported fruit and vegetable consumption before and after the intervention, was 0.8 servings (0.2 servings of fruit and 0.6 servings of vegetables, or 75 g). The Go for2&5® campaign evaluation shows that well-executed social marketing campaigns are an effective method to increase awareness of dietary recommendations and to motivate dietary behaviour change. Results demonstrate the importance of implementing social marketing campaigns over an extended period so that incremental growth in knowledge, intentions and behaviour can occur and be maintained.'

### Conclusion

The WA 'Go for 2&5' campaign appears to have achieved the goals of increased awareness of recommended intake of FV and increased consumption of vegetables. It also underscores the importance of continuity in campaign execution and placement over an extended period.

## 3.2.3 WA LiveLighter Campaign

In June 2012 the Department of Health together with the National Heart Foundation and the Cancer Council WA launched the LiveLighter campaign, utilising the same confronting advertising techniques as have been employed in anti-smoking campaigns.

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The background is described in a brochure released by the campaign entitled 'LiveLighter: One Year On":

'LiveLighter is one of the world's first well researched, public education campaigns generating public debate about the need to reverse the growing rate of obesity. It uses a suite of strategies to encourage Western Australian adults to commit to healthier lifestyles choices – to make changes to what they eat and drink, and to be more active. LiveLighter is funded by the Department of Health WA and run by the National Heart Foundation WA in partnership with the Cancer Council WA.'

The creative concentrates on disturbing images of the body.



The brochure lists the following achievements after the first six months:

- 'Recall of the campaign was maintained at a high level from the first to the second postcampaign study phase making it one of the strongest obesity-related campaigns in Australia.
- 'Overweight and obese adults were significantly more likely to recall the campaign than those of a healthy weight.
- 'Overweight adults were significantly more likely than those of a healthy weight to recognise the relevance of the main campaign ad suggesting it resonated with the target group.
- 'There was a significant increase in intentions to engage in recommended levels of physical activity in the immediate term in the campaign state which was not seen in the comparison state, suggesting this is attributable to the campaign.
- 'A sub study of adolescents was also conducted to evaluate awareness of the campaign among this age group and any unintended consequences of the campaign.



The evaluation shows no signs of unintended consequences for this age group.

'Without doubt, LiveLighter has had a successful first year in terms of raising awareness about the rising levels of obesity in WA; making an impact on healthy attitudes and behaviours and generating debate about the health issues associated with being an unhealthy weight. 'However, despite the success so far, there is no room for complacency in preventing obesity. We know that public health campaigns on their own cannot deliver sustained changes. 'Together with support from the government we need support from the community to ensure fresh, healthy food and drink is the easy choice everyday. Most of all we need everyone to continue raising awareness about the consequences of being overweight and what we can do to start living a healthier life and building a healthier future for West Australians.'

Notably, this shift has tended to move away from the message of 'Go for 2&5' in terms of recommended diet and rather to eat less sugar-based foods and do more exercise.

**Conclusion:** With its emphasis on reduced intake of sugar and unhealthful foods, the promotion of fruit and vegetables takes a back seat.

# Goofor 2 & 5 ® NSW Go for 2&5® 2008 campaign evaluation

3.3 NSW 'Go for 2&5' Campaign 2007/8

The 2008 NSW Go for 2&5 Campaign was aired between 3<sup>rd</sup> April and 14<sup>th</sup> June, following the initial phase in 2007. The media strategy changed in 2008. In 2007 the campaign ran across two bursts between February and June, with 11 weeks of free-to-air television. In 2008, it ran over seven weeks in one burst, supported by four weeks of cinema advertising.

It was a joint initiative between the NSW Department of Health, the Cancer Institute NSW and Horticulture Australia. An evaluation was published in a 2009 document<sup>50</sup> issued by these organisations.

The results were summarised as follows:

- Advertising performance was mainly positive, with good recall, recognition and personal relevance;
- The campaign was most successful in achieving an increase in awareness of the recommended daily intake of fruit and vegetables;

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<sup>&</sup>lt;sup>50</sup> NSW Department of Health, Cancer Institute NSW and Horticulture Australia: '*NSW Go for 2&5®: 2008 Campaign Evaluation*', March 2009

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• While this awareness was maintained over time for fruit, it wasn't for vegetables.

**Conclusion**: This study suggests that burst activity is not suitable for the purpose of increased vegetable consumption. Rather an ongoing and consistent campaign than a dip in and out.

## 3.4 NSW 'Eat It To Beat It' Program 2008-2011

Launched by Cancer Council NSW as a pilot program in the Hunter region between 2008 and 2011. It consisted of a number of elements:

- *Fruit* & *Veg* \$*ense*: an education program delivered by trained community educators
- *Fruit & Vegie Drive*: a trial of a fruit and vegetable fundraiser box
- Shopping centre cooking demonstrations
- *Fruit 'n' Veg Month*: a campaign for primary schools
- Communication strategy: local print media, school newsletters and The Star Fruit and Veg challenge



The Evaluation report<sup>51</sup> summarised the following results and conclusions as follows:

- The program achieved a high level of community engagement;
- It was well accepted by parents;
- Despite its low budget, it led to modest improvements in the predisposition and intake of vegetables;
- *Fruit & Veg \$ense* led to a measured increase in predilection for behaviour change, and increased consumption of fruit and vegetables by half a serve daily;
- Demonstrated that low-cost social marketing campaigns together with larger community-based programs can achieve increased consumption of vegetables.

Conclusion: The NSW "Eat It to Beat It' demonstrates the importance of involving stakeholders and the community as well as continuity in execution.

## 3.5 USA: State Marketing Programs

This section is based on an article by Howlett et al. in the American Journal of Health Promotion in 2012<sup>52</sup>

<sup>&</sup>lt;sup>51</sup> Cancer Council NSW: 'Evaluation of the Eat It To Beat It Program'. <u>http://www.cancercouncil.com.au/wp-content/uploads/2011/09/Eat-It-To-Beat-It-Evaluation-Report.pdf</u>

<sup>&</sup>lt;sup>52</sup> Howlett EA, Burton S, Newman CL and Faupel MA: '*The Positive Influence of State Agricultural Marketing Programs on Adults' Fruit and Vegetable Consumption*', American Journal of Health Promotion, Sep 2012, 27, No. 1 (September/October 2012) pp. 17-20



The purpose of the research was to assess whether state-sponsored agricultural marketing programs had a positive influence on adult consumers' fruit and vegetable consumption.

The authors studied differences in fruit and vegetable consumption in states that had initiated marketing campaigns against those that hadn't over the period from 2000 to 2005.

The study used data from the Behavioral Risk Factor Surveillance System, which yielded a representative sample of 237,320 adults aged 18 and over from states with and without marketing programs.

Data measured included the number of fruit and vegetable servings per week and the percentage of respondents consuming five or more servings of fruits and vegetables per day.

Statistical analysis of the data yielded the following results and conclusions:

- In states where there were no marketing progams, there was a significant decrease in fruit and vegetable consumption between 2000 and 2005. In states with campaigns, consumption remained stable or increased.
- Marketing efforts yielded stronger responses from women than men.
- 'State-sponsored agricultural marketing programs had favorable effects on consumers' consumption of fruits and vegetables.'

**Conclusion:** These state marketing programs, taken together, worked to maintain demand for vegetables in a declining market.

# 3.6 Canada. 'Advertising for Fresh Fruits and Vegetables: An Analysis of Four Retail Banners in Canada'<sup>53</sup>

The study set out to test the hypothesis that retailers catering to lower income segments advertise healthy food choices less than higher income oriented retailers. As gatekeepers of the food supply, retailers could, therefore, influence consumers' food purchases.

In the course of the report, the authors review relevant literature, with particular reference to a study by Perez, using data from the 2000/2001 Community Health Survey<sup>54</sup>. This study analyses the average daily frequency of fruit and vegetable consumption of consumer segments in Canada.

They highlight the following salient points:

 From Perez (2002) the Boeker and So state: 'Men in the lowest household income group consumed the least number of fresh fruit and vegetable products. The consumption rate increases as income increases; however, it tapers off for middleincome men. For female consumers, consumption continually increases as household income increases.'

<sup>&</sup>lt;sup>53</sup> Boecker A and So J: 'Advertising for Fresh Fruits and Vegetables: An Analysis of Four Retail Banners in Canada'. University of Guelph, Canada. Presented at IFAMA 2011 Annual World Symposium

<sup>&</sup>lt;sup>54</sup> Perez CE, '*Fruit and Vegetable Consumption*' Health Reports, 13, Issue 3, pp 23-31. 2002



- They provide substantiation from another study (Riediger et al, 2007<sup>55</sup>) with the following quote from that study: "For example, 34.2% of families with a total annual income of \$15,000 and 37.0% of those with an annual income of \$50,000 to \$79,999 reported fruit and vegetable consumption 5 to 10 times per day. Frequency of intake of fruits and vegetables increased sharply, from 37.0% to 42.1%, when total household income exceeded \$80,000."
- Riediger (2007) also noted that ethnicity did not appear to play a role: 'The analyses revealed that cultural/racial origin was not an important factor significantly associated with fruit and vegetable intake by Canadian adolescents (data not shown). Adolescents from all ethnic groups, including whites, Arabs, Chinese, Japanese, Koreans, blacks, Pacific Islanders, Southeast Asians, Latin Americans, and West Asians reported a similar frequency of fruit and vegetable consumption.'
- Education was found by many researchers to play a significant role, with a positive correlation to higher levels of education to number of serves consumed daily. (Includes Perez (2002), Riediger et al (2007), Wardle et al (2000)<sup>56</sup>.
- Gender was found to be significant, with Canadian women consuming more than men ref; Perez (2002).
- Older Canadians tend to consume more than younger.

The authors analysed communications from four retail banners, and concluded that the hypothesis was not supported by the data: they found that advertising intensities did not vary greatly between retailers.

# 3.7 USA: Evaluation of Nutrition Education in California<sup>57</sup>

This study centres on the work done by the Dairy Council of California (DCC), which provides Californian schools with nutrition education materials and lesson plans.

Despite the orientation of this research towards dairy, the research covered all the main food groups. Vegetables was one of these.

The study focused on one of the programs offered by the DCC: the Exercise Your Options (EYO) program, which provides education material to teachers to assist them in teaching about nutrition topics such as the basic food groups. It is aimed at sixth, seventh and eighth grade students (most commonly sixth graders are 11 years old, seventh 12 and eighth 13).

The study was undertaken in more than 100 Californian classrooms. Food records were completed by the students in autumn 1996 in three phases. 'Record One' was prior to the start of the program. 'Record Two' took place immediately after the program. 'Record Three' took place one month later (on average).

<sup>&</sup>lt;sup>55</sup> Riediger ND, Shooshtari S, Moghadasian MH: '*The Influence of Sociodemographic Factors on Patterns of Fruit and Vegetable Consumption in Canadian Adolescents*' Journal of the American Dietetic Association, 107 (9: 1511-1518) 2007

<sup>&</sup>lt;sup>56</sup> Wardle J, Permenter K, Waller J: '*Nutrition knowledge and food intake*'. Appetite, 2000; 34: 1-8

<sup>&</sup>lt;sup>57</sup> Alston JM, Chalfant JA and James JS: '*Evaluation of Nutrition Education by the Dairy Council of California*'. Chapter 13 in '*The Economics of Commodity Promotion Programs: Lessons from California*', Kaiser HM; Alston JM; Crespi JM and Sexton RJ. Peter Lang Publishers, 2005

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There were three distinct groups of students. A control group, who completed the questionnaires without any involvement in the EYO program. An 'Intervention' group, in which DCC regional managers collected food records. And a 'Non Intervention' group, in which teachers collected the food records.

From a vegetable consumption point of view, the results showed significant increases in the consumption of vegetables by both groups who had participated in the EYO program. This was both immediately after the EYO program and one month later, as per the charts below.



Figure 13.2. Ninety-Five Percent Confidence Intervals for Changes in Daily Consumption from Record 1 to Record 3 for Treatment and Control Groups



Source: The Economics of Commodity Promotion Programs. Pages 298 and 300

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**Conclusion:** There was a significant increase in the consumption of vegetables over the study period, and one month later, when the Treatment groups were compared to the Control group.

# 3.8 Supermarket and Grocery Store Interventions: A Review in 2013<sup>58</sup>

The objective of the review was to synthesise evidence on the above type of interventions to promote healthful food choices.

The following methods were employed: 'We searched PubMed through July 2012 to identify original research articles evaluating supermarket and grocery store interventions that promoted healthful food choices. We categorized each intervention by type of intervention strategy and extracted and summarized data on each intervention. We developed a scoring system for evaluating each intervention and assigned points for study design, effectiveness, reach, and availability of evidence. We averaged points for each intervention category and compared the strength of the evidence for each category.'

This is summarised in the following chart:



Source: Escaron et al [2013]

<sup>&</sup>lt;sup>58</sup> Escaron AL, Meinen AM, Nitzke SA, Martinez-Donate AP. 'Supermarket and Grocery Store-Based Interventions to Promote Healthful Food Choices and Eating Practices: A Systematic Review'. CDC pub 'Preventing Chronic Disease', 10, April 2013



The 33 interventions were implemented in the United States (n = 22), Canada (n = 4), and 5 other countries (n = 7) (Australia, Marshall Islands, Netherlands x 3, Japan, New Zealand).

The authors created an assessment scheme based on three characteristics: study design, effectiveness and reach. So, study design was rated 1,2 or 3 according to the suitability of the study design to determine effectiveness. 'Greatest suitability (3 points) was defined as a study that had a concurrent comparison group and prospective measurement of outcomes. Moderate suitability (2 points) was defined as retrospective designs or studies that had multiple pre- or post-measurements but no concurrent comparison group. Least suitability (1 point) was defined as before-after studies that had no comparison group or studies in which outcomes were measured in a single group at the same point in time.'

Effectiveness (in attaining specified goals such as awareness) and reach were scored more widely, from 0-3 points.

In many cases, however, there wasn't sufficient data to provide information of success in terms of increased offtake of targeted items.

In summary, the authors found limited evidence of effects on purchasing behaviour. Eight out of 13 interventions collected store sales data showed an increase in targeted product purchases, and 13 interventions presented self-reported data on purchasing behaviours. 'One of these, a 12-week child- focused intervention yielded a significant increase in the proportion of sales of featured items to total store sales. The intervention displayed fruit, vegetable, and healthful snack samples in a low-to-the-ground kiosk. Similarly successful interventions targeting low-income populations and drawing on social cognitive theory and social marketing were more likely to include components such as taste tests and focus on purchasing of more healthful items, fruit and vegetable acquisition, and food preparation.'

**Conclusion**: Unfortunately the diversity of the studies listed doesn't allow for easy conclusions. Certainly it is possible for such interventions to result in increased sales of vegetables, and, as noted above, the majority of the interventions where sales data was measured showed positive growth in sales. Success depends on the completeness of the intervention on the demand stimulation side (eg. promotion and advertising) and the supply side (eg. display stocking and pricing).

# 3.9 Effectiveness of Community-Based Interventions to Increase Fruit and Vegetable Consumption<sup>59</sup>

The purpose of this study was to answer the question: 'What is the effectiveness of community interventions to increase fruit and vegetable consumption in people 4 years of age and older?'. To achieve this, two librarians conducted a search of a wide range of journals and grey literature from 1988 to 1998. Two team members independently read and rated each retrieved

<sup>&</sup>lt;sup>59</sup> Ciliska D; Miles E; O'brien MA; Turl C; Tomasik HH; Donovan U; Beyers: <sup>'</sup>Effectiveness of Community-Based Interventions to Increase Fruit and Vegetable Consumption', J. Journal of Nutrition Education, 32, Issue 6, November 2000 pp 341-352

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article for relevance. Of those deemed relevant, then two team members assessed the validity of the research.

The researchers initially obtained 189 articles, of which 60 were deemed relevant.

Of these, only one was rated strong, 17 were rated moderate and 42 were rated weak in terms of methodology. The authors restricted further analysis to the 18 strong and moderate articles.

Appendix Six contains a summary of their analyses.

The breakdown of the studies was as follows:

- Four interventions with parents of young children
- Seven interventions with school children
- Three interventions with adults in non-worksites
- Three reports of two worksite studies

The following were their major conclusions:

- Generally it was easier to effect a change in fruit intake than vegetable intake
- Generally the longer the intervention, the more successful
- Three of the four interventions with young children resulted in increased fruit and vegetable intake. The fourth resulted in fruit increase only.
- The schoolchildren studies were varied and not easily summarised. There was a significant increase in attitudes in two; significant increase in vegetable intake in another two; increase in fruit not vegetables in another; short-term but not longer-term improvement (3 months) in another; only an improvement in physical exercise and decreasing fat content in a fifth
- Nonworksite adults very varied: One study recorded a decrease in the intake of FV (but reduced fat intake...so not just FV study); another FV intake significantly increased; the third 'no change in proportion of people who consumed 5+ fruit and vegetables daily' (but no evidence on shifts of intake, it would seem).
- Worksite adults: both studies/ three reports positive on FV intake.

The authors included the following in their 'Implications for Practice and Research' section: 'In summarizing the literature from 18 reports of 15 different studies with quality ratings of moderate or strong, not one of the studies found a harmful effect of the intervention, that is, none had a statistically significant effect of decreasing fruit and vegetable consumption. Generally, interventions were most successful if part of a multicomponent program, if they included education directed at behavioral change as opposed to acquisition of information, if multiple contacts were made with the participants, and if the message was not generally about nutrition but specifically targeted to the increased intake of fruits and vegetables. These findings are in agreement with those found in Contento et al's review of U.S.studies.'

**Conclusion:** Well-considered and executed interventions, over a long time period, that are specifically directed at increasing vegetable consumption, do work.

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# 3.10 The Efficacy of Behavioral Interventions to Modify Dietary Fat and Fruit and Vegetable Intake: A Review of the Evidence<sup>60</sup>

The following abstract appears to have provided sufficient information for our needs in a broad review of the literature. It is reproduced here verbatim.

*Background.* The evidence suggesting that nutrition, particularly dietary saturated fat and fruit and vegetable intake, is related to chronic disease risk has prompted considerable research on behavioral interventions focusing on dietary change. No clear understanding has emerged, however, of the degree to which these interventions can materially influence dietary change, or the types of intervention that are most effective and for whom. Therefore, the primary objective of the current study was to evaluate the overall effectiveness of behavioral dietary interventions in promoting dietary change related to chronic disease risk reduction. A secondary goal was to explore the relative effectiveness of specific intervention features and among different population subgroups.

*'Methods.* We conducted an evidence-based review and secondary analysis of existing literature. Our data sources included reports of randomized controlled trials and other study designs identified from multiple searches of MEDLINE, EMBASE, PsycINFO, CINAHL, AGELINE, and AGRICOLA. We included all studies on humans (including children, adolescents, and adults) published in English since 1975 that had been conducted in North America, Europe, or Australia; that had sample sizes of at least 40 subjects at follow-up; that were not based on controlled diets; and that otherwise met inclusion criteria. Through dual review, we abstracted detailed information on study characteristics, methodology, and outcomes relating to consumption of fruits, vegetables, and fats.

*'Results.* From 907 unduplicated articles originally identified, we retained 104 articles reporting on 92 independent studies. The studies were similarly successful in reducing intake of total and saturated fat, and increasing fruit and vegetable intake. More than three-quarters of the studies (17 of the 22 reporting results for fruit and vegetable intake) reported significant increases in fruit and vegetable intake, with an average increase of 0.6 servings per day. Similar consistent decreases were seen in intake of saturated fat and total fat (7.3% reduction in the percentage of calories from fat). Interventions appeared to be more successful at positively changing dietary behavior among populations at risk of (or diagnosed with) disease than among general, healthy populations. Two intervention components seemed to be particularly promising in modifying dietary behavior—goal setting and small groups.'

#### Conclusion

Given that 77% of the studies reported significant increases in fruit and vegetable intake, it appears to support the conclusion that these interventions are more often successful than not in increasing vegetable consumption.

<sup>&</sup>lt;sup>60</sup> Ammerman AS, Lindquist CH, Lohr KN; '*The Efficacy of Behavioral Interventions to Modify Dietary Fat and Fruit and Vegetable Intake: A Review of the Evidence*', Hersey J. Preventative Medicine, 35, Issue 1, July 2002 pp25-41.

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## **3.11 Summary and Conclusions**

Examination of a varied number of campaigns and interventions in this section led us to the following conclusions:

- 1. The Western Australia Fruit and Vegetable campaign (1990-1994) was successful in increasing demand for and consumption of vegetables;
- 2. The 'Go for 2&5' campaign (2002-2005) in Western Australia was also successful and indicated that such interventions and promotion should be integrated with other stakeholders, wide-ranging and continuous over the long-term;
- 3. The WA LiveLighter campaign (2012 onwards) seems to have been less effective in promoting the consumption of fresh vegetables, due to its primary messaging being on eating less sugar-based foods and taking exercise;
- 4. The NSW 'Go for 2&5' campaign (2008) suggests that burst activity is not suitable for the purpose of increased vegetable consumption. Rather an ongoing and consistent campaign than a dip in and out;
- 5. The NSW 'Eat It to Beat It' program (2008-2011) demonstrated that low-cost social marketing campaigns together with larger community-based programs can achieve increased consumption of vegetables;
- 6. On a broader playing field, the US state marketing programs support the argument that promotion of vegetables is successful in boosting demand;
- 7. The 1996 intervention by the Dairy Council of California (DCC), to provide Californian schools with nutrition education materials and lesson plans, appears to have increased vegetable consumption in school children significantly;
- 8. The review of supermarket and grocery store interventions showed that it is possible for such interventions to result in increased sales of vegetables, and that the majority of the interventions where sales data was measured showed positive growth in sales. Success depends on the completeness of the intervention on the demand stimulation side (eg. promotion and advertising) and the supply side (eg. display stocking and pricing);
- 9. The survey article on the effectiveness of community-based promotions in 2000 showed that well-considered and executed interventions, over a long time period, that are specifically directed at increasing vegetable consumption, do work;
- 10. Finally, the Ammerman et al [2002]review article, which surveyed behavioral interventions, concluded that more than three-quarters of the 22 studies measuring vegetable consumption had achieved significant success, with the techniques of goal setting and working with small groups proving effective.

## In conclusion:

- Professional marketing services should be involved in the set up and naming of a program right from the outset;
- Success depends on engaging all stakeholders in the community, be it the Federal Government, parents, children, schools, medical service practitioners, local government and non-government organisations;
- Continuity beats changing the program every couple of years;
- Specific goals help define targets and help provide direction to all stakeholders.



# SECTION FOUR: COMMODITY MARKETING PROGRAMS

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# 4.1 Introduction

Commodity marketing programs are a distinct type of intervention that differ substantially in nature to the previous categories.

Here, it is conventional promotional activity, in which the commodity becomes the 'brand' (eg. 'Fresh Potatoes').

They are more single-minded in their messaging, aiming directly at demand creation and consequent increase in price/quantity.

We undertook an extensive review of commodity programs, both in Australia and overseas. We examined ABARES 2014 agricultural statistics, and were somewhat disappointed to find that 'vegetable production has increased steadily (less than 2% per annum), which is consistent with the Australian population growth of about 1.7% over the same period; implying that per capita consumption of vegetables has remained stagnant.

Unit         2007-08         2008-09         2009-10         2010-11         2011-12         2012-13         2013-14           Potatoes         -         -         -         -         1         1         1         288.2         1         273.2         na           - value         \$m         689.0         557.1         614.1         552.9         625.6         690.2         na           Exports b         -         -         value         \$m         34.8         36.0         46.1         54.3         47.2         47.4         39.5           Imports b         -         -         walke         \$m         86.3         129.0         92.5         105.7         164.1         131.7         143.2	TABLE 126 Production and trade for Australian vegetables								
Potatoes         Production a         kt         1 400.2         1 178.5         1 278.1         1 128.2         1 288.2         1 273.2         na           - value         \$m         689.0         557.1         614.1         552.9         625.6         690.2         na           Exports b         - value         \$m         34.8         36.0         46.1         54.3         47.2         47.4         39.5           Imports b         - value         \$m         56.3         129.0         92.5         105.7         164.1         131.7         143.2		Unit	2007–08	2008-09	2009–10	2010–11	2011-12	2012-13	2013–14
Production a         kt         1 400.2         1 178.5         1 278.1         1 128.2         1 288.2         1 273.2         na           - value         \$m         689.0         557.1         614.1         552.9         625.6         690.2         na           Exports b         - value         \$m         34.8         36.0         46.1         54.3         47.2         47.4         39.5           Imports b         - value         \$m         86.3         129.0         92.5         105.7         164.1         131.7         143.2	Potatoes								
- value         \$m         689.0         557.1         614.1         552.9         625.6         690.2         na           Exports b         -	Production a	kt	1 400.2	1 178.5	1 278.1	1 128.2	1 288.2	1 273.2	na
Exports b - value \$m 34.8 36.0 46.1 54.3 47.2 47.4 39.5 Imports b - value \$m 86.3 129.0 92.5 105.7 164.1 131.7 143.2	– value	\$m	689.0	557.1	614.1	552.9	625.6	690.2	na
- value \$m 34.8 36.0 46.1 54.3 47.2 47.4 39.5 Imports b	Exports b								
Imports b	- value	\$m	34.8	36.0	46.1	54.3	47.2	47.4	39.5
value Śm. 863 1290 925 1057 1641 1317 1432	Imports b								
	- value	\$m	86.3	129.0	92.5	105.7	164.1	131.7	143.2
Tomatoes	Tomatoes								
Production a kt 381.8 440.1 471.9 301.7 371.5 455.7 na	Production a	kt	381.8	440.1	471.9	301.7	371.5	455.7	na
-value Śm 404.6 341.8 346.5 418.1 351.8 438.7 na	– value	\$m	404.6	341.8	346.5	418.1	351.8	438.7	na
Exports	Exports								
Fresh kt 4.7 2.7 3.5 2.4 1.5 0.4 0.8	Fresh	kt	4.7	2.7	3.5	2.4	1.5	0.4	0.8
-value \$m 11.8 6.1 7.2 5.9 4.6 2.0 2.8	- value	\$m	11.8	6.1	7.2	5.9	4.6	2.0	2.8
Processed kt 7.4 7.1 7.6 6.7 7.6 2.6 7.1	Processed	kt	7.4	7.1	7.6	6.7	7.6	2.6	7.1
-value \$m 17.1 16.0 16.5 14.9 16.0 7.5 10.7	– value	\$m	17.1	16.0	16.5	14.9	16.0	7.5	10.7
Imports	Imports								
Processed kt 103.0 101.5 90.1 112.7 125.0 117.6 119.4	Processed	kt	103.0	101.5	90.1	112.7	125.0	117.6	119.4
-value \$m 109.5 148.9 112.3 113.2 124.6 115.1 145.5	– value	\$m	109.5	148.9	112.3	113.2	124.6	115.1	145.5
Onions	Onions								
Production kt 254.4 283.8 259.9 330.8 346.6 301.7 na	Production	kt	254.4	283.8	259.9	330.8	346.6	301.7	na
-value \$m 206.7 224.0 180.0 274.0 212.5 199.6 na	– value	\$m	206.7	224.0	180.0	274.0	212.5	199.6	na
Exports kt 45.7 50.0 49.7 58.1 58.5 51.6 45.3	Exports	kt	45.7	50.0	49.7	58.1	58.5	51.6	45.3
-value \$m 27.3 27.5 26.3 33.8 26.4 27.6 27.9	- value	\$m	27.3	27.5	26.3	33.8	26.4	27.6	27.9
Carrots	Carrots								
Production kt 272.6 263.5 267.4 224.6 319.2 272.1 na	Production	kt	272.6	263.5	267.4	224.6	319.2	272.1	na
value \$m 188.4 182.1 175.6 130.7 215.0 194.2 na	- value	\$m	188.4	182.1	175.6	130.7	215.0	194.2	na
Exports kt 54.2 61.8 68.4 69.7 69.3 67.3 72.0	Exports	kt	54.2	61.8	68.4	69.7	69.3	67.3	72.0
value \$m 38.3 46.1 51.5 52.0 51.3 51.1 55.9	- value	\$m	38.3	46.1	51.5	52.0	51.3	51.1	55.9
Lattuce	Lettuce								
Production kt 168.7 164.5 na 144.6 114.7 164.0 na	Production	kt	168.7	164.5	na	144.6	114.7	164.0	na
-value Śm 168.0 187.0 na 164.0 129.2 193.1 na	- value	Śm	168.0	187.0	na	164.0	129.2	193.1	na
Fronts a kt 1.3 1.3 1.2 1.1 1.1 1.0 1.3	Exports a	kt	1.3	1.3	1.2	1.1	1.1	1.0	1.3
value \$m 4.9 5.5 5.3 5.5 4.8 4.7 5.5	– value	\$m	4.9	5.5	5.3	5.5	4.8	4.7	5.5
Mushrooms	Mushrooms								
Production kt 47.1 43.4 41.3 49.7 46.5 50.0 na	Production	kt	47.1	43.4	41.3	49.7	46.5	50.0	na
-value Sm 281.5 249.5 235.7 293.4 267.0 284.6 na	- value	Śm	281.5	249,5	235.7	293.4	267.0	284.6	na

a Fresh and processed. b Fresh, dried and processed. na Not available.

Sources: Australian Bureau of Statistics (ABS), Agricultural Commodities, Australia, cat. no. 7121.0, Canberra; ABS, International Trade, Australia, cat. no. 5465, Canberra

Source: Australian Government Department of Agriculture '*Agricultural commodity statistics 2014*' Commonwealth of Australia, 2014



'Consumption of vegetables is estimated to be 162 kilograms per capita annually. However, there is still substantial room for growth with about 90% of Australians not consuming the recommended daily allowance of vegetables.'<sup>61</sup>

While we didn't cover every commodity program that has been undertaken, we covered a wide range. From an Australian vegetable perspective, there doesn't appear to be incontrovertible evidence of sustained success on a national basis. Whilst the 'Fresh Potatoes' campaign in WA has been widely reported as being successful, the recorded evidence only covers the period 2012-2014, and remains a work in progress.

Beyond potatoes, we needed to evaluate non-vegetable commodities, including avocados and mushrooms, to find Australian examples which endorsed specific commodity campaigns.

The Australian examples are supplemented primarily by Californian case studies, which seem to be the most prevalent in the literature.

<sup>&</sup>lt;sup>61</sup> AusVeg and HAL: 'Australian vegetable industry Strategic Investment Plan 2012 – 2017'. 2012.


### 4.2 Australian Avocados

There is well documented evidence, both from within HIA and other sources, which acknowledges that the Australian Avocado industry has enjoyed a sustained period of growth. As with many industry programs, success results from a wide range of activities, of which advertising is but one key element.

The Avocado Industry report 2007-08 notes: 'The industry has been undergoing significant growth for more than a decade – doubling in volume in the last 10 years...Australian growers have over the period from 2002 to 2007 enjoyed robust wholesale pricing. This period resulted in significant growth in the production during the period from 2005 to now. The current growth cycle is set to continue and during 2009 there were increased plantings in the main growing regions.<sup>62</sup>

John Tyas, Chief Executive Officer, Avocados Australia Limited, notes: 'There is no doubt that the avocado market is in very good shape where we have had increased supply and increased price simultaneously, a very enviable position, and there are many things that have contributed to this outcome. The input and oversight by a strong and committed industry body has steered the marketing and promotion program in the direction it has gone. The HIA marketing program has had an impact but so has the extensive work undertaken to improve quality through the supply chain.'



Another study notes that aggressive marketing has resulted in a doubling of consumption growth, and production has almost doubled from 36,000 tonnes in 2004/5 to a forecasted 63,500 tonnes in 2015/6.<sup>63</sup>

<sup>&</sup>lt;sup>62</sup> Avocados Australia: 'Australian Avocado Industry Strategic Plan 2011-2016'

<sup>&</sup>lt;sup>63</sup> Lines I: 'The Success of Generic Marketing Campaigns in the Food Sector'. Potatoes South Australia, October 2013

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Marketing strategy has built on a large research study in 2005/6 with a small follow up in 2007/8. This was augmented by retail scan data from a major retail chain and an annual online survey of 1,800 consumers over the key growing seasons commissioned by Horticulture Australia Limited. Further use was made of Nielsen's Homescan Consumer Panel to monitor consumer behaviour.

Marketing activity has built on this knowledge base and increased from \$987,000 in 2005/6 to \$2.17m in 2011/12.

The review covers various marketing activities, including:

- Initial magazine advertising and associated PR campaigns;
- Television advertising;
- Digital campaign (expandable banners);
- Online editorial sponsorships;
- Fresh product sampling in gyms and mothers & babies groups;
- Dedicated website;
- Masterclass program to educate food service professionals;
- Early age learning tools for educators
- A nutrition and health program with health professionals

In conclusion, Australian Avocados provides a strong case study on the potential for success with multi-faceted industry campaigns over a prolonged period.

### 4.3 Australian Mushrooms

The Australian mushroom industry is actively marketed by the Australian Mushroom Growers Association (AMGA). In the Australian Mushroom Industry Strategic Plan 2011-2016 the objectives are clearly outlined as follows<sup>64</sup>:

- To ensure demand closely matches estimated production levels by maintaining and developing existing markets and exploiting new market opportunities.
- 2. To protect the industry's reputation, production and assets through management of risks, production support and promotion of the industry's interests.
- Manage information, resources (financial, physical and human), and alliances and relationships, to develop the industry and build capacity.



<sup>&</sup>lt;sup>64</sup> AMGA 'Australian Mushroom Industry: Strategic Plan 2011-2016' 2011 page11 http://www.mushrooms.net.au/files/files/Mushroom%20Industry%20Strategic%20Plan1.pdf

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It's emphasis on new product development and marketing is pronounced. Doug Schirripa, Chairman of AMGA wrote: 'Continued investment in R&D and marketing is essential to stimulate consumer demand that will meet the industry's production estimates. Without that investment, the industry's profitability will be seriously challenged.'<sup>65</sup>

The plan's stated strategy re: consumer marketing is to: 'Maintain and develop a strong consumer marketing program that will position mushrooms as an essential part of the everyday diet of all Australians'.<sup>66</sup>

In a presentation on consumer marketing, Greg Seymour, GM of AMGA, references the investment strategy in order to keep demand ahead of supply, and thus produce a healthy return on investment of marketing funds.<sup>67</sup>

The success of this strategy is recounted in a submission to the Senate Rural and Regional Affairs and Transport References Committee Enquiry in November 2014.<sup>68</sup>

The Australian mushroom industry has had a levy system in place for over 45 years. The levy funds have been used primarily for marketing, R&D and industry risk management. The levy system has received strong support from the vast majority of levy payers, because the benefits they have received have accrued consistently over a long period of time. The Australian mushroom levy system, and the outcomes it has produced, is acknowledged inside and outside the industry as a key driver of sustained industry growth. It is the envy of the mushroom industry around the world.

'Since official industry records began in 1978, the Australian mushroom industry has grown from 6,000 tonnes to 66,000 tonnes of production today, with annual per capita consumption increasing from 0.6kg to 3.2kg in the same period. Imports have decreased from 50% back then to less than 10% today. A key industry marketing strategy has been the repositioning of mushrooms in the mind of consumers from a low value canned product in the 70s and 80's to a high value fresh product today.<sup>69</sup>

#### Moreover:

'In 2002, the mushroom industry moved from a voluntary levy to a statutory levy for R&D and marketing. In the decade that followed, significant benefits were realised with the industry's Gross Value Production (GVP) increasing nearly twofold (Fig 1). Increases in both production and prices to growers occurred simultaneously for ten consecutive years as a result of the industry's generic marketing program.

<sup>6</sup>During this period combined Investments in Research and Development (R&D) and marketing of \$25 million between 2002 and 2012 resulted in almost \$1 billion of additional cumulative industry revenue above the 2002 baseline. This effectively demonstrates the high value of the

<sup>65</sup> AMGA [2011] p. 2 Chairman's Foreward

<sup>&</sup>lt;sup>66</sup> AMGA [2011] p. 19

<sup>&</sup>lt;sup>67</sup> Seymour G: 'What's Really Involved in Cut-through Consumer Promotion – The Mushroom Industry Experience' http://www.pma-anz.com/userfiles/files/thu%20p3%201230%20seymour.pdf slide 18

<sup>&</sup>lt;sup>68</sup> Seymour G/AMGA 'Industry structures and systems governing the imposition and disbursement of marketing and research and development levies in the agricultural sector' Submission to the Senate Rural and Regional Affairs and Transport References Committee Enquiry November 2014.

<sup>&</sup>lt;sup>69</sup> Seymour G/AMGA [2014] p. 4

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levy system to the mushroom industry as-a-whole.<sup>70</sup>

#### 4.4.1 Tasmanian Test Market

In late 2010/ early 2011 a test market experiment was undertaken in Tasmania to evaluate the effectiveness of a new marketing campaign. The AMGA developed a revised marketing strategy, the core of which is the concept summarised in the slogan 'Are You in the Dark about the Power of Mushrooms?'. This was to replace the concept already running and summarised in the line: 'Mushrooms, the Healthy All-Rounder'.

This was conveyed in a number of media:

- Television commercials
- Radio commercials
- Product demonstrations in stores and at local festivals
- Point of sale material in certain stores
- Public relations campaign
- 'The Power of Mushrooms' website



The industry retained Professor Julian Alston, one of the world's foremost authorities on the promotion of agricultural products, to assist in the analysis of the success of the test market. He, together with colleague Joanna Parks, published their findings in the Australian Journal of Agricultural and Resource Economics.<sup>71</sup>

They found that the benefit-cost ratio was a conservative 7.6:1 for producers if they had funded the entire expenditure for the campaign, and, for Tasmania as a whole, it was 11.4:1. However, this is in comparison to the Australian mainland, in which mushrooms were being promoted over the same time period. To adjust for this 'the true benefit–cost ratios for producers and society may be twice as large—15:1 if producers bear all the cost and 22:1 if they bear in proportion to their share of benefits.<sup>72</sup>

As the authors note, these are very favourable results, since anything over a benefit-cost ration of 1:1 is sufficient to justify investment of marketing funds.

#### 4.4.2 Conclusions Regarding Mushroom Marketing in Australia

The evidence on both the macro results over many years, and the test market results in Tasmania, shows that marketing has proved to be a strong contributor to stimulating market demand.

<sup>&</sup>lt;sup>70</sup> Seymour G/AMGA [2014] pp. 4/5

<sup>&</sup>lt;sup>71</sup> Alston JM and Parks JC: '*The returns to promotion of healthy choices in Tasmania: are you in the dark about the power of mushrooms*' Australian Journal of Agricultural and Resource Economics, 56 (3), Jul 1, 2012, pp. 347-365

<sup>&</sup>lt;sup>72</sup> Alston and Parks [2012] p. 363

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### 4.4 West Australian Potatoes

'The Potato Marketing Corporation of Western Australia, established in 1987, is a statutory marketing organisation under Western Australian Government legislation and is responsible for managing the supply of fresh table potatoes in Western Australia.

'Western Potatoes, the marketing arm of the Corporation, conducts marketing activities on behalf of Western Australian potato growers and has a considerable reputation for the delivery of extensive marketing of fresh potatoes in that State. All potato growers pay a mandatory marketing levy of \$26.00 per tonne sold.<sup>73</sup>

'Fresh potato consumption per capita in Western Australia has declined by 20% over the last decade, WA growers committed to investing in a category marketing campaign to stop this decline and increasing consumption per capita of fresh potatoes.<sup>74</sup>

#### **Campaign Overview**



- The 'Serve Up Some Goodness' campaign aims to inspire increased potato consumption by reinforcing the taste attributes of potatoes with areat tasting, simple recipes, hints and tips in a creative delivery.
- It also sets out to remove barriers to consumption by tackling perceived consumer concerns of healthiness and inconvenience.



A new brand ('Fresh Potatoes') was created to headline the category. 'This is complemented by the Buy West Eat Best logo which is used to signpost the WA origin of the product. The campaign has required the production of a suite of creative materials including new recipes, television, digital radio and print adverts and a world class website.<sup>75</sup>

The campaign includes:

- Television advertising
- Print advertising, used tactically to support specific themes
- Cinema advertising
- Radio advertising to support key health themes
- Digital advertising approximately 20% of the budget spent on digital advertisements
- Social media

<sup>&</sup>lt;sup>73</sup> Lines I, 'The Success of Generic Marketing Campaigns in the Food Sector'. South Australian Potato Trust, October 2013

<sup>&</sup>lt;sup>74</sup> Potato Marketing Corporation of Western Australia, Annual Report 2013/2014 <u>http://www.pmc.wa.gov.au/pdf/Annual-Report-</u> 2013-2014.pdf <sup>75</sup>Potato Marketing Corporation of WA Annual Report 2013/2014 p.40

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- Royal Show over 22,000 children dug potatoes at the specially designed potato stand.
- Foodservice Education 'Potatodors' (potato chef ambassadors) were appointed to represent the potato industry to their fellow chefs.
- Seed for Schools over 350 schools in a program that teaches children about the potato growing cycle.

#### **Campaign Results**

On the basis of quarterly household tracking measures:

- 'Consumers are purchasing a larger volume of potatoes on a weekly basis (compared to the same time periods 1 year ago). This is a function of increased numbers of households purchasing potatoes and/or increased volume of potatoes being purchased in each transaction.
- 'Consumers are spending more per kilo on potato purchases. This reflects a transition to better tasting branded product lines that are sold at a higher price.

'This has translated to real demonstrable results to growers. with a sustained growth in the WA Fresh Ware Potato Industry. Sales growth is a result of better use of produced product, increases in quality and the demand created by the category marketing campaign.

<sup>(During the same time period there has been a material change to total market size (measured by PMC sales and total imports to WA). A declining market (2012-2013) has been put back into growth (2013-2014) by the major grower investment in a category marketing campaign.<sup>76</sup></sup>

#### **Editorial Comment**

This campaign has received press endorsement as follows:

'Last year, WA growers invested \$1.5 million into the development of a campaign which was designed to address consumers perceptions that potatoes were unhealthy. After just nine months, the Potato Marketing Corporation WA has lifted declining sales up by 2000 tonnes *The Weekly Times reports*.

#### Caveat

There are certain bodies that have expressed concern regarding the campaign's effectiveness: 'AUSVEG remains wholly unconvinced of the benefits of a grower-funded generic potato marketing campaign despite claims from the Potato Marketing Corporation of Western Australia that the initiative has been a success in that state.

'Data from the PMC's own annual report has shown that potato sales revenue for 2013-14 dropped by almost 3 per cent from the previous financial year, which raises very legitimate questions about the value growers have received from their significant marketing investment.

"While the PMC are claiming 'clear and tangible signs of success' from the Western Australian grower-funded generic marketing campaign, we believe growers have

<sup>&</sup>lt;sup>76</sup> Potato Marketing Corporation of WA: *Annual Report 2013/2014* p.41

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received an unacceptable return on their investments," said AUSVEG spokesperson Andrew MacDonald.'77

#### Conclusion

The results of the WA 'Fresh Potatoes' campaign have polarised opinions. Protagonists point to increased awareness and demand. Detractors question the benefits, both short and long-term.

### 4.5 California Commodity Marketing Programs

Two sources provide considerable insight into the above. The first is an article by Professor Hoy Carman of the Davis campus of University of California<sup>78</sup>. The second is a book edited by four leaders in the field of agricultural economics: Harry M Kaiser, Julian M Alston, John M Crespi and Richard J Sexton<sup>79</sup>.

Both provide the context of several legal challenges to Federal funding of commodity marketing programs by powerful organised opposition groups.

These legal actions have focused on the effects of mandated marketing programs.

Provisions in the 1996 Farm Bill in the USA require all Federal Research and Promotion Boards to do an economic evaluation of their programs at least every five years.

The authors note that there is increasing interest in verifying and documenting the costs and returns relating to:

- 1. Advertising and promotion
- 2. Minimum maturity, size and quality standards
- 3. Quantity controls in the form of reserves, pro-rate and set aside
- 4. Research programs

Some of the major case studies from the above references are summarised herewith:

 California Almonds. Success of campaigns resulted in increased almond plantings in California and in competing countries like Spain. The Giannini Foundation has created an econometric model<sup>80</sup> which can offer projections of acreage adjustments and pricing projections. In a separate article by Kaiser et al [2005]<sup>81</sup> it was estimated that 'marginal dollars expended promoting almonds yielded a return to producers in the range of from 3 to 1 to 10 to 1.'

<sup>77</sup> http://ausveg.worldsecuresystems.com/media-release/ausveg-questions-benefits-of-generic-potato-marketing-campaign-1

<sup>&</sup>lt;sup>78</sup> Carman HF: *Evaluation of California Commodity Marketing Programs*' ARE Update, 1, No. 2, Winter 1998

<sup>&</sup>lt;sup>79</sup> Kaiser HM, Alston JM, Crespi JM and Sexton RJ: '*The Economics of Commodity Promotion Programs: Lessons from California*', Peter Lang Publishers, 2005

<sup>&</sup>lt;sup>80</sup> Alston JM, Carman HE, Christian JE, Dorman J, Murua JR and Sexton RJ: '*Optimal Reserve and Export Policies for the California Almond Industry: Theory, Econometrics and Simulations*', Davis: University of California Agricultural Experiment Station, Giannini Foundation Monograph 42, February 1995

<sup>&</sup>lt;sup>81</sup> Crespi JM and Sexton RJ: 'Evaluating the Effectiveness of California Almond Promotion: How Much Did the Litigation Cost Producers', Chapter 8 in Kaiser HM et al [2005]



 California Walnuts. Carman references a paper by Weiss et al<sup>82</sup> which concluded that the USDA's Market Promotion Program for walnuts in Japan had been very effective, with a cumulative increase in shelled walnut shipments totalling 4.5 tons for every \$1,000 of promotion expenditures. 'In total revenue terms, each promotional dollar spent in Japan increased revenues by approximately \$5.85.

In another analysis of the Walnut Marketing Board's (WMB's) activities<sup>83</sup>, Kaiser's analysis indicates that 'WMB's marketing programs have had a positive and statistically significant effect on domestic per capita walnut demand...' and that 'In the years between 1984 and 1999, WMB marketing activities increased total walnut utilization by 124,665 tons, or 7,333 tons per year'. Moreover, Kaiser found that the WMB's activities had had a positive impact on grower profits and that the benefits of WMB's marketing programs have been considerably greater than the costs.

- **Table Grapes.** Carman notes that both completed and work underway 'documents significant increases in product demand as a result of commodity advertising and promotional programs, with net monetary benefits to producers being much greater than costs.' Carman also quotes Alston et al<sup>84</sup>, who estimated that 'the elasticity of demand with respect to promotion for California table grapes was 0.16. 5 Using this promotion coefficient, they estimated that the promotional activities of the Table Grape Commission had increased per capita consumption by about 1.5 pounds over that which would have existed in the absence of a promotional program. This increase was about one third of recent total per capita consumption. Carman writes: 'The benefits to producers were very high in both the short and long-run. The short-run marginal benefit-cost ratio was estimated at over 80:1 which indicates that, for every \$1 spent on the program, the industry gained net benefits of \$80. When producer supply response was factored into the analysis, the benefit-cost ratios decreased. Using a supply elasticity of 5, the average benefit-cost ratio was about 10:1 and the marginal benefit-cost ratio for a 10 percent increase in promotional expenditures was about 5:1'.
- California Avocados. Professor Carman refers to a paper undertaken by himself and R K Craft<sup>85</sup> in 1997. They 'found that industry advertising and promotion programs have significantly increased the demand and price for California avocados.' Comparison of simulated advertising and no advertising scenarios showed that advertising increased prices and per-acre returns.

Based on estimated price flexibilities of demand, a 10 percent increase in advertising and promotion expenditures was associated with a 1.3 percent increase in the price of California avocados. Estimated discounted short-run (month-to-month and year-to-

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<sup>&</sup>lt;sup>82</sup> Weiss KR, Green RD. Havenner AM: 'Walnuts in Japan: A Case Study of Generic Promotion Under the USDA's Market Promotion Program', In Agricultural Commodity Promotion Polies and Programs in the Global Agri-Food System, Proceedings of NEC-63 Conference, NICPRE, Cornell University, pp. 47-80, May 1996

<sup>&</sup>lt;sup>83</sup> Kaiser HM: 'An Economic Analysis of the Walnut Marketing Board's Promotion Programs'.. Chapter 9 in Kaiser HM et al [2005]

<sup>&</sup>lt;sup>84</sup> Alston JM, Chalfant JA, Christian JE, Meng E, Piggott NE: '*The California Table Grape Commission's Promotion Program: An Evaluation*', Davis: University of California Agricultural Experiment Station, Giannini Foundation Monograph No. 43, November 1997

<sup>&</sup>lt;sup>85</sup> Carman HF and Craft RK: '*An Economic Evaluation of California Avocado Industry Marketing Programs, 1961-1995*',. Davis: University of California, Department of Agricultural and Resource Economics, February 1997



year) returns ranged from \$5.33 to \$6.35 for every dollar spent on advertising and promotion over the period of analysis. After allowing for increased production due to improved returns, discounted real long-run returns from advertising and promotion expenditures still averaged \$1.71 to \$1.78 for every dollar of advertising and promotion expenditures over the 34-year period of analysis.'

Carman and Craft also contributed a chapter in the book mentioned at the start of this section<sup>86</sup>. In the figure below, the last observation without advertising was 55,196 acres, which was 4,568 acres (almost 8 percent0 less than with advertising.

Figure 7.10. California Avocado Bearing Acreage, Actual and Simulated with and without Advertising, 1962–1995



- California Prunes. Carman references a paper which he co-authored<sup>87</sup>: 'Our most recent research results indicate that expenditures on promotion by the California Prune Board and by Sunsweet Growers have significantly increased the demand for prunes.' And 'Over the four-year period analyzed, investments by prune growers in promotion yielded them marginal returns of at least \$2.65 for every dollar spent.'
- **California Raisins.** A case study of the export promotion programs of the Raisin Administration Committee undertaken by Kaiser et al [2003]<sup>88</sup>. The study addressed four questions:
  - What was the responsiveness of demand for California raisins in Japan and the UK in response to the RAC's export promotion programs between 1965 and

<sup>&</sup>lt;sup>86</sup> Carman HF and Craft RK: '*Evaluation of Avocado Promotion by the California Avocado Commission*'. Chapter 7 of Kaiser et al [2005]

<sup>&</sup>lt;sup>87</sup> Alston JM, Carman HF, Chalfant JA, Crespi JM, Sexton RJ and Venner RS: '*The California Prune Board's Promotion Program: An Evaluation*'. Davis: University of California, Department of Agricultural and Resource Economics, October 1997

<sup>&</sup>lt;sup>88</sup> Kaiser HM, Liu DF, Consignado T: '*An Economic Analysis of California Raisin Export Promotion*', Chapter 10 Kaiser et al [2005]. Originally published in Agribusiness: An International Journal, 2003, John Wiley and Sons.

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1998?

- What would have been the exports to these countries if there weren't such programs?
- What was the benefit-cost ratio?
- What was the marginal return?

The charts below give a simple graphic answer to the first two of these questions.

Figure 10.1. Simulated California Raisin Exports to Japan with and without Export Promotion Programs in Metric Tons



#### Source: Kaiser et al [2003]

Figure 10.2. Simulated California Raisin Exports to the United Kingdom with and without Export Promotion Programs in Metric Tons



Source: Kaiser et al [2003]

Kaiser et al calculated that every dollar invested in export promotion in Japan returned, on average, \$6.64 or \$5.13 over the two periods examined. It was even higher in the UK, with every dollar invested returning \$15.29 in export revenue to the

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Californian raisin industry.

Kaiser et al provided the following table to show how these compare with other export promotions.

Table 10.3. Selected Benefit-Cost Ratios for Other Export Promotion Programs

Study		Ratio
Pecan Export Promotion – Asia	Onunkwo and Epperson 2000	6.45
Pecan Export Promotion – EU	Onunkwo and Epperson 2000	6.75
Almond Export Promotion – Japan	Halliburton and Henneberry 1995	4.95
Almond Export Promotion – Taiwan	Halliburton and Henneberry 1995	5.94
Almond Export Promotion – Hong Kong	Halliburton and Henneberry 1995	3.69
Potato Export Promotion – Japan	Lanclos, Devadoss, and Guenther 1997	1.29
Potato Export Promotion – Philippines	Lanclos, Devadoss, and Guenther 1997	11.77
Potato Export Promotion – Thailand	Lanclos, Devadoss, and Guenther 1997	16.36
Red Meat Export Promotion – Pacific Rim Excluding Japan	Le, Kaiser, and Tomek 1998	15.62

Source: Kaiser et al [2003]

In terms of the fourth question, they found the following:

- For Japan, the marginal benefit-cost ratio was 0.56 for 1965-1998, and 0.42 for the more recent period, 1985-1998. This means that, if the industry spent more on export promotion, for every dollar spent, only about 50 cents return would result.
- For the UK, the marginal benefit-cost ratio was 3.19, indicating that further investment would enjoy greater proportional returns.

#### Conclusion

The above case studies from California provide strong support to the case for commodity programs in those industries that can muster the marketing muscle and apply it over sustained periods. The positive average benefit-cost ratios across the above examples provide a numeric measure of this success.

California Strawberries: 'Food Safety and the Strawberry Case'<sup>89</sup>. On the face of it, this seems like an odd inclusion in this paper. However, this chapter/article has interesting observations regarding advertising versus public relations as a method of countering negative media reports, and, via application of econometrics, makes estimates of benefit-cost amounts associated with the communications. The article focuses on a reported outbreak of illness in 1996 attributed to the consumption of Californian strawberries. This resulted in significant reduction in

<sup>&</sup>lt;sup>89</sup> Richards TJ and Patterson PM: '*The Economic Value of Spin Control: Food Safety and the Strawberry Case*'. Chapter 14 in Kaiser et al [2005]. Originally published as '*The Economic Value of Public Relations Expenditures: Food Safety and the Strawberry Case*', Journal of Agricultural and Resource Economics, 24, Issue 2, pp 440 -462, December 1999.

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demand. Laboratory tests later exonerated the strawberries and found that the problems were due to consumption of Guatemalan raspberries. However, almost exactly a year later, 198 Michigan schoolchildren and teacher contracted Hepatitis A from eating a dessert made from contaminated strawberries, quickly discovered to have been imported from Mexico.

The authors review the arguments regarding righting negative publicity, with wellreferenced attribution to different contributions. They note the difficulty of using advertising or sales promotion to counter negative opinions, and ground their analysis in Attribution Theory as proposed by H Kelly in 1967<sup>90</sup> and discussed by Mizerski [1982]<sup>91</sup>.

Using an econometric model based on Attribution Theory, the authors quantify grower losses due to negative media reports and the value of defensive media activities. In the short-term, they assume that supply is relatively inelastic, as the plants are in the ground and bearing fruit. The more inelastic the supply, the more the price will fall in response to a rapid, or shock, fall-off in demand. The simulations considered a range of different supply elasticities as per the chart below.

	Short Run (million dollars)			Long	Long Run (million dollars)			
Scenario Supply Elasticity	Bad News	With Defense	Value of Defense	Bad News	With Defense	Value of Defense		
0.01	-232.656	-109.493	123.163	-273.424	-128.649	144.775		
0.1	-227.585	-107.369	120.216	-266.978	-126.002	140.976		
0.5	-207.424	-98.612	108.812	-241.975	-115.232	126.743		
1.0	-187.800	-90.056	97.744	-218.559	-105.170	113.389		
2.0	-161.250	-78.634	82.616	-189.173	-97.585	91.588		
5.0	-140.828	-92.257	48.571	-83.518	-49.705	33.813		

Table 14.2. Loss of Producer Returns due to Unfavorable Media Exposure and the Value of Media Defense from a 10 percent Shock to the Number of Articles

Notes: All cases represent the cumulative cost or benefit of all media exposure from January 1994 to October 1997. Producer returns are in millions of current dollars.

Source: Richards et al [2005]

'Assuming a very low supply elasticity (0.01) and short-run price and information adjustments, and focusing on the case where consumers are exposed to only bad news, growers would lose a total of \$232.6 million over the sample period - 19.6 percent of the total value of all shipments. Including the effects of positive media information reduces the total loss to \$109.5 million, which implies that positive information is worth \$123.2 million in this case.' At higher elasticities of supply, whereby the producers are able to adjust supply in response to price changes, the damage is less, as per the table above.

Moreover, although the long-run effects are greater per supply elasticity level, it is likely

<sup>&</sup>lt;sup>90</sup> Kelly HH: 'Attribution Theory in Social Psychology'. Nebraska Symposium on Motivation. Levine D, ed., pp 192-238. 15. Lincoln NE: University of Nebraska Press, 1967.

<sup>&</sup>lt;sup>91</sup> Mizerski R: 'An Attribution Explanation of the Disproportionate Influence of Unfavorable Information'. Journal of Consumer Research 9 (1982): 301-310.

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that growers can adjust more in a longer time frame, so the elasticity is likely to be higher in this time frame.

**Conclusion:** This study recognises the importance of news stories in modifying consumer demand, both on the negative and positive side. Cogently argued, the model defines a world in which both negative and positive stories can have considerable effect on demand. As a component of the marketing mix, this indicates the importance of PR in any intervention or movement to improve the overall consumption of vegetables.

# 4.6 USA: National Benefit-Cost Estimates for the Dairy, Beef, Pork and Cotton Promotion Programs<sup>92</sup>

The focus on these commodities is due to their prominence in the US check-off (aka. Levy) system, accounting for 83% of total funds available from check-offs in 2001; an amount of \$500 million.

Considerable econometric analysis has been applied to these commodities, giving them a firm basis for determining whether promotion pays.

The authors focus on evaluations submitted to the US Department of Agriculture for the 1995-2000 evaluation period.

The authors define the benefit-cost ratio (BCR) as the average benefit-cost ratio, as distinct from the marginal benefit-cost ratio. So, if the BCR for a commodity is 5, it means that for every dollar spent on promoting it, there is a profit of \$5.

'Overall, it appears from these estimates that the cotton promotion program, like the dairy, beef and pork programs, is highly profitable.....it appears that Pork is the most lucrative program (51.8), followed by cotton (45.4), beef (32.3) and fluid milk (18.8)' [figures in brackets are the benefit-cost ratios].

#### Conclusion:

The basic conclusion reached by the writers is that 'benefits exceed costs for all programs'.

<sup>&</sup>lt;sup>92</sup> Kinnucan HW and Yuqing Zheng: 'National Benefit-Cost Estimates for the Dairy, Beef, Pork and Cotton Promotion Programs'. Chapter 12 of Kaiser et al [2005]

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### 4.7 UK 'Many Faces of Potatoes' Campaign 2011

In 2011 the UK Potato Council published the Cost Benefit Analysis – CB05 for the first year of the 'Many Faces of Potatoes' Campaign.

The market challenge was to sustain the demand for potatoes and counter the trend towards competitive products such as pasta and rice, which received considerable promotional support.

The first year was quite low budget at £250,000. The analysis calculated the return at £3,170,000: 'Based on the assumptions...each pound of levy invested is returning £12.68 of consumer spend'.<sup>93</sup>

In 2012 a commercial aired featuring people bringing potatoes to the plate: for example, a farmer, a food blogger, dinner lady, chef.



In its website, the Potato Council notes<sup>94</sup>, under the date 21 November 2011, 'The <u>Many</u> <u>Faces of Potatoes (link is external)</u> campaign, an EU co-financed initiative alongside France and Belgium whose sectors face similar challenges with younger consumers, has successfully helped to highlight the versatility, convenience and healthiness of the potato through a wide range of consumer-centred marketing tools.

'Our third Many Faces of Potatoes TV advertisement aired between July 1-14 2013, demonstrating the health benefits of potatoes in a family home situation. It previewed on ITV1 at 8:45am on Daybreak on Monday July 1, with further 30" runs on Daybreak, ITV Digital, Sky1, Sky Living, Discovery Channel and Food Network. Other key spots include Jeremy Kyle

<sup>&</sup>lt;sup>93</sup> Evans C: '*Promote: Many Faces of Potatoes Campaign. Cost Benefit Analysis – CB05*' Potato Council, Agriculture and Horticulture Development Board, 2011

<sup>94</sup> http://www.potato.org.uk/about-us/marketing/promote

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on ITV1, Coronation Street and Emmerdale on ITV2, Mad Dogs and Modern Family on Sky1, and Man v Food on Food Network.'



Lines [2013], records that 'The Potato Council sought to raise awareness for the new season crop in the United Kingdom, with a television advertising burst that 'hit' the screens in July 2013. The commercial, which aired across major national channels for two weeks at the start of the month, drove home healthy facts about potatoes to young family audiences.... 'The campaign aimed to highlight the versatility of potatoes through the wide variety of consumers that eat them and is entitled the 'Many Faces of Potatoes'. It was hailed a major success, following positive industry and consumer feedback. The impact of activity, which included national television advertising and a consumer-facing road-show, triggered a clear shift in awareness of the healthiness of potatoes, as well as their versatility and convenience.

'The television advertisement aired on popular ITV and Sky Media channels at breakfast and daytime in July 2013 to a target viewing audience of 3.6 million 25-44 year olds, particularly mothers. The advertisement focused on potatoes being naturally fat free and a source of vitamin C.

'The television presence followed a range of promotional highlights, including the introduction of Potato Week and a nationwide competition fronted by Chef James Martin. This has encouraged hundreds of consumers to share quick and easy potato-based recipe ideas. Following viewing, 95% of consumers agreed that potatoes are healthy compared to 83% of non-viewers; an increase of nearly one million shoppers. During the two weeks of broadcasting the advertisement also increased visitor traffic to the Many Faces of Potatoes website (www.manyfacesofpotatoes.co.uk) by one third.<sup>95</sup>

In July 2013, an online article 'Many Faces of Potatoes Big Success'<sup>96</sup> carried the following: 'Stu Baker, Potato Council marketing and PR executive, said, "Many Faces of Potatoes has

<sup>&</sup>lt;sup>95</sup> Lines [2013] pp53-54

<sup>&</sup>lt;sup>96</sup> <u>http://www.freshplaza.com/article/111929/Many-Faces-of-Potatoes-campaign-big-success</u>

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been an excellent platform to reach consumers. The TV ad was impactful in terms of raising health awareness and driving traffic to the website.

"The roadshows provided additional opportunities for in-depth interaction with our core audience and provided much needed recipe inspiration. The TV commercial played continually on our stand at each centre to attract consumers and we had a skilled chef on hand to cook three potato dishes every hour for sampling."

"Reassuringly at the end, 95% of consumers visiting the stand agreed that potatoes were a healthy choice. People also love their convenience and versatility – all of which are essential messages to drive sales."

'Consumer response to the new classification system has also been positive throughout the activity, with high recognition of 'salad', 'fluffy' and 'smooth' amongst the general public. 'Natural' and 'nutritious' also scored well, with over a third of consumers associating these terms with potatoes.

'Stu added, "It is clear the three-year Many Faces of Potatoes campaign has had real influence, generating much needed awareness for potatoes and giving shoppers more reasons to choose them."

#### Conclusion

It is difficult to find more than the initial Cost Benefit results in reports, but clearly there is a belief that this campaign has been effective in increasing the demand for potatoes in the UK.

Despite this, a July 2014 article in FreshFruitPortal.com noted that 'sales of potatoes have fallen by 8% in Britain as consumers make alternative choices that often snub the nation's traditional staple'.<sup>97</sup>

This suggests that competitive activities, in this case, may outgun the fresh produce promotion.

<sup>97</sup> http://www.freshfruitportal.com/2014/07/03/u-k-potato-consumption-peels-off/?country=australia

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### **4.8 US Potato Board: Marketing Evaluation 2012**

As part of legal requirements regarding the employment of check-off (levy) funds for marketing in the USA, an evaluation is required every five years.<sup>98</sup>

In 2012 Timothy Richards and Harry Kaiser, both highly experienced agricultural economists, presented such an evaluation.<sup>99</sup>

They note that this was a volatile period, largely due to the changes in grower prices, which peaked at \$23.66 per hundredweight ( $cwt^{100}$ ) in 2008 and fell to only \$6.00/cwt a year later. This was a result of the recession in the USA.

In September 2008 the US Potato Board launched the 'Potatoes...Goodness Unearthed' Campaign in food lifestyle, health, parenting and women's service magazines. The campaign showed three different types of potatoes in separate executions, with the skin peeled back to reveal the health and nutrition message.





The Richards and Kaiser evaluation covers all aspects of this and associated marketing initiatives (eg. retail category management, PR, innovation research and export market development).

<sup>&</sup>lt;sup>98</sup> The Farm Security and Rural Investment Act of 2002 requires all Federally sanctioned marketing orders to undertake an econometric assessment of the impact of these activities on grower profits.

<sup>&</sup>lt;sup>99</sup> Richards TJ and Kaiser HM: *'Evaluation of Grower-Funded Marketing Activities by the United States Potato Board'*, Final Project Report Prepared for the United States Potato Board, November 2012 http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5088455

<sup>&</sup>lt;sup>100</sup> One hundredweight in the US Customary System is 100lbs, and is known as a short hundredweight, to distinguish it from the Imperial system, which is 112lbs or 8 stone

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The authors point out that there are two aspects to marketing activity that need to be examined:

- The activity must have increased the demand for potatoes
- The increase in demand must generate higher returns to growers than the cost of the activity (as defined by the Benefit Cost Ratio or BCR).

This is illustrated in the simple demand and supply graph below. It is assumed that successful promotions will shift the demand curve to the right, with a resultant increase in price and production quantity.



Source: Richards and Kaiser [2012] p.4

Their results were summarised as follows: 'On average, across all markets and type of investment, we found a BCR of 5.167 in the short run and 6.511 in the long run.'<sup>101</sup> In other words, for each \$1 invested in promotion and marketing, the industry gained a return of \$5.167 in the short run and \$6.511 in the long run.

#### Conclusion

Within the assumptions made, the marketing initiatives over this period have proved worthwhile, delivering a significantly positive return on investment.

<sup>&</sup>lt;sup>101</sup> Richards and Kaiser [2012] p. 20

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### 4.9 Summary and Conclusions

- 1. Australian avocados. There is a strong belief that the national marketing campaign has been instrumental in the dramatic growth of the industry.
- 2. Australian mushrooms. The evidence on both the macro results over many years, and the test market results in Tasmania, shows that marketing has proved to be a strong component for stimulating market demand.
- 3. It seems clear that the WA 'Fresh Potatoes' campaign achieved significant results in increasing demand, resulting in increased price and quantity sold.
- 4. California almonds. it was estimated that 'marginal dollars expended promoting almonds yielded a return to producers in the range of from 3 to 1 to 10 to 1.
- 5. California walnuts. Econometric analysis estimated that, in total revenue terms, each promotional dollar spent in Japan increased revenues by approximately \$5.85. In the local market,
- 6. California table grapes. In the short run, it was estimated that, for every \$1 spent on the program, the industry gained net benefits of \$80. The average benefit cost ration for the longer run was estimated at 10:1.
- 7. California avocados. A study in 1997 found that returns ranged from \$5.33 to \$6.35 for every dollar spent on advertising and promotion over the period of analysis.
- 8. California prunes. Over the four-year period analyzed, investments by prune growers in promotion yielded them marginal returns of at least \$2.65 for every dollar spent.
- 9. California raisins. Kaiser et al calculated that every dollar invested in export promotion in Japan returned, on average, \$6.64 or \$5.13 over the two periods examined. It was even higher in the UK, with every dollar invested returning \$15.29 in export revenue to the Californian raisin industry.
- 10. Econometric analysis for dairy, beef, pork and cotton industries resulted in the conclusion that investment in advertising for all of these yielded substantial returns.
- 11. The UK's 'Many Faces of Potatoes' campaign is accorded success by those in the industry, on the one hand, but this seems in contrast to an apparent continuing fall in consumer demand.
- 12. In terms of the US campaign by the US Potato Board, an econometric study of the results showed that for each \$1 invested in promotion and marketing, the industry gained a return of \$5.167 in the short run and \$6.511 in the long run.

#### Conclusion

Here in Australia the evidence is very limited. Other than a few shining lights (mushrooms, avocados, potatoes) for this segment, overall it is challenging, if not impossible, to find definitive evidence of sustained growth in consumption.

The American system of check-offs (levies) being applied to marketing, and the requirement to evaluate these every five years, has driven grower organisations to seek the services of agricultural economists. They have, in turn, applied the science of econometrics to the analysis of effectiveness. In many cases a Benefit-Cost ratio (BCR) was calculated with regard to the efficiency of these programs, and results were notably positive.

There seems little doubt that, where the growers are motivated to fund sustained marketing efforts, in the United States it has proved beneficial.



# SECTION FIVE: STRATEGIC DISCUSSION



## 5.1 Introduction

As noted in the introduction to this document, when we started our investigation, we realised that 'advertising' (as per our original mandate) can be interpreted very broadly. The terminology of the field is more frequently expressed as an intervention, which could include all manner of communications including pamphlets, posters, public relations, sampling, events, school education programs and retail promotions. Even packaging can be a form of advertising, and indeed often it is a well-executed retail presence that has a significant bearing upon consumer purchase.

We rapidly realised that too narrow a lens, would exclude many important reports as to the success or failure of different interventions.

So, in the interest of a more complete report, we opted to take a wider view.

We also noted that there are a large number of interested parties that are motivated to initiate behaviour change with respect to the national diet.

From the wide ranging national perspective, the problem of obesity in Australia is at the forefront in motivating large scale interventions. As one of the primary tactics to attack this issue, increasing vegetable consumption is an important weapon in the campaigners' arsenal. It is important that the vegetable industry has a voice at the table.

National interventions also express themselves at the localised level. Here the emphasis on vegetable-oriented diet is crucial, particularly in the youngest generation, especially schoolchildren.

At the more immediate level, there are campaigns to promote specific 'brands' of commodities such as mushrooms, avocados and potatoes.

In this section we address some of the issues and discuss potential solutions.



### 5.2 The Not-So-Level Playing Field

As per Harris et al [2009]<sup>102</sup>, and countless published reports from academics across the globe, the world has been led down a path of calorie–dense, nutrient poor unhealthful foods.

Harris et reports that 'it is de rigeur to claim that obesity results from a complex combination of genetics, family and psychological variables and a host of environmental factors that effect diet, physical activity or both'.<sup>103</sup> This stance discourages action because institutions such as the food industry and governments can claim exemption from responsibility because," there is no one cause for obesity" and because of a paucity of evidence of effective interventions.

Indeed, what is disturbing is that despite countless efforts over several decades and across different continents, there is little clinical evidence of effective interventions.

Whilst success or failure is often difficult to categorically attribute to any single determinant, it is worth noting and acknowledging that governments and their heath proponents will continue in search of answers and solutions.

As the above section title infers, the task is an onerous one. The food giants and marketers of unhealthful foods have a good 50 year head start; have very deep pockets to invest in massive marketing initiatives, and are well placed to protect their investment in the consumer. Above all, these companies have zeroed in on children, recognizing that children and adolescents represent a vast market opportunity. In the United States, these age groups spend an estimated \$200 billion per year. With many years of consumer behaviour ahead of them, it is not surprising that food companies invest heavily to increase sales and create brand loyalty amongst young consumers.



<sup>&</sup>lt;sup>102</sup> Harris JL, Pomeranz JL, Lobstein T and Brownwell KD: 'A Crisis in the Marketplace: How Food Marketing Contributes to Childhood Obesity and What Can Be Done'. Annual Revue of Public Health, 2009.30 pp. 211-25

<sup>&</sup>lt;sup>103</sup> Harris et al [2009] p. 212



The extent of marketing targeted directly to children and adolescents is striking, but the content also alarms health experts. In the US, more than 98% of the television food ads seen by children and 89% of those seen by adolescents are for products high in fat, sugar and/or sodium.<sup>104</sup>

Whilst one could populate this issue with pages of evidence, the real point is that success to date has been hampered by many challenges of which, perhaps the most significant is the sheer weight of activity, which promotes unhealthful foods.

Given these challenges, enormous effort and a unified approach from multiple interested parties (government, health, diet and nutritionists, schools, producers and retailers) provides the only possible solution for a positive shift of the needle in favour of fruit and vegetables.

As evidenced by Meat and Livestock Australia, in the case of Red Meat, negative barriers to consumption can be alleviated through consistent clever creative messaging. The answer lies with the consumer. Sound research can identify barriers and obstacles that communications need address in strategies, which are then well executed consistently over years rather than weeks or months.

### 5.3 A Way Forward?

Our analysis was broken down into three subsets, namely;

- 1) Vegetable commodity programs (mushrooms, avocados, potatoes)
- 2) Regional/local interventions (WA Go for 2&5,NSW Eat it to beat it)
- 3) National Diet Programs (Canada About half your plate, UK Food Dudes)

Our research led us to examine countless academic reports that are easily accessible via the Internet. Whilst access is not the issue, quality of data and depth of analysis are real concerns. Certainly, the US, UK and Australia provided us with the best quality of literature and aside from the Danish, `Six a Day `campaign, few examples of significance were from Europe or elsewhere.

Let us draw some conclusions from the best available academic analysis.

#### 5.3.1 Vegetable commodity Programs

California is a leading source of commodity specific marketing and Hoy Carman, professor from the Department of Agricultural and Resource Economics is acknowledged as an authority.

Carman [1998] reported that California has 13 Federal marketing programs in place and 48 state marketing programs. Californian commodity producers have recently assessed themselves upwards to \$150 million annually to operate these marketing programs with about 75% budgeted expenditure devoted to advertising and promotion.

<sup>&</sup>lt;sup>104</sup> Harris et al [2009] p. 213



Carmen concludes that `commodity marketing administrative committees will continue to face questions concerning the economic effectiveness of their individual marketing program expenditures. Given standards of evidence and information presently available, many California commodity groups are in the position that they would be hard-pressed to defend their marketing programs in a court of law...Empirical evidence concerning the impact of marketing programs on producers, intermediaries and consumers has large numbers of gaps.'<sup>105</sup> As a result, there is increasing dependence on agricultural economists to undertake econometric validation to satisfy critics of the marketing initiatives.

A further paper from professor Julian Alston from the same California Department of Agricultural and Resource Economics, `Beggar thy Neighbour`<sup>106</sup> suggests that profits from generic advertising by one producer group often come partly at the expense of products of closely related commodities.

Here in Australia, once again, the evidence is very limited. Other than a few shining lights (mushrooms, avocados, bananas, potatoes) for this segment, overall it is challenging, if not impossible, to find definitive evidence of sustained growth in consumption.

Certainly, from a tactical perspective, there remain significant opportunities to focus around season, promoting individual vegetable products around their individual features and benefits, thus presenting consumers with variety and appetite options.

#### 5.3.2 Regional/Localized Interventions

The WA Go for 2 plus 5 campaign and the NSW `Eat it to beat it` campaign provide two good examples of successful regional interventions. In particular The WA campaign as has been carefully recorded by Dr Christina Pollard and subsequently attracted global endorsement, provides demonstrable evidence. Rather than simply recording positive shifts in consumer awareness and saliency, Pollard was able to prove that the Go for 2 plus 5 campaign successfully delivered sustained increased consumption through the three-year life of the campaign from 2002 to 2005.

-Total mean daily vegetable intake by Western Australian adults over 18 years increased by a significant amount of 0.6 servings over the campaign period.

The increase in vegetable intake was observed across all consumption levels but was most pronounced for males with very low consumption.

The NSW `Eat it to Beat it' Hunter Region pilot was also considered effective. Despite its low budget, modest improvements in the predisposition and intake of vegetables were recorded.

Further afield, Ciliska et al. [2000] reported on a wide reaching study reviewing a decade (1988-98) of literature.189 articles were assessed and 60 deemed relevant. A shortlist of 18 articles was found to provide strong analytical/empirical evidence of positive effect. Key conclusions included;

<sup>&</sup>lt;sup>105</sup> Carman [1998] p. 9

<sup>&</sup>lt;sup>106</sup> Alston JM, Freebairn JW and James JS: '*Beggar-Thy-Neighbor Advertising: Theory and Application to Generic Commodity Promotion Programs*' American Journal of Agricultural Economics 83 (2001) 4 pp. 888-902



-Generally easier to effect change in fruit intake than vegetables

-Generally, the longer the intervention the more successful.

-Three of the four interventions with young children resulted in increased fruit and vegetable intake. The fourth resulted in fruit increases alone.

-The schoolchildren studied were varied and not easily summarized. There was a significant increase in attitudes in two, significant increase in vegetable intake in another two and increases in fruit, not vegetables in another.

It would be remiss of us not to acknowledge Ammerman et al. [2002]. 907 unduplicated articles were identified and 104 articles reporting on 92 independent studies were assessed at length. More than three-quarters of the studies (17 of the 22 reporting results for fruit and vegetable intake) reported significant increases in fruit and vegetable intake, with an average increase of 0.6 servings per day. Unfortunately, given time and scope, the authors were unable to obtain full report, however it is recommended that further analysis is warranted in this area.

#### 5.3.3 National Diet Programs: Food Dudes...A Proven Pathway that has Delivered

As has been referenced in papers acknowledged throughout our analysis, there are significant numbers of supporters and detractors of `specific` vegetable promotions and `regional/ localised interventions`.

In the positive camp it is easy to point to avocados or mushrooms, indeed potatoes and argue the point that advertising and promotion has led to increased sales. However, whilst such examples present individual successes in increased sales of their particular vegetable, there is little evidence that they assist in growing the wider vegetable market.

As recently recorded by Rekhy and McConchie [2014], in regard to National Diet Programs, in the developed world, numerous promotional interventions have been initiated by government, industry and not-for profit organizations promoting consumption of fruits and vegetables, to help reduce the risk of disease and promote well-being. Over the past decade, Australia, USA, Canada, New Zealand and several counties in the European Union have conducted informational and educational campaigns to promote increased consumption without significant and sustained success.

However, two interventions have been recorded as standout proven successes. These are, the Danish `6 a Day` campaign and the UK `Food Dudes ` campaign



#### DANISH "6 a day "Campaign

'Launched in 1999 as a 5-year project, it is one of the best known programmes in the European Union, promoting vegetable and fruit consumption through increased accessibility in schools, worksite canteens and the food service industry. The campaign promotes the daily consumption of six fruits and vegetables or 600g of fruits and vegetables.....

'Between 1995 and 2004, The Danish National Survey of dietary Habits and Physical Activity reported that vegetable and fruit consumption for the 4 to 10 year old group increased by 29% and 58% respectively. For the 11- to 75-year-old group, vegetable and fruit consumption increased by 41% and 75% respectively.'<sup>107</sup>



#### UK's "Food Dudes " Campaign

To combat obesity amongst children, a unique programme based on a variety of behaviour change principles involving role modelling, rewards and repeated tastings, has been developed by Bangor University's Food and Activity Research Unit.

The programme aims to increase children's intake of fruit and vegetables, on a long-term sustainable basis, at school and at home. The programme is structured around a series of DVD adventures starring young heroes called Food Dudes seen as positive role models by the children.



'Controlled trials on the `Food Dudes` programme conducted in the UK, Italy and the US among primary school children (4-11 years) and nurseries/child care centres (2-4 years), report that there is a 60%-200% increase in fruit and vegetable consumption and where monitored, an associated decline in consumption of unhealthy foods by 20-100%.'<sup>108</sup>

This programme is perceived as extremely effective and has received several awards over the last 7 years

<sup>&</sup>lt;sup>107</sup> Rekhy and McConchie [2014] p. 117

<sup>&</sup>lt;sup>108</sup> Rekhy and McConchie [2014] p. 118



In reviewing the above two interventions, there are some clear signposts for success;

- Advertising *per se* is not the answer. Campaigns, which encourage consumers to eat more healthful foods such as fruit and vegetables, tend to be insufficient to change consumer behaviour over a sustained long term. These kinds of initiatives tend to lose momentum and after initial successes, retail, government or industry are unable to continue to invest the effort required to deliver sustainable momentum. (The Australian National campaign, `Go for 2&5" provides evidence of this point.)
- Both the Danish and UK campaigns were `interventions` rather than campaigns. As
  referenced in our introduction on page 9,ecological frameworks clearly depict the
  multiple influences on what people eat. Food Marketing and Media play a vital but
  relatively small role in the scheme of things. Both of the successful interventions
  recognized that engagement was required on a sustained basis on many levels; at
  school, in the home, in the supermarket, in restaurants, in the media and in advertising.
  Both interventions successfully engaged government, producers, heath, diet and
  nutritionists, parents and their children.
- Perhaps the most significant learning lies in recognition that there are `lost generations` weaned on unhealthful diets which would take massive investment to turn around. Better we think, to start with the next generation of children and focus on them and their parents to begin to shift the needle in favour of healthful foods.

#### In Conclusion

Our investigations have resulted in eight key learnings:

- 9. Advertising alone appears to be insufficient to change consumption;
- 10. More subtle and proactive strategies need to be introduced to facilitate sustainable change;
- 11. Visibility and prominence at the point of purchase is vital;
- 12. Schools and workplaces are key environments to showcase variety and choice;
- 13. Cost effective, convenient packaging including single serves encourages healthy snacking;
- 14. Positive role models can strongly influence consumer behaviour;
- 15. Children whose unhealthful food consumption is less entrenched present the greatest opportunity for dietary change to embrace vegetables;
- 16. A tool kit of strategies is required to counter the far-reaching influence of years of powerful unhealthful food marketing.

Our analysis has led us to unreservedly confirm that well-managed, sustainable interventions (rather than advertising) can be highly effective in encouraging consumers to eat more fruit and vegetables.

Where continuity of interventions is sustained, there is a greater likelihood that this will lead to behavioural change of a lasting nature.

The authors recommend that deeper investigation into `Food Dudes' and `6 a Day` be undertaken to assess their relative viabilities for the Australian market.



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Appendix One: International Fruit and Vegetable Promotion Programmes Identified in Pomerleau et al [2004]

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Country	Name of fruit and vegetable programme	Types of activities	Website link	
Argentina	5 al dia	Event sponsorship, seminars, partnership with horticulture sector	www.5aldia.com.ar	
Australia (Western Australia)	Go for 2 and 5	Mass media campaign including television advertisements and kids in kitchen television series, cookbooks, consumer literature. School canteen accreditation (STARCAP), school fruit and vegetable week, under-five daycare scheme, low- income project (food cents)	www.gofor2and5.com.au	
Canada	5 to 10 a day	Three-year media campaign including television, radio stations, and print media. Information materials distributed to health offices, schools, grocery retail stores and dieticians	www.5to10aday.com	
Denmark	6 om dagen, School fruit programme	Media campaign and educational material, worksite interventions, subscription school fruit scheme	www.6omdagen.dk www.frugtkvarter.dk	
France	10 par jour	Newsletters, media campaigns, recipes	www.10parjour.net	
Hungary	3 a day	Started in 1997 as a partnership funded both by agriculture and health. Target groups: children, young people and housewives. Activities include supermarket promotions, cooking shows, taste- testing at school, advertising and public relations materials.	www.kertnet.hu/Hungaria nHorticulture/gb/129s.htm	
Germany	5 am tag	Campaigns, published literature	www.5amtag.de	
Japan	Vegefru-7	Started in 2002 as a partnership between government (agriculture, education) and the Japan Produce Alliance for Better Health (producers, retailers, industry). Dietary education tool distributed to classrooms, supermarket tours, harvesting tours, communications strategy and materials	www.vf7.jp	
Mexico	5 x dia	Formation of Fundacion Campo Y Salud Organisation, communications strategy	ww.cincopordia.com.mx	
Netherlands	2+2	Interactive website for children, recipes, communication strategy	www.vgf.info	
New Zealand	5 a day	National media campaign, 5+ a day week, 5+ a day school programme, various projects	www.5aday.co.nz	

#### Table 1. Selected national fruit and vegetable promotion programmes identified



Norway	5 om dagen, school fruit programme	Subscription school fruit scheme	www.frukt.no/ www.skolefrukt.no
Poland	5 a day	National campaign co-organized between cancer centres and private sector (producers, processors, retailers). "5 a day" promotion activities in kindergarten, primary and secondary schools	
Spain	5 al dia	Information campaign, activities for children, symposia, events with agricultural sector	www.5aldia.com
Sweden	5 om dan	Series of activities involving health, nutrition, education and commercial sectors	www.fruktogront.se
Switzerland	5 am tag/ par jour/ al giorno	Consumer information, media campaign, food giveaway sessions in public places	www.swisscancer.ch/ fr/content/violett/nationpr og_5amtag_aktivitaeten.p hp
United Kingdom of Great Britain and Northern Ireland	5 a day	Communications programme including media campaigns and written information, school fruit scheme, local "5 a day" community projects and local project workers, work with retail sector applying "5 a day" logo to foodstuffs	www.dh.gov.uk/PolicyAn dGuidance/HealthAndSoci alCareTopics/FiveADay/fs /en
Uruguay	5 por dia	Series of activities involving health, nutrition, education and commercial sectors	www.mercadomodelo.net/ programa.php
United States of America	5 a day (Produce for Better Health Foundation)	Public/ private partnership, communications strategy, "5 a day" week, endorsement of "5 a day" logo.	www.5aday.com
	5 to 9 a day for better health (National Cancer Institute)		www.5aday.gov/



### Appendix Two: Summaries of Studies with Primary School-age Children Identified in Pomerleau et al [2004]

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Girls Scouts Eat 5, United States Cullen et al. (35)	Randomized pre-test, post- test control group design	Twenty-two junior girl scout troops with about 300 girls were recruited from a local girl scout council. All of the troops participated in the pre-test and three-month follow- up. However, 48 girls were not present at the post- test and an additional 48 girls were not present at the three-month follow-up.	There were four sessions. In session 1, the girls learned how to complete three-day food records. During the next three sessions the girls went through activities designed to increase fruit and vegetable exposure and preparation skills and knowledge, and skills in self evaluation, self monitoring, goal-setting and problem-solving, and to establish troop norms for serving and eating fruit and vegetables. Fruit and vegetables were prepared and tasted at each meeting. Parent information sheets were encouraged to promote fruit and vegetable consumption at home. Girl scouts completing the activities received an "Eat 5" badge. Follow-up: three months	<ol> <li>Food recognition form (FRF) at baseline, and at three months, one- page modified food frequency questionnaire (FFQ) with 12 items.</li> <li>Determinants of food behaviour questionnaires were filled out immediately before session 1 was started (pre-test) and then about one week after all activities had been completed (post-test).</li> </ol>	Only 20% of girls consumed five or more fruit and vegetable servings per day; 17% reported consuming 0 servings on the survey day. There were significant differences in fruit and vegetable intake between conditions at pre-test. The change in fruit and vegetable intake for girls in the intervention condition troops was significantly greater at post-test than the control condition troops ( $P$ <0.0019) [at pre-test intervention n=126 had mean fruit and vegetable intake of 3.02 (SD 2.21) and at post-test (n= 101) they had a mean intake of 3.39 (SD 1.93); at pre- test control n=133 had a mean fruit and vegetable intake of 2.06 (SD 1.71). Intervention group levels returned to pre-test levels at the three- month follow-up ( $P$ > 0.13).	

#### Table A6-1. Summary of studies with primary school-age children

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Integrated Nutrition Project, United States Auld et al. (37)	Cross- sectional, quasi- experimental pre-test (third quarter 1997) post-test (second quarter 1998)	The integrated nutrition project has been going on since 1993. From 1993–1997 it has involved about 1250 children in three Denver schools. This study reports on students selected in year 3 (n=268 treatment and n=181 comparison) and year 4 (n=456 treatment and n=395 comparison).	The intervention consisted of several components: 1) 24 weekly special resource teacher- taught classes that included food preparation and eating; 2) teacher training through three after-school in services and weekly classroom role modelling from the resource teacher; 3) parent education consisting of 12 bimonthly bilingual low-literacy newsletters; nutrition classes taught by existing community nutrition education programmes and two family fun nights per school; and 4) community nutrition / food resource development. In years 4 and 6 corresponding parent-taught school lunchroom activities were added. Follow-up: four years	1) Plate waste assessment to visually estimate fruit and vegetable selected and consumed in the school lunchroom; 2) food recall / record; survey 3) classroom survey on knowledge and attitudes to fruit and vegetables; 4) five-minute interview with kindergarten children about their knowledge of fruit and vegetables	Fruit and vegetable intake: Complete plate waste data from 226 participants and survey data from 295 participants. Post-test fruit and vegetables intake from plate waste (year 4) indicated that treatment students consumed significantly more fruit and vegetables then comparison students: 0.19 more fruit servings, 0.25 more vegetable servings and 0.4 more fruit and vegetables servings in total. Knowledge, attitudes and self-reported behaviour outcomes: Treatment children demonstrated higher levels of knowledge than the comparison students.	
5-a-Day Power Play! Campaign, United States Foerster et al. (38)	Experimental cohort study, non- randomized, controlled	Forty-nine schools and 151 classrooms (4th and 5th grade children) in California participated in the study. When the cohort was matched pre-study and post-study, 2684 cases were established: the data reported here are based on these cases. There were 15 schools in the control group, 19 in T1,15 in T2.	T1 intervention consisted of Power Play! activities conducted only in school. T2 intervention consisted of Power Play! activities simultaneously conducted in schools, community youth organizations, supermarkets, farmers' markets, and mass media. The control group got any nutrition activities except for Power Play!. Follow-up: ~ one school year	California Children's Food Survey – a 24- hour recall self- reported food diary	Both intervention sites reported significant increases in self-reported fruit and vegetable intake compared with the control site but not compared with each other. Increases were highest for T2 (0.4 serving, from 2.9 to 3.3) compared with 0.2 serving (from 2.7 to 2.9) in T1. Consumption decreased for the control group by 0.3 serving (2.6 to 2.3 servings). Changes in self-reported consumption between treatment and control groups was statistically significant at <i>P</i> <0.001; the change between treatment groups was not significant.	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
5-a-Day Power Plus Programme, United States Perry et al. (36) and Story et al. (110)	Randomized controlled trial (matched-pair design)	Fourth-grade children in 20 elementary schools were chosen to include a group of children with considerable ethnic and socioeconomic diversity, matched by pairs based on size, ethnic makeup, percentage of students participating in the free or reduced- price lunch programme. One school per pair randomized to intervention. 1750 students enrolled, 1612 completed the health behaviour questionnaire. 657 selected at random for dietary measurements: 652 observed during lunchtime, 580 completed a one-day food record of whom 536 completed a 24-hour recall. Of these 536, 441 completed a 24- hour recall at follow-up.	March-May 1995 (Grade 4) and Oct 95-Jan 96 (children then in Grade 5). The intervention included four components: 1) behavioural curricula in classroom (two x 16 classroom sessions of 40 to 45 minutes, twice weekly, for eight weeks: including skill- building, problem-solving, snack- preparation, taste-testing, comic books and adventure story, team competitions, prize rewards); 2) parental involvement/education (five information/activity packets and four snack packs); 3) school food-service changes (point-of- purchase fruit and vegetable promotions using characters and messages from the classroom curricula, enhancing the attractiveness of fruit and vegetables served every day, increasing variety and choices, providing an additional fruit item on days when a baked dessert was served, trays and signs to show available fruit and vegetable choices each day); 4) industry involvement and support (support from the 72-member Minnesota "5- a-Day" Coalition, fruit and vegetables, supply for classroom taste testing/home snack packs/school lunch, a 30-minute presentation on fruit and vegetables, and provision of additional educational and incentive materials). Follow-up: ~10 months	In all students: group- administered health behaviour questionnaires measuring a variety of factors related to fruit and vegetable intake. In a random sample of students: self- completed 24-hour non-quantified food record and observation of students in lunchroom to record all items eaten at lunch and their portion size (same day) and 24- hour recall (next day). Students who completed the 24- hour recall at baseline were recruited a year later for the follow-up lunchroom observation and 24- hour recall.	Lunchroom observations at follow-up (424 students): compared with the control group, intervention students had a higher mean intake of fruits and vegetables (1.53 versus 1.06 serving, $P$ <0.01), fruits (0.74 versus 0.44, $P$ <0.01), fruit and vegetables in servings per 1000 kcal (3.02 versus 2.19 $P$ <0.01) and fruit in servings per 1000 kcal (1.67 versus 0.95, $P$ <0.01). As well, vegetable intake was greater in girls in the intervention versus control group (0.26 serving, $P$ <0.05). 24-hour recalls at follow-up (407 students): compared with the control group, intervention students had a higher mean intake of fruits (5.24 versus 4.66, $P$ =0.02), fruit and vegetables, in servings per 1000 kcal (1.51 versus 1.16, $P$ =0.02). Health behaviour questionnaire (1028 to 1271 students depending on the question being asked): there was significantly more perceived teacher support for eating fruit and vegetables ( $P$ <0.01), greater perceived need to eat fruit and vegetables ( $P$ <0.01), and more reported usual daily servings of fruit and vegetables ( $P$ <0.01).	There were high levels of participation, dose, and fidelity for all the intervention components, with the exception of parental involvement.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on nutrition education at primary school, Ireland Friel et al. ( <i>34</i> )	Quasi - experimental comparative study, with schools the unit of randomization	821 Irish schoolchildren aged 8–10 years in eight schools in both urban and rural areas (453 in intervention and 368 in control schools)	A pilot dietary education programme for primary school pupils, followed up at three months. The intervention comprised 20 sessions over 10 weeks including worksheets, homework and an exercise regime. In addition to classroom sessions, "parent packs" were mailed home to parents / guardians with short family assignments. Follow-up: three months	Five-day food diary at baseline and three months	Following the intervention there was no significant change in the control group but there was a very small significant increase in the number of intervention children consuming the recommended amount of fruit and vegetables (four or more servings per day).	Schools were selected for practical reasons, not necessarily compatible
Eat Well and Keep Moving, United States Gortmaker et al. (41)	Quasi- experimental field trial	Intervention group: six public elementary schools in Baltimore. Control: eight matched schools	A classroom-based intervention: delivered by teachers and integrated into maths, science, language arts, social studies classes, and included links to food school services, physical education, teacher and other staff- member wellness programmes, families and classroom-based campaigns. Units were implemented during two school years and consisted of 13 lessons each for grade 4 and 5 students. Eighteen "Eat Well" cards were created to introduce students to new foods, used in the classroom, and linked to food services. Activities such as "Get 3 at School" and "5 a Day" were promoted in the classroom but also at home and so involved family members. Follow-up: two years	Food frequency questionnaire and 24- hour recall	Analyses from the 24-hour recalls found that there was an increase in the consumption of fruit and vegetables (0.36 servings / 4184 KJ; 95% CI, 0.10- 0.62; <i>P</i> =0.01). This difference in fruit and vegetable consumption is equivalent to an increase of 0.73 servings /day given a mean total intake of 8473 KJ.	

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-	Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
	A study on "Gimme 5" fruit, juice and vegetables for fun and health, United States Baranowski et al. ( <i>39</i> )	Randomized controlled trial	Participants were 1253 children in fourth and fifth grades at 16 elementary schools	The intervention group received a six-week, 12-session "Gimme 5" curriculum which encouraged and assisted children to eat more fruit and vegetables. Teachers had handouts, posters, worksheets, newsletters, videos. Point of purchase education was conducted at shops per school that parents most used. Follow-up: three years	The 1253 children completed a seven- day food record for all three years	Increases in mean consumption only occurred in the two lowest quintile groups, and were highest in the intervention group (lowest quintile: +.47 servings and +0.82 servings for control and intervention groups respectively). Declines in consumption occurred in the top three quintiles, which were least for the intervention group (highest quintile: -1.59 and -0.88 servings for control and intervention groups respectively)	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
High 5 Project, United States Reynolds et al. (42)	Randomized controlled trial (matched-pair design)	Participants were 28 elementary schools pair- matched based on ethnic composition and proportion of students receiving free or reduced- price meals. 1698 families or fourth- grade children (69% participation rate) agreed to participate.	There were three intervention components based on social cognitive theory: 1) classroom component (14-lesson curriculum taught by nine curriculum coordinators employed by the "High 5" project. The curriculum was delivered on three consecutive days each week with a 30-45 minute lesson on day 1, a "High 5" day on day 2 (challenge to eat five servings of fruit and vegetables) and a 30-45 minute lesson on day 3. This included modelling, self-monitoring, problem-solving, reinforcement, taste-testing, other methods); 2) Parent component (kick-off night, parents asked to encourage and support behaviour change and do seven homework assignments with their child); 3) Food service component (half-day of training on purchasing, preparing and promoting fruit and vegetables, intervention activities). Control: usual care, follow-up: two years	Children: two methods: 1) one 24- hour recall (a "5 a Day Guidelines Fruit and Vegetable Score" was created by eliminating from the count of servings all fruit and vegetables containing more than the stipulated amount of salt, fat and sugar defined by "5 a Day" guidelines); 2) cafeteria observation (a sample of 425 students were observed during school lunch to assess fruit and vegetable consumption). Parents: food frequency questionnaire (fruit and vegetable items from the Health Habits and History Questionnaire). NB: some psychosocial data collection measures were also included for students and parents.	24-hour recall: There was no difference at baseline in fruit (intervention=1.00 serving/day, control=0.85, $P<0.14$ ), vegetables (1.32 versus 1.33, $P<0.89$ ) or fruit and vegetables (2.61 versus 2.51, $P<0.59$ ). The intervention group had higher intakes at one year (fruit: 1.71 versus 0.83, $P<0.0001$ ; vegetables: 1.84 versus 1.15, P<0.0001; fruit and vegetables: 3.96 versus 2.26, $P<0.0001$ ) and two years (fruit: 1.21 versus 0.65, $P<0.0001$ ; vegetables: 1.60 versus 1.25, $P<0.09$ ; fruit and vegetables: 3.20 versus 2.21, P<0.0001). Similar findings were found for the "5 a Day Fruit and Vegetable Score". Differences among groups were found in boys and girls, and in children of different ethnic groups (African- and European- Americans) and socioeconomic status. Cafeteria observation: no differences between groups were observed at baseline, one year and two years. Parents' food frequency questionnaire: at one year, intervention parents consumed more servings of vegetables (2.38 versus 2.21, $P<0.0359$ ) and fruit and vegetables (4.23 versus 3.94, P<0.0366). No differences were observed at two years.	The intervention group had lower intakes of fat and saturated fat and higher intakes of carbohydrates, fibre, folate, beta-carotene and vitamin C compared with the control group at one year and two years. A shift towards higher stages of stage-of- change for five fruit and vegetables was seen in the intervention group at one year.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on the "APPLES" health promotion programme, United Kingdom Sahota et al. (32)	Randomized control trial, randomization of schools	Participants were 636 children aged 8–10 years (314 intervention, 322 controls) in 10 primary schools in Leeds	Five schools undertook the APPLES (Active programme promoting lifestyles in schools) health promotion programme. APPLES is a one- year multi- disciplinary programme designed to influence diet and physical activity. It uses a health promotion approach targeting the whole school community including parents, teachers and catering staff. It is based on action plans developed by individual schools based on perceived needs. It involves teacher training, modification of school meals, curriculum development, physical education, tuck shops and playground activities. Looking at risk factors for obesity. Control: The other five schools received the usual school curriculum. Follow-up: 12 months	24 hour recall, and three- day diet diary at baseline and 12 months	Intervention children had a higher vegetable intake after the study, the weighted mean difference was 0.3 serving (95% CI 0.2–0.4), which is 50% of baseline intake. This was true for all children and for the categories of overweight, and obese children. The three-day diet diary did not show these differences.	It is suggested that five schools in each arm is too small to show an effect.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Food Dude Healthy Eating Programme, United Kingdom Lowe et al. (31)	Non- randomized, controlled trial	Children aged five to seven years in two primary schools in deprived areas of south London (364 in intervention school and 384 in control).	Children in the intervention school received the 16-day "Food Dude" programme including a supply of fruit and vegetables at snacktime and lunchtime. Those in the control school had fruit and vegetables made available but no programme was introduced. The " Food Dude" programme teaches children to name fruit and vegetables, with reinforcement using a video in which older peer "Food Dudes" have adventures and extol the benefits of eating a number of fruit and vegetables. Prizes (stickers, badges etc) are awarded to children who consume sufficient quantities of targeted foods. A 10-week maintenance phase followed in both schools, in which fruit and vegetables continued to be presented but rewards were intermittent. Follow- up: four months	Consumption was measured at baseline, during the intervention and at follow-up after four months. At snacktime all foods were weighed before and after consumption. At lunch, consumption was recorded on a five point scale by researchers (and inter-observer and inter-observer and inter-measure agreement was checked). Parents completed questionnaires about their child's consumption at home, and a subset took part in parental recall interviews during baseline and intervention phases.	In the experimental school, lunchtime consumption of fruit and vegetables was significantly higher at follow-up than baseline, while for the control school, consumption of vegetables was significantly lower at follow-up than baseline. At lunchtime, fruit consumption increased in the experimental school, from 36% to 79% during intervention, and remained raised at 61% at four months. At snacktime, fruit consumption increased in the experimental school from 75% (baseline) to 87% during the intervention ( <i>P</i> <0.001), but returned again to baseline levels (76%) at follow-up (no significant difference with baseline). In the control school, consumption remained between 60% and 65% throughout the three study phases. In experimental schools the lowest consumers had the greatest increase, compared with little change in this group at the control school.	Over 80% of children in both schools were from ethnic minorities, 40–55% had special educational needs, and 46–67% were entitled to free school meals.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on the prevention of obesity in children, United Kingdom Warren et al. (33)	Randomized controlled study	Participants were 213 five to seven year-olds from three primary schools in Oxford.	The primary goal of the intervention is obesity prevention. Children were randomly assigned to a control group ("Be Smart" - learned about food in a non- nutrition sense) or one of three intervention groups: nutrition (Eat Smart), PA (Play Smart), and combined nutrition and PA (Eat Smart Play Smart). Fruit and vegetables were promoted using tasting sessions and games based on the "Gimme 5" intervention. Interventions were set in lunchtime clubs where age- appropriate curriculum was delivered. Follow- up: 20 weeks over four school terms	Dietary intake was assessed using a combination of two questionnaires completed by the parents on behalf of the children: a 24- hour recall questionnaire and a food frequency questionnaire.	Overall fruit and vegetable intake increased significantly ( <i>P</i> <0.01 and <i>P</i> <0.05 respectively). In males there was a significant increase in fresh fruit consumption ( <i>P</i> <0.01). A significant increase in fruit consumption was found in the "Eat Smart" and "Be Smart" groups.	
5-A-Day Cafeteria Power Plus Project, United States Perry et al. (40)	Randomized controlled trial	Participants were 1668 students in first and third grades, randomly selected from 26 elementary schools randomized to intervention or control groups (35 per grade and per school)	The aim was to increase opportunities during school lunch to eat a variety of fruit and vegetables, provide new healthful role models who ate fruit and vegetables, and institute social support at lunch. It involved daily activities (increasing the availability, appeal, and encouragement of fruit and vegetables in the school lunch programme, emphasizing changes in the lunch line, school snack cart, encouragement of food-service staff) and special events (two- week kick off campaign, monthly sampling of fruit and vegetables during the lunch period, challenge week at midyear of each intervention year (competition to eat three servings of fruit and vegetables per day at lunch), theatre production in first year, final special event). Control: Delayed intervention after the end of the active study phase. Follow-up: two years.	The number of servings of fruit and vegetables consumed during lunch was recorded during observation by trained observers, who, from a distance, recorded items eaten and their portion size. There was also direct observation of the lunch offerings (whether the fruit and vegetables were appealing); observation of verbal encouragement by the food-service staff; and recording of the number of fruit and vegetables on the school snack cart.	After two years, there was a significant difference between groups for the intake of fruit without juice (intervention: 0.37 serving versus control 0.21 serving, $P<0.01$ ), fruit with juice (0.79 versus 0.63, $P=0.01$ ), fruit and vegetables without potatoes and juice (0.64 versus 0.50, $P=0.02$ ), and fruit and vegetables without potatoes, with juice (1.06 versus 0.92, $P=0.03$ ). Intervention schools had significantly more verbal encouragement by school food-service staff ( $P=0.01$ ) and more fruit and vegetables on the lunch line ( $P<0.01$ ). Verbal encouragement was significantly associated with higher intake.	The overall change came from a change in fruit consumption rather than vegetable intake. [Environmental interventions alone may have limited impact without classroom and parental involvement]

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#### Appendix Three: Summaries of Studies with Secondary School-age Children Identified in Pomerleau et al [2004]

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Gimme 5, United States Nicklas et al. (46)	Randomized paired design	Nineteen of 22 high schools in New Orleans, Louisiana, agreed to participate. Twelve schools (six pairs) were randomized to intervention or control condition (total 2213 students at baseline). Seven other schools served as pilot testing sites.	One school in each pair was randomly assigned to receive the "Gimme 5" measurements and interventions while the other schools received the "Gimme 5" measurements only (controls). Three primary end points were assessed at the school level: 1) increased awareness 2) increased positive attitudes and knowledge toward eating at least five daily servings of fruit and vegetables, and 3) increased daily consumption of fruit and vegetables. Changes from baseline (second quarter 1994) to end intervention (second quarter 1997) were assessed at intervention: longitudinal following a cohort of students from grades 9–12. It comprised a school-wide media marketing campaign; classroom activities; school meal modification (Fresh Choices); and parental involvement (Raisin Teens). The whole school benefited from the media campaign and school meal modification; only the intervention cohort also got parental involvement and classroom activities. Follow-up: three years	The Knowledge, Attitudes and Practices questionnaire, a class-administered, 45-minute instrument to evaluate knowledge, self- efficacy, programme awareness, stages of change, and fruit and vegetable consumption. Fruit and vegetable intake was measured by the self-reported number of servings of fruit and vegetables usually consumed on a daily basis.	Fruit and vegetable intake: Reported consumption of daily fruit and vegetable servings was significantly higher in the intervention schools than in the control schools in 1995 and 1996 ( <i>P</i> <0.05). This difference was not sustained at follow-up in 1997. From 1994 to 1996 a significant linear increase in the reported daily consumption of fruit and vegetable servings was observed in the intervention group compared to no significant linear trend shown in the control group ( <i>P</i> <0.001). The intervention group reported a 14% increase (+ 0.37 servings) in consumption of fruit and vegetable servings after two years of intervention, from 2.63 servings at baseline in 1994 to 3.00 servings in 1996. At follow-up in 1997 reported consumption remained stable in the intervention group, concomitant with increased consumption in the control group, so no significant difference existed between groups at follow-up.	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
CATCH, United States Perry et al. (47)	Randomized controlled trial	Participants were 1186 students i.e. all students who participated in the 24-hour recall, among the 5106 students in the original CATCH study	CATCH was implemented in 96 schools in four states in the US from 1991to 1994. The intervention involved modifications in school food service, physical education, classroom curricula and parental involvement. CATCH originally mainly assessed fats (cf. 5010 and 5002- out) but this paper addresses whether the CATCH message helped to increase fruit and vegetable intake. Follow-up: three years	24-hour recalls	There were no significant overall differences between conditions in fruit and vegetable consumption at follow- up. Baseline: average consumption among all students was 2.12 servings of fruits and 2 servings of vegetables in 24 hours. At follow-up: the intervention group n=707 consumed 4.17 servings (SE 0.19) of fruit and vegetables; 2.25 servings (SE 0.16) of fruit; and 1.90 servings (SE 0.16) of regetables. The reference group n=479 consumed 4.10 servings (SE 0.23) of fruit and vegetables; 2.20 servings (SE 0.19) of fruit; and 1.89 servings (SE 0.13) of vegetables.	
Planet Health, United States Gortmaker et al . (45)	Randomized controlled trial	Ten public schools from four communities in Boston MA metropolitan area were randomly assigned to either intervention (n=5) or control (n=5). Participants were boys and girls from Grades 6 to 8.	Each intervention school received the "Planet Health" programme of teacher training workshops, classroom lessons, physical education materials, wellness sessions and fitness funds. Each theme was addressed in one lesson per subject (e.g. language, maths) for a total of 16 core lessons each in year 1 and year 2 (32 total). Follow-up: two years	Food and activity survey, and youth food frequency questionnaire	Overall participation n= 1560 students. Only statistically significant fruit and vegetable intake change occurred in girls: 0.32 servings/day; 95% Cl, 0.14- 0.50 servings/day; P=0.003).	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Teens Eating for Energy and Nutrition at School, United States Birnbaum et al. (44) , Lytle et al. (111)	Randomized controlled trial	Sixteen schools with at least 20% of students approved for a free and reduced-priced lunch programme, and with at least 30 students in each of the seventh and eighth grades. Schools were pair- matched based on the proportion of seventh graders expected to receive all school-based components of the intervention and the proportion of students receiving free or reduced- price meals. The paper reports only on the effects of intervention in the seventh-grade.	Four groups: 1) Control: no intervention. 2) School environment interventions only: promotion of fruit, vegetables and low-fat snacks (food tastings, increasing availability of fruits, vegetable, low-fat snacks, posters, prize raffles). 3) As for (2), plus classroom curriculum. The curriculum consisted of 10 curriculum sessions and three "Parent Packs" (activities and intervention-related messages). 4) As for (3) plus peer leaders. Peer leaders were trained elected students who helped teachers to deliver the curriculum sessions. Follow-up: two years	Modified version of the Behavioural Risk Factor Surveillance System (BRFSS) measure. This includes items on the frequency of consuming fruit juices, fruit (excluding fruit juices), green salad, potatoes (excluding French fries, fried potatoes and potato chips), carrots, and vegetables (excluding carrots, potatoes, and salads) during the past year.	Year 1: Groups 1 and 2: no significant changes in fruit, vegetable, or fruit and vegetable intakes. Group 3: borderline significant increases in intakes of fruit (P =0.056, +~1/2 serving/day), vegetable (P =0.052, +~1/4 serving/day) and fruit and vegetable (P =0.097, +~1/2 serving/day). Group 4: significant increases in fruit (P=0.02, +~1/2 serving/day) and fruit and vegetables (P =0.012, +0.9serving/day) and borderline significant increase in vegetable intake (P =0.059, +0.4 serving/day). Year 2: no significant differences between the groups in fruit and vegetable consumption.	Includes potatoes



# Appendix Four: Summaries of Studies with Adults in the General Population Identified in Pomerleau et al [2004]

#### A.4.1 GENERAL POPULATION

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Hiraka Dietary Intervention Study, Japan Takashashi et al. (53)	Randomized controlled trial (crossover after 10 months)	Participants were 550 men and women aged 40–69 years from two rural villages in Akita Prefecture recruited through public magazines and posters.	Two 15-minute personal dietary counselling sessions, one group lecture, and two newsletters. The aim was to decrease sodium intake and increase vitamin C and carotene intakes. There was an emphasis on lower intakes of miso, salted vegetable pickles, salted fish and seasonings with a high salt content, and higher intakes of fruit and vegetables (particularly carotene- and vitamin C-rich vegetables, such as dark- green leafy vegetables and carrots). Control: only baseline and final assessments, follow-up: 10 months	470 participants completed a self- administered dietary history at baseline, five months and ten months.	There was a higher increase in fruit intake in the intervention (+20.0g) versus the control group (+2.9g, 95%) ( $P$ =0.009), and in green and yellow vegetable intake (intervention: +27.7g versus control: +5.3g, $P$ =0.010). For other vegetables, changes were not significantly different among groups (intervention: -14.6g versus control: - 5.4g, $P$ =0.846). Total vegetable intake also did not differ among groups (intervention: +13.1g versus control: - 0.1g, $P$ =0.08).	Akita Province has a high incidence of stomach cancer and stroke, high salt intake and low carotene intakes. Some respondents may have been from the same family. Comparisons of blood carotenoid levels and reported carotenoid intakes suggest that intakes may have been overestimated by respondents.

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Study and	Design	Participants	Intervention	Data collection	Results	Comments
reference				methods: fruit and		
				vegetable intake		
A study on increasing fruit and vegetable intake among callers to the Cancer Information Service, United States Marcus et al. ( <i>51, 52</i> )	Randomized controlled trial	Participants were 1706 adults (78.7% females) over 18 years of age who called six regional offices of the National Cancer Institute's Cancer Information Service (CIS) for questions unrelated to diet. Participants were not cancer patients in treatment or awaiting treatment, nor on a diet that would limit fruit and vegetable intake.	Baseline telephone assessment (fruit and vegetable intake and demographics) followed by a short series of educational and motivational messages based on the trans-theoretical model and a short list of behavioural suggestions for increasing fruit and vegetable consumption. Two follow-up mailouts (mailed at baseline and two weeks). Material derived from the NCI "5 A Day for Better Health" programme. Control: Baseline and follow-up assessments only. Follow-up: Reassessment of fruit and vegetable intake at four weeks, and follow-up at four and 12 months.	Three methods: 1) single-item question at baseline, four weeks, four months, 12 months; 2) two- item question used in the Block food frequency questionnaire at baseline, four weeks, four months, 12 months; 3) Seven- item food frequency index on fruit and vegetable and juices in half the participants at four weeks, and in all respondents at four months and 12 months; 4) 24-hour recall in half the participants at four weeks and at four months.	1022 participants completed a 12- month follow-up. At baseline, there was no difference in fruit and vegetable intake between the intervention and control groups (3.79 versus 3.73 serving, $P > 0.05$ ). At four weeks, differences were 0.88 serving (4.70 versus 3.82, $P < 0.001$ ) with the single- item question, 0.63 serving (5.11 versus 4.49, $P < 0.001$ ) with the seven-item question. At four months, differences were 0.63 serving (4.29 versus 3.66, $P$ <0.001) with the single-item question, 0.39 serving (4.68 versus 4.29, $P$ =0.002) with the seven-item question, 0.67 serving (6.75 versus 6.07, $P$ =0.015) with the 24-hour recall. At 12 months, differences were 0.43 serving (5.04 versus 3.84, $P < 0.001$ ) with the single-item question and 0.44 serving (5.04 versus 4.59, $P=0.002$ ) with the seven-item question. At each follow-up time point, intervention participants were more likely than controls to correctly identify the "5 A Day" programme and the specific "5 A Day" guidelines for fruit and vegetable intake, and to report a specific attempt to increase their intakes.	Includes potatoes. Approximately 80% were females.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on the "5 a Day" Community Pilot Initiatives, England Department of Health, ( <i>50</i> )	Controlled pre-test and post-test cross- sectional study	Participants were 1560 adults living in the five project areas across England (randomly selected from the electoral register). There were 400 control subjects living in another area, who were taking part in another study (EPIC) but had not been advised to change their diet.	Five community-based "5 a day" pilot interventions lasting 12 months and targeting a total population of 1 million people. These were multi-component interventions and took place in a variety of settings including the health service, food retailers and farmers' markets, schools and pre-schools, workplaces and caterers, and the wider community. Full details can be found in the five pilot project reports. Follow-up 12 months	Self administered postal questionnaires at baseline and after one year. Two methods were used: a 49- item food frequency questionnaire was used to determine usual fruit and vegetable intake over one year. A short questionnaire (FACET) with nine questions was used to determine how many portions of fruit and vegetable were eaten in one day. The control group also provided detailed information from weighed food diaries for reference purposes.	At baseline the mean fruit and vegetable intake was 1.5 portions/ day higher in the control group (4 intervention, 5.5 control). At follow-up there was no change in overall intake in the intervention group, but there was a decline in the control group (by about 0.5 portion), reflecting national trends as observed in the National Food Survey. People in intervention areas that ate the least (less than five portions a day) at baseline tended to increase their fruit and vegetable intakes by about one portion a day. Those who ate five a day or more at baseline decreased intakes by about one portion per day. Similar trends were observed in the control group.	Both the food frequency questionnaires and FACET questionnaires tended to overestimate the frequency of fruit and vegetable intake compared with the reference method (1.5 servings). Eating frequency appeared to have a greater impact on total fruit and vegetable intake. The intervention increased perception of better knowledge and access to fruit and vegetables.
A study on the "Latino 5 a day" Campaign, California Backman and Gonzaga ( <i>49</i> )	Non- randomized controlled trial	Participants were 969 Latino adults (18–65 years old) living in two counties in California	The population living in Fresno were exposed to social marketing interventions for four months. These targeted predominately Spanish- speaking Latinos, included bi-lingual television, radio, and outdoor advertisements; media interviews that featured information from Latinos "5 a day" spokespeople; festival and farmers' markets activities, and grocery-store merchandizing and promotions. The control population living in Riverside/ San Bernadino did not receive the intervention (baseline and follow-up assessments only). Follow-up five months	675 participants completed both the baseline and follow-up telephone interview surveys (24- hour recall)	At baseline there was no significant difference in fruit and vegetable intake between intervention and control communities. At follow-up Spanish speakers in the intervention reported an increase of 1.63 servings per day in fruit and vegetable intake (baseline 4.41, follow-up 6.04 servings, $P < 0.05$ ), compared to Spanish-speakers in the control community who reported an increase of one serving per day (baseline 4.05, follow-up 5.05 servings, P < 0.05). English- speaking participants in the intervention community only reported an increased intake of 0.43 serving per day (baseline 4.37, follow- up 4.80, $P > 0.05$ ) compared with a large increase of 1.80 servings in the control community (baseline 4.06, follow-up 5.86, $P < 0.05$ ). The difference in change in fruit and vegetable intake between the intervention and control communities was significant among Spanish and English speakers.	There were significant positive correlations between exposure to some aspects of the campaign, and to participants' awareness, attitudes and beliefs and fruit and vegetable intake. There was a significant negative correlation between participants' beliefs that they could overcome barriers to fruit and vegetable intake. Similar increases in fruit and vegetable consumption in the English-speaking control community are attributed to other English-language nutrition education programmes operating at the same time.

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#### A.4.2 WORKSITES

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Treatwell Study, United States Hunt et al. (54)	Randomized controlled trial	Sixteen worksites specialized in life insurance sales, health care delivery, computer manufacture and sales, wholesale food sales, telecommunications, construction and manufacturing, with between 200 to 2000 workers. Worksites were stratified by size and proportion of women and randomized to intervention and control groups. Analyses were based on eight control worksites and five that received the full intervention, including a total of 2365 individuals at baseline and 1762 with adequate data at both baseline and follow-up.	Focused on discrete food- based eating messages (to increase consumption of fruit, vegetables, high-fibre products, whole-grain breads/rice/pasta, potatoes, legumes, to substitute low-fat dairy products, remove skin of chicken and visible fat from meat or substitute fish and poultry for other meat). These were delivered through programmes targeting employees' individual eating behaviours (classes, taste tests, food demonstrations) and the worksite environment (labelling of recommended foods in cafeteria and bulletin- board displays). A standard intervention was tailored to the individual worksite in cooperation with an employee advisory board established at each site. Control: no intervention. Follow-up: 15 months.	Self-administered 67-item food frequency questionnaire	Changes in fruit intake did not vary significantly between groups (+2.948 servings/month in the control group and +6.820 servings/month in the intervention group, p=0.21). For vegetables, however, the changes were statistically significant between groups (p<0.02) (-1.581 servings/month in the control group and +3.288 servings/d in the intervention group) for an estimtated net effect of +4.869 servings/month or approximately +0.16 servings/d.	The only other significant difference in dietary changes was a greater reduction of processed margarine and butter in the intervention group.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Treatwell 5 a Day Study, United States Sorensen et al. (55), Hunt et al. (56)	Randomized controlled trial	Twenty-two community health centres located in underserved areas with between 27 to 640 workers (20 worksites employed fewer than 120 workers). Block randomization to three groups was done to achieve balance in size and ethnicity across conditions. Eligible workers were permanent employees working at least 15 hours per week. Two cross-sectional surveys of 1359 individuals at baseline and 1306 individuals at follow-up were performed. About 47% of the respondents at baseline also provided information at follow-up.	Minimal intervention control group (G3): there was periodic exposure to the national "5 a Day" media campaigns, promotion of the Cancer Information Service Hot Line, and a one-hour general nutrition presentation and taste test were provided at the worksites. Worksite intervention (G2): As for the minimal intervention control group plus worker participation in programme planning and implementation (worksite coordinator and employee advisor board) plus programmes targeting individual behaviour change (kick-off event, 10, 30-minute information sessions from the "Eatwell 5 a Day" discussion series, at least one educational campaign each intervention year lasting for three to five weeks, and holiday events) plus worksite environmental changes (increased offerings of fruit and vegetable, point-of- choice labelling of fruit and vegetable, posters, videos and brochures). Worksite-plus-family (G1): as for worksite intervention, plus written five- part series learn-at-home programme, plus annual family newsletter, plus annual family festival, plus periodic mailings of materials to family (nine mailings). Follow-up: 19.5 months	Self-administered seven-item food frequency questionnaire developed for use in the National Cancer Institute "5 a Day for Better Health" research projects.	Baseline: There was no significant difference in geometric mean intakes among groups (G1=2.8 serving/day, G2=3.0 serving/day, G2=3.0 serving/day, G2=2.9 Serving/day ( <i>P</i> =0.62). Follow-up: Adjusted changes in fruit and vegetable intake varied significantly among groups ( <i>P</i> <0.05). Intakes increased significantly more in G1 (+0.49 serving/day or +19%) compared with G3 (+0.01 serving/day or +0.4%) ( <i>P</i> =0.018). No difference was found between G2 (+0.2 serving/day or +7%) and G3 ( <i>P</i> =0.47).	84% females, 23% Latino and 18% non-Latino Black workers. Fruit and vegetable intakes include potatoes. A higher number of activities offered per employee were significantly correlated with greater change in fruit and vegetable consumption (r= 0.55; <i>P</i> =0.04). Greater participation in activities was significantly correlated with increased fruit and vegetable intake (r=0.55; <i>P</i> =0.04).

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Working Well Trial, United States Sorensen et al. (57), Patterson et al. (58) and Gianz et al. (59)	Randomized controlled trial (matched-pair design)	Participants were 114 manufacturing, communications, public services or utilities worksites with between 49 to 1700 employees (total of more than 28 000 workers) in 16 states. Sites were matched by the presence of a cafeteria, worksite size, type of smoking policy, company type, sex distribution, distribution of blue/white-collar jobs, and response rate to the baseline survey. One site per pair was randomized to the intervention. Two cross- sectional surveys of individuals and key informants were performed at baseline and follow-up. Three sites were lost due to economic dislocation and three matched sites lost accordingly.	The intervention focused on promotion and building awareness, plus action and skills training, plus maintenance of behaviour and preventing relapse (stage-of-change model). Participatory strategies included worksite coordinator and gatekeeper, plus employee advisory boards. Interventions directed at the individuals included a kick-off event, interactive activities, posters and brochures, self-assessments, self-help materials, campaigns and contests, and direct education through classes and groups. Interventions directed at environmental changes included consultation on the formation and implementation of smoking policy, changes in food offerings and/or nutrition education in cafeterias and vending machines, and catering policies. Control: no intervention, follow-up: two years.	Self-administered 88- item food frequency questionnaire listing portion sizes. In this, fruit and vegetable intake was calculated on the basis of two questions asking about usual intakes of fruit (excluding juice) and vegetables (excluding potatoes and salads), plus responses to items about salad, potatoes, and fruit juice servings.	Follow-up (using data from 108 worksites): fruit and vegetable intake changed from 2.60 to 2.80 servings/day in the intervention sites and from 2.58 to 2.60 servings/day in the control sites, for a net effect of +0.18 servings/day (or 5.6% (SE 1.3), <i>P</i> <0.001). Increased intake was consistently higher in intervention sites and was negligible in most control sites.	The intervention was based on a theoretical model derived from individual, organizational and community activation theories. Fruit and vegetable intakes included potatoes. Using data from the 55 intervention worksites, contests and direct education were associated with fruit (r=0.31, $P$ <0.05) and vegetable (r=0.38, $P$ <0.05) intakes. Intervention dose for activities directed toward individuals was associated with fruit and vegetable intake (R2=0.16, P=0.004). It was also associated with a greater reduction of fat intake in the intervention worksites.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Working Healthy Project - imbedded in the <i>Working</i> <i>Well Trial</i> , United States (see above) Emmons et al (60)	Randomized controlled trial (randomized matched-pair design)	Twenty-six manufacturing worksites with an average of 337 eligible employees per site (SD 135). One site per pair randomized to intervention. Three sites were lost due to economic dislocation and three matched sites lost accordingly. Analyses based on 22 matched-pair worksites with 2055 study participants.	Multiple risk-factor approach targeting nutrition, physical activity, and smoking. Each worksite had an employee advisory board as well as a worksite coordinator (main contact person and typically the chairperson of the advisory board). The intervention protocol included a number of individually focused intervention activities (informational/educational/ motivational materials, self-assessment with feedback, self-help/self-skills management programmes, direct education, contests and monetary incentive) as well as strategies targeted at social norms and health-related worksite policies (labelling in cafeteria and vending machines, catering policy, smoking-control policy, enforcement of policy). Follow-up: 2 ½ years	Self-administered 88- item food frequency questionnaire based on the Block food frequency questionnaire. In this, fruit and vegetable intake was calculated on the basis of two questions asking about usual intakes of fruit (excluding juice) and vegetables (excluding potatoes and salads), plus responses to items about salad, potatoes, and fruit juice servings.	Baseline (n=2055): there was no significant difference in fruit and vegetable intake between groups (2.8 (SD 1.8) servings/day in each group). Follow-up (n=2055). At follow-up, fruit and vegetable intake increased to 3.0 (SD 2.0) servings/day (+0.20 servings/day) in the intervention group. It decreased to 2.6 servings/day (SD 1.8) servings/day (SD 1.8) servings/day (-0.20 servings/day) in the control group. The difference at follow-up between the groups did not reach significance ( $P$ =0.06).	The intervention was based on individual, organizational, and community activation theories, including a participatory strategies model. Fruit and vegetable intake included potatoes. Fibre intake and physical activity levels were higher in the intervention group than in the control group at follow-up.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
WellWorks Study, United States Sorensen et al (61)	Randomized controlled trial (matched-pair design) with cross- sectional sample surveys at baseline and follow-up.	Twenty-four predominantly manufacturing worksites with between 250 to 2500 employees, use of known or suspected occupational carcinogens. Worksites were matched by pairs based on site characteristics including presence of a cafeteria, size, smoking policy, company type, distribution by sex and by blue/white-collar jobs, response rate to baseline survey. One site per pair randomized to intervention. Two cross-sectional surveys of 5914 individuals at baseline and 5406 at follow-up were performed. 2658 individuals provided information at both time points (considered in these analyses). Of these, 272 were excluded from the analysis because of out- of-range or missing dietary values.	Integrated programme targeting both behavioural risk factors (dietary habits and cigarette smoking) and exposure to hazards on the job. Strategy: joint worker-management participation in programme planning and implementation, operationalized through an employee advisory board and a designated work-site liaison, plus consultation by project staff with management on worksite environmental changes including tobacco-control policies, increased availability of healthy foods and reduction in the potential for exposure to occupational hazards, plus health education programmes targeting individual behaviours. Control: no intervention, follow-up: two years.	Self-administered 88- item food frequency questionnaire. In this, fruit and vegetable intake was calculated on the basis of two questions asking about usual intakes of fruit (excluding juice) and vegetables (excluding potatoes and salads), plus responses to items about salad, potatoes, and fruit juice servings.	Follow-up: Significant net effect (adjusted) of +0.13 serving/day of fruit and vegetables ( <i>P</i> =0.03) (adjusted changes in the intervention group: 2.29 to 2.52 servings/day (or 10%), and 2.26 to 2.36 servings/day (or 4%) in the control group).	76% males. Fruit and vegetable intakes include potatoes. Professional and managerial workers increased their fruit and vegetable intake more than other workers did, although this difference was apparent in both groups. Percentage energy from fat was also reduced more in the intervention group than in the control group.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on changing risk behaviours for noncomm- unicable diseases in NZ working men, New Zealand Cook et al. (67)	Controlled field trial	Male hourly-paid employees at two manufacturing worksites. Participation was voluntary (42% of employees volunteered): 132 participants at intervention site and 121 at control site.	Health promotion programme targeting dietary behaviours and physical activity. At the intervention site participants attended a 30-minute workshop once a month for six months. Topics included nutrition and noncommunicable diseases. Six nutrition displays were rotated through the cafeteria. Illustrated point-of-choice messages were installed promoting fruit and vegetables and lower-fat items, and water as a beverage. Follow-up: 12 months	Ten-minute questionnaire on self- reported behaviour including questions on frequency of fruit and vegetable intake.	Measured change in percentage of participants consuming two to three servings/day of fruit and two to three servings/day of vegetables. There was a significant difference between groups for the change in vegetable intake from baseline ( $P$ =0.007). In the intervention group, 12.2% more people (from 14.4% to 26.6%) ate two to three servings/day at six months ( $P$ =0.002); the change from baseline dropped to 7.1% at twelve months but remained significant ( $P$ =0.05). In the control group vegetable intake fell at six months (from 21.5% to 14.1%), and then returned to baseline levels (22.7%) at 12 months. The intervention did not significantly affect fruit intake ( $P$ =0.78).	This intervention targeted both diet and physical activity. Diet focus was low-fat, high-fruit and vegetable intake. The study did not quantify the change in actual intake.

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Study and	Design	Participants	Intervention	Data collection methods: fruit and	Results	Comments
				vegetable intake		
WellWorks- 2 study, United States Sorensen et al. (62)	Randomized controlled trial	Fifteen manufacturing worksites with between 400 to 2000 employees and probable use of chemical hazards. Eight sites randomized to the control group and seven to the intervention group. There were two cross-sectional surveys of 9019 individuals at baseline, 7327 at follow- up were performed. Of these, 5156 individuals provided data at both time points (embedded cohort).	Health promotion (HP), plus an occupational health and safety programme (HP/OHS). Control: health promotion only. The health promotion programme included interventions at the individual, organizational and environmental levels (including an employee advisory board for worker- manager input into the programme) and focused on nutrition and tobacco use. The HP/OHS programme also addressed both occupational health and safety (exposure to hazardous substances). Follow-up: ~two years	Self-administered seven-item food frequency questionnaire from the "5 a Day for Better Health" programme.	Baseline (cross-sectional sample): Adjusted mean intakes were 3.45 servings/day in the HP/OHS programme and 3.53 servings/day in the HP programme. In the follow-up (cross-sectional sample), there was no significant difference between groups for the change in fruit and vegetable intake (net effect=-0.06 serving/day, $P$ =0.54. Change in fruit and vegetable intake: -0.03 serving/day in the HP/DHS and +0.03 serving/day in the HP/DHS and significant difference between groups for the change in fruit and vegetable intake: -0.03 serving/day in the HP/DHS and +0.03 serving/day in the HP. Follow-up (embedded cohort): there was no significant difference between groups for the change in fruit and vegetable intake (net effect=-0.15 serving/day, $P$ =0.24. Change in fruit and vegetable intake: -0.10 serving/day in the HP/OHS and +0.05 serving/day in the HP).	~60% males. Fruit and vegetable intakes included potatoes.
A study on the effect of peer education on increasing fruit and vegetable intake, United States Buller et al. (63)	Randomized controlled trial (matched-pair design)	Participants were 2091 labour and trades blue- collar employees from 10 public employers recruited by formal work group. (There were 126 work groups with 2530 eligible employees, 2091 of whom completed the baseline survey). These were divided into 93 cliques (informal networks in which members interact more with each other than surrounding people within their work group).	Baseline awareness programme: nine- month general "5 a Day" programme delivered to all employees at each worksite regardless of job type through formal worksite communication channels (mail, posters, cafeteria promotion, guest speakers). Control: nine-month continuation of the programme. Intervention: nine-month continuation of the programme, plus peer education programme. One worker was selected from each intervention clique to be a peer-educator and trained (16-hours over an eight-week period); they were paid for time spent in training, travelling to training, distributing material and keeping daily logs of	Two methods: 1) 24- hour recall (estimates excluded olives, avocados, coconut, fried potatoes, fried potatoes, cranberry juice); 2) interviewer-administered seven-item food frequency questionnaire from the "5 a Day for Better Health" programme.	Baseline: Total fruit and vegetable intake tended to be lower in the intervention than control cliques (intervention 3.32 (SD 0.88) servings/day with the 24-hour recall and 2.80 (SD 0.64) with the food frequency questionnaire; control: 3.55 (SD 1.16) servings/day with the 24- hour recall and 2.80 (SD 0.64) with the food frequency questionnaire). Eighteen-month follow-up: 1) Significant (adjusted) net effect for fruit and	74% males. Ethnic origin: 46% White/Anglo, 42% Hispanic. Fruit and vegetable intakes included potatoes. Intervention increased awareness and knowledge of the fruit and vegetable recommendations.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
		Forty-six matched-pairs (matched on: average fruit and vegetable intake, stage of readiness to change, clique density, co-worker and management support for health, perceived self-efficacy for change, percentage Hispanic employees, percentage females, and size) were randomized to intervention and control groups. At eight or nine months, some reorganization took place (some cliques no longer existed, some did not want to participate further, no employee would serve as peer leader, etc.) and 41 matched-pairs were left, representing 332 employees in the control group and 363 in the intervention group who completed the trial.	contacts with co-workers, speaking to researchers about their progress. In addition to discussion with co-workers they provided various materials to help co-workers practise dietary skills and stimulate discussion. Follow-up: Assessment at baseline, at 18-months, and six months after the intervention (24 months after baseline)		vegetable intake of +0.77 serving/day (SD 0.14, P<0.001) with the 24-hour recall and +0.46 serving/day (SD 0.14, P=0.002) with the food frequency questionnaire. Using the 24-hour recall, the (adjusted) net effect was +0.41 serving/day for fruit (SD 0.09, $P<0.001$ ), +0.10 for juice servings (SD 0.15, $P=0.175$ ), +0.26 for vegetable servings (SD 0.07, $P=0.075$ ). Slightly smaller effects were seen with the food frequency questionnaire (+0.25 for fruits (SD 0.06, $P<0.001$ ), +0.01 for juice servings (SD 0.06, $P=0.806$ ) and +0.19 for vegetable servings (SD 0.09, $P-$ 0.047). 22 months after baseline survey: the significant net effect in the total number of daily servings of fruit and vegetable persisted only when measured by 24- hour recall (+0.41serving/day (SD 0.10), $P=0.034$ versus food frequency questionnaire: - 0.04 (SD 0.12), $P=0.743$ ).	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and	Results	Comments
				vegetable intake		
Next Step Trial, United States Tilley et al. (64)	Randomized controlled trial	Twenty-eight automotive industry worksites participated with at least 45 eligible employees from the pattern and model-making areas (representing a total of 5042 employees). Eligible employees). Eligible employees, considered to be at high risk of colorectal cancer, included employees who were active, on layoff, or retired and had worked at least two years at 20% effort in plant pattern and model- making areas. Fifteen worksites were randomized to intervention (n=1578 individuals included) and 13 to control status (n=1899 individuals included).	The aim was to decrease fat intake and increase consumption of fibre and fruit and vegetables. The intervention included five nutrition classes on paid work time, plus mailed self-help materials in the first 12-month period, and worksite posters, plus personalized feedback from food frequency questionnaires (comparison of employees' diets to the USDA Food Guide Pyramid and motivational messages) in the second 12-month period, and quarterly newsletters throughout the trial. Control: no intervention, follow-up: two years	Self-administered food frequency questionnaire, a modified version of the National Cancer Institute food frequency questionnaire. Servings of fruit and vegetable were calculated following the approach used by the national "5 a Day for Better Health" programme.	Baseline (n=3477): There was no difference in fruit and vegetable intake (intervention: 3.4 (SD 1.9) servings/day and control: 3.4 (SD 1.7) servings/day), fruit intake (1.7 (SD 1.2) versus 1.6 (SD 1.1)) or vegetable intake (1.8 (SD 1.0) versus 1.7 (SD 1.9)). Follow-up (n=3477 at year 1 and n=3485 at year 2 using a modified intention- to-treat approach). There was a significant net effect at year 1 (adjusted) +0.20 serving/day ((SE 0.06), P=0.001, intakes at one year: intervention=3.56 (SE 0.04), control=3.35 (SE 0.05)) but non-significant net effect at year 2 (adjusted) +0.10 serving/day ((SE 0.06), P=0.11, intakes at two years: intervention=3.62 (SE 0.04), control=3.52 (SE 0.04), control=3.52 (SE 0.05)). Similar findings were observed for fruit (adjusted net effect=+0.11 serving/day (SE 0.03) at 2- yr ( $P=0.15$ )) and vegetables (adjusted net effect=+0.09 serving/day (SE 0.03) at 1 year ( $P=0.005$ ) and +0.03 serving/day (SE 0.03) at 2 years ( $P=0.19$ )).	98% males. The intervention was based on the concepts from social cognitive theory, social support principles, and the stages-of-change construct from the trans-theoretical model of behaviour change. There was also significant improvement in the intervention group at one year for fat and fibre, but this remained significant at two years only for fibre intake. Intervention effects were larger in younger (<50 years), active employees and class attendees.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Seattle 5 a Day programme United States Beresford et al. (65)	Randomized controlled trial with cross- sectional sample surveys at baseline and follow-up	Twenty-eight worksites with between 250 and 2000 employees and with cafeterias. Fourteen worksites were randomized to the intervention and 14 to the control group. Cross- sectional surveys were performed of 2828 individuals at baseline (1428 in the intervention and 1400 in the control group) with a mean age of 41.1 years (SD 3.2), and 2395 individuals at follow-up (1169 in the intervention and 1226 in the control group). 1681 individuals provided information at both time points (cohort data).	Intervention: four-phase activities addressing work environment and individual behaviour: 1) "teaser" campaign to increase awareness about "5 a Day"; 2) worksite kick-off event about the benefits of fruit and vegetable and to assess personal knowledge and diet; 3):skill-building for individuals, signs/displays/etc in cafeterias, incentives in some sites; 4) emphasis on ways to adapt new skills to every day, importance of social support and environmental changes. An employee advisory board at each worksite guided the intervention, aided by an intervention specialist from the research team. Control: no intervention, follow-up: ~2 years	Four self-administered methods: 1) Seven-item food frequency questionnaire during the past month; 2) Fat- and fibre-related diet behaviour questionnaire with a six- item fruit and vegetable subscale (about eating 1+ vegetable at lunch, 2+ vegetable at dinner, fruit for dessert, raw vegetables for snacks, fruit for snacks, fruit at breakfast); 4)Three 24-hour recalls (eight persons/ worksite); 5) Usual-day checklist including 12 questions on usual fruit and vegetable- eating habits. Two unobtrusive indicators: 1) plate observation (one lunch hour); 2) community- level fruit and vegetable availability checklist to record the presence of these offerings in the cafeterias.	Baseline (n=2742 individuals): No difference in fruit and vegetable intake between the intervention (food frequency questionnaire: 3.68 servings/day, fat- and fibre-related diet behaviour questionnaire: 0.92, 24- hour recall: 5.17, usual-day checklist : 5.75, single question: 2.62) and control group (food frequency questionnaire: 3.63, fat- and fibre-related diet behaviour questionnaire: 0.95, 24-hour recall: 5.05, usual-day checklist: 5.80, single question: 2.93). Follow-up (n=2395 individuals): there was a significant net effect (adjusted) for fruit and vegetable with the food frequency questionnaire (+0.30 serving/day, P<0.05; unadjusted changes: intervention=+0.51, control=+0.21), fat- and fibre-related diet behaviour questionnaire (+0.12 serving/day $P<0.05$ ; unadjusted changes: intervention=+0.13, control=+0.01), and single question (+0.19 serving/day, $P<0.01$ ; unadjusted changes: intervention=+0.27, control=+0.08). No significant (adjusted) net effect with the usual-day checklist (+0.40 serving/day, $P=0.08$ , unadjusted changes: intervention=+0.52, control=+0.12) or 24-hour	58% males. The intervention was designed around the stage-of-change model. The fruit and vegetable intakes included potatoes. The group of persons surveyed at baseline and follow-up was not entirely the same. Plate observation: net=+0.16 serving on average (95% Cl - 0.27, 0.57). Checklist: there was a non- significant effect for the number of types of vegetables and fruits offered.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
					recall (+0.73 serving/day, P=0.19, unadjusted changes: intervention=+0.29, control=-0.44). Cohort data (n=1681): non-significant net effect (+0.25 (95% CI - 0.01,0.50)) with the food frequency questionnaire, but significant with fat- and fibre-related diet behaviour questionnaire (+0.11 (95% CI 0.04,0.17)), usual-day checklist (+0.47 (95% CI 0.04,0.90)), single question (+0.13 (95% CI 0.03,0.22)).	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Health Works for Women, United States Campbell et al. (66)	Randomized controlled trial	Participants were 859 blue-collar women aged 18+ years and working in nine rural small to medium-size (125 to 350 employees) textile or light manufacturing industries in North Carolina employing a majority of women and with no current comprehensive health promotion programme onsite.	There were two interventions (one at baseline and one at six months), individualized computer-tailored women's magazines that provided personalized feedback, strategies for change, and community resource information plus social- support activities using worksite natural helpers (women in the workplace trained to diffuse information and provide support for healthy behaviour change). The intervention addressed multiple health behaviours (physical inactivity, unhealthy diet (high-fat, low-fruit and vegetable intake), smoking, and breast and cervical cancer screening). Delayed intervention: after six months, one individualized computer-tailored women's magazine but no worksite natural helpers programme. Follow-up: 18 months (measurements at baseline, six-months and 18-months).	Self-administered 28- item food frequency questionnaire based on a validated instrument (four assessed fruit intake and six assessed vegetable intake)	Baseline: Women in the intervention group consumed significantly more fruit and vegetables compared with the delayed intervention group (2.9 (SD 2.4) servings/day versus 3.4 (SD 3.1) servings/day). Follow-up (n=660 at sixmonths and n=538 at 18-months): At 18-months, the mean fruit and vegetable intake was higher in the intervention group (3.6 (SD 3.1) servings/day) than in the control group (3.4 SD (3.1) servings/day) (adjusted comparison <i>P</i> <0.05). Between baseline and 18-months, there was a significantly higher change (adjusted analyses) in fruit and vegetable intake in the intervention group (+0.7 serving/day) (net effect: +0.7 serving/day, <i>P</i> =0.01), and higher changes in fruit intake (+0.5 serving/day, net effect=+0.6 serving/day, <i>P</i> =0.02) and vegetable intake (+0.2 serving/day, net effect=+0.3 serving/day, <i>P</i> =0.03).	



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#### A.4.3 HEALTH CARE SETTINGS

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Recruitment th	rough Health Ma	intenance Organizations (i	HMO)			
A study on newsletter interventions to improve fruit and vegetable consumption in healthy adults, United States Lutz et al. (68)	Randomized controlled trial	Participants were 710 adults aged 18+ years, primary subscribers to a HMO in North Carolina (only one participant per household). There were 180 participants in the control group, 177 in the Intervention 1 group, 176 in Intervention 2 and 177 in Intervention 3.	Intervention 1 (11): Non-tailored nutrition newsletters. Intervention 2 (12): Tailored nutrition newsletters without a goal- setting component. Intervention 3 (13): Tailored newsletters with tailored goal- setting information. Newsletters were sent each month for four months. Computer-tailored messages were based on the participants' responses to the baseline survey. Tailored goal- setting messages covered the specific goal of increasing fruit and vegetable intake to 5+ servings/day plus three subgoals based on answers to the baseline questionnaire. Control: no newsletters, follow-up: six months	Self-administered food frequency questionnaire including 17 fruit and vegetable items (developed for this study). The number of fruit and vegetable items eaten at least once a week were also counted and added to determine variety.	Based on data from respondents who provided information at baseline and follow-up (n=573), fruit and vegetable intake changes were more favourable in all intervention groups compared with the control group ( <i>P</i> <0.002). Changes in intake ranged from +0.1 serving/day in the control group (from 3.5 to 3.6), +0.7 serving/day in 11 (3.4 to 4.1), +0.8 serving/day in 12 (3.3 to 4.1), and +0.9 serving/day in 13 (3.5 to 4.4). There was no significant difference among the intervention groups. Using intention-to- treat analyses (n=710), improved intakes were seen only for I2 and I3 compared with the control group (but no significant difference between I2 and I3).	64.4% female, 77.9% White. Newsletter content was tailored using theoretical constructs (self-efficacy from the social cognitive theory, stage or readiness to change from the trans- theoretical model of change, and perceived barriers and benefits from the health belief model). French fries were excluded from the calculation of the number of daily servings. Post- intervention variety scores were higher for all intervention groups ( <i>P</i> =0.0001).

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Study and	Design	Participants	Intervention	Data collection	Results	Comments
reference				vegetable intake		
Puget Sound Eating Patterns Study, United States Kristal et al. (69)	Randomized controlled trial	Participants were 1459 adults aged 18–69 years, randomly selected from computerized lists of enrolees of a large HMO, stratified into three age groups (18–34, 35–54, 55–69 years) (only one participant per household). There were 729 in the intervention group and 730 in the control group. Analyses were based on 1205 (601 in the intervention group, 604 in the control group) with data at the baseline, three-month and 12-month follow- ups.	Computer-generated personalized letter, plus motivational phone call, plus self-help manual, plus package of supplementary self-help materials, plus computer-generated behavioural feedback based on a self-administered food frequency questionnaire, plus semi-monthly newsletters sent until one year post-randomization. The aim was to lower fat intake and increase fruit and vegetable intake. Control, usual care, follow-up: 12 months	Two methods: 1) a six- item interviewer administered food frequency questionnaire was used for the evaluation in the "5-a- Day for Better Health" programme. 2) 24-hour recall (optional at 12- months but completed by 67% of respondents at baseline and 12- months).	Food frequency questionnaire (intervention n=610, control n=604): There was a significant net effect (adjusted) in fruit and vegetable intake: 0.46+/- 0.10 serving/day (unadjusted changes: intervention=0.47+/-1.83, baseline=3.62 servings/day; control=0.14+/-1.80, baseline=3.47). The intervention effect did not differ between fruit and vegetables (both +0.23 serving/day). 24-hour recall: the net effect was not significant (0.25 serving/day, 95% CI=-0.2; 0.7).	49% females, 85.9% White. The intervention was based on the social learning theory, stages- of-change construct from the trans- theoretical model, and diet individuation model. The fruit and vegetable measure included potatoes. Intervention effects were modestly larger among women. They were larger for those in the action or maintenance stages of dietary change at baseline, those who used at least two of the materials, and those who received behavioural feedback. Cost: approximately \$57 for individuals completing all intervention activities.
A study on computer- assisted intervention to decrease consumption of fat and increase consumption of fruit and vegetables, United States Stevens et al. (70, 71)	Randomized controlled trial	616 women aged 40–70 years, members of a HMO in Oregon, recruited by mail, with a negative mammogram during the previous two months. There were 308 in the intervention group and 308 in the control group.	Two 45-minute counselling sessions (including a 20-minute interactive computer-based intervention) ~two to three weeks apart and two 5-10 minute follow-up telephone contacts. The aim was to reduce dietary fat and increase intake of fruit, vegetables and whole grains. Control: intervention focusing on breast self-examination. Follow-up: 12 months	Two methods: 1) 24- hour recalls (two at baseline and one at four-months), administered by telephone with instructions and dimensional charts of geometric shapes to estimate serving sizes; 2) Self-administered Block food frequency questionnaire (accompanied with pictures of ¼-1/2 cup serving sizes) at baseline and 12-month follow-up.	24-hour recall at four- months: Significant net effect (adjusted) for fruit and vegetable intake: +1.04 servings/day ( <i>P</i> <0.001) (unadjusted changes: intervention=5.11 to 5.54, control=5.01 to 4.50 servings/day). Food frequency questionnaire at 12months: significant net effect (adjusted) for fruit and vegetable intake: +0.93 serving/day ( <i>P</i> <0.001) (unadjusted changes: intervention=3.09 to 4.33, control=3.21 to 3.40 servings/day).	Intervention used strategies from the trans-theoretical model, principles of motivational interviewing, and social- cognitive theory. There was significantly less fat consumption in the intervention than control group at 12 months.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Recruitment th	rough general pr	ractices				
A study on improving dietary behaviour through tailored care messages in primary care settings, United States Campbell et al . (72)	Randomized controlled trial	Participants were 558 adults aged 18+ years from four family practices (two urban and two rural) in North Carolina recruited at check-in for any type of medical appointment, randomized to three groups.	Tailored intervention: One-time mailed computer-developed nutrition information packet tailored to the participant's stage of change, dietary intake, and psychological information, mailed within three weeks of baseline assessment. The aim was to increase fruit and vegetable and decrease fat intake. Comparison intervention: one- time mailed nutrition information packet providing standard information based on the 1990 Dietary Guidelines for Americans, mailed within three weeks of baseline. Control: did not receive nutrition messages, follow-up: four months	Self-administered 28- item food frequency questionnaire (10 items for fruit and vegetables) to recall intake during the previous three months.	Fruit and vegetable intake decreased by 0.3 serving/day in each group (from 3.6 servings/day at baseline, SD-0.19). The net change was thus 0 serving/day when comparing the tailored intervention with the control group ( <i>P</i> =0.817) and when comparing the comparison intervention with the control group ( <i>P</i> =0.968). Analyses based on n=394.	43.4% females, 47.9% non-White. The intervention used a stage-of-change approach based on the trans-theoretical framework to match tailored information to the participant's specific needs. At baseline, fruit and vegetable intake was correlated with stage of change. Seasonal factors may have affected intake as baseline data collection was carried out in two different seasons.
Women's Health Trial Feasibility Study in Minority Populations, United States Coates et al. (73)	Randomized controlled trial	Participants were 2208 postmenopausal women, 50 to 79 yrs, enrolled at clinics in Atlanta, Birmingham and Miami, with fat intake >=36% dietary energy but no history of major chronic diseases and no lipid medication. Since randomization occurred between Sept 92 and Apr 94 and the trial ended in June-Aug 94, follow-up time was not the same for all women. Thus the FFQ was completed by 2207 women at baseline, 1780 women at 6- months, 1141 at 12- months and 479 at 18- months. This represented response rates of 100% at baseline and between 75% and 85% during follow-up.	The primary aim was to reduce total fat intake to <=20% energy, the secondary aims were to reduce intake of saturated fat and cholesterol and increase intake of fruit and vegetables and grain products. The Vanguard Women's Health Trial Programme was modified to include the secondary aims. Nutritionists assigned personal goals and met study participants in group sessions (weekly for five weeks, biweekly for five weeks, monthly for nine months, and then quarterly). Each session integrated nutritional and behavioural change strategies. Forms and materials were translated into Cuban Spanish. Staff members were of varied racial/ethnic backgrounds. Family members were invited to some sessions. Controls received only the Dietary Guidelines for Americans, follow-up: 18 months	Two methods: 1) Self- administered 100-item food frequency questionnaire, designed to be sensitive to changes in intake of fat- modified foods; 2) four- day food record with foods recorded on alternate days (half of the data were analysed).	Food frequency questionnaire at 18 months (n=285 intervention and n=194 control): there was a significant net effect for fruit = +0.53 serving/day (95% CI=0.33,0.73) (changes: intervention=+0.54, control=+0.02 serving/day). There was a significant net effect for vegetables = +0.27 serving/day (95% CI=0.07,0.47) (changes: intervention=+0.35, control=+0.08). Stratified analyses by ethnic group showed significant net effects for fruit in Blacks and Whites, and for vegetables in Whites. Food records: results generally paralleled those of the food frequency questionnaire but intervention effects were somewhat smaller.	56% White, 28% Black, 16% Hispanic. There were also significant net effects for changes in fat, saturated fat, cholesterol and energy intakes (greater reduction in the intervention group) at 18 months. There was little variation in the results by education level.



-	Study and	Design	Participants	Intervention	Data collection	Results	Comments
	reference				vegetable intake		
	A study on the use of a "talking computer" to improve adults' eating habits, United States Delichatsios et al. (74)	Randomized controlled trial	Participants were 298 adults aged 25+ years recruited from a multi- specialty group practice, with sedentary behaviour and suboptimal diet quality. 148 participants were randomized to intervention and 150 to the control group.	Six-months of weekly communication with an interactive computer-based voice system (Telephone-Linked Communications - TLC). The system monitored dietary habits and provided educational feedback, advice and behavioural counselling. Control: Same TLC technology but with a content focusing on increasing physical activity. Follow-up: six months	Two methods sent by mail: 1) Self- administered 131-item food frequency questionnaire to recall intake during the previous year (at baseline) or the past three months (at follow- up); 2) 18-item Prime Screen instrument targeting intake of fruit, vegetables, dairy products, whole grains and meats.	Food frequency questionnaire (n=61 intervention and n=53 control): Significant net effect (adjusted) for fruit = +1.1 servings/day (95% CI=0.4,1.7) (unadjusted changes: intervention=2.8 to 3.2 and control=2.4 to 2.0 servings/day). Non- significant net effect (adjusted) for vegetables = +0.8 serving/day (95% CI=-0.3,1.8) (unadjusted changes: intervention=3.8 to 4.5 and control=3.5 to 3.6 serving/day). Prime Screen (n=148 intervention and n=150 control, intention-to-treat analysis): Significant net effect (adjusted) for fruit = +0.4 serving/day (95% CI=0.2,0.6) (unadjusted changes: intervention=1.1 to 1.5 and control=1.2 to 1.2 serving/day (95% CI=-0.1;0.3) (unadjusted changes: intervention=1.3 to 1.5 and control=1.2 to 1.4 serving/day).	42% females, 45% African Americans. Intervention used social cognitive theory as the guide to behaviour change. The intervention also improved diet quality, increased fibre intake, and decreased saturated fat and energy intake. There was a generally low usage of the TLC system but the level of use was not significantly related to change in fruit intake at six months.
	EatSmart, United States Delichatsios et al. (75)	Randomized controlled trial (matched-pair design)	504 adults aged 18+ yrs were recruited via the appointment system at six group practices in the primary care research network in New England. Practices were paired by size of patient panels and randomly assigned within each pair to intervention and control groups. There were 230 participants in the intervention, 274 in the control group.	Recommendations and educational booklets were sent by mail, tailored to baseline dietary intake and stage-of- change, plus provider endorsement of the recommendations at the routine office visit, plus two motivational counselling sessions by trained telephone counsellors two weeks and two months after the provider visit. The aim was to increase fruit and vegetable intake, decrease red and processed meat intake, and replace whole-fat by low-fat dairy products. Control: no intervention, follow-up, three months	18-item Prime Screen instrument (see Delichatsios et al. above).	Significant net effect (adjusted) in fruit and vegetable intake: +0.6 (95% CI=0.3,0.8) (intention-to-treat analysis with n=195 intervention and n=252 control) (unadjusted changes: intervention=2.9 to 4.0 and control=3.3 to 3.7 servings/day).	77.4% females, 16.6% non-White. There was a non significant difference in stage progression for fruit and vegetables.

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Study and	Design	Participants	Intervention	Data collection	Results	Comments
reference				vegetable intake		
A study on the effects of fruit and vegetable consumption on plasma antioxidant concentrations and blood pressure, United Kingdom John et al. (76)	Randomized controlled trial	Participants were 729 adults aged 25–64 years recruited from two general practices in Oxfordshire. 364 were randomized to the intervention and 365 to the control group.	The brief negotiation method was used to encourage participants to identify specific and practical ways (consistent with their habits and preferences) of eating more fruit and vegetables (5+ servings/day), performed by a research nurse. Two weeks later a phone call was made to reinforce the message and discuss problems. At three months a letter reinforcing the "5-a-day" message was sent together with a booklet of seasonal recipes and a strategy checklist. Control, no intervention until six months, then assigned to receive the intervention. Follow-up: six months	A self-administered dietary instrument for nutrition education was modified to assess fruit and vegetable intake and include stage of change questions.	There was a significant net effect (adjusted) in fruit and vegetable intake (n=329 intervention and n=326 control): +1.4 servings/day (95% CI=1.2,1.6, P<0.0001) (unadjusted changes: intervention=+1.4 with baseline= 3.4 servings/day, control=+0.1 with baseline=3.4 servings/day).	The intervention was associated with significantly larger increases in blood levels of alpha-carotene, beta- carotene, lutein, beta- cryptoxanthin, and vitamin C, and larger decreases in systolic and diastolic blood pressure.
A study on behavioural counselling to increase consumption of fruit and vegetables in low-income adults, United Kingdom Steptoe et al. (77)	Randomized controlled trial	Participants were 271 adults aged 18 to 70 years, registered at one primary health centre in a deprived inner city area, recruited by letter. 136 were in the behavioural counselling group and 135 in the nutrition counselling group. Overall, 177 were with a lower income (<\$640).	The two groups received two 15-minute individualized consultations (one carried out after the baseline assessment and one two weeks later) with personalized specific advice and setting of short-term and long-term goals, plus written information. The aim was to increase the intake of fruit and vegetables. The nutrition counselling group received education about the importance of increased fruit and vegetable intake and a "5-a-day" message. Behavioural counselling group: the intervention was founded on social learning theory and the stage of change model. Follow-up: 12 months	Two methods: 1) Interviewer-administered two-item food frequency questionnaire; 2) Self-completed dietary instrument for nutrition education , a weighted food frequency questionnaire that accounts for most fat and fibre in the typical UK diet.	There was a significant net change (adjusted) for fruit and vegetable intake: +0.62 serving/day (95% CI=0.09,1.13) (intention-to- treat analyses with full sample). Adjusted changes in each group: nutrition counselling=+0.87 (95% CI=0.50,1.25, baseline=3.67 servings/day), behavioural counselling=+1.49 (95% CI=1.12,1.86, baseline=3.60 servings/day). There were similar findings in a lower income subsample (n=177): net adjusted change=0.89 (95% CI=0.25,1.24); nutrition counselling: +0.78 (95% CI=0.31,1.24), baseline=0.87 serving/day; behavioural counselling: +1.67 (95% CI=1.22,2.11), baseline=3.34 servings/day.	The proportion of participants consuming 5+ servings/day increased significantly more in the behavioural counselling group, based on the whole sample, but not in the low-income subsample. The increase in blood levels of beta-carotene was greater in the behavioural counselling group.

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#### A.4.4 LOW INCOME POPULATIONS

Study and reference	Design	Participants	Intervention	Data collection methods: FV intake	Results	Comments
California Expanded Food and Nutrition Education Program, United States Del Tredici et al. (82)	Randomized controlled trial	Participants were 683 low-income adults (355 in the intervention group and 328 in the control group), responsible for planning and preparing meals for their family, and eligible to receive the Expanded Food and Nutrition Education Programme. Participants were selected from 15 counties in California.	Repeated visits of a nutrition assistant (mean number 7.8 of mean duration of 80.5 min) and one-to-one instruction on nutrition facts, selection and buying of foods, cooking skills, economical preparation, food safety, preserving. The methods used were mainly lecture/discussion and written materials, but also included demonstrations, audiovisuals, field trips. Control group: no instruction, follow-up: six months.	24-hour recall at baseline and six months	There was a significant increase in fruit and vegetable intake of 1.1 servings/day in the intervention group (baseline 2.6, SD 2.0, follow-up 3.7, SD 2.4 servings/day, <i>P</i> <0.001) but not in the control group (baseline 2.8, SD 2.3, follow-up 2.6, SD 2.0, servings/day, NS). Also there were significant increases in the intervention group for vitamin C-rich fruit and vegetable intake (1.4 to 2.2, <i>P</i> <0.01) and vitamin A- rich fruit and vegetable intake (0.3 to 0.6 <i>P</i> <0.01). No significant changes were observed in the control group (respectively: 1.4 to 1.4 servings/day of vitamin-C-rich fruit and vegetables, 0.4 to 0.3 servings/day of vitamin-A- rich fruit and vegetables)	The results also showed an increase in the number of different fruit and vegetables consumed in the intervention group (2.7 to 3.4 types, <i>P</i> <0.01) but not in the control group (2.6 to 2.5). The majority of the participants were female (percentage not stated).



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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
High 5, Low Fat Program, United States Haire-Joshu et al. ( <i>81</i> )	Randomized controlled trial	Participants were 910 high-needs African American parents (single parents, low- income, minority ethnicity, or living with stressors). Recruited from "Parents As Teachers" (PAT) programmes in 12 school districts (divided into six matched pairs) with randomization of districts within each matched pair.	Parent educators from PAT delivered a dietary change programme via five personal visit sessions, 10 bimonthly newsletters, and group meetings. The primary aims were to decrease fat intake and increase fruit and vegetable intake. The secondary aims were to improve nutrition-related skills and parental modelling of dietary behaviours. Control: PAT programme but without H5LF sessions, follow-up: from the third quarter to second quarter	Modified short-form block food frequency questionnaire for use with African American parents was administered by telephone interview pre- test and post-test. 731 participants completed both.	Baseline: intervention and control groups mean fruit and vegetable intake was 4.65 (SE 2.7) and $4.86$ (SE 2.9) servings/ day respectively (no significant difference between groups). At follow-up there were significant differences between groups for changes in vegetable and fruit and vegetable intakes ( $P$ =0.03 and $P$ =0.04 respectively). For fruit and vegetable intake, intake increased by 0.19 serving/day in the intervention group and decreased by 0.34 serving/day in the intervention group and decreased by 0.08 serving/day in the intervention group and decreased by 0.34 serving/day in the control group. There was no significant change in fruit intake.	98% were African American females

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Study and	Design	Participants	Intervention	Data collection	Results	Comments
reference				methods: fruit and		
				vegetable intake		
Women, Infants,	Randomized	3122 women (18+ years	The intervention comprised three	Mean daily consumption	Baseline: the intervention	The "intention to treat"
and Children 5 a	controlled trial	of age) enrolled in 16	components over six months; 1)	at baseline and end of	group consumed significantly	paradigm was used for
day programme	crossover	women, infants, and	nutrition sessions conducted by peer	intervention was	fewer mean servings of fruit	all analyses.
United States	design	children (WIC) sites	educators (brief messages at enrolment	assessed by a self	and vegetable (3.9)	
		across the state of	and three group discussion sessions),	administered seven-item	compared with controls (4.2,	
Havas et al. (79),		Maryland. The	2) printed materials and reminders, 3)	food frequency	P=0.04). Follow-up (eight	
Langenberg et		participants were low-	individually tailored direct mail all	questionnaire.	months) the intervention	
al. ( <i>80</i> )		income, pregnant,	related to participant's set goals.		group increased mean fruit	
		postpartum and	Control sites experienced normal		and vegetable intake by 0.56	
		breastfeeding women	activities, which generally included less		(SE 0.11) compared with an	
		and mothers of children	than 10 minutes' nutrition education at		increase of 0.13 (SE 0.07)	
		enrolled at these sites	bimonthly visits. Follow-up: 8 months +		among controls, a significant	
		(1443 intervention and	12 months later for those in phase 1		difference (P=0.002). One	
		1679 control). In phase			year later (those in phase 1),	
		1, eight sites were			mean fruit and vegetable	
		randomized to			intake had increased by an	
		intervention and eight to			additional 0.27 (SE 0.09)	
		control status. In phase			servings among intervention,	
		2, control sites became			and 0.27 (SE 0.07) servings	
		intervention sites and			among control participants.	
		vice versa. Persons in			The difference in mean	
		phase 1 were ineligible			change in fruit and vegetable	
		for phase 2.			intake from baseline between	
					Intervention and controls	
					remained significant	
					(P=0.004). The biggest	
					change occurred in women	
					then two convince/day of	
					than two servings/day at	
					and 76% of control	
					and 70% of control	
					participants completed the	
					stuay.	

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Study and	Design	Participants	Intervention	Data collection	Results	Comments
reference				methods: fruit and		
				vegetable intake		
and Children food for life	controlled trial, crossover design	years of age) enrolled in 10 sites of the Special Supplemental Nutrition	enthusiastic participants from pilot study, attractive Food For Life brochure, individualized feedback on baseline	item food frequency questionnaire in a format	mean fruit and vegetable intake between groups (both	at sessions was suboptimal but there
United States	doolgii	Program for Women,	food frequency questionnaire, kick-off	1995 food frequency	(eight months): there was a	in intake with attendance
Havas et al. (78)		Infants, and Children in Maryland. In Phase 1, five sites were randomized to intervention and five to control group. In Phase 2, control sites became intervention sites and vice versa.	fair, four 45-minute workshops, newsletters, mail packets, personalized invitations, behaviour-reinforcing incentives, phone calls. Phase 2: As for Phase 1 but with slightly modified messages, five day-long fairs, mailed recipes with one food item, individualized dietary counselling/interactive cooking demonstration/free bag of food added to the fairs. Control: no intervention, follow-up: 8 months + an additional 12 months in participants from Phase 1.	questionnaire	significant difference between groups for changes in fruit and vegetable intakes (net change=0.4 serving/day, P=0.0003). Intake increased by 0.16 (SE0.08) serving/day in the intervention group and decreased by 0.24 (SE 0.08) serving/day in the control group. The largest changes were in women in the pre- contemplation, contemplation and preparation stages of change at baseline. Twelve months later (those in phase 1), the net change in fruit and vegetable intake remained significant (intervention: +0.1 serving/day versus control: - 0.32 serving/d. P=0.03). Only	at more sessions ( <i>P</i> -value for trend=0.002).
					53% of intervention and 60.2% of control participants completed the last follow-up	
					survey.	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on predicting achievement of a low-fat diet, adults with low literacy skills, United States Winkleby et al .(83)	Randomized controlled comparison using a cluster design	Participants were 242 low-income adults who participated in vocational and basic skills training classes. Twenty-four classes were matched in pairs on type of class and one of each class pair was randomly assigned to receive either the Stanford Nutrition Action Program (SNAP) or an existing general nutrition (GN) control curriculum.	There were two curriculum interventions: General nutrition (GN) consisting of an existing general nutrition curriculum. Stanford Nutrition Action Program (SNAP) a nutrition program with the primary goal of reducing fat intake (also emphasising increase in FV and grains) and with material designed for low literacy adults and based on social learning theory. Both had six to seven 60-minute classes, each taught once a week by health educators. In addition to this SNAP provided six maintenance contacts by phone during the 12- week period following the intervention. Randomization occurred at classroom level but analysis occurred at individual level. Follow-up: 3 months post intervention (12 weeks after completion of the SNAP maintenance contacts).	Low-literacy survey questionnaires were developed and were administered in a group setting. Measurement of dietary intake was obtained using a self- administered 98-item National Cancer Institute food frequency questionnaire that had been validated.	Three "signal detection subgroups" were created based on the probability of meeting the goal of <30% energy from fat at follow- up: Group 1 - high baseline dietary fat; Group 2 - moderate baseline dietary fat plus GN curriculum; and Group 3 - moderate baseline dietary fat plus SNAP curriculum. Change in fruit and vegetable intake was different between three "signal detection subgroups". Group 3 showed significant increases in vegetables (15.6 to 18.1 servings/week) while Groups 1 and 2 showed no significant increases (respectively 22.3 to 18.1 servings/week, and 16.6 to 14.6 servings/week).	Group 3 also had greater improvement in nutrition knowledge and self efficacy scores compared with G1 and G2.
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## A.4.5 CHURCHES

Study and	Design	Participants	Intervention	Data collection	Results	Comments
Tererenoe				vegetable intake		
Black Churches United for Better Health Project , United States Campbell et al. (84, 85)	Randomized controlled trial (matched-pair design)	Participants were adult members more than 18 years old of 50 Black churches located in 10 rural counties of North Carolina. Counties were matched by demographic and geographic characteristics and randomized to intervention or control groups. 3737 individuals provided information at baseline, 459 at one year (a one-eighth subsample), and 2519 at the two-year follow-up. The 25 churches in the intervention group were further randomized into two groups for a subintervention.	Activities were conducted at the individual, social network, and community levels, targeting predisposing factors (computer-tailored bulletins and printed materials), enabling factors (gardening, educational sessions, cookbook and recipe tasting, serving more fruit and vegetables at church functions), and reinforcing factors (training of a Nutrition Action Team and lay health advisors, community coalitions, pastor support, grocer-vendor involvement, church-initiated activities). The intervention lasted approximately 20 months. The 25 intervention churches were randomized to two sub- interventions and received, during the first year of intervention, either: 11: an expert-oriented bulletin which used scientific language and messages from nutritionists; or 12: a spiritually oriented bulletin which used religious language and messages from the church pastor. Control: no programme activities until the completion follow-up survey, follow- up: two years	Two methods: 1) interviewer-administered 15-item food frequency questionnaire. Seven items were developed by the National Cancer Institute to measure fruit and vegetable intake in the "5-a-Day" studies. The other eight items represented eight fruit and vegetable items drawn from the Block food frequency questionnaire and previous research, designed to provide more information about specific kinds of fruit and vegetables that are commonly consumed in this population. 2) three- day food record on a subset of 146 individuals who provided information at one-year follow-up.	Baseline (n=3737): no difference in fruit and vegetable intakes among the three groups (results for 11 and 12 are merged) (overall: 3.84 (SE 0.10) servings/day, $P$ =0.21; fruit: 2.14 (SE 0.06) versus 2.04 (SE 0.06); vegetable: 1.69 (SE 0.04) versus 1.61 (SE 0.04)). Vegetable intakes were approximately 0.15 serving lower when fried potatoes were excluded. Follow-up (two years) (n=2519): the intervention group (results for 11 and 12 are merged as there was no difference among intervention groups) had a significantly higher fruit and vegetable intake at follow- up than the control group (adjusted analyses). Overall: +0.85 (SE 0.12) serving/day (4.45 (SE 0.08), $P$ =0.0001). Overall difference without fried potatoes +0.87. Fruit: +0.66 (SE 0.09) serving/day (2.64 (SE 0.06), p=0.0001). Vegetables: +0.19 (SE 0.04) serving/day (1.82 (SE 0.03) versus 1.63 (SE 0.03), $P$ =0.0003).	73% females. The intervention used concepts from the stages-of-change trans- theoretical model, social cognitive theory and social support models. It included potatoes. At baseline, approximately 23% of both groups were consuming 5+ servings/day. At follow- up, this proportion increased to 33% in the intervention group and decreased to 21% in the control group (P<0.0001). The difference in fruit and vegetable intake at follow-up was significant across gender, age (except among the 18–37 year group), marital status, education and income strata. The intervention was also associated with higher stage-of-change and with better knowledge of the recommendations. In the intervention group, more frequent church attendance during the study period was a strong predictor of increased fruit and vegetable intake at follow-up.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Eat for Life Programme United Sates Resnicow et al. (86)	Randomized controlled trial (matched pair)	African Americans aged 18+ years were recruited from 14 Baptist and Methodist churches. Churches were pair- matched based on size and socioeconomic status, and randomized to the treatment groups (four in Group 1, six in Group 2 (including two smaller churches), and four in Group 3). 1011 participants were recruited by a liaison in each church using a quota sampling framework (first come, first served) (mean number of participants per church=72). Of these, 861 provided information at one year.	Group 1 (G1): received standard nutrition education materials (National Institute of Health brochures addressing fruit and vegetable intake). Group 2 (G2): received a culturally sensitive multi-component self-help intervention (including a video, a cookbook containing recipes and information, printed education material, and a quarterly newsletter) with one telephone cue call (-two weeks after the health fair). Group 3 (G3): As for Group 2, plus three telephone counselling calls based on motivational interviewing performed by trained dieticians (3, 6, and 10 months after baseline). Follow- up: one year	Three methods: 1) Self- administered seven-item food frequency questionnaire based on the Behavioural Risk Factor Surveillance System (BRFSS) that assessed fruit and vegetable intake (excludes potatoes). To reduce over-reporting, response categories of four and five times per day were removed; 2) Self-administered two- item food frequency questionnaire (FFQ) to assess usual fruit and vegetable intake; 3) A self-administered 36- item food frequency questionnaire was developed for this study based on the Health Habits and History Questionnaire (HHHQ) modified to ask about intake during the past week (rather than a longer timeframe), to use open-ended questions, separating some questions (excludes potatoes).	Baseline (n=861): No difference in fruit and vegetable intake among groups (mean of 3 FFQ: G1=3.64, G2=3.97, G3=3.78). Follow-up (n=861): Across the 3 FFQ, the change in fruit and vegetable intake was largest in G3. For total fruit and vegetable intake (mean of 3 FFQ) there were significant net effects:+1.12 servings/day ( <i>P</i> <0.01) when comparing G1 and G3 and +0.98 serving/day ( <i>P</i> <0.01) when comparing G2 and G3 (changes: G1=3.64 to 3.91 servings/day). For fruit intake (mean of 3 FFQ), there were significant net effects: +0.63 serving/day ( <i>P</i> <0.01) when comparing G1 and G3 and +0.98 servings/day). For fruit intake (mean of 3 FFQ), there were significant net effects: +0.63 serving/day ( <i>P</i> <0.01) when comparing G1 and G3 and +0.56 serving/day ( <i>P</i> <0.01) when comparing G2 and G3 (changes: G1=1.79 to 1.95 servings/day; G2=1.94 to 2.17 servings/day). For vegetable intake (mean of 3 FFQ, there were significant net effects: +0.50 serving/day ( <i>P</i> <0.01) when comparing G1 and G3 and +0.44 serving/day ( <i>P</i> <0.01) when comparing G2 and G3 (changes: G1=1.88 to 1.98 servings/day; G2=2.04 to 2.20 servings/day).	73% females. No differences were seen by gender, age, education, and income. There was no difference among groups for the change in knowledge of portion size, self- efficacy, outcome expectations, or high fat practices.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Body and Soul, United States Resnicow et al. (87)	Randomized controlled trial (matched pair, effectiveness trial)	Adult members of 16 Black churches pair- matched based on size, socioeconomic status and urban city (eight intervention and eight control); one control church dropped out. 1022 individuals were recruited by liaisons in each church using a quota sampling framework (first come, first served) and provided information at baseline. Of these, 854 (526 in the intervention and 328 in the control group) were assessed at six months.	The intervention was developed from the Black Churches United for Better Health Project and the Eat for Life Programme. It involved church-wide activities (a kick-off event, forming a project coordination committee, conducting church-wide nutrition events, plus one additional event involving the pastor, making at least one policy change), self-help materials ( <i>Eat for Life</i> cookbook, American Cancer Society educational pamphlets, public screening of a video developed for the "Eat for Life" Programme), motivational interviewing delivered by lay church members trained by project staff). Control: no programme activities, follow-up: 6 months	Two methods: 1) Self- administered 19-item food frequency questionnaire (FFQ) developed by the National Cancer Institute to assess intake in the past month. However, the two items assessing fried potatoes were excluded leaving 17 items (four items for fruits and 13 for vegetables); 2) Self-administered two-item food frequency questionnaire used to assess usual fruit and vegetable intake.	Baseline (n=854): There was no significant difference in fruit and vegetable intakes between the intervention and control groups. Two-item FFQ: 4.0 (SD 1.94) servings/day versus 3.8 (SD 1.94). 17- item FFQ: 5.5 (SD 4.83) servings/day versus 4.7 (SD 4.38). Follow-up (n=854): two-item FFQ: There were significant differences (P<0.05) at follow-up (adjusted) for fruit and vegetables = +0.7 serving/day (post-test values: intervention=4.8 (SE 0.12) and control=4.1 serving/day SE 0.12)), for fruit = +0.4 serving/day (post-test values: intervention=2.4 (SE 0.08) and control=2.0 (SE 0.09)), and for vegetables = +0.2 serving/day (post-test values: intervention=2.4 (SE 0.07) and control=2.2 (SE 0.07). 17-item FFQ: there was a significant difference (P<0.05) at follow-up (adjusted) for fruit and vegetables = +1.4 servings/day (post-test values: intervention=6.6 (SE 0.39) and control=5.2 serving/day (post-test values: intervention=3.3 (SE 0.26) and control=2.4 (SE 0.30)), and for vegetables = +0.5 serving/day (post-test values: intervention=3.2 (SE 0.17) and control=2.7 (SE 0.17) and control=2.7 (SE 0.17) and control=2.7 (SE 0.19)).	73% females. There were significantly greater changes (in the desirable direction) in the intervention group for the proportion of energy from fat, intrinsic and extrinsic motivation to eat fruit and vegetables, self-efficacy to eat fruit and vegetables, and social support to eat more fruit and vegetables.

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## A.4.6 SUPERMARKETS

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
A study on computerized social cognitive intervention for nutrition behaviour, United States Anderson et al. (89)	Randomized controlled trial	There were 296 participants (148 intervention, 148 control) recruited in five supermarkets. Recruitment was by brief face-to-face contact and mail back of enrolment materials including four weeks of annotated food receipts.	The Nutrition for Lifetime System (NLS) is a self-administered computer-based intervention based on social cognitive theory. NLS computers were located in kiosks in the five supermarkets. Intervention participants had passwords to access the system. The NLS programme guided users to decrease fat consumption and to increase fruit and vegetable and fibre in food purchases and consumption. The NLS consisted of 15 brief weekly segments (requiring 5–10 minutes) which used pictures, audio tracks and graphics to suggest strategies to monitor and plan food purchases and meal preparation and provided opportunities for personalized goal-setting and feedback for each targeted food group or behaviour-change strategy. There were monetary incentives for completing study questionnaires, as well as weekly food coupon printed from the computer (\$8–12 a week redeemable within a week of printing). Control participants did not have access to the NLS computer. Follow-up four to six months after the end of the intervention.	163 participants completed the follow-up. There were two methods; self- administered food frequency questionnaires were collected at baseline, 4 weeks, 15 weeks and post-test; food shopping receipt data were collected at baseline and the last six weeks of each study phase. There was also a composite measure of the two.	Baseline: There were no significant differences between the groups. At follow-up intervention users had higher levels of fruit and vegetable intake in the food frequency questionnaire ( $p$ <0.05) but not with the composite measure (0.05< $p$ <0.10) or shopping receipts ( $p$ >0.10). In controls the fruit and vegetable intake remained virtually unchanged. Using the food frequency questionnaire, the intervention group increased fruit and vegetable intake by 0.55 servings/1000 kcal (baseline 2.79 (SD 1.14), follow-up 3.34 (SD 1.46). The control group increased fruit and vegetable intake by 0.03 servings (baseline 2.77 (SD 1.40), follow-up 2.80 (SD 1.40).	96% female, 92% white. Neither intervention nor control group attained fruit and vegetable goals at follow-up.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
An evaluation of a supermarket intervention to increase consumption of fruit and vegetables, lowa, United States Kristal et al. (90)	Randomized controlled trial (randomization at the level of supermarket)	There were eight supermarkets of the same chain in similar sized small towns in lowa with only modest ongoing health promotion activity, separated by at least 35 miles. At each store 120 shoppers (aged 18+ years) completed interview surveys.	The supermarkets received an eight- month (approximately) intervention consisting of informational flyers including recipes and coupons for money off fruit and vegetables, and linked supermarket signage. The flyers were distributed weekly but became bi- weekly halfway through. There were also awareness- raising activities including people dressing up as large vegetables and food demonstrations. Control supermarkets carried on business as usual. Follow-up 12 months	There was a repeated cross-sectional survey at baseline and one year post-randomization. At each shop, a random sample of 120 shoppers completed exit interviews and a take- home survey including a modified food frequency questionnaire. Interview periods were balanced over time of day and day of week.	The crude increases in fruit and vegetable intake (after adjustment) were 0.33 servings per day in intervention respondents (baseline 3.21 (SD 1.75), follow-up 3.54 (SD 1.79)), and 0.30 servings per day in control respondents (baseline 3.14 (SD 1.74), follow-up 3.44 (SD 1.83)). After adjusting for age, gender, income and education, the changes were +0.21 servings/d in the intervention group (p<0.09) and +0.27 servings/d in the control group (p<0.03). The intervention effect was not statistically significant.	Neither the purchase of fruit and vegetables, usual consumption of fruit and vegetables, nor fruit and vegetables related dietary habits changed as a result of the supermarket-based intervention. Only 43% of people recalled having seen the intervention fliers in the previous six months.

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## A.4.7 ADULTS WITH HEALTH CONDITIONS

Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Cardiovascular disease						
Lyon Diet Heart Study, France de Lorgeril et al. (91)	Randomized controlled trial	Participants were 605 adults <70 years of age recruited in six services within Lyon Cardiovascular Hospital, who survived a myocardial infarction within six months of enrolment (without heart failure, hypertension, inability to complete an exercise test due to recurrent angina, ventricular arrhythmias, atrioventricular block, clinically unstable after coronary angioplasty or bypass, or other condition thought to limit survival or ability to participate in a long-term trial). There were 302 in the intervention and 303 in the control group.	A one-hour long advice session with the research cardiologist and dietician to promote a Mediterranean-type diet (more bread, more root vegetables and green vegetables. more fish, less meat (beef, lamb, pork to be replaced with rapeseed based margarine supplied by the study, only rapeseed and olive oils as the selected oils for salads and food preparation, moderate alcohol consumption in the form of wine allowed at meals). Control: participants were expected to follow the dietary advice given by their attending physicians (not involved in the study) and stay close to the Step 1 Diet of the American Heart Association (30% energy from fat, 10% saturated, 10% polyunsaturated, <300 mg/d cholesterol). Follow-up: one to four years	Two methods: 1) One 24-hour recall; 2) food frequency questionnaire. For the first four years, diet was assessed only in the intervention group (so as not to influence the behaviour of controls). However, the diet of 192 consecutive controls was evaluated once. At baseline it was assumed that the diet of the intervention group was similar to that of the control group.	Baseline: It was assumed that the diet of the intervention group was similar to that of the control group. Follow-up: After one to four years' follow-up, the intervention group had a higher fruit intake (251 (SE 12) g/d) than the control group (203 (SE 12)) (difference of +48 g/d or ~0.6 serving, <i>P</i> =0.007), but not significantly different intakes of vegetables (316 (SE 10) versus 288 (SE 12), <i>P</i> =0.07).	91% males. Intervention associated with a lower risk of non-fatal myocardial infarction ( <i>P</i> =0.001), cardiovascular death ( <i>P</i> =0.02) and death (all causes, <i>P</i> =0.02).

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Cardiovascular disease						
A study on cardio- protective diet in patients with recent acute myocardial infarction, India Singh et al. (92)	Randomized controlled trial	Participants were 406 adults with a mean age of 50.5 years (SD 9.3) and with a clinical diagnosis of possible or definite acute myocardial infarction and unstable angina during the previous 24–48 hours. There were 204 in the intervention group and 202 in the control group.	Both groups: personal advice was given to replace meat, eggs, hydrogenated oils, butter and clarified butter with vegetarian meat substitutes and to consume soya bean, sunflower and ground nut oils so as to provide a prudent diet reflecting the recommendations of the American Heart Association. In both groups, participants had a mainly vegetarian diet, eating eggs four to five times a week and meat one or two times a week. Other health-related advice (stopping smoking, reducing alcohol intake, counselling to relieve mental stress and on physical activity) was given to both groups, but the advice was regularly reinforced only in the intervention group. Control: As above. Intervention: As above, plus additional advice to eat fruit and vegetables, pulses, nuts and fish. Follow-up: one year (for diet, but follow-up of three years for health outcomes).	Detailed history of pre- study food intake from spouse. Dietary diary with the help of a dietician on days 3, 6 and 10 after infarction and then every week for six weeks, and finally every 1 to 12 weeks.	Baseline (n=406): Fruit and vegetable intakes were similar in the intervention (172 (SD 23.5) g/d) and control (165 (SD 18.8) g/d) groups. 1-year follow-up (n=406 based on intention- to-treat analyses): fruit and vegetable intakes were significantly higher in the intervention group (575 g/d (SE 91.4)) than in the control group (185 g/d (SE 25.4)) (P<0.001 for a difference of 390 g/d (4.9 servings/day at follow-up).	85.5% males. Lower intakes of saturated fat and cholesterol and higher intake of fibre in the intervention group at one- year follow-up. The intervention was associated with lower blood lipoprotein concentrations, lower body weight, cardiac events, and total mortality, compared with the control group.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Indo- Mediterranean Diet Heart Study, India Singh et al. (93)	Randomized controlled trial	Participants were 1000 adults aged >25 years with angina pectoris, myocardial infarction, or surrogate risk factors for coronary heart disease (hypertension, hypercholesterolaemia, diabetes), recruited through advertisements in newspapers and local service clubs. There were 499 in the intervention group and 501 in the control group.	Control: Instructed to follow the National Cholesterol Education Program (NCEP) in the Step 1 prudent diet (<30% energy from total fat, <10% from saturated fat, <300 mg cholesterol/day). Given an instruction sheet by a dietician at each visit (weeks 4, 8, 12, 24 and then at 12 week intervals). Intervention: As for the control group but also advised to consume 400–500+ g/d of fruits, vegetables and nuts per day (that is, 250–300g fruit, 125–150g vegetables, 25–50g walnuts or almonds). They were encouraged to eat 400–500g/d of whole grains (legumes, rice, maize and wheat), as well as mustard seed or soy bean oil in three to four servings/day (consistent with recommendations from the Indian Consensus Group). They were given a thorough explanation of the usefulness of the experimental diet and the types of food that are rich in n-3 fatty-acids. Follow-up: two years. At each visit, patients in both groups were provided with additional motivation by a dietician to adhere to the advice about diet. They were also provided with physical activity advice.	One-week weighed food diary.	Baseline (n=1000): Intake of fruit and vegetables, nuts and legumes were similar in the intervention (215 g/d (SD 29)) and control (207 g/d (SD 23)) groups. Follow-up (n=1000 based on intention to treat analyses): intakes of fruit and vegetables, nuts and legumes increased to 573 g/d (SD 127) in the intervention group and to 231 g/d (SD 19) in the control group, for a net effect of +334 g/d (~4.2 servings/day, <i>P</i> <0.0001).	89.7% males. Intakes presented include legumes and nuts. Total cardiac end points were significantly fewer in the intervention group ( <i>P</i> <0.001 versus control). Sudden cardiac deaths were also reduced ( <i>P</i> -0.015) as were non-fatal myocardial infarctions ( <i>P</i> <0.001).

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Cardiovascular dis	sease					
Diet and Angina Randomized controlled Trial (DART2), United Kingdom Ness et al. (94), Burr et al. (95)	Randomized controlled trial (factorial design)	Participants were 3114 men aged 37to 70 years with treated angina, recruited from general practices in South Wales (between 1990 and 1992 and between 1992 and 1996), not awaiting coronary artery by-pass surgery, not currently eating oily fish twice a week, and who could tolerate oily fish or fish oil. Of these, a sample of 1191 were sent (from April to December 2000) a brief self-administered questionnaire including a food frequency questionnaire; of these 1036 were still alive and completed questionnaires were obtained from 944 men.	There were four groups. Group 1: personal advice was given to eat two portions of oily fish each week or to take up to 3g of fish oil ("Maxepa") as a partial or total substitute. Group 2: personal advice was given to increase intake of soluble fibre by eating four to five servings of fruit and vegetables (apart from potatoes) and to drink at least one glass of natural orange juice daily and also to increase the intake of oats, so as to obtain a higher intake of vitamin C and at least 8 g of soluble fibre from all sources every day. Group 3: a combination of advice from groups 1 and 2. Group 4: given non-specific advice ("sensible eating") that did not include either of the above interventions.	The food frequency questionnaire was derived (with only minor modifications) from a questionnaire that had previously been validated against seven- day weighed dietary records.	Follow-up (n=944 surviving men): at follow-up, men that had been advised to eat more fruit and vegetables (groups 2 and 3) had significantly higher fruit and vegetable intakes than those who had not received such advice (groups 1 and 4) (373.2 g/d (SD 161.5) versus 351.7 g/d (SD 351.7), for a difference at follow-up of 21.5 g/d or 0.27 serving/day, <i>P</i> =0.05). The difference was significant for vegetables (140.2 (SD 59.6), <i>P</i> =0.03) but not for fruit (233.1 (SD 146.2) versus 220.5 (SD 135.3) g/d, <i>P</i> =0.17).	Results from the DART Trial showed that all-cause mortality was not reduced by either form of advice (fish advice or soluble fibre advice). Risk of cardiac death was higher among men advised to take oily fish than among other men.

- Evaluation of

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
PREMIER Clinical Trial, United States Appel et al. (96)	Randomized controlled trial	Participants were 810 adults aged 25+ years with a body mass index between 18.5 kg/m <sup>2</sup> and 45 kg/m <sup>2</sup> , with above-optimal blood pressure, including stage 1 hypertension, who were not taking anti- hypertensive medications, drugs that affect blood pressure or weight-loss medications, who were without prior cardiovascular event, congestive heart failure, angina, cancer diagnosis or treatment during the past two years, or diabetes, whose alcohol consumption was more than 21 drinks/week, recruited using mass mailings and community- based screening, and mass-media announcements. There were 273 in Group 1, 268 in Group 2, and 269 in Group 3.	Group 1: Advice-only comparison group: an interventionist (typically a registered dietician) discussed non- pharmacological factors that affect blood pressure and provided printed educational materials (a 30-minute individual session without counselling on behaviour change). Group 2: Established intervention: a behavioural intervention that implemented traditional lifestyle recommendations (weight loss among those overweight, reduced sodium intake, increased physical activity, limited alcohol intake among those who drank alcohol, fat intake <30% energy, saturated fat <=10%). Included 18 face-to-face intervention contacts (14 group meetings and four individual counselling sessions) during the initial six months. Group 3: stablished intervention + DASH: Same traditional recommendations as Group 2 + DASH diet (higher intake of fruit and vegetables (9–12 servings/day), low-fat dairy products (2–3 servings/day), lower saturated fat intake (<=25% energy). Same contact pattern as Group 2. Follow-up: six months	Unannounced 24-hour dietary recalls conducted by telephone interview (one on a weekday and the other on a weekend day).	Baseline (n=641): Fruit and vegetables intakes were similar among groups (Group 1: 4.4 (SD 2.3) servings/day, Group 2: 4.6 (SD 2.4) servings/day, Group 3: 4.8 (SD 2.5) servings/day). Follow-up (n=641, based on intention-to-treat analyses): change in fruit and vegetable intake was significantly higher in Group 3 (+3.0 (SD 3.6) servings/day) compared with Group 1 (0.5 (SD 2.8) serving/day) (net effect of +2.5 servings/day, P<0.001) and compared with Group 2 (0.5 (SD 2.6) servings/day (net effect of +2.5 servings/day, P<0.001).	38% males, 34% African- Americans. Changes in urinary potassium levels paralleled those observed for fruit and vegetable intake. The mean net reduction in systolic blood pressure was 3.7 mm Hg in Group 2 ( $P$ <0.001) and 4.3 mm Hg in Group 3 (no significant difference between Groups 2 and 3). Compared with the baseline prevalence of hypertension of 38%, the prevalence at follow-up was 26% in Group 1, 17% in Group 2 ( $P$ =0.01 compared with Group 1), and 12% in Group 3 ( $P$ <0.001 compared with Group 1, P=0.12 compared with Group 2).

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Cardiovascular dis A study on dietary advice for patients with a single high blood pressure reading in primary care, United Kingdom Little et al. (97)	Randomized controlled trial (factorial design)	Participants were 296 adults aged 18+ years with blood pressure >160/90 mm Hg (but systolic <=200 and diastolic <=120 mm Hg) but not taking hypertensive drugs, recruited from six general practices in the Southampton area.	Interventions consisted of: the British Hypertension Society's booklet "Understanding High Blood Pressure" which includes information about blood pressure and its treatment (explained by a nurse), low-sodium salt to be used in cooking and on food instead of normal salt, the fatty food swap sheet lists (to help people swap high-fat foods to similar but lower fat foods), fruit- vegetable-fibre daily prompt sheets (to help remind patients to eat fruit and vegetable and fibre). There were eight groups: Group 1: booklet + salt + prompt. Group 2: booklet + salt. Group 3: booklet + prompt. Group 4: prompt + salt. Group 5: booklets. Group 6: salt. Group 7: prompt. Group 6: salt.	Vegetable intake	Baseline (n=296): fruit and vegetable intake was similar among groups. It was 392 g/d (SD 226) in participants who received "prompts" and 403 g/d (SD 247) in the other participants. Follow-up: after one month, participants who received "prompts" had a significant increase in fruit and vegetable intake (+106 g/d (95% CI 51,161), <i>P</i> <0.001). However, at six months, this change was no longer significant (+48 g/d (95% CI -8 104)	56% males. "Prompts" were significantly associated with weight loss but not with changes in blood pressure.
			intervention. Follow-up: six months		<i>P</i> =0.09).	

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and	Results	Comments
				vegetable intake		
Cardiovascular di	sease					-
Indian Diet Heart Study, India Singh et al. (98)	Randomized controlled trial	Participants were 621 adults with a mean age of 46.3 years (SD 8.6) recruited by advertisements by local clubs, newspapers, hospitals and clinics using pamphlets and loudspeaker announcements stating that all subjects with hypertension, diabetes mellitus, hypercholesterolemia, obesity and heart attack, or symptoms simulating these problems would be given free advice by experts. Respondents were shopkeepers, office workers, business men, teachers, doctors, and engineers, all with sedentary occupations from the middle socioeconomic group. There were 310 in the intervention group and 311 in the control group.	The control group were instructed to follow the American Heart Association Step 1 Diet for four weeks (stabilization period), to then follow the same diet for 12 weeks, and finally to follow it for another eight weeks during which the participants were given a sheet containing advice on diet and exercise. Intervention: the group were instructed to follow the American Heart Association Step 1 Diet and to eat at least 400g/d of fruit and vegetables for four weeks (stabilization period), to then follow the American Heart association Step 1 Diet and to eat at least 400g/d of fruit and vegetables for four weeks (stabilization period), to then follow the same diet for 12 weeks, and finally to follow it for another eight weeks during which participants were given repeated advice to have a supervised exercise programme including brisk walking and/or intermittent jogging. In both diets, meat, eggs, hydrogenated solid oils, cheese, butter and clarified butter were replaced with soy beans, cottage cheese and oils of soybean, sunflower and ground nuts. The intervention also included fruits such as guava, apple, tomato, green vegetables, legumes, cereals, and nuts. Follow-up: 24 weeks	Food diary	Baseline (n=621): Fruit and vegetable intakes were similar in the intervention (256.4 g/d (SD 45.8)) and control (261.4 g/d (SD 47.8)) groups. Follow-up (n=621 based on intention- to-treat analyses): fruit and vegetable intakes increased significantly in the intervention group between baseline and the measurements made at 16 weeks (592.0 g/d (SD 112.0), <i>P</i> =0.01) and 24 weeks (580.0 g/d (SD 186), <i>P</i> =0.01). No significant change was observed in the control group between baseline and the measurements made at 16 weeks (278.5 g/d (SD 65.5)) and 24 weeks (268.5 g/d (SD 56.5)). At the 24-week follow-up, intakes were significantly higher in the intervention than in the control group ( <i>P</i> =0.01, for a difference at follow-up of +311.5 g/d or 3.9 servings/day).	89.9% males. At follow-up, there were higher intakes of fibre, lower intakes of saturated fat and cholesterol, and more exercise in the intervention group. Improvement in blood cholesterol was significantly greater in the intervention group.

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Study and	Design	Participants	Intervention	Data collection	Results	Comments
reference				vegetable intake		
Cardiovascular disea	ase					
The Netherlands Mediterranean alpha-linolenic enriched Groningen dietary intervention (MARGARIN) study Bemelmans et al. (99)	Controlled trial with randomization to two strata within each of the intervention and control groups	Participants were 266 adults aged 30 to 70 years with hypercholesterolaemia and at least two other cardiovascular risk factors (high blood pressure or use of anti-hypertensive medication, excess weight, smoking, diagnosis of coronary heart disease or first- degree relative with a coronary heart disease history before age 60), recruited by an invitation to all inhabitants aged 30+ in two counties, by registration systems of one general practice and three pharmacies in the two counties, and by invitation through a local radio programme. Participants in the intervention group were recruited from one county and those in the control group from the other county.	The control group was subdivided into two strata: A) usual care in the form of a leaflet with the Dutch guidelines for a healthy diet + supply of linoleic acid-rich margarine. B1) usual care (as A) plus supply of alpha- linolenic acid-enriched margarine. The intervention group was subdivided into two strata: B2) nutritional education about the Mediterranean diet in groups of 10 people (three meetings of 10 people (three meetings of two hours each, with their partner), (five to seven slices of bread, 400g vegetables, two pieces of fruit, fish at dinner twice a week, less red meat, less fat, cheese, and fewer eggs, limited alcohol to one to two drinks/day + supply of linoleic acid-rich margarine; B3) nutritional education (as B2) + supply of alpha-linolenic acid-enriched margarine. Follow-up: 12 months	Self administered 165- item food frequency questionnaire	Baseline (n=262): there was no significant difference in fruit and vegetable intake. Follow- up (n=225): The change in fruit intake was greater in the intervention group (+39 g/d (SD 213)) than in the control group (-18 g/d (SD 159)) (for an estimated net effect of +57 g/d (~0.71 serving/day), P<0.05). There were no significant differences in change of intake of vegetables between the groups.	44% males. Some respondents were from the same household (thus randomized to the same subgroup).

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Cancer						
Polyp Prevention Trial, United States Schatzkin et al. (100), Lanza et al. (101)	Randomized controlled trial	Participants were 2079 adults aged 35 to 89 years with at least one histologically confirmed large- bowel adenomatous polyp removed during a colonoscopy within the previous six months, recruited from eight United States clinical centres. There were 1037 in the intervention and 1042 in the control group.	The aim was to increase fruit and vegetable (3.5 servings/1000kcal, equivalent to 5–8 daily servings) and fibre (18 g/1000kcal) intakes and to reduce fat intake (20% energy). Each participant received personal dietary goals at the beginning and then engaged in an intensive nutrition education and counselling programme over four years (offered a total of 50 hours of counselling sessions). The programme consisted of four elements: 1) nutrition skill- building; 2) behaviour modification; 3) self- monitoring; 4) provision of standardized nutrition and behaviour modification materials. In addition, three special campaigns were launched during years 2–4. Control: Usual diet with provision of general dietary guidelines but no additional nutritional or behavioural information. Follow-up: four years	Three methods: 1) Self- administered food frequency questionnaire (modified Block-National Cancer Institute food frequency questionnaire at baseline and at the end of years 1, 2, 3, 4); 2) four-day food record at baseline and at the end of years 1, 2, 3, 4; 3) Unannounced 24- hour recalls in a newly selected random 10% sample of participants throughout each trial year.	Baseline (n=1905 who completed the study): there was no significant difference in fruit and vegetable intake between the intervention and control groups using food frequency questionnaire data: 2.05 (SE 0.03) servings/1000 kcal versus 2.00 (SE 0.03) servings/1000 kcal. Follow- up (n=1830): there was a significant net effect (using food frequency questionnaire data) +1.13 servings/1000 kcal for fruit and vegetable intake. Changes in each group: intervention 2.05 (SE 0.03) to 3.41 (SE 0.04) servings/1000 kcal, control 2.00 (SE 0.03) to 2.23 (SE 0.03) servings/1000 kcal. Results from the four-day food records from a random sample of 20% of subjects showed a net effect of 1.8 servings/1000 kcal.	35% females. There were also significant net effects (favourable changes in the intervention group) for fat and fibre intake. Dietary changes generally occurred within the first year and were subsequently maintained. There was a significant increase in total serum carotenoids in the intervention group compared with the control group. The rate of recurrence of large or advanced adenomas did not differ significantly between the groups.

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Study and reference	Design	Participants	Intervention	Data collection methods: fruit and vegetable intake	Results	Comments
Cancer						
Women's Healthy Eating and Living (WHEL) Study, United States Pierce et al. (102)	Randomized controlled trial	Participants were 2970 women, aged 18 to 70 years when diagnosed with early-stage breast cancer within the four-year preceding enrolment, enrolled in the WHEL Study, who provided complete dietary data at baseline, and who had not had a study end point (e.g., breast cancer event) by the 12-month follow-up.	The aim: consumption of five vegetable servings/day, 480 mL/d of vegetable juice, three fruit servings/day, 30 g/d fibre and <20% energy from fat. The intervention consisted of telephone dietary counselling and monthly cooking classes and newsletters. Control: print materials that included dietary guidelines from the United States Department of Agriculture and the National Cancer Institute, including the "5-a-Day" programme, plus an invitation to four cooking classes (food themes other than vegetables, fibre and fat), plus a bimonthly cohort maintenance newsletter. Follow-up: 12 months	Four 24-hour recalls	Baseline (n=2970): There was no significant difference in fruit and vegetable intake between groups. Mean intake: 3.9 servings/day of vegetables and 3.3 servings/day of fruit. Follow-up (n=2970): vegetables: there was a significant increase in vegetable intake in the intervention group (+3.2 servings/day, 95%CI 3.0,3.4) but not in the control group (+0.0, 95% CI -0.1,0.1) (difference between groups <i>P</i> <0.05, net effect of +3.2 servings/day). The observed increase in vegetable consumption in the intervention group was facilitated in part by a marked increase in vegetable juice consumption (mean 232 mL/d at 12-months). Fruit: there was a significant increase in fruit intake in the intervention group (+0.6 serving/day, 95% CI 0.5, 0.7) but not in the control group (+0.0 serving/day, 95% CI -0.1, 0.1) (difference between groups <i>P</i> <0.05, net effect +0.6 serving/day).	Potatoes were included. There was a significant increase in fibre intake and decrease in fat intake in the intervention group but no change in the control group. There was also a significant increase in plasma carotenoid concentrations (alpha- carotene, beta-carotene, lutein, lycopene) in the intervention group but no change in the control group.



Appendix Five: Charts from Pollard et al [2007]

- Evaluation of

N.	2002	2002/03	2003/04	2004/05	2005/06	
Year	'Pre'		'Campaign period'		'Post'	
TARPS		3129 n = 360	5685 n = 1531	4523 n = 1499	0 n = 1439	
	%		% (95% CI)			
Awareness						
Spontaneous		59.6	66.4 (64.0-68.8)	62.4 (59.9-64.9)	42.2 (39.6-44.8)	
Prompted		86.3	90.8 (89.4–92.2)	90.2 (88.7–91.7)	77.7 (75.5–79.9)	
Knowledge						
≥2 servings fruit	77.7	92.8 (90.1–95.5)	92.1 (90.7–93.5)	89.2 (87.6–90.8)	90.7 (89.2–92.2)	
<2 servings fruit	20.4	6.1 (3.6–8.6)	7.1 (5.8–8.4)	9.9 (8.4–11.4)	7.6 (6.2–9.0)	
≥5 servings vegetables	20.4	41.0 (35.9–46.1)	43.3 (40.8–45.8)	43.9 (41.4–46.4)	47.2 (44.6–49.8)	
<5 servings vegetables	77.6	58.1 (53.0–63.2)	55.9 (53.4–58.4)	55.4 (52.9–57.9)	51.9 (49.3–54.5)	
Perception						
I should eat more fruit	59.1	59.5 (54.4–64.6)	59.4 (56.9–61.9)	59.3 (56.8–61.8)	56.7 (54.1–59.3)	
Fruit amount is about right	40.0	38.1 (33.1–43.1)	38.6 (36.2–41.0)	39.1 (36.6–41.6)	40.2 (37.7–42.7)	
I should eat less fruit	0.9	2.1 (0.6–3.6)	1.7 (1.1–2.3)	1.0 (0.5–1.5)	2.2 (1.4–3.0)	
I should eat more vegetables	35.2	37.3 (32.3–42.3)	42.5 (40.0–45.0)	42.2 (39.7–44.7)	40.3 (37.8–42.8)	
Vegetables amount is about right	64.4	62.4 (57.4–67.4)	57.1 (54.6–59.6)	57.2 (54.7–59.7)	58.3 (55.8–60.8)	
I should eat less vegetables Action	0.5	0.2 (0.0–0.7)	0.5 (0.1–0.9)	0.6 (0.2–1.0)	1.1 (0.6–1.6)	
Mean servings of fruit	1.4	1.6 (1.4–1.8)	1.6 (1.5–1.7)	1.5 (1.4–1.6)	1.6 (1.5–1.7)	
Mean servings of vegetables	2.5	2.7 (2.6–2.8)	2.8 (2.7-2.9)	2.7 (2.6-2.8)	3.0 (2.9–3.1)	

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CI – confidence interval; TARPS – a standard measure of weekly volume of television advertising weight scheduled to reach the target audience<sup>18</sup>.

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Trends for fruit and vegetable consumption, persons aged 18 years and older, Western Australia, March 2002 to July 2006





## Appendix Six: Summary of Analyses of Studies Review in Ciliska et al [2000]

- Evaluation of

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Table 1. Included studies.

Study	Design/Quality	Participants	Intervention	Outcomes	Results/Comments
nterventions with pa	rents of young children				
Del Tredici et al.º (1988) USA EFNEP	Controlled trial Moderate No "weak" ratings	663 low-income mothers in California 355 EFNEP and 328 control	Instruction × 6 months Mean visits = 7.8 Mean/visit = 80.5 min Topics: nutrition facts Selecting and buying Cooking and preserving Food safety Method Lecture Written materials Demonstration	Increase in fruit and vegetable consump- tion from 2.6–3.7 servings/day (p < .001)	Also increase in vitamin C and vitamin A-rich fruits and vegetables, and variety of fruits and vegetables con- sumption No intervention control group
Cox et al. <sup>11</sup> (1996) USA EFNEP	Randomized con- trolled trial Moderate Rated "weak" on blinding	150 Iow-income females in Virginia	Educational intervention (18 sessions) 2 times/ week × 6 months delivered by nutrition paraprofessional Interventions Health Futures (can- cer prevention) dietary, lifestyle fac- tors, food choices, cooking methods ↓ fat, ↑ fruits and veg- etables Control EFNEP—lessons not part of cardiovascu- lar disease study Money management Both interventions done in home or small neighborhood groups, tailored to existing knowledge, skills, and resources	Statistically significant increased consump- tion of fruits (24-hour recall) and vegetables in intervention vs. "usual" EFNEP control group Intervention group increased intake of Fruit (1.5–2.6) vs. no change in control (p < .002) Vegetables (0.9–1.6) vs. (0.6–0.8) in con- trol (p = .038)	Collected 3 random— repeat 24-hour recalls at each measurement time to enhance accuracy and repre- sentations No impact on calcium/milk intake Experimental group also increased intake of vitamin E and fiber
Koblinsky et al. <sup>12</sup> (1992) USA	Cohort analytic Moderate Rated "weak" on blinding	<ul> <li>171 mothers from Head Start pro- gram</li> <li>3 New York centers and 2 Maryland centers were inter- vention group</li> <li>3 centers in each state were controls</li> </ul>	13 weekly nutrition let- ters, four workshops (2 hours each, 2 weeks apart) Presentation Hands-on activity Small-group discus- sion Food demonstration Topics Nutrition and preschool child Feeding preschool child Meal planning and preparation Food shopping skills	Maryland group had sig- nificant increase in fruit consumption compared to control, from 1.9 to 2.72 serv- ings/day (p < .05) also increased intake of vitamin C-rich foods, dark green or dark orange vegetables No change in overall vegetable intake or in any fruit and veg- etable intake in New York group	Workshops and newsletters translated into Spanish for New York groups New York groups had higher baseline levels of fruit and vegetable intake and thus smaller room for improvement Control group received usual Head Start pro- gram

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Study	Design/Quality	Participants	Intervention	Outcomes	Results/Comments
Interventions with pa	arents of young children	1			
Havas et al. <sup>13</sup> (1998) USA WIC	Controlled trial Crossover Moderate Rated "weak" on blinding	3122 low-income women on program for Women, Infants and Children (WIC) 16 WIC sites used	Group nutrition ses- sions led by peer educators (three over 6 months) Printed materials and reminders (four dif- ferent packages mailed to partici- pants)	Increase in fruit and vegetable consump- tion of 0.56 servings/ day in intervention group and 0.13 in control group (both from 3.88 servings/ day) (p = .002)	Intervention partici- pants showed greater progress in stages of change, knowledge, attitudes, and self- efficacy Change in consumption related to level of attendance at nutri- tion sessions Control group received usual WIC interven- tion
Interventions with sc	hool children				
Graves et al. <sup>14</sup> (1982) USA	Cohort analytic Moderate No *weak" ratings	Grade schools K-grade 6	9-week school curricu- lum Cafeteria, posters, and activity sheets	Significant effect of intervention on atti- tude scales of eating nutritious foods and eating vegetables but not for eating new foods Significant effect on knowledge for K-grade 5 but not grade 6	Lowest scores on atti- tudes re: vegetables. Small difference in scores between groups but scale score range is 0–3 Control group received usual health curricu- lum
Shannon et al. <sup>15</sup> (1982) USA				Significant increase in consumption of car- rots/broccoli and spinach salad (p < .05) and green beans (p < .01)	
Shannon and Chen <sup>16</sup> (1988) USA	Controlled trial Moderate Rated "weak" on withdrawals and dropouts	Grade 3 students, continued in grades 4 and 5	9–12 weeks/year cur- riculum taught by classroom teachers Focused on partici- pants trying out a variety of foods Posters, table tents for cafeterias	Improvement in atti- tudes in both groups over time; however, if entry knowledge and attitudes scores were low, then intervention children improved more than control. No overall significant differences between groups	No intervention control group
Perry et al. <sup>17</sup> (1998) USA	Controlled trial Moderate Rated "weak" on blinding	536 grade 4 students	School curriculum 16–40 min classroom sessions (2/week × 8 weeks) Snack preparation and taste-testing Comic books about nutrition Team competitions Education package to parents 5 packages sent at intervals Parents signed they received snack packs	24-hour recall—no sig- nificant difference in total fruit and veg- etable intake; increased fruit serv- ings/day (p < .02) Lunch intake 1.53 serv- ings of fruits and veg- etables/day for inter- vention group vs. 1.06 for control group (p < .001) and increased consump- tion of fruits (p < .001)	Intervention increased fruit intake but not vegetables or total intake of fruits and vegetables Control group received usual health curricu- lum

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Study	Design/Quality	Participants	Intervention	Outcomes	Results/Comments
terventions with s Perry et al. (continued)	school children		Food service Point-of-purchase pro- motion of fruits and vegetables Increased variety and attractiveness of fruits and vegeta- bles Provided 2-hour train- ing of foodservice staff Industry Coalition of producers 30-minute presenta- tion to classes Additional educational material		
Perry et al. <sup>19</sup> (1998) USA CATCH	Controlled trial Moderate Rated "weak" on confounders	1186 grade 3 stu- dents in 96 schools (12 school districts in Callfornia, Louisiana, Min- nesota, and Texas)	Curriculum over grades 3, 4, 5 15 lessons in grade 3 24 lessons in grade 4 16 lessons in grade 5 Curriculum included 47 lessons on nutri- tion including food preparation and taste-testing 8 lessons on physical activity Family education 15 activity packages Family fun nights at school Food service interven- tion offered new fruit and vegetable promo- tion, table tents, posters, taste-testing, public address announcements	Follow-up at end of grade 5 24-hour recall of daily servings of fruits and vegetables, fruits alone or vegetables alone; not significant Analysis of variance showed no difference by site, gender, or ethnicity Only Texas site showed difference in fruit intake (increased intaks in intervention group)	CATCH intervention had significant impact on increasing physi- cal activity and decreasing fat intake Control group received usual health curricu- lum
Cullen et al. <sup>19</sup> (1997) USA	Controlled trial Moderate Rated "weak" on blinding	22 Girl Scout troops 259 girls (grades 4 and 5)	1 session/week × 4 weeks Buddy Self-monitoring Goal setting Problem solving Preparation and taste- testing Information package to parents	1-week post-test: increased 24-hour recall fruit and veg- etable consumption in intervention group (3–3.39 servings/day) (p < .01) Not maintained at 3- month post-test	19% dropped out at 1 week 38% dropped out at 3- month follow-up No intervention control group

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Study	Design/Quality	Participants	Intervention	Outcomes	Results/Comments
nterventions with sch	nool children				
Nicklas et al. <sup>20</sup> (1998) USA GIMME 5	Controlled trial Moderate Rated "weak" on blinding	12 schools Grade 9 random- ized to Gimme 5 or control Followed to grade 12	Based on PRECEDE model 3 years Mass media cam- paign in school Curriculum of 5 work- shops of 55 minutes each re: knowledge, attitudes, and skills Cafeteria increased availability, variety, appeal of fruits and vegetables Brochures to parents, taste-testing, recipes, calendar with food tips	Significant increase in knowledge in intervention group $(p < .05)$ Significant increase in fruit and vegetable intervention group $(p < .05)$ Stages of Change Fewer intervention students in precontemplation and contemplation and more in preparation stage at post-test than control group	Increased fruit and ve etable consumption was maintained in ti intervention group a follow-up, but increased intake by control group result in no significant diffe ences Control group increas attributed to 5 A Da campaign at same time Control group receive usual health curricul lum
nterventions with ad	ultsnonworksite				
Campbell et al. <sup>21</sup> (1994) USA	Controlled trial Strong No "weak" validity ratings	394 adult patients from family prac- tice offices	Tailored Mailed nutrition infor- mation package, tai- lored to stage of change, dietary intake and psy- chosocial informa- tion Nontailored Mailed nutrition pack- age with standard risk information relating diet to dis- ease vs. control No information	Daily intake of fruits and vegetables decreased in each group by 0.25 servings/day (p = .19)	People in intervention 1 more likely to remember receiving information; more likely to have read a of message, reduce fat intake
Gorbach et al. <sup>22</sup> (1990) USA Henderson et al. <sup>23</sup> (1990) USA Women's Health Trial	Controlled trial Moderate Rated 'weak' on selection bias	Women 45–69 at risk for breast cancer Randomized to inter- vention (184) or control (119)	Group format (8–15 women taught by nutritionist): Weekly sessions × 8 weeks, 2 ×/month × 6 months, then monthly for 4 months Individual session with nutritionist at 2 and 12 weeks Goal of intervention 20% reduction in total calories, increase complex carbohydrates, ade- quate intake of vita- mins and minerals without supple- ments, kept track of own fat intake, given fat g/day	12-month and 24-month follow-up, fruit and wegetable intake sig- nificantly increased (p < .001) in interven- tion group more than in control from base- line of 15.9% of total kcal/day to 22% at 12 months and 23.1% at 24 months	Total energy intake in intervention group decreased by 25%, mean weight loss 3. kg Fat intake reduced in intervention group from 39% to 22% of total energy No intervention contro group





Study	Design/Quality	Participants	Intervention	Outcomes	Results/Comments
Interventions with add	ults-nonworksite				
Brownson et al. <sup>24</sup> (1996) USA	Interrupted time series No *weak* validity ratings	People in six coun- ties in Southern Missouri	Development of coali- tions for Heart Health	No change in proportion of people who con- sumed 5+ fruits and vegetables/day	No true control group
nterventions with adu	ults-worksite				
Sorensen et al. <sup>26</sup> (1996) USA Working Well Trial Glanz (1998) <sup>26</sup> USA	Controlled trial Moderate Rated "weak" on blinding	108 worksites 28,000 workers	Kick-off event Interactive activities Posters and brochures Self-assessment Self-help materials Campaigns and con- test Direct education vs. employee survey Documentation of health promotion activities Duration 80–125 weeks	Intake of fruits and veg- etables increased by 0.2 (2.6–2.8) servings per day in intervention group vs. 0.02 (2.58–2.6) in control groups (p < .001) Collected 3 years after pretest Stages of change Movement through stages of change more likely in inter- vention, dietary changes made with changes in stage of change	82% of process objec- tives obtained Control group sites doc- umented usual health promotion activities
Hunt et al. <sup>27</sup> (1993) USA Treatwell	Controlled trial Moderate "Rated "weak" on blinding	13 companies 1762 workers	Employees on advisory boards Treatwell inter- ventions Core educational pro- grams offered (18 sessions) Cafeteria, point-of- purchase labelling All groups used behavior change strategies Health fairs Taste-tests, food and cooking demonstra- tions vs. usual health programming in control eites	Mean increase in total fruit servings/month was 2.9 in control and 6.8 in intervention ( $p < .21$ ) and in veg- etables a decrease in the control (~1.6 serv- ings/ month) and increase in interven- tion group (6.8 serv- ings/month) ( $p < .02$ )	Intervention group experienced signifi- cant mean reduction in margarine and but- ter (5.2 servings/ week p < .01)