



School of Public Health

**Determinants of fruit and vegetables consumption among adults in
Perth, Western Australia**

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**This thesis is presented for the degree of
Doctor of Philosophy
of
Curtin University of Technology**

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Declaration

“To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university”.

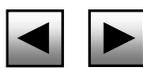
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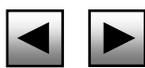
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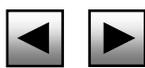
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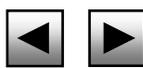
Abstract

Regular consumption of adequate amounts of fruits and vegetables may be protective against chronic disease such as cardiovascular diseases, stroke, and some cancers. Inadequate consumption of fruit and vegetables is a major risk factor contributing to 1.8% of the worldwide burden of disease, with Australian estimates at 2.7%. Dietary guidelines encourage eating patterns to reduce the risk of diet-related disease and improve population well being. They provide the context for most nutrition education initiatives. Increasing fruit and vegetable consumption is a core component of most dietary guidelines.

The World Health Organization (WHO) and Food and Agricultural Organization asked nations to conduct targeted campaigns to increase consumption of fruit and vegetables. Effective health communications have the capacity to increase awareness and knowledge and induce long-term changes in individual and social behaviours. There is a lack of published information about population-based interventions promoting fruit and vegetable consumption. In addition, information about the factors influencing fruit and vegetable consumption is required to assist the development of effective interventions to promote increased consumption. Demographic, individual, and environmental factors are associated with fruit and vegetable consumption.

The Department of Health in Western Australia aimed to increase the prevalence of healthy eating habits consistent with Australian Dietary Guidelines. The Department developed and implemented the Go for 2&5[®] population based campaign to increase awareness of the need to eat more fruit and vegetable consumption between 2002 and 2005. Effective fruit and vegetables communication campaigns reach the target audience via a number of pathways including point-of-sale promotions developed by industry partners. Health professionals, industry and consumers need resources to assist food selection. Specific nutrition and recipe criteria consistent with Australian Dietary Guidelines were developed to assist industry to conduct Go for 2&5[®] promotions at point-of-sale.

Attitudes, beliefs and behaviours relating to fruit and vegetable intake were monitored with the 1995, 1998, 2001 and 2004 Nutrition Monitoring Surveys (NMS), the Health & Wellbeing Surveillance System (HWSS) from 2001 to 2006, and the Campaign Tracking Surveys (CTS) from 2002 to 2006.

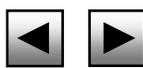




Analysis of the CTS and the HWSS found that the Go for 2&5[®] campaign was successful in reaching the target audience and increased awareness of the recommended serves of fruit and vegetables. There was a 0.8 serve population net increase in the mean number of serves of fruit and vegetables per day over 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)) significant at ($p < 0.05$). Social marketing campaigns are an effective method to increase awareness of dietary recommendations and to motivate dietary behaviour change. Monitoring changes over time showed 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.

Analysis of the NMS observed changes in knowledge, attitudes and some behaviours relating to fruit and vegetable intake between 1995 and 2004. In 2004, respondents were more likely to report two servings of fruit/day (OR 3.66, 95% CI=2.85, 4.70) and five servings of vegetables/day (OR 4.50, 95% CI=3.49, 5.80) as optimum compared to 1995. However, vegetable consumption (in cups) in 2004 remained less than in 1995 (RR=0.88, 95% CI=0.82 to 0.96, $p=0.003$). Perceived adequacy of vegetable (59.3%) or fruit (34.5%) intake, and insufficient time for vegetable preparation (14.3%) remained the main barriers to a healthy diet.

A population based nutrition campaign intervention based on the fruit and vegetable dietary guideline message was associated with changes in knowledge, attitudes and some behaviours relating to fruit and vegetable consumption in Western Australian adults. Further analysis and research to assess the impact of other individual, socioeconomic and environmental factors associated with fruit and vegetable consumption is recommended.





Acknowledgements

Make visible what, without you, might perhaps never have been seen.

Robert Breeson

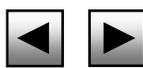
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Horticulture Australia Limited funded Curtin University to publish results from the Go for 2&5[®] campaign. The DHWA supported Curtin University to prepare campaign reports and owns all Intellectual Property relating to Go for 2&5[®]. This work documents some of the work undertaken by the now defunct Nutrition and Physical Activity Branch of the DHWA, and perhaps may assist individuals and organisations undertaking this type of work in the future.





Glossary

AHMAC:

AHMAC means the Australian Health Ministers' Advisory Council.

AIHW

AIHW means Australian Institute of Health and Welfare, Australia's national agency for health and welfare statistics and information. AIHW is an Australian Government statutory authority accountable to Parliament.

National Public Health Partnership:

National Public Health Partnership (NPHP) means the structure for national public health policy and planning between the Health Ministers of each of the Commonwealth and the States and Territories as documented in the Memorandum of Understanding signed by each of those Ministers in February 2003. The NPHP was replaced on 30 June 2006 with the Australian Health Protection Committee (AHPC) and the Australian Population Health Development Principal Committee (APHDPC), two Principal Committees of AHMAC.

Strategic Inter-Governmental Nutrition Alliance:

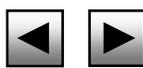
Strategic Inter-Governmental Nutrition Alliance (SIGNAL) means the public health nutrition subcommittee of the NPHP comprising representatives from the Commonwealth's Department of Health and Ageing, all Health Departments of the Governments of the States and Territories, the AIHW, Food Standards Australia New Zealand, the NHMRC and the New Zealand Ministry of Health.

Horticulture Australia Limited:

Horticulture Australia Limited (HAL) is a national research, development and marketing organisation that works in partnership with the horticulture sector to invest in programs that provide benefit to Australian horticulture industries.

NHMRC:

National Health and Medical Research Council (NHMRC), established in 1936, is Australia's peak body for supporting health and medical research; for developing health advice for the Australian community, health professionals and governments; and for providing advice on ethical behaviour in health care and in the conduct of health and medical research.



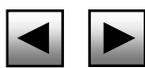


1 INTRODUCTION AND OVERVIEW

Inadequate consumption of fruit and vegetables is a major risk factor contributing to the worldwide burden of disease (Lock et al. 2005). Regular adequate consumption of fruits and vegetables may be protective against chronic disease such as cardiovascular diseases, some cancers, hypertension, non-insulin dependent diabetes mellitus, and cataract and macular degeneration of the eye. (A Ness, Egger & Powles 1999; Riboli & Norat 2003; World Cancer Research Fund/American Institute of Cancer Research 2007).

Systematic monitoring of behaviours and other health indicators are important strategies to measure the impact of health public policies and public actions and health of target populations. The use of routinely collected information to feedback to health policy makers is not a common practice. Dietary Guidelines throughout the world are increasing the emphasis on consuming more fruit and vegetables. To help reduce chronic disease, the World Health Organisation (WHO) and Food and Agricultural Organisation calls for nations to increase consumption of fruit and vegetables through targeted campaigns (World Health Organization 2003a) asserting that effective health communication “has the capacity to create awareness, improve knowledge and induce long-term changes in individual and social behaviours”(World Health Organization 2003b). Identification of best practice requires review of the evidence of effectiveness of interventions with consideration of practical aspects of implementation. An international review of the effectiveness of interventions and programs promoting fruits and vegetables identified a lack of published information about interventions, particularly population based interventions (J. Pomerleau et al. 2005a). Developing interventions requires an understanding of the factors determining fruit and vegetable consumption.

The Department of Health in Western Australia undertakes population-based campaigns to encourage healthy eating behaviours and has commissioned research to monitor dietary beliefs and behaviour since 1995. This research guides the development, implementation and evaluation of nutrition interventions. The Department implemented the Go for 2&5[®] social marketing campaign to encourage increased consumption of fruit and vegetables between 2002 and 2005. Specific nutrition criteria consistent with Australian government policy were required to assist stakeholders to conduct Go for 2&5[®] promotions at point-of-sale. The criteria aimed





to identify fruit, vegetables and recipes that could be promoted using the campaign logo. This thesis outlines the process for developing and applying the Go for 2&5[®] recipe nutrition criteria.

Routinely collected Western Australian nutrition monitoring data was analysed to assess the impact of nutrition interventions and provide feedback for health planners. This thesis presents results of trend analysis of knowledge, attitudes and behavior of adults relating to Australian government eating recommendations aiming to prevent chronic diseases. This thesis presents findings of analysis of three independent population level surveys to identify the factors (knowledge, attitudes and behaviours) relating to fruit and vegetable consumption among adults in Perth, Western Australia.

1.1 Objectives of the study:

1. To identify factors influencing fruit and vegetable consumption among adults in Perth, Western Australia to assist in developing interventions to promote increased consumption.
2. To review the use of evidence (epidemiological, empirical and theoretical) for use in health promotion programs aimed at increasing fruit and vegetables consumption in Western Australia.
3. To analyse trends in attitudes and knowledge among adults in Perth, Western Australia, prior to, during the development and implementation, and following the Western Australian fruit and vegetable campaign.

1.2 Limitation of the study

This thesis relies on action research, routine data collection undertaken by the Department of Health in Western Australia to develop, implement, monitor and evaluate population-based government dietary guidelines and interventions. The data was collected to develop and inform strategies to improve nutrition by the Department of Health in Western Australia. This thesis provides a retrospective analysis of the impact of a population-based interventions relating to fruit and vegetable consumption.

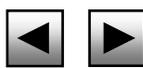
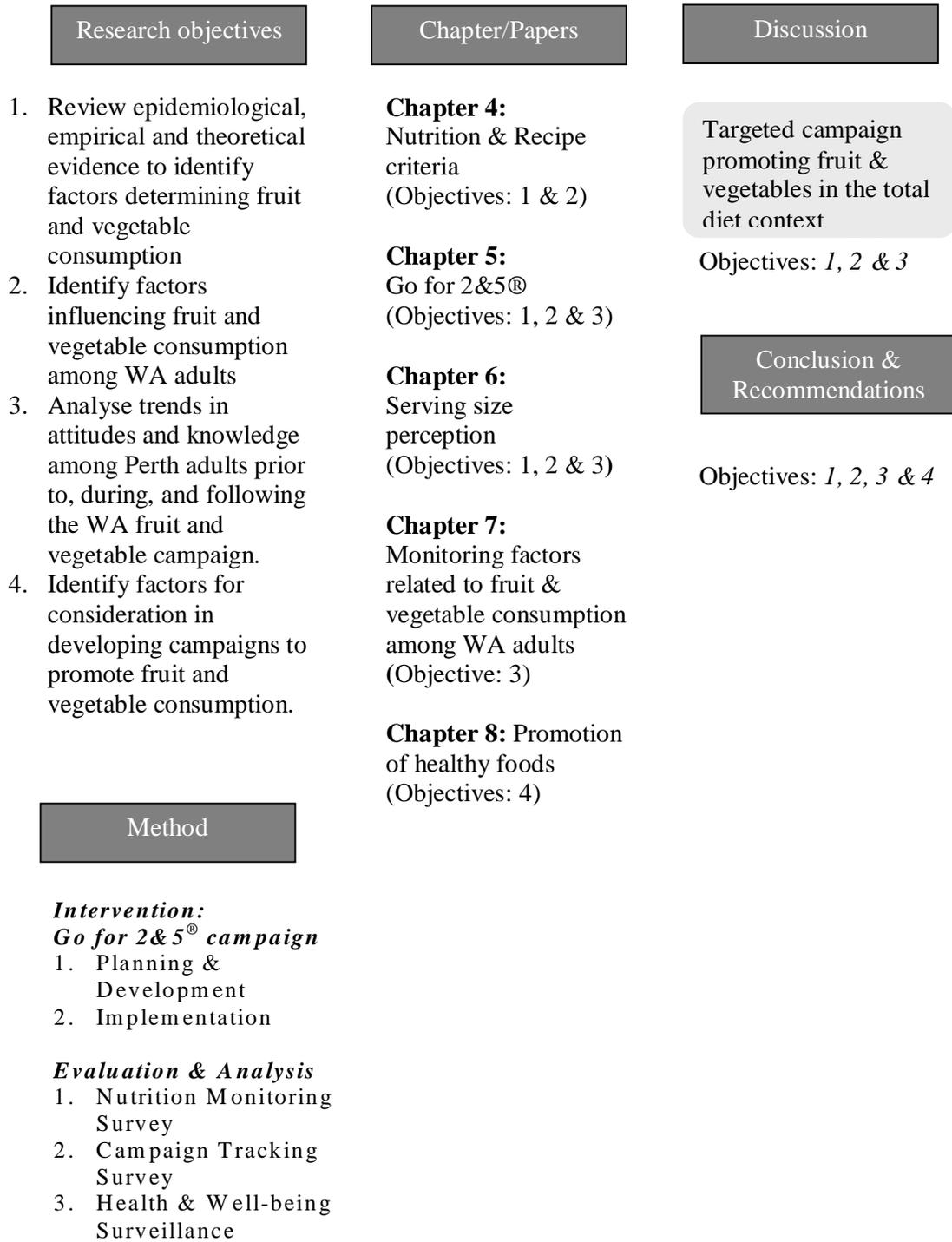




Figure 1 Overview of Thesis





1.3 List of publications included as part of the thesis.

Five papers were prepared for publication in peer-reviewed journals as part of this thesis. The papers were co-authored by a number of public health practitioners and academics external to Curtin University, see co-author contributions in Appendix 1.

1. **Pollard, CM**, Miller, MR, Daly, AM, Crouchley, KE, O'Donoghue, KJ, Lang, AJ & Binns, CW. 2008, 'Increasing fruit and vegetable consumption: success of the Western Australian Go for 2&5[®] campaign', *Public Health Nutrition*, 11 (3): 314-320.
2. **Pollard, CM**, Nicolson, C, Pulker, CE, & Binns, CW. 2008, 'Translating government policy into recipes for success! -nutrition criteria promoting fruit and vegetables', *Journal of Nutrition Education and Behavior*, (In press: accepted for publication 12 February 2008).
3. **Pollard, CM** and Binns CW. 2008, 'Vegie man could be the new David (to tackle Goliath)', *Australian and New Zealand Journal of Public Health*, 32 (1): 92-93.
4. **Pollard, CM**, Miller, MR, Woodman, RJ, Meng, R, Binns, CW. 2007, 'Changes in knowledge, beliefs and behaviours related to fruit and vegetable consumption among Western Australian adults, 1995 to 2004', *American Journal of Public Health*, (In Press: accepted for publication 27 May 2008).
- 5 **Pollard, CM**, Daly, AM, & Binns, CW. 2008, 'Go for 2&5[®] Consumer perceptions of fruit and vegetables serving sizes. *Public Health Nutrition*. Published online June 2008.

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2 REVIEW OF THE LITERATURE

2.1 Conducting the review

The review investigated three main areas: the benefits of increasing fruit and vegetable consumption, the barriers and promoters to consumption, and interventions to increase consumption. The review was structured and undertaken systematically and topics of interest were identified based on:

- ‘working knowledge’ of the evidence required to inform, implement and evaluate fruit and vegetable promotion initiatives
- expert comment and advice from key individuals with experience in public health nutrition, economic analysis, and horticultural industry
- key search term, initially limiting to ‘systematic review’ papers.

The following electronic databases were used: PubMed; Proquest 5000; Global: PsychInfo; ScienceDirect; InformaWorld, and Web of Knowledge. See Appendix for search terms.

The scope of the review was refined due to the breath of the literature. Initially conducted in 2002, the review had unlimited timeframe constraints, however, the review was conducted again recently with timeframe was restricted to the last five years 2002 to 2007.

The following example conducted on 25 October 2007, gives an indication of the expansion of the literature in the area of determinants of fruit and vegetable consumption. Searching the Medline database using the term ‘fruit OR vegetables’ and limiting the search to 1980 to 2000 (20 years) and humans identified 7339 papers, whereas, from 2002 to 2007 (5 years) found 6967 papers.

During the last four years there were a number of systematic reviews published in all three areas of interest. Publications were also identified during the preparation of papers for publication as in-depth study of each possible journal revealed more papers. Information was also sought from organisations for example, the International Fruit and Vegetable Alliance, the Australian Fruit and Vegetable Coalition, and through conferences proceedings, for example, the International 5 A Day Symposiums.





2.2 Definitions and classifications of fruit and vegetables

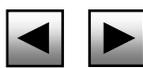
Fruit and vegetables can be classified and defined in a number of ways, based on their botanical nomenclature, culinary or common household usage, nutritional content and potential health effects (Cunningham 2002; World Health Organization and Food and Agriculture Organization 2004) (World Cancer Research Fund/American Institute of Cancer Research 2007). The categorisation of fruit and vegetables depends on the context (Cunningham 2002). Studies often treat fruit and vegetables as a univariate variable, however, there are broad differences in the sensory qualities and cultural uses (Gibson, Wardle & Watts 1998). Classifying fruit and vegetables clearly for consumer nutrition education purposes is important to avoid confusion (MR Miller, Pollard & Coli 1997).

2.2.1 Fruits

Fruit is usually defined as the ‘flower of the plant, and usually contains the seed’ or “the edible reproductive body of a seed plant” (Cunningham 2002; Smith, Kellett & Schmerlaib 1998). Fruit is the sweet, fleshy, edible portion of a plant that surrounds the seed. This includes apples, bananas, berries, citrus fruit (lemons, limes, oranges, mandarins, grapefruit), tropical fruit (mangoes), pears, stone fruit (apricots, nectarines, peaches, plums), melons, and grapes. Usually fruit are eaten raw, however they may be dried (apricots, dates, figs, and sultanas), or cooked.

This means that tomatoes, cucumbers, green beans and squash would be categorised as fruit, however they are classified as vegetables for the purpose of nutrition education (Cunningham 2002). In 1893 United States Supreme Court judge Mr Justice Gray declared that the tomato was a vegetable within the meaning of the tariff act of 1883 and was subject to import tax,

“Botanically, tomatoes are considered a fruit of the vine, just as cucumbers, squashes beans and peas. But in common language of people, whether sellers or consumers of provisions, all these are vegetables which are grown in kitchen gardens, and which, eaten cooked or raw, are like potatoes, carrots, parsnips turnips, beets, cauliflower, cabbage, celery and lettuce, usually served at dinner in, with or after the soup, fish, or meat which constitute the principal part of the repast and not like fruit generally, as dessert.” (US Supreme Court 1893)





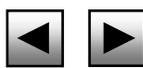
Food selection guides and dietary guidelines usually group fruits together based on their nutritional and energy contribution to the total diet. The Australian's food selection guide, the Australian Guide to Healthy Eating (AGHE) specifies 300 kJ per serving for fruit (Smith, Kellett & Schmerlaib 1998). As a group fruits are a good source of vitamins including vitamin C and folate. Some fruits have over 100 separate compounds that may contribute to antioxidant capacity (Prior 2003).

2.2.2 Vegetables

Vegetables are the edible parts of plants, including leaves, roots, stalks, bulbs and flowers. Australian dietary guidelines define vegetables as all leafy green vegetables (for example spinach, lettuce, silver-beet and bok-choy), cruciferous (for example broccoli, cabbage, and Brussels sprouts), all roots and tubers (carrots, yams and potatoes), and edible plant stems (for example celery and asparagus), gourd vegetables (for example pumpkin and cucumber), alliums (for example onions, garlic, leeks and shallots) and sweet corn (National Health and Medical Research Council 1999, 2003a, b). Other dietary classifications identify vegetables as non-starchy (for example green, leafy vegetables, cruciferous and allium vegetables) or starchy vegetables (potatoes, and sweet potatoes or yams, cassava and corn) (World Cancer Research Fund American Institute of Cancer Research 1997) (World Cancer Research Fund/American Institute of Cancer Research 2007) and may include or exclude them in dietary recommendations based on this categorisation. Epidemiological studies often exclude potatoes or starchy foods (Baghurst et al. 1999).

Vegetables are eaten raw or cooked. Cooking makes some vegetables more digestible, and can change the bioavailability or active nutrient properties of components, for example, addition of olive oil to diced tomatoes during cooking increases the absorption of the dietary carotenoids lycopene (Fielding et al. 2005) (Agarwal et al. 2001).

Nutrition policies, for example, food selection guides and dietary guidelines usually group vegetables together based on their nutritional and energy contribution to the total diet as well as their culinary use. Due to the cultural differences in dietary patterns, some countries exclude starchy vegetables from the vegetable group (World Cancer Research Fund/American Institute of Cancer Research 2007).





The Australian's food selection guide, the Australian Guide to Healthy Eating (AGHE) specifies 75 to 250 kJ per serving for vegetables (Smith, Kellett & Schmerlaib 1998). As a group vegetables are good sources of vitamins, minerals, dietary fibre, carbohydrates, and other bioactive compounds (World Cancer Research Fund American Institute of Cancer Research 1997).

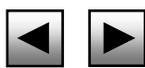
2.2.3 Legumes

Legumes or pulses are the seeds of leguminous plants, they are dried edible beans and peas [Rogers 1990]. Legumes are botanically considered a fruit, however, as the main part eaten is the seed and not the flesh surrounding the seed, they are categorised separately. Most legumes are dried seeds that mature on the plant, for example, navy beans, red kidney beans, soybeans, mung beans, lentils, split peas and chickpeas. Some immature types of legumes are eaten fresh from the plant as green peas and beans. Sometimes the pod is eaten as well. Legumes may also be germinated and consumed as bean sprouts (World Cancer Research Fund/American Institute of Cancer Research 2007). Most legumes are indigestible and thus inedible in their dried form and generally require cooking (National Health and Medical Research Council 2003a) (World Cancer Research Fund American Institute of Cancer Research 1997). Legumes that are eaten raw have higher levels of non-digestible polysaccharides than dried legumes (World Cancer Research Fund American Institute of Cancer Research 1997).

Legumes are high in protein, 20 to 25 percent protein when raw, and six to eight percent when cooked (Rogers 1990). They contain niacin and thiamin and minerals (iron, phosphorus, zinc and magnesium). Legumes are low in fat, with the exception of soybeans, and contain no cholesterol. They are high in dietary fibre. Soya beans have a high content of isoflavones or phytoestrogens (World Cancer Research Fund American Institute of Cancer Research 1997).

2.2.4 Form of fruit and vegetables

The way food is prepared and eaten is important in determining bioavailability of components. Dietary advice usually recommends eating various types of fruit and vegetable in eaten in a variety of forms, both raw and cooked. In some cases cooking increases bioavailability of foods and other cases results in loss of vitamins, for example heat volatile vitamins are destroyed in cooking. For example, lycopene





is most bioavailable from cooked or pureed tomatoes (World Cancer Research Fund/American Institute of Cancer Research 2007).

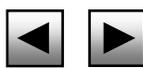
Knowledge about the form fruit and vegetables are eaten in influences the assessment of intake and can assist in developing interventions to increase consumption. More than two thirds of vegetables consumed by mothers across eleven European countries were eaten as cooked vegetables (Wolf et al. 2005). The average 400 grams a day fruit and vegetable recommendation was not achieved by any country, however, if fruit juice was included, all but two countries achieved it (Wolf et al. 2005).

Regular consumption of fresh fruit and vegetables is the primary recommendation. Improvements in technology mean that frozen and canned varieties of fruit and vegetables maintain high levels of nutrients, however it is important to choose varieties without added fats or sugars, consistent with dietary guidelines.

2.2.5 Fruit and vegetable standard serving sizes

Standard serving sizes are required for education and research purposes, for example epidemiological studies categorising groups of the population who meet nutrition recommendations. Naskas et al. (2000) suggest that there is an assumption that a 'decent' serving size of fruit and vegetables is 80 grams (Naska et al. 2000). He et al. (2006) found that the average weight for an average vegetable ½ cup standard serving was 77, and 80 gram average serving for fruit (He, Nowson & MacGregor 2006). Dutch standard serving sizes for children for raw salad were calculated at 35 grams, half the recommended adults serving size (Tak et al. 2006).

Recommended daily food intakes are often subject to widespread misinterpretation by consumers. Amounts are depicted as number of servings or specified size and there is little if any consistency. (Britten, Haven & Davis 2006) Britten et al. found that most people considered fruits and vegetables should be part of a healthy diet, however there was some confusion about serving and portion recommendations, and recommended range of servings each day. People used the words 'serving' and 'portion' interchangeably to describe the amount eaten on a single occasion. Serving was viewed as a recommended or measured amount, particularly in relation to the serving size listed on the label of food packaging. Many participants suggested that weights or measures would be a more effective way of communicating nutrition recommendations for food groups, for example amounts expressed as cups.





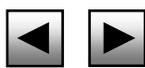
Expressing in household measures rather than in grams/ounces was considered to be easier to interpret by consumers. Ranges of serves were interpreted as minimum and maximum amounts of foods for a healthy diet, rather than a range for different eating patterns as intended (Britten, Haven & Davis 2006). Scottish people 'just knew' that a portion of fruit was a piece, however salad and vegetables were less clear (D. Marshall et al. 1995).

Consumers had difficulty translating fruit recommendations expressed in cups and preferred pieces of fruit (Britten, Haven & Davis 2006). For vegetables, daily recommendations with a common household unit or measure for example a cup were preferred (Britten, Haven & Davis 2006). Visual examples of serving sizes and types of vegetables in different subgroups were also recommended. Weekly recommendations were considered large and not very practical. Britten et al. (2006) found that consumers needed a type and amount of recommended foods to assist with understanding dietary recommendations (Britten, Haven & Davis 2006). Focus group participants had mixed responses in how they would use the information to make their daily food choices however, many thought that they could apply the information for themselves or their families by mentally adding up the amounts they consumed each meal and comparing it to daily recommendations. Other barriers such as lack of time, children's taste preferences, and lack of interest in shopping and preparing food were considered barriers to making dietary changes to follow nutrition guidelines.

Consumers appear to have little concern about mentally deconstructing their food and assigning multiple food group placements. However, Britten found that more education was required to insist consumers to correctly identify vegetable subgroups, e.g. dark green vegetables, orange red vegetables, starchy vegetables (Britten, Haven & Davis 2006).

2.2.6 Eating styles and food categorisation

The way people categorise foods is dependent on the context, for example location (work, dinner in a restaurant, at home), by mealtime (breakfast, weekends, celebrations), meal component (salad, soup, dessert), convenience (quick and easy, logistically difficult), source (home made) and person (made for others, with others or alone) (Blake et al. 2007). Personal experience influences food categorisation, for example, routine (used to eat it, eat it often), preferences (favourite, hate it), well

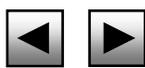




being (personal health, mood cravings) (Blake et al. 2007). Food-based category types include food groups, nutrition composition and physical characteristics (salty, sweet, processed) (Blake et al. 2007). When making dietary recommendations, nutrition professionals may categorise foods based on nutrient content or health benefits. Consumers use personally relevant perspectives when they classify foods (Blake et al. 2007; Falk et al. 2001). Blake et al. (2007) found that overall, in a non-context sorting of categories, that meal/time, routine and preference were almost always used to classify foods, and the person and nutrient categorisation was the least used by consumers. Food was categorised as ‘breakfast foods’, ‘healthy foods’ and ‘try to avoid’ foods. Blake et al. (2007) suggest that in real life situations, the time or situation that a food is eaten in may be more salient than the intrinsic structure of the food (Blake et al. 2007). For example, work environment may be a barrier to eating fruit and vegetables (G. Sorensen et al. 1998; Glorian Sorensen, Linnan & Hunt 2004; G. Sorensen et al. 1999).

2.2.7 Nutrient profiling and food categorisation

Nutrient profiling is defined as the science of ranking foods based on their nutrient composition (A Drewnowski 2005; A Drewnowski & Fulgoni V 2008; Rayner M 2005). Nutrition profiling has been applied to total diets and more recently to categorizing individual foods according to nutrition composition has many applications from consumer education, to dietary recommendations, to food labelling and other legislative uses (Azais-Braesco, Goffi & Labouze 2006; A Drewnowski & Fulgoni V 2008; T. Lobstein & Davies 2008; Marcoe et al. 2006; Scarborough et al. 2007; Scarborough, Rayner & Stockley 2007). The nutrient density concept was used in the development of the 2005 American Dietary Guidelines and MyPyramid (T. Lobstein & Davies 2008). The European Commission in 2006 adopted the use of nutrient profiles for future nutrition and health claims recommendations, suggesting that only foods with favourable profiles would be permitted to carry such claims. This is the concept that has been considered in Australia (Food Standards Australia and New Zealand 2008). Programs using nutrition criteria to identify individual foods representing healthier food choices have been developed (Heart & Stroke Foundation of Canada 2007; Laura et al. 1999; O'Neill Mike 2004; Vogt et al. 1999; Peter Williams, McMahan & Boustead 2003). Usually multiple criteria are developed to assess an individual food or recipe. The criteria used are dependent on





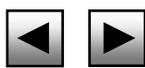
the context and the aim of the profiling system (A Drewnowski & Fulgoni V 2008). Nutrient profiling models often taking to acquire account disqualifying nutrients (total fat, saturated fats, trans fats, sugar, and sodium as well as beneficial nutrients). They also need to consider the importance of food eaten in significant amounts in the populations die and the application to population groups with specific traditional needs, for example children and other vulnerable groups (A. Drewnowski, Maillot & Darmon 2008). Many nutrient profile models now include a combination of specific macronutrients, vitamins, minerals and sometimes non-nutrients or specific food groups (A Drewnowski & Fulgoni V 2008). Validation of nutrient profiling systems have found individual fruits and vegetables rank highly (Azais-Braesco, Goffi & Labouze 2006).

Health agency endorsement schemes and supermarket ‘healthy eating’ brands use nutrition criteria to select foods suitable for inclusion. Food companies who develop, label, advertise and promote food or recipes as ‘healthy’ must demonstrate product nutrition profiles meet agreed nutrient targets (Trichterborn J & Harzer G 2007). The Australian, UK, US fruit and vegetable campaigns supply nutrition criteria to partner organizations to assist them to promote fruit and vegetables in the context of a healthy diet (National Health Service 2004; Christina M Pollard et al. 2008; Produce for Better Health Foundation 2004).

2.3 Fruit and Vegetables and Health

Epidemiological dietary research consistently find that people who regularly eat adequate amounts of fruits and vegetables have lower risks of coronary heart disease (AR Ness & Powles 1997) and some cancers (Steinmetz & Potter 1996; World Cancer Research Fund American Institute of Cancer Research 1997) hypertension (Steinmetz & Potter 1996) non-insulin-dependent diabetes mellitus, and cataract and macular degeneration of the eye. Emerging evidence suggests further protective effects of fruit and vegetables against non-communicable degenerative diseases.

Studies of the relationship between diet and disease may produce varying results depending on the study design and sample size (Coleman et al. 2007). Case-control studies obtain information from people with a disease and an appropriate control group to determine their exposure to the factor under study. Case-series measure outcomes on pre-post exposure. Cohorts study groups of people with and without the factor studied over time (prospective cohorts observe the factor at a point in time and



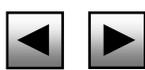


then follow up to observe outcomes, retrospective cohorts collect information on past factor exposure and at a point in time and then contact again or follow up). Cross-sectional studies assess a group at a particular point in time, however cannot be used to determine causal links, time-series studies monitor trends in outcomes in relation to the factor being studied at several points in time (Coleman et al. 2007). Systematic reviews appraise and synthesis evidence from the scientific studies.

Case control and prospective studies have been used to identify dietary components of disease. Recently large cohort studies across many countries have been used to study diet-disease relationships. These studies collect information on diverse populations with eating habits that vary widely providing information about a variety of consumption patterns that are difficult to obtain from studies of homogenous populations. This is particularly important when considering fruit and vegetable intake where many populations have low consumption and the differences in eating diets high in fruit and vegetable may not be easy to detect due to insufficient sample size. It is important to consider the long-term links between diet and disease as the protective effects and disease development may be over a long period of time.

There are a number of large cohort dietary studies including the US Nurses Health Study and the European Prospective Investigation into Cancer and Nutrition (EPIC) (Gonzalez 2006) (Flight & Clifton 2006; Hsin-Chia et al. 2004). The World Health Organization's International Agency for Research on Cancer (IARC) established the European Prospective Investigation into Cancer and Nutrition (EPIC) project in 1992 to "*investigate the relationships between diet, nutritional status, lifestyle and an environmental factors and other chronic diseases*" (Gonzalez 2006). Over half a million respondents in ten European countries (Denmark, France, Germany, Greece, Italy, The Netherlands, Norway, Spain, Sweden and the United Kingdom) have participated. Food frequency questionnaires, seven-day food diaries and health and lifestyle questionnaires are used to collect dietary information (Gonzalez 2006).

A wide variety of micronutrients and other bioactive compounds have been identified in fruits and vegetables, see Table 1. Studies of 'food synergy', that is, the additive, or more than additive influences of foods and food constituents on health highlight the importance of eating a variety of fruits and vegetables as well as adequate amounts (Jacobs & Steffen 2003). Research into the synergistic effect starts with a top-down approach, searching for combinations of foods and their constituents that influence health, starting with the influence of dietary patterns, foods, food





components, nutrients and finally other bioactive components (for example phytochemicals) (Jacobs & Steffen 2003). Schooling et al. (2006) reviewed the diets of 32,462 Hong Kong Chinese adults over the previous decade and found lower all-cause mortality was associated with the consumption of a diet high in a range of healthy foods, including fruit and vegetables (Schooling et al. 2006). Liu (2003) concluded that the additive and synergistic effect of combinations of phytochemicals in fruit and vegetables are important in chronic disease prevention and consumption from whole food as part of a diet consistent with dietary recommendations is preferable to single nutrient supplementations (Liu 2003).

The World Cancer World Cancer Research Fund/American Institute of Cancer Research report in nutrition and the prevention of cancer determined that it is not possible to ascribe the association between micronutrients and the bioactive compounds and lower cancer risk to a cause or effect of specific components of food with confidence. Each food contains a complex mixture of different constituents of all of which might also contribute any effect (World Cancer Research Fund/American Institute of Cancer Research 2007). The complex mixture of phytochemicals in fruits and vegetables may have additive and synergistic effects responsible for their anti-cancer properties.

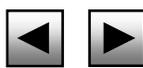




Table 1 Nutrient, micronutrient and other bioactive compounds in fruits and vegetables

Component	Fruit and vegetable sources
<p>Carotenoids: Family of more than 600 fat soluble red orange pigments (including, xanthophylls (eg. Lutein) and carotenes (α and β carotene and lycopene). Convert to retinol and dietary source of vitamin A. The intensity of the colour of the fruit of vegetable indicates beta-carotene content.</p>	<p>Vegetables, particularly red or orange. Carotenoids: Spinach, Kale, butternut squash, pumpkin, red capsicum, carrots, tomatoes, cantaloupe melon and sweet potatoes. β carotene: yellow, orange and green fruits and green leafy vegetables including carrots, spinach, lettuce, tomatoes, sweet potatoes, broccoli, cantaloupe melon, oranges, and pumpkin. Lycopene: tomatoes, watermelon, red capsicum, pink or red grapefruit pink fleshed guava, and persimmon.</p>
<p>Folate: Involved in a number of metabolic pathways including the synthesis of purines and pyrimidines, important for DNA synthesis and cell replication.</p>	<p>Beans, spinach, broccoli, romaine lettuce, chicory, oranges and papaya.</p>
<p>Vitamin C (ascorbic acid): Collagen synthesis and antioxidant preservative (traps free radicals and reactive oxygen molecules). Regenerates other anti-oxidants. Inhibits carcinogen formation and protects DNA from mutagenic attack. Severe deficiency causes scurvy. Destroyed by heat or contact with the air.</p>	<p>Red/yellow fruits, tubers and vegetable including: red yellow capsicums, kiwi fruits, broccoli, papaya, citrus fruits, strawberries and potatoes.</p>
<p>Vitamin E: Fat soluble vitamin (α and γ tocopherol)</p>	<p>Green, leafy vegetables. Vegetable oils including corn, soya bean and olive oils.</p>
<p>Flavonoids: A type of polyphenol with antioxidant activity and can inhibit carcinogen-activating enzymes. Flavanoids can also alter the metabolism of other dietary agents resulting in less DNA damage.</p>	<p>Quercetin: Apples, onion, raspberries, red grapes, citrus fruits, leafy green vegetables, cherries, elder berries, broccoli, blueberries, Cranberries and bilberries. Naringin in grapefruit.</p>
<p>Pyridoxine: One of water-soluble compounds known as B6. Involved in neurotransmitters synthesis, red blood cell formation and function, niacin formation, steroid hormone function and nucleic acid synthesis.</p>	<p>Bananas, potatoes eaten with the skin on, green, leafy vegetables, beans, and legumes.</p>
<p>Selenium: Mineral essential trace element. Component of amino acids, which integrate into proteins antioxidant enzymes important for DNA synthesis and thyroid hormones.</p>	<p>Soil determines amount present in vegetables.</p>





2.3.1 The role of fruit and vegetables in disease prevention

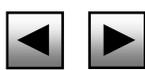
Epidemiological studies provides the scientific evidence of the protective effects of diet in the development of disease. Dietary recommendations initially focussed on the prevention of diseases resulting from nutrition deficiency, for example, scurvy (vitamin C), anaemia (iron), and failure to thrive (Jacobs & Steffen 2003). The focus then shifted to incorporate the prevention of chronic diet-related diseases, for example cardiovascular disease, diabetes and some cancers. Various epidemiologic studies have examined dietary patterns and found lower risk of disease or all-cause mortality for certain plant-based diets (Fung et al. 2001; Frank B. Hu et al. 2000; Terry et al. 2001a; van Dam et al. 2002).

Foods and food dietary patterns act synergistically to influence the risk of chronic disease (Jacobs & Steffen 2003). It is important to examine the association between foods and disease as well as that between food constituents and disease. Foods contain complex biochemical compounds which may interact with each other, for example, although a nutrient is present in a food group in a large amount, other nutrients may reduce the bioavailability of that nutrient (L. A. Bazzano 2005).

Ness et al. (1999) suggested examining the associations of disease risk with food groups and individual foods as well as specific constituents, due to the chemical complexity of food as well as the limited understanding of how specific dietary constituents (alone or in combination) alter risks. *“People eat foods rather than dietary constituents and effective advice therefore has to be framed in terms of foods.”* Ness et al. 1999, pp 900 (A Ness, Egger & Powles 1999).

Epidemiological studies have found considerable health benefits of eating a ‘prudent diet’ (high in fruit, vegetables, legumes, whole grains, fish, and poultry) over the ‘Western diet’ (high in red meat, processed meat, refined grains, sweets and dessert, French fries, and high-fat dairy products) (Frank B. Hu et al. 2000; Jacobs & Steffen 2003). Prudent dietary patterns are associated with lower rates of diabetes (Fung et al. 2001; van Dam et al. 2002), ischemic heart disease (Frank B. Hu et al. 2000), and colorectal cancer (Terry et al. 2001a) but not breast cancer (Terry et al. 2001b).

Although some of the mechanisms for the protective effects of fruit and vegetables have been researched and identified, the precise mechanisms of the protective components, their interactions and effects may never be completely understood (Byers 1999) (M. Miller, Shiell & Stafford 2000). Table 2 outlines some of the





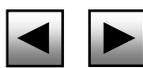
potential mechanisms for the protective effects for diets high in fruit and vegetables against chronic disease. Bermejo et al. (2007) found that higher fruit and vegetable intake was associated with better overall nutritional intake from other food sources in a Spanish sample of 152 elderly institutionalised people (Bermejo et al. 2007). Higher fruit and vegetable intake were associated with better eating habits.

Attempts to reproduce the protective effects of fruit and vegetables with nutritional supplements of specific antioxidants (beta-carotene, retinol, alpha-tocopherol) have not been successful, and in some cases have increased disease risk (Hennekens, Buring & et al. 1996; Omenn et al. 1996).

There are substantially lower risks of diet-related diseases in populations with routinely high consumption of fruit and vegetables (including legumes) (Lock et al. 2005; AR Ness & Powles 1997; Riboli & Norat 2003). Diets high in fruit and vegetables have been associated with a lower risk of coronary heart disease (Frank B. Hu 2003), stroke, several cancers (World Cancer Research Fund/American Institute of Cancer Research 2007), possibly hypertension, non-insulin dependent diabetes mellitus, and cataract and macular degeneration of the eye.

Table 2 Potential mechanisms for the protective effect of fruit and vegetables against chronic diseases

Chronic disease	Potential mechanisms for protective effect of diets high in fruit and vegetables
Cancer-colon -breast -prostate -other cancers	Indoles, dialylsulfides, salicylates in vegetables Limonene in citrus fruits, antioxidants in green vegetables, reduced fat and energy intake Lycopene in tomatoes, reduced fat intake Antioxidants from green and yellow vegetables, vitamin C, flavonoids
Cardiovascular disease	Antioxidants, reduced homocysteine with high folate intake, reduced serum lipids and weight with reduced saturated fat and energy intake, increased soluble fibre intake.
Non-insulin dependent diabetes mellitus	Reduces the concentration of glycosylated hemoglobin in the blood; low glycaemic load (amount of food eaten and the glycaemic index [blood glucose response after consumption of carbohydrate containing food relative to test food, usually glucose or white bread]) benefits glycaemic control in people with diabetes
High blood pressure and stroke	High potassium-low sodium content, reduced energy intake and effects on body weight, blood lipids





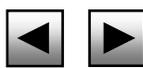
The potential clustering of lifestyle risk factors that needs to be taken into account when assessing the health benefits of diets high in fruit and vegetables. For example individuals who eat more fruit and vegetables are likely to have lower smoking rates, salt and saturated fat intake, incidence of overweight than those who do not eat adequate amounts fruit and vegetables (He, Nowson & MacGregor 2006; Poortinga 2007). They are also likely to be more physically active.

Myint et al. (2007) found that self-reported good physical functional health of 16, 792 adults living in Norfolk UK, 40 to 79 years of age, was associated with higher fruit and vegetable consumption (Myint et al. 2007). The relationship was less consistent for mental functional health.

2.3.2 Burden of Disease

The global burden of disease attributed to poor nutrition cannot be quantified precisely due to considerable methodological issues (Lock et al. 2005). Fruit and vegetables are a heterogeneous group differing among countries and cultures. The growing and storage condition, preparation and cooking methods and seasonal availability influence the nutrients consumed from fruit and vegetables. Intake is measured by a variety of methods, and analysis software used in different countries varies. These factors contribute to the belief that the estimates for burden of disease attributable to fruit and vegetables are considered conservative. The methods used to determine exposure and estimates of fruit and vegetable intake required further research (Lock et al. 2005; Joceline Pomerleau et al. 2004). Pomerleau et al. investigated estimates of fruit and vegetable consumption in 14 regions (191 countries) in eight age groups and by gender. Daily grams a fruit and vegetable intake excluded potatoes, pulses and starchy vegetables and fruits, and included fruit and vegetable juices (Joceline Pomerleau et al. 2004).

Inadequate consumption of fruit and vegetables is a major risk factor contributing to 1.8 percent of the total worldwide burden of disease (J. Pomerleau et al. 2005a) (Lock et al. 2005). The 2002 World Health Organization Global Burden of Disease report estimated that increasing fruit and vegetable consumption to 600 g of per day could reduce the worldwide burden of disease for ischaemic heart disease by 31 percent and ischaemic stroke by 19 percent (Lock et al. 2005; Joceline Pomerleau et al. 2004), and cancers of the stomach by 19 percent, oesophagus by 20 percent, lung by 12 percent, and a two percent reduction in colorectum cancer (Lock et al. 2005).





Increasing fruit and vegetable intake in the European Union to 400 or 600 grams per person per day could reduce the total burden of disease by 1.9 and 3.6 percent respectively in the newer member states (van't Veer et al. 2000).

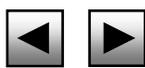
The burden of disease and disability from cancer, stroke and ischaemic heart disease (angina, acute myocardial infarction and heart failure) directly due to inadequate consumption of fruit and vegetables (less than five serves a day) was estimated to account for 2.7 percent of the total burden of disease and disability in Australia (C Mathers, Vos & Stevenson 1999; C. D. Mathers et al. 2001). In 2002 it was estimated that increasing fruit and vegetable consumption by just one serve would save the Australian health care system \$157 million per year in relation to heart disease alone (C. D. Mathers et al. 2001).

Many of the 15 leading causes of disease burden in Australia identified in 1996 have some component attributable to inadequate fruit and vegetable intake, for example heart disease, strokes, diabetes mellitus, and some cancers (C. D. Mathers et al. 2001). Burden of disease studies provide valuable insights for potential health gains at a population level. It is essential to link burden of disease studies with studies of cost effectiveness of interventions to address underlying risk factors (C. D. Mathers et al. 2001).

Dietary pattern is associated with disease prediction, a prospective US study of 380,296 retired adults found that a Mediterranean dietary pattern (high in vegetables, legumes and fruit) was associated with a lower all-cause mortality, including deaths from cardiovascular disease and cancer(Mitrou et al. 2007).

2.3.3 Cardiovascular disease

There is good evidence that high intakes of plant foods, particularly regular adequate consumption of fruit and vegetables, may be protective against coronary heart disease (Appel et al. 1997; Dauchet et al. 2006; Frank B. Hu 2003; Frank B. Hu et al. 2000; A Ness, Egger & Powles 1999; A. Ness, Egger & Smith 1999; AR Ness & Powles 1997) (Joshi et al. 2001) (F. B. Hu & Willett 2002). Bazzano et al. (2006), found inverse associations between fruit and vegetable consumption and coronary heart disease (Lydia Bazzano, A. 2006). Winkler et al. (2006) conducted a review of the relationship between dietary fruit and vegetable consumption and the risk of coronary heart disease and found a convincing level of evidence to support a relationship between diets high in fruit and vegetables and reduced risk of coronary





heart disease (Winkler, Patterson & Newman 2006). Cohort studies have found a relationship between dietary fibre from fruits and vegetables in and coronary heart disease (Pereira et al. 2004). Appel et al. (1997) found that a diet high in fruit and vegetables can substantially lower blood pressure (Appel et al. 1997).

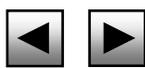
Hu (2003) reviewed that a number of large prospective cohort studies and found that a high consumption of plant-based foods such as fruit, vegetables, nuts, and whole grains was associated with a significantly lower risk of cardiovascular disease (CVD) and mortality (Frank B. Hu 2003). The mechanism for protection may be related to the dietary components of fruit and vegetables (fibre, folate, potassium, flavonoids and antioxidant vitamins) (Frank B. Hu 2003).

Dauchet et al. (2006) conducted a meta-analysis of nine observational cohort studies and found an inverse association between fruit and vegetable consumption and coronary heart disease even taking into account over-reporting of intakes. (Dauchet et al. 2006). For each additional portion per day of fruit and vegetable intake there was a decrease of four percent in the risk of coronary heart disease, and seven percent for fruit alone. The association between vegetable intake and CVD risk was more pronounced for cardiovascular mortality than for incidence (Dauchet et al. 2006). The Nurses' Health Study and the Health Professionals' Follow-Up Study reported an inverse relationship between high fruit and vegetable consumption and cardiovascular disease risk (Hung et al. 2004). Hung et al. found that participants eating at least five servings of fruit and vegetables per day had a 28 percent lower risk of cardiovascular disease than those eating less than 1.5 servings per day. The best effects were seen with green leafy vegetables (Hung et al. 2004) and fruits and vegetables high in vitamin C (Joshi et al. 2001).

A Cochrane Review to determine the influence of dietary advice to achieve improve cardiovascular risk found that fruit and vegetable intake increased significantly by 1.25 servings/day with dietary advice (Brunner et al. 2007). There were also improvements in other dietary risk factors for cardiovascular disease, for example, fibre, saturated fat and total energy intake.

Steffen et al. (2007) found that respondents eating four or more servings of fruit and vegetables per day and one serving of fish per week had a lower incidence of deep vein thrombosis.

The precise mechanisms responsible for the effects of these foods and nutrients on the causal relationship of coronary heart disease are poorly understood (L. A.

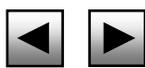




Bazzano 2005; Dauchet et al. 2006). Fruit and vegetables contain a number of protective constituents such as potassium, folate, a vitamin C, fibre and other phenolic compounds (Dauchet et al. 2006). A number of mechanisms may be involved, these nutrients contribute to “reducing antioxidant stress, improving glycoprotein profile, lowering blood pressure, increasing insulin sensitivity, and improving haemostasis regulation” (Dauchet et al. 2006). Increased BMI results in the development of dyslipidaemia, a significant risk factor for CHD, increasing the risk by 3.6 times as BMI increases over 21kg/m² (Haslam & James 2005) Much of the epidemiological evidence of the protective role of fruit and vegetables in cardiovascular disease is inferred from studies that have measured antioxidant markers of fruit and vegetables intake (Baghurst et al. 1999; Eichholzer et al. 2001) The antioxidants phytochemicals may reduce the formation of atheromatous plaques. Folate reduces blood levels of the compound homocysteine, established risk factors of coronary heart disease. Dietary studies have demonstrated increasing dietary fruit and vegetable intake without increases in plasma folate or homocysteine emphasizing the need to chose fruits and vegetables rich in folate (Pauline Al Ashfield-Watt et al. 2002).

Increasing fruit and vegetable consumption, excluding potatoes, to 600 grams per person per day would reduce the burden of ischaemic heart disease in the European Union by 17 to 24 percent (Joceline Pomerleau, Lock & McKee 2006). It was estimated that increasing the average fruit and vegetables consumption from the current 250 grams per day to 400 grams per day would decrease cardiovascular deaths in the Netherlands by 16 percent (range 6 to 22 percent) (van't Veer et al. 2000). An estimated four cent lower risk of coronary heart disease with every one serving per day increase in vegetables or fruit was predicted in 2001 (Joshiyura et al. 2001).

Cox et al. (1999) estimated the odds of developing cardiovascular disease to be reduced by 15 percent per additional salad vegetable consumed in winter (B. D. Cox, Whichelow & Prevost 2000). Fresh fruit consumption year round was associated with a lower risk of cardiovascular disease in women (B. D. Cox, Whichelow & Prevost 2000).





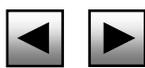
2.3.4 Hypertension

Observational and experimental studies have reported an association between higher fruit and vegetable intake and lower blood pressure (Lydia Bazzano, A. 2006) (Alonso et al. 2004) (L. L. Moore et al. 2005) (Appel et al. 1997). The Dietary Approaches to Stop Hypertension (DASH) study conducted a randomised feeding trial to test the effect of dietary patterns on hypertension and found that a diet high in fruit and vegetables reduced blood pressure in borderline and mildly hypertensive adults (Appel et al. 1997).

Miura et al. (2004) analysed yearly dietary assessments from 1957 to 1966 of 1,710 men employed by the Chicago Western Electric Company and found that men with higher fruit and vegetable intakes had less of an increase in systolic and diastolic blood pressure over seven years (Miura et al. 2004). Higher vegetable intake substantially suppressed blood pressure increase over the period, independently of fruit intake, as did higher fruit intake independent of vegetable intake (Miura et al. 2004).

2.3.5 Stroke

There is evidence of a protective association between high intakes of fruit and vegetables and the risk of stroke (Joshiyura et al. 1999) (AR Ness & Powles 1997) (L. A. Bazzano 2005; He, Nowson & MacGregor 2006; Lock et al. 2005; McKee, Lock & Pomerleau 2006). Pomerleau et al. (2006) estimated that the burden stroke attributable to fruit and vegetable consumption in the European Union could be reduced by 10 to 15 percent if consumption of fruits and vegetables, excluding potatoes, increased to 600 grams per person per day (Joceline Pomerleau, Lock & McKee 2006). This analysis also found that the burden of stroke attributable to fruit and vegetable intake occurred at a younger age in the newer member states (Joceline Pomerleau, Lock & McKee 2006). He et al. (2006) conducted a meta-analysis of nine cohort studies and found that individuals with a higher fruit and vegetable intake, three or more servings, had a reduced risk of stroke, 0.89 (95% CI 0.83–0.97, $P=0.005$) (He, Nowson & MacGregor 2006). He et al. estimated that eating three to five servings a day of fruits and vegetables reduced the risk of stroke by 11 percent, and eating more than five servings reduces risk by 26 percent reduction (He, Nowson & MacGregor 2006). Lock et al. (2005) estimated that the pooled relative risk of ischaemic stroke was 0.94 (95% CI 0.89–0.99) for each additional 80g fruits and



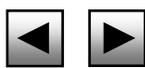


vegetable consumption, concluding that 90 percent of the global burden of ischaemic stroke could be attributed to fruit and vegetable consumption in lower than 600 grams per day (Lock et al. 2005; McKee, Lock & Pomerleau 2006). Ness and Powles (1997) found an inverse relationship between fruit and vegetable consumption and stroke when reviewing cohort, case-control and ecological studies (AR Ness & Powles 1997). This type of analysis allows for the examination of associations between fruit and vegetables, however does not allow for association about specific fruit and vegetable groups or seasonal variations to be assessed. The authors stress the importance of food based dietary analysis for identifying dietary related disease and recommended that international comparisons be made, as this may be able to assess secular trends in consumption and eating patterns (AR Ness & Powles 1997). Analysis of two large cohort studies in the US found an incremental increase of one serving per day of fruit or vegetables was associated with a six percent lower risk of ischemic stroke (Joshiyura et al. 1999).

A biological basis for the mechanism for the protective effect of fruits and vegetables on stroke is based on fact that fruit and vegetables are rich sources of potassium, folate, fibre, and antioxidants (He, Nowson & MacGregor 2006). Raised blood pressure is the major cause of stroke, and increasing fruit and vegetable consumption has been linked to increases in potassium and reductions in blood pressure (Appel et al. 1997; He, Nowson & MacGregor 2006).

2.3.6 Non-insulin dependent Diabetes mellitus

Epidemiological research suggests that adequate fruit and vegetable intake reduces the risk of developing diabetes (Colditz et al. 1992; Feskens et al. 1995; Ford & Mokdad 2001; Heidemann et al. 2005; Sargeant et al. 2001; Schroder 2007; Schulze et al. 2005; Snowdon & Phillips 1985; D E Williams, Wareham & Cox 1999). A diet high in fruit and vegetables reduces the risk of Type 2 or Non Insulin Dependent Diabetes (NIDDM) (Granado-Lorencio & Olmedilla-Alonso 2004; Heidemann et al. 2005; Montonen et al. 2005; Montonen et al. 2003; Montonen et al. 2004). Schulze et al. (2007) found that although cereal fibre was associated with a reduction in diabetes risk, fruit fibre and vegetable fibre were not significantly associated (Schulze et al. 2007). Bazzano et al. (2008) found that a diet high in fruit and green leafy vegetables was protective against Type 2 diabetes, whereas, consumption of fruit juice may be associated with increased the risk(L. A. Bazzano et al. 2008).





Obesity is the dominant risk factor for non-insulin dependent Diabetes Mellitus (Dunstan, Zimmet & Welborn 2001) and there is evidence to support the link between a diet high in fruits and vegetables and a lower risk of developing non-insulin dependent Diabetes Mellitus (Lydia Bazzano, A. 2006). The rising proportion of children presenting with obesity, greatly increases the risk of the onset of early non-insulin dependent Diabetes Mellitus, along with its complications such as coronary heart disease (Sabin, Crowne & Shield 2004).

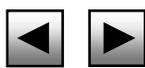
Inflammation is considered a key mechanism leading to Type 2 diabetes (Schulze et al. 2005). Schultz et al., (2005) identified a dietary pattern that may increase chronic inflammation and raise the risk of developing Type 2 diabetes, a diet low in cruciferous vegetables, yellow vegetables, and high in sugar sweetened and diet soft drinks, and processed meats (Schulze et al. 2005).

Mechanisms for the protective effects of diets high in fruit and vegetables may be related to their fibre and complex carbohydrate content and hypoglycaemic activity. A lower body weight is protective against diabetes; diets high in fruit and vegetables may lead to displacement of high fat or sugar foods.

A diet rich in fruits and vegetables reduces the concentration of glycosylated hemoglobin in the blood (Lydia Bazzano, A. 2006). One of the suggested mechanisms is that plant foods with a low glycaemic load (GL) (the amount of food eaten and the glycaemic index, that is the blood glucose response after consumption of carbohydrate containing food relative to test food, usually glucose or white bread) may benefit glycaemic control in people with diabetes (Venn & Green 2007). However, health benefits are limited to those GL foods naturally occurring with minimally processed carbohydrate and containing cereals, fruits and vegetables (Venn & Green 2007).

A US cohort study of 10000 adults over 20 years, found almost half the risk of diabetes in women who regularly consuming adequate daily amounts of fruit and vegetables compared to none. There was only a small effect in men. (Ford & Mokdad 2001).

A dietary pattern high in fresh fruit and low in high-energy soft drinks, beer, red meat, poultry, processed meat, legumes and bread (excluding wholegrain bread) has been associated with lower risk of Type 2 diabetes (Heidemann et al. 2005).





2.3.7 Cancers

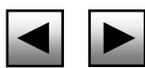
People who eat large amounts of fruits and vegetables have a lower risk of oesophageal, gastric, colorectal, lung, pharyngeal and laryngeal cancers (Bingham et al. 2003; Norat & Riboli 2002; World Cancer Research Fund American Institute of Cancer Research 1997; World Cancer Research Fund/American Institute of Cancer Research 2007). Smoking alone is estimated to have caused 21 percent of deaths from cancer worldwide, with alcohol use and low fruit and vegetable intake causing a further five percent each. (Danaei et al.)

The EPIC study found associations between cancer and fruit and vegetable consumption (World Cancer Research Fund/American Institute of Cancer Research 2007). The study found consistent protective effects of diets high in fruit and vegetables and vegetable subtypes (more evidence from case-control studies than from cohort studies), dose-response relationships, and plausible mechanisms.

The protective effect of fruit and vegetables against epithelial cancer has been related to many constituent substances and mechanisms including antioxidants, dietary fibres, micronutrients and other phytochemicals. Micronutrients such as carotenoids, vitamin C and E, dietary fibre, selenium, glucosinates and indoles, isothiocyanates, flavonoids, phenol, protease inhibitors and plant sterols are potentially anti-carcinogenic agents (La Vecchia, Altieri & Tavani 2001).

Potter (2005) examined the role of fruit and vegetables and the association with lower risks of cancer and the paradox that the literature prior to 1997 produced consistent findings associating high intakes of fruits and vegetables with a reduction in risk of variety of cancers, compared to subsequent less consistent findings (Potter 2005) (World Cancer Research Fund 1997). Specifically, links between high intakes of fruits and vegetables with lower risk of female premenopausal breast cancer, female lung cancer, male bladder cancer (cruciferous vegetables), non-Hodgkin's lymphoma and prostate cancer (fruit only), and no association with colon cancer. The association of high fruit and vegetable intakes and reduced breast cancer risk was not present in the Leisure World Study, but was in the Canadian National Breast Screening Study. The colon cancer cohort studies revealed reduced risk particularly in women. For lung cancer there was a suggestion of lower risk for women but not men and one study identified lower risk for fruit but not vegetables.

Hung et. al (2004) analysed the results of two prospective cohorts of 71 910 females (Nurses' Health Study, NHS) and 37 725 males (Health Professionals' Follow-up





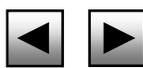
Study, HPFS) with dietary assessment in 1986, 1990, and 1994 for women and in 1990 and 1994 for men and found that high intakes of fruit and vegetables were associated with benefits for cardiovascular disease and not for cancer (Hung et al. 2004).

Hung et al. (2004) used the discrepancies in findings in cardiovascular disease and cancer to argue the null findings cannot be solely a measurement error problem. However this is exactly the same argument that was used when the Harvard group found that fat intake was unrelated to breast cancer but there was still an association with colon cancer. Subsequent studies between revealed an association with saturated fat and breast cancer and none for fat and colon cancer.

Cardiovascular disease is a small cluster of heterogeneous diseases compared with cancers, therefore collapsing across all cancers types and subtypes to examine a single exposure relationship is doubtful. This is particularly true for different associations with fruit and vegetables e.g. stomach cancer. The participants in the study had unusually high fruit and vegetable intakes, median fruit and vegetable intake was 5.23 servings per day (NHS) and 5.21 (HPFS), greater than the normal US intake.

Potter (2005) considered the following possibilities for the discrepancies in cancer risk reported:

- Previous studies were in error as there is an association between risk of cardiovascular disease and intake of fruits and vegetables but in none for cancer.
- The association with cancers was there earlier but has changed over time due to increasing error in measurements or as more time lapses between exposure and outcome. As there is still an association with cardiovascular disease it implies a difference in the way measurement error affects cardiovascular disease versus cancer.
- Exposure of cancer-preventing constituents of fruits and vegetables have been eliminated or reduced in food sources, e.g. due to factors such as plant breeding, harvesting, transport and storage. As there is still an association with cardiovascular disease it implies that the cardiovascular disease-preventing constituents are active and different from putative cancer preventatives. Potter considers this a plausible explanation for the discrepancies between studies throughout the world (Potter 2005).





There is a need to consider a number of variables in relation to determining disease risk and fruit and vegetable consumption including: changes in specific foods, meal patterns, changes over time (in food itself or changes in behaviours). Potter (2005) suggests that large international cohort studies are required to determine these relationships (Potter 2005).

Plausibility is considered when determining the contribution of factors to cancer risk. It is plausible that vegetables may decrease endometrial cancer risk. “Non-starchy vegetables including green leafy and deep yellow varieties contain vitamins, minerals, dietary fibre, carotenoids, flavonoids, and allumin compounds thought to influence cancer risk through their antioxidants activity, modulation of detoxification enzymes, stimulation of the immune system, and modulation of steroid hormone concentration and hormone metabolism.” pg 18 (Bandera et al. 2007). Many compounds in plant foods are potent modulator of the cytochrome 450 (CYP) monooxygenases in vitro and certain enzymes that metabolites phytochemicals also contribute to the in activation of endogenous steroid hormones. Cruciferous vegetables contain glucosinolates and hydrolysis products, including indoles and isothiocyanates, demonstrated to have the ability to influence chemical carcinogenesis processes (Bandera et al. 2007).

Bandera et.al. (2007) conducted a systematic literature review and meta-analysis to determine the role of fruit and vegetables in endometrial cancer risk (Bandera et al. 2007) and concluded that vegetables, including cruciferous vegetables, may be inversely associated with endometrial cancer risk. A weak association of fruit intake with endometrial cancer risk was observed however there was limited number of suitable studies.

Foods containing fibre in the cereals (grains), roots, tubers and plantains, group are probably protective against colorectal cancer and limited evidence that they protect against oesophageal cancer. These foods may also have a protective effective indirectly due to their low energy density (World Cancer Research Fund/American Institute of Cancer Research 2007), see Table 3.

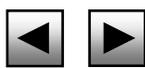




Table 3 Strength of evidence that fruit and vegetables can modify the risk of cancer

Judgement	Exposure	Cancer site
Cereals (grains), roots, tubers and plantains		
	Decrease Risk	
Probable	Foods containing fibre ¹	Colorectum
Limited –suggestive	Foods containing fibre ¹	Oesophagus
Substantial effect on risk unlikely	None	
	Increase Risk	
Convincing	Aflatoxins ²	Liver
Vegetables, fruits, pulses (legumes) nuts, seeds, herbs and spices		
	Decrease Risk	
Probable	Non-starchy vegetables ³	Mouth, pharynx, larynx, oesophagus
	Allumin vegetables ³	Stomach
	Garlic ³	Colorectum
	Fruits ³	Mouth, pharynx, larynx, oesophagus, lung, stomach
	Foods containing:	
	• Folate ⁴	Pancreas
	• carotenoids ⁴	Mouth, pharynx, larynx, lung
	• beta-carotene ⁴	Oesophagus
	• lycopene ^{4, 5}	Prostate
	• Vitamin C ^{4, 6}	Oesophagus
	• Selenium ^{4, 7}	PROSTATE
Limited –suggestive	Non-starchy vegetables ³	Nasopharynx, lung, colorectum, ovary, endometrium
	Carrots ³	Cervix
	Fruit ³	Nasopharynx, pancreas, liver, colorectum





Pulses (legumes)⁸
Foods containing:

- folate⁴
- pyridoxine^{4, 9}
- Vitamin E⁴
- Selenium⁴
- Quercetin⁴

Increase Risk

Chilli³

Stomach, prostate

Oesophagus, colorectum

Oesophagus

Oesophagus, prostate

Lung, stomach, colorectum

Lung

Stomach

Substantial effect on risk unlikely Foods containing beta-carotene¹⁰ in the in the: prostate, skin (non-melanoma)

Source adapted from (World Cancer Research Fund/American Institute of Cancer Research 2007)

¹Includes both as naturally occurring in foods (e.g. fruit and vegetables) and as added constituent.

² some fruits, and vegetables, and pulses (legumes) may be contaminated with aflatoxins.

³ fruit and the constituent and foods which have a constituent added

⁵ mostly contained in tomatoes and tomato products, also fruit such as grapefruit, watermelon and apricot

⁶ also found in some roots and tubers -- notably potato.

⁷ also found in cereals (grains) and some animal foods.

⁸ including soya and soya product

⁹ vitamin B₆, also found in cereals

¹⁰ derive from studies using supplements and food containing beta-carotene



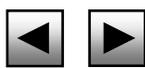


The 2007 WCRI identified a number of considerations when determining vegetables, fruits, and pulses (legumes) and causation of cancers: intake patterns in the populations studied are relatively homogeneous, there is no general agreement on categorisation of fruit and vegetables (some studies report broad categories and some individual food items -the report used the culinary definition), measurement of selenium was problematic due to soil content, confounders such as smoking and fat have only recently been accounted for, self-reporting tends to overestimate consumption, therefore, where relationships exist the studies are likely to underestimate the effect. The types and frequency of vegetables consumed has been associated with cancer risk, for example Cox et al. (2000) estimated the odds of developing cancer to be reduced by 21 percent per frequency category of increasing winter salad vegetables consumption (B. D. Cox, Whichelow & Prevost 2000). Year round salad/raw vegetable consumption is associated with a reduced risk of developing cancer in men (B. D. Cox, Whichelow & Prevost 2000).

Steinmetz and Potter (1996) estimated that 30 percent of many major cancers had a strong dietary association (Steinmetz & Potter 1996). Dietary factors may reduce the risk of cancer, or in some cases, hasten the cancer development. Diets low in fat and high in fibre, fruits and vegetables have been associated with reduced cancer risk leading the US Food and Drug Administration to allow a health claim “associating diets low in fat and high in fibre-containing grain products, fruits and vegetables “may” or “might” reduce the risk of some cancers”. [Codes of Federal Regulations].

Estimates of the contribution of low fruit and vegetables intake (lowest quartile or quintile of intake compared to highest) to preventable cancer risk range are difficult due to the complexity of interactions between dietary constituents and other risk factors. This complexity has resulted in recent reviews concluding fruit and vegetable intake is not associated with overall cancer risk (Hung et al. 2004; van Gils et al. 2005), whereas others show an inverse relationship (Steinmetz & Potter 1996).

The 1997 World Cancer Research Fund report on Food, Nutrition, and the Prevention of Cancer found convincing evidence that diets high in fruits and vegetables protected against cancers of the mouth, pharynx, oesophagus, lung and stomach and diets high in vegetables protect against colorectal cancer. The panel judged diets high in fruits and vegetables probably protected against cancers of the larynx, pancreas, breast and bladder, and possibly protect against cancers of the





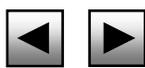
cervix, ovaries, endometrium and thyroid, and that diets high in vegetables possibly protect against cancers of the liver, prostate, and kidney.

The 2007 review panel found that results from number of large cohort studies since the 1990s failed to show the effects seen in the early case-control studies resulting findings that the evidence of the protective effects of fruits and vegetables is less impressive than the previous report on (World Cancer Research Fund/American Institute of Cancer Research 2007). Since the previous report evidence on soya and soya products, garlic, allium vegetables in general and chilli have emerged, and some classifications differed between the reports, for example bananas were classified as plantains and is in the previous report. The 2007 review considered foods containing specific micronutrients together with fruits vegetables, pulses (legumes), nuts and seeds and other plant foods, for example dietary fibre.

The 2007 review found probable protective effects for non-starchy fruit and vegetables for cancers of the mouth, pharynx, larynx, oesophagus, and stomach, and, for fruits only, lung cancers. The reviewed judged that the there was limited evidence for a protective effect of non-starchy vegetables against cancers of the nasopharynx, lung, colorectum, ovary, and endometrium. Allium vegetables probably protect against stomach cancer, and garlic probably protects against colorectal cancer. There is limited evidence that fruits also protect against cancers of the nasopharynx, pancreas, liver and colorectum and that carrots protect against cervical cancer, and pulses protect against stomach and prostate cancers (World Cancer Research Fund/American Institute of Cancer Research 2007).

Evidence of protective effects of various micronutrients that are markers for fruit, vegetables, pulses and other plant food consumption supported the protective effects of diets high in fruit and vegetables (including legumes). Folate containing foods were found to probably protect against cancer of the pancreas, and limited evidence suggested they also protect against oesophageal and colorectal cancers. The review judged that there was no convincing evidence of the protective effects of diet high in fruits and vegetables. (World Cancer Research Fund/American Institute of Cancer Research 2007).

Studies have estimated the reduction in the burden of cancer that could be achieved by increasing fruit and vegetable intake. Pomerleau et al. (2006) estimated that a one to 17 percent reduction in the burden of cancer could be achieved in the European Union by increasing fruit and vegetable consumption to 600 grams per person per





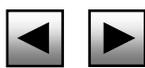
day (Joceline Pomerleau, Lock & McKee 2006). Vainio and Weiderpass (2006) estimated the proportion of preventable cancers at various cancer sites due to low intake of fruit and vegetables and found that when the lowest intakes were compared to the highest intakes the relative risk estimates were 20 to 30 percent lower in the subjects with the highest category of intake. These risks were then applied to the prevalence of low intake resulting in a preventable fraction for low fruit and vegetable intake of five to 12 percent (Vainio & Weiderpass 2006). The preventable risk varies for cancer site and different regions in the world. The true relative risk for low intake is uncertain due to limitations in dietary assessment and study design and the mix of various cancers (Vainio & Weiderpass 2006). Gundgaard et al. (2003) estimated between 19-32 percent of cancers among the Danish population could be prevented by increasing fruit and vegetable consumption to 500 grams per person per day (Gundgaard et al. 2003). Mathers et al. (1999) estimated that about 11 percent of the total cancer disease and disability burden in Australia is due to fruit and vegetable consumption of less than five servings per day (C Mathers, Vos & Stevenson 1999).

Interactions between other risk factors and fruit and vegetable intake have been found. Boeing et al. (2006) found a significant inverse relationship between fruit and vegetable consumption and cancers of the upper aero-digestive tract when they controlled for alcohol and tobacco smoking (Boeing et al. 2006). The World Cancer Research Fund and the American Institute of Cancer Research estimated that diets high in fruit and vegetables could prevent at least 20 percent of all cancer incidence in 1997 (World Cancer Research Fund American Institute of Cancer Research 1997). Baghurst et al. (1999) concluded that about seven percent of all cancers in Australia could realistically be attributed to low fruit and vegetables consumption (Baghurst et al. 1999)

Van Gils et al. (2005) found no association between total or specific fruit and vegetable consumption and breast cancer with a prospective cohort study of 285,526 women recruited from 10 European countries for between four and 10 years (van Gils et al. 2005).

2.3.8 Cataract and age-related macular degeneration of the eye

High dietary intake of carotenoids may protect against the development of age-related macular degeneration and other diseases of the eye (Calvo 2005; Cooper,





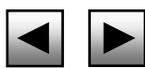
Eldridge & Peters 1999; 2004; Mares & Moeller 2006) (Lisa Brown et al. 1999a; Christen et al. 2005). Van Leeuwen et al. (2005) found that the risk of age-related macular degeneration of the eye could be reduced by a high dietary vitamin E, vitamin C and zinc intake (van Leeuwen et al. 2005). The authors concluded that increasing consumption of these nutrients as part of a total diet was more important than using nutritional supplements. Mares and Moeller (2006) suggest that dietary patterns are associated with macular degeneration of the eye and the mechanism may be a function of the interaction of several antioxidant nutrients and glycaemic index of the diet (Mares & Moeller 2006).

High dietary intake of fruit and vegetables were have been found to be protective against developing cataracts (Taylor, Jacques & Epstein 1995) (Christen et al. 2005) (Jacques & Chylack 1991) (L. Brown et al. 1999b). High levels of antioxidant vitamins-vitamins C, E and carotenoids are associated with delayed development of cataracts in older people (Hankinson et al. 1992).

2.3.9 Overweight and obesity

Emerging evidence suggests that fruit and vegetables may assist dietary weight management strategies to prevent obesity (Lydia Bazzano, A. 2006) (Tohill 2005). It has been suggested that the large amounts of fruits and vegetables recommended increases the feeling of satiety and results in the displacement of more energy dense foods (Tohill 2005).

Energy density is reduced by higher intake of fruit and vegetables and showed lowered blood pressure (Haslam & James 2006). In adults in North Karelia, Finland, during a 15-year period in which vegetable consumption trebled there was a substantial fall in intake of total fat and saturated fat accompanied by a 15 percent decrease in total serum cholesterol concentrations and a substantial decline in salt intake. The highest rates of obesity occur in the populations with the lowest socioeconomic status (A. Drewnowski & Darmon 2005). Poverty, deprivation and limited access to healthy foods explains some of the differential. Refined grain foods and added sugar and handed fats are usually affordable, enjoyable and readily accessible, they also contain the least nutrients per unit cost. The cost to society of consuming diets high in energy is higher. Prevailing economics, employment practices import tariffs and trade policies may contribute significantly to the obesity epidemic.





On a day-to-day basis people tend to eat a consistent volume of food, regardless of the energy content of the food. Therefore the energy density (kilojoules per gram) has an impact on the daily energy intake. Incorporating fruits and vegetables can reduce overall energy density, promotes satiety and decrease in total energy intake (J. Ledikwe et al. 2006). A study of 71 obese women tested this hypothesis, the first counselled to choose low fat foods and the second group were counselled to choose lower fat foods and increase consumption of water rich foods (including fruit and vegetables). At one year follow up the group counselled to eat more fruit and vegetables and reduce fat had a greater reduction in dietary energy density and lost 23 percent more weight, they also consumed an average of 25 percent more food by weight and reported less hunger (Ello-Martin, Ledikwe & Rolls 2005)

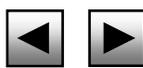
2.3.10 Neural Tube Defects

High folate intake immediately prior to and in early pregnancy can protect against neural tube birth defects such as spina bifida (Daly et al. 1995) (Wald et al. 2001) (LL Moore et al. 2003) (Mitchell et al. 2004). It has been estimated that 70 percent of neural tube defects can be prevented by adequate folate intake (Mitchell et al. 2004). Folate supplementation before pregnancy for women of child bearing age is recommended in Australia, however, less than two percent of take folate supplements (Australian Bureau of Statistics 1997). Vegetables and citrus and tropical fruit are the main source of dietary folate in Australia and contribute about a third of the average folate intake of women of child bearing age (Australian Bureau of Statistics 1998).

The mechanism for the association between folate and neural tube defects is not know, however it is likely that interruptions to two metabolic pathways that folate is required for, nucleic acid synthesis and methylation reactions, could adversely effect embryo development if there is not adequate intake (Mitchell et al. 2004).

2.3.11 Chronic obstructive pulmonary disease

Chronic obstructive pulmonary diseases affect the mucous membranes and small bronchial tubes of the respiratory tract, with asthma and bronchitis the most common, affecting approximately five percent of the US population and people over 30 years in Australia (Abramson et al. 2002). Van Duyn and Pivonka (2000) reviewed studies measuring fruit and vegetable intake and pulmonary function and





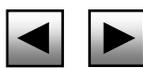
suggest that a diet high in fruit and vegetables enhances ventilatory function reducing the risk of COPD. Some studies have shown inverse associations with respiratory health and citrus fruit and vegetable consumption (La Vecchia, Decarli & Pagano 1998) (Antova et al. 2003) (Cora Tabak et al. 1999). A recent specific study on diet and asthma in children by Tabak et al. (2005) found no clear associations between fruit and vegetable intake and asthma end points (C. Tabak et al. 2006). Most fruits and vegetables have a high flavanoid concentration, such as quercetin. Flavanoids and vitamin C are strong antioxidants which may enhance pulmonary function, particularly in fruit (Mary Ann S van Duyn & Pivonka 2000).

2.3.12 Diverticulosis

Diverticulosis occurs when small out-pouches develop in the large intestine and colon and obstruction leads to inflammation or diverticulitis (Mary Ann S van Duyn & Pivonka 2000). The prevalence of diverticulosis rises with age and is generally asymptomatic, however, about 10-20 percent of patients will require medical treatment for diverticulitis or haemorrhages (Stollman & Raskin 2004). High fibre diets increase stool bulk and moisture, reduce gastrointestinal transit time, and protect against the development of diverticulitis (Marlett, McBurney & Slavin 2002). Fruit and vegetables are high soluble and insoluble fibre which to prevent diverticulosis (Aldoori et al. 1998) (Marlett, McBurney & Slavin 2002).

2.3.13 Dental and oral health

Perceived chewing ability, the presence and number of teeth, and posterior contacting teeth were associated with fruit and vegetable intake and biochemical measures of nutritional status in 753 free-living adults over 65 years in Britain (A. Sheiham & Steele 2001). Chewing encourages jaw development and prevents dental plaque build up in children. Dye et al. (2004) found an association between children's poor eating habits, including low fruit and vegetable intake, and the number of dental caries (Dye et al. 2004). The intrinsic sugars in fruits when consumed as part of a mixed human diet has no or very low carcinogenicity (A. Sheiham & Steele 2001) (Aubrey Sheiham 2007). As diets high in fruit and vegetables are high in vitamin C they can protect against gum disease (National Health and Medical Research Council 1999).





2.3.14 Other conditions

Evidence is emerging for the protective effects of diets high in fruit and vegetables for a variety of other conditions (Liu 2003) (Charlton 2002). A diet high in fruit and vegetables may help to prevent rheumatoid arthritis (Pattison et al. 2004) (Cerhan et al. 2003) and improve symptom management (Hanninen et al. 2000), Alzheimer's disease (Engelhart et al. 2002) (Charlton 2002; Liu 2003) (National Health and Medical Research Council 1999), constipation prevention and treatment (Marlett, McBurney & Slavin 2002) (Petticrew, Rodgers & Booth 2001), Parkinson's disease (Gao et al. 2007) (Zhang et al. (2002) found that high intakes of vitamin supplements and carotenoids did not appear to reduce the risk (Zhang et al. 2002), osteoporosis (Prynne et al. 2006) (Lanham-New 2006), bone mineral status and general bone health (Prynne et al. 2006) (Nieves 2005), deep bone thrombosis (Steffen et al. 2007), ulcers (Ryan-Harshman & Aldoori 2004), and multiple sclerosis (Baghurst et al. 1999) More research is required to reach conclusions about the associations.

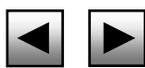
2.3.15 Dietary recommendations for fruit and vegetable consumption

Foods are consumed as part of a diet, therefore the interactions of foods needs to be considered when making dietary recommendations. Some dietary components modify the effect of others, sometimes the effect is complementary where foods act synergistically to enhance their effect, other times components of foods may inhibit the absorption or metabolism of other components (Prior 2003) (Schooling et al. 2006).

Food selection guides provide a conceptual framework for selecting the types and disease (Binns & Lee 2001; Britten et al. 2006; U. S. Department of Health and Human Services & U.S. Department of Agriculture 2005). Usually the recommendations are food group based, specify what constitutes a food group, and give standard serving sizes with visual representations. (Marcoe et al. 2006)

Dietary recommendations to increase consumption of fruit and vegetables need to:

- be part of total dietary recommendations, not just consider fruit and vegetables alone
- replace high-energy low nutrient dense foods, as adding more does not necessarily reduce energy density of the diet





- recommend eating a variety of fruits and vegetables as a group, as many components of fruit and vegetables are beneficial and work synergistically (World Health Organization and Food and Agriculture Organization 2004).

Dietary recommendations usually include recommendations to eat a variety of fruit and vegetables incorporating specific sub-groups (Smith, Kellett & Schmerlaib 1998; Smith et al. 1999a; Smith et al. 1999b) (National Health and Medical Research Council 1999, 2003a, b) (U. S. Department of Health and Human Services & U.S. Department of Agriculture 2005) (Reedy & Krebs-Smith 2008). These recommendations increase the likelihood of consumption of a wide variety of nutrients and non-nutrient components in plant foods, for example, folate from green leafy vegetables and carotenoids from yellow and orange fruit and vegetables. The main recommendation is for fresh or raw fruit and vegetables, incorporating cooked fruit and vegetables as cooking may enhance digestibility and bioavailability of some nutrients.

The World Health Organization's population goal for fruit and vegetable intake is greater than or equal to 400 grams of per person per day. Most countries have guidelines and recommendations for adequate fruit and vegetable consumption levels (Agudo 2005; Wolf et al. 2005). There is little uniformity in the total number of servings recommended or proportioned specification. Recommendations range from 400 to 750 grams, four to 12 portions per day, see Table 4. Dietary fruit and vegetable recommendations, the classification of fruit and vegetables, what constitutes a serve, and the recommended servings differ between countries and health organisations (Reedy & Krebs-Smith 2008).

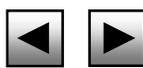




Table 4 Recommended amounts of fruit and vegetables for good health by country, guideline and portion definition.

Country	Guideline	Portion definition (one serving or portion equals)
WHO	At least 400 g	Tubers excluded, all ages
Greece	3 servings of fruit, 6 servings of vegetables	A cup of raw leafy vegetables or ½ cup of other vegetables (about 100 g). One apple (80 g), one banana (60 g), orange (100 g) melons (200 g) grape (30 g).
Austria	250-300 g fruit 400 g vegetables 650-700 g total	Potatoes excluded, adults, fruit can be juiced
Belgium	1-3 portions fruit 300 g vegetables	Potatoes and juice excluded, recommendation is from 6 years old
Denmark	3 portions fruit 3 portions vegetables 600 g total	Potatoes excluded, juice on portion only, recommendation is from 10 years old
Iceland	>200 g fruit >200 g vegetables >400 g total	Potatoes excluded, juice included in total, recommendation school child onwards
The Netherlands	At least 2 pieces fruit 200 g vegetables ≥400-450 g total	One bowl crudités contains 50 g of vegetables; a piece of fruit 100-125 g, for adults.
Norway	2 portions fruit 3 portions vegetables 750 g total	Potatoes and juice included, for adults.
Portugal	3-5 portions fruit 3-5 portions vegetables	Potatoes excluded, 3<5 portions based on 2,200 kcal intake, 5 is for >3,00 kcal intake.





Sweden	250 g fruit 250 g vegetables 500 g total (½ kg)	Potatoes excluded, fruit juice maximum 100 g /day
United Kingdom	At least 5 portions overall	One portion is 80 g., 3 tablespoons cooked vegetables, 2 tablespoons pulses, one medium fruit, 2 small fruit, 1 small glass 100% fruit juice, handful/bowl equals 300 ml.
New Zealand	At least 5 portions overall 2 servings of fruit 3 servings of vegetables	One medium potato (135 g); ½ cup cooked vegetables (20-80 g); ½ cup salad vegetables (60 g).
United States of America	2-4 servings of fruit 3-5 servings of vegetables	1 cup of raw leafy vegetables, ½ cup of other vegetables 1 medium (apple, banana, orange, pear), ½ cup chopped canned fruit, ¾ cup 100% juice
Switzerland	2-3 portions fruit 3-4 portions vegetables	100 g fresh vegetables; 150-200 g cooked vegetables; 50 g green salad; 100 g mixed salad; 1 apple; 1 banana; or 3 plums.
Australia	2-4 servings of fruit 4-8 servings of vegetables	75 g vegetables and 150 g fruit, different number of serves for age or life course categories (e.g. pregnancy).
Japan	2-4 servings of fruit 5+ servings of vegetables	70 g vegetables and 100-200 g fruit.
Spain	2-4 portions fruit 3-5 portions vegetables ≥400 g total	One average dish of salad or cooked vegetables; 1 eggplant, tomato; 2 carrots, cucumbers; 1 medium-sized fruit (apple, orange, pear); 1 slice watermelon; 2-3 small fruits; 1 cup very small fruits (berries).
Canada	5-10 servings overall	One medium-sized fruit or vegetable (banana, apples, carrot); 1 slice melon; ½ cup fresh fruit and vegetables; 1 cup salad; ½ cup juice.
Mexico	5-10 servings overall	One medium-sized fruit (apple, pear); 1 cup fruit or vegetables; 1 cup 100% juice; 5 pieces dried fruit.
Argentina	5-10 portions overall	One medium-sized fruit (apple, pear); 1 cup leafy vegetables; ½ cup cooked/canned vegetables or legumes; ¼ cup dried fruits; ¾ cup 100% juice.
Brazil	2-4 portions fruit 4-5 portions vegetables	One medium-sized fruit; 1 slice of large fruit; ½ cup raw or chopped fruit; 1 cup leafy raw vegetables; ½ cup other vegetables.





Malaysia	At least 5 portions overall	½ cup cooked green leafy vegetables; ½ cup fruit or root vegetables; ½ medium-sized guava; 1 small-medium orange, pear or apple; 1 medium-sized banana; 1 slice papaya pineapple, watermelon.
Philippines	2-3 servings of fruit 3 servings of vegetables	1 cup raw or ½ cup cooked leafy vegetables; ½ cup raw or cooked other vegetables; 1 medium-sized fruit; or 1 slice large fruit.
South Africa	2-4 servings of fruit 3-5 servings of vegetables	1-cup free vegetables (asparagus, broccoli, cabbage, eggplant, green beans, lettuce, radishes, tomatoes); ½ cup other vegetables (peas, beetroot, carrot, pumpkin, onions, butternuts); 1 medium-sized fruit (apple, peach, orange, grapefruit, pear); 1 small banana or mango; 4 apricots or prunes, 20-24 medium grapes or strawberries; 4 tablespoons raisins; or ½ cup sliced fruit.
Mauritius	At least 5 portions overall	1 cup raw or ½ cup cooked vegetables; 1 mango, banana, apple, pear, orange, or mandarin; 1 slice papaya, pineapple, watermelon; 2 small plums, peaches, nectarines, or kiwis; or ½ cup grapes.

Adapted from Agudo (2005)(Agudo 2005) and Wolf et al. (2005)(Agudo et al. 2002; Wolf et al. 2005)



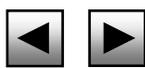


Most countries have designated standard serving sizes and recommended number of serves for fruit and/or vegetables (Naska et al. 2006). The US Department of Health recommended consuming from two to three servings of fruit and three to five of vegetables daily in 1980, and the US Department of Agriculture revised the recommendation in 1995 to two to four servings of fruit and three to five of vegetables daily (US Department of Agriculture 1995). The World Health Organization set a lower per capita limit of 400 grams per day increased to 400 to 600 grams per day (excluding potatoes) to protect against disease and the recent dietary review of cancer prevention. (World Health Organization 1990) (World Cancer Research Fund/American Institute of Cancer Research 2007; World Health Organization 2003a) (Lock et al. 2005). The recent World Cancer Research Fund report recommends that populations consume an average of at least 25 grams of non-starch polysaccharide each day. The personal recommendation is to eat at least five 14-ounce servings (400grams) of a variety of non-starchy vegetables and fruit every day. The recommendation also includes that people who consume starchy roots or tubers as staples ensure a sufficient intake of non-starchy vegetables, fruits and pulses (legumes).

The World Health Organization acknowledges that some countries have such a low intake that 400 grams may not be an appropriate minimum target, however, reached consensus is that the 400 grams minimum should be the ultimate goal for all countries.

Each country was advised to set intermediate objectives to reach the 400g goal according to their own situation and include promotional messages to encourage variety and fresh as better. The minimum Australian recommend intake of fruit and vegetables of 675 grams per day (including potatoes) is consistent with the 400 to 600 grams (excluding potatoes) recommendations. The Netherland Bureau for Food and Nutrition recommends adults eat four serving-spoons of vegetables (about 200grams) and two pieces of fruit (about 200grams) per day (Brug et al. 1995). European guidelines generally recommend at least 400 grams daily (Naska et al. 2000).

The main similarities are that most countries now have separate recommendations for fruit and vegetables, define the portion of fruit and vegetable (either in common household terms, a serve equivalent or weight) and have some definition of the portion or serving form. However, there are many differences and it is difficult to





compare recommendations due to different definitions of portion or serving size, exclusions or inclusions of specific fruit or vegetables, and who the recommendation applies to (children, whole population).

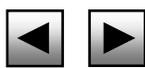
Most countries do not specify whether the minimum recommended intakes are for use as measures for dietary surveys or if they were designed for promoting fruit and vegetables among population groups (Wolf et al. 2005).

In Australia, recommended intakes for fruit and vegetables have been separate since 1994 when the Five Food Groups, developed 20 years previously, were revised. The differing nutrient profiles of fruits and vegetables, the practical aspects of eating them, current household consumption levels, and food supply were considered when developing the new Core Food Group (CFG) (Cashel & Jefferson 1994). The Recommended Daily Intake of nutrients, food modelling of current dietary patterns, the Australian Dietary Guidelines and the Composition of Foods in Australia were used to develop the CFG. The CFG are minimum recommendations to achieve nutrient requirements and 70 percent of total energy; the remaining 30 percent is to be obtained from a similar distribution of food groups.

Table 5 Minimum number of servings of fruit and vegetables recommended per day to achieve a healthy diet, by age group

<i>Fruit</i>	Age (years)	Servings/day
<i>One serving equivalent to: one medium piece (150g) or two small pieces, or one cup canned or chopped fruit, or ½ cup (125 mL) 100% fruit juice or 30g dried fruit.</i>	Children 4 to 7 years	1 to 2
	Children 8 to 11 years	1 to 2
	Adolescents 12 to 18 years	3 to 4
	Women 19 to 60 years	2 to 3
	Pregnant women	4
	Breastfeeding women	5
	Women over 60 years	2 to 3
	Men 19 to 60 years	2 to 3
	Men over 60 years	2 to 3
<i>Vegetable, including legumes</i>		
<i>One serving equivalent to: ½ cup (75g) cooked and/or legumes (dried beans, peas or lentils), or one small potato, or 1 cup salad vegetables, or ½ cup or 125mL. 100% vegetable juice.</i>	Children 4 to 7 years	2 to 4
	Children 8 to 11 years	3 to 5
	Adolescents 12 to 18 years	4 to 9
	Women 19 to 60 years	5 to 7
	Pregnant women	5 to 6
	Breastfeeding women	7
	Women over 60 years	5 to 6
	Men 19 to 60 years	5 to 8
Men over 60 years	5 to 7	

Source: (Smith, Kellett & Schmerlaib 1998)





The Core food groups formed the basis of Australia's food selection guide, the Australian Guide to Healthy Eating (Smith et al. 1999b). The Guide is incorporated into Australian dietary guidelines (National Health and Medical Research Council 1999, 2003a, b) and is used as the basis for most nutrition education initiatives. The fruit and vegetable recommendations are outlined in the Table 5.

In 2006, the Australian and New Zealand Governments revised the Nutrient Reference Values and subsequently the Core Food Groups and Australia's food selection guide require revision (Australian Government & Ministry of Health 2006).

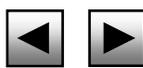
2.4 Fruit and vegetable consumption

This section outlines factors related to the measurement of fruit and vegetable consumption at all levels, current Australian consumption, and the economic benefits of increasing consumption.

2.4.1 Measuring fruit and vegetables consumption and related factors

Information about fruit and vegetable consumption and dietary and disease patterns is used to develop dietary recommendations, identify disease associations and develop and evaluate interventions to improve diet (World Health Organization and Food and Agriculture Organization 2004). The data required for these purposes is broad, from accurate measurement of daily intake, to measures of usual intake, food service provision, production, trade, to advertising and promotion (World Health Organization and Food and Agriculture Organization 2004). Individual, demographic and environmental factors need to be considered when assessing dietary data (World Health Organization and Food and Agriculture Organization 2004).

The survey instruments themselves and the criterion for assessment of fruit and vegetable consumption level influence estimates of adequacy of consumption. Table 6 displays examples of different methodology and categorisations that have been used to assess adequacy of fruit and vegetable intake in population subgroups. The method of assessment and the parameters to targets defined to represent adequate intake vary from frequency of consumption (times per day) to number of types or proportion of population meeting designated number of servings per day.



**Table 6 Examples of methodologies used to estimate adequacy of fruit and vegetable consumption:**

Measurement instrument	Analysis	Sample details	Results	Comment
Food Frequency (FFQ) self-reported (116 fruit and vegetables with defined servings sizes (80gr)) Postal survey(D. N. Cox et al. 1998)	Sum of servings tertiles. Compared mean 80-gram servings per day to 400 grams (5 x 80 grams portions/day) exclude potato.	UK adults, n=2020, 37% response rate, (n=741)	Fruit: Low 0.96 serves/day, Medium 2.33 serves/day, High 4.46 serves/day Veg: Low 1.61 serves/day, Medium 3.39 serves/day, High 5.99 serves/day Fruit & vegetables: Low 3.63 serves/day, Medium 6.72, High 11.27 serves/day.	Higher than previously known intake, 244g or 3 portions fruit & veg in UK and 2.4 Scotland (1994). High number of individual foods may overestimate intake.
FFQ and diet diary frequency of consumptions Face-to-face interviews(Donkin et al. 1998).	Mean frequency of fresh, frozen, canned, dried, juice representing >5% contribution any nutrient to diet.	UK adults, 65-75yrs n=369, 67% response rate, age-stratified random through GPs	Fruit & vegetables: Mean: 4.1 servings per day Men 2.66 single: 4.20 married Females 4.45 single: 4.31 married	Married men and single women have higher fruit and vegetable intakes.
FFQ semi-quantified , adapted from British arm of EPIC study whole diet (11 fruit and 27 veg items) Postal survey(Sharon Friel, Newell & Kelleher 2005)	Target four or more servings of fruit and vegetables Food groups & diet & lifestyle behaviours, food pyramid shelves	UK adults, n=6,539 62% response rate postal	Percent consuming recommended four or more servings of fruit and vegetables, 60 to 74% women and 52 to 55% of men.	
7 day food diary and FFQ (71 food items, 27fruit and vegetables) (Wendy L. Wrieden et al. 2007)	Included fruit juice and salads. Mean frequency of consumption.	Scotland (n=93)low SES 88% females, mean age 32.3yr.	Fruit and vegetables mean 8.1 times/week FFQ no fresh fruit 25% less than daily fruit 50%	Times consumed fruit and vegetables.
FFQ (7 items fruit and	5 servings of fruit &	US (n=2755) in	Five or more servings 23.4% in 1991	Women, those over





vegetables). Servings should eat for good health. Random digit dialling. (Stables et al. 2002)	veg/day. 100% citrus juice, other juice, green salad, fried potatoes, other potatoes, other vege not incl. salad or potatoes, fruit.	1991 and (n=2544) in 1997 Response rate: 43.8% and 50.5% 1991 then follow-up 1997	significantly increased to 25.8% in 1997 Mean servings 3.75 in 1991 significantly increased to 3.98 in 1997	65, non-smokers and more educated were more likely to consume five servings of fruit and vegetables.
FFQ times per day of fruit and vegetables(Wendy Louise Wrieden et al. 2004a)	Excluded tomatoes >400 grams/day is equal to > 4 times per day or 28 per week target.	Scotland n=2883 men and 3127 women. 1986, 1989, 1992, 1995	Fruit and vegetables: Men increased from 7% meeting target in 1986, 89 to 11% in 1992 and 12% in 1995 Women: increased from 10% meeting target in 1986, 15% in 89 to 16% in 1992 and 20% in 1995	Food frequency number of times per day target, excluded tomatoes.
24-hour dietary recall In-home, one-on-one interviews(Maclellan, Gottschall-Pass & Larsen 2004).	Mean intake ^a excludes potatoes, bananas, corn ^b Canada Food Guide to Healthy Eating	Canada,n=40 adult women 20-49 years.	Mean serves: 2.1 ^a or 4.4 ^b men 2.9 ^a or 4.1 ^b women Proportion eating ≥5serves/day 6% ^a or 38% ^b men, 12% ^a or 32% ^b women	
FFQ fruit juice, fruit (not juice), green salad, carrots, potatoes, other vegetables(Riediger, Shooshtari & Moghadasian 2007).	Frequency of fruit and vegetable intake <5 times/day, 5-10 time/day, >10 times	Canadian (n=18,524) 12 to 19 yrs. Cross sectional	38.3% of Canadian adolescents consumed fruits and vegetables five to 10 times per day;	Education, income, and being female had a significant positive Impact on consumption.
FFQ quantified and 3-day food record self-administered)(Park et al. 2005).	Food group allocations according to USDA Pyramid, time/day by portion	Hawaii and LA, n=195,298, adults 45 to 75 years, cohort 1993 and 1996	Three dietary patterns emerged, “fat and meat”, “vegetables” and “fruit and milk”. Age, gender, ethnicity and education were associated with these patterns.	





2.4.2 Dietary Surveys

Dietary surveys for epidemiological purposes study the nutrition components of food as well as the dietary patterns, cumulative and real world effects and inter-relationships (Schulze & Hoffmann 2006). Dietary pattern analysis allows for consideration of latent interactions and cumulative effects in disease progression (Schulze & Hoffmann 2006). A variety of survey types are currently used to determine fruit and vegetable consumption levels and to provide information needed to develop interventions to increase consumption.

Tools for assessing dietary intake include food records or diaries (can be weighed, measured or described), 24-hour dietary recalls, food frequency questionnaires (FFQs), brief instruments focussing on specific nutrients or food categories (Frances E. Thompson et al. 2004) (M. L. Neuhouser et al. 2001), behavioural questionnaires collecting food selection and preparation information, and measures of the dietary environment (Marian L. Neuhouser et al. 2007).

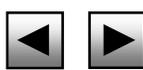
2.4.2.1 Food records, recalls and diaries

Exact portion sizes can only be obtained by weighing dietary intake for several days including weekends or repeated 24-hour recalls (Wolf et al. 2005). These instruments also provide the opportunity to measure the types of raw, cooked, juice and dishes eaten as well as meal occasion, and identify non-consumers (Wolf et al. 2005). These instruments may not account for usual intake, seasonal variations The Pro Children Study across Europe has developed a pre-coded 24-hour recall instrument (Wolf et al. 2005).

The EPIC study found that food energy intakes obtained from self-reported questionnaires underestimate true intakes, with 10-14 percent described as 'extreme' under-reporters, the majority of these with higher BMIs (T. Lobstein & Millstone 2007).

2.4.2.2 Food frequency questionnaires

The food frequency questionnaire (FFQ) is a practical and economical method for collection of dietary data in large epidemiological studies (Subar et al. 2001). Respondents report their usual frequency of consumption of foods listed for specific time periods (for example, daily, weekly, fortnightly, monthly or yearly). FFQ can





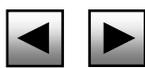
identify the most commonly consumed items, however, they collect less information about the foods consumed, cooking methods or portion size than dietary record or recall methods (Subar et al. 2001). Semi-quantified food frequencies describe portions or serving sizes which can then be used to calculate mean grams. It has been suggested that including a longer list of fruit and vegetables and portion sizes increases validity and accuracy (World Health Organization and Food and Agriculture Organization 2004) (Kremers et al. 2005), however, others have reported that questionnaires, particularly those with multiple fruit and vegetables assessed often over-estimates consumption (Bingham et al. 1994; D. N. Cox et al. 1998; D. N. Cox et al. 1997; Gibson, Wardle & Watts 1998). Ashfield-Watt et al. (2004) suggest that as portion sizes of fruit and vegetables tend not to vary, it is the frequency of consumption that is important when comparing high and low consumers (P. A. L. Ashfield-Watt et al. 2004).

Bingham et al. (1994) estimated that food frequencies can overestimate fruit and vegetable consumption by about 30 percent and that vegetable intake can be doubled compared to weighed records (Bingham et al. 1994). Wrieden et al. (2007) found that the seven-day food diary and food frequency questionnaires (with 71 foods of which 27 were fruit and vegetables) resulted in considerable subject burden (Wendy L. Wrieden et al. 2007). The Dutch EPIC Food Frequency questionnaire has been utilised to evaluate a number of studies (Ocke et al. 1997a; Ocke et al. 1997b).

2.4.2.3 Apparent consumption

National Apparent Consumption gave an indication of historic trends in the foods available for consumption; foods consumed and enabled assessment of changes in the food supply per head of population in Australia. Trend analysis explained changes in dietary consumption, for example, significant changes in source of fruit consumption due in part to juice, or vegetable consumption due in part to fries. The Australian Bureau of Statistics routinely collected national Apparent Consumption data since 1926-37, however, collection ceased in 1998-99 (Australian Bureau of Statistics 2000b).

Apparent consumption was calculated with consideration of commercial and estimated home production, imports, exports, stored produce, non-food use and wastage (before sale). It did not represent actual direct intakes of produce and





overestimated actual consumption because waste from domestic residences, restaurants and other food outlets are not considered.

2.4.2.4 Household expenditure

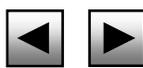
Food consumption patterns can be determined using food expenditure data. This data allows assessment of the types and foods on which people spend their money and determines similarities and disparities in spending habits of differing family sizes, income, geographical areas and other demographic and socio-economic features.

2.4.3 Surveys measuring fruit and vegetable consumption in Australia

2.4.3.1 Australian National Nutrition survey

National food consumption surveys in Australia were first conducted in 1938, surveying domestic food budgets, and then in 1944 measuring food consumption and dietary levels. The next dietary survey was conducted with adults 25 to 64 years using a 24-hour recall methodology in 1983. In 1985 10 to 15-year-old schoolchildren were surveyed using 24-hour food diaries. During the 1980s and 90s several surveys using food frequency questionnaires were conducted in individual states or on small national samples. In 1995 the NNS was conducted to monitor the dietary and nutrient intakes of Australians. The survey results were to be used to assess changes in dietary habits since the 1983 survey and assist the development of Australia nutrition policy and nutrition promotion interventions.

The 1995 NNS collected information on food and beverage consumption on the day prior to the interview using: (1) a 24-hour recall questionnaire, adapted from the Continuing Survey of Food Intakes by Individuals 1994-96 of the United States Department of Agriculture (USDA) questionnaire (types and amounts of all food and beverages consumed over a 24 hour period); (2) physical measurements (height, weight, waist hip ratio, and blood pressure of those over 16 years); (3) dietary habits and attitudes questionnaire; and (4) a food frequency questionnaire of certain foods over the previous 12 months. The FSANZ developed a customised nutrient composition database to analyse the food records for nutrient intake. Nutrient density per 1000 kJ energy for each nutrient (except energy) per person was calculated. Percentage contribution to total energy per person per day for macronutrient was calculated.





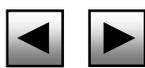
The sample was a sub-sample of the National Health Survey, information about sample selection, personal interview detail is available elsewhere (Australian Bureau of Statistics 1998). Approximately 13,800 people completed the NNS. The response rate was in three stages, 76.8 percent of those invited to participate agreed, and 61.4 percent completed the interview at a later date, resulting in a sample size of 13,858. Food frequency questionnaires were received from 76.2 percent of respondents 12 years and over. The low response rate was due to the responded burden, previously completed NHS.

Measurements of physical fitness and physical activity levels provide information needed to interpret energy intake and output and influencers. Measurements of blood levels of specific nutrients including folate, provides important nutrition information. In relation to initiatives to increase fruits and vegetables, the NNS survey allows for comparison with prior surveys, and other countries; between and across socio-economic groups, genders, and ages; assessment of fruit and vegetable consumption in the context of the total diet (average portion sizes, total energy intake, mixed foods, food group consumption, height and weight measurement and indicators of social eating patterns (foods eaten at home, versus eaten out, nutrient composition of these foods); amount of fruit and vegetables consumed including sub-groups; frequency and location of consumption. The NNS takes into account seasonality and availability of fruit and vegetables and measures nutritional status.

Australia does not have a recent national dietary survey, which is a limitation for those working in nutrition, particularly as there have been changes in the composition and number of foods available over the last 12 years. A NNS for children commenced implementation in 2007.

2.4.3.2 Australian National Health Survey

The Australian Bureau of Statistics (ABS) National Health Surveys (NHS) were conducted in 1989–90, 1995, 2001 and 2004–5 to collect and monitor national benchmark information on a range of health-related issues. In 2004-5 face-to-face interview were conducted in 19,501 private dwellings throughout Australia using the Computer Assisted Interview (CAT) instrument (Australian Bureau of Statistics 2006b). The sample obtained information about one adult and one child aged 0 to 17 years in each household, with 25,906 respondents, an 86.4 percent response rate. Respondents reported their usual daily intake of fruit (150 grams of fresh or 50





grams of dried fruit) and vegetables (75 grams servings) (excluding drinks and beverages) usually consumed each day.

2.4.3.3 Australian Household Expenditure Survey

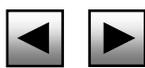
The Australian Household Expenditure Survey (HES) collects detailed information about the expenditure, income and household characteristics of a sample of households resident in private dwellings throughout Australia. The Australian Household Expenditure Survey have been conducted in 1974-5, 1975-6, 1984, 1988-9, 1993-4, 1998-99 and 2003-04. Average weekly expenditure on over 600 goods and services was obtained from the survey with household income, household characteristics and broad geographical areas (state, capital city, other urban and rural) breakdown. There was important information on the types and amounts (even brands) of foods purchased that can be used to examine factors influencing fruit and vegetable consumption. In 2003-4 71 percent of the 9,753 households originally selected for inclusion responded.

2.4.4 Fruit and vegetable supply, consumption and trade data

Fruit and vegetable market authorities can collect information on the current cost and state supply of fruit and vegetables. At a global level, data on country food balances is available in the FAO Food Balance Sheets, allowing international comparisons of fruit and vegetables available for consumption per capita. The method of derivation of the Food Balance Sheets is available from FAO website, <http://www.fao.org> (United Nations Statistics Division 2008). The per capita per year fruit and vegetable availability increased between 1985 and 2003 in Australia, from 94.5 to 102.55 kilograms per capita per year of fruit and 80.04 to 93.83 kilograms per capita per year of vegetables (Food and Agriculture Organization of the United Nations 2003). World food trade data is collected by the United Nations and made available from the COMTRADE datadase <http://comtrade.un.org/> (Uniited Nations Statistics Division 2008).

2.4.5 Household food inventory

Neuhouser et al. (2007) tested a household food inventory measure of fruit and vegetables against a food frequency questionnaire (assessing usual frequency of vegetables, green salad, potatoes, 100 percent fruit or vegetable juice) and serum





carotenoids and found that both methods were poor indicators of consumption (Marian L. Neuhouser et al. 2007).

2.4.6 Fruit and vegetable sales data

Retail scanning systems can now provide information on the purchasing habits of fruit and vegetables. There is important information on the types and price (including brands) of foods purchased that can be used to examine factors influencing fruit and vegetable consumption. This commercially sensitive information is available in aggregated formats from data companies and specific fruit and vegetable data can be purchased (BIS Shrapnel 2000, 2002). Retailer tracking data can assess the impact at point of sale of fruit and vegetable campaign activities (Horticulture Australia Limited 2005).

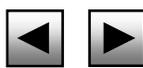
2.4.7 Quality and consumer perceptions data

Horticulture industries collect market intelligence to assist in their strategic development. The Australian horticultural industry has invested significantly into collecting information on consumer attitudes and perceptions to specific fruit and vegetable categories (Horticulture Australia Limited 2001). Information collected includes food-purchasing habits, perceptions of quality, taste and value.

2.4.8 Fruit and vegetable supply and safety data

The industry has a comprehensive research and development program which monitors fruit and vegetables. Health Departments and the Australia New Zealand Food Authority conduct regular monitoring of the food supply in Australia.

Market Basket Surveys purchase foods or collect information at point-of-purchase to measure the impact of the retail environment, for example the study might measure nutrition (healthy food basket), pesticide and food safety, or quality and availability. Usually a cross section of different geographical locations is surveyed to identify any variations in retail practices. Criteria are set for how to select and price product, the range of foods, or other products or factors to be observed. Cassady et al. (2007) measured fruit and vegetable prices in 25 supermarkets across Sacramento and Los Angeles and found that the average price per serving of fruit and vegetables was \$0.21, the highest was fruit, dark green vegetables, and legumes at \$0.23, and orange vegetables were \$0.07 (Cassady, Jetter & Culp 2007). The authors conclude that





low-income families would need to allocate 43 to 70 percent of their food budget to fruit and vegetables (Cassady, Jetter & Culp 2007).

2.4.9 Food advertising data

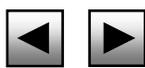
Food advertising data is useful to assess competition and the market place. Australian children's television has a high prevalence of junk food advertising and healthy eating is rarely promoted (Chapman et al. 2007; Chapman, Nicholas & Supramaniam 2006; H. G. Dixon et al. 2007; Morton et al. 2005; Neville, Thomas & Bauman 2005).

2.4.10 Intervention research and evaluation

Qualitative and focus group studies are useful for identifying potential determinants of consumption in specific target groups. Cross-sectional studies test associations between factors and provide a snapshot of potential determinants of consumption (Brug, van Lenthe & Kremers 2006). However, the correlates of current behaviour are not necessarily the predictors of behaviour change (Brug, van Lenthe & Kremers 2006). Longitudinal and experimental studies are necessary to identify predictors of consumption (Brug, van Lenthe & Kremers 2006). There are many 'natural experiments' in place, for example government campaigns or policies are applied in one country but not another and provide an opportunity for evaluation for example with cross country comparison (Brug, van Lenthe & Kremers 2006). This is particularly relevant to environmental influences (Brug, van Lenthe & Kremers 2006).

Evaluating the impact of interventions to increase fruit and vegetable consumption is difficult in the context of the 'real world'. Wrieden et al. found that randomised controlled trial design was challenging to undertake with hard-to-reach socially deprived, low-income target group due to the chaotic nature of the subjects lives (Wendy L. Wrieden et al. 2007). In these groups it is often the process of implementing the intervention and reaching participants that is reported.

The method of dietary assessment chosen to determine intervention effectiveness varies widely. It is important to choose instruments sensitive enough to measure changes in fruit and vegetable intake and to detect other changes, sometimes unintended. A combination of food frequency questionnaires and 24-hour recall were used to measurement consumption in interventions in children, only the 24 hour





recall was sensitive enough to detect significant changes in consumption (Knai et al. 2006).

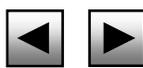
Eriksen et al. (2003) used two methods of dietary assessment to evaluate the impact of a fruit and vegetable subscription scheme; a food frequency questionnaire and the 24-hour food recall (Eriksen et al. 2003). Only the 24-hour recall was sensitive enough to detect dietary change and demonstrate the compensation made in out of school hours. For example, although fruit intake increased at school in subscribers and non- subscribers, total fruit and vegetable intake did not change over the whole day. The research also highlighted the value of controls, as the intervention had an impact on non-subscribers in the intervention schools, compared to controls (Eriksen et al. 2003).

A systematic review of environmental interventions to promote fruit and vegetable intake found that dietary outcomes were most often measured by food frequency, a few used seven-day food record or 24-hour dietary recall (Kamphuis et al. 2006).

Assessment of nine to ten year old children's fruit and vegetable intake and determinants of consumption in the Netherlands found that children overestimated their intake compared to parental assessment (Tak et al. 2006).

Study design to measure intervention effectiveness is important (Kamphuis et al. 2006; Knai et al. 2006). A number of randomised control trials and fewer non-randomised control trials have met the criteria for inclusion in systematic reviews to determine the effectiveness of interventions to increase fruit and vegetable consumption (Knai et al. 2006). This often means that 'in practice' interventions are not included in reviews of intervention effectiveness as their evaluation does not have research rigor, or due to inability to access a control group (J. Pomerleau et al. 2005a; Joceline Pomerleau et al. 2005b).

New instruments are being developed to assist in identifying the determinants of consumption of fruit and vegetables. The tools are useful is specifying separate reasons for fruit and vegetables that may assist in intervention design. For example, Baranowski et al. (2007) developed a pantry management and availability scale that identifies the reasons consumers choose to stock processed (juice, canned or frozen) fruit and vegetables (Tom Baranowski et al. 2007a), and another scale that measures outcome expectancies for fresh versus other fruit and vegetables. Blake et al. (2007) applied schema theory using qualitative interviews and repeated card sort activities to





identify how adults categorise foods in different settings (Blake & Bisogni 2003; Blake et al. 2007).

Pomerleau et al. (2005) recommends that minimum evaluation standards be applied when designing interventions to increase fruit and vegetable consumption, including standard validated measures of fruit and vegetable intake, and tools measuring predictors of intake such as knowledge, attitude, and social support (J. Pomerleau et al. 2005a). The authors encourage the use of comparison groups in all evaluations, however identified financial costs and lack of expertise as barriers (J. Pomerleau et al. 2005a). Population based interventions often have the disadvantage of no comparison group.

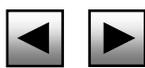
2.4.11 Factors to consider when designing interventions

Australia has a lack of readily available recent detailed information on fruit and vegetable production, supply and consumption, so nutrition professionals often rely on observations from other countries. The comparability of data is limited because of lack of consistency of measures, for example, the definition of fruit and vegetables and standard serving size varies from country to country, the amount recommended varies depending on what is considered to constitute a serving. The 2004 Food and Agriculture and World Health Organization's Fruit and Vegetable for Health workshop in Japan recommended that a consistent definition, categorization and serving size for fruit and vegetables should be decided to avoid confusion (World Health Organization and Food and Agriculture Organization 2004).

Quantified food guides and recommendations enable individuals to self-assess their intake and thus provide a call to action (MR Miller, Pollard & Coli 1997). Marketing slogans specifying the recommended servings of fruit and vegetables have been used as a component of effective campaigns to increase consumption, for example, 5 A-Day in the United States, New Zealand and some countries in Europe, and 2 serves of fruit & 5 serves of vegetables or 7 A-day in Australia (Coles 2001; Helen Dixon et al. 1998; C. M. Pollard, Miller & Lievers 2000) (National Institutes of Health & National Cancer Institute 2001).

2.4.12 Fruit and vegetable consumption levels in Australia

Fruit and vegetable consumption levels in Australia are assessed using the available data, the most recent dietary survey, the 1995 NNS and the 1998/9 Apparent





Consumption data. The state-based CATI surveys provide tracking of self-reported daily servings of fruit and vegetables. The next section summarizes the latest published consumption data.

2.4.12.1 Australian National Nutrition Survey

The 1995 National Nutrition Survey is the most recent population wide Australian dietary information available that includes consumption patterns and the types and amounts of foods eaten (Australian Bureau of Statistics 1999). Secondary analysis of trends in fruit and vegetable consumption between 1983 and the 1995 National Nutrition surveys was undertaken, and some key results relating to fruit and vegetables are reported here (Cook, Rutishauser & Seelig 2001; Magarey 2004).

2.4.12.1.1 Proportion consuming fruit and vegetables

A third of the population did not consume any fruit on the day of the survey and vegetables 13 percent consumed no vegetables in 1995 (Magarey 2004), see Table 7. The proportion likely to consume fruit increased significantly with age ($P<0.001$) and females were significantly more likely to consume fruit than males ($P<0.001$).

Ten percent of participants only consumed fruit as juice. The proportion of people who drank fruit or vegetable juice on the day of the survey declined steadily with age from 72 percent of 4 to 7 year olds to 33 percent of those aged 45 years or more. There was little difference the proportion consuming juice between males and females, with the exception of 12 to 24 year old males who consumed greater quantities than females of the same age.

The proportion of people who consumed fruit (not including fruit juice) on the day of the survey decreased between 1983 and 1995, six percent for men (from 59 to 53 percent) and by 10 percent for women (70 to 60 percent) for women (Cook, Rutishauser & Seelig 2001). The proportion of people who consumed vegetables on the day of the survey decreased between 1983 and 1995, two percent for men (from 91 to 89 percent) and by three percent for women (92 to 89 percent) for women (Cook, Rutishauser & Seelig 2001).

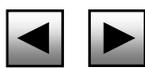




Table 7 Percent of participants consuming some fruit and vegetables on the day prior to survey, by age and gender, Australia 1995.

Age (years) (n=13858)		2-4	5-12	13-18	19-24	25-39	40-64	65 +
		Proportion consuming (%)						
Fruit^a								
	Males	83.4	74.9 ^b	65.1	44.8 ^b	52.5 ^b	64.1 ^b	74.0 ^b
	Females	83.2	80.1	64.7	56.8	63.4	72.4	80.3
	All	83.3	77.4	64.9	50.7	58.0	68.2	77.6
Fruit (no juice)								
	Males	77.5	58.5 ^c	44.2	31.9 ^b	43.4 ^b	58.0 ^b	69.6 ^c
	Females	72.6	68.0	47.1	41.3	54.4	66.4	75.6
	All	75.1	63.1	45.6	36.6	48.9	62.2	73.0
Vegetables								
	Males	73.3 ^d	77.7	82.2	86.4	87.5	90.7	92.5
	Females	82.2	79.9	85.2	87.4	88.4	90.9	92.1
	All	77.6	78.7	83.7	86.9	87.9	90.8	92.4

^aincludes pure juice, ^b: p< 0.001, ^c: p<0.05, ^d: p<0.01 for gender difference Source: (Magarey 2004)

2.4.12.1.2 Mean fruit and vegetable intake

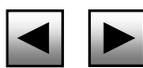
The mean daily intake of adults was 258.8 grams (3.4 servings), potatoes accounted for 35 percent (89.3g or 1.2 servings), and tomatoes and other 13 percent (33.4 g).

The mean vegetable intake of both males and females increased with age, it is lowest between 16 and 24 years, rising to its highest in those 65 years and older. Males and females reported similar intakes up to early adolescence after which male intake was significantly higher. The difference was mainly due to increased potato intake by males (Australian Bureau of Statistics 1999)

Between 1983 and 1995, there was a significant decrease in the mean fruit (not including juice) intake of 30 grams (18 percent) for men and 50 grams (24 percent) for women (Cook, Rutishauser & Seelig 2001). The mean intake of vegetables also decreased by about 11g per day between 1983 and 1995 from 298 grams to 270 grams for males, and 10 g per day for women (239 g to 229g) although the difference was not significant overall or for any subgroups. The mean fruit intake of children did not change significantly because those that consumed fruit ate 30 to 40g more per day.

2.4.12.1.3 Contribution to nutritional intake from fruit and vegetables

Energy from food is necessary for growth, movement, metabolism and physical activity (Australian Bureau of Statistics 1997). Fruit and vegetables are energy dense that is they are relatively low in energy and high in nutrients per weight. Tables 8, 9 and 10 display the proportional dietary contribution of energy, macro- and micronutrients from fruit and vegetables from analysis of the NNS. Even at less than





optimal levels of consumption, fruits and vegetables are an important dietary source of a wide variety of vitamin, minerals, fibre and non-nutrients.

Fruit contributed three percent of the mean daily kilojoule content for men and 4.4 percent for women. Pome fruit, for example apples and pears contributed about one percent of this. Vegetable products and dishes contributed 8.3 percent of the energy intake for men and nine percent for women. The nutrient contribution varies for fruit and vegetables.

Household income was positively associated with fruit and vegetable income (Katrina Giskes et al. 2002a; K. Giskes et al. 2002b; Johansson & Andersen 1998; Kamphuis et al. 2006; Laaksonen 2006).

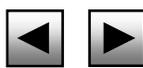




Table 8 Proportional contributions from fruit to daily energy, and macronutrient intake, adults 19 years and over, Australian National Nutrition Survey, 1995.

	(Percent daily intake)											
	Fruit products & dishes		Pome fruit		Citrus fruit		Stone fruit		Tropical fruit		Other fruit	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Energy, kJ	3.0	4.4	0.8	1.2								
Moisture, g	3.4	4.3	1.1	1.3								
Protein, kJ	1.1	1.7										
Carbohydrate, g	6.1	8.6	1.8	2.5					1.8	2.8		
Sugars, g	12.5	17.1	3.6	5.0	1.2	1.5	1.2	1.5	3.5	5.1	1.4	2.1
Dietary fibre, g	10.6	13.8	3.3	4.2	1.5	1.8	1.1	1.6	2.5	3.4	0.9	1.3
Vit A, retinol eq	2.9	3.6										
Provit A, mcg	5.9	6.6					0.9	1.0	2.3	2.3	1.4	2.0
Thiamin, mg	2.6	3.6										
Riboflavin, mg	2.3	3.2	1.2	1.7								
Niacin eq, mg	1.4	2.2										
Folate, mcg	3.7	4.8			1.8	2.1			1.1	1.6		
Vitamin C, mg	16.9	21.1	1.5	1.8	7.6	8.3			3.4	4.5	2.3	3.6
Calcium, mg	1.7	2.0										
Phosphorous, mg	1.4	2.0										
Magnesium, mg	3.7	5.1							1.4	2.1		
Iron, mg	2.9	4.0										
Zinc, mg	1.6	2.5										
Potassium, mg	7.0	9.6	1.2	1.6					2.5	3.5		

Note: Only food groups or subgroups contributing >1.5% shown.





Table 9 Proportional contributions from vegetables to daily energy and macronutrient intake, adults 19 years and over, Australian NNS, 1995.

Gender	(percent daily intake)																	
	Vegetable products & dishes		Potatoes		Other fruiting vegetables		Peas & Beans		Brassica		Other vegetables combo		Carrot & similar root veg		Tomato & tomato Products		Leaf & stalk vegetables	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Energy, kJ	8.3	9.0	5.8	5.6														
Total fat, g	6.4	7.5	3.0	3.1														
Protein, kJ	9.0	9.6	6.8	6.3														
Saturated fat, g	7.2	7.5	6.1	5.7														
Monounsaturated fat, g	9.7	10.8	7.3	6.8	1.2	2.3												
Polyunsaturated fat, g	11.5	11.9	8.4	7.6							1.6	2.0						
Cholesterol, g	2.3	2.7	2.0	2.1														
Carbohydrate, g	9.1	9.4	6.5	6.1														
Sugars, g	4.4	5.2																
Starch, g	12.8	12.9	11.2	11.0														
Dietary fibre, g	26.4	26.9	9.5	8.1	1.4	1.9					2.8	2.8						
Vit A, retinol eq	35.3	38.6	1.8	1.6	5.5	6.5							21.9	23.7	1.7	1.9		
Preformed vit A, mcg	3.7	3.8	3.0	2.9														
Provit A, mcg	69.4	69.0			11.3	12.2	2.4	2.2					2.6	2.3	45.4	44.4	3.4	3.5
Thiamin, mg	9.9	11.1	4.8	4.7														
Riboflavin, mg	6.7	7.7	1.6	1.5					1.3	1.6								
Niacin eq, mg	8.1	9.4	4.2	4.2														
Folate, mcg	26.7	29.6	8.1	7.1	1.7	2.3	2.8	2.9	4.6	5.6	2.3	2.6	2.3	2.6	1.5	1.8	3.2	4.3
Vitamin C, mg	40.3	40.8	13.3	11.4	5.1	5.9	1.8	1.7	10.8	12.2	1.7	1.8			4.8	5.1		
Calcium, mg	5.3	6.0																
Phosphorous, mg	7.9	8.6	3.9	3.6														
Magnesium, mg	12.8	13.7	6.4	5.8														
Iron, mg	11.7	12.9	4.7	4.3			1.7	1.8	1.2	1.5								
Zinc, mg	8.9	10.5	3.3	3.4														
Potassium, mg	24.4	25.5	13.8	12.4	1.9	2.7			1.9	2.3	1.3	1.5	1.4	1.6	2.0	2.4	1.1	1.5





Table 10 Mean number of serves of fruit and vegetables consumed, and the proportion of adults aged over 19 years meeting the recommended two servings of fruit and five servings of vegetables on the day prior to survey Australia, 1995.

	n 13, 858	19 to 24 years (percent)			25-39 years (percent)			40-64 years (percent)			65 + years (percent)		
		Male	Female	All	Male	Female	All	Male	Female	All	Male	Female	All
<i>Mean weight consumed (g)</i>													
Fruit	9319	437 ^a	339	383	380 ^b	315	345	344 ^a	292	317	305	284	293
Fruit, excluding juice	8042	278 ^b	223	247	283 ^a	243	260	277 ³	241	258	257 ³	233	243
Vegetables	12,130	330 ³	267	299	334 ^b	253	293	339 ^b	289	314	316 ^b	270	290
<i>Mean number of servings (consumers only)</i>													
Fruit	9319	3.2 ^a	2.5	2.8	2.7 ^a	2.2	2.5	2.4 ^a	2.0	2.2	2.1	2.0	2.0
Fruit, excluding juice	8042	1.9	1.5	1.7	1.9 ^a	1.6	1.7	1.9 ^a	1.6	1.6	1.7	1.6	1.6
Vegetables	12,130	4.4 ^b	3.6	4.0	4.4 ^b	3.4	3.9	4.5 ^b	3.9	4.2	4.2 ^b	3.6	3.9
<i>Mean number of servings (overall)</i>													
Fruit	13,858	1.4	1.4	1.4	1.4	1.4	1.4	1.6	1.5	1.5	1.6	1.6	1.6
Fruit, excluding juice	13,858	0.6	0.6	0.6	0.8	0.9	0.8	1.1	1.1	1.1	1.2	1.2	1.2
Vegetables	13,858	3.8	3.1	3.5	3.9	3.0	3.4	4.1	3.5	3.8	3.9	3.3	3.6
<i>Proportion who met recommendation (consumers only)</i>													
Fruit	9319	65.2 ^a	54.4	59.3	57.7 ^b	49.8	53.3	52.9 ^b	46.3	49.4	49.5	46.9	48.0
Fruit excluding juice	8042	37.6	27.4	31.9	39.4	34.0	36.4	42.1 ^b	33.9	37.8	38.0	36.0	36.8
Vegetables	12,130	37.8 ^a	39.3	33.6	37.9 ^b	23.7	30.7	40.7 ^b	30.2	35.5	38.2 ^b	27.3	32.0
<i>Proportion who met recommendation (overall)</i>													
Fruit	13,858	29.2	30.9	30.0	30.3	31.6	30.9	33.9	33.5	33.7	36.7	37.7	37.2
Fruit excluding juice	13,858	12.0	11.4	11.7	17.1	18.5	17.8	24.4	22.5	23.5	26.4	27.2	26.9
Vegetables	13,858	29.2	25.6	27.6	27.0	20.9	24.0	32.2	27.5	29.9	29.6	21.5	25.6

a: p < 0.01, b: p < 0.001 for gender comparison





2.4.12.1.4 Types of fruit and vegetables consumed

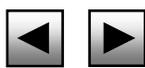
The proportion consuming each fruit vegetable sub-group varied significantly with age and females consumed more sub-groups than males (Magarey 2004). The proportion consuming juice decreased with age (Magarey 2004), see Table 11.

Potatoes accounted for about a third (89g) of the average daily vegetable intake of adults 19 years and over (Australian Bureau of Statistics 1999). The most commonly consumed vegetable was potato, eaten by about half of the respondents. About a third consumed carrot and similar root vegetables, leaf and stalk, other fruiting, tomato and tomato products, and other vegetables and vegetable combinations. The percentage of adolescents and children eating vegetables other than potatoes, peas and beans was significantly less than for adults (Australian Bureau of Statistics 1999). Only two percent of respondents consumed legumes and pulses, and five percent consumed dishes including legumes and pulses (Magarey 2004)

Table 11 Proportion of persons aged over 19 years fruit and vegetable who consumed fruit and vegetable sub-groups on the day prior to survey Australia, 1995.

(n=13, 858)	Proportion Consuming (percent)			
	19-24	25-39	49-64	65 +
<i>Fruit products and dishes</i>				
Pome (apple, pear)	14.8	21.4	27.6	32.6
Berry	2.3	3.2	3.8	3.1
Citrus	7.6	11.6	15.3	17.9
Stone	3.1	9.5	13.1	14.4
Tropical (<i>pineapple & banana</i>)	18.3	21.8	26.9	38.2
Other	5.3	9.5	13.1	14.4
Mixtures of two or more groups of fruit	1.1	2.4	2.3	4.7
Dried, preserved	2.0	3.8	7.2	12.7
Fruit juice	26.7	21.4	21.1	25.6
<i>Vegetable products and dishes</i>				
Potato	49.9	47.3	51.7	61.5
(Fried potato)	(20.7)	(18.4)	(11.4)	(8.5)
Brassicas	19.7	19.6	25.1	29.0
Carrot & similar root	32.3	37.1	40.8	43.8
Leaf & stalk	32.4	38.1	41.5	35.0
Peas & beans	21.3	23.5	28.1	31.7
Tomato & tomato products	31.3	38.7	42.4	38.2
Other fruiting vegetables	34.2	35.2	40.5	42.2
Other veg & combinations	40.1	38.1	37.6	31.4
Dishes where vege major component	2.5	3.2	2.4	1.7
<i>Legumes & pulse products & dishes</i>				
	1.1	1.6	2.4	2.2

Source: (Magarey 2004)





2.4.12.1.5 Consumption of recommended levels

Overall, 24 to 30 percent of adults met the vegetable target, compared to 30 to 36 percent for those who consumed vegetables (Australian Bureau of Statistics 1999). Only eight percent of adults met the minimum 400 grams of fruit and vegetables recommended by WHO (Baghurst et al. 1999). The mean vegetable intakes, including potato, ranged from 64 to 72 percent of the recommended intake, with young adults (16-44 years), particularly females least likely to meet the recommendation. Males consumed significantly more potatoes than females, and when potatoes are excluded, mean intake of adolescent and young adult males and females was equally low at around 30-45 percent of recommended intake (Baghurst et al. 1999).

The mean fruit intake for adults over 19 years was over two serves, however, only 30 to 37 percent met the target. Of those who consumed fruit, 50 to 65 percent met the target. Men who consumed fruit and vegetables were significantly more likely to meet the target than women. Mean fruit intake fell significantly below recommended intake in adolescence (12-15 years), and began to rise again after 25 years of age. Inclusion of juice almost doubled the proportion of the recommended intake met by the adolescent and young adult age groups. With fruit juice excluded, mean fruit intakes ranged from 24 to 96 percent of the recommended intake. Mean intake of children under seven years old was adequate. Age related trends in fruit intake were similar for males and females (Baghurst et al. 1999)

Considering adult 24-hour intake at an individual rather than mean group level, 17 percent ate 300 grams per day of fruit (28 percent with juice included) on the day of the survey, the bottom end of the ranges recommended by the Australian Guide to Healthy Eating. However, these data relate to only one day and may not represent usual intake.

2.4.12.1.6 Recommendations to meet minimum consumption levels

Adults and adolescents need to increase their average vegetable intake by one to two serves (97-135g) to meet minimum recommended intakes. Children need to increase their average vegetable intake by about half to one serve (40-70g). All groups need to eat a greater variety of vegetables other than potato.

Adults over 25 years old and children aged 12 to 15 years and need to increase their average fruit intake by about one serve (127-174g). Young people aged 16 to 24 years need to increase their average fruit intake by one and a half to two serves (209-





343g). Fruit juice may be included to increase intake, but should not represent total intake (Baghurst et al. 1999).

2.4.12.1.7 Other foods

In contrast to the decrease in fruit and unchanged vegetable consumption of adults, between 1983 and 1995 there was an overall increased intake of energy (relative increase 3-4 percent), cereal-based foods (19-27 percent), cereals and cereal products (80-91 percent), snack foods (200-300 percent), non-alcoholic beverages (9-15 percent), fish and seafood products (36-44 percent) and legumes (250 percent) (Cook, Rutishauser & Seelig 2001).

For children, there was no change in fruit and vegetable intake between 1985 and 1995, but an overall increased intake of energy (relative increase 12-15 percent), cereal-based foods (46 percent), confectionary (40-56 percent), non-alcoholic beverages (29-48 percent), fish and seafood products (88-89 percent) and sugar and sugar products (59-136 percent) (Cook, Rutishauser & Seelig 2001). Adults aged 19 to 25 years consume 36 percent of their energy intake from 'junk' food.

2.4.12.2 Self-reported fruit and vegetable consumption, 2004-5

The 2004-2005 National Health Survey reported that 46 percent of adults did not consume the recommended amount of fruit each day and 86 percent did not consume the recommended serves of vegetables each day (Australian Bureau of Statistics 2006a). Western Australian adults had the highest proportion of the population consuming the target, with 18.8 percent usually eating the recommended five serves of vegetables per day, and 56.4 percent two or more servings of fruit per day (Australian Institute of Health and Welfare 2006). State and territory 2004 CATI surveys similarly found that 85.1 percent of Australian adults did not usually eat the recommended five serves of vegetables per day, while 46.9 percent eat less than two serves of fruit, see Table 12. Again, although population proportions were similar between states and territories, a greater proportion of Western Australian adults met the target.

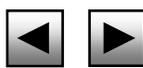




Table 12 Inadequate consumption of fruit and vegetables, persons aged 18 years or over, 2004–05 (percent)(Australian Institute of Health and Welfare 2006)

Survey	NSW	Vic ^a	Qld	WA	SA	Tas	ACT	NT	Aust ^b
2004 CATI									
<i>Males</i>									
Inadequate	93.9	96.4	91.3	87.3	93.0	94.6	90.6	91.5	93.0
Vegetables ^c									
Fruit ^d	59.7	57.0	51.6	52.0	67.5	58.1	55.3	64.8	58.1
Inadequate									
<i>Females</i>									
Vegetables	89.7	89.9	88.6	83.0	90.1	84.1	89.0	90.5	88.8
Fruit	46.7	39.6	42.2	41.4	52.9	47.9	43.1	52.7	44.0
Inadequate									
<i>Persons</i>									
Vegetables	91.8	93.0	90.1	85.1	91.5	84.3	89.7	91.1	90.9
Fruit	53.1	48.0	49.0	46.9	60.0	52.8	49.1	59.3	50.9
2004/5 NHS									
<i>Persons</i>									
Inadequate veg	88.0	84.6	84.7	80.2	87.9	79.4	89.8	Na	85.7
Inadequate fruit	46.0	44.0	47.3	44.6	50.0	46.3	46.5	Na	46.0

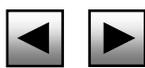
^a Reported results have been adjusted for missing values. ^b Derived from a weighted average of the state and territory estimates for CATI data. ^c Consumption of four or fewer serves of vegetables. ^d Consumption of one or no serves of fruit.

Sources: ABS 2006d; AIHW analysis of 'Filling the gaps in data pooling' survey (December 2004); AIHW analysis of Vic Population Health Survey (DHS 2004); NSW Population Health Survey, unpublished data; SA Monitoring and Surveillance System, unpublished data; WA Health and Wellbeing Surveillance System, unpublished data;

2.4.12.3 Apparent consumption

The average per capita apparent consumption of fruit (including fruit for fruit juice) in 1998/99 was 135kg (370g/day) (Australian Bureau of Statistics 2000b). The amount of fruit products and vegetables available has increased slightly over the previous decade by about 40 grams per head per day for each. In 1999, the average per capita apparent fruit consumption had increased about 56 percent since the late 1960s and 72 percent since the late 1930s. Ninety percent of the fruit available for consumption in 1998/99 was fresh fruit, only seven percent was processed and three percent dried. Oranges (38 percent) were the most common fruit, apples and pears (17 percent), bananas and pineapple (17 percent) (Australian Bureau of Statistics 2000b). The apparent consumption data are not directly comparable with the NNS intake data for fruit because they include fruit used for fruit juice (Cook, Rutishauser & Seelig 2001).

The average per capita vegetable consumption in 1998/99 was 162kg (443g/day) (Australian Bureau of Statistics 2000a, b). Apparent consumption of vegetables increased by approximately 60 grams per head over the period 1983 to 1995 compared to no increase in the NNS data. The classification of vegetables in mixed





dishes in the nutrition surveys may account for some of the inconsistency between the survey findings (Cook, Rutishauser & Seelig 2001).

In 1998/99, potato represented around 40 percent of vegetables available for consumption (Australian Bureau of Statistics 2000a, b). Other root and bulb vegetables (half of this was carrot), green leafy vegetables, tomatoes and miscellaneous other vegetables each provided around 15 percent of vegetables available.

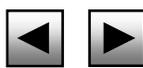
2.4.12.4 Usual intake

Adults participating in the 1995 National Nutrition Survey (NNS) adults were asked about how many serves (pre-defined) of fruit and vegetables they usually ate each day. For vegetables, 15 to 22 percent said they usually ate the minimum recommended five servings. About half, 46 to 55 percent said they ate the recommended number of serves of fruit. More women than men met the recommended levels and the portion meeting minimum recommended intakes varied between states (Marks et al. 2001b). Rutishauser et al. (2001) suggests that these estimates may be optimistic since the questions asked are believed to slightly overestimate intake of both fruit and vegetables (Rutishauser et al. 2001).

Giskes et al. (2002) analysed the 1995 Australian NNS data for 13 to 64 year old people to determine whether socio-economic groups differed in their consumption of fruit and vegetables (Katrina Giskes et al. 2002a). Fruit and vegetable consumption was positively associated with income with the exception of vegetable consumption of adolescent males. People from low household income consumed less variety of fruit and vegetables than those on higher incomes (Katrina Giskes et al. 2002a).

2.4.13 Other countries

Fruit and vegetable availability based on household budget surveys has been used to determine inter-country variations and to examine the ability of countries to comply with dietary policy or recommendations (Naska et al. 2000). The Data Food Networking bank has information based on household budget surveys across 10 European countries (Naska et al. 2000). The data excluded pulses, potatoes and nuts. Disparities were found between fruit and vegetable availability in different European populations; most people from Greece (63 percent) and half from Spain met the recommended 150 grams of fruit and 250 grams of vegetables, whereas the majority





of people in the other eight European countries had less than the recommendation. Half of the populations were likely to consume less than the recommended amount of vegetables. In all countries with the exception of Poland there was a greater proportion of low vegetable consumers compared to low fruit consumers. In Ireland and Norway the low vegetable intake was the general population dietary pattern. The range of low fruit consumers was from 32 to 81 percent of the population, Greece and Norway respectively. The proportion of low vegetable consumers ranged from 56 percent in Greece to 93 percent in Norway. European populations appeared to have a preference for fruit over vegetables (Naska et al. 2000).

Two thirds of mothers across eleven European countries said they ate vegetables every day, and only 52 percent ate fruit daily (Wolf et al. 2005). Only 4.6 percent were fruit non-consumers and 1.8 percent for vegetables, when non-consumers were defined as those eating fruit or vegetables less than once a week (Wolf et al. 2005). Daily fruit and vegetable consumption rates were 50 percent for fruit and 65 percent for vegetables, indicating that increasing frequency of consumption, even by one eating occasion would significantly increase total intake.

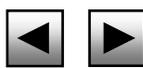
2.4.14 Economic benefits of increasing fruit and vegetable consumption

The economic benefits of increasing fruit and vegetable consumption are in terms of industry and workforce benefits and health care cost savings benefits.

2.4.14.1 Reduction of health care costs

Daviglus et al. (2005) examined fruit and vegetable intake (dietary patterns over the last 20 years and a profile based on last month) and Medicare claims between 1984 to 2000, of 2,107 men in the Chicago Western Electric Study (Daviglus et al. 2005). Higher fruit and vegetable intakes were associated with lower, although not statistically significant, mean annual cumulative Medicare charges. Men with higher fruit and vegetable intakes earlier in life had the potential for better health status and lower health care costs as they grew older (Daviglus et al. 2005).

Gundgaard et al. (2003) concluded that increasing the mean fruit and vegetable intake of the Danish population to 400 grams from the current intake of 250 grams would increase life expectancy by 0.8 years and reduce cancer incidence by 19 percent (Gundgaard et al. 2003). Increasing consumption to 500 grams would increase life expectancy by 1.3 years and reduce cancer incidence by 32 percent. The authors





concluded that this public health gain could be achieved without additional health cost due to the savings based on increased life expectancy (Gundgaard et al. 2003).

Accurate estimates of health care costs due to specific aspects of diet rely on accurate estimates of the contribution of the dietary aspects to disease causation. The complexity of interactions between dietary constituents and between diet and other risk factors make the causality difficult (Baghurst et al. 1999).

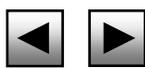
Marks et al. (2001) estimated that health care costs for colorectal, breast, lung and prostate cancer associated with low consumption of fruit and vegetables in Australia was Aus\$58.8 million per year and Aus\$29.4 million per year for breast and lung cancer (Marks et al. 2001a). At that time it was estimated that increasing vegetable intake by one serve a day would save \$24.4m dollars per year from the costs of breast and lung cancers (Marks et al. 2001a) and increasing fruit intake by one serve a day would save \$8.6m dollars per year from the Australian health costs of breast and lung cancers (Marks et al. 2001a).

2.5 Determinants of consumption

This section outlines the demographic, individual, and environmental factors associated with fruit and vegetable consumption.

Both personal and environment factors influence human behaviour and need to be considered when developing interventions to achieve health outcomes (Swinburn, Egger & Raza 1999). Effective interventions to change behaviour need to be aimed at the modifiable determinants of that behaviour. Determinants that predict intention include: attitudes (subjective weight of expected positive and negative consequences of the behaviour), perceived social influence (what people in our direct social network expect us to do), self-efficacy (perceived behavioural control) and self-representation (principles about a particular behaviour, based on moral values and personal norms) (Kremers et al. 2005). Cognitive factors are also associated with health behaviours (Kremers et al. 2005).

Identification of determinants is required to assist the development of effective interventions to increase consumption. Although many studies treat fruit and vegetables as a univariate variable, there are broad differences in the sensory qualities, cultural uses, and attributes which suggest that different factors may influence consumption (D. N. Cox et al. 1998; Gibson, Wardle & Watts 1998). Children as young as nine years can distinguish fruit and vegetables (Domel et al. 1993). Cross-sectional studies identify the potential determinants, or baseline



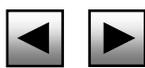


predictors of consumption and longitudinal studies show the effects of determinants of intake (Ball, Crawford & Mishra 2006; Bogers et al. 2007; M. A. van Duyn et al. 2001).

Factors determining fruit and vegetable consumption can be categorised by demographic, individual, and environmental factors. Demographic factors include age, gender, socio-economic status, ethnicity, education, geographic location, and employment. Socio-economic status includes household income, educational attainment, occupation, marital status, social class, and area of residence (Shohaimi et al. 2004). Miller and Stafford (2000) reviewed the literature and found that demographic factors accounted for about 10 percent of the variation in fruit and vegetable consumption compared to psychosocial factors (individual) accounted for about 25 percent (M. Miller, Shiell & Stafford 2000).

Women reported eating fruit and vegetables more frequently than men in a study of 25,000 respondents aged 45 to 74 years in East Anglia, UK (Fraser et al. 2000). The older population in this study had less healthful dietary patterns than those in the US, perhaps due to cultural differences in older British subjects (Fraser et al. 2000). Respondents with a higher education reported eating more salad vegetables, and less legumes (Fraser et al. 2000). Age, gender and ethnicity had strong associations with dietary patterns in the US multi-ethnic cohort study of 195,298 people (Park et al. 2005). Three dietary patterns emerged that accounted for 63.5 percent of the variability in the diet, “Fat and Meat”, “Vegetables” and “Fruit and Milk” eating patterns. Smoking showed a negative association with “Vegetables” and “Fruit and Milk” consumption patterns, and physical activity was positively associated with these eating patterns (Park et al. 2005). The Vegetable pattern negatively correlated with fat and had positive correlations with vitamins and dietary fibre, the “Fruit and Milk” pattern positively correlated with calcium, iron, vitamin C and dietary fibre (Park et al. 2005).

Individual factors include knowledge, attitudes, beliefs, skills, life course events and experiences (food upbringing, dietary changes for health, social roles, food skills, practice of food traditions) (C. M. Devine et al. 1999). Environmental factors include availability of fruits and vegetables and advertising and promotion of foods. The factors influencing fruit consumption are similar to those for vegetables however, the extent of influence differs (Kamphuis et al. 2006). Determinants of consumption are also specific for certain forms and type of fruit and vegetables, for





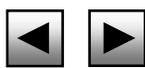
example, the barriers to eating cooked vegetables are different to those to eating salad vegetables or fresh fruit (D. N. Cox et al. 1998). Beydoun and Wang (2007) investigated the possibility of a synergistic effect between socioeconomic status and nutrition knowledge and beliefs (Beydoun & Wang). Individual factors such as knowledge and health considerations are influenced differentially by socioeconomic status (Ball, Crawford & Mishra 2006).

Barriers to change may be practical or attitudinal, for example working hours limiting shopping access or perception of current intake as adequate (Lappalainen et al. 1997; E. J. Lea, Crawford & Worsley 2006). Viswanath and Bond (2007) propose that the effects of communication are mediated by social determinants on health outcomes (Viswanath & Bond 2007). Influences on access to and use of sources of nutrition and dietary information and the way people process and retain the information influences social norms and environmental support (Viswanath & Bond 2007).

2.5.1 Demographic correlates of fruit and vegetable consumption

A number of individual and demographic factors have been correlated with fruit and vegetable consumption levels. Ball et al. confirmed strong socioeconomic differences in fruit and vegetable intake (Ball, Crawford & Mishra 2006). Disadvantaged groups exhibit a lower diet quality and have lower intakes of fruits and vegetables (Wendy Louise Wrieden et al. 2004a). Wardle et al. (2002) found that higher fruit and vegetable intakes were associated with being female, higher education level, higher occupational category, and being middle aged (Wardle, Parmenter & Waller 2000). Gibson et al. (1998) found that socio-economic status had little influence on fruit and vegetable consumption (Gibson, Wardle & Watts 1998).

Wrieden et al. (2004) found that overall there was an increase in consumption of fruit and vegetables between 1986, 1989, 1992 and 1995 in the north Glasgow Scottish population, however, there was no trend of increased consumption in the most deprived quarter of the population thus concluding that socio-economic gap seemed to be widening (Wendy Louise Wrieden et al. 2004a). In 1986, only 6 to 10 percent of the population met the fruit and vegetable target, with no significant differences between to least and most deprived groups, compared to 17 percent of men and 29 percent of women in the least deprived group meeting the targets in 1995 but only 8 percent of men and 12 percent of women in the most deprived group meeting the



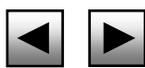


target (Wendy Louise Wrieden et al. 2004a). Mushi-Bunt et al. (2007) did not report any significant differences in fruit and vegetable consumption among US adults or children based on annual household income (Mushi-Brunt, Haire-Joshu & Elliott 2007). Weekly spending on groceries positively influenced children's fruit and vegetable intake, but not parents. In households where parents believed they would spend more on groceries if they purchased fruit and vegetables, the mean daily fruit and vegetable intake for children and parents was lower than in households where this was not the perception (Mushi-Brunt, Haire-Joshu & Elliott 2007). Parents who thought cost of fruit and vegetables was always a barrier consumed less and so did their children than those who did not consider it a barrier (Mushi-Brunt, Haire-Joshu & Elliott 2007). The consumer price index for fruit and vegetables in the US at the time was higher than that for high fat or sugar snack food, however, canned and frozen produce did not increase to the same extent (Mushi-Brunt, Haire-Joshu & Elliott 2007).

Differences in fruit and vegetable consumption have been reported in rural versus urban locations (Beydoun & Wang 2007; Gustafson, Cavallo & Paxton 2007; Kamphuis et al. 2006; Nanney et al. 2007). Work status, workload and lack of control have been associated with consumption of less healthy diets (Carol M. Devine et al. 2003).

Socioeconomic status, social integration, race and ethnicity, place (or geographical location), environmental support, and social policies, have an impact on an individual's dietary habits (Viswanath & Bond 2007). Sociodemographic factors were not powerful predictors of fruit and vegetable intake in a study of Maryland US women on a low income; however, self-efficacy and perceived barriers were (Havas et al. 1998). This may have been due to the variables (psychosocial and sociodemographic) measured, which accounted for 21 percent of the variance in consumption (Havas et al. 1998). Rienarts et al. (2007) were able to account for 50 percent of the variance in fruit consumption and 33 percent of the variance for vegetable consumption in children in models that included psychosocial variables, accessibility, availability, parental consumption and habit (Reinaerts et al. 2007). Viswanath & Bond (2007) suggest that the effect of nutrition and diet communications is mediated by the impact of social determinants.

Education levels were associated with fruit and vegetable intakes in an American study of 405 adults in 1992 and indirectly related to being in the pre-contemplation

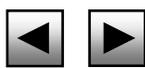




stage for increasing fruit and vegetable consumption levels (Laforge, Greene & Prochaska 1994). Deshmukh-Taskar et al. (2007) found that fruit, 100 percent fruit juice and vegetable intakes were positively associated with higher education levels in an American sample of 1,266 young adults (Deshmukh-Taskar et al. 2007). There were associations in ethnic origin and consumption, European-American women ate more vegetables than African-American women, whereas African American men and women ate more fruit and 100 percent fruit juices (Deshmukh-Taskar et al. 2007).

Gender and living alone were determinants of fruit and vegetable consumption in elderly people (Donkin et al. 1998). Elderly people were more likely to have high intakes of fruits and vegetables if they ate shared meals. Dynesen et al. (2003) found an association between sociodemographic factors and dietary habits of 1642 Danish people between 15 and 90 years of age (Dynesen et al. 2003). Women had a higher frequency of consumption of foods adhering to dietary guidelines recommendations than men (Dynesen et al. 2003; Wendy Louise Wrieden et al. 2004a). Gender, age, occupation and urbanisation showed an association with frequency of consumption of cooked vegetables (Dynesen et al. 2003). Gender and education showed an association with consumption of green salad/shredded vegetables (Dynesen et al. 2003). Gender, education and household composition showed an association with frequency of consumption of fruit (Dynesen et al. 2003). Women who were older, had the highest level of education and lived in what two-person households have the highest dietary scores (Dynesen et al. 2003). Older men living in multi-person households, with higher levels of education had higher dietary scores (Dynesen et al. 2003). Women were significantly more likely than men to meet the target for fruit and vegetable intake in Scotland in 1986, 1989, 1992 and 1995 (Wendy Louise Wrieden et al. 2004a). Women report different barriers to increasing fruit and vegetable consumption than men, for example, preparation, availability and cost, which may reflect their greater role in food purchasing and preparation (MacLellan, Gottschall-Pass & Larsen 2004). Women said they would not hesitate to purchase produce, regardless of the price, if they knew it would not go to waste (MacLellan, Gottschall-Pass & Larsen 2004).

Fruit intakes were found to be lower and vegetable intakes higher in men than in women in the Netherlands (Brug et al. 1995; Hulshof et al. 1991). The most important factor for compliance with fruit and vegetable recommendations for 6,539 Irish adults was gender (Sharon Friel, Newell & Kelleher 2005). For women the



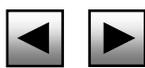


predictors of compliance with dietary fruit and vegetable recommendations were socio-economic in nature (medical card status, education level, social class), whereas for men it was a combination of socioeconomic and social support factors (medical card status, education level, social class, employment status, age, marital status and home tenure) (Sharon Friel, Newell & Kelleher 2005). There appears to be a co-existence of healthy/unhealthy lifestyle factors, smokers who did regular exercise were more likely to eat the recommended servings of fruit and vegetables (Sharon Friel, Newell & Kelleher 2005).

Ethnicity was not significantly associated with fruit and vegetable consumption in a number of studies (Cullen et al. 2002; Riediger, Shooshtari & Moghadasian 2007). Both household education and income were associated with adolescent's fruit and vegetable consumption in Canada (Riediger, Shooshtari & Moghadasian 2007). Household income was positively associated with fruit and vegetable intake (Katrina Giskes et al. 2002a; K. Giskes et al. 2002b; Johansson & Andersen 1998; Kamphuis et al. 2006; Laaksonen 2006). Adolescents living at home with one parent had significantly lower intakes (Riediger, Shooshtari & Moghadasian 2007). The vegetable consumption of young Norwegian National Guards was correlated with parental occupation (Uglem et al. 2007).

Analysis of the 1995 National Nutrition Survey found that socio-economic groups differed in their fruit and vegetable intake (Katrina Giskes et al. 2002a). Those with a lower household income consumed less fruit and vegetables and less variety (Katrina Giskes et al. 2002a). The lower-socioeconomic groups also had less desire to increase their intake than those on a high income. Australian adults considered price and storage of fruit and vegetables barriers to increasing fruit and vegetable intake (Katrina Giskes et al. 2002a).

Factors determining fruit and vegetable intake may vary with age. For example, college students may have fluctuating living arrangements (van Assema et al. 2007), where as the role of diet in the prevention of disease or circumstances relating to retirement or ill health are more likely to influence older adults. Sahyoun et al. (2005) studied 4,622 participants 60 years and over in the NHANESIII (1988-1994) to identify demographic, lifestyle, economic, social contact, physical functioning and health-related factors as potential barriers to fruit and vegetable consumption. The frequency of fruit and vegetable intake increased with age (Lautenschlager & Smith 2007). Lower consumers were more likely than high consumers to have lower





educational attainment, lower economic status and tended to be smokers (Lautenschlager & Smith 2007). Those with difficulty in physical functions were also more likely to report difficulty in preparing meals, managing money and had lower intakes. Respondents reporting less physical activity, limited social contact, poor health, and obesity ate less fruit and vegetables (Lautenschlager & Smith 2007). Dittus et al. (1995) suggest that demographic factors such as age, sex, ethnicity and education explain only about 10 percent of variation in fruit and vegetable consumption levels in the United States (Dittus, Hillers & Beerman 1995).

Psychosocial factors namely attitude, beliefs, habits, confidence, taste preferences and eating since childhood explain 25 percent of variance in intake (Krebs-Smith et al. 1995) and vary in influence between fruit and vegetables (Trudeau et al. 1998).

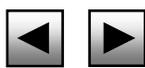
Uglem et al. (2006) developed a model using personal factors, socio-environmental and behavioural factors which explained 32 percent of the variance in vegetable consumption in 578 male Norwegian National Guards aged 18 to 26 years (Uglem et al. 2007).

Understanding some of the community level barriers to changing health related behaviours may lead to more effective interventions to improving health in the whole community, particularly those who are most vulnerable (Shohaimi et al. 2004).

2.5.2 Individual determinants

Consumer knowledge, attitudes, beliefs, and intentions have been shown to be determinants of fruit and vegetable consumption. Life events such as being pregnant, moving out of parent's home, being diagnosed with an illness, having children can have a positive influence on fruit and vegetable intake (Maclellan, Gottschall-Pass & Larsen 2004). Parents concerned about their children's intake may change their behaviour when their children are around (Maclellan, Gottschall-Pass & Larsen 2004). Children's fruit and vegetable intake is not just motivated by concern for health or liking of their taste (Gibson, Wardle & Watts 1998).

Using a life-course approach as a conceptual tool to determine how current food choices were shaped, Devine et al. found that 'food upbringing', food experiences early in life, are a prominent factor shaping adult fruit and vegetable trajectories (C. M. Devine et al. 1998). Participation in enjoyable family activities and rituals that included vegetables and fruit, experience with a variety of vegetables and fruits, experience preparing vegetables and fruits, and pleasurable memories of the taste of





fruits and vegetables were all mentioned as reasons people liked fruit and vegetables as adults. People with favourable early experiences were more likely to have higher lifelong fruit and vegetable consumption.

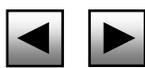
Life-course events approach suggests that food habits are developed as part of a continuum and are linked to ethnic group (C. M. Devine et al. 1999). Devine et al. (1999) found that fruit and vegetable consumption in different ethnic groups were associated with independent life events when they controlled for age, gender, and education. A telephone survey of 600 adults (aged 18 to 60 years) on a low to moderate income found that life course factors such as family composition, education, family roles, liking of fruits and vegetables during youth, eating with others, and making dietary changes for health were associated with fruit and vegetable consumption. The degree of association was different for each ethnic group (C. M. Devine et al. 1999).

Fruit and vegetable intakes are lower in smokers and the proportion of smokers in lower socio-economic groups is larger (Ahluwalia et al. 2007; Margetts & Jackson 1993; Poortinga 2007; Wendy Louise Wrieden et al. 2004a). Studies report a clustering of lifestyle factors, poor fruit and vegetable consumption, alcohol consumption and smoking (Poortinga 2007).

Fruit and vegetable intakes were lower in people with children at home (Laforge, Greene & Prochaska 1994). There was a strong linear relationship between the stages of change, (in considering and then acting to change health behaviour), and the servings of fruit and vegetables people said were eaten yesterday (Laforge, Greene & Prochaska 1994). Forty five percent were in the pre-contemplation stage and 34 percent in the contemplation stage. Only 22 percent in the pre-contemplation, contemplation and preparation stages were prepared to take action (Laforge, Greene & Prochaska 1994).

As would be expected, Brug et al. (1997) found that fruit and vegetable intake was highest in the action/maintenance stages of change in 799 adults in the Netherlands (Brug, Glanz & Kok 1997). There was little reported difference in the fruit and vegetable stages of change (maintenance 40:48 percent, preparation 36:33 percent and pre-contemplation/contemplation/action stages 19:22 percent respectively). (Brug, Glanz & Kok 1997).

A study of 236 US college women 18 to 24 years found that stages of change for increasing fruit and vegetable consumption differed for fruit and vegetables, with





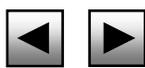
50.3 percent in maintenance stage for fruit and 34.7 percent for vegetables. Participants in the action/maintenance stages consumed an average fruit and vegetable intake that was higher than recommended amounts. Those in the pre-contemplation/ contemplation and preparation stages consumed lower than the recommended servings (Chung et al. 2006). People used self-evaluation of consumption most frequently for vegetables in the preparation stages of change (Chung et al. 2006). The processes that were important for these women were related to weight management or appearance driven. Either, purposefully eating enough fruit or vegetables to decrease fat intake, or eating them instead of other foods to lose or maintain weight (Chung et al. 2006).

The nature of dietary change may represent more of a trait than a stage, and the stages may be less discrete leading some researcher to clump together the three early motivational stages of change to a 'pre-action' stage (Resnicow, McCarty & Baranowski 2003) (K. Glanz et al. 1998b). Resnicow et al. (2003) recommendation that pre-contemplators are not excluded from dietary interventions and that additional prospective research is conducted to understand the application of this model to diet (Resnicow, McCarty & Baranowski 2003).

2.5.3 Knowledge

Nutrition knowledge is significantly associated with healthy eating and is a mediator of demographic variables (age, gender, ethnic origin, work status, occupation, education, marital status) in English adults (Wardle, Parmenter & Waller 2000). Wardle et al. (2000) found respondents in the highest quintile for knowledge (recommended intakes of fruit and vegetables, nutrient content of specific foods, how would participant reduce fat in diet, diet and disease links) were 25 times more likely to meet the recommended fruit and vegetable intake (Wardle, Parmenter & Waller 2000). Higher knowledge scores were associated with women, people who had higher education levels, and occupational class and who were middle aged (Wardle, Parmenter & Waller 2000). Nutrition knowledge was significantly, and independently associated with vegetables and fruit intake (Wardle, Parmenter & Waller 2000).

Knowledge about fruit and vegetables influences intake (Beydoun & Wang 2007). Mothers nutrition knowledge and belief about diet in disease prevention is a predictor of children's fruit and vegetable intake, however, Gibson et al. (1998)

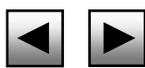




found a positive influence for fruit and a negative influence for vegetable intake (Gibson, Wardle & Watts 1998). Mothers with a high fruit intake tended to have children with higher intakes, however there was no correlation for vegetables (Gibson, Wardle & Watts 1998).

Most people have positive beliefs about the benefits of eating fruit and vegetables (Gibson, Wardle & Watts 1998; E. J. Lea, Crawford & Worsley 2006; Maclellan, Gottschall-Pass & Larsen 2004; D. Marshall et al. 1995; Yuen et al. 1994), however, some studies have found that those consuming lower amounts of fruit and vegetables are less positive about the health benefits of eating more than those eating less (Brug, Lechner & De Vries 1995). Marshall et al. (1995) found that the perceptions related to health were reactive, not proactive, and that personal relevance was required before this would instigate change (D. Marshall et al. 1995). Maclellan et al. (2005) suggest that the perceived benefits tend to be non-specific and relate to feeling good, where as the perceived barriers were specific (Maclellan, Gottschall-Pass & Larsen 2004). Lea et al. (2006) surveyed 415 adults in Melbourne, Australia, and found that there was high awareness of the health benefits of eating a plant-based diet and few respondents perceived any barriers (E. J. Lea, Crawford & Worsley 2006). Lack of information about plant-based diet was one of the barriers identified (E. J. Lea, Crawford & Worsley 2006). Focus groups research of adults found perceptions of many benefits to eating fruit and vegetables, from specific nutrient and disease protection relationships, to variety and versatility, environmental savings (energy efficiency, land and water usage savings), and that they were less expensive than meats (Emma Lea, Worsley & Crawford 2005)

Knowledge of the health consequences of eating fruit and vegetables were considered an important determinant of consumption by participants in focus groups the Netherlands (Brug et al. 1995). Sub-issues were also described, vitamins, weight loss, disease prevention or cure, to keep from eating unhealthy foods. There were also negative determinants, for example, residues or pesticides, boiling vitamins and nutrients out of vegetables (Brug et al. 1995). Brug et al. (1995) found that people were less concern about the positive health consequences and vitamin content of fruit and vegetables than they were about the pesticides and residues (Brug, Lechner & De Vries 1995). Gibson et al. (1998) found that there was a strong agreement among mothers in the UK that eating more fruit and vegetable could reduce the risk of becoming overweight and digestive disease (Gibson, Wardle & Watts 1998). The

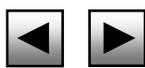




belief in the reduction of risk for heart disease, cancer, tooth decay and acne was about 50-65 percent, however there were no significant correlations between mothers beliefs and children's consumption of fruit, fruit juices, vegetables, total fruit and vegetables or confectionery (Gibson, Wardle & Watts 1998). However, children of mothers who believed that more fruit and vegetables could reduce their child's risk of cancer tended to have children who ate more fruit, but not vegetables, suggesting other mediating variables (Gibson, Wardle & Watts 1998). Three variables, mother's nutrition knowledge, fruit consumption, and belief that fruit and vegetable could reduce cancer risk, accounted for 37 percent of the variance in children's fruit intake. Children's liking of vegetables had a positive influence on children's vegetable intake and mothers concern for disease prevention when choosing foods for her child had a negative effect, both accounted for 20 percent of the variance in consumption (Gibson, Wardle & Watts 1998). Perceptions of barriers to adopting a health behaviour are likely to diminish concern for the health issue (Dittus, Hillers & Beerman 1995).

Fruit and vegetable consumption by young people seem to be less influenced by knowledge of health benefits (Uglem et al. 2007), this may be due to the fact that diet-disease relationships are not the primary influences on food choices of young people (Uglem et al. 2007). This contradicts Wind et al. (2005) finding that the positive health outcomes of eating more fruit and vegetables was the most often mentioned reason for eating fruit and vegetables in focus groups of 92 ten and 11 year old children in Belgium and the Netherlands (Marianne Wind et al. 2005). Most children know that fruit and vegetables were healthy and contained vitamins. Most 10 to 15 year old children in a recent study in South Australia believed that a good diet was important, 88 percent of boys and 92 percent of girls (Dollman & Lewis 2007).

Pollack (2005) suggests that health claims may initially increase demand for produce, for example as with sales of cranberry juice following information on urinary tract infections, however, consumption levelled off over time, suggesting that health benefits alone are not enough to increase consumer demand (Pollack S 2005). Knowledge of the recommended servings of fruit and vegetables is an important and modifiable determinant of consumption (Watters, Satia & Galanko 2007). Lack of nutrition knowledge, how many servings should be eaten, how often, and how much, has been associated with lower intake (MacLellan, Gottschall-Pass & Larsen 2004;

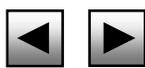




Watters, Satia & Galanko 2007). Knowledge of the recommended number of serves that should be eaten each day has been associated with higher intake (Brug et al. 1999; Havas et al. 1998; Krebs-Smith et al. 1995; M. A. van Duyn et al. 2001), however the association is not always strong (Brug, Lechner & De Vries 1995). Those aware of the 5 A Day message had significantly higher total daily intake of fruits and vegetables, on average 1.5 more daily servings of vegetables and fruits than those who were not aware of the message (Stables et al. 2002). Reynolds et al. (2004) concluded that knowledge of the recommended number of servings of fruit and vegetables may be a mediator of fourth grade children's fruit and vegetable consumption (Kim D. Reynolds et al. 2004). The research was conducted with 2,106 children attending two schools. Fruit and vegetable consumption was determined using a 24-hour food recall and the mediators were assessed by surveying students and their parents. Knowledge accounted for 9.8 percent of the total intervention effect in one of the school areas (Kim D. Reynolds et al. 2004). Knowledge of the recommended amount may reflect a key skill needed to perform the behaviour, it may serve a motivational function leading to a self-evaluation of intake, and it may provide a normative influence, increasing the expectation and approval for that level of consumption (Kim D. Reynolds et al. 2004).

"I eat plenty of fruit and vegetables" "I can't eat more than I do" (Brug et al. 1995). Brug et al. (1995) found a lack of knowledge about the recommended amount of fruit and vegetables, and a belief that they were already eating enough (Brug et al. 1995). Perception that 'my diet is already healthy' or an 'over-optimistic perception of current fruit and vegetable intake (it is high or more than the average) is a barrier to increasing consumption (Basiotis, Lino & Dinkins 2000; D. N. Cox et al. 1998; Lappalainen et al. 1997). Complacency about the need to increase intake and thus intention to change was based on an over-optimistic perception of the adequacy of current intake, particularly for vegetables (D. N. Cox et al. 1998). Wind et al. (2005) suggest that an over-estimation of current consumption may result from lack of knowledge of recommended servings by children 10 and 11 years of age (M. Wind 2006).

There is a lack of knowledge about what fruit and vegetables are available and what to do with them (MacLellan, Gottschall-Pass & Larsen 2004). Lower income groups have been found to lack nutrition knowledge and cooking skills (Dibsdall et al.



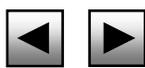


2003). The complexity of information received in relation to healthy eating may be a bigger barrier for those of a lower socio-economic status (Dibsdall et al. 2003).

Self-efficacy refers to a person's expectations regarding their capability at performing certain behaviours. It is dependent on a person's ability to perform the behaviour and/or addressing the barriers prevents the behaviour (Brug et al. 1995). Brug et al. (1997) found that the greatest increases in self-efficacy towards increasing fruit and vegetable consumption were between the preparation and action phases (Brug, Glanz & Kok 1997). This implies that people only start to take action to increase consumption when they are confident that they can (Brug, Glanz & Kok 1997). Chaun Ling et al. (1999) conducted a study of 1200 Chinese Singaporeans to determine if self-efficacy to eating fruit and vegetables differed across stages of change (Chuan Ling & Horwath 2001). The scale they used was an assessment of the subject's confidence in their ability to include fruit and vegetables in their diet (Chuan Ling & Horwath 2001). Two components were important, "difficult situations", that is meal patterns/preparation and social situations that have a negative affect on consumption, and "being able to remember" to include fruit and vegetables (Chuan Ling & Horwath 2001). Fruit was difficult to remember as it was not always included as part of a meal. Confidence in difficult situations was higher in tertiary educated people and women who regularly took vitamin supplements remembered to include fruit and vegetables. Women reported greater self-efficacy than men, and variations in self-efficacy were reported across the stages of change.

The role of self-efficacy skills in children is conflicting (Blanchette & Brug 2005). Self-efficacy skills in children may be 'asking skills' to encourage parents to buy or prepare fruit and vegetables, or food selection and preparation skills (Blanchette & Brug 2005; Kim D. Reynolds et al. 2004).

Wrieden et al. (2004) identified three main types of cooks: confident (liked cooking and prepared a range of dishes with confidence); fearful (had basic cooking skills but felt they needed improving) and hopeless (lacked basic cooking skills and were disempowered by this) (W. L. Wrieden et al. 2004b). Recipes were problematic due to low numeracy and literacy skills, a lack of understanding of measurements and terminology. Learning to cook healthy meals was not a priority, sauces, budget meals and soup were the topics they would like to learn about (W. L. Wrieden et al. 2004b).





Beydoun and Wang (2007) suggest that diet quality is associated with increased socioeconomic status among subjects with better nutrition knowledge and beliefs (Beydoun & Wang 2007). Frequency of fruit and vegetable consumption occasions is associated with higher overall consumption (Perez 2002).

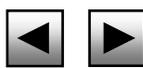
Demographic factors influence the variety of vegetables purchased, variety increases with the number of people in the household, as people get older, as education levels increase and if the household 'cooks meals from scratch' and decreases if there are children in the household (Stewart, Harris & Guthrie 2004).

2.5.4 Food-related behaviours

Crawford et al. (2007) found that food-related behaviours predicted fruit and vegetable intake in metropolitan sample of 1136 Australian women (Crawford et al. 2007). Forward planning and organizing of meals and snacks, for example using shopping lists or taking packed lunches, and enjoyment and valuing meal preparation and eating were associated with higher fruit and vegetable intakes in women (Crawford et al. 2007).

Food-purchasing patterns for home influence the availability and accessibility of fruit and vegetables at home (Tom Baranowski et al. 2007b; Cullen et al. 2000a; Hearn et al. 1998; Yoo et al. 2006). Family characteristics, socio-economic status, and the person responsible for food shopping and preparing foods influence the frequency of food shopping (Yoo et al. 2006). A study of 2762 people in the Houston Texas area, the major food shopping patterns were weekly or twice weekly large shopping trips (Yoo et al. 2006). Shoppers with more people in their household shopped more frequently, as did Hispanic or Asian/Pacific islanders. Frequency of shopping influenced preference for type of shop, 70 percent of participant's preferred larger stores, however, those who shopped more frequently preferred smaller grocery stores. Education level, transportation, and shopping distance from home did not result in significantly different shopping patterns (Yoo et al. 2006). Anderson et al. (1998) reported that the number of visits to the shops was a barrier to increasing fruit and vegetable consumption for adults involved in a nutrition education program (A. S. Anderson et al. 1998).

Mushi-Brunt et al. (2007) conducted a study of 555 parent:child (6 to 12 year old) dyads to determine fruit and vegetable grocery shopping perceptions in the US. Baranowski et al. (2007) undertook a study to measure outcome expectancy for





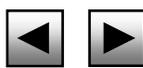
shopping for fruit and vegetables to identify the predictors of home fruit and vegetable availability (Tom Baranowski et al. 2007b). Fruit predictors corresponded to the home availability even after controlling for social desirability; however, with vegetables the relationship was not significant after controlling for social desirability. There appeared to be a continuum relationship between predictor variables that suggested that interventions could work on the next easiest change point. For example, if a person believed that vegetables good for you, taste good and were inexpensive, then it would be easiest to assist that person to believe that they are easy to prepare. For both fruit and vegetable the easiest item to agree with was that fruit and vegetables were ‘good for your health’, suggesting that this is well recognised and developing interventions to persuade people of this would not be beneficial (Tom Baranowski et al. 2007b). The variables that positively influenced individual fruit and vegetable purchases were if they were inexpensive, quick and easier to prepare (Tom Baranowski et al. 2007b). The need for them and children liking them positively influenced vegetable purchases (Tom Baranowski et al. 2007b).

2.5.5 Family behaviour

Family food socialization influences fruit and vegetable intake, for example parents and spouse personal beliefs (Cullen et al. 2000a). Parent role modeling for meal planning, purchasing and preparing food, family rules and meal communication is important (Cullen et al. 2000a). Many of these factors are specifically cultural. Family table food management practices encourage children to eat specific foods.

2.5.6 Convenience

“If it’s not quick and easy forget it.” (MacLellan, Gottschall-Pass & Larsen 2004)
Cox et al. (1997) found that most consumers had positive attitudes towards fruit (78 percent) and vegetables (77 percent), however, the extent of perceived attributes and barriers to increasing consumption differed (D. N. Cox et al. 1998). Fruit and vegetables were valued similarly for their taste, health protection benefits, nutrient value, and ease of fitting into eating habits. High cost was considered a barrier to increasing fruit intake by 31 percent of the sample, compared to 23 percent for vegetable dishes. Fruit was also perceived to not be filling. There did not appear to be much social pressure to increase fruit and vegetable consumption. Vegetable dishes were assessed separately and were considered negatively; they were boring,

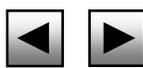




expensive, providing less nutrients (lost in cooking), less liked by family, less useful in weight control and more difficult to prepare. Vegetable dishes were considered easier to chew and digest than fruit and vegetables, and as filling as vegetables.

In-depth interviews of women who did not meet fruit and vegetable recommendations found that most could identify one or more benefits of eating fruit and vegetables, however they were not specific (Maclellan, Gottschall-Pass & Larsen 2004). The main barriers identified included effort, lack of knowledge, socio-psychological (preferences, habit, mood) and socio environmental factors (family member influence, childhood experience) and availability (Maclellan, Gottschall-Pass & Larsen 2004). Internal influencers, life events and food rules encouraged women to increase consumptions. Habit has also been described as “eating the amount of fruit and vegetables they are used to” and appears to be dependent on how eating was taught in the past. There is a perception that habits are hard to change (Brug et al. 1995). Forgetting to eat, ask for or take fruit and vegetables was one reason children reported not eating fruit and vegetables (M. Wind 2006). Habit is a strong independent predictor of fruit and vegetable consumption for adults and children (Brug et al. 2006; Reinaerts, de Nooijer & de Vries 2006).

Time scarcity, not having enough time to do everything that one wants to or needs to do, is increasingly a factor influencing food choice (Jabs et al. 2007). Jabs et al. (2007) found that feelings of time scarcity were common among low-wage earning mothers and influenced theirs and their families food choices, for example “ I don't have the time to... cook and prepare meals.. make healthy meals”. Most mothers expressed feelings of time scarcity, however it was most common in single mothers or mothers who were solely responsible for child care, cooking and household tasks, whether they had a partner or not, or those in inflexible work schedules that conflicted with family times. Time management strategies included planning, coordination, and prioritisation. For all mothers, "feeding children was a priority". Enabling factors for healthy food preparation included household help from partner or children, flexible work schedules, working fewer hours, cooking skills and self-efficacy. Strategies to address time scarcity could consider developing time management strategies that account for role in the family, income levels, life course stages and cooking skills. Interventions could include community activities to increase self-efficacy including: cooking classes, recipe provision (quick, easy, affordable, child-acceptable, healthful recipes).



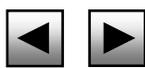


Lea et al. (2005) found that although some people find fruit and vegetables convenient, quick and easy to prepare compared to meat, for others, the added convenience of packaged or processed foods over-rides this (Emma Lea, Worsley & Crawford 2005).

Food industry data supports the notion that convenience is an important and increasing factor determining fruit and vegetable intake (Pollack S 2005). The most popular fresh fruit (bananas, apples and grapes) and vegetables (French fried potatoes and canned tomatoes) are convenient to eat, for examples. Oranges are the most consumed fruit by Americans, and juice accounts for 86 percent of this consumption. Over half of vegetable the domestic vegetable consumption in 1997/99 in the US was canned, frozen or dried produce, and 43 percent of fruit was consumed as juice (Pollack S 2005). Tomatoes accounted for 70 percent of the canned vegetable consumption, potatoes were 70 percent of frozen vegetable consumption and orange juice was 63 percent of juice consumption (Pollack S 2005). More products is used to produce these commodities, however this does not translate to more individual servings being consumed. Frozen fruit and vegetable consumption has increased over the last 20 years to 44 percent of vegetables and 36 percent of fruit. The reason is because they are easy to cook, available out of season. Frozen vegetables are an easy main meal side dish, and frozen fruit is mainly used for desserts (Pollack S 2005). Pre-cut and peeled ready-to-cook produce reduces meal preparation time.

2.5.6.1 Attitudes with a positive influence on consumption

Consumers are likely to eat more fruit and vegetables if they or their family like the taste (Bogers et al. 2007; D. N. Cox et al. 1998), perceive health benefits from eating more (Bogers et al. 2007; D. N. Cox et al. 1998), perceive nutritional value (D. N. Cox et al. 1998), perceived importance (MacLellan, Gottschall-Pass & Larsen 2004), have an intention to eat more (Bogers et al. 2007), have favourable attitudes towards eating them (Bogers et al. 2007), have higher self-efficacy (Bogers et al. 2007), perceive strong social support (Ball, Crawford & Mishra 2006; M. A. van Duyn et al. 2001) or social norms to eating more (Bogers et al. 2007), and have correct knowledge of the recommended servings per day (Bogers et al. 2007). Routine and habitual eating habits that include fruit and vegetables (D. N. Cox et al. 1998; MacLellan, Gottschall-Pass & Larsen 2004), perceived benefits for weight control (D.





N. Cox et al. 1998) and ‘feeling good’ or ‘having more energy’ are reasons people state they eat more (Maclellan, Gottschall-Pass & Larsen 2004).

People who eat recommended amounts are likely to be making a conscious effort (Maclellan, Gottschall-Pass & Larsen 2004). Feeling guilty about not eating enough or thinking certain foods ‘should’ be eaten can have a positive impact on consumption (Maclellan, Gottschall-Pass & Larsen 2004).

Planning meals was associated with a higher fruit and vegetable intake (Boutelle et al. 2003). Young American adults, 20 to 38 years old who were physically active consumed more fruit and 100% fruit juice than those who were not active (Deshmukh-Taskar et al. 2007).

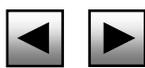
2.5.6.2 Negative influences on consumption.

People eat fewer fruit and vegetables when they perceive more barriers (Bogers et al. 2007), consider them expensive (Bogers et al. 2007; D. N. Cox et al. 1998), perception of cost of adding more fruit and vegetables to usual food budget (Dibsdall et al. 2003), incorrectly perceive they have an adequate or high current intake (Bogers et al. 2007; D. N. Cox et al. 1998). Children’s taste preferences (Bogers et al. 2007), and mother’s beliefs concerning disease prevention also influence consumption (Bogers et al. 2007).

Lack of social support for increasing consumption (M. A. van Duyn et al. 2001) (D. N. Cox et al. 1998), lack of satiety of fruit (D. N. Cox et al. 1998), overconfident about ability to increase intake resulting in complacency (D. N. Cox et al. 1998), that ‘should’ eat more is a moral issue (Maclellan, Gottschall-Pass & Larsen 2004).

People on lower incomes may have poorer access to healthy foods and limited social support (Ball, Crawford & Mishra 2006; Dibsdall et al. 2003; M. A. van Duyn et al. 2001). Lack of resources and skills may limit ability to consumer diets high in fruit and vegetables. For example, lack of storage facilities and cooking skills (Dibsdall et al. 2003). High levels of domestic chaos or stress, and the time constraints of demanding and complexity of day-to-day lives may negatively influence fruit and vegetable consumption, particularly for people of low socio-economic levels (Dibsdall et al. 2003).

Foods disliked early in life or not incorporated into personal food systems often remained unsought, unacceptable, or uneaten (C M. Devine 2005). Early childhood experiences, including limited exposure to fruit and vegetables or negative memories





can influence consumption (MacLellan, Gottschall-Pass & Larsen 2004). Habitual exposure to and use of foods from an early age likely to be related to consumption (Domel et al. 1993; Gibson, Wardle & Watts 1998; Krebs-Smith et al. 1995; Sullivan & Birch 1994).

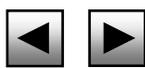
Watching television during dinner was associated with lower fruit and vegetable intakes (Boutelle et al. 2003). Television viewing has been found to be associated with decreased fruit and vegetable consumption (Boutelle et al. 2003; Boynton-Jarrett et al. 2003; K. J. Campbell, Crawford & Ball 2006; Coon et al. 2001; Coon & Tucker 2002; Crawford et al. 2007; H. G. Dixon et al. 2007; Overby et al. 2004; Scully et al. 2007; Taveras et al. 2006; Vereecken et al. 2006; Wang et al. 2007). There are a disproportionate number of advertisements, particularly in children's viewing times, promoting junk foods and very few advertisements encouraging nutritionally-preferred foods, such as fruit and vegetables (Chapman et al. 2007; Hammond, Wyllie & Casswell 1999; Neville, Thomas & Bauman 2005). Fast food outlet use has been found to be inversely associated with fruit and vegetable consumption in adolescents (S. A. French et al. 2001b)

2.5.6.2.1 Taste

"In the first place I eat it because I like it" (Brug et al. 1995)

Satisfaction is a determinant of fruit and vegetable consumption, for example, taste, digestibility, satiety (Brug et al. 1995). Taste has been identified as a determinant of fruit and vegetable consumption in cross sectional studies (Ball, Crawford & Mishra 2006; K. Glanz et al. 1998a; Krebs-Smith et al. 1995; Satia et al. 2002).

A recent American dietary survey of preschool children aged 24 to 60 months and their parents revealed that the foods most commonly eaten were fruit drinks, carbonated beverages, reduced-fat milk, and French fries. The vegetable group consistently had the lowest variety scores and dominated the least favourite foods lists (Skinner et al. 1999). Children have a high preference for fruits and juices and preference is the primary determinant of children's consumption (Domel et al. 1993). Birch asserts that few food and flavour preferences are innate; most are learned via experience with food and eating and involve associative conditioning of food cues to aspects of the child's eating environment, especially the social contexts and physiological consequences of eating (Birch & Fisher 1998). Parents' child-feeding practices are central in this early feeding environment and affect children's food preferences and their regulation of energy intake. An understanding of how children's





food preferences are acquired is essential in developing strategies to improve the quality of children's dietary intake. It may be possible to alter children's perception of taste of vegetables, for example, Havermans and Jansen (2007) were able to encourage children to accept the taste of vegetables with a flavour-flavour form of Pavlovian conditioning (Havermans & Jansen 2007).

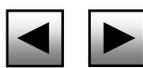
Gibson et al. (1998) found that children's vegetable intake was associated with their liking for common vegetables (Gibson, Wardle & Watts 1998). Children's liking the taste of confectionery was associated with their mother's confectionery intake (Gibson, Wardle & Watts 1998).

Taste preference, particularly for fruit, were one of the main reasons that 10 to 11 year old Belgium and Dutch children reported eating, or not eating, fruit and vegetable (Marianne Wind et al. 2005). Taste preferences for fruit and vegetables was strongly associated with higher consumption by 578 Norwegian national guards aged 18 to 26 years (Uglem et al. 2007). A preference for cooked vegetables and the number of hot meals for lunch was also related (Uglem et al. 2007). A preference for competing foods was a reason 10 and 11 year old children reported not eating more fruit and vegetables (M. Wind 2006).

2.5.7 Environmental influences

Environmental influences on health behaviour have been defined as all factors external to the individual (Kamphuis et al. 2006). Swinburn et al. (1999) categorised environmental influences as micro- (settings people gather e.g. home, schools, workplaces, supermarkets, neighbourhoods) and macro- (broader systems or structures that support or inhibit behaviour –transport infrastructure, produce marketing and distribution) (Swinburn, Egger & Raza 1999). These factors relate to the four types of environments: physical (opportunities for the healthy choice/behaviour, for example points of purchase), economic (costs related to the healthy choice/behaviour), political (rules and regulations that influence behaviour, for example food laws and legislation) and sociocultural (subjective and descriptive norms influencing the behaviour) (Swinburn, Egger & Raza 1999).

Research into the influence of the environment on dietary intake is increasing (Katrina Giskes et al. 2007). Global, economic and political forces influence food choice (M. Nestle 2003; Paisley & Skrzypczyk 2005). Giskes et al. (2007) developed a framework that had four categories of environmental factors:



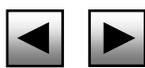


Accessibility and availability (access to shops and availability of foods); Social conditions (interpersonal relationships and social relationships); Cultural conditions (engagements with larger groups of people, cultural eating, health values, food experiences in childhood, cultural participation); and material conditions (financial, material and social deprivation) (Katrina Giskes et al. 2007).

Kamphuis et al. (2006) conducted a systematic review of environmental influences on fruit and vegetable consumption using the above framework (Kamphuis et al. 2006). Material factors (income, poor or deprived neighbourhoods) were most often studied in relation to fruit and vegetable consumption and were often associated with lower intakes (Kamphuis et al. 2006). Food insecurity was associated with lower intake (Tingay et al. 2003). Country and regional differences were found in three out of five areas (Kamphuis et al. 2006). Lack of kitchen equipment, or an inadequate income was related to poor nutrition (W. L. Wrieden et al. 2004b). Some people perceive storing fruit and vegetables as difficult (Katrina Giskes et al. 2002a).

Brug et al. (1995) describe environmental influences on fruit and vegetable consumption in adults living in the Netherlands as availability, social influence and financial cost (Brug et al. 1995).

Environmental influences include the proximity of food outlets (Booth, Pinkston & Poston 2005), media marketing and promotion of foods (Swinburn, Egger & Raza 1999), workforce food service, variety of foods available, and portion sizes (Katrina Giskes et al. 2007). The cost and availability of foods is considered a determinant of dietary intake. Many studies have found that the cost and availability of fruit and vegetables does not appear to be a significant determinant of consumption among people in low-income areas (Latham & Moffat 2007; Pearson et al. 2005). Latham and Moffat (2007) found that the types of retail outlets may influence dietary intake, for example there was a larger number of variety stores in the lower income areas, and these types of stores had a limited variety of fresh produce at higher prices than supermarkets Hamilton, Canada (Latham & Moffat 2007). Winkler et al. (2005) found minimal socioeconomic differences in opportunity to purchase fresh fruit and vegetables in Brisbane, Australia (Winkler, Turrell & Patterson 2006a, b). Focus group research in the Netherlands suggests that high prices of fruit and vegetables were a deciding factor in whether or not they were purchased regardless of socio-economic group (Kamphuis et al. 2007). Participants of a lower socio-economic status identified poor access to shops as a barrier, particularly if they had a lack of





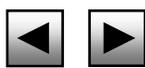
mobility (Kamphuis et al. 2007). Availability and accessibility to local supermarkets may influence fruit and vegetable consumption (Ball, Crawford & Mishra 2006; Rose & Richards 2004).

Redeemable vouchers for fruit and vegetables as special supplemental nutrition programs for woman, infants and children in Los Angeles, US had an uptake of 90 percent and resulted in a wide variety of fruit and vegetables being purchased from supermarkets and farmers markets (Herman, Harrison & Jenks 2006). Food insecurity is defined as “limited or uncertain availability of nutritionally adequate and safe foods or uncertain ability to acquire acceptable foods in socially acceptable ways” (Kendall & Kennedy 1998). Local fruit and vegetable production, nutrition education, and transport were highly rated by ‘food insecure’ households as useful strategies to improve health (Nolan et al. 2006).

Blanchette and Brug (Blanchette & Brug 2005) conducted a systematic review of determinants of fruit and vegetable consumption of children aged 6 to 12 years of age concluded that the availability and accessibility of fruit and vegetables and children’s taste preferences were key positive determinants of consumption. There are seasonal variations in the availability of fruits and vegetables and this impacts on consumption levels (Maclellan, Gottschall-Pass & Larsen 2004).

Complex relationships between changes in accessibility and availability and children's consumption are likely and require further research, including parent and child communication, parent and child food preferences and environmental influences. Perceptions of access and availability may influence consumption of fruit and vegetables (van Assema et al. 2007). van Assema et al. (2007) found an association between children’s fruit intake and their perception of availability of snacks and parent’s perception of breakfast foods, however, there were conflicting perceptions of family rules and environment between children and parents (van Assema et al. 2007). Hearn (1998) asserts that "the more we know about these relationships, the more likely we are to develop more effective interventions for dietary change." (Hearn et al. 1998, p31) Food neophobia, the reluctance to eat or wanting to avoid new foods, and ‘fussy eaters’ have been demonstrated to contribute to rejecting fruit and vegetables (Dovey et al. 2007).

Bogers et al. (2007) provided 75 families with young children with free fruit and vegetables for one month and asked them to consume at least 200 grams of vegetables and two pieces of fruit each day, and asked them to self-monitor

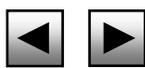




consumption (Bogers et al. 2007). At one month, fruit consumption by women in the experimental group increased, at baseline these women considered fruit expensive, perceived that they had little control over their consumption and saw health benefits for their children in eating fruit (Bogers et al. 2007). The increases in vegetable intake were explained by intention to eat more and taste preferences of women and their children. There were no long term changes in fruit consumption noted, however, at one year, vegetable intakes were positively associated with perceived health benefits for children (Bogers et al. 2007). Women who ate large amounts at baseline had only to increase small amounts to meet the required level and those with low intakes had to eat more. Perceived behavioural control and costs were associated with changes in consumption. Cost seems to play an important role in fruit and vegetable intake (Bogers et al. 2007; S. A. French et al. 1997). Removal of free fruit and vegetables resulted in reduced intake at one year (Bogers et al. 2007).

2.5.8 Seasonality

Seasonal differences in fruit and vegetable consumption in Great Britain revealed that salad vegetables (leafy salads, cucumbers and tomatoes) were consumed at a level in April to September almost three times higher than that during October to March (B. D. Cox, Whichelow & Prevost 2000). Salad consumption in summer is higher than in winter (B. D. Cox, Whichelow & Prevost 2000). Lack of fresh fruit and vegetables at the markets during different seasons has been noted as a barrier to increasing consumption, however, improved storage and processing techniques mean that seasonality is becoming less of an issue (D. Marshall et al. 1995). Seasonal differences in fruit and vegetable intakes reported by John and Ziebland were related to the types of activities people were undertaking and the meals that were served, for example, to holidays and festive occasions (John & Ziebland 2004). Seasonal differences were not reported in some earlier environmental studies (Kamphuis et al. 2006; Ziegler et al. 1987). Seasonal differences in children's fruit and vegetable intake were not significant in a study of spring and autumn consumption levels (Tak et al. 2006). Lower vegetable intakes were associated with winter (Kamphuis et al. 2006)





2.5.9 Supply and industry-related factors

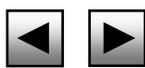
Supply-side and demand-driven factors contribute to fruit and vegetable consumption. Industry factors are related to increasing fruit and vegetable consumption. Pollack (2005) identified a number of factors that were related to the increase in domestic consumption of fruit and vegetables in the US over the last two decades (Nebeling et al. 2007). Trends in the increased consumption of specific types of fruit and vegetables point to these factors. Since the mid-seventies consumption preferences have changed, Americans are eating more fresh and frozen vegetable and fruit and less canned product, since that time food stores have increased the selection and quantity of fresh produce on display. Consumers are eating more asparagus, broccoli, and lettuces other than iceberg etc. The supply of some products relies on imports, for example, bananas in America. Fresh orange consumption has declined and alternative fruits that are now available for a much longer period are being chosen, for example grapes, pears and strawberries.

Improvements in technology for shipping, handling, plant breeding and packing means that produce is less perishable and maintains appearance and quality. New varieties with consumer preferred attributes are available, for example seedless grapes and watermelon (Pollack S 2005).

International trade agreements have lead to more imported produce and an increased range of produce available out of season and successfully reduced consumption fluctuations (Pollack S 2005). In 1997-99 in the US imported product accounted for 40 percent of domestic consumption (Pollack S 2005).

Consumer expectation is for a wide variety of good quality product at stable prices (Pollack S 2005).

Price is one attribute of consumer purchasing decisions. Price describes sales changes and economic theory suggests that as price increases, the quantity demand goes down (McLaughlin 2004). Value, the benefit of the product divided by the price, is another attribute that particularly influences fruit and vegetable purchase choice (McLaughlin 2004). Convenience, quality, information (recipes), taste, safety, nutrition and fun are attributes related to value of fruit and vegetables (McLaughlin 2004). Baby carrots, lunchbox bananas, cherry tomatoes, bagged salad mixes, are examples of products that are of value to consumers who are willing to pay the price difference (McLaughlin 2004). McLaughlin et al. (2004) suggests that the year round availability of fruit and vegetables has lead to an overall increase in



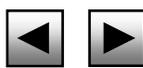


value of fresh produce (McLaughlin 2004). From an industry perspective the challenge is to increase the value for consumers without relying entirely on lowering the price (McLaughlin 2004).

Consumers obtain produce from retail stores, foodservice establishments or direct market. The fresh produce distribution system has eight main marketing channels with five different brokerage points (McLaughlin 2004).

In the US in 2000 the estimated value for the produce marketing channel was \$247.9 billion. Of this, the total value of purchase by consumers accounted for 32 percent (\$78.5 billion), 16 percent (\$39.2 billion) and 15 percent (retail stores). Imports and exports accounted for 2 percent (\$5.5 billion) and 1 percent (\$5.5 billion) respectively (Kaufman et al. 2000). Consumers doubled their purchase of fresh fruit and vegetables between 1987 and 1997 in the US (Kaufman et al. 2000). Foodservice had the largest share of produce sales to consumers in 1997 (Kaufman et al. 2000). Between 1987 and 1997 the retail share decreased from 64 to 48 percent and the food service share increased from 35 to 50 percent. New store formats service specific consumer value attributes, for example warehouse stores for economy-minded shoppers, organic stores for the less price conscious health-oriented. Retailers introduced pre-prepared produce (salad bars, pre-cut produce, packaged and branded higher quality produce) and the Internet also provided home shopping options.

Australian industry research reports the same trends, for example, more fruits and vegetables are available all year round (particularly specific categories) (*Future Focus -the Australian horticulture plan. Horticulture: the big drivers? Part 1: Edibles. Discussion paper for industry consultation*). Work is being done to control quality and cost through quality assurance schemes and aligning of seasonal supplies across the different climate zones across the country (*Future Focus -the Australian horticulture plan. Horticulture: the big drivers? Part 1: Edibles. Discussion paper for industry consultation*). Consumer satisfaction is not consistently high for food safety and quality. The Australian horticulture industry depends on irrigation water, which with the future impact of climate change and water scarcity are of concern (*Future Focus -the Australian horticulture plan. Horticulture: the big drivers? Part 1: Edibles. Discussion paper for industry consultation*). Industry attention is on how to increase profit through reducing cost margins and increasing domestic and export





market opportunities (*Future Focus -the Australian horticulture plan. Horticulture: the big drivers? Part 1: Edibles. Discussion paper for industry consultation.*).

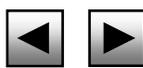
The Australian Government's Austrade states that the single most important market trend when exporting to the UK is to supply almost all products all year and notes that fruit and vegetable marketing is now similar to high profile grocery product marketing. New products, greater store prominence and generic and specific marketing campaigns are being used. Consumers demand variety, quality, specialty and premium produce and these products hold higher value. Double income families desire convenience that has led to a range of new products being developed, for example, baby carrot snack packs, lunchbox bananas, cut and peeled ready-to-cook packs of casserole vegetables (Austrade. Australian Government 2007).

The retail value of fresh fruit in the UK is A\$7.4billion, of which 90 percent is imported and are self-sufficient for vegetables. In the UK 50 percent of fresh produce volume is sold through retail outlets of which supermarkets distribute 75 percent. The remainder is through wholesale trade and processing (Austrade. Australian Government 2007).

The Australian apparent consumption of fruit (including fruit and juices) was 135 kg pre capita in 1998-9, having increased from 80 kg in 1938. The main increase is due to increases in orange consumption. Vegetable (including potatoes) apparent per capita consumption in 1998-9 was 162 kilograms, having increased from 117.1 kilograms in 1958. In the decade previous decade fruit consumption increased 23 kilograms and vegetable consumption increased 12 kilograms per apparent per capita (Australian Bureau of Statistics 2000a).

Between 1985-6 and 2005-6 household consumption expenditure on catering rose 30 percent, or 1.3 percent per year (Australian Bureau of Statistics 2007). The expenditure on catering exceeded the growth on food, 0.4 percent annually and 7.8 percent total. People 'contracting out' meal preparation activity in response to the reduced availability of time due to increased employment combined with expanded income capacity (Australian Bureau of Statistics 2007).

Consumers show concern for the safety of their food, in particular linking pesticides and herbicides with diseases such as cancer. Often the perception of risk is greater than the risk itself and small risks create large consumer concern (Winkler, Patterson & Newman 2006). A wide range of microbial and chemical contaminants can reside in fruit and vegetables; however, there are a number of practices that can prevent

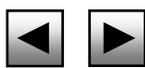




contamination (World Health Organization and Food and Agriculture Organization 2004). The Codex Alimentarius is an intergovernmental body that aims to protect the health of consumers and ensure fair practices in the food trade. It provides general guidance on food hygiene and recently developed guidelines on the labelling of organic food (Joint FAO/WHO Food Standards Programme 1997). Establishing critical control points to reduce contamination to safe levels is a fundamental food safety practice (Joint FAO/WHO 1997). Government need to establish dietary monitoring programs to assure safe and tolerable levels of contaminants are not exceeded (Joint FAO/WHO 1997). Food Standards Australia New Zealand (FSANZ) monitor the Australian food supply to ensure it is safe and that foods comply with microbiological contaminants, pesticide residue limits and chemical contamination standards (Food Standards Australia New Zealand 2007). The Australian Total Diet Study is conducted every two years to assess consumers' exposure to contaminants. Diets for each individual are based on the 1995 National Nutrition Survey consumption patterns, which is over 12 years old, therefore the relevance is questionable (Australian Bureau of Statistics 1999). The foods tested are mainly processed foods where the additives are allowed, therefore, many commonly eaten foods like fruit and vegetables are not included (Zealand 2005). The results to date suggest that Australia has a safe food supply with residue and pesticide levels below the minimum standards set by Codex.

2.5.10 Availability

Following a decrease in the relative availability of staple foods, fruit and vegetables have increased only slightly in most countries and consumption is below the recommended level (World Health Organization and Food and Agriculture Organization 2004). The likely impact is an increase in fat, energy density and a decrease in fibre; possible impacts include an increase in saturated fats, and glycaemic index, and a decrease in vitamins, minerals and bioactive compounds (World Health Organization and Food and Agriculture Organization 2004). The result in an increase of the FAOSTAT data from 1980 to 2003 found that production and consumption for 11 of 15 vegetables and all 15 fruit monitored worldwide had increased (World Health Organization and Food and Agriculture Organization 2004). Export/import markets have increased, particularly for fruit, and fruit juice, as have





sales of organically grown product (World Health Organization and Food and Agriculture Organization 2004).

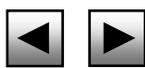
Availability of fruit and vegetables in the home or when eating away from home influences intake (Cullen et al. 2000a). The availability of fruit and vegetable at a national level in different countries varies, for example 233 grams per person per day in Ireland to 617 grams per person per day in Greece, with parallel differences in intake (Naska et al. 2000). Hearn et al., when assessing environmental influences on children's fruit and vegetable consumption concluded that availability may facilitate consumption when available items are also preferred items (Hearn et al. 1998). Increasing availability and accessibility of fruit and vegetables are two mechanisms that can be used to maintain high consumption within families. The availability of fruits and vegetables at home has been associated with higher intake. A review of fruit and vegetable availability found that consumption was associated availability at home among children, adolescents and adults, and the association was maintained over time (Jago, Baranowski & Baranowski 2007). Interventions that modified availability resulted in increased consumption. The association between consumption and availability was complex and likely to differ with demographic and psychosocial variables. The authors suggest that while causality is not clear, assuming the direction for effect from availability to consumption leaves three likely explanations: availability is a facilitating factor (it is there so it can be eaten and vice versa); external cues (seeing, smelling) may trigger consumption; and thirdly, increased exposure leads to increased consumption (Jago, Baranowski & Baranowski 2007).

Exposing children to vegetables increased liking and consumption of that food.

Poor availability of fruit and vegetables in food service outlets, for example workplaces, school canteens, or restaurants, may limit fruit and vegetable consumption (A. S. Anderson et al. 1998).

Van Assema et al. (2007) identified that parents responses to availability and accessibility of foods consistent with dietary behaviour were more in the direction of socially desirable behaviours, whereas their adolescent children's responses were less so, leading them to conclude that adolescents responses may provide a more realistic view (van Assema et al. 2007).

Availability of and access to fruit and vegetables are determinants of children's fruit and vegetable consumption (Cullen et al. 2000b; Hearn et al. 1998; Kratt, Reynolds





& Shewchuk 2000; Kim D. Reynolds et al. 2004). Limited exposure to fruit and vegetables may reduce preference for their taste (Birch 1999; Havermans & Jansen 2007).

A number of factors in the school setting have been shown to be associated with fruit and vegetable consumption in children. Access to snack bars or vending machines offering high energy, fat or sugar foods at school have been associated with lower fruit and vegetable intake (Blanchette & Brug 2005). Conversely, in schools where children have access to lunch meals served at school, they routinely received two serves of vegetables (Blanchette & Brug 2005).

Reynolds et al. (2004) found that parental consumption and availability were mediators determining fruit and vegetable consumption in fourth grade children (Kim D. Reynolds et al. 2004).

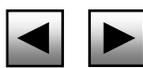
2.5.11 Price, cost, affordability and value

The food price environment influences food consumption (Cassady, Jetter & Culp 2007; K. Glanz et al. 1998a). Cost is a determinant of fruit and vegetable intake, both a barrier and a promoter and with differences for fruit and vegetables. The relationship between income area and food prices is not clear, some market basket studies have found that food prices in lower income areas are higher than in higher income areas, some that they are lower (Cassady, Jetter & Culp 2007) and others that there is no difference .

Affordability influences fruit and vegetable consumption across the world (Pollack S 2005). Although the cost of fruit and vegetables does not appear to vary greatly over time, immediate individual prices of fresh fruit and vegetables are relatively elastic and fluctuate in relation to perishable foods, contribution to a perception of expensiveness in relation to other foods (D. N. Cox et al. 1997).

Fruit is often considered expensive, or at least the cost of fruit is seen as a barrier to increasing intake, identified as a barrier to increasing fruit more than for vegetables (MacLellan, Gottschall-Pass & Larsen 2004). However, if the quality of fruit and vegetables is considered high, then paying more is less of a barrier, even for women on a lower income (MacLellan, Gottschall-Pass & Larsen 2004).

Dibsall et al. (2003) assert that access and affordability are not significant barriers to low-income earners eating more fruit and vegetables, however additional expense in terms of money or effort could be (Dibsall et al. 2003). Affordability may be





influenced by motivational, psychosocial or lifestyle factors (Dibsdall et al. 2003). Some studies have reported that people on a low income report the relatively high cost of eating more fruit and vegetables as a barrier (D. Marshall et al. 1995; Reicks, Randall & Haynes 1994).

The perception of the relative price of fruit and vegetables compared to other foods is clouded by the elasticity of fruit and vegetable pricing (Epstein et al. 2006a). Reducing the relative price of fruit and vegetables has been shown to increase consumption (S. A. French et al. 1997) Same-price elasticity describes the decrease in consumption of a commodity due to an increase in price (Epstein et al. 2006a). Epstein et al. (2006) found that as the price of healthy or less healthy foods increased, mothers, children decreased their purchases of that food (Epstein et al. 2006a). There may be an opportunity to influence intake by reducing the price of healthier foods relative to less healthy alternatives (Epstein et al. 2006a; Epstein et al. 2006b). The more money that children have available to spend on food, the less likely they are to substitute and the more likely they are to purchase based on preference (Epstein et al. 2006b). High price is one reason why people purchase less healthy alternatives (Adam Drewnowski & Specter 2004).

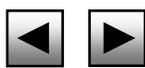
The perishability of fruit and vegetables and poor quality contributes to the perception that they cost more (Emma Lea, Worsley & Crawford 2005). Community supported agriculture involves a local farmer selling produce direct to consumers (E. J. Lea 2005).

Australian research has found that healthy eating is not necessarily more expensive than unhealthy eating if costing of foods is based on a structuring of diets in line with dietary guidelines rather than substitution of healthy for less healthy versions of foods (McAllister, Baghurst & Record 1994).

2.5.12 Access

Adults and children will choose healthier food alternatives when access to high preference less healthy foods is reduced (Epstein et al. 2006b; Goldfield & Epstein 2002). A cross-sectional population based study of 22,562 men and women aged 39 to 79 years in the United Kingdom found that living in a deprived area predicting significantly lower vegetable consumption (Shohaimi et al. 2004)

Distance and resulting transport issues were the biggest barriers to low-income groups fulfilling on their retail needs and wants (Robinson, Caraher & Lang 2000).





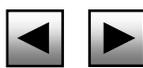
Robinson et al. (2000) found that 58 percent of respondents reported that the local supermarket was one of the shops they most frequently used. Convenience (95 percent), location close to home (71 percent), cheapness (69 percent) and wide range of goods (61 percent) were the main reasons for use. Most people, 84 percent, reported that they did their food shopping at a local supermarket (Robinson, Caraher & Lang 2000). Local supermarkets were also more expensive for almost all foodstuffs. This research suggested that health and local authorities support community-development, living in a deprived area volunteer projects and farmers' or street markets, to local small shops, and local rather than distant supermarkets to encourage access to food.

2.5.13 Pantry or shopping management practices

Pre-preparing or processing fruit and vegetables decreases their perishability and may increase availability (Tom Baranowski et al. 2007a). Identifying the reasons people stock juice, canned or frozen produce (not fresh) in the pantry may assist in designing interventions to encourage consumption. The reasons differ for fruit and vegetables. Baranowski et al. (2007) found the strongest reason for stocking fruit 'when it is on sale' and for vegetables 'when I run out', suggesting that respondents viewed fruit as more of a luxury item and vegetable as a standard to always keep in stock (Tom Baranowski et al. 2007a). The reasons of habit and using sale coupons to purchasing these foods were not strong.

2.5.14 Advertising and promotion

McLaughlin et al. (2004) indicated that anecdotal evidence suggests that retailers are not marketing fruit and vegetables as aggressively as they were a decade ago. Public health and policy makers need to collaborate with industry to assist them to communicate appropriate messages to consumers (McLaughlin 2004). Reducing or stabilising the cost of fruit and vegetables has been recommended to encourage increased consumption, however, pricing produce is a complex and dynamic process (McLaughlin 2004). Increased television viewing by children is associated with a less nutritious diet (Borzekowski & Robinson 2001; Coon et al. 2001; Woodward et al. 1992) or more pestering of parents to buy less nutritious foods (Kraak & Pelletier 1998; Lewis & Hill 1998). Although a direct causal link with advertising is difficult to prove, marketing theory and practice suggests that high exposure to advertising





that presents foods as fun, tasty and what popular kids like will increase children's demand for them (Kraak & Pelletier 1998).

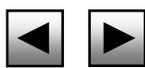
Tobacco, alcohol and food advertising have a detrimental effect on health (Hastings G 2007). Food industry advertising expenditure on product innovations, distribution, packaging and pricing is substantial and industry and governments make money from food marketing and promotion (Hastings G 2007). Food manufactures and retailers lobbying governments to influence dietary advice to the public in an effort to establish a 'healthy' or 'nutritious' image for their products (M. Nestle 2003).

There is a disproportion amount of advertising of unhealthy foods to children compared to healthy foods in Australia (Chapman et al. 2007). Australia has one of the highest junk food advertising exposures directed at children in the world (Hill & Radimer 1997) (Australian Divisions of General Practice 2003). There is a corresponding lack of advertising of healthy foods, including fruit and vegetables. Controlling advertising of unhealthy foods to young children has been recommended as a cost effective public health intervention (Australian Divisions of General Practice 2003) (Australian Consumer Association 1990; SUSTAIN 2002).

2.5.15 Social context

Social context, social networks and supportive social norms were associated with increases in fruit and vegetable intake (G. Sorensen et al. 2007). Modifiable components in a social context include material circumstances, social ties, friendship diverse city and patterns, family roles and responsibilities, jobs strained, social capital, safety, and discrimination (G. Sorensen et al. 2007). The mediating mechanism is well below the social context (social norms and support) and individual factors (self-efficacy and motivation to perform behaviour (G. Sorensen et al. 2007). Sorensen et al. (2007) recommended that interventions build social ties and social norms, as these were pivotal to increasing fruit and vegetable consumption (G. Sorensen et al. 2007).

Women are predominantly responsible for household food purchasing, meal choice and preparation in Australia (Ball, Crawford & Mishra 2006) and overseas (D. Marshall et al. 1995). Parents, usually mothers, are the gatekeepers of children's nutritional intake. Mothers usually purchase, prepare and provide food. North and Emmett (2000) found that in relation to mothers influence on the early eating





patterns of their three-year-old children; there were identifiable groups of mothers based on social, demographic and lifestyle factors (North & Emmett 2000).

Nucci and Smetana, 1996, found that mothers of infants and toddlers set limits around issues of safety, family conventions, and daily routines but permitted children to make decisions about food, recreational activities, clothes, and playmates. They viewed children's choices as helping them to develop autonomy and competence. Mothers saw their roles as educators and nurturers and valued the development of individuality in their children (Nucci & Smetana 1996).

Parents play an important role in the formation of food habits and preferences of young children. They can influence their children's food choice by making specific foods available, by acting as models for their children and by their behaviour in specific situations (R. C. Klesges et al. 1991; Koivisto Hursti 1999).

Research indicates that families can be segmented according to the importance of beliefs about healthfulness of foods and that this segmentation predicts quality of diet of children (Contento et al. 1993; Michela & Contento 1986). Contento, 1993, suggests that interventions should be designed to increase mothers beliefs in the importance of health in choosing foods and that for mothers whose food choices are dominated by children's tastes, interventions should be directed at how to prepare healthful foods to taste good to children. Changing roles influence fruit and vegetable choices, new parents often remark on how they had increased the amount of fruit and vegetables they ate for the sake of their children.

Factors influencing household food choice are complex. The main factors influencing fruit and vegetable purchases include cost, quality, convenience, availability, habit, and to some extent the preferences of family members, in particular, husbands and children. De Bourdeaudhuij and Van Oost, 1998, found that the influence of fathers and children are important in food decisions (De Bourdeaudhuij & Van Oost 1998). Devine et al. (1998) found that perceived knowledge and skills; the available time, space and financial capabilities; social networks and supports; and cultural and social skills influenced fruit and vegetable consumption (C. M. Devine et al. 1998).

The importance of eating vegetables, health benefits, convenience and taste of raw and cooked vegetables were associated and explained 14 percent of intake variance (Satia et al. 2002). Tables 13, 14 and 15 summarise the demographic, individual and environmental factors influencing or determining fruit and vegetable consumption.

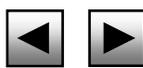




Table 13 Socio-demographic factors determining fruit and vegetable consumption

Socio-demographic	
Gender: women > men	(Beydoun & Wang 2007; Donkin et al. 1998; Dynesen et al. 2003; Fraser et al. 2000; Sharon Friel, Newell & Kelleher 2005)
Men more likely to adhere to vegetable guideline	(Beydoun & Wang 2007)
Age: older > younger	(Beydoun & Wang 2007; Dynesen et al. 2003; Sharon Friel, Newell & Kelleher 2005)
Education: > with higher	(Ball, Crawford & Mishra 2006; Dynesen et al. 2003; Sharon Friel, Newell & Kelleher 2005) (Beydoun & Wang 2007)
Household composition –size: one person > more	(Donkin et al. 1998; Dynesen et al. 2003)
Marital status	(C. M. Devine et al. 1999; Dibsall et al. 2003; Donkin et al. 1998; Sharon Friel, Newell & Kelleher 2005; Kamphuis et al. 2006; Jennie Pollard et al. 2001; Roos et al. 1998)
Household composition –children: > with children	(Dynesen et al. 2003)
Household: >ownership	(Sharon Friel, Newell & Kelleher 2005)
Occupation: >white collar status of parents	(Uglen et al. 2007)
Location: >urbanisation	(Beydoun & Wang 2007; Gustafson, Cavallo & Paxton 2007; Nanney et al. 2007)(Kamphuis et al. 2006)
Income	(Beydoun & Wang 2007; Katrina Giskes et al. 2002a; K. Giskes et al. 2002b; Katrina Giskes et al. 2006; Laaksonen 2006)
Discretionary income	(Ball, Crawford & Mishra 2006)
Medical card status –an indicator of financial means	(Sharon Friel, Newell & Kelleher 2005)
Ethnicity	(Beydoun & Wang 2007; C. M. Devine et al. 1999; Havas et al. 1998)
Single mother	(Jabs et al. 2007)





Table 14 Individual factors determining fruit and vegetable consumption

Individual	
Life-course events/experiences - food upbringing	(Uglem et al. 2007)
Life-course events/experiences - food experiences/food skills	(Ball, Crawford & Mishra 2006; Brug et al. 1995; Dittus, Hillers & Beerman 1995; Maclellan, Gottschall-Pass & Larsen 2004)
Self-efficacy	(Ball, Crawford & Mishra 2006; Havas et al. 1998; Watters, Satia & Galanko 2007)
Dietary changes for health and well-being, feeling good	(Ball, Crawford & Mishra 2006; Brug et al. 1995; Dittus, Hillers & Beerman 1995; Kearney et al. 2000; Emma Lea, Worsley & Crawford 2005; Maclellan, Gottschall-Pass & Larsen 2004; Watters, Satia & Galanko 2007; M. Wind 2006)
Food traditions	(C. M. Devine et al. 1999; Dibsdall et al. 2003)
Perception of food safety risks	(World Health Organization and Food and Agriculture Organization 2004)
Frequency of consumption	(Perez 2002)
Being at school (Australia)	(Bell & Swinburn 2004)
High intakes in early life	(Daviglius et al. 2005)
Internal influences: making a conscious effort, guilt, 'should' eat	(Maclellan, Gottschall-Pass & Larsen 2004; Paisley & Skrzypczyk 2005)
Obesity	(Klassen et al. 2007)
Forget or laziness	(M. Wind 2006) (John & Ziebland 2004)
Planning skills	(John & Ziebland 2004)
Concern for children's intake	(Maclellan, Gottschall-Pass & Larsen 2004)
Nutrition concern	(Cotugna et al. 1992; Dittus, Hillers & Beerman 1995)
Work and study pressure	(Jabs et al. 2007; Maclellan, Gottschall-Pass & Larsen 2004; D. Marshall et al. 1995)
Smoking	(Sharon Friel, Newell & Kelleher 2005; Sahyoun, Zhang & Serdula 2005; Uglem et al. 2007)
Taste preferences	(Ball, Crawford & Mishra 2006; K. Glanz et al. 1998a; Kearney et al. 2000; Krebs-Smith et al. 1995; Maclellan, Gottschall-Pass & Larsen 2004; D. Marshall et al. 1995; Satia et al. 2002; Uglem et al. 2007; Watters, Satia & Galanko 2007; M. Wind 2006)
Nutrition knowledge	(Ball, Crawford & Mishra 2006; Beydoun & Wang 2007; Dibsdall et al. 2003; Maclellan, Gottschall-Pass & Larsen 2004; Wardle, Parmenter & Waller 2000; M. Wind 2006)
Knowledge of recommended intake	(Blanchette & Brug 2005; Havas et al. 1998; Krebs-Smith et al. 1995; M. A. van Duyn et al. 2001; Watters, Satia & Galanko 2007; M. Wind 2006)





Beliefs	(Beydoun & Wang 2007)
Time scarcity	(Jabs et al. 2007; D. Marshall et al. 1995)
Physical functioning	(Sahyoun, Zhang & Serdula 2005)
Shopping and eating behaviours- forward planning, and valuing and enjoying food prepared at home	(Crawford et al. 2007)
Responsibility for food shopping and preparation	(Langenberg et al. 2000)
Habit	(Dibsdall et al. 2003; John & Ziebland 2004; Maclellan, Gottschall-Pass & Larsen 2004)
Physical activity	(Deshmukh-Taskar et al. 2007; Sharon Friel, Newell & Kelleher 2005; Sahyoun, Zhang & Serdula 2005)
Awareness of/belief in importance	(Brug et al. 1995; Maclellan, Gottschall-Pass & Larsen 2004; Watters, Satia & Galanko 2007)
Satisfaction	(Brug et al. 1995)
Pregnancy status	(Havas et al. 1998; Maclellan, Gottschall-Pass & Larsen 2004)
Weight loss or maintenance and appearance: - young women and men	(Chung et al. 2006; Uglem et al. 2007)
Hot meals eaten, preference for cooked vegetables	(Uglem et al. 2007)
Recommended level too much	(John & Ziebland 2004)
High alcohol /heavy drinkers	(Serdula et al. 1996)
Dental or digestive problems	(John & Ziebland 2004)
Optimistic assessment of current intake/eat enough	(D. N. Cox et al. 1998; Lappalainen et al. 1997; E. J. Lea, Crawford & Worsley 2006; M. Wind 2006)
Attitude	(Brug et al. 1995; Havas et al. 1998; R. L. Thompson et al. 1999)
Dairy food consumption	(Sharon Friel, Newell & Kelleher 2005)





Table 15 Environmental factors determining fruit and vegetable consumption

Environmental	
Social support or context	(Ball, Crawford & Mishra 2006; Brug et al. 1995; D. N. Cox et al. 1998; Dibsall et al. 2003; Kamphuis et al. 2007; Maclellan, Gottschall-Pass & Larsen 2004; Sahyoun, Zhang & Serdula 2005; G. Sorensen et al. 2007; Uglem et al. 2007; M. A. van Duyn et al. 2001)
Lack of social pressure to increase consumption	(D. N. Cox et al. 1998; M. Wind 2006)
Food safety risk	(World Health Organization and Food and Agriculture Organization 2004)
Competing government priorities (e.g. losing growing land)	(World Health Organization and Food and Agriculture Organization 2004)
Unhygienic or unsafe preparation of food	(World Health Organization and Food and Agriculture Organization 2004)
Climate, drought	(World Health Organization and Food and Agriculture Organization 2004)
Lack of horticultural technology	(World Health Organization and Food and Agriculture Organization 2004)
Availability of convenience foods (take-away)	(Kamphuis et al. 2007; Maclellan, Gottschall-Pass & Larsen 2004)
Availability of fruit and vegetables at home	(Cullen et al. 2000a; Hanson et al. 2005; Neumark-Sztainer et al. 2003; M. Wind 2006)
Availability of fruit and vegetables at school	(Blanchette & Brug 2005; M. Wind 2006)
Parental encouragement	(Cullen et al. 2000a; M. Wind 2006)
Have to ask to take/eat fruit at home	(M. Wind 2006)
Preference for competing foods	(M. Wind 2006)
Policy at school	(M. Wind 2006)
Peer pressure	(M. Wind 2006)
Shared meals	(Hannon et al. 2003)
Someone to prepare meals with	(Watters, Satia & Galanko 2007)
Vegetable garden, community or farmers	(Gustafson, Cavallo & Paxton 2007; Kamphuis et al. 2007; Nanney et al. 2007)
Material deprivation	(Kamphuis et al. 2007)





Family environment, rules,	(Maclellan, Gottschall-Pass & Larsen 2004; Tak et al. 2006; van Assema et al. 2007; M. Wind 2006)
Convenient mealtimes	(D. Marshall et al. 1995)
Teachers influence, school rules	(M. Wind 2006)
Inflexible work hours	(Jabs et al. 2007)
TV viewing/advertising exposure	(Blanchette & Brug 2005)
Vending machine/snack bar	(Blanchette & Brug 2005)
High price (affordability) of fruit	(D. N. Cox et al. 1998)
High price (affordability) of fruit and vegetables	(Brug et al. 1995; Cullen et al. 2000a; Dibsall et al. 2003; Kamphuis et al. 2007; Mushi-Brunt, Haire-Joshu & Elliott 2007)
Accessibility, including transport and location and type of retail outlets	(Ball, Crawford & Mishra 2006; Dibsall et al. 2003; John & Ziebland 2004; Kamphuis et al. 2007; Latham & Moffat 2007; D. Marshall et al. 1995; Robinson, Caraher & Lang 2000)
Material: -storage	(Katrina Giskes et al. 2002a; John & Ziebland 2004)
Barriers	(Brug et al. 1995; Dittus, Hillers & Beerman 1995; Havas et al. 1998)
Seasonality	(Brug et al. 1995; John & Ziebland 2004; D. Marshall et al. 1995)
Fruit messy or squashed when eating away from home	(M. Wind 2006)
Appearance	(M. Wind 2006)
Parental intake[food choice], role modelling, meal planning/purchasing practices	(Blanchette & Brug 2005; Cullen et al. 2000a; Epstein et al. 2006a)
Quality/freshness	(Kearney et al. 2000)
Taste preferences of children	(Blanchette & Brug 2005)
Taste preferences of children and/or male partner, stressful encounters	(Dovey et al. ; John & Ziebland 2004)
Taste preference of parents	(Hanson et al. 2005)
Perishability	(Emma Lea, Worsley & Crawford 2005)
Child involved in shopping/meal preparation	(Cullen et al. 2000a)





2.5.16 Factors to be considered when developing interventions

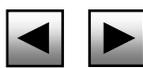
Shoppers appreciate fresh versus processed fruit and vegetables, and the taste of fruit more than the taste of vegetables (Tom Baranowski et al. 2007b). Tasty, simple, quick and easy to prepare vegetable recipes for people to enjoy may assist in increasing vegetable consumption (Tom Baranowski et al. 2007b; Jabs et al. 2007; Emma Lea, Worsley & Crawford 2005).

Nutrition education efforts should address barriers to eating fruit and vegetables by assisting people to prepare and integrate fruit and vegetables into their current diets (Dittus, Hillers & Beerman 1995). Barriers to healthy eating are likely to be specific to each dietary change and relate directly to the behaviour (Cotugna et al. 1992; Dittus, Hillers & Beerman 1995). Dittus et al. (1995) asserts that the barriers relate more strongly to the behaviour than the benefits; therefore they should be addressed by nutrition education initiatives (Dittus, Hillers & Beerman 1995).

Efforts to increase fruit and vegetable consumption should include suggestions on how to eat fruit and vegetables in ways that are easy, and require little time and effort (Brug, Glanz & Kok 1997). Social desirability response bias is the self-reported overestimation or acceptable traits or underestimation of unacceptable traits (L. M. Klesges et al. 2004; Watson et al. 2006). Social desirability response bias should be considered when developing and evaluating interventions (Tom Baranowski et al. 2007b). A study of Australian Air force recruits found that fruit and vegetables are socially desirable food choices compared to sweet snack foods (Worsley, Baghurst & Leitch 1984).

Stages of change research identified that many people in the action/maintenance states had consumption levels lower than recommended, perhaps indicating that they are in fact pre-contemplators, unaware of the need to change (Brug, Glanz & Kok 1997). Nutrition education should focus on encouraging people who over-estimate their consumption to compare their intake to recommendations (Brug, Glanz & Kok 1997). Thus, different stages of change may require different strategies. Richards et al. (2006) successfully used staged-based newsletters, motivational interviews and Internet materials to encourage fruit and vegetable consumption in a convenient sample of 437 18 to 24 year olds (Richards, Kattelman & Ren 2006).

Some problems or barriers to increasing consumption are only encountered when individuals try to make changes; therefore intervention research is critical to identify





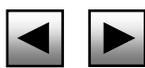
these, and intervention designs need to be flexible (John & Ziebland 2004). For example participants identified 16 barriers to increasing fruit and vegetables prior to an intervention, three additional barriers at six-month follow-up, and five more two weeks later (John & Ziebland 2004). The additional barriers were indicative of attempting to make changes, for example fruit and vegetables too messy to eat, lack of cooking skills for specific meal types, or related to unexpected disruptions or changes in routine (John & Ziebland 2004).

Studies have demonstrated that confidence in cooking can be improved, however, in areas of social deprivation flexible approaches would need to be undertaken to access the hard to reach groups (R. M. Foley & Pollard 1998; Wendy L. Wrieden et al. 2007). Lea et al. (2005) found that lack of knowledge about how to prepare plant food and meals, and lack of time were the main barriers to increasing consumption (Emma Lea, Worsley & Crawford 2005).

The health message should not be the over-riding message (Emma Lea, Worsley & Crawford 2005). Most people know that fruit and vegetables are good for them and healthy, however, other aspects such as convenience, ease of preparation, taste and enjoyment are more likely to motivate (Emma Lea, Worsley & Crawford 2005).

It is important to focus on factors that can be modified with developing interventions to promote fruit and vegetables (Watters, Satia & Galanko 2007). Pre-disposing, enabling, and reinforcing factors need to be considered when developing interventions and are often specific to the target audience.

Jago et al. (2007) assert that understanding the mechanisms by which availability impacts consumption would aid the design of more effective intervention programs (Jago, Baranowski & Baranowski 2007). Specific recommendations for interventions included: building asking skills in children, involve parents in school based interventions, increase exposure to a variety of fruit and vegetables (to children), including their preferred types, up-size the serving size and containers for fruit and vegetables, make sure there are cost savings or perceived value, display produce prominently and in a convenient form, include the social environment (facilitate meal sharing, taste testing). Jago et al. (2007) identified a gap of policy level interventions and research, for example the wider impact of meal provision, coupons etc. (Jago, Baranowski & Baranowski 2007), for example, do government subscription schemes increase home availability and general consumption (Jago, Baranowski & Baranowski 2007).





In 1998, when reflecting on results of research into the determinants of fruit and vegetable consumption and evaluation of interventions Rayners suggested that further research to identify the most effective interventions is warranted (Rayner 1998). Amid calls for ‘nationally co-ordinated and sustained strategies that tackle availability and access as well as changing attitudes and behaviours’ a range of interventions were recommended, for example, reforming agricultural and food policy to support lower costing of fruit and vegetables, provision of free apples to schools, managing food available in vending machines (Rayner 1998). The need to identify effective interventions is still a high priority a decade later.

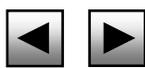
Nutrition education messages are often framed using food-based categories with no eating context. Personal experience and specific eating contexts should be incorporated to increase salience, for example, ‘packable’ or ‘quick and easy’ food (Blake et al. 2007). The framing of messages encouraging increased fruit and vegetable consumption is important, Williams-Piehota et al. (2006) found both messages encouraging individual and those encouraging social responsibility were effective at increasing consumption (Williams-Piehota et al. 2004).

Fruit and vegetable consumption are clearly different behaviours influenced by different factors and this must be taken into account when developing interventions (Reinaerts et al. 2007). For example, there are some variations based on gender or ethnicity (in children) however the availability for fruit and taste preferences and habit for vegetables are important (Reinaerts et al. 2007).

Habit is thought to be triggered by environmental cues and is associated with fruit and vegetable consumption; therefore, environmental change strategies should be incorporated into interventions (Brug et al. 2006).

Consumers may need to allocate more of their food budget to fruit and vegetables, and reduce spending on other foods (Cassady, Jetter & Culp 2007). The FOODcents program outlines a proportional spending model that assists consumers to make such changes (MR Foley, Pollard & McGuinness 1997; R. M. Foley & Pollard 1998). Public policies should consider strategies to reduce economic barriers to purchasing foods in line with dietary recommendations (Cassady, Jetter & Culp 2007).

Fruit and vegetable messages should emphasize that the recommendations are a minimum, and separate advice should be given for fruit and vegetables (World Health Organization and Food and Agriculture Organization 2004). ‘Variety is important’ and ‘fresh is better’ need to be incorporated into all nutrition messages





promoting increased consumption of fruit and vegetables (World Health Organization and Food and Agriculture Organization 2004).

Interventions need to address sociocultural, economic, educational and technical challenges to expand and address the fruit and vegetable supply chain. Strategies required include increasing:

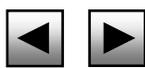
- consumer awareness benefits of healthy eating , motivation and skills to increase consumption
- fruit and vegetable production and availability
- understanding of the components of consumer food choice attributes (taste, texture, form, price, convenience, quality and safety)
- innovation and the development of fruit and vegetable based food products
- opportunities for consumption in various settings, for example worksites
- implement and evaluate educational campaigns integrated with efforts to increases availability of and access to fruit and vegetables (World Health Organization and Food and Agriculture Organization 2004).

Evaluation needs to be incorporated into the planning and implementation of the intervention. Standard validated methods for measuring fruit and vegetable consumption, stages of change, and psychosocial predictors of consumption need to be simple to encourage use when research is not the primary motivation, for example as in government population based interventions (M. Miller & Stafford 2000) (J. Pomerleau et al. 2005a).

2.6 Interventions to increase fruit and vegetable consumption

This section outlines the types and effectiveness of interventions designed to increase fruit and vegetable consumption.

Health education focuses on the individual's knowledge, attitudes and behaviours and motivations to encourage them to make changes. The behavioural determinants are specific to different health behaviours, for example, the barriers and motivators for why a person eats/does not eat fruit and vegetables are different to why they are active/not active (Brug, van Lenthe & Kremers 2006). Health education focuses on the individual and their motivations or barriers to changing behaviour, whereas, the opportunities to make the behaviour change may depend on their environment. The ecological approach to health promotion focuses on both educational and environmental supports for actions and living conditions conducive to health (Brug, van Lenthe & Kremers 2006; Green & Kreuter 1999).





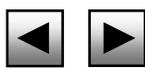
The WHO Fruit and Vegetables for Health workshop concluded that National fruit and vegetable programs should:

1. Include demand and supply side initiatives
2. Be consistent with and complimentary to national policies and action plans
3. Mobilise existing resources (people, information, initiatives, policies)
4. Have consistent message across all programs and interventions
5. Have increased consumption as the main outcome
6. Evaluate the process and each intervention, and
7. Be based on best practice (World Health Organization and Food and Agriculture Organization 2004)

2.6.1 Cost effectiveness of interventions to promote fruit and vegetables

Cost effectiveness is a key factor in assessing public health interventions. Dalziel and Segal (2007) conducted a review of 10 nutrition interventions to determine their economic impact (Dalziel & Segal 2007). The economic evaluation considered cost utility, all eight interventions subject to economic modeling were estimated to be highly cost-effective according to the World Health Organization definition, and media campaigns were potentially very cost-effective (Dalziel & Segal 2007). Their nutrition interventions to prevent cardiovascular disease were more favourable than antihypertensive medications and cholesterol lowering medication interventions (Dalziel & Segal 2007). The incremental cost effectiveness ratio of the Australian multi-media 2 fruit + 5 vegetable campaign that was AU\$12 per percentage point increase.

Evidence about the cost effectiveness of interventions to promote fruits and vegetables is limited (J. Pomerleau et al. 2005a). An Australian group assessing priorities for action in cancer control determined that a national campaign to increase fruit and vegetable consumption was cost-effective, acceptable and feasible (Commonwealth Department of Health and Ageing 2001). The report found that national campaigns to increase fruit and vegetable consumption were similar in effectiveness to national campaigns to reduce tobacco consumption (Commonwealth Department of Health and Ageing 2001).





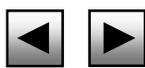
2.6.2 Health promotion models for improving fruit and vegetable intake

An understanding of the determinants of fruit and vegetable consumption is required to assist the development of effective interventions (Brug et al. 1995).

Eating activity is mediated by motivations consisting of reinforcements, self-efficacy and setting personal goals (Ewart 1991). In designing effective interventions aimed at increasing children's fruit and vegetable consumption, health professionals should apply theoretical models to inform the selection of strategies to promote and sustain behaviour change.

A number of different behavioural theories have been used to plan interventions to increase consumption of vegetables and fruit. The American '5 a Day' campaign has used the Health Belief Model, Consumer Information Processing and Social Learning Theory in the development of interventions (National Institutes of Health & National Cancer Institute 2001). Application of the Trans-theoretical or Stages of Change Theory have also been described (K. Glanz 2000). The Stages-of-Change model provides a theoretical framework for explaining health behaviours and predicting which individuals are most likely to change (Prochaska & Velicer 1997). The theory hypothesises that individual's progress through a series of cognitively different stages in considering and then acting to change health behaviour (K. M. Campbell et al. 2000). As the theory is based on cognitive stages and temptation to return to previous habits, it is most relevant to adults.

The Health Belief Model suggests that health behaviours are influenced by readiness to take actions and intervening beliefs about the specific behaviour (Dittus, Hillers & Beerman 1995). A framework proposed for fruit and vegetables includes, that the readiness to take action may be driven by the perceived susceptibility to a particular disease state, for example cancer, and may be related to concern about nutrition. Barriers to increasing consumption need to be considered, for example cost, availability, preparation skills (Dittus, Hillers & Beerman 1995). The balance of benefits and barriers leads to an individuals behaviour. Nutrition concern and cancer susceptibility were positively correlated to fruit and vegetable consumption behaviour. Barriers to consumption were negatively correlated benefits of intake, nutrition concern and behaviours. Benefits were positively correlated to nutrition concern, cancer susceptibility and behaviour. Lower education and income groups had higher scores for barriers; however, nutrition concern and susceptibility to cancer and benefits were not significantly different, suggesting that efforts should





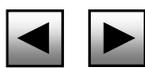
concentrate on addressing the barriers to consumption (Dittus, Hillers & Beerman 1995).

Theoretical frameworks underpinning the development of interventions targeting children include the Social Learning Theory (SLT) or Social Cognitive Theory (SCT) and the Resilience Theory (RT).

SLT explains behaviour in terms of a three way dynamic reciprocal relationship in which personal factors; environmental influences and behaviour continually interact. SLT assumes that individuals learn not only from their own experiences, but also from observing the actions of others and the result of those actions. "The environment shapes, maintains, and constrains behaviour; but people are not passive in the process, as they can create and change their environments." (K. Glanz 2000 p4) The six concepts described in this theory include: reciprocal determinism (behaviour change occurs through interaction with environment); behavioural capacity (knowledge and skills to influence behaviour); expectations (beliefs about likely results of behaviour); self-efficacy (confidence in ability to take and persist with action); observational learning (observing others and/or results); and reinforcement (positive responses to behaviour).

The SCT has provided a foundation for many school health promotion programs. The principle of reciprocal determinism identifies the continuous reciprocal interrelatedness of environmental (physical and social), personal, and behavioural factors (Weber Cullen et al. 2000). In 1999, Baranowski et al. found that there were few studies identifying psychosocial predictors of fruit and vegetables intake among children (T. Baranowski, Cullen & Baranowski 1999). The consumption by meal and weekend versus weekday (T. Baranowski, Smith & Hearn 1997), food preference, and availability-accessibility (Hearn et al. 1998) are three factors that have been identified as influencing fruit and vegetable choice.

Self-efficacy had been positioned as a mediating variable between environmental social factors and behaviour and a consistent determinant of eating behaviour (Shannon et al. 1990). Shannon et al. (1990) assert that a supportive social environment influences self-efficacy. Intervention programs need to allow opportunities and time for respondents to experience success in trying the health-related behaviours (Shannon et al. 1990). Brug et al. (1997) found that self-efficacy expectations for increasing fruit and vegetable consumption were most positive in the action/maintenance stages of change (Brug, Glanz & Kok 1997).





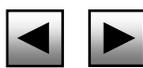
The Theory of Planned Behaviour has been used to study decision-making relating to health issues (Lautenschlager & Smith 2007). TPB includes their attitude (result of their beliefs about the consequences of the behaviour), subjective norms (what important others think) and their perceived behavioural control to comply (Ajzen 2001).

Watters et al. (2007) examined the use PRECEDE/PROCEED planning framework, incorporating aspects of the Stages of Change Transtheoretical Model, and social support models, to develop, implement and evaluate interventions to encourage fruit and vegetable intake (Watters, Satia & Galanko 2007). Pre-disposing factors (knowledge, attitudes and taste preferences), reinforcing factors (addressing social support) and enabling factors (affordability, time, information, and preparation skills) were assessed on 658 African Americans aged 18 to 70 years. The factors were different for men and women (Watters, Satia & Galanko 2007)

2.6.3 Intervention types

Public health interventions have been described as any action that could be taken or things that could be done to improve a health problem (National Public Health Partnership 2000c). There are many types of interventions that be considered when deciding what action to take to increase fruit and vegetable consumption. The National Public Health Partnership in Australia developed a framework to assist governments to identify and select interventions to address public health issues. The type of interventions identified included:

1. Public policy development
 2. Legislation and regulation
 3. Resource allocation
 4. Engineering and technical interventions
 5. Incentives (financial and non-financial)
 6. Service development and delivery
 7. Education (including skills development)
 8. Communication (including social marketing)
 9. Collaboration/partnership building (community and intersectoral)
 10. Community & organisational development (including organisational policy)
- (National Public Health Partnership 2000c).



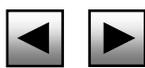


An international review of the effectiveness of interventions and programs promoting fruits and vegetables identified a lack of published information about interventions, particularly population based (J. Pomerleau et al. 2005a). Increasing understanding of the mechanisms by which fruit and vegetable availability impacts consumption will lead to better interventions (Jago, Baranowski & Baranowski 2007).

Although their intake was less than recommended Australian children consumed more fruit when at school than at home. Bell and Swinburn (2004) suggest that increasing the fruit and vegetables available for consumption at school in Australia would lead to increased intake of these foods and may reduce consumption of less nutritionally preferable foods (Bell & Swinburn 2004). Initiatives to increase the inclusion and consumption of fruit and vegetables in lunchboxes are also warranted (Sanigorski et al. 2005). Carter and Swinburn (2004) recommended urgent policy changes to control food choices available through school canteens. Many states in Australia have policies or guidelines with criteria concerning the provision and promotion of foods in school canteens and these governments are working towards a national standard.

2.6.4 Intervention effectiveness

Interventions to promote increased consumption of fruit and vegetables in adults were found to have positive effects, despite the difficulty in changing an individuals diet (John & Ziebland 2004). Interventions to increase consumption of fruit and vegetable have been shown to be effective, increasing consumption among children by +0.14 to +0.90 servings and +1.2 servings among adults (World Health Organization and Food and Agriculture Organization 2004). Most studies targeting the general population showed effects ranging from +0.2 to +0.6 servings of fruit and vegetables per day (Joceline Pomerleau et al. 2005b). The effects were greater when they targeted smaller communities, +0.7 to +1.4 servings per day (Joceline Pomerleau et al. 2005b). Reviews of interventions to increase fruit and vegetable intake have found no adverse effects (World Health Organization and Food and Agriculture Organization 2004) (J. Pomerleau et al. 2005a) (Joceline Pomerleau et al. 2005b). Interventions need to be based on scientific evidence, evaluated to determine effectiveness and unintended consequences, messages need to be integrated into dietary guidelines and programs, and culturally specific (World Health Organization and Food and Agriculture Organization 2004).





2.6.5 Policy interventions

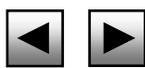
Policy interventions include guidelines, voluntary and enforceable codes of conduct, legislation, and supporting regulations (National Public Health Partnership 2000c). Policies, strategies and guidelines can provide the strategic direction and political impetus to assist organisations and governments to take action to address health issues. There is some agreement that public policy could assist local communities to alter the mix of local food retailing to enable access to fresh, good quality, appropriately priced fruit and vegetables (Robinson, Caraher & Lang 2000).

2.6.5.1 Food and nutrition policy

National government nutrition policies implemented with appropriate research, political will and financial support have been shown to direct and implement dietary guidelines and contribute to dietary and health gains (Kokko & Rasanen 1997) (Norum et al. 1997). Countries need to consider global influences on food and nutrition policy (Norum et al. 1997), particularly in relation to food production, distribution, advertising and promotion. Nutrition policy also has significant implications for agriculture and trade (Norum et al. 1997). There is an increasing emphasis on the need for food policy to support the production, access, promotion and equitable consumption of health promoting foods (McMichael 2005).

The Australian Food and Nutrition Policy was developed in 1979 and revised in 1992 (Commonwealth Department of Health & Family Services 1998). The key principles of the policy were: social justice, quality food supply, community participation and accountability, food system and wider interaction and ecologically sustainable development. The policy was to be implemented through intersectoral strategies consistent with the dietary guidelines for Australians. Political commitment facilitated the implementation of the policy and lead to considerable financial commitment (\$5.55 million between 1992 and 1996), and stakeholder engagement (government, private and non- government) (Commonwealth Department of Health & Family Services 1998).

Food and nutrition policies can be developed and implemented at global, national, local and organisational levels. Intersectoral food policies implemented at a local government level have resulted in increased access to fruit and vegetables (NPHP 2001; Webb, Hawe & Noort 2001; Western Sydney Area Health Nutrition Program 2001). A number of factors are considered essential preconditions to successful





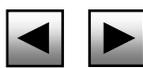
collaborative health action: necessity, opportunity, capacity to work together, relationships, planned action, evaluation and sustainability of outcomes (Webb, Hawe & Noort 2001) (M. Miller & Pollard 2005).

2.6.5.2 Policy to increase consumption of fruit and vegetables

The World Health Organisation (WHO) and Food and Agricultural Organisation called for member nations to increase consumption of fruit and vegetables through targeted campaigns (World Health Organization 2003b) (World Health Organization 2003a), asserting that effective health communication “has the capacity to create awareness, improve knowledge and induce long-term changes in individual and social behaviours” (World Health Organization 2003b). An International Fruit and Vegetables Alliance (IFAVA) was formed to encourage efforts to increase fruit and vegetable consumption globally (*The International Fruit and Vegetables Alliance.*).

In the United Kingdom the National Heart Forum called for a "national co-ordinated and sustained strategy to increase fruit and vegetable consumption" and that "such a strategy should tackle availability and access to fruit and vegetables as well as changing attitudes and awareness" (National Heart Forum 1997; Rayner 1998).

Dietary guidelines and nutrition recommendations in Australia highlight the need to eat more fruit and vegetables, at least 675 grams daily (including potatoes). This is consistent with the minimum 400 to 600 grams daily (excluding potatoes) recommended by health authorities to protect against disease (World Cancer Research Fund/American Institute of Cancer Research 2007; World Health Organization 2003a) (Lock et al. 2005). Eat Well Australia, the strategic framework for public health nutrition strategy and action, identified increasing fruit and vegetable consumption as a priority work plan area (Strategic International Nutrition Alliance 2001). A body of work was undertaken by the Australian governments to support the development of interventions to increase fruit and vegetable consumption, background documents and position statements (National Public Health Partnership 2000d) (National Public Health Partnership 2000a) (M. Miller, Shiell & Stafford 2000; M. Miller & Stafford 2000) (Baghurst et al. 1999) formation of the Australian Fruit and Vegetable Coalition, and funding the intergovernmental “Increasing fruit and vegetable consumption in Australia Project” to develop a coordinated, collaborative approach to increasing fruit and vegetables in Australia (C Pollard & Rowley 2006). Healthy Weight 2008, the Australian governments strategy





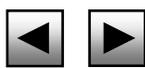
to address overweight and obesity encourages multi-strategy, cross sectional interventions across private, public and community sectors (National Obesity Task Force 2003).

2.6.5.3 Key messages

There is a need for effective educational messages to encourage the consumption of fruit and vegetables (Jenny H. Ledikwe, Ello-Martin & Rolls 2005). Developing suitable messages to assist consumers to understand and accept the importance of healthy eating is complex. Although there is agreement on the need to increase consumption, there are differences between countries in the classification of fruit and vegetables, what constitutes a serve, and the recommended servings (MR Miller, Pollard & Coli 1997), Clarification of dietary recommendations for fruit and vegetables needs clarification and they need to be addressed separately (Naska et al. 2000). Messages such as ‘eat more’ and ‘five servings are open to misinterpretation (Naska et al. 2000). Interventions should target vegetables specifically as the dietary intakes are lower than current consumption and the perceived difficulty with increasing consumption is greater than for fruit (Naska et al. 2000). Clarification is required with the classification of foods such as pulses, potatoes and nuts (Naska et al. 2000).

The World Health Organization focus on the importance of fruit and vegetables in the diet is highlighted in the Global Strategy on Diet, Physical Activity and Health where it called for member countries to take action to increase the promotion of fruit and vegetables (World Health Organization 2003b). In response nations have formed a number of alliances to encourage and foster efforts globally and many nations have fruit and vegetable campaigns, for example, the International Fruit and Vegetable Alliance (*The International Fruit and Vegetables Alliance.*) and the European Partnership for Fruits, Vegetables and Better Health (*European Partnership for Fruits, Vegetables and Better Health (EPBH).* 2003).

Dietary guidelines and policies around the world have increasingly encouraged increasing fruit and vegetable consumption. Australia has a number of policies relevant to increasing fruit and vegetable consumption including Dietary Guidelines (National Health and Medical Research Council 1999, 2003a, b), Eat Well Australia (Strategic International Nutrition Alliance 2001) and Food Selection Guide (Smith, Kellett & Schmerlaib 1998; Smith et al. 1999a; Smith et al. 1999b), the National





Action Plan to increase consumption of fruit and vegetables (National Public Health Partnership 2000a).

2.6.5.4 Horticultural policy, standards and production interventions

“The production and consumption of fruit and vegetables should be seen in a holistic supply chain approach i.e. from seed to table.”

Pg 11 (World Health Organization and Food and Agriculture Organization 2004)

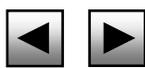
Public policy has a role in determining which fruits and vegetables are produced and consumed, for example, through price corrections through taxes or levy systems to assist production. Strategies can be employed to *‘improve the long term productivity, diversity and quality of fruit and vegetable production’* (World Health Organization and Food and Agriculture Organization 2004). National horticultural research and government agriculture agencies should assist the grower community to develop and implement interventions (World Health Organization and Food and Agriculture Organization 2004). Interventions can address all aspects of the supply chain, for example, transport cost and handling procedures, and how to add value to the current market. Countries are encouraged to engage other stakeholders to ensure links with promotional programs and adopting practices that ensure product quality and safety (World Health Organization and Food and Agriculture Organization 2004).

“Elements which could be included in a framework for action include:

- *advocacy, information and decision support*
- *supporting urban/peri-urban horticulture*
- *promoting sustainable production and enhancing efficiency of production factors*
- *preventing post-harvest losses and enhancing value of fresh produce*
- *ensuring food safety and quality*
- *strengthening trade intelligence, marketing, processing, and financial services*
- *promoting research and technology*
- *investing in nutrition education e.g. in rural, home gardens, school feeding and gardens.”*

Pg 11 The FAO/WHO workshop (World Health Organization and Food and Agriculture Organization 2004)

Food distribution impacts the environment, the supply chain results in ‘food miles’ (E. J. Lea 2005). The use of fees and allowances by produce buyers and sellers needs to be documented and assessed so that the impact on price competitiveness can





be determined (Kaufman et al. 2000). The impact of trade practices also needs to be considered (Kaufman et al. 2000). Fresh produce and seafood have the most volatile prices due to their distribution systems, transportation paths, product perishability and seasonality (McLaughlin 2004). Retail supplies and pricing strategies are complex (McLaughlin 2004).

There is considerable debate over government food policies and their impact on food purchasing habits and health. Miller et al. (2007) tested whether 'Cheap food policy', direct payments to producers, contribute significantly to the proportion of disposable income devoted to food expenditure in the US and concluded that direct payments do not significantly affect the affordability of food (J. Corey Miller & Coble 2007).

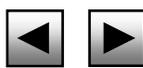
Policies include food security policies, agricultural production policies, education (and school) policies, credit policies, environmental policies, farming policies, labour, land and water policies, commerce and trade policies, food and agriculture taxation policies, horticultural and poverty reduction policies and GAP policies and bilateral and multilateral donor programs (World Health Organization and Food and Agriculture Organization 2004).

Industry strategies, for example Horticulture Australia Limited Supply Chain 2005-2010 (McEvelly 2006), Australian Vegetable Industry Strategic Development (AVIDG) Strategic Plan "Vegvision 2020" (Australian Vegetable Industry Development Group 2005), Future Focus –the Australian horticulture plan, as well as individual produce and state based strategies.

Australia houses half of the 22 million hectares of organically managed land worldwide, 2.3 percent of Australian agricultural area. Organic food retail sales in Australia increased tenfold between 1990 and 2003. There has been a rapid increase in availability of organic lines in supermarkets, for example Coles increased from 12 to 150 lines in two years. For retailers and growers adopting the organic line may be more about a consumer niche market than environmental concerns (E. J. Lea 2005). This comment is made considering the additional environmental costs of transport, packaging and growing that are used.

2.6.5.5 Food service policy

Food service policy has potential to influence food provided and consumed in a variety of settings (Jennifer D. Seymour et al. 2004a; J. D. Seymour et al. 2004b).





Prices can be changed to influence food choices without affecting revenue (Epstein et al. 2006b; S. A. French 2003; S. A. French et al. 2001a). Government subsidies supporting the sale of fruit and vegetable dishes at cost would encourage the purchase of fruit and vegetables (S. A. French et al. 1997).

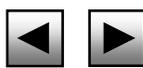
2.6.5.6 Fiscal and social policy

Regulation and fiscal policies to encourage consumption of fruit and vegetables are dependent on each country's political, social and environmental situation. Regulation to limit use of health claims, advertising and promotion of nutritionally less-preferable foods or facilitation of advertising and promotion of fruit and vegetables through health claims are a possibility (World Health Organization and Food and Agriculture Organization 2004).

Aspromourgos (2006) defines fiscal policy as the national government's planned, discretionary balance between its outlays and recurrent revenues (broadly, spending and taxes) (Aspromourgos 2006).

Marshall (2000) suggested the extension of the Value Added Tax to certain foods to reduce the risk of heart disease in the UK (T Marshall 2000). The robust debate that followed suggested that issues of equity, practicality and effectiveness (O'Rourke 2000) and the need to consider more than single nutrients as the basis for selecting foods needed to be considered (Stanley 2000). Taxation will raise revenue and influence demand, any fiscal policy needs to be based on an analysis of the net effect of the change of food consumption on nutrition indicators. Marshall (2000) offered three arguments against fiscal food policy, that they would not result in dietary change, that they were inequitable, and that they would erode personal freedom. These factors should be considered in assessing the impact of fiscal food policy, however, as Marshall demonstrated, the loss of personal freedom should be considered against the health gains (T Marshall 2000).

A review of acceptability of policy options to reduce obesity found that stakeholders (including food producers, retailers and caterers, advertisers and the media, teachers, public health professionals, environmental planners, advocacy groups and consumer organisations) found that fiscal measures, for example taxing high fat or high sugar foods or subsidizing healthier foods, would have to be justified in terms of health and social benefits (Millstone & Lobstein 2007) (Mohebati et al. 2007). 'Upstream' policy measures were less accepted by the private sector, however, were welcomed

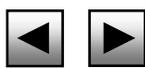




by other stakeholders (Millstone & Lobstein 2007). The cost of not taking actions was considered more important than taking actions (Millstone & Lobstein 2007). Monitoring food consumption patterns was considered essential.

The ProGrow suggests that a collection of policies, including fiscal policies, may be the most effective options to reduce obesity. Fiscal options considered included reducing subsidies on the price of over-consumed foods, for example cakes and biscuits, or reducing the price of fruit and vegetables by increasing subsidies (T Lobstein & Millstone 2006). Policies altering food composition were considered effective, feasible and acceptable in tackling obesity. Caraher (2005) suggests that applying a food tax can send a direct message to the public that the government is committed to improving issues related to healthy eating (Caraher & Cowburn 2005). Nestle (2000) suggests taxing unhealthy foods and using the revenue to promote healthy foods as an alternative to banning or restricting advertising (M Nestle & Jacobsen 2000). This approach is similar to the Australian taxing of cigarette sales for health promotion programs. Caraher (2005) suggests that although useful, this 'hypothecated revenue' approach is ineffective, as it cannot compete with the food industry advertising investment, focuses on the individual rather than changing the production and marketing of unhealthy foods. However, it could be considered a symbolic measure (Caraher & Cowburn 2005).

Many EU countries have a Value Added Tax (VAT) that applies to food and drink, however, the amount and foods it applies to differs, and may be based on social and environmental issues and in some cases contradictory to promoting healthier food choices (Caraher & Cowburn 2005). The US has many examples of food taxes that are designed to generate income and not on promoting healthy food choices (Caraher & Cowburn 2005). Most food taxation examples were on categories of foods sold in micro-level environments, for example school canteens, with a flat rate percentage of retail price across the food service (Caraher & Cowburn 2005). Caraher (2005) suggests taxing food advertising as an effective alternative as most foods advertised are not nutritionally preferred (Caraher & Cowburn 2005). Categorisation of foods based on nutrient or energy content to allow for assessment against nutrition criteria is a prerequisite of any taxation system designed to encourage health eating (Caraher & Cowburn 2005). Unprocessed fresh fruit and vegetables however do not require this level of assessment. The political appeal (or not) of food taxation appears to be the ultimate decider, not empirical evidence. Caraher (2005) asserts that the power





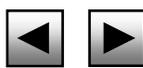
of the food industry and impact on the poor appear to be the two influencers of political will (Caraher & Cowburn 2005). Caraher (2005) suggest a mix of food tax and subsidies may be beneficial (Caraher & Cowburn 2005).

Fiscal policy in Australia has evolved over the last 25 years in response to two main drivers, sizeable account deficits, and the projected implications of an ageing population on future public health costs (Gruen & Sayegh 2005). In Australia a Goods and Services Tax (GST) was introduced in 2000 to replace a number of indirect taxes, basic or minimally prepared food commodities such as fruit and vegetables were excluded (Caraher & Cowburn 2005). Kenny (2000) found strong equity, simplicity and economic efficiency grounds for the GST food exemption system. There have been no overarching evaluations of the impact of the GST food exemption system on food consumption in Australia. There have been a number of state based market basket surveys that show increases in the relative costs of fruit and vegetables since the introduction of GST. The 2006 Healthy Food Access Basket survey found that the cost of healthy food had to a greater extent than less nutritious alternatives (Queensland Health 2007).

Food stamps and coupons redeemable on fruit and vegetables have been used effectively with disadvantaged groups in the United States to ensure that financial support is used for the purpose intended by the donor (J. V. Anderson et al. 2001). The US Department of Agriculture revised its Women, Infants and Children food packages ruling to increase the value of the fruit and vegetable vouchers to increase consumption of food consistent with American dietary guidelines (Food and Nutrition Service U.S. Department of Agriculture 2007). Studies show that the uptake of these programs is high in the US (Herman, Harrison & Jenks 2006), however, this form of support may not be as politically or socially acceptable in Australia.

Winkler et al. (2006) found substantial and consistent evidence that diets high in fruit and vegetables reduced the risk of coronary heart disease, and considered policy recommendations appropriate and applicable to the Australian lifestyle characteristics (Winkler, Patterson & Newman 2006).

Australian food regulations are being revised to address food industry demands for health claims on food products. The Australia New Zealand Food Standards Code requires nutrition information on most Australian food products, single ingredient foods (including fruit and vegetables) are exempt (Food Standards Australia and





New Zealand 1995). Food Standards Australia New Zealand is currently developing nutrition, health and related claim standards to allow food industry to put substantiated health claims on packaged goods. It is expected that claims related to dietary advice concerning fruit and vegetables would be allowed, for example “eat at least two servings of fruit and five of vegetables every day” and “oranges are good sources of vitamin C”. It is envisaged that these new regulations will allow use of health claims outlining the health benefits of eating more fruit and vegetables on fresh and partially processed fruit and vegetables at point of sale (Food Standards Australia New Zealand 2006) (Food Standards Australia New Zealand 2007). Food manufactures and retailers lobbying governments to influence dietary advice to the public in an effort to establish a ‘healthy’ or ‘nutritious’ image for their products (M. Nestle 2003). The evidence to suggest that these changes will result in healthier food choices is limited, if at all available.

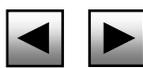
2.6.6 Programs

2.6.6.1 Multi-strategy

Multi-component interventions appear to be the most effective in increasing children's fruit and vegetable consumption (J. Pomerleau et al. 2005a). It appears that there is a dose relationship, with the greatest increase in fruit and vegetable consumption found in those studies with the greatest intensity of intervention (J. Pomerleau et al. 2005a). For adults the impact of multi-component strategies was more difficult to assess due to a lack of control groups for population based interventions. In addition to this it is difficult to ascertain which component of these types of interventions is most effective. However, Pomerleau et al. concluded that “multi-component approaches appear to be more effective, especially when combined with personal follow-up” pg 43 (J. Pomerleau et al. 2005a).

2.6.6.2 Mass communications (including social marketing)

Consumers need clear unambiguous health information to get the message across (Kelly & Stanner 2003). The media promotes contradictory, incorrect or misleading messages that leave the general public confused, apathetic or anxious (Kelly & Stanner 2003). Awareness of key health messages is important step in changing health behaviour (Stables et al. 2002). Emphasis should be on increasing vegetable



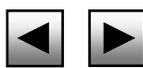


consumption (specifically dark green, deep yellow, and cruciferous vegetables) in addition to fruit to ensure chronic disease protection (Stables et al. 2002).

Social marketing applies learnings from the commercial sector to the resolution of social and health problems (Stead et al. 2007). Social marketing draws from many bodies of knowledge to understand the influences on people's behaviour. Andreasen (1995) defines social marketing as:

“the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of their society.”(p.7) (Andreasen 1995). Donovan and Henley (2003) consider Andreasen's definition too constricted in terms of its emphasis on voluntary behaviour, pointing out that some social marketing initiatives require voluntary behaviour among change agents that will result in involuntary behaviour change among the target audience (Donovan & Henley 2003). Unobtrusive changes to the food supply, for example a reduction in sodium, or substitution of polyunsaturated and monounsaturated fat for saturated fats are good examples of voluntary behaviour change resulting in involuntary behaviour change. In addition to the inclusion of involuntary behaviour, Donovan and Henley proposed that the definition of 'common good' is based on the United Nations Universal Declaration of Human Rights (United Nations 1948), and that the focus of a social marketing the expanded to include not only individual behavioural change, but changes in social determinants of health and well-being (Donovan & Henley 2003). Hastings (2007), goes further to define that social marketing is not social advertising, and that it is multifaceted (Hastings G 2007) and uses Lazer & Kelley's definition that *“social marketing is concerned with the application of marketing knowledge, concepts and techniques to enhance social as well as economic ends. It is also concerned with analysis of the social consequences of marketing policies, decisions and activities”*(p.ix) (Lazer & Kelley 1973). Although there is little agreement about the exact definition of social marketing, Stead et al. identified for key features: voluntary behaviour change; the principle of exchange (a clear benefit to the customer); consumer oriented market research, segmentation, targeting and use of marketing mix; the end goal is to improve the individual and societal welfare (Stead et al. 2007).

The UK National Social Marketing Centre has developed eight benchmark criteria for good social marketing: (1) sets behaviour goals; (2) uses consumer research and





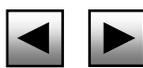
pre-testing; (3) makes judicious use of theory; (4) is insight driven; (5) applies the principles of segmentation and targeting; (6) thinks beyond communications; (7) creates attractive motivational exchanges with the target group; (8) pays careful attention to the competition faced by the desired behaviour (Hastings G 2007).

A recent systematic review of the social marketing effectiveness of 54 interventions, found that more extensive consumer formative research led to a greater likelihood of intervention impact, suggesting a focus on understanding the target audience, using consumer research to develop insights for intervention design (Stead et al. 2007). Social marketing can affect upstream change, changing behaviour of individuals, professionals, organisations and policymakers (Stead et al. 2007). Effective interventions addressed competition to the behaviour, both internal and external, for example enforcement through legislation to restrict youth access to alcohol. This is relevant in terms of food-service provision and marketing of healthy food choices, or restricting nutritionally undesirable foods. Stead et al. suggest that the use of theory to design interventions leads to effective interventions (Stead et al. 2007).

2.6.6.3 Messages

The beliefs, attitudes, and cultural uses that determine fruit and vegetable consumption differ (Gibson, Wardle & Watts 1998), therefore this must be taken into account when developing messages. Consumers feel that the information presented in the media is often confusing and contradictory (Wilson 2007). When designing media messages about health and nutrition, and those which have a specific audience in mind are the most effective (Wilson 2007). Segmenting the population based on people's nutrition beliefs and behaviours is one approach, for example, "*I am already doing it*", "*I know I should but...*" or the "*don't bother me*" groups, as each has different characteristics and motivations (Wilson 2007). Personal relevance is important, and both motivation and a guillotine must be present, also the source of the message should be credible, attractive, or likeable. This means that when developing a persuasive nutrition message:

- It's important to select the most appropriate message source.
- Give precise, clear-cut advice, for example about types in quantities of foods to eat.
- Acknowledge the inappropriate message and then present evidence to refute





- If using fear, strong messages that convince the receiver that they are susceptible should be used (Wilson 2007).

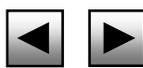
Nutrition messages are best kept simple, or if not simple should be presented in a medium that allows for self pacing and reflection, for example magazines or reading material (Wilson 2007). Mass media campaigns may play an important role in public health promotion in Australia (Bauman, Owen & Brown 2007). Bauman et al. (2007) point out that the initiatives must be linked to other activities across sectors (Bauman, Owen & Brown 2007). Personally relevant information is more systematically processed than less salient information (Ruiter et al. 2006). Attentive processing of information is required for effective health communication (Ruiter et al. 2006). People are more likely to change their diet after reading a personalised nutrition message, for example, you are eating half the amount of fruit and vegetables recommended for good health (Brug et al. 1999).

Awareness of the 5 A Day message among adults over 18 years in United States increased from 7.7 percent in 1991 to 19.2 percent in 1997 and knowledge of the program increased from two percent to 17.8 percent (Stables et al. 2002). When reflecting on the 5 A Day Program in the United States, it was considered that the development of the 5 A Day message and logo is one of the best decisions made (National Institutes of Health & National Cancer Institute 2001). Permission to use the 'brand' was integral to licensing arrangements that supported partners to implement the campaign.

The purchase of fruit and vegetables in the US doubled between 1987 and 1997 and consumption increased by 12.3 percent to 319 pounds per capita (Kaufman et al. 2000). The choice increased, the number of individual produce items increased by 94 percent and food service produce sales increased 62 percent over that time period. The Department of Agriculture found that consumers were more aware of the health benefits of fruit and vegetables, and were responding by increasing consumption.

"Promotion campaigns, such as USDA's Food Guide Pyramid and the 5-A-Day for Better Health program, improved produce quality, increased variety and year-round availability have also boosted consumption of fresh fruit and vegetables." Pg 15 (Kaufman et al. 2000).

The types of messages that are used for mass media campaigns need to be carefully considered. Health messages need to be personally relevant (Iversen & Kraft 2006). Messages linking the risk of disease with health behaviour have the potential to be

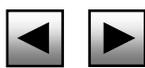




considered stressful or guilt provoking and activate non-coping mechanisms, particularly in those less educated (Iversen & Kraft 2006). Health messages should be constructed to increase motivation to perform the health behaviour (Iversen & Kraft 2006). With regard to messages to increase fruit and vegetable consumption, Lechner et al. (1998) asserted that differences in actual behaviour and perceived behaviour may lead individuals to be unaware of the fact that they do not meet dietary guidelines (Lechner et al. 1998). Increasing awareness of recommended amounts of fruit and vegetables and encouraging self-assessment is therefore essential to encourage increased consumption (Lechner et al. 1998).

Mass media has the potential to reach large segments of the population that may not be reached by other health interventions. Simplicity of message has been shown to be a key factor in successful mass media campaigns (Wallack 1981). Public confidence in media messages from a credible health agency has been shown to be a key factor in affecting consumer buying patterns (National Institutes of Health & National Cancer Institute 2001).

Nationally coordinated tobacco control, immunisation and illicit drugs campaigns have been more cost effective (Australian Department of Health and Ageing 2002). Until recently, health campaigns promoting fruit and vegetables and physical activity were state based. Evaluation of the Australian national fruit and vegetable campaign conducted in 2003 found 70 percent awareness, increases in knowledge of recommended amount of vegetables, and attempts to increase consumption (Woolcott Research Pty Ltd 2007). The campaign was based on the Go for 2&5@ campaign developed in Western Australia. The industry government partnership formed to develop this campaign was integral (M. Miller & Pollard 2005). Campaigns need to be maintained to achieve sustained change (M. Miller & Stafford 2000). An Australian government review of intervention to promote fruit and vegetables recommended a national social marketing campaign as an effective intervention to promote fruit and vegetables (M. Miller & Stafford 2000). Further research into psychosocial predictors of fruit and vegetable intake in Australia and into the effectiveness of promoting fruit and vegetables separately or together were recommended (M. Miller & Stafford 2000).





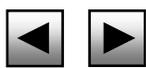
2.6.6.4 Community initiatives

Community initiatives enable specific local needs to be addressed, provide an opportunity to build the capacity of community members to promote health, and build ongoing links between stakeholders within the area encouraging long term commitment.

Community gardens, street or farmers markets and community cooking programs develop skills as well as increased fruit and vegetables consumption (R. M. Foley & Pollard 1998; Nanney et al. 2007). The Kamilaroi Market Garden Project in Australia provided training opportunities for Indigenous people as well as increased variety and supply of fruit and vegetables for older members of the community (Malalo 2001). A study of 96 Minnesota youth involved in a garden program found that those in the program consumed more fruit and vegetables (Lautenschlager & Smith 2007). Attitude was a strong predictor of intention to change behaviour in boys, but not for girls who already had relatively high intakes and intentions to increase consumption (Lautenschlager & Smith 2007).

Rural communities who report eating home grown vegetables (either from a personal or neighbours garden or farmers market) report higher fruit and vegetable consumption (Gustafson, Cavallo & Paxton 2007). This concept may also improve access. Gustafson et al. (2007) suggest that nutrition professionals can support this concept through providing information to local community members, being policy advocates with schools, parents, local farmers, local and national governments (Gustafson, Cavallo & Paxton 2007). Local governments may support payment benefits, as with the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) in the US and federal governments can focus on agricultural policy, for example, the opportunities to improve access to healthy food in the 2007 Farm Bill (Block et al. ; Patrick 2006; Stokstad 2007; Weber & Becker 2006; Weems & Weber 2007). Programs promoting fruit and vegetables delivered by through train the trainer programs at the local community level can access hard to reach groups (Annie S. Anderson 2007; MR Foley, Pollard & McGuinness 1997; R. M. Foley & Pollard 1998).

Most social marketing interventions are evaluated using randomised controlled trials or quasi-experimental design with follow-up ranging from one month to several years post campaign (Stead et al. 2007). The social marketing classification requires that interventions have specific measurable behavioural objectives, for example,





prevalence of consumption of recommended servings of fruit and vegetables, frequency of consumption, progression of one stage to another. Some social marketing campaign measure attitudinal, knowledge and skills as evaluation outcomes. Psychosocial measures such as self-efficacy for or social support for behaviour and physiological outcomes such as blood pressure, cholesterol level and Body Mass Index, may also be included (Stead et al. 2007).

2.6.6.5 Setting based promotion

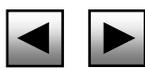
Settings based approaches to promotion often provide convenient ways to reach specific target groups, for example, supermarkets, schools, worksites and food service, institutions (prisons or childcare settings) and health care facilities. These settings allow the opportunity to implement a range of strategies including mass communications, environmental change, and group education and skills development.

Settings based promotions have been identified as best-practice interventions to increase fruit and vegetable consumption in Australia (M. Miller, Shiell & Stafford 2000).

Results of the evaluation of nine 5-A-Day fruit and vegetables promotions targeting specific groups in different settings (schools, worksites, community health centres, churches and a university) revealed increases in the provision of information, partners working together at local levels, and increases in fruit and vegetable intake attributed in part to the campaign (National Institutes of Health & National Cancer Institute 2001).

2.6.6.6 Point of sale

Cooking demonstrations, taste testing and information provision (recipes cards etc.) at point of sale are recommended to encourage increased consumption of fruit and vegetables (Emma Lea, Worsley & Crawford 2005). The health focus can be included, but is not the main message (Emma Lea, Worsley & Crawford 2005). Changing price can influence food choices in vending machines (S. A. French 2003; S. A. French et al. 2001a), cafeterias (S. A. French 2003) and restaurants (Adam Drewnowski & Specter 2004). Policy changes in schools to limit provision of less healthy food need to be supported with external environmental changes so that compensation does not occur (Cullen et al. 2006).

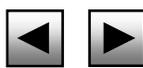




2.6.6.7 Schools

School based interventions can improve children's nutrition by providing opportunities for formal learning (curriculum), experiential and skills development (gardening, cooking and tasting). Programs are relatively low cost, practical to implement and keep children at school (Knai et al. 2006). Knai et al. (2005) conducted a systematic review of interventions to encourage fruit and vegetable consumption by children five to 18 years of age. Of the studies on primary school children, nine of 11 showed significant increases in fruit and vegetable consumption of +0.3 to +0.99 servings per day, two studies reported a positive net effect of +0.7 servings per day. One study did not increase consumption, however, prevented the overall decrease in consumption observed in the control group (T. Baranowski et al. 2000). Only one of the four interventions in secondary schools showed an increase in consumption. Gortmaker et al. (1999) found girls increased consumption by +0.32 servings per day (Gortmaker et al. 1999). Blanchette et al. (2005) reviewed school-based interventions to increase fruit and vegetable consumption among children six to 12 years, finding increases +2.54 daily servings of fruit and vegetables (Blanchette & Brug 2005). Increasing consumption of fruit was reported more often than of vegetables.

A number of observations regarding effective interventions to increase children's fruit and vegetable consumption, key success factors were that they were multi-component, had a good length of exposure, and increase availability of product (Knai et al. 2006). Specifically, intervention components should focus on fruit and vegetables rather than nutrition in general; integrate interventions into whole school environment (usual curriculum, food service and posters and promotions); 'hands on' exposure to fruit and vegetables (preparation and taste-testing) rather than static lectures; train teachers and food service staff; establish peer leaders; food service promotions (staff encourage students to chose fruit and vegetables); involve parents at school and home; establish a school advisory committee and develop a school nutrition policy; engage the local community (producers, retailers, youth service organisations); long follow-up (the three most effective interventions ran for 12 months) (Knai et al. 2006). Knai et al. (2006) observed that the more students were exposed to fruit and vegetables, the better the consumption patterns (Knai et al. 2006).





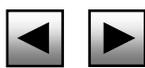
The low priority of nutrition in a crowded curricula, perceived or real; teacher or school burden; and poor planning and communication across the school community, have been identified as barriers to school based interventions (Cho & Nadow 2004).

2.6.6.8 Multi-component interventions

French et al. (2003) concluded that multi-component interventions were effective at increasing fruit consumption by 0.6 servings per day and vegetable intake by 0.3 servings a day (Simone A. French & Stables 2003). Combinations of classroom curriculum, parent home activities and food service are recommended (Simone A. French & Stables 2003). Curriculum activities encouraging asking skills and offering tasting opportunities are encouraged, school meal modification, marketing and promotions, staff training and community interactions). Participation of parents in home activities was more successful than parent activities outside the home, which had low attendance (Davis et al. 2000; French & Blair-Stevens 2006).

2.6.6.9 Food service

There are significant differences in food service practices and expectations in the school environment around the world. For example, in The Netherlands two thirds of children eat their lunch at home during lunch break and the meals that are eaten at school are provided by the parents (Tak et al. 2006). There are no vending machines and children are not allowed to access other eating outlets (Tak et al. 2006). School meals provided by the school in England make a significant contribution to children's daily intake, an estimated that over three million meals are served daily contributing to 25 to 35 percent of energy, fat, fibre and other nutrients intake (Lambert et al. 2005a). Smart cards, an electronic debit cart, can be used to monitor and evaluate food purchases at school (Lambert et al. 2005a). Food provided only met nutrient recommendations for food service about 50 percent of the time (Lambert et al. 2005b). Sweet baked goods were 10 times more popular than fresh fruits and yoghurts (Lambert et al. 2005c). Lambert et al.'s (2005) research using smart cards highlighted that unhealthy foods on school menus are popular. Limiting availability of unhealthy options leads to increased consumption of other items, however, foods brought from home or at other outlets may contribute to accessing foods less nutritionally preferable (Lambert et al. 2005c).





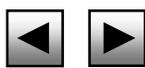
Children's school meals have had extensive media coverage with a project featuring Mr Jamie Oliver, "*as a consequence of this, the UK government pledged an additional £280 million to tackle the 'crisis' in England*" (Lambert et al. 2005c). In Scotland there was a call to revitalize school meal provision, standardize portion sizes and product specifications.

Point-of-sale social marketing advertising and promotions at the food service outlet are usually part of effective food service promotions (Blanchette & Brug 2005).

Provision of fruit and vegetables at lunchtime provides an opportunity to increase fruit and vegetable consumption among students (Cullen et al. 2000b; K. D. Reynolds et al. 2000b). School meal modification or canteen promotions have been successful in increasing fruit and vegetable consumption, these usually consist of increasing availability and variety of fruit and vegetables in the food service outlet, improved taste, appropriate portion sizes and food service staff training (C. L. Perry et al. 1998; Cheryl L. Perry et al. 2004; K. D. Reynolds et al. 2000a). Fruit baskets at point-of-sale at an American university resulted in increase fruit sales (Buscher, Martin & Crocker 2001).

2.6.6.10 Food provision or subscription schemes

There is a recent trend to provide free fruit or offer subscription schemes through schools including in the US, United Kingdom, the Netherlands, Denmark and New Zealand (Fogarty et al. 2007) (Blanchette & Brug 2005) (Eriksen et al. 2003) (E. Bere et al. 2006) (Elling Bere, Veierod & Klepp 2005) (Wells & Nelson 2005) (Horne et al. 2004) (Lowe et al. 2004). The Dutch Schoolgruitem campaign provides a serving of fruit and vegetables free to all primary school aged children three times a week (Tak et al. 2006), other programs include Krachtvoer (Martens et al. 2006) and Pro Children Study across Europe (Brug, Yngve & Klepp 2005). The National Schools Fruit Scheme (NSFS) provided a free piece of fruit at school four to six year old children and was implemented on a regional basis, allowing for a natural experiment evaluation (Fogarty et al. 2007). Results indicated that fruit intake increased during the intervention however, this benefit was not sustained after fruit provision had ceased (Fogarty et al. 2007). Cafeteria provision or subscription of fruit and vegetables were positive (Eriksen et al. 2003; Cheryl L. Perry et al. 2004). Eriksen et al. (2003) evaluated a five-week fruit (apple twice a week and other 100 gram portion of other fruit on the third day) and vegetables (50 grams carrot or

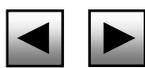




cucumber two days per week) subscription scheme for six to 10 year old Danish children (Eriksen et al. 2003). Results found an increase of 0.4 pieces of fruit per school day and no change in vegetables, or total fruit and vegetable intake (Eriksen et al. 2003). The intake of non-subscribing children in the intervention schools increased 0.3 pieces of fruit per school day, with no increase in control schools. The authors suggest that the subscription scheme, with the formal break to eat fruit or vegetables, prompted Danish parents who did not subscribe to provide fruit as Danish parents feel strongly that it is the responsibility of the parent to provide food for their child at school (Eriksen et al. 2003). Uptake of the subscription scheme was higher in younger children (45 percent in 0 to 3 year olds, 35 percent in 4 to 6 years and 11 percent in 7 to 9 year olds) (Eriksen et al. 2003).

Bere et al. (2006) evaluated the impact on fruit and vegetable intakes of 11-year-old children in an educational program, along with the Norwegian no parental cost subscription program in 2001 and 2002 (E. Bere et al. 2006). The program was followed up one year post intervention and the authors concluded that longer term increases in fruit and vegetable intake were most likely due to the subscription scheme rather than the educational program (E. Bere et al. 2006). Free subscription schemes appeared to result in higher fruit and vegetable consumption than parent pay schemes which only appear to have the positive effect on subscribers (E. Bere et al. 2006).

The Food Dudes program in UK gave out fruit at lunch and mid-morning snack times, combined with a peer-support program and rewards (Horne et al. 2004) (Lowe et al. 2004). Children's 'liking for' fruit and weekday consumption increased significantly during the intervention period (Horne et al. 2004; Lowe et al. 2004). A multi-strategy school breakfast program in Queensland was implemented for one year and utilised curriculum, food provision (school canteen opened for breakfast for duration of intervention and free breakfast for one week only) and community involvement components (Radcliffe et al. 2005). The intervention groups had a significantly lower increase in the proportion of children skipping breakfast, and eating less nutritionally preferable foods over the period than the control groups, and there was no change in usual breakfast food consumption between the groups (Radcliffe et al. 2005). The intervention group had broadened their perception of what constituted a healthy breakfast. The authors recommended that programs should be multi-component and individualised to each school (Radcliffe et al. 2005).





Subsequent evaluation of the National School Fruits Scheme in the UK found that even though fruit and vegetable consumption increased in children aged four to six years, the results were not sustained longer term (Wells & Nelson 2005). Wells and Nelson (2005) recommended that ongoing nutrition promotion and integration into primary school curriculum be provided to encourage more sustainable outcomes (Wells & Nelson 2005).

2.6.6.11 Curriculum component

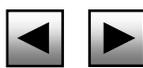
Educational activities including teacher training have been an effective component of school-based initiatives to increase fruit and vegetable consumption (Blanchette & Brug 2005; Story et al. 2000).

2.6.6.12 Recommendations for school promotions

In summary, key recommendations for effective fruit and vegetable promotions in the school setting by addressing key determinants and mediators of fruit and vegetable consumption in the target age group. Programs should address personal factors (taste preferences, self-efficacy –asking and preparing foods) and environmental factors (access and availability of fruit and vegetables at home and at school, peer and parent influences) (Blanchette & Brug 2005; Marianne Wind et al. 2005).

Specific recommendations to interventions:

- Multi-strategy interventions
- Theory driven
- Food service component –incorporate fruit and vegetables
- Policy component –restrict vending and snack machines
- Training of teachers and school cooks
- Curriculum content to address key determinants (encourage food preparation skills, asking skills, knowledge of recommended amounts of fruit and vegetables, motivational -goal setting and behavioural skills)
- Multi-media, for example tailored computer programs to increase reach and reduce costs
- Mass media, marketing and promotions
- Engage parents through homework
- Subscription schemes or formal meal and snack breaks





2.6.6.13 Worksites

People who work outside the home often have access to meals at or near their worksite. Worksites have formal communication channels and often implement health policies (Heimendinger et al. 1995; National Institutes of Health & National Cancer Institute 2001) Beresford et al. (2000) found that worksites with the greatest use and distribution of intervention materials resulted in the greatest increase in fruit and vegetable consumption (Beresford et al. 2000).

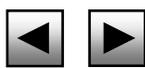
Sorensen et al. (2004) reviewed worksite-based initiatives to promote fruit and vegetables and found that program effectiveness relied on managerial commitment, supervisor support to encourage employee participation, and organisational structure to support change over time (Glorian Sorensen, Linnan & Hunt 2004) (G. Sorensen et al. 1998). The WHO has recently released a toolkit for worksite interventions to promote fruit and vegetables, concluding that the workplace is an appropriate setting for health promotion and recommending that programmes have clear goals and objectives, link to business objectives, enlist strong managerial support and effective communication and develop supportive environments (World Health Organization 2008).

2.6.6.14 Health services

Australians see their general practitioner (GP) at least once a year and consider them a source of reliable information. A randomised controlled trial through general practitioners with a minimal nutrition intervention reported self-reported significant differences in increases in dietary change between the intervention group and control group (76 percent versus 29 percent) and intentions to make dietary change (83 percent intervention group versus 43 percent control group) (Hickling et al. 2007).

2.6.7 Infrastructure support

Extensive infrastructure and support is required to develop and sustain effective programs promoting fruit and vegetables (National Institutes of Health & National Cancer Institute 2001). Partnerships are required for strategies to increase fruit and vegetable consumption to be effective (World Health Organization and Food and Agriculture Organization 2004). Potential partners include public sector (for example, Health, Education, Agriculture, Transport, Public works, Commerce and Trade, Local governments, Environment departments), private sector (agriculture

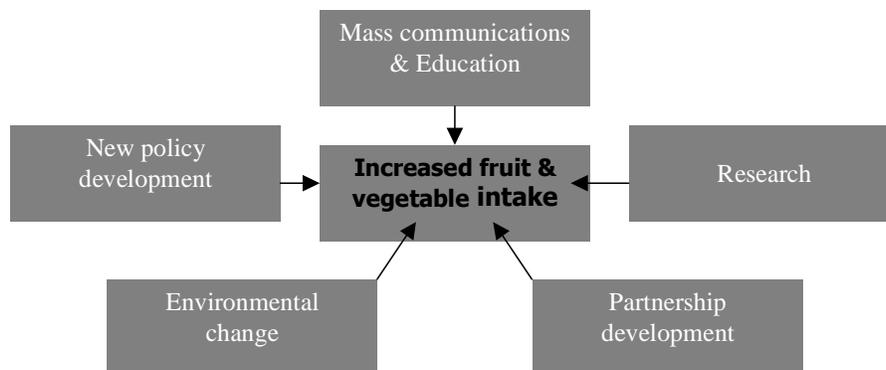




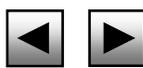
suppliers, producers, fruit and vegetable processing, packaging, transport, marketing, retailers, wholesalers, and importers industries, media, financial institutions, worksites, schools and hospitals), non-government organisations (community groups, consumer groups, non-government health organisations, professional associations – dietitians, parents, teachers, community or religious leaders) and international bodies (WHO, FAO, UNICEF etc, consultative and advocacy groups) (World Health Organization and Food and Agriculture Organization 2004). Leadership for national campaigns should be either health or agriculture driven, or both (World Health Organization and Food and Agriculture Organization 2004).

Successful initiatives to increase fruit and vegetable consumption require both effective promotional interventions, and initiatives to address the underlying structural factors. The Strategic Inter-Governmental Alliance in Australia (2001) identified structural supports for public health initiatives including: research to assist the development and assess the potential impact of health and non-health interventions; evaluation and monitoring of change; development and implementation of policy to support initiatives addressing structural barriers; adequate and sustained resourcing (both human resources and funding arrangements); and a strategic management structure to manage coalitions at national, state and local levels (Strategic International Nutrition Alliance 2001). These are similar to those identified at the first international meeting of 5 A-Day managers to promote fruit and vegetables, Figure 2 (L DiSogra, Dudley & Strunge Meyer 2004).

Figure 2 Effective Programs to increase fruit and vegetable intake



Source: Adapted from Morten Strunge Meyer (L DiSogra, Dudley & Strunge Meyer 2004)





2.6.7.1 Product development

“The share of the stomach is moving towards speciality retailers and foodservice, especially dining out”. Pg14 (Australian Government Department of Agriculture 2006)

Horticulture industries need to be flexible to meet the challenges they face to meet consumer demands in the food retail and food service sectors. Pre-prepared fresh vegetables and ready-to eat salads have been successful, but further opportunities (and challenges) exist for the inclusion of fruit and vegetables in innovative meal solutions and take-away foods (BIS Shrapnel 2000, 2002), especially for the youth market.

An analysis of the opportunities for the Australian food sector identified sustained pressure to offer convenience to the end consumer, expansion of casual dining and take-away food, opportunities for specialist retail and food service, scope for improved intelligence to better understand opportunities outside grocery retail, collaboration within the supply chain, nutritional-cost trade offs in institutional meals, greater supply of meals through contract arrangements, growth in interest or niche foods (Australian Government Department of Agriculture 2006). In Australia, consumer demands for higher quality, convenience and other factors, such as food safety are anticipated (*Future Focus -the Australian horticulture plan. Horticulture: the big drivers? Part 1: Edibles. Discussion paper for industry consultation.*).

The major food retail chains accounted for 78 percent of the grocery channel market share, and food service 35 percent in Australia in 2006. A summary of a recent review of trends affecting consumer shopping and food consumption practices in Australia are outlined in Figure 3. The demand for ‘away from home’ and interest in health saw a significant growth in fresh salad meals and healthy snacks (Australian Government Department of Agriculture Fisheries and Forestry 2007).

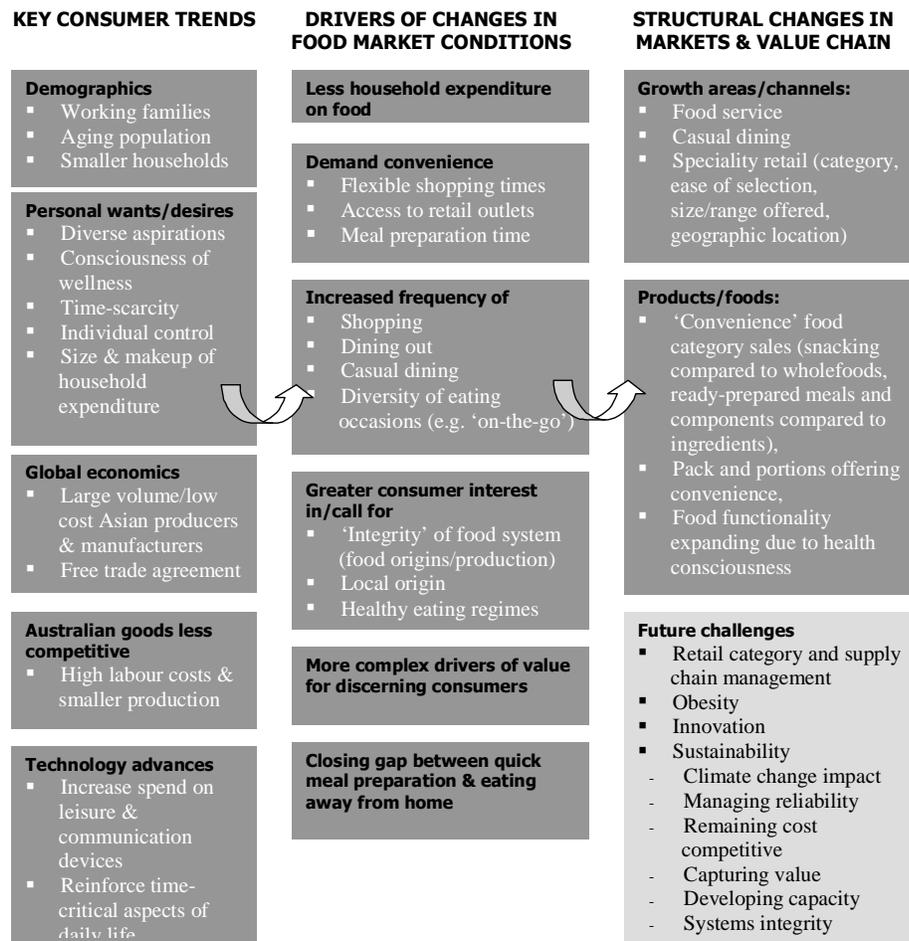
The fresh and processed fruit and vegetable categories performed poorly in an assessment of value chains of different food categories in Australia. This was mainly skewed to the higher number of participants, existence of wholesale market clearance functions in the chain and the low level of market information. These factors challenge the capacities to innovate, limits diversity, and results in limited success in capturing value (Australian Government Department of Agriculture 2006). The major trends for fresh fruits and vegetables were cost competition from imported produce and snack foods, and the impact of climate change on supply lines



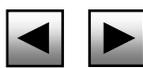


(Australian Government Department of Agriculture 2006). Supermarkets are commanding growth in dry grocery categories to address consumer convenience needs, which is impacting processed fruit and vegetables (Australian Government Department of Agriculture 2006). Opportunities for product innovation, food service and specialty retail, and institutional food service were identified. Improving information and intelligence of market conditions was considered a priority with significant scope (Australian Government Department of Agriculture 2006).

Figure 3 Trends affecting Australian consumer shopping and eating practices



Source: Adapted from Australian Food Statistics (Australian Government Department of Agriculture Fisheries and Forestry 2007) and FOODmap (Australian Government Department of Agriculture 2006)

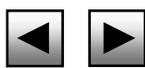




2.6.7.2 Partnerships and the role of industry

Communication models to improve eating habits in line with dietary recommendations need to influence opinion leaders in all strata of society (Emma Lea, Worsley & Crawford 2005). Structural support for such initiatives requires a broad base and should include government, horticulture and food industry sectors (Emma Lea, Worsley & Crawford 2005). There is limited financial support available for such initiatives and partnerships can assist in influencing stakeholders to improve public health by well-funded promotions of plant foods (Emma Lea, Worsley & Crawford 2005). Marshall et al. (1995) concluded that government, policy makers, food retailers and other parts of the food network have roles to play in facilitating dietary change to increase fruit and vegetable consumption (D. Marshall et al. 1995). Intersectoral action is essential for the effective promotion of fruit and vegetables (M. Miller & Pollard 2005) (M. Miller, Shiell & Stafford 2000) (Karen Glanz & Hoelscher 2004) (*European Partnership for Fruits, Vegetables and Better Health (EPBH)*. 2003) (*The International Fruit and Vegetables Alliance*. 2005) (National Institutes of Health & National Cancer Institute 2001). The right mix of organisational commitment, leadership, relationships, opportunities and capacity to achieve results is required (M. Miller & Pollard 2005). A number of factors are considered essential preconditions to successful collaborative health action necessity, opportunity, capacity to work together, relationships, planned action, evaluation and sustainability of outcomes (Webb, Hawe & Noort 2001) (M. Miller & Pollard 2005). The national 5 A Day program in the United States is supported by formal multilevel public and private partnerships The establishment of the national 5-a-Day logo and licensing scheme has been acknowledged as the key to the success of the program in the United States (National Institutes of Health & National Cancer Institute 2001). The logo and formal agreements amplify the effect of individual promotions and enable expansion of activities across many communities. The formal structure enables the standard of the campaign to be managed and assists with communication between partners. In the US it was estimated that there was a four-fold return in promotional value for every dollar invested by the National Cancer Institute in the 5-a-Day scheme.

In July 2004 Australian Health Ministers endorsed a national initiative for a “national information programme to promote increased consumption of fruit and vegetables”(Australian Health Ministers' Conference 2004). In April 2005,



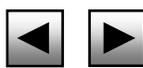


Parliamentary Secretary to the Minister launched Australia's national Go for 2&5[®] campaign. A national campaign had been a long-term goal in Australia for over 20 years. Based on the success of the WA Health Department's Go for 2&5[®] campaign, with the support of SIGNAL, Health Ministers and Industry partners (through the Australian Fruit and Vegetable Coalition (AFVC)), in 2004 Health Ministers and industry partners endorsed the Go for 2&5[®] campaign as the national model to adopt. The WA Department of Health prepared the campaign licensing framework and campaign materials, including resources to assist the management of the brand and the nutrition aspects of the campaign, to be used nationally in consultation with the AFVC and Horticulture Australia Limited (HAL). The return on investment was high with \$3.25 AUD million invested in developing and piloting the campaign in Western Australia, a further \$583,000 AUD was invested to establish the campaign including formal partnerships with government and industry, attracting \$15 AUD million for implementation over the next three years, representing \$26 AUD of promotional investment for every dollar invested (Department of Health in Western Australia 2007).

2.6.7.3 Research and evaluation

Monitoring the supply and consumption of fruit and vegetables is an essential component of developing effective interventions. Integration of data collection into national nutrition monitoring systems is recommended (World Health Organization and Food and Agriculture Organization 2004). Dietary surveys, food surveys, household expenditure, food balance sheets all contribute (World Health Organization and Food and Agriculture Organization 2004). Data sources include agricultural census reports, dietary intake surveys, and institutional food provision, and purchase data.

The development of the National 5 A Day program in the United States was informed by epidemiological evidence and consistent with national food and nutrition policy (National Institutes of Health & National Cancer Institute 2001). The research effort needs to be sustained and renewed across the timeline of the interventions (National Institutes of Health & National Cancer Institute 2001).





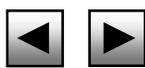
2.6.7.4 Sustained effort

There are examples of comprehensive multi-strategy campaigns to promote fruit and vegetable consumption that have been implemented since the late 1980s. The United States 5 A Day program and the Department of Health in Western Australia's fruit and vegetable campaigns commenced at about the same time (National Institutes of Health & National Cancer Institute 2001) (M. Miller, Pollard & Paterson 1996). Experience from these campaigns shows that intervention activity and outcomes are related to the resources invested (Helen Dixon et al. 1998) (National Institutes of Health & National Cancer Institute 2001).

The US 5 A Day program considers partnerships critical as each partner takes the lead in ensuring adequate, long-ranging funding for ongoing activities (National Institutes of Health & National Cancer Institute 2001). When funding is withdrawn, new initiatives may cease and gradually gains in knowledge, attitude or behaviour change are reversed (National Institutes of Health & National Cancer Institute 2001). Adequate resources and long-term investment is required to sustain campaigns. The 5 A Day program in the United States strengthened and expanded its partnerships to support new areas of activities in food service, retail, and education (National Institutes of Health & National Cancer Institute 2001).

2.6.8 Segmentation of target audiences

The need to increase fruit and vegetable intake is across all ages, genders and demographics (Australian Bureau of Statistics 1999; World Health Organisation 2003a, b) (Sharon Friel, Newell & Kelleher 2005) (Myint et al. 2007). Segmentation of target audiences according to common characteristics (behavioural, cultural, demographic, physical, psychographic) can assist in developing messages and strategies (Donovan & Henley 2003) (National Cancer Institute 1989). Within each market segment, it is important to identify the primary intended audience (whom communication will be directed at) and set priorities for specific changes that are intended. There may be several primary audiences, and possibly 'gateway' or 'gatekeeper' audiences who influence the primary intended audience (National Cancer Institute 1989). Potential audiences for communications to increase fruit and vegetable consumption include, consumer segments (based on life course, age, consumption levels), providers (food service or horticultural industry) or influencers (educators and health professionals), political influencers and governments.





2.6.9 Adults

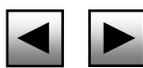
Adults are an important target audience due to their low fruit and vegetable consumption levels, potential health risks and ‘gateway’ influence on other audiences. Adults have considerable influence over household food preparation and consumption (Wolf et al. 2005) (Maclellan, Gottschall-Pass & Larsen 2004). Throughout the life course there are points of high amenability for dietary change, for example, childbirth, marriage, or onset of chronic illness.

2.6.9.1 Household food purchasers and preparers

Family members who purchase or prepare food are an important influencer of family fruit and vegetable consumption (Maclellan, Gottschall-Pass & Larsen 2004). Maclellan et al., (2004) used semi-structured one hour face-to-face interviews to explore the perceptions of barriers and nutritional benefit of fruit and vegetable intake of 40 women 20 to 49 years old who were not meeting the recommended daily fruit and vegetable intake compared to those who do. Women who had children and ate five or more servings a day had could identify more benefits and appeared to have specific nutrition knowledge (Maclellan, Gottschall-Pass & Larsen 2004).

2.6.9.2 Children and adolescents

Children and adolescents are an important target for promotions to increase fruit and vegetable consumption because they are developing their lifelong eating habits and they are the future food shoppers and meal preparers. They also are a relatively captive audience, through schools and childcare settings. There are a number of reports of promotions encouraging children to eat more fruit and vegetables (T. Baranowski & Stables 2000; Cullen et al. 2000b; L. DiSogra & Glanz 2000; S. Friel et al. 1999; Harris et al. 1998; McArthur 1998; Nicklas et al. ; Story et al. 2000). Strategies have focused on increasing availability and accessibility of fruit and vegetables in the school environment (canteen and curriculum with home based support). Nicklas et al. (2000) conducted an intervention to improve fruit and vegetable consumption though high schools (Nicklas et al.). Focus group research identified lack of availability, variety, and inconsistency in taste as barriers to increased consumption. School-wide media-marketing activities, meal and snack modification, classroom workshops and supplementary subject matter activities, and





parental involvement effectively increased awareness, positive attitudes, and knowledge about fruits and vegetables (Nicklas et al.).

An Australian population-based systematic review of interventions to increase consumption of fruit and vegetables in children identified three priority areas for intervention (directly and indirectly) as social marketing, supermarket and school promotion (M. Miller & Stafford 2000). The report highlighted the need to systematically evaluate the outcomes of interventions promoting fruit and vegetables to children for use in future planning.

2.6.9.3 Horticulture and food service sectors

The horticulture sector and related industries influence the supply, demand and quality of food. The horticultural sector is leading domestic market growth in Australia (Emma Lea, Worsley & Crawford 2005). The food service sector is emerging as an important influence as market share is increasing and there is opportunity to increase the provision of fruit and vegetables (Australian Government Department of Agriculture 2006).

2.6.9.4 Others

Health and education professionals are important sources of dietary advice and information and influencers of behaviour. Politicians, media, stakeholder organisations can influence fruit and vegetable consumption levels through their influence on policy, social attitudes, behaviours, priority and resource provision.





3 METHODOLOGY

A number of surveys that were developed and implemented by the DHWA were utilised to consider the factors influencing fruit and vegetable consumption in Perth, Western Australia. As well as using extensive literature and program reviews to guide the development of nutrition interventions, the DHWA conducted a monitoring and surveillance system, nutrition attitudes monitoring surveys, and research to underpin the development and ongoing evaluation of nutrition program activities. This thesis uses these resources to consider the impact of the comprehensive high profile fruit and vegetable social marketing campaign.

3.1 Campaign Description

3.1.1 Background

The DHWA has undertaken targeted social marketing campaigns to encourage healthy eating behaviours since 1989. The campaigns aimed to encourage eating habits consistent with the Dietary Guidelines for Australians. Initially in 1989, the Department launched the '*Eat Less Fat*' campaign to encourage awareness of the need to eat less fat. Consumer awareness was high and other health agencies, including the National Health Foundation, and industry groups were promoting the message.

In 1990 the DHWA developed a campaign to encourage increased consumption of fruit and vegetables. Increasing fruit and vegetable consumption was considered a government health priority due to inadequate consumption levels and the increasing evidence of considerable health benefits (and related health system savings). There was limited advertising and promotion of fruit and vegetables compared to less nutritious competing foods at that time. The campaign was developed using literature reviews, industry consultations and consumer focus groups and surveys to gain information about attitudes towards eating fruits and vegetables, how much should be eaten to gain a health benefit, barriers to greater purchasing and consumption of fruits and vegetables and effective promotional strategies. Consumers were amenable towards fruit and vegetables, and there were identified misconceptions and barriers that could be addressed by an advertising campaign.





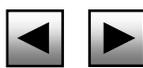
Multiple promotional strategies were used including television, radio, press, and billboard advertising, public relations activities, point-of-sale promotions, cookbooks and recipe cards, publications, community activities, sponsorships, and work-site and school-based activities. Resources allocated directly to the campaign advertising and production of materials ranged from \$200,000 to \$300,000 per year and two staff members. This does not include the resources of the research and evaluation and production teams.

Pre campaign research identified the following barriers to increasing fruit and vegetable consumption:

- personal and family eating habits that are difficult to change
- false impression of already eating enough
- perceived high cost, particularly of fruit
- inconsistencies in price of fruit and vegetables
- lack of skills in preparation of tasty and convenient fruit and vegetable dishes
- perception that vegetables are time consuming to prepare
- concerns about pesticide residues and genetically modified foods, and
- lack of, or limited supply, poor quality and high cost (in isolated areas in Western Australia).

The multi-strategy campaigns included paid mass media advertising, public relations activities, publications (including cookbooks), food demonstrations, point-of-sale promotions, school and worksite promotions, art/sport sponsorships, and collaboration with industry and other agencies. Strategies aimed to increase awareness of the recommended amount to eat for good health and provide practical information about healthy food selection and preparation. Partnerships with industry were established to try to address quality, freshness, pesticide levels and cost issues. Both sectors worked together on food selection, storage, preparation, food safety and value for money.

Initially the '*Fruit 'n' Veg with Every Meal*' message was used to encourage an increase in frequency of consumption (Health Department of Western Australia 1990). Evaluation results showed that although about 80 percent of consumers were aware of some aspect of the campaign and interpreted the message as needing to eat more fruit and vegetables, they were not prompted to action, suggesting that a more specific message promoting an optimal intake was preferable to one suggesting to just 'eat more' (M. Miller, Pollard & Paterson 1996).



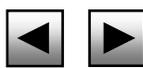


In 1991 until 1995, the ‘2 Fruit ‘n’ 5 Veg Every Day’ message was developed to encourage individuals to consider their own intake to prompt behaviour change (MR Miller, Pollard & Coli 1997). The campaign initially targeted women, who were considered the main food purchasers and preparers, and later one advertisement targeted 20 to 40 year old men, identified as influencers and low consumers. The ‘Buy in Season’ message was the used for point-of-sale promotions in conjunction with the ‘2 Fruit ‘n’ 5 Veg Every Day’.

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 percent and vegetables from 65 to 93 percent, and increasing the proportion of low consumers of vegetables that believed that they should eat more vegetables from 50 to 63 percent. The proportion of 25 to 65 year old women in Perth eating at least two servings of fruit per day increased significantly from 15 to 22 percent. 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. The campaign and its evaluation are described in more detail elsewhere (Pollard et al., 2000).

In 1991, the *Foodcent\$* program was developed for low-income earners to teach participants how to allocate their food budget to obtain value for money and balance their diet (MR Foley, Pollard & McGuinness 1997; R. M. Foley & Pollard 1998). The program comprised of three sessions: cooking, budgeting and supermarket tours. Community members were trained as ‘advisors’ to conduct the budget and cooking sessions and local dietitian’s conducted the supermarket tours. Television, radio and press were used to raise awareness of the project and recruit community advisors. The program was piloted in a regional area and evaluation results demonstrated that the proportion of ‘advisors’ who ate vegetable five or more times a week increased significantly at the six week follow-up, and at four years (although the sample was too small at this point to conduct statistical analysis). Based on these results the program was developed further for statewide implementation.

In 1995, there was a political decision to target eating behaviours among Western Australian children. Social Learning Theory and formative evaluation results identified the need to target parents before children. Pre-campaign research, focus groups with mothers of children 9 to 11 years of age, children and friendship pairs





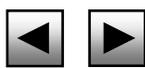
and a literature review on advertising to children, determined that, at least initially, parents with primary school aged should be the target audience. The '*Be Creative With Fruit 'n' Veg*' message which aimed to increase self-efficacy of parents to provide fruit and vegetables was launched in May 1995. The '*Fruit 'n' Veg-Eat it*' message was then used in September 1995 to target primary school aged children. The communication strategy used animated characters with attitudes to encourage positive attitudes towards fruit and vegetables in children. The campaign comprised of television advertising, whole of school promotions in the classroom, school canteen, and school community. There was a higher level of overall awareness of the campaign, 75 percent of parents (n=301) and 98 percent of children (n=2189) were aware of the campaign strategies. The more action oriented '*Fruit 'n' Veg-Ask for it*' message followed encouraging children to pester their parents to provide fruit and vegetables.

Although the campaign included a number of initiatives directed to children through the schools setting, a political priority for initiatives focusing directly on children resulted in the 1995 to 2000 campaign target audience changing to children. Formative evaluation identified two key target audiences: parents of children nine to 11 years of age, and children nine to 11 years of age. The first phase of this campaign used the Be Creative with Fruit 'n' Veg message to encourage parents to provide fruit and vegetable meals and snacks to their children. This was followed the '*Just Ask for It*' and '*Just Eat It*' messages targeting children. Results indicated high awareness of campaign messages among children, however availability of fruits and vegetables, primarily as provided by parents was still the key factor to increasing consumption.

3.1.2 The Go for 2&5® campaign

Previous campaigns were used to inform the development of a new fruit and vegetable campaign strategy in 2002.

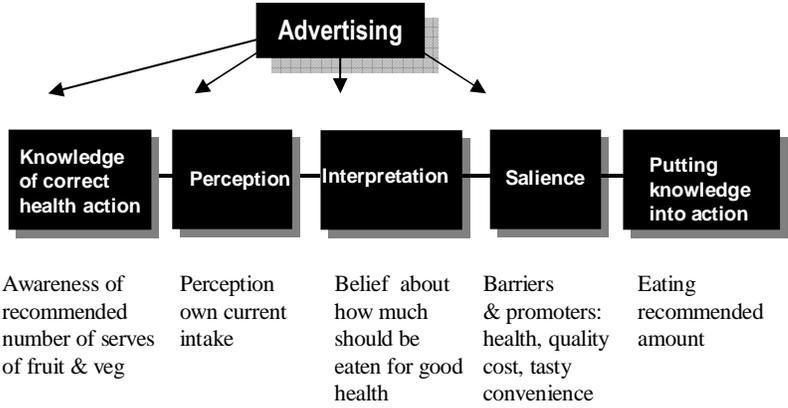
Health promotion theory assists health promoters to develop an understanding of the attitudes, belief and behaviours relating to the health behaviour they are encouraging (K. Glanz 2000), in this case increasing fruit and vegetable consumption. Research undertaken since 1990 was used to identify, develop and refine concepts, messages, and the marketing mix and multi-strategy program components. Pre-campaign research was structured using the: Health Belief Model (identified beliefs about the





health implications of not eating adequate amounts of fruit and vegetables, the concern about diet, benefits of eating more fruit and vegetables, barriers to increasing consumption, promoters of increased consumption, source of dietary advice, exposure to diet-related media advertising, and perceived confidence to make change). The Stages of Change (Transtheoretical Model) (Prochaska, DiClemente & Norcross 1992; Prochaska & Velicer 1997) was used to identify readiness to change behaviour and a model of adapted phases between knowledge and behaviour (Fishbein & Ajzen 1975), (Egger 1990) was used to examine behavioural beliefs, attitudes, influencers and intentions. See Figure 4 below.

Figure 4 Adapted phases between knowledge and behaviour for fruit & vegetable consumption



Source: Adapted from (Fishbein & Ajzen 1975), (Egger 1990).

The nutrition monitoring survey conducted in 2001 identified barriers and promoters to increasing fruit and vegetable consumption among adults in Western Australia. The issues were similar to those previously identified in 1998 and 1995, with the exception of increased emphasis on lack of time as a barrier to increasing consumption. There was some residual awareness of the two and five recommendation, however, there was a greater awareness of the need to eat two servings of fruit per day compared to five servings of vegetables. A new communication strategy was required. There was increasing evidence of the health





benefits of vegetables and acknowledgement of the consumer perception of difficulty and lack of time to prepare vegetables. Most consumers agreed that fruit and vegetables were healthy. The optimistic perception of current intake was considered a major barrier. The Department of Health's HWSS showed that in 2001, adults in Western Australia were consuming an average 1.6 servings of fruit per day and 2.6 servings of vegetables.

The household shopper and meal preparer was chosen as the target audience as it was considered that this was the person with the greatest influence on the family diet. Although most adults said they had some involvement in food shopping and meal preparation, it was largely the women who were the main meal preparer and shopper. The Go for 2&5[®] campaign was launched in March 2002 with the aims of increasing awareness of the need to eat more fruit and vegetables, and encouraging increased consumption of fruit and vegetables. The key communication objectives of the campaign were to:

- Raise awareness of the need to eat more fruit and vegetables, with an emphasis on vegetables;
- Improve perceptions of the ease of preparing and eating vegetables; and
- Increase knowledge of the recommended intake of fruit and vegetables.

The communication strategy was supportive and mindful of the mother's situation, busy and time poor. To encourage action, practical meal solutions were delivered in a positive manner. Current fruit and vegetable consumption levels were used to reinforce that intake was lower than recommended, and to congratulate consumers that "WA adults were halfway towards reaching the recommended intake of fruit and vegetables, it is easy to add more – and here's how". The Go for 2&5[®] message captured the intent of this message, prescriptive, yet encouraging. The campaign logo was developed as a mnemonic, to be used in animation, to prompt recall. The logo featured commonly eaten fruit and vegetables.





Figure 5 The Go for 2&5 logo, black and white version



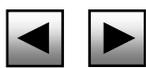
The single minded advertising proposition was “Getting an extra serve of vegies is easy”. At the time of the development of the campaign television chefs were very popular. A fruit and vegetable character with the voice of a popular chef would be created as the spokesperson for the campaign.

Pre-campaign research tested the popularity of a selection of chefs, including Jamie Oliver, Nigella Lawson, and four Western Australian chefs, namely, Aristos –the surprise chef, Geoff Jansz, and Iain Hewitson. The local, Aristos, was considered ideal as he visited households, opened the refrigerator and cooked meals for families in his television show. A colourful, fruit and vegetable character was developed based on Aristos. This face later became the Vegie-man, a key campaign trademarked image.

Figure 6 Vegie-man Registered Trademark



Television advertisements featuring animated fruit and vegetable characters with recognisable voices were the main mass media element. The characters had both audio and visual appeal. Initially the advertisements were encouraging, reminding

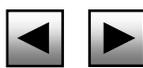




the audience of the recommended amount of fruit and vegetables, and then providing meal solutions. The first 30-second television advertisement featured an animated vegetable character with the voice of Aristos. A number of 15 second ‘meal solution’ commercials followed. Table 16 describes the advertisements.

Table 16 Description of Go for 2&5[®] advertisements

	Specification	Description
Encouragement Phase	1. Fruit & Vegie intake, 30 sec	Vegie man’ informs viewers their vegetable intake is ½ the recommended 5 serves and encourages them to ‘fit a few more vegies in your day’. He does this via an entertaining cooking demonstration – including adding salad to your roll and vegies on your pizza. Screened in 2002
	2. Meal solutions – Stir fry (Vegie man): 15 sec	Following message of the 30second ad, the meal solution gives additional ideas on quick, easy ways to add extra vegies. Vegie man’ character with the voice of Aristos, informs viewers that it is easy to ‘fit a few more vegies in your day’ showing a stir-fry meal. The animated mnemonic end frame reinforces the 2&5 [®] message.
	3. What is a vegie serve? (Vegie man): 30 sec	‘Vegie man’ character with the voice of Aristos, informs viewers about what constitutes a serve of vegies. i.e. 1 potato, ½ cup cooked vegies, 1-cup salad vegies. The animated mnemonic end frame reinforces the 2&5 [®] message
	4. Cookbook (Vegie woman): 30 sec	This ad uses the animated ‘Vegie lady’ character with the voice of Noni Hazelhurst (a high-rating TV lifestyle presenter) to prepare quick, easy and healthy recipes containing fruits and vegetables. The ad shows a number of recipes from the Healthy Food Fast cookbook i.e. Chicken and vegies, BBQ vegies, Italian pasta, Greek and Thai salad and pizza. The ad is colourful, features healthy fast food. The animated mnemonic end frame reinforces the 2&5 [®] message
Self-assessment phase	5. Dame Edna (interview) 30 sec	The ad introduces the Dame Edna animated vegetable character. The interviewers ask the question on everyone’s lips “How may serves of vegetables did you really eat today?”. Dame Edna assesses her intake meal by meal. The ad finishes with a question to the viewer “Did you really have your 5 serves of vegies today?”. The tone is playful. The animated mnemonic end frame reinforces the 2&5 [®] message
	6. Shopping solution (Dame Edna) 15 sec	The animated male vegetable interviewer reminds Dame Edna character to put vegies at the top of her shopping list the next time she goes shopping. The ad with a question to the viewer “Did you have your 5 serves of vegies today?”. The tone is playful. The animated mnemonic end frame reinforces the 2&5 [®] message.
	7. Dining out solution (Interviewer): 15 sec	The interviewer, an animated ‘Vegie man’ with a ‘cool’ comb over, reminds Dame Edna that it’s easy to add an extra serve of vegies when dining out – order side salad, swap chips for vegies. The animated mnemonic end frame reinforces the 2&5 [®] message





Other	8. Countdown billboard, 10 sec	Countdown billboard featuring animated fruit and vegies - 'Brought to you by 2 fruit & 5 veg'.
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Campaign tracking data revealed high campaign awareness but still a strong belief in the adequacy of their consumption, as the main barrier. This led to the decision to provoke a realistic more self-assessment as the main message from the next series of advertisements. Advertising and promotion budgets increased from \$330,000 in 2002 to \$880,000 per year in 2003 and 2004. Table 17 shows the media strategy and timing of the advertisements.

The advertisements and other campaign elements are available for viewing electronically on attached CD.

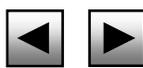




Table 17 Media strategy Go for 2&5[®] campaign, 2002 to 2005

Year	Media	Jan	Feb	Mar	April	May	Jun	July	August	Sept	Oct	Nov	Dec
2002	Television 30												
	Television 15												
	Radio												
	Newspaper												
	Boom gate												
	Taxi top												
	In-store eyelite												
	Trolley ads												
	Shelf-talkers												
	Website												
2003	Television 30												
	Television 15												
	In-store eyelite												
2004	Television 30												
	Television 15												
	Radio												
	Newspaper												
2005	Television 30												
	Television 15												
	Television CSA												
	TV subscription*												
	Radio												
	Newspaper												
	In-store eyelite												
Trolley ads													

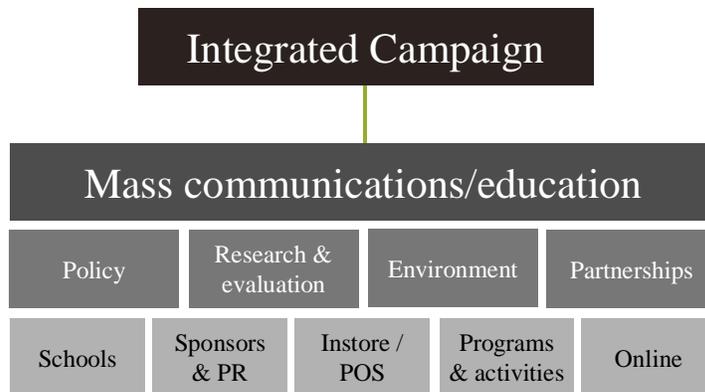




3.1.2.1 Other campaign considerations

Consumption is influenced by structural factors impacting on supply. Cost components of accessibility occur throughout the value chain: cost of production, processing, transport, wholesale and retail marketing practices. Changes in any of these cost components can have an impact on either final price or cost effectiveness of selling in some locations, particularly rural and remote areas. The numerous factors that influence consumption indicate that a comprehensive approach is required, see Figure 7.

Figure 7 Go for 2&5[®] comprehensive campaign approach



Social marketing applies learnings from the commercial sector to the resolution of social and health problems (Stead et al. 2007). Although there is little agreement about the exact definition of social marketing, Stead et al. identified for key features: voluntary behaviour change; the principal of exchange (a clear benefit to the customer); consumer oriented market research, segmentation, targeting and use of marketing mix; the end goal is to improve the individual and societal welfare. Researchers have identified specific aspects of social marketing that should be considered when developing assessing interventions. Table 18 outlines the social marketing characteristics of the Go for 2&5[®] campaign.

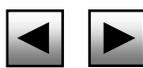
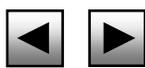




Table 18 Social Marketing Characteristics of the Go for 2&5[®] campaign

<p>1. Behavioural goals^{1,2,3,4}</p>	<p>Goal: Increase the population average consumption of fruit and vegetables by one serve across the population over five years.</p> <p>Communication objectives:</p> <ul style="list-style-type: none"> • Raise awareness of the need to eat more fruit and vegetables, with an emphasis on vegetables; • Improve perceptions of the ease of preparing and eating vegetables; • Increase knowledge of the recommended intake of fruit and vegetables.
<p>2. Uses consumer research and pre-testing^{1,2,3,4}, Consumer orientation³.</p>	<p>Literature and program reviews. Stakeholder consultations. Dietary analysis to identify priority targets and behaviours. Benchmark survey identifying budgeting, purchasing and food preparation and dietary behaviours, attitudes and beliefs. Internet panel pre-test of character and advertising concepts. Industry validity of suitability choice of logo mnemonic devise. Pilot tested sub-programs, FOODcents and Crunch&Sip.</p>
<p>3. Makes judicious use of theory^{1,4}</p>	<p>Mixed theory approach: Precede-proceed theory to assist in identification of predisposing and enabling factors Stages of Change Theory, Health Belief Model, Change Theory Diffusion of Innovation, Organisational Change formative and evaluation instruments. and Theory of Innovation in program implementation strategy.</p>
<p>4. Is insight driven^{1,4}</p>	<p>Used 2. and 3. to identify key insights: consumption ½ recommended; need to increase across all ages and demographics; amenable to increasing consumption, know fruit and vegetables are good for them but nutrition not highest priority; consider 2 fruit easy and achievable, 5 vegetables more difficult, interested in saving money, women are ‘gatekeepers’, main household shoppers and food preparers, time poor. Disproportionate advertising of competition ‘junk’ foods; increasing consumption of meals away from home.</p>
<p>5. Applies segmentation and targeting^{1,2,4}</p>	<p>Main target “ household food shopper and meal preparer”, mostly women who assume this responsibility and secondary targeting of all adults. Other targets: health and education professionals; horticulture industry; hospitality industry. Children, as influences of parents eating habits and future consumers, are target for school based strategies.</p>
<p>6. Thinks beyond communications, Uses more than one element of</p>	<p>An integrated campaign; high reach mass communication (television, radio, press; Web site); point-of-sale promotions (including food demonstration); publications (including cookbooks); collaboration and policy</p>



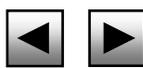


marketing mix, integrated approach^{1,2,3,4}	implementation through stakeholder steering group; public relations (issue raising); school activities (annual fruit and vegetable week, curriculum resources); sponsorships at sports and arts related events; related programs (FOODcents, budgeting shopping and cooking skills development; Crunch & Sip [®] , formal fruit and veg snack break schools).
7. Creates attractive motivational exchanges with target group^{1,2,3,4}	Main exchange through encouragement and support; quick, easy to prepare, recipe and meal ideas. Reward and incentive schemes increasing the provision of healthy foods in various settings, e.g. school canteens, child-care centres.
8. Pays careful attention to competition to desired behaviour^{1,4}	Campaign advertisements placed during food advertising times, opportunistic advertising in response to media issues (e.g. Pillman versus Vegie man, withdrawal of vitamin supplements); food service criteria.
9. Considers motivation to engage in desired behaviour^{2,3}	Good nutrition is considered important, however, information is confusing, and nutrition is not the highest priority. The main motivators are related to quick, easy, convenient, tasty and good value, to this end, the campaign provides information, is encouraging and is solutions based.
10. Considers strategies to minimise competing behaviours,^{1,2} monitor and influence environmental forces³	Communication strategies and the target audience priorities changed over time; initially encouragement and support moving to more provocative ‘ self-assessment’. DHWA media comment on nutrition issues, and staged and targeted public relations plan (for example role of fruits and vegetables in the diet when trying to lose weight leading up to summer). Daily media monitors and monthly, campaign tracking, and tri-annual monitoring surveys.
11. Involves sectors not traditionally associated with health³	The horticulture industry, from growers groups to retailers, the hospitality industry (including public and private sector institutionalised catering), other government departments (Agriculture, Commerce and Trade), non-government organisations, not-for profit organisations, community groups (through sponsorships), and education were all engaged through the campaign steering group and/or various campaign related activities.

Source: ¹(Hastings G 2007), ²(Stead et al. 2007), ³(Donovan & Henley 2003)
⁴(French & Blair-Stevens 2006)

3.1.3 Strategic planning and intervention selection

Government policy (Strategic International Nutrition Alliance 2001) and dietary guidelines (National Health and Medical Research Council 1999, 2003a, b) form the basis for most nutrition interventions in Australia. A planning process is required to





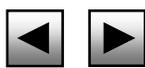
select effective interventions and actions bring about the desired changes. A planning framework was developed for the National Public Health Partnership to assist Australian government health departments with their planning, management, quality assurance and provision of public health interventions (National Public Health Partnership 2000c). Barraclough & Gardner assert that, in Australia, if policy goals are shared between the Federal, State and Territory levels, the implication is that they will be pursued more vigorously (Barraclough & Gardner 2008). The systematic approach to planning the provision of public health interventions was used by the DHWA to prepare the “Eat Well WA -Fruit and Vegetable Strategy”. The process involves the following steps:

1. *Identifying the determinants of health*
2. *Assessing the risks and benefits posed by each determinant to identify what should be addressed*
3. *Identify intervention options and appraising them*
4. *Deciding on the portfolio of interventions*
5. *Implementing the portfolio*
6. *Evaluating the portfolio* (National Public Health Partnership 2000c).

The broad purpose in developing management portfolios was to select interventions that will improve access to and increase consumption of fruit and vegetables in WA. Firstly, literature reviews and formative research were used to identify the health determinants and their risk/benefits. Next, to decide what action to take, the full range of intervention types were considered covering policy, program interventions, and the infrastructure required to support them.

Grouping intervention types resulted in two distinct management portfolios, each identifying a health determinant and a management objective. Portfolio one addressed the health determinant: access to vegetables and fruit. The management objective was to increase and sustain access to high quality, safe, affordable vegetables and fruit. Portfolio two addressed the health determinant: consumption of at least 300g (two servings) fruit and 375 g vegetable (five servings) daily. The management objective was to increase consumption of fruit and vegetables by people in WA to meet or exceed recommendations.

A steering group was formed to lead the development of the strategy and to select priorities for action. This group was asked to weight the importance of interventions in selecting these. Using the evidence available, their knowledge and professional





judgement they assigned a score out of ten to each intervention for its expected performance against specific criteria including: effectiveness, equity, feasibility, acceptability, timing and sustainability. Involving both the government and non-government sector was crucial for effective action in implementing strategies. The interventions selected, the custodian for management, partners required, action, costs, and performance indicators or measures were identified and confirmed by the steering group.

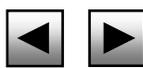
Key stakeholders from government departments and the fruit and vegetable industry were identified and invited to form the WA Fruit and Vegetable Steering Committee. An Eat Well WA –Fruit and Vegetable strategy workshop was held to initiate the process. Participants from relevant sectors were invited – government (health, agriculture, education, industry, training and transport), non-government health agencies, the fruit industry (from gate to plate), Foodbank WA, hospitality, and training, and horticulture industries. Attendees were asked to nominate to be part of a committee to oversee the development of a ten-year strategy and implementation plan. The committee have added their suggestions to interventions set out in two management portfolios, reviewed the interventions, and identified priorities for action.

3.1.3.1 Determining management objectives

Management portfolios were developed to select interventions that would improve access to and increase consumption of fruit and vegetables in Western Australia using the NPHP framework (National Public Health Partnership 2000b). Two health determinants were identified and their risk/benefits researched and assessed:

1. access (management objective was to increase and sustain access to high quality, safe, affordable vegetables and fruit)
2. consumption of at least 375 g vegetable (5 serves) and 300g (2 serves) fruit daily (management objective to increase consumption of fruit and vegetables by people in WA to meet or exceed recommendations).

A full range of intervention types were considered to address the two health determinants. Management portfolios, including policy, program interventions, and the infrastructure required to support them were developed.





3.1.3.2 The process of developing intervention portfolios

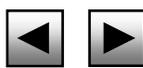
The DHWA lead a steering group of 12 representatives from government and non-government sectors to develop the strategy framework and select priorities for action. Individual members ranked each intervention using the available evidence and his or her knowledge and professional judgement. Each intervention was ranked according to its expected performance against the following criteria: effectiveness, equity, feasibility, acceptability, timing and sustainability. The group then came together to agree on overall intervention rankings. At this time individuals explained their reasoning for ranking order and an agreement was reached. This often involved those with working knowledge or relevant experience educating members from other sectors so that an informed choice could be made. The group then identified the custodians for management, partners required, action, costs, and performance indicators or measures.

3.1.3.3 Strategy steering committee and custodianship

Key stakeholders from government departments and the fruit and vegetable industry were then identified and invited to form the WA Fruit and Vegetable Steering Committee, and a workshop was held to initiate the process. Participants from relevant sectors were invited – government (health, agriculture, education, industry, training and transport), non-government health agencies, the fruit industry (from gate to plate), FOODbank WA, hospitality, and training, and horticulture industries. The SIGNAL Fruit and Vegetable Officer presented national priorities at the meeting. Attendees were asked to nominate to be part of a committee to oversee the development of a ten-year strategy and implementation plan for WA.

3.1.3.4 Key outcomes

A mass media campaign was identified as a priority activity to promote fruit and vegetables in Western Australia with the DHWA nominated as the lead implementation agency, due to their experience in and commitment to social marketing campaigns. The priority activities for industry groups were identified as research and development. Individual industry grower groups undertook to promote specific fruit and vegetables as a priority activity.





The hospitality industry, hospitality training, the Department of Agriculture, Department of Transport, and Environmental Health were identified as the custodians for management in a number of fruit and vegetable supply strategies.

This process highlighted the need to identify management performance measures including economic evaluation. Developing models to measure cost effectiveness for public health strategies that are implemented in a range of settings by practitioners from different backgrounds is essential.

Developing a State based fruit and vegetable strategy using the NPHP framework highlighted the importance of stakeholder participation in the decision making process, issues of ownership and importantly that costs can be considered by those accountable for the outcomes.

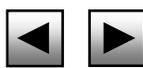




Table 19 Example of highest-ranking interventions in management portfolios

Policy interventions	Program interventions	Infrastructure support
Portfolio 1: to increase and sustain access to high quality, safe affordable fruit and vegetables		
<ul style="list-style-type: none"> Develop/support health fruit and vegetable consumption guidelines and position statements Develop/support nutrition policies promoting fruit and vegetables in schools e.g. Fruit and Water policy 	<ul style="list-style-type: none"> Support award schemes increasing consumer access to fruit and vegetables (e.g.: Healthy Choices Awards, Worksite Healthy Choices Awards, Start Right-Eat Right) and supplier/retailer, transport operator accreditation/incentive schemes (e.g.: WA nutrition awards, Gold Plate Awards) Support fruit and vegetables promotion in hospitality and catering training Support welfare agencies in the provision of fruit and vegetables e.g. FoodBank 	<ul style="list-style-type: none"> Collect and analyse information to assess fruit and vegetable supply, cost, quality, access, sales / marketing e.g. Market basket survey Identify fruit and vegetable supply issues in rural and regional development plans and make recommendations for action
Portfolio 2: to increase consumption of fruit and vegetables by people in WA to meet or exceed recommendations		
<ul style="list-style-type: none"> Encourage whole of government organisations' policies to support fruit and vegetable consumption Support DHWA resources allocated to support fruit and vegetable mass media campaign: TV, radio, press, publications, point of sale, school activities, sponsorships, retailer and food service promotions 	<ul style="list-style-type: none"> Develop and support school canteen promotions to increase fruit and vegetable sales (education materials, use of seasonal produce, handling and storage) e.g. STARCanteen Accreditation Program Coordinate and implement Western Australian schools' Fruit 'n' Veg Week Support statewide fruit and vegetable promotions and campaigns consistent with DHWA recommendations e.g. retailer point-of-sale promotions, co-promotions and branding 	<ul style="list-style-type: none"> Collect and analyse information to assess consumption and consumer attitudes to fruit and vegetables Publish food consumption and trends in newsletters, website Research best practice programs that increase consumption of fruit and vegetables, develop guidelines

(C. M. Pollard & Lewis 2007)





Table 20 Western Australian Department of Health Campaign Activities 1990 to 2005

Campaign Activities Phases	FVWEM	2 Fruit 'n' 5 Veg Every Day and Buy in Season				Be Creative	Ask for it	Eat it	Go for 2&5
	1990	1991	1991	1992	1993	1995	1995	1996	2002-2005
Industry collaboration	✓	✓#	✓#	✓#	✓	✓	✓	✓	✓#
Paid mass media:									
Television	✓	✓	✓	✓	✓	✓	✓	✓	✓
Radio		✓	✓	✓	✓	✓	✓	✓	✓
Press		✓	✓	✓	✓	✓	✓	✓	✓
PR and unpaid media	✓	✓	✓	✓	✓	✓	✓	✓	✓
Website									✓
Publications:									
Consumer leaflets			✓	✓					✓
Self-help kit	✓	✓							
Recipe cards	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bulletin-professionals	✓	✓	✓	✓	✓				✓
Cookbooks:									
F&V With Every Meal	✓	✓	✓	✓	✓				
F&V Snack 'n' Pack			✓	✓	✓	✓	✓	✓	✓
Kids in the Kitchen							✓	✓	✓
Food Cents								✓	✓
Healthy Food Fast									✓
Point-of-sale promotions:									
Display & Food dems	✓	✓	✓	✓	✓				✓
Seasonal promotions			✓	✓	✓				
Schools activity book/kits	✓		✓	✓	✓	✓	✓	✓	✓
Fruit 'n' Veg Week			✓	✓	✓	✓	✓	✓	✓
Worksite promotion			✓	✓					
General practitioner kits	✓								
Lunchbar promotion	✓								✓
Sports/arts sponsorships			✓	✓	✓				✓
Regional activities	✓	✓	✓	✓	✓	✓	✓	✓	✓

#Industry working group





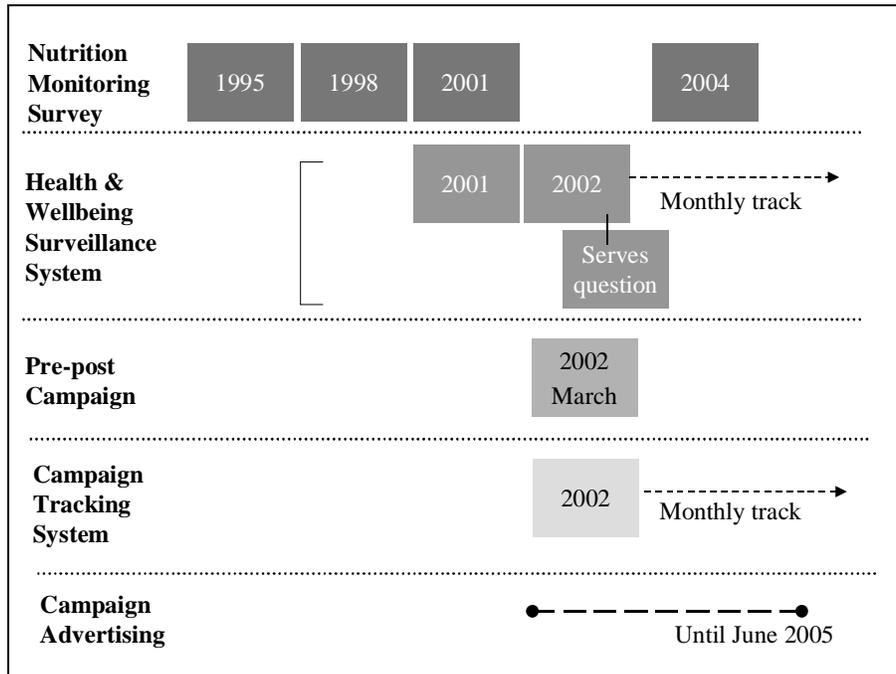
3.2 Evaluation framework

A review of existing nutrition-related data collected by the DHWA to inform, implement and evaluate the fruit and vegetable campaign, outlined in Table 21, was undertaken. The review aimed to determine factors (the barriers and promoters) to increasing fruit and vegetable consumption. As 80 percent of the data has not previously been analysed, primary analysis was conducted first. Health promotion theory was applied to identify determinants of consumption.

Primary re-analysis of existing datasets was undertaken:

1. 1995, 1998, 2001 and 2004 Nutrition Monitoring Surveys,
2. 2002 Fruit and Vegetable pre-campaign Survey
3. 2002 to 2006 Campaign Tracking Survey
4. 2002 to 2006 Health & Wellbeing Surveillance System (HWSS)

Table 21 Evaluation framework determining factors influencing fruit and vegetable consumption in Western Australia, 1995 until 2006.





3.3 Ethical Issues

Original data sets were collected on behalf of the Department of Health in Western Australia in accordance with the ethical standards of the NHMRC. Identifying information has been removed from all datasets. All data analysis will continue to preserve confidentiality and remains the property of the Department of Health.

3.4 Facilities and Resources and Data Storage

The Nutrition and Physical Activity Program at the DHWA granted access to datasets on the Western Australian Nutrition Monitoring Surveys, Health Department's Health & Wellbeing Surveillance System (HWSS), fruit and vegetable Campaign Tracking Survey (CTS) for the study. Data is stored in secure files at the DHWA.



Abstract:

Objective: To develop nutrition criteria, consistent with Australian dietary guidelines encouraging fruit and vegetables consumption, for branding recipes with the Go for 2&5[®] campaign message.

Design: Dietary policies, guidelines, food selection guides, nutrient targets, existing consumer education programs nutrition criteria, food habits, and eating styles were reviewed to develop nutrition criteria which were then used to assess 128 recipes.

Setting: Perth, Australia

Analysis: Recipes were analysed then assessed against criterion for fat, sodium, fibre, energy, added sugar, fruit, vegetables, cereal and dairy foods content/per serve.

Results: Recipe nutrition criteria were devised and 128 contemporary industry recipes (main meals; light meals (includes breakfast); soups; salads; side dishes; snacks (includes drinks); desserts; bakery and basic ingredients (e.g. stocks, dips and sauces)) were evaluated according to developed nutrition criteria. Nearly $\frac{3}{4}$ failed. Excess fat (45%) and sodium (30%), and inadequate cereal (24%) were the main reasons. Only minor modifications were required to meet criteria.

Conclusions and Implications: 'Healthy' recipes promoting fruit and vegetables were often high in fat and sodium and low in cereal foods. Nutrition criteria developed for this study provided a practical way of assessing specific meals and snacks according to the dietary guidelines making them suitable for nutrition promotions.

INTRODUCTION

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Dietary guidelines encourage eating patterns to reduce the risk of diet-related disease and improve population well being. They provide the context for most nutrition education initiatives.¹⁻³ The Australian dietary guidelines (ADGs) encourage consumption of foods containing essential nutrients (core food groups) while limiting dietary sodium, fat and added sugar.

Food selection guides provide a conceptual framework for selecting the types and amounts of foods to meet dietary recommendations.⁴⁻⁶ They provide food group based recommendations, specify what constitutes a food group, and give standard serving sizes with visual representations.⁷ The Australian Guide to Healthy Eating (AGTHE) provides practical food selection advice through recommended servings of core food groups,⁸ see Table 1.

Increasing fruit and vegetable consumption is a core component of most dietary guidelines.^{4, 9-12} The World Health Organization's global dietary strategy calls for targeted campaigns to promote fruit and vegetables consumption.¹³ The Western Australian Health Department has promoted ADGs using social marketing campaigns since 1989.¹⁴⁻¹⁷ Individual guidelines should not be considered in isolation as dietary guidelines apply to the total diet and do not assess the 'healthiness' of individual food items.³ Decisions need to be made about the nutritional value of foods eaten in significant amounts in our diets. Therefore, the Go for 2&5[®] campaign promotes fruits and vegetables in the context of 'total diet' recommendations.

Effective communication campaigns reach the target audience via a number of paths.¹⁸ Point-of-sale promotions developed by industry partners are essential when promoting fruit and vegetables.¹⁶ Health professionals, industry and consumers need resources to assist food selection.

Health agency endorsement schemes and supermarket 'healthy eating' brands use nutrition criteria to select foods suitable for inclusion. Food companies who develop, label, advertise and promote food or recipes as 'healthy' must demonstrate product nutrition profiles meet agreed nutrient targets.¹⁹ Nutrition profiling models need testing against their intended purpose.¹⁹

33 Nutrition profiling, or categorizing foods according to nutrition composition assists
34 consumers to identify nutritionally preferable foods.^{7, 20, 21} Programs using nutrition
35 criteria to identify individual foods representing healthier food choices have been
36 developed.²²⁻²⁶ The UK and US 5 A-Day campaigns supply nutrition criteria to
37 partner organizations to assist them to promote fruit and vegetables in the context of a
38 healthy diet.^{17, 27, 28}

39 Food companies and retailers often provide recipes (a list of ingredients with a set of
40 directions for preparing food at home) at point-of-sale to encourage consumers to
41 purchase ingredients. Specific nutrition criteria consistent with Australian
42 government policy were required to assist industry to conduct Go for 2&5[®]
43 promotions at point-of-sale. The criteria aimed to identify fruit, vegetables and
44 recipes that could be promoted using the logo. This paper outlines the process for
45 developing and applying the Go for 2&5[®] recipe nutrition criteria.

46 METHODS

47

48

49 Specific nutritional goals, food group and energy recommendations consistent with
50 Australian dietary policy were identified (Step 1). Recipe categories were designated
51 based on their energy contribution to the total diet and contemporary eating styles.

52 **Step 1: Reviewing Australian Dietary Recommendations.**

53

54 The exact wording of the ADGs,¹⁻³ food selection guide,^{8, 29, 30} and core food
55 models³¹ were examined for specific food-based dietary targets. The Food Standards
56 Australia and New Zealand Code of Practice nutrient claims criteria³² were
57 considered, as recipes used for point-of-sale promotions would need to comply. The
58 energy content of a standard or ‘sample’ serving of food was noted for each food
59 group. The total average daily energy intake of 2150 kilocalories was calculated by
60 determining the average calories for each food group, based on the recommended
61 number of servings for adults, see Table 1. The recommended nutrient intake was
62 also noted, and an average daily intake of key nutrients for adults was calculated.

63 **Step 2: Comparison With Existing Nutrition Criteria.**

64

65 Nutrition criteria from other food and nutrient policies^{22, 33-36} and initiatives
66 translating dietary recommendations into specific food, nutrients or targets^{22, 37, 38}

67 were examined. Health agency endorsement schemes³⁹⁻⁴² and supermarket ‘healthy
68 eating’ brands were reviewed, see Table 2. Existing criteria were sorted into the food
69 groupings used in the AGTHE (fruit, vegetables, and legumes; bread and cereals;
70 meat, fish, poultry and alternatives; milk, yogurt and cheese; ‘extra’ or discretionary
71 foods) and specific nutrients (fat, salt, sugar, alcohol, carbohydrate, sugar, energy and
72 fibre). Criteria were then compared to the AGTHE number of recommended servings
73 for each food group for adults⁸ and nutrient recommendations identified from Step 1.

74 **Step 3: Recipe Categories.**

75

76 Recipe categories were chosen based on eating patterns identified in the 1995
77 National Nutrition Survey, the most current Australian dietary information available.⁴³
78 Eating patterns were likely to have changed since 1995 so categories were checked
79 against contemporary cookbooks. Kilocalories were allocated for each recipe
80 category so that an adult would meet their recommended intake if they ate only from
81 the recipes.

82 Nutrient and food criteria were calculated according to recipe type. For example: a
83 side dish had a lower calorie content than a main meal; fruit desserts contribute more
84 sugar than savoury main meals containing meat and vegetables. Stocks, sauces,
85 dressings and other cooking ingredients, often made in larger proportions and used
86 over a number of meals, were a separate category. Categories were combined if their
87 energy and nutrient contributions were similar, for example, light meals and breakfast.

88 **Preliminary Testing.**

89

90 Healthy Food Fast cookbook⁴⁴ recipes were assessed to test the plausibility of the
91 recipe criteria. Recipe categories were modified in relation to the fruit, vegetable, and
92 cereal requirements. The criterion for a serving of cereal foods per recipe for all
93 recipes was not necessary as cereal requirements were met from breakfast, light, main
94 meals and snacks. Bakery goods, such as fruit muffins or scones, were too moist if
95 they contained a serving of fruit or vegetables per recipe serving. Some specific
96 ingredients (eg. avocado) were considered important to promote as part of a fruit and
97 vegetable campaign, however, needed to be compensated for in terms of their
98 contribution to total fat and kilocalories. Table 3 displays the criteria summary.

99 The final nutrition criteria were used to assess whether recipes from ten ‘healthy
100 eating’ brochures were suitable Go for 2&5[®] campaign materials. The Horticultural
101 Markets produced and distributed the brochures at point-of-sale to encourage fruit and
102 vegetable purchases. The ‘healthy eating’ themed brochures, “Healthy Kids”, “Low
103 Fat Life-style”, and “Women’s Health were popular with consumers”.

104 **Dietary Analysis.**

105

106 A dietitian analysed the 128 recipes for energy, sodium, fibre, fat, saturated fat,
107 mono/polyunsaturated fat, and carbohydrates using Foodworks Professional 2007.⁴⁵
108 Foodworks does not provide food groups analysis, so fruit, vegetable, cereal, meat
109 and added sugar content per recipe/serving were calculated by summing the weights
110 of individual foods into food group ingredient weights. Fruit and vegetable servings
111 were calculated by dividing total weight in grams by serving sizes defined in the
112 AGTHE (e.g. 150 grams for fruit) checking for plausibility against common
113 household serving sizes (e.g. pieces of whole fruit). Use of alcohol, full-fat dairy
114 products, preservatives or additives were checked.

115 Recipes had to meet every criterion to be able to use the logo. This categorical
116 approach has been used by food industry and others to designate food products as
117 ‘low-fat’ or ‘healthy’, rather than ‘lower in fat’ or ‘healthier’.²¹

118 Recipes were modified to meet the criteria if possible. Minimal changes consistent
119 with the recipe style, flavour and preparation method were sought, see Table 4.

120 Frequencies and descriptives were used. Ethics approval was granted through Curtin
121 University and the research was approved by the Department of Health.

122

122 **RESULTS**

123

124

125 The criteria evolved from a basic food group checklist and energy criterion consistent
126 with the AGTHE to recipe category criteria promoting daily food group consumption
127 and specific nutrient requirements. In contrast to most pre-existing nutrition criteria
128 the Go for 2&5[®] criteria and logo imply that the recipe is ‘healthy’ rather than a
129 ‘healthier’ choice’. Table 3 summarizes the Go for 2&5[®] nutrient recipe criteria.

130 **Fruit and Vegetables.**

131

132 Promoting fruit and vegetables as part of every meal and snack was the priority,
133 unlike other nutrient profiling criteria. To achieve the recommended seven servings a
134 day, a minimum of one serving fruit or vegetables per individual serving of each
135 recipe was set, with the exception of cooking ingredients (eg dips, sauces) and bakery
136 products (eg muffins) where a minimum of one serving per recipe was set. (Table 3)

137 **Recipe Categories.**

138

139 Recipe categories chosen were light meals (including breakfast); main meals; soups
140 and salads; side dishes; desserts; snacks (including drinks); bakery, and basic
141 ingredients (e.g. stocks, dips and sauces). Recipe categories were designated energy
142 criteria based on their anticipated contribution to the total daily adult energy intake.
143 The practical aspects of developing recipes to promote fruit and vegetables consistent
144 with the dietary guidelines were described, see Table 3.

145 **Cereal Foods.**

146

147 A minimum of one serving of cereal foods per individual serving of light and main
148 meals recipes was set to achieve seven cereal servings per day. Serving suggestions
149 are included, for example, casserole served with crusty bread. Serving suggestion
150 ingredients are specified in the recipe and included in nutrient calculations. Bakery
151 products such as muffins and scones require half a cereal serving per individual recipe
152 serving. Collections of recipes must include some wholegrain ingredients.

153 **Meat and Dairy Foods.**

154

155 To meet the one daily serving for lean meat, fish, poultry or alternatives, a maximum
156 of one serving per individual serving of all recipes was set. To encourage variety
157 recipe collections must include some recipes containing red meat, white meat, oily
158 fish, white fish or vegetarian alternatives. Recipes use lean meat cuts, trim visible fat,
159 and remove poultry skin. To meet the two daily dairy servings, a maximum of two
160 servings of dairy per individual serving of a recipe was set. Recipe collections
161 encourage use of low- or reduced-fat dairy ingredients.

162 **Fat.**

163

164 Adults' daily fat limit is 73 grams, of which less than 24 grams should be saturates
165 and trans fatty acids. The recipe criteria controlled the use of saturated fat by stating

166 the types and amounts of meat and dairy to be used, and stipulating the use of poly-
167 and mono-unsaturated fats and oils. Fat criterion per individual recipe serving was
168 determined by the likely contribution to daily intake, see Table 3. Recipes containing
169 avocado were the exception with less than five grams of fat from ingredients other
170 than avocado and up to half a serving of avocado per individual serving of the recipe.

171 **Sodium.**

172

173 The maximum daily sodium intake for adults is 2300 mg per day. The sodium
174 criterion was 400 mg per individual recipe serving for light and main meals, soups,
175 salads, and bakery recipes and 200 mg for all other recipes. Recipes containing bread
176 were the exception with ingredients apart from bread providing less than 200 mg
177 sodium per recipe serving and bread providing less than 400 mg sodium per serving.

178 **Added Sugars and Sweeteners.**

179

180 Australian guidelines state that no more than 15 to 20 per cent of energy should come
181 from sugar, about 105 grams for adults. The sugar criterion limits dietary intake of
182 ‘added sugar’. The sugar content in dairy products, whole fruit and vegetables, dried
183 fruit, and 100% juice is exempt as these food groups are essential for good health.
184 ‘Added sugar’ is defined as all sugar added to sweeten recipes, including sucrose,
185 honey, fruit concentrates and purees. The criterion is a maximum of 10 grams of
186 added sugar per recipe serving for light meals, main meals, and side dishes and 20
187 grams for all other recipes. Artificial sweeteners perpetuate the consumption of sweet
188 foods. Although they may play a role in reducing energy density they are not an
189 essential dietary requirement. Recipes should not contain artificial or intense
190 sweeteners.

191 **Fibre.**

192

193 An intake of 25 grams of fibre per day was set and criteria were based on an estimate
194 of the recipes’ contribution to total daily intake. Main meals should provide at least
195 six grams of fibre per individual recipe serving, light meals at least four grams, and
196 two grams for other recipe categories.

197 **Criteria Application.**

198

199 Only 27 per cent of the 128 recipes assessed met all the nutrition criteria, see Table 4.
200 The majority failed more than one criterion, for example, if the energy criterion was
201 exceeded then the fat or sugar criteria were usually also exceeded. Table 4 details the
202 modifications required to meet the criteria for each recipe category.
203 All of the main meals, 83% of light meals, and about half of the desserts and snack
204 recipes failed to meet the nutrition criteria. The main and light meals failed due to
205 excess fat and sodium and lack of a cereal serving. Over half the meat containing
206 recipes required less meat per serve, for example, the main meal *Grilled Steak and*
207 *Spinach* required less steak, cooking oil, salt and nuts, and an extra cereal serving
208 Recipe modifications most often made were to reduce fat or sodium and add cereal
209 foods. Substituting lower-fat ingredients or using less oil reduced fat. Omitting salt
210 during cooking, using less salty ingredients or replacing tinned, bottled, pickled or
211 preserved ingredients lowered sodium. Recipe assessments and modifications were
212 provided to the brochure developers.

213

DISCUSSION

214

215

216 Global health priorities encourage the promotion of fruit and vegetables consistent
217 with dietary guidelines. Existing nutrition criteria varied, they were formulated using
218 percentage energy for individual nutrients, and did not include specific servings of
219 food groups based on recommended daily servings of foods in selection guides.

220 There were no criteria for recipes promoting consumption of fruit and vegetables
221 consistent with ADGs. The Go for 2&5[®] nutrition criteria were devised by assessing
222 existing nutrition criteria by food group and determining consistency with the ADGs.
223 Contemporary eating styles were considered when defining 'healthy' recipes featuring
224 fruit and vegetables. Consideration was given to consumer issues such as time
225 scarcity,⁴⁶ cooking skills, food literacy, and ingredient cost and availability. Practical
226 aspects of the recipe criteria reflect these issues.

227 Promotion of core foods, such as fruit and vegetables, is particularly important when
228 considering private sector marketing in relation to overweight and obesity.⁴⁷
229 Apportioning the recommended energy intake, to meals and snack recipes controlled
230 for energy intake. The 2150 kilocalorie criteria is consistent with the 2,000 to 2,500
231 kilocalorie Guideline Daily Amounts used in UK food labelling.³⁷

232 **Meeting The Nutrition Criteria.**

233

234 Many recipes required changes in the types and amounts of ingredients used to meet
235 the nutrition criteria. Most changes were made to achieve reductions in the fat and
236 sodium content, or inclusion of fruit, vegetables or cereals foods.

237 Health authorities continue to recommend lowering of sodium intakes to reduce
238 chronic disease risk.^{48, 49} Sodium content was high due to the use of multiple high-
239 sodium ingredients in recipes, for example, tomato sauce, ham, olives and cheese
240 were used in one recipe. Bread also contributed to sodium content. Using salt-
241 reduced or no-added-salt ingredients and substituting herbs and spices, lowered the
242 sodium content of many of the recipes. This supports the need for food manufacturers
243 to reduce the salt content of their products to the lowest threshold possible.⁴⁹

244 The individual recipe serving size and the use of energy-dense ingredients influenced
245 the calorie content. The ‘healthy’ recipes sampled had appropriate serving sizes that
246 met the energy criterion, it is unlikely that they reflect all industry recipes.

247 Reducing the amount of high-fat foods, or substituting them with lower-fat versions,
248 or adding plant based or cereal foods lowered the fat content of recipes. These
249 changes also favourably modified saturated to unsaturated fat ratios.

250 The importance of incorporating fruit, vegetable and cereal foods at meal times to
251 achieve dietary fibre recommendations was demonstrated in this analysis. It would be
252 difficult to meet recommended fibre levels of 28 to 38 grams (for women and men
253 respectively)⁴⁸ without cereal foods making up the majority of the diet.

254 Including fruit and vegetable criterion as the starting point resulted in an eating
255 pattern that encouraged fruit and vegetable consumption as part of every eating
256 occasion. Results are consistent with the validation of nutrient profiling systems that
257 have found individual fruits and vegetables rank highly.⁵⁰

258 Generalisation of the findings must be considered in light of the sample of recipes
259 tested. This paper reports one application of the criteria by assessing a recipe
260 collection that was part of a ‘health’ series, so they should not be considered to be
261 representative of recipes developed by industry to promote fruit and vegetables. The
262 small number of desserts and bakery recipes included mean that no conclusions
263 should be drawn about these recipe categories.

264 Under current Australian food standards most products require a nutrition information
265 panel. Food Standard Australia New Zealand provide an online Nutrition Panel

266 Calculator to assist food manufacturers to assess their products.⁵¹ This also enables
267 an assessment the ‘healthiness’ of a recipe or product. The same nutrient analysis
268 package⁴⁵ was used in this study. The package does not calculate food group
269 contributions, so these were calculated by hand. For example, total servings of fruit,
270 vegetables or cereal foods. Incorporating this calculation as part of the nutrition
271 analysis package would allow for simple assessments of food selection guide
272 recommendations. Analysis packages developed to assess and revise the American
273 MyPyramid Food Guidance System appear to have the functionality.^{6, 7, 52}
274 Results showed that ‘healthy’ recipes developed by industry to promote fruit and
275 vegetables were frequently high in fat and sodium, low in cereal foods and had
276 undesirable saturates to unsaturated fat ratios. Most recipes required minor
277 modifications to meet criteria, indicating that an assessment tool with practical
278 suggestions to assist meeting the criteria is useful.
279 High profile mass media, recipes and cookbooks encouraged fruit and vegetable
280 consumption, leading to significant increases in adult’s self-reported intake during the
281 campaign.¹⁷ Total diet impact assessment requires a repeat nutrition survey. The Go
282 for 2&5[®] nutrition criteria are now used Australia-wide for campaign promotions.

283 **IMPLICATIONS FOR RESEARCH AND PRACTICE**

284

285

286 Developing nutrition criteria to reflect current eating patterns that are consistent with
287 dietary recommendations is challenging, particularly in relation to energy
288 requirements and core food promotions. The Go for 2&5[®] nutrition criteria
289 encourage fruit and vegetable consumption in the total diet context and provided a
290 way of assessing specific recipes for their suitability as campaign materials.

291 The criteria are based on adult’s dietary requirements and may need to be further
292 developed for other population sub-groups and settings, for example extended to food
293 service settings, such as school canteens. Further research is required to assess
294 usability with end-users such as food industry and health professionals.

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441

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453

Table 1. Summary of Go for 2&5[®] serve sizes of core food groups, adapted from the Australian Guide to Healthy Eating¹⁶

Food Group	Recommended serves (adults minimum)	Kilocalories per sample serving	What constitutes a serve?
Vegetable and legumes	Five	20 to 60 Kcal	½ cup (75 g) cooked vegetables and or legumes (dried beans, peas or lentils); or one small potato, or 1 cup salad vegetables, or ½ cup or 125mL. 100% vegetable juice. Serve sizes are ‘as eaten’ (ie. without inedible skin, or liquid medium etc.) this represents the minimum amount with no percentage leeway. The serve size of concentrated puree products (e.g. tomato puree) and dried vegetables and legumes, is based on wet or reconstituted weight.
Fruit	Two	75 Kcal	1 medium piece (150 g) of fruit or 2 small pieces, or 1 cup of canned or chopped fruit, or ½ cup (125 mL) 100% fruit juice. Serve sizes are ‘as eaten’(ie. without inedible skin, or liquid medium etc) this represents the minimum amount and there is no percentage leeway. The serve size of concentrated puree products and dried fruit is based on wet or reconstituted weight or 30 grams or 1½ tablespoons of dried fruit. Fresh, chilled, frozen, canned, dried and 100% fruit and vegetable juice without any added fats, sugars, sweeteners, or salt that contain one serving per serving can carry the Go for 2&5 [®] logo. An indicator of serving size, in line with the AGTHE ¹⁶ must be provided at point-of-sale, for example, the label of packaged green salad vegetables would state that ‘one cup of salad equals one serving of vegetables’
Bread and cereals foods	Seven	145 Kcal	2 slices (60 g) bread, one medium bread roll; 1 cup (180 g) cooked rice, pasta, noodles; 1 cup (230 g) cooked porridge, 1 ⅓ cups (40 g) cereal flakes or ready to eat cereal, ½ cup (65 g) in toasted muesli; ⅓ cup (40 g) flour
Meat and alternatives	One	145 to 200 Kcal	65 -100 g of cooked meat, chicken; ½ cup (80 g) cooked (dried) beans, lentils, chickpeas, split peas and canned beans; 80 to 120 g cooked fish fillet, 2 small eggs, ⅓ cup peanuts, almonds: ¼ cup sunflower seeds, sesame seeds
Milk foods	Two	90 to 175 Kcal	1 cup (250 mL) fresh, long life or reconstituted dried milk; 1 cup (250 mL) calcium fortified soy milk; ½ cup or ½ cup (125 mL) evaporated milk; two slices (40 g) cheese; one small carton (200 g) yoghurt; 1 cup (250 mL) custard.
Extra foods	None	145 Kcal	Confectionery, cakes, alcohol, fats, butter, margarine, oils, crisps, icecream,

Table 2. Nutrition policies, targets and schemes reviewed to develop the Go for 2&5[®] Nutrition Criteria

Food and Nutrition policy	Specific food and nutrient targets	Health agency endorsement schemes	Supermarket endorsement schemes
<p>Australian</p> <ul style="list-style-type: none"> • Australian dietary guidelines¹⁻³ • Australian Guide to Healthy eating^{8, 29, 30} • Core Food Groups³¹ <p>Other countries</p> <ul style="list-style-type: none"> • Guideline Daily Amounts³⁷ • Balance of Good Health³³ <p>Global</p> <ul style="list-style-type: none"> • Diet, Nutrition and the Prevention of Chronic Disease³⁵ • WHO Fruit and Vegetable Promotion Initiative³⁶ 	<ul style="list-style-type: none"> • DASH eating Plan³⁴ • Traffic lights for food²² • Better Health Channel³⁸ 	<ul style="list-style-type: none"> • UK 5-A-Day • Heart Check, American Heart Association • Canada Health Check²⁶, • Scottish Nutrient Standards for School Lunches³⁹, • Australian StarChoice FOCIS⁴⁰, • Western Australian Nutrition Awards⁴¹ <p>*with Recipe criteria</p> <ul style="list-style-type: none"> • USA 5-A-Day²⁷ • Australian Heart Foundation Tick⁴² • Healthy Food Fast cookbook⁴⁴ 	<ul style="list-style-type: none"> • <i>Perfectly Balanced</i>, Waitrose (2004) • <i>Food Explorers</i>, Waitrose (2004) • <i>Count on Us</i>, Marks & Spencer (2004) • <i>Loved by Kids</i> Marks & Spencer (2004) • <i>Be Good To Yourself</i>, Sainsbury's (2004) • <i>Healthy Living</i>, Tesco (2004) • <i>Good for You</i>, Asda (2004) • <i>Healthy Living</i>, Co-op (2004)

Table 3. Summary of Go for 2&5[®] Nutrition Recipe Criteria

Recipe criterion	Recommended serves ^a and nutrients	Average daily targets	Light meals includes breakfast	Main meals	Soups and salads	Side dishes	Desserts	Snacks and drinks	Bakery	Ingredients
Vegetables	≥5	90-300 Kcal	≥1serve ≥2 types	≥1serve ≥2types	≥ 1	≥ 1	≥ 1	≥ 1	≥ 10 g /recipe	≥ 10 g /recipe
Fruit	≥2	145 Kcal	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 20 g /recipe	≥ 20 g /recipe
Cereals	≥7	1000 Kcal	≥ 1 ^b	≥ 1 ^b	na	na	na	na	≥ ½	na
Meat & alternatives	1	145-200 Kcal	≤1 ^c	≤1 ^c	≤1 ^c	≤1 ^c	na	na	na	na
Milk&dairy	≥2	180-350 Kcal	≤2 ^d	≤2 ^d	≤2 ^d	≤2 ^d	≤2 ^d	≤2 ^d	≤2 ^d	≤2 ^d
Fat (g)	30% energy ^e	73 g fat 24 g sats	≤10 g ^f	≤15 g ^f	≤5 g ^f	≤5 g ^f	≤5 g ^f	≤5 g ^f	≤5 g ^f	≤5 g ^f
Sodium (mg)	2300 mg	2300mg	≤400 ^g	≤400 ^g	≤400 ^g	≤200 ^g	≤200 ^g	≤200 ^g	≤400 ^g	≤200 ^g
Added sugar(g)	15-20% energy	105 g	≤10 g ^h	≤10 g ^h	≤5 g ^h	≤5 g ^h	≤20 g ^h	≤20 g ^h	≤20 g ^h	≤20 g ^h
Energy (Kcal/day)	M:2390 Kcal F:1910 Kcal	2150 Kcal	≤480 Kcal	480-720 Kcal	≤480 Kcal	≤240 Kcal	≤240 Kcal	≤240 Kcal	≤240 Kcal	≤240 Kcal
Fibre (g)	25 –30 g	25 g	≥ 4 g	≥ 6 g	≥ 4 g	≥ 4 g	≥ 2 g	≥ 2 g	≥ 4 g	≥ 2 g
Practical aspects	All recipes: contain less than 10 common, low-cost or seasonal ingredients; are simple and involve less than 15 minutes preparation; use basic household equipment; appeal to all age groups; have clear names that identify the dish; encourage healthy eating habits in line with Australian Dietary guidelines; encourage safe food preparation and cooking methods; do not use stimulants (e.g. caffeine, guarana) or alcohol; limit use of ingredients containing additives (colours, flavours, preservatives) and voluntarily fortified ingredients.									

^aAustralian Guide to Healthy Eating, ^bCereal food can be part of serving suggestion, ^cUse only lean cuts of meat, trim visible fat, and remove skin from poultry, ^dUse only low-fat or reduced-fat dairy ingredients, or very small amounts of full-fat dairy, ^eSaturated plus trans fatty acids: 10% energy, polyunsaturated fatty acids: 8% energy, ^fApart from for recipes containing avocados ≤ 5 g fat per serve excluding avocado and maximum ½ avocado per serving, ^gApart from recipes containing bread (sodium ≤ 200mg per serve excluding bread and bread used must be ≤ 400mg per serve (145Kcal)), ^hDo not use artificial sweeteners.

Table 4: Nutrition Criteria initial assessment and modifications required to meet criteria, by recipe category

Recipe Category	Main (n=16)	Light (n=36)	Snacks (n=21)	Side (n=12)	Dessert (n=30)	Soup/salad (n=10)	Bakery (n=3)	Total (n=128)	
Criteria Assessment	n	n	n	n	n	n	n	n	%
Failed criteria (Total)	16	30	10	10	15	9	3	93	73
▪ Fat (high)	9	21	5	4	12	4	3	58	45
▪ Sodium (high)	13	14	3	4	0	5	0	39	30
▪ Cereal (low)	10	21	na	na	na	na	0	31	24
▪ Meat (high)	6	2	0	na	na	na	na	8	6
▪ Fruit/veg (low)	2	7	4	2	2	0	2	19	15
▪ Energy (high)	0	3	2	2	5	0	3	15	12
▪ Ingredients (amount)	2	7	1	4	5	2	0	21	16
▪ Fibre (low)	3	5	2	1	0	1	1	13	10
▪ Added sugar (high)	0	0	1	0	4	0	1	6	5
▪ Energy (low)	3	0	0	0	0	0	0	3	2
Changes to meet criteria									
Specify ingredients	2	7	1	4	5	2	0	21	16
Include number of serves	0	1	1	0	1	0	0	3	3
Alter serving suggestions	0	0	0	1	0	0	0	1	1
Reduce:									
▪ Oil	8	12	2	3	0	4	2	31	24
▪ Dairy fat	1	5	4	2	7	3	1	23	18
▪ Added salt ^a	9	7	1	1	0	2	0	20	16
▪ High salt foods ^b	1	6	1	0	0	3	0	11	9
▪ Meat serve size	6	2	0	0	0	0	0	8	6
▪ Nuts (fat)	2	1	1	0	2	0	2	8	6
▪ High fat sauce ^c	1	1	0	0	1	2	0	5	4
▪ Portion size	0	1	1	0	0	0	1	3	2
▪ Added sugar	0	0	1	0	4	0	1	6	5
▪ High sodium sauces	1	0	0	2	0	0	0	3	2
▪ High salt meat ^d	1	0	1	1	0	0	0	3	2
Add:									
▪ Cereals	10	21	0	0	0	0	0	31	24
▪ Vegetables	2	7	1	2	0	0	0	12	9
▪ Fruit	0	0	3	0	2	0	2	7	5

^ae.g. use herbs etc, ^be.g. olives, sun-dried tomatoes ^ce.g. mayonnaise, coconut milk ^de.g. ham

Increasing fruit and vegetable consumption: success of the Western Australian Go for 2&5[®] campaign

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Abstract

Objective: The Western Australian Health Department's Go for 2&5[®] campaign aimed to increase adults' awareness of the need to eat more fruit and vegetables and encourage increased consumption of one serving over five years.

Design: The multi-strategy fruit and vegetable social marketing campaign, conducted from 2002 to 2005, included mass media advertising (television, radio, press and point-of-sale), public relations events, publications, a website (www.gofor2and5.com), and school and community activities. Campaign development and the evaluation framework were designed using health promotion theory, and assessed values, beliefs, knowledge and behaviour. Two independent telephone surveys evaluated the campaign: the Campaign Tracking Survey interviewed 5032 adults monitoring fruit and vegetable attitudes, beliefs and consumption prior to, during and 12 months after the campaign; and the Health & Wellbeing Surveillance System surveyed 17993 adults between 2001 and 2006, continuously monitoring consumption.

Setting: Population public health intervention–social marketing campaign in Western Australia, population of 2 010 113 in 2005.

Subjects: Adults in the Perth metropolitan area.

Results: The campaign reached the target audience, increasing awareness of the recommended servings of fruit and vegetables. There was a population 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), significant at $P < 0.05$).

Conclusion: Sustained, well-executed social marketing is effective in improving nutrition knowledge, attitudes and consumption behaviour. The Go for 2&5[®] campaign provides guidance to future nutrition promotion through social marketing.

Keywords
Fruit
Vegetables
Social marketing
Campaign
Nutrition intervention

Regular adequate consumption of fruits and vegetables may be protective against chronic disease such as cardiovascular diseases and some cancers^{1–6}. Indeed, inadequate consumption of fruit and vegetables is a major risk factor contributing to the worldwide burden of disease^{7,8}. Eating more fruit and vegetables may be the single most important dietary change needed to reduce the risk of these chronic diseases⁹.

To help reduce chronic disease, the World Health Organization and the Food and Agriculture Organization of the United Nations ask countries to conduct targeted campaigns to increase the consumption of fruit and vegetables¹⁰, asserting that effective health communication 'has the capacity to create awareness, improve

knowledge and induce long-term changes in individual and social behaviours'¹¹.

The Western Australian Health Department's Go for 2&5[®] fruit and vegetable social marketing campaign aimed to increase awareness of the need to eat more fruit and vegetables and to encourage increased consumption. The present paper reports results using an evaluation framework based on behaviour-change theory, which included reach or awareness of the campaign; knowledge of the recommended intake for fruit and vegetables; self-perception of current intake; and self-reported fruit and vegetable intake.

Although there is agreement on the need to increase fruit and vegetable consumption, there are differences in

the classification of fruit and vegetables, in what constitutes a serving and thus in the recommended number of servings¹². The Australian Government's food selection guide recommends that adults over the age of 18 years consume at least two servings of fruit and five servings of vegetables each day¹³. A serving of vegetables is equivalent to 75 g and includes salad and cooked vegetables, potatoes, tomatoes and avocados, while a serving of fruit is equivalent to 150 g. In 2000, Western Australian adults reported consuming a mean of 1.6 servings of fruit and 2.6 servings of vegetables daily.

Health promotion theory and pre-campaign research guided campaign development. While most adults were aware that fruit and vegetables were good for them, they did not know the recommended level of intake and did not perceive a need to increase their intake. Lack of time, difficulty in preparation (particularly for vegetables) and incorrect perception about the adequacy of fruit and vegetable intake were the barriers to increasing intake. The campaign objectives were to increase knowledge of the recommended number of servings of fruit and vegetables, improve perceptions of the need to eat more fruit and vegetables (particularly vegetables), and reduce the barriers to intake through communicating the ease of preparing and eating vegetables.

The meal main preparer and the household grocery shopper were the target groups, considered to have the greatest influence on the family diet. Most adults (88%) in pre-campaign surveys considered themselves as either the main household food shopper or had shared responsibility for food shopping.

The Go for 2&5[®] campaign, launched in March 2002, was implemented for three years until June 2005. The comprehensive range of strategies included mass media advertising (television, radio and press) supported by

public relations events, publications (including cookbooks), point-of-sale promotions, school-based activities, community activities and a website (www.gofor2and5.com). The Go for 2&5[®] campaign logo and colourful animated characters, based on well-known television personalities made from fruit and vegetables, were used to deliver the message. Advertising propositions were clear and simple: initially 'It's easy to get an extra serving of vegies into your day', followed by the more intrusive self-assessment question 'How many servings of vegies did you really eat today?' in 2003.

Method

The campaign development and evaluation framework (Fig. 1), adapted from Fishbein and Ajzen¹⁴, Egger¹⁵ and Flay and Cook¹⁶, was designed to assess values, beliefs, knowledge and behaviour. Flay and Cook¹⁶ surmised that advertising, particularly social marketing, rarely changes behaviour directly but rather works by initially creating (or maintaining) awareness; modifying or reinforcing perceptions; and providing relevant behavioural motivators to influence the target audience's attitudes about an issue. Then, as attitudes change, an increased propensity to behave differently results.

Two independent surveys demonstrated the impact of the campaign: the Campaign Tracking Survey (CTS) monitored advertising, awareness, knowledge and perceptions, attitudes towards fruit and vegetable consumption, and self-reported intake; and the Health Department's Health & Wellbeing Surveillance System (HWSS) provided data on self-reported fruit and vegetable intake using short questions based on those

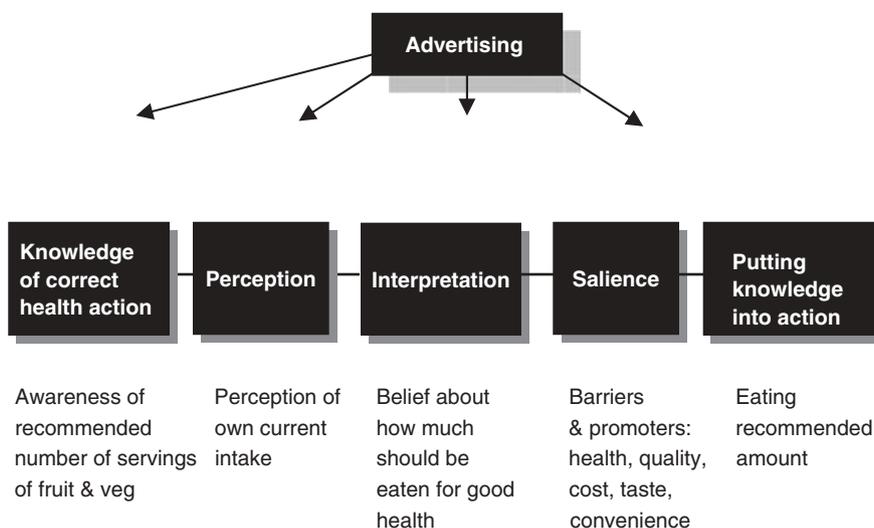


Fig. 1 Adapted phases between knowledge and behaviour for fruit and vegetable consumption (source: adapted from Fishbein and Ajzen¹⁴ and Egger¹⁵)

Table 1 Survey instruments and measures

Campaign Tracking Survey Questions	Western Australia Health & Wellbeing Surveillance System
<p>Daily fruit and vegetable consumption</p> <ul style="list-style-type: none"> ● ‘On average, how many days per week do you eat [fruit/vegetables]?’, and ● ‘When you eat [fruit/vegetables] how many servings a day do you usually eat?’ <p>For each question a serving was defined:</p> <ul style="list-style-type: none"> ● ‘a serving of fruit is equal to one medium piece, two small pieces of fruit or one cup of diced fruit’; or ● ‘a serving of vegetables is equal to half a cup of cooked vegetables, one small potato or one cup of salad vegies’ <p>Perception of own current intake</p> <p>‘How do you feel about the amount of [fruit/vegetables] that you currently eat?’</p> <p>Knowledge of correct health action</p> <p>‘To maintain good health, how many servings of [fruit/vegetables] do you think you should eat per day?’, with serving sizes read out as defined above</p> <p>Campaign awareness</p> <p>‘Have you heard or seen any ads about fruit and vegetables in the last two months?’— spontaneous and prompted, the latter explained that the Health Department had recently screened advertisements about fruit and vegetables and briefly described them, then asked ‘Did you see it?’</p>	<p>Includes questions about a range of issues including health conditions, lifestyle risk factors, protective factors and socio-demographics</p> <p>Daily fruit and vegetable consumption</p> <ul style="list-style-type: none"> ● ‘How many servings of vegetables do you usually eat each day? A serving of vegetables is equal to half a cup of cooked vegetables or one cup of salad’, and ● ‘How many servings of fruit do you usually eat each day? A serving of fruit is equal to one medium piece, two small pieces of fruit or one cup of diced fruit’

validated against 24-hour intake¹⁷. Table 1 outlines key questions from each survey.

Prior to any campaign mass media activity, a ‘pre-campaign’ baseline telephone survey of 300 adults in the Perth metropolitan area was undertaken. From October 2002 to May 2006, ‘continuous tracking’ surveys of 30 people each week for 33 months were conducted to measure campaign impact, including 12 months after campaign cessation. The computer-assisted telephone interview (CATI) method was used to collect information from the television advertising audience of adults aged 25 to 44 years living in the Perth metropolitan area (75% of the population of Western Australia resides in Perth). Telephone numbers were generated by a strict random sampling approach from the electronic White Pages. A 47% participation rate was achieved, resulting in 3578 completed interviews. Data were weighted by age and gender. Prevalence and means were calculated using the Statistical Package for the Social Sciences (SPSS 14.0 for Windows; SPSS Inc., 2004). Tests for statistical significance by time period and subgroup were conducted using standard *t*-tests and confidence intervals.

The second survey, HWSS, interviewed Western Australian adults aged 18 years and over about issues including health conditions, lifestyle risk factors, protective factors and sociodemographics. Pre-campaign information was collected at a single time point in 2001, then continuously from March 2002 using CATI methodology. Monthly samples were identified using electronic White

Pages and a stratified random sample approach with over-sampling in rural and remote areas. A 78–80% response rate was achieved, higher than the CTS, possibly because respondents were sent an initial letter prior to being telephoned. HWSS data were weighted to adjust for rural over-sampling, age and sex. The analysis includes adults aged 18 years and over in the April 2001 pre-campaign ($n = 4274$, comprising 1748 males and 2526 females) and from March 2002 to July 2006 ($n = 27153$, comprising 11288 males and 15865 females).

Prevalence estimates, with 95% confidence intervals, for the number of servings of fruit and vegetables consumed from March 2002 to July 2006 were conducted using SPSS 14.0. The data were examined for consumption trends over time and pre- and post-campaign using time-series analysis. Regression modelling was used to determine if the trends noted were related to time and to explore any post-campaign changes. Auto-regression was used to correct for serial autocorrelation. Curtin University and the Department of Health granted research and ethics approval.

Results

Table 2 shows annual campaign recall, changes in attitudes and beliefs, and self-reported behaviour from the CTS. Table 3 shows annual changes in self-reported fruit and vegetable intake from the HWSS.

Table 2 Campaign awareness, knowledge, attitudes and beliefs towards fruit and vegetable consumption, by year, of persons aged 25–45 years in Perth metropolitan area, Western Australia, 2002 to July 2006 (source: Campaign Tracking Survey)

Year	2002	2002/03	2003/04	2004/05	2005/06
	'Pre'	'Campaign period'			'Post'
TARPS	0 <i>n</i> = 20	3129 <i>n</i> = 360	5685 <i>n</i> = 1531	4523 <i>n</i> = 1499	0 <i>n</i> = 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	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)
Action					
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)

CI – confidence interval; TARPS – a standard measure of weekly volume of television advertising weight scheduled to reach the target audience¹⁸.

Campaign recall increased during the intervention: 62.4% of respondents were spontaneously aware of the Go for 2&5[®] campaign in 2005 after three years and 90.2% were aware when prompted with a description, the values declining significantly at 12 months post-intervention to 42.2% spontaneously and 77.7% when prompted (see Table 2).

Prevalence of correct knowledge of the recommended number of servings of fruit and vegetables also increased significantly over the campaign period, from 77.7% to 89.2% for fruit and from 20.4% to 43.9% for vegetables. Knowledge continued to increase in the 12 months after the intervention, with 90.7% reporting correct recommendations for fruit and 47.2% reporting correctly for vegetables in 2006 (see Table 2).

Pre-campaign in 2002, the proportion of adults who thought they should eat more fruit (59.1%) was higher than for vegetables (35.2%). This proportion did not change significantly for fruit during the campaign period (59.3% in 2005) or the post-intervention year (56.7%). The proportion who felt they should eat more vegetables increased significantly to 42.2% in 2005, then decreased significantly to 40.3% in 2006 (see Table 2).

The HWSS showed that total mean daily fruit and vegetable intake by Western Australian adults aged over 18 years increased by 0.8 servings over the campaign period, an increase of 0.2 servings of fruit (not significant) and 0.6 servings of vegetables (significant at $P < 0.05$) (Table 3). At 12 months post-intervention, consumption levels declined by 0.1 servings of fruit and 0.2 servings of vegetables – a net decline of 0.3 servings.

The increase in vegetable intake was observed across all consumption levels but was most pronounced for males with very low consumption. In 2001, 26.4% of respondents consumed less than two servings of vegetables each day, declining significantly to 15.8% by 2005 but rebounding to 19.1% at 12 months post-campaign. Although males' fruit and vegetable intakes were less than females' at baseline and throughout the campaign, there was a net increase in male intake of 1.0 serving of fruit and vegetables between 2001 and 2005. Mean male fruit intake increased from 1.4 servings in 2001 to 1.7 in 2005, and mean male vegetable intake increased significantly from 2.3 servings in 2001 to 3.0 in 2005 (see Table 3).

Time-series auto-regression analysis confirmed a significant increase in vegetable consumption over the campaign period but no significant change in fruit consumption, as shown in Fig. 2. The interrupted time-series analysis showed for both fruit and vegetables that there was a significant decrease in mean consumption from June 2005, when the campaign stopped. Overall, the proportion of the population who reported eating two or more servings of fruit and five or more of vegetables daily increased significantly from 7.0% in 2001 to 13.4% in 2005.

Discussion

The intervention reached the target audience, with prompted campaign awareness in 90.2% of those surveyed in 2005, generated mainly through high-profile television advertising. Changes in each component of the

Table 3 Fruit and vegetable consumption, by year and gender, of persons aged 18 years and older, Western Australia, 2001 to July 2006 (*source*: Western Australia Health & Wellbeing Surveillance System)

Year	2001	2002	2003	2004	2005	2006
	% (95% CI)					
Fruit						
Females	<i>n</i> = 2131	<i>n</i> = 2830	<i>n</i> = 4935	<i>n</i> = 2500	<i>n</i> = 3754	<i>n</i> = 1846
<2 servings	40.7 (37.1–44.4)	44.2 (41.9–46.6)	39.9 (38.2–41.5)	40.6 (38.0–43.3)	40.4 (38.4–42.5)	44.5 (41.2–47.8)
2 servings	30.1 (26.9–33.4)	32.3 (30.1–34.5)	32.5 (30.9–34.1)	34.4 (31.9–37.0)	35.2 (33.2–37.2)	33.4 (30.3–36.7)
>2 servings	29.3 (25.9–32.9)	23.5 (21.6–25.5)	27.7 (26.2–29.2)	25.0 (22.7–27.3)	24.4 (22.6–26.2)	22.1 (19.6–24.7)
Mean servings	1.9 (1.8–2.0)	1.8 (1.8–1.9)	1.9 (1.9–2.0)	1.9 (1.8–2.1)	1.8 (1.8–1.9)	1.8 (1.7–1.9)
Males	<i>n</i> = 2125	<i>n</i> = 2085	<i>n</i> = 3592	<i>n</i> = 1859	<i>n</i> = 2588	<i>n</i> = 1164
<2 servings	62.0 (57.9–65.9)	56.8 (54.0–59.4)	52.0 (50.0–54.0)	52.3 (49.2–55.5)	49.4 (47.0–51.9)	55.2 (51.4–58.9)
2 servings	22.9 (19.5–26.7)	26.1 (23.8–28.6)	25.8 (24.1–27.6)	28.5 (25.7–31.5)	30.2 (27.9–32.5)	27.3 (24.1–30.7)
>2 servings	15.1 (12.7–17.9)	17.1 (15.2–19.2)	22.2 (20.6–23.9)	19.2 (17.0–21.6)	20.4 (18.5–22.5)	17.6 (15.0–20.5)
Mean servings	1.4 (1.3–1.5)	1.6 (1.5–1.6)	1.7 (1.7–1.8)	1.7 (1.6–1.7)	1.7 (1.6–1.7)	1.6 (1.5–1.7)
All persons	<i>n</i> = 4256	<i>n</i> = 4915	<i>n</i> = 8527	<i>n</i> = 4359	<i>n</i> = 6342	<i>n</i> = 3010
<2 servings	51.5 (49.4–53.6)	50.6 (48.8–52.4)	45.9 (44.6–47.2)	46.6 (44.6–48.7)	44.7 (43.1–46.3)	49.8 (47.3–52.3)
2 servings	26.5 (24.7–28.3)	29.2 (27.6–30.8)	29.2 (28.0–30.4)	31.4 (29.5–33.3)	32.8 (31.3–34.3)	30.4 (28.1–32.7)
>2 servings	22.2 (20.0–23.7)	20.3 (18.9–21.7)	25.0 (23.9–26.1)	22.0 (20.4–23.7)	22.5 (21.2–23.8)	19.8 (18.0–21.8)
Mean servings	1.6 (1.5–1.7)	1.7 (1.6–1.7)	1.8 (1.8–1.8)	1.8 (1.7–1.9)	1.8 (1.7–1.8)	1.7 (1.6–1.7)
Vegetables						
Females	<i>n</i> = 2131	<i>n</i> = 2830	<i>n</i> = 4935	<i>n</i> = 2500	<i>n</i> = 3754	<i>n</i> = 1846
<2 servings	19.4 (16.6–22.5)	19.6 (17.7–21.6)	17.4 (16.1–18.7)	14.6 (12.7–16.7)	12.2 (10.9–13.7)	15.6 (13.0–18.7)
2 to <5 servings	68.2 (64.7–71.6)	66.6 (64.3–68.8)	68.6 (67.0–70.2)	67.8 (65.2–70.3)	66.1 (64.0–68.0)	67.4 (64.2–70.5)
≥5 servings	12.4 (10.3–14.8)	13.9 (12.4–15.5)	14.0 (12.9–15.2)	17.6 (15.7–19.7)	21.7 (20.0–23.5)	16.9 (14.8–19.2)
Mean servings	2.8 (2.7–2.9)	2.9 (2.8–3.0)	2.9 (2.8–2.9)	3.1 (3.0–3.2)	3.3 (3.2–3.4)	3.1 (3.0–3.2)
Males	<i>n</i> = 2125	<i>n</i> = 2085	<i>n</i> = 3592	<i>n</i> = 1859	<i>n</i> = 2588	<i>n</i> = 1164
<2 servings	33.3 (29.4–37.6)	28.9 (26.4–31.5)	28.7 (26.8–30.5)	23.2 (20.6–26.0)	19.7 (17.8–21.7)	22.6 (19.4–26.2)
2 to <5 servings	57.8 (53.5–62.0)	61.8 (59.1–64.5)	61.9 (60.0–63.9)	64.4 (61.3–67.4)	63.2 (60.8–65.5)	63.4 (59.6–67.0)
≥5 servings	8.8 (6.6–11.6)	9.3 (7.9–10.9)	9.4 (8.3–10.6)	12.4 (10.5–14.6)	17.2 (15.4–19.0)	14.0 (11.8–16.5)
Mean servings	2.3 (2.2–2.5)	2.5 (2.4–2.6)	2.5 (2.4–2.6)	2.7 (2.6–2.8)	3.0 (2.9–3.1)	2.8 (2.7–2.9)
All persons	<i>n</i> = 4256	<i>n</i> = 4915	<i>n</i> = 8527	<i>n</i> = 4359	<i>n</i> = 6342	<i>n</i> = 3010
<2 servings	26.4 (23.9–29.1)	24.3 (22.7–26.0)	23.0 (21.9–24.1)	19.0 (17.3–20.7)	15.8 (14.6–17.0)	19.1 (17.0–21.4)
2 to <5 servings	63.0 (60.2–65.8)	64.2 (62.4–65.9)	65.3 (64.0–66.5)	66.1 (64.0–68.0)	64.7 (63.1–66.2)	65.4 (62.9–67.8)
≥5 servings	10.6 (9.0–12.4)	11.6 (10.5–12.7)	11.7 (10.9–12.5)	15.0 (13.6–16.4)	19.5 (18.3–20.8)	15.5 (13.9–17.1)
Mean servings	2.6 (2.5–2.7)	2.7 (2.6–2.8)	2.7 (2.7–2.7)	2.9 (2.8–3.0)	3.2 (3.1–3.2)	3.0 (2.9–3.0)

CI – confidence interval.

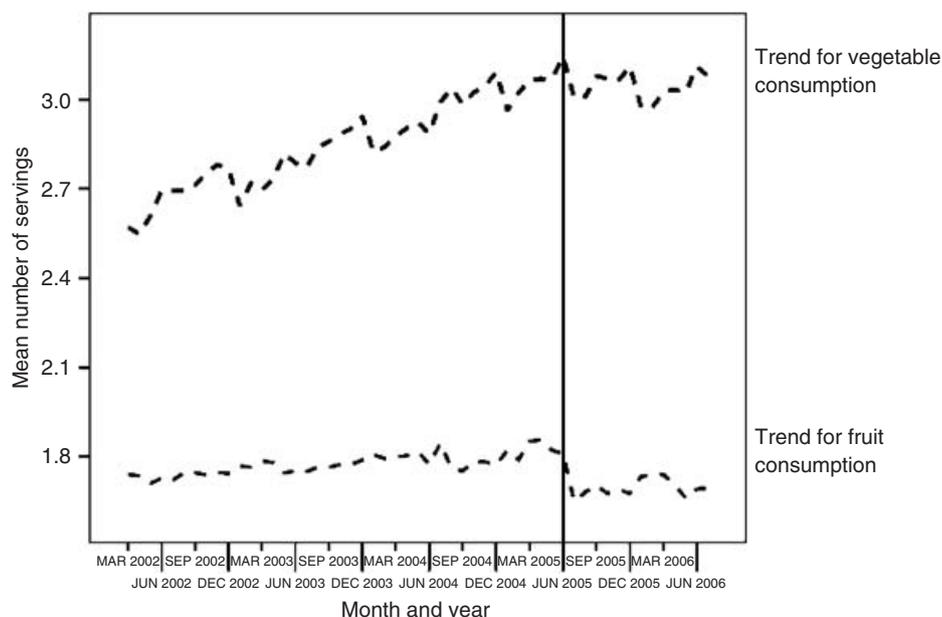


Fig. 2 Trends for fruit and vegetable consumption, persons aged 18 years and older, Western Australia, March 2002 to July 2006

evaluation framework were seen over the intervention period, with significant increases in proportions of the population who reported correct knowledge of recommended health action, perception of need to increase own current intake and self-reported consumption (particularly vegetables).

Population estimates showed significant increases in mean vegetable intake over the intervention period, particularly for men, and a significant decline at 12 months post-intervention. Increases in intake were seen across the continuum of intakes, with the greatest effect at lower intakes. The effect is similar to, although not directly comparable with, other fruit and vegetable intervention studies^{19,20}.

Although there was no defined control group, comparative fruit and vegetable consumption data – obtained using a similar methodology to the WHSS survey²¹ – for two other Australian states where a campaign did not occur show consumption prevalence in 2004 lower than that in Western Australia (WA) and similar to WA pre-campaign figures in 2001 (Table 3). In 2004, 91.8% of adults in New South Wales (NSW) and 91.5% in South Australia (SA) were consuming four or fewer servings of vegetables per day, compared with only 85.1% in WA (89.4% consuming less than five servings in 2001). For fruit, 53.1% of adults in NSW and 60.0% in SA were consuming one or no servings of fruit per day compared to only 46.9% in WA (51.5% consuming less than two servings in 2001).

Results should be interpreted keeping in mind that the evaluation was action research with population monitoring, not a controlled research design. Impact was assessed by pre-campaign baseline, tracking during the campaign period, and 12-month post-campaign data. The con-

tinuous tracking method monitored the build of campaign awareness and impact. Trends in awareness, perceptions, intentions and consumption are consistent with campaign advertising and suggest a causal relationship. There were no similar campaigns at the time and no obvious or logical influences other than the Go for 2&5[®] campaign over the tracking period. However, analyses are descriptive and are limited in determination of causal relationships.

The greater impact for vegetables than for fruit is not surprising, given the greater emphasis on increasing vegetable consumption in campaign television advertising. Ball *et al.*²² suggest that fruit and vegetable intake is related to nutrition knowledge. The effect may also be because baseline intake of fruit, knowledge of recommended intake and perceived intake were closer to the recommended levels than for vegetables.

Conclusion

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 for 2&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.

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Consumer perceptions of fruit and vegetables serving sizes

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Abstract

Objective: To assess consumer understanding of fruit and vegetable serving sizes.

Design: The Western Australian Health Department launched the Go for 2&5[®] campaign to promote fruit and vegetables in March 2002. The Health & Wellbeing Surveillance System surveyed 1108 adults, aged 16 years and over, between September and November 2002 about what constituted a serving of fruit and of vegetables, their usual daily fruit and vegetables intake, and their recall of the campaign.

Setting: The study was undertaken as a part of a public health intervention – social marketing campaign in Western Australia, which had a population of 1 927 000 in 2002.

Results: Forty-two per cent of respondents knew that the fruit serving size was one piece and only 14.5% reported the ½ cup vegetable serving size. The mean fruit intake was 1.8 (95% CI 1.7, 1.8) servings/d and the mean vegetable intake was 2.8 (95% CI 2.7, 3.0) servings/d. Vegetable intake was associated with being female ($P=0.006$), increasing age ($P<0.0001$), awareness of the campaign ($P=0.031$) and knowledge of standard serving size ($P=0.006$). Fruit consumption was associated with being female ($P=0.007$). Fruit and vegetable intakes were not associated with educational attainment or household income.

Conclusions: The Go for 2&5[®] campaign uses a prescriptive message to promote increased consumption of fruit and vegetables. Respondent's knowledge of the standard of serving sizes for fruit and vegetables suggests there is value in separating fruit and vegetable recommendations in messages to encourage increased consumption.

Keywords
Fruit
Vegetables
Serving size
Social marketing

Regular adequate fruit and vegetable intake contributes to good nutrition and general health and protects against common chronic diseases including CHD^(1–14), hypertension^(2,9,15), stroke⁽⁶⁾, diabetes^(16–21) and some cancers⁽²²⁾, as well as overweight and obesity and a number of other diseases⁽¹⁴⁾. The WHO and FAO have called for nations to increase fruit and vegetable consumption through targeted campaigns⁽¹⁴⁾. Multi-component approaches, addressing individual factors (e.g. knowledge, attitudes, skills, social influences and behaviours) as well as environmental factors (e.g. access, cost, quality and supply), appear to be more effective^(23–27). There is a lack of published information about the effectiveness of population-based interventions promoting fruits and vegetables⁽²⁴⁾.

Health communication has the capacity to create awareness, improve knowledge and induce long-term changes in individual and social behaviours⁽²⁸⁾. There is a need for effective educational messages to encourage the consumption of fruit and vegetables^(29,30). Knowledge of the recommended fruit and vegetable intake may be motivational, leading to self-evaluation of intake,

influencing social norms and increasing the expectation and approval for that level of consumption⁽³¹⁾. There might be agreement on the need to increase fruit and vegetable consumption; however, there are differences between countries in their classification, what constitutes a serving and the recommended servings⁽³²⁾, see Table 1.

The Australian recommendation of at least 675 g daily (including potatoes) is consistent with the minimum 400–600 g daily (excluding potatoes) recommended by health authorities to protect against disease^(14,22,33). Australian fruit and vegetable recommendations have been separate since 1994, based on the differing nutrient profiles of fruits and vegetables; the practical aspects of eating them; current household consumption levels; and food supply⁽³⁴⁾. Australia's food selection guide, The Australian Guide to Healthy Eating⁽³⁵⁾, is incorporated into Australian dietary guidelines^(36–38) and is used as the basis for most nutrition education initiatives.

Developing suitable messages to assist consumers to understand and accept the importance of healthy eating is complex. The way in which recommended food intake

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Table 1 Standard and recommended fruit and vegetables servings per day for good health in Australia, Canada and USA

Age (years)	2-3	4-8	9-13	14-18	19-50	51+
Sex	Both	Both	Both	Female	Female	Male
Country and one serving equivalent						
Australia	na	3-6*	4-7†	7-13‡	7-10§	7-9||
Fruit: 1 medium piece (150 g) or 2 small pieces, or 1 cup canned or chopped fruit, or ½ cup (125 ml) 100% fruit juice or 30 g dried fruit. Vegetables: ½ cup (75 g) cooked and/or legumes (dried beans, peas or lentils), or one small potato, or 1 cup salad vegetables, or ½ cup or 125 ml 100% vegetable juice.						
Canada	4	5	6	7	7-8	7
Fruit: 1 fruit or ½ cup (125 ml) fruit or 100% fruit juice. Vegetables: ½ cup (125 ml) fresh, frozen or canned, leafy or 100% juice. Form: Fresh, frozen or canned with little or no added fat, salt or sugar. Leafy green (e.g. broccoli, romaine, lettuce and spinach), orange (e.g. carrot, sweet potato and winter squash).						
USA	na	5-6	7-5-8	8-10	9-10	8-9
Amount: Both: ½ cup raw/cooked or juice, 1 cup leafy salad greens. Form: Both: All fresh, frozen, canned, and dried and juices with no added sugars or fats. Vegetables: Dark green (e.g. broccoli, spinach, romaine, collard, turnip, and mustard greens), orange (e.g. carrots, sweet potato, winter squash, and pumpkin), starchy (white potatoes, corn, green peas) vegetables and all cooked dry legumes (cooked dry beans and peas and soyabean products).						

na, not applicable.

*4-7 years, †8-11 years, ‡12-18 years, §19-60 years, ||60+ years.

**Fig. 1** Go for 2&5[®] logo

amounts are presented, as number of servings or specified size, is often misinterpreted by consumers⁽³⁹⁾. Focus group research to assist the development of educational messages for the American MyPyramid Food Guidance System found people considered fruits and vegetables should be part of a healthy diet; however, they were confused about serving sizes and the recommended daily intake⁽³⁹⁾.

The '5-a-day' message has been used as part of campaigns to encourage increased fruit and vegetable consumption⁽⁴⁰⁻⁴²⁾. Consumer research suggests that the '5+ a-day' message is understood and appropriate to encourage increased frequency of consumption; however, consumers have a limited understanding of servings size^(40,41). The Western Australian Health Department (WAHD) developed the Fruit 'n' Veg with Every Meal social marketing campaign to encourage fruit and vegetable consumption in 1990. Evaluation found that although consumers were aware of the campaign and interpreted the message as needing to eat more fruit and vegetables, they were not prompted to action⁽⁴³⁾, suggesting that a message specifying an optimal intake was preferable to one saying 'just eat more'.

The Go for 2&5[®] social marketing campaign launched in March 2002 with mass media advertising (television, radio, press and point-of-sale), public relations, publications, website (www.gofor2and5.com), and school and community activities⁽⁴⁴⁾. The campaign increased awareness of the need to eat more fruit and vegetables by increasing knowledge of the recommended number of servings, with a corresponding increase in consumption⁽⁴⁴⁾. The Go for 2&5[®] logo mnemonic device reminded consumers of the target (Fig. 1).

The objective of the present study was to determine consumer understanding of what constitutes a serving and the relationship to current fruit and vegetable intake. The timing of the research, six months into a high-profile social marketing campaign, allows analysis of the association between serving size understanding and campaign awareness.

Methods

In March 2002, the WAHD commenced the Health & Wellbeing Surveillance System (HWSS) continuous data

collection system. Computer-assisted telephone interview was used to interview over 550 Western Australian people aged 16 years and over each month. The survey asked about a range of issues including health conditions, lifestyle risk factors, protective factors and socio-demographics. Monthly samples were extracted using the Electronic White Pages telephone numbers as the sample frame and stratifying by rural, remote and metropolitan areas. Within each stratum, random samples were selected. From mid-September until the end of November 2002, all respondents over 16 years (*n* 1108) were asked four additional questions relating to fruit and vegetable serving size and campaign awareness.

Respondents were asked, 'What do you think a serve of vegetables/[fruit] equals?'; no alternatives were given and there was no prompting. Responses were then coded into pre-designated categories (one piece, one type, e.g. apple or carrot, ½ cup, other amount [Specify], 'what I put on my plate' [vegetables], other [Specify] or don't know).

Next they were asked about their usual fruit and vegetable intake: 'How many serves of vegetables/[fruit] do you usually eat each day? A serve of vegetable is equal to ½ cup of cooked vegetables or 1 cup of salad' and 'A serve of fruit is equal to one medium piece, two small pieces of fruit or one cup of diced fruit'. They were then asked about awareness of the campaign; 'The Department of Health has recently conducted a campaign about fruit and vegetables. Do you recall hearing or seeing anything about this?'

Prevalence and mean estimates, with 95% CI, were calculated using the Statistical Package for the Social Sciences version 15.0.1 (SPSS Inc., Chicago, IL, USA). Generalised linear models analysis was conducted using the survey data analysis module⁽⁴⁵⁾ in STATA 10 (StataCorp, College Station, TX, USA). Differences were reported as statistically significant when the confidence intervals did not overlap, where they are reported. Inferential statistical analyses provide *P* values as the basis for statistical significance. The WAHD-approved research met standard social marketing research criteria.

Results

The final sample of adults aged 16 years and over represents 81% of contacts made. The data were weighted to correct for over-sampling in rural and remote areas and then adjusted to the age and sex distribution of the Western Australian Estimated Resident Population for 2002.

Knowledge of fruit serving size

Table 2 displays the self-reported serving size for fruit and vegetables. Most respondents, 83%, nominated a serving size for fruit. More men (22%) than women (12%) said they were unsure about the fruit serving size and there were no significant differences based on age. 'One piece' was the

Table 2 Perceived fruit and vegetable serving size, by gender and age, of persons aged 18 years and older, Western Australia, September to November 2002

Serving size*	<i>n</i>	An amount % (95% CI)					Unsure	What I put on my plate
		One piece	One type	Half a cup	Other	Other		
Fruit								
All persons	1108	41.9 (38.6, 45.2)	10.9 (9.1, 13.1)	5.8 (4.5, 7.5)	15.7 (13.2, 18.4)	9.1 (7.3, 11.2)	16.6 (14.3, 19.2)	na
Female	652	47.9 (43.7, 52.2)	11.9 (9.4, 15.1)	6.2 (4.5, 8.4)	12.9 (10.3, 15.9)	8.9 (6.7, 11.6)	12.2 (9.8, 15.2)	na
Male	456	34.4 (29.6, 39.5)	9.7 (7.3, 14.8)	5.4 (3.5, 8.3)	19.1 (15.0, 24.1)	9.4 (6.7, 12.9)	22.0 (17.9, 26.6)	na
Age (years)								
16-24	177	32.0 (24.7, 40.2)	12.1 (7.6, 18.9)	7.5 (4.1, 13.2)	25.2 (17.9, 34.1)	9.3 (5.6, 15.0)	14.0 (9.1, 20.9)	na
25-39	210	47.9 (40.8, 55.1)	8.8 (5.6, 13.6)	4.6 (2.5, 8.3)	16.3 (11.5, 22.5)	9.0 (5.5, 14.4)	13.4 (8.9, 19.7)	na
40-59	352	42.5 (37.1, 48.1)	10.0 (7.2, 13.6)	5.4 (3.3, 8.8)	14.6 (11.0, 19.1)	10.7 (7.8, 14.6)	16.8 (13.0, 21.3)	na
≥60	369	40.3 (34.9, 46.0)	14.4 (11.0, 18.7)	6.8 (4.6, 10.0)	9.5 (6.6, 13.3)	6.5 (4.3, 9.6)	22.5 (18.3, 27.5)	na
Vegetable								
All persons	1108	2.3 (1.6, 3.4)	4.0 (2.9, 5.5)	14.5 (12.4, 16.9)	27.7 (24.7, 30.8)	21.5 (18.9, 24.3)	23.0 (20.3, 26.0)	6.9 (5.3, 8.8)
Female	652	2.6 (1.5, 4.3)	4.5 (3.0, 6.6)	20.5 (17.3, 24.1)	27.7 (23.9, 31.8)	21.8 (18.5, 25.5)	18.8 (15.7, 22.3)	4.3 (2.9, 6.3)
Males	456	2.0 (1.1, 3.6)	3.5 (2.0, 6.1)	7.2 (4.9, 10.5)	27.6 (23.1, 32.6)	21.2 (17.3, 25.7)	28.2 (23.6, 33.3)	10.1 (7.3, 13.9)
Age (years)								
16-24	177	1.1 (0.3, 4.8)	3.8 (1.6, 8.9)	6.4 (3.3, 11.9)	32.2 (24.9, 40.6)	22.6 (16.7, 29.9)	28.4 (20.8, 37.5)	5.4 (2.6, 10.6)
25-39	210	2.2 (1.0, 5.0)	3.1 (1.3, 7.3)	10.0 (6.4, 15.2)	36.1 (29.5, 43.2)	20.3 (15.2, 26.6)	19.3 (14.0, 26.0)	9.0 (5.6, 14.3)
40-59	352	2.0 (0.9, 4.3)	4.7 (2.9, 7.6)	20.4 (16.3, 25.3)	23.2 (18.8, 28.3)	23.1 (18.6, 28.2)	20.5 (16.5, 25.3)	5.7 (3.6, 9.0)
≥60	369	3.8 (2.2, 6.6)	4.3 (2.6, 7.0)	17.1 (13.5, 21.6)	20.5 (16.2, 25.4)	19.4 (15.3, 24.3)	27.7 (23.0, 33.0)	7.1 (4.7, 10.7)

na, not applicable.

*The column headings refer to the categories for the questions asking what constitutes a serving of fruit or vegetables.

most commonly identified serving size for fruit (42%), with women (48%) more likely than men (34%) to suggest it. People aged 16–24 years were least likely to select ‘one piece’, 32% compared to 48% of 25- to 39-year-olds.

‘One type of fruit’ was identified as the serving size for fruit by 11% of respondents, with no significant difference based on gender or age. Other serving size amounts were specified by 16% of respondents.

Knowledge of vegetable serving size

Table 2 displays the self-reported serving size for vegetables. Most respondents, 78%, thought they knew the vegetable serving size. Significantly more men than women said they were unsure about the vegetable serving size, 28% and 19%, respectively. There were no significant differences based on age. Fourteen per cent of respondents, 20% of women and 7% of men identified ‘ $\frac{1}{2}$ cup’ (the standard vegetable serving size). People over 40 years old were more likely to identify ‘ $\frac{1}{2}$ cup’ than those who were younger. Twenty-eight per cent of respondents nominated a different amount for the vegetable serving size. Respondents less than 40 years old were more likely than those aged over 40 to specify a different amount. Men (10%) were more likely than women (4%) to identify ‘the amount I put on my plate’ as a serving of vegetables.

Fruit and vegetable consumption

Table 3 displays knowledge of standard serving size by the mean fruit and vegetable intake. The mean fruit intake was 1.8 (95% CI 1.7, 1.8) servings/d, with women consuming more than men, 1.9 (95% CI 1.8, 2.0) and 1.6 (95% CI 1.5, 1.7) servings/d, respectively. Those who knew the standard fruit serving size had higher intakes, 1.9 compared to 1.7 servings/d; however, the difference was not significant. Respondents who knew the standard serving size for fruit were more likely to eat the recommended two servings per day than who did not, 57.2% (95% CI 52.0, 62.2) compared to 46.3% (95% CI 42.0, 50.7).

The mean vegetable intake was 2.8 (95% CI 2.7, 3.0) servings/d. Women had higher intake than men, 3.1 (95% CI 2.9, 3.0) and 2.6 (95% CI 2.6, 2.8) servings/d, respectively. Men who knew the standard serving size had 1.1 servings more than those who did not. Respondents who knew the standard serving size for vegetables were more likely to have the recommended five servings per day than those who did not, 19% compared to 11%; however, the difference was not significant. Women who knew the standard serving size for vegetables were more likely to eat five or more servings daily than men who knew the standard serving size, 22% compared to

Table 3 Daily fruit and vegetable consumption, by serving size and gender, of persons aged 18 years and older, Western Australia, September to November 2002

Consumption levels* (servings)	n	Standard serving†	Incorrect‡	Unsure
			% (95%CI)	
Fruit				
Females				
≥2 servings	652	64.2 (58.0, 70.0)	54.4 (47.7, 61.0)	49.3 (38.0, 60.7)
<2 servings		35.8 (30.0, 42.0)	45.6 (39.0, 52.3)	50.7 (39.3, 62.0)
Mean servings		2.0 (1.8, 2.2)	1.9 (1.7, 2.0)	1.7 (1.5, 2.0)
Males				
≥2 servings	456	45.2 (36.6, 54.1)	40.1 (32.6, 48.2)	38.6 (28.8, 49.4)
<2 servings		54.8 (45.9, 63.4)	59.9 (51.8, 67.4)	61.4 (50.3, 71.2)
Mean servings		1.7 (1.4, 1.9)	1.6 (1.4, 1.8)	1.4 (1.5, 2.0)
All persons				
≥2 servings	1102	57.2 (52.0, 62.2)	47.7 (42.5, 52.9)	42.8 (35.3, 51.0)
<2 servings		42.8 (37.8, 48.0)	52.3 (47.1, 57.5)	57.1 (49.0, 64.7)
Mean servings		1.9 (1.7, 2.0)	1.7 (1.6, 1.9)	1.5 (1.4, 1.7)
Knowledge of serving size		41.8 (38.6, 45.2)	41.5 (38.3, 44.9)	16.6 (14.3, 19.2)
Vegetables				
Females				
≥5 servings	652	22.3 (15.6, 30.9)	13.7 (10.4, 17.9)	15.9 (10.1, 24.2)
<5 servings		77.7 (69.1, 84.4)	86.3 (82.1, 89.6)	84.1 (75.8, 89.9)
Mean servings		3.5 (3.2, 3.8)	3.0 (2.8, 3.2)	2.8 (2.5, 3.1)
Males				
≥5 servings	456	8.7 (2.1, 30.4)	13.8 (9.9, 18.9)	6.6 (3.2, 13.0)
<5 servings		91.3 (69.6, 97.9)	86.2 (81.1, 90.1)	93.4 (87.0, 96.8)
Mean servings		3.2 (2.8, 3.6)	2.7 (2.4, 2.9)	2.1 (1.8, 2.4)
All persons				
≥5 servings	1102	19.3 (13.5, 26.8)	13.7 (11.1, 16.9)	10.8 (7.3, 15.7)
<5 servings		80.7 (73.2, 86.5)	86.3 (83.1, 88.9)	89.2 (84.3, 92.7)
Mean servings		3.5 (3.2, 3.7)	2.8 (2.7, 3.0)	2.4 (2.2, 2.6)
Knowledge of serving size		14.5 (12.4, 16.9)	62.5 (59.2, 65.7)	23.0 (20.3, 26.0)

*The consumption levels are equal to or above/below the recommended Australian guidelines of at least two servings of fruit and five servings of vegetables per day.

†One piece of fruit or $\frac{1}{2}$ cup of vegetables.

‡Another amount or ‘other’.

Table 4 Parameter estimates by number of servings of fruit (vegetables) consumed per day of persons aged 18 years and older, Western Australia, September to November 2002

Parameter	Coefficient	t	P>[t]	95% CI	
				Lower	Upper
Number of vegetable servings per day					
Gender	-0.41	-2.74	0.006	-0.71	-11.67
Age group	0.34	3.85	0.000	0.17	0.52
Knowledge of the campaign	0.33	2.16	0.031	0.03	0.64
Recognition of the vegetable face	0.12	-0.57	0.569	-0.52	0.29
Knowledge of serving size	0.52	2.77	0.006	0.15	0.89
Household income	0.05	0.86	0.388	-0.06	0.16
Education	0.56	1.02	0.308	-0.05	0.16
Number of fruit servings per day					
Gender	-0.29	-2.71	0.007	-0.50	-0.01
Age group	0.13	0.48	0.632	-0.16	0.26
Knowledge of the campaign	0.05	0.48	0.632	-0.16	0.27
Recognition of the vegetable face	-0.11	-365	0.516	-0.45	0.23
Knowledge of serving size	0.07	0.61	0.544	-0.16	0.29
Household income	0.06	1.56	0.119	-0.15	0.13
Education	0.03	0.72	0.474	-0.06	0.12

Analysis done using STATA 10 survey data analysis module, generalised linear models.

9%, respectively. Respondents who were aware of the campaign reported higher mean vegetable intake than those who were not, 3.0 (95% CI 2.8, 3.1) compared to 2.5 (95% CI 2.3, 2.7) servings/d, respectively. There was no significant difference for fruit consumption. Table 4 displays factors influencing fruit and vegetable consumption. Vegetable intake was significantly associated with being female ($P=0.006$), increasing age ($P<0.0001$), awareness of the campaign ($P=0.031$), and knowledge of standard serving size ($P=0.006$). Fruit consumption had a significant association with gender ($P=0.007$). There were no significant associations based on educational attainment or household income.

Discussion

Developing suitable messages to assist consumers to understand and accept the importance of healthy eating is complex. Knowledge gaps associated with the recommendation to eat more fruit and vegetables were evident in this study, particularly for vegetables. Knowledge of the recommended amount may reflect a key skill needed to perform the behaviour, it may serve a motivational function leading to a self-evaluation of intake, and it may provide a normative influence, increasing the expectation and approval for that level of consumption⁽³¹⁾. To understand dietary recommendations, consumers needed to know the type and amount of recommended foods, and to assess the adequacy of their current intake they needed to know what constituted a serving⁽³⁹⁾. Britten *et al.* (2006) found consumers could apply this information by mentally adding up the amounts they consumed at each meal and comparing it to daily recommendations⁽³⁹⁾. Overly optimistic assessment of current intakes results in complacency about the need to eat more fruit and

vegetables^(44,46,47). Respondents were more confident in assigning a serving size to fruit than to vegetables. The most common fruit serving size of 'one piece' supports the finding that consumers prefer recommendations expressed in pieces of fruit⁽³⁹⁾. Respondents reported vegetable serving sizes in 'amounts', consistent with previous findings that common household units or measures, for example a cup, were preferred for vegetables⁽³⁹⁾.

Many theoretical models can be used to guide food choice research^(48,49). The Go for 2&5[®] campaign used a model of adapted phases between knowledge and behaviour^(50,51) to examine behavioural beliefs, attitudes, influencers and intentions⁽⁴⁴⁾. How or whether consumers use serving size information to make their food choices is still not clear; however, the information may be useful to assist with the assessment of current intake. Policy recommendations and assessment of intervention effectiveness rely on accurate dietary assessment. The measurement method influences the proportion of the population categorised as meeting fruit and vegetable guidelines⁽⁵²⁻⁵⁴⁾.

The main strength of the present study is that it provides a quantified population-level snapshot of consumer understanding of fruit and vegetable serving sizes six months after the commencement of the Go for 2&5[®] campaign. The results are representative of the Western Australian population as a whole but may not represent subgroups within the population, such as Aboriginal people. There were also study limitations, the analysis did not distinguish amounts other than '½ cup'; other amounts, particularly for vegetables, are required. Additional questions relating to knowledge of recommended intake, or asking current intake before and after defining serving sizes are suggested; however, minimal additional questions can be added to an existing surveillance system. Knowledge of serving size or dietary behaviour may merely be a marker for a cluster of 'healthy lifestyle'

behaviours (e.g. smoking, exercise). Recent New Zealand research found little or no clustering of healthy behaviours, and refuted that fruit and vegetable consumption is merely a marker of healthy lifestyle⁽⁵⁵⁾. Further analysis to determine the influence of other lifestyle factors is suggested. More community education is required on serving size to maximise the impact of health promotion campaigns such as the Go for 2&5[®]. More research is required to establish the best method for this education.

Conclusions

Consumers differentiate between serving sizes for fruit and vegetables. Knowledge of the standard fruit and vegetable serving sizes is related to the consumption of the recommended amounts. Respondents' understanding of fruit and vegetable serving sizes suggests it is important to separate fruit and vegetable recommendations, using common household measures to convey serving sizes, and using prescriptive messages, for example Go for 2&5[®] to encourage fruit and vegetable consumption.

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Introduction

Culturally specific dietary guidelines are developed to meet nutrient recommendations and reduce the risk of chronic disease. The Australian Governments Dietary Guidelines provide advice to the general public about healthful food choices and form the basis for most nutrition education initiatives (1-3). Monitoring dietary factors that determine food consumption changes in relation to nutrition recommendations is necessary to assist in the development of public health interventions (4).

Public health focus on chronic disease prevention has led to increased emphasis on fruit and vegetable intake amongst population-based dietary guidelines. Australian Dietary Guidelines (1-3) advises to 'Eat plenty of vegetables, legumes and fruits' and recommends adults eat at least two 150 gram servings of fruit and five 75 gram servings of vegetables per day (5), a total of at least 675g per day. This is consistent with World Health Organization, Food and Agriculture Organization of the United Nations, and the World Cancer Research Fund recommended daily fruit and vegetable intake of 400 to 600 grams per day (6, 7). It has been suggested that increasing consumer awareness of the recommended daily intake of fruits and vegetables for good health is a priority (8-11), as knowledge of recommended intake would in part determine an individual's ability to assess the adequacy of their current intake and need for change (8, 12, 13).

In 2002, the Department of Health in Western Australia (DOH) launched a high-profile social marketing campaign to increase awareness of the need to eat more fruits and vegetables. The Go for 2&5[®] message was used to achieve the communication objective of increasing consumer knowledge of recommended daily amounts of fruits and vegetables.

Measuring the proportion of the population who meet dietary recommendations can assist in assessing the impact of health promotion initiatives (14). The routine data collected for health surveillance systems monitor health behavior trends and may be useful in developing and providing feedback on public health intervention effectiveness. Monitoring attitudes and beliefs as well as self-reported dietary behaviors may provide useful insights about the factors associated with dietary patterns.

The DOH conducted four Nutrition Monitoring Surveys of adults between 1995 and 2004. The purpose of the surveys was to provide information for planning initiatives to promote healthy eating behaviors consistent with the Dietary Guidelines for Australians. Respondents were queried about their knowledge, attitudes and beliefs in relation to the Dietary Guidelines. The surveys also aimed to identify dietary concerns, barriers to, and promoters of healthy eating behavior. This paper describes the observed changes relating to fruit and vegetable intake amongst Western Australian (WA) adults residing in the Perth metropolitan area between 1995 and 2004.

Methods

Surveys were conducted during July and August of 1995, 1998, 2001 and 2004. The sample for each survey was selected using computer generated random digit dialling, except in the 2004 survey, where the numbers were randomly selected from the electronic Perth metropolitan telephone directory in order to reduce the number of non-household telephone numbers. Virtually all Australian households, over 97.5%, had a telephone in 1999(15). Interviewing was conducted on weeknights and weekends over a four-week period so as not to bias the sample against working





people. The person aged 18 to 64 years with the ‘next birthday’ within each household was selected. Up to four telephone calls were made to contact the required respondent; the initial call plus three callbacks, except in 2004 when up to six callbacks were made. No substitutions were made within households if the required respondent was not available. From 1998 onwards, to maintain gender balance, each survey was stratified according to gender with a pre-designated ratio of male to female respondents of 1:1. The questionnaires contained between 107 and 120 defined category and open-ended questions. The questions relating to this paper include:

Fruit and vegetable consumption:

1. *“How many pieces of fruit did you eat yesterday? A piece of fruit would be, for example, an apple, a small bunch of grapes, three prunes, a quarter of rock melon or half a cup of stewed, puréed or canned fruit”*
2. *“How many different types of vegetables did you eat yesterday? Include salads, fresh, frozen, canned, raw and cooked vegetables”*
3. *“How many cups of each type of vegetables did you eat? An example, one medium potato equals 1 cup of vegetables include part cups.”, and “Just to check...did you remember to include the salads, fresh, frozen, canned, raw and cooked vegetables you ate yesterday?”*

Dietary changes and barriers to increasing fruit and vegetables:

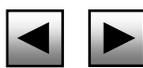
4. *“In the past 12 months, have you tried to change the amount of fruit/vegetables that you eat?” If yes, “Was that an increase or a decrease?”*
5. *“What are the main things that make it difficult for you to eat plenty of fruit/more vegetables?”*

Awareness of daily amount of fruit and vegetable recommendations:

6. *“What do you think is the recommended number of serves of fruit that should be eaten each day? One serve of fruit is equal to one medium piece of fruit or half a cup of cooked or canned fruit.”*
7. *“What do you think is the recommended number of serves of vegetables that should be eaten each day? One serve of vegetables is equal to one medium potato, half a cup of cooked vegetables or 1 cup of salad vegetables.”*

Data on respondent’s age, sex, highest level of education completed, country of birth, current employment status, occupation (job category), and total household income were also collected.

Statistical analysis. Data was analyzed using STATA version 9.2 (StataCorp, Texas, USA). Prior to analysis, the samples were weighted using inverse probability weighting in order to match each sample to the Perth metropolitan age and sex population estimates according to Australian Bureau of Statistics Census data for the appropriate year. Prevalence estimates and means were calculated data using STATA’s suite of survey estimation commands (svy) for sample-surveys. Binary outcomes were assessed using the svy commands for binary logistic regression and are reported as odds ratios (OR), with 95% confidence intervals (95% CI). Count outcomes were assessed using either the svy poisson or negative binomial regression models as appropriate for the best model fit and are reported as incidence rate ratios (RR) with 95% CI. Associations between each outcome variable in 1995 and other years in which the survey was conducted are reported with adjustment for age and sex. The additional effects of level of education and household income were also included in the models and kept when significant ($p < 0.05$) according to the Wald statistic.





Results

The final samples of 600 to 753 per survey represented between 32 and 58% of the total contacts made. This is a typical response rate for this type of survey (16, 17). This sample size is sufficient to obtain estimates of proportions with 95% CI accurate to +/- 3.8% (n= 750) to +/- 4% (n=600). The reason for exclusion of contact in this survey included language or hearing problems, outside the age range, nominated respondent was unavailable for duration of survey, or refusal to participate. Table 1 displays the participation rates and demographics of the subjects for each year. The average interview took between 33 and 35 minutes.

Knowledge of recommended intakes for fruit and vegetables. Table 2 displays participant's knowledge of the recommended intakes of fruit and vegetables between 1995 and 2004. The proportion correctly reporting the minimum recommended two servings of fruit daily increased from 23.8% in 1995 to 52.7% in 2004. In 2004, respondents were several times more likely to say they should eat two servings of fruit per day than they were in 1995 (OR=3.66, 95% CI=2.85 to 4.70, $p<0.001$). There was no significant difference in the proportion of women and men correctly identifying the minimum recommended fruit intake.

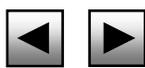
The proportion of respondents reporting the minimum recommended five servings of vegetables a day increased from 30.1% in 1995 to 64.3% in 2004. In 2004, respondents were over four times more likely to know the minimum recommended five servings of vegetables than they were in 1995 (OR=4.50 95% CI=3.49 to 5.80, $p<0.001$). Overall, women were more likely than men to know the minimum recommended intake of vegetables (OR=2.49, 95% CI=2.09 to 2.96; $p<0.001$).

Attempts to increase fruit and vegetable consumption over last year. Table 2 displays respondent's attempts to change their fruit and vegetable intake between 1995 and 2004. There were slight changes across the surveys in the proportion of respondents who had tried to increase their fruit intake over the last year; 39.4% in 1995, 39.3% in 1998, 36.2% in 2001 and 40.7% in 2004 (Design based $F(5.9, 16833.5)=2.11$, $p=0.05$). Overall, women were more likely than men to have attempted to increase their fruit intake (OR=1.31, 95% CI=1.12 to 1.54; $p<0.001$), and attempts to increase intake decreased with increasing age (OR=0.91, 95% CI=0.88 to 0.94; $p<0.001$).

Only about a third of respondents had tried to increase their vegetable intake over the previous year; 33.8% in 1995, 30.5% in 1998, 29.3% in 2001 and 33.5% in 2004 (Design based $F(5.91, 16848.3)=2.74$, $p=0.01$). Overall, women were more likely to have attempted to increase their vegetable intake than men (OR=1.81, 95% CI=1.52 to 2.17; $p<0.001$), attempts to increase intake decreased with increasing age (OR=0.91, 95% CI=0.88 to 0.95; $p<0.001$) and increasing income (OR=0.90, 95% CI=0.82 to 0.98; $p<0.019$).

Fruit and vegetable intake on the day prior to the survey. Table 3 displays fruit and vegetable consumption on the day prior to the survey between 1995 and 2004. There were no significant changes in mean fruit consumption between 1995 and 2004. Overall, women ate 20% more pieces of fruit than men on the day prior to the survey (RR =1.20, 95% CI=1.09 to 1.32; $p<0.001$), those with higher education ate more pieces (RR=1.11, 95% CI=1.06 to 1.17; $p<0.001$), and intake was higher with increasing income (RR=1.06, 95% CI=1.00 to 1.11; $p=0.036$).

When compared to 1995, less respondents ate some fruit on the day prior, however the differences were only significant in 2001 (RR=0.60, 95% CI=0.41 to 0.86, $p=0.006$). Overall, women were more likely than men to have eaten some fruit on the





day before the survey (RR=1.73, 95% CI=1.31 to 2.29; $p<0.001$), and the likelihood increased with higher education (RR=1.39, 95% CI=1.20 to 1.61; $p<0.001$).

The mean vegetable intake on the day prior to the survey is shown in table 3. Respondents ate 12% fewer cups of vegetables in 2004 than in 1995 (RR=0.88, 95% CI=0.82 to 0.96, $p=0.003$). Overall, women ate significantly fewer cups of vegetables than men (RR=0.92, 95% CI=0.87 to 0.97 $p=0.004$). A greater proportion of respondents ate no vegetables on the day prior to the survey in both 2001 (OR=0.50, 95% CI=0.35 to 0.70, $p<0.001$) and in 2004 compared to 1995 (OR=0.50, 95% CI=0.35 to 0.72, $p<0.001$). Overall, the likelihood of eating no vegetables on the day prior to the survey increased with increasing income (OR=1.16, 95% CI=1.03 to 1.30, $p=0.013$).

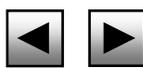
The variety of vegetables eaten on the day prior to the survey is shown in table 3. The mean number of different types of vegetables respondents reported eating on the day prior to the survey ranged from 3.4 in 2001 to over 4.0 in the other survey years. Respondents consumed fewer types of vegetables in 2001 (RR=0.85, 95% CI=0.80 to 0.90; $p<0.001$) and in 2004 (RR=0.93, 95% CI=0.88 to 0.98; $p<0.009$) than they did in 1995. Overall, women consumed a greater variety of vegetables than men (RR=1.13, 95% CI = 1.09 to 1.17; $p<0.001$) and variety increased with higher education (RR=1.04, 95% CI = 1.02 to 1.06; $p<0.001$).

Barriers to increasing fruit and vegetable intake. Table 4 shows that barriers to increasing fruit intake were similar to those for increasing vegetable intake, however, the proportion of respondents reporting them differed. The main reason respondents gave for not eating more of both fruit and vegetables was the perception that they already ate enough (approximately one-third and two-thirds of participants respectively). In 2004, respondents were significantly less likely to say they already ate enough vegetables than they were in 1995 (OR=0.71, 95% CI=0.55 to 0.92, $p<0.008$). Overall, women were less likely than men to say they already ate enough vegetables (OR=0.72, 95% CI=0.61 to 0.86; $p<0.001$), the belief that ‘I already ate enough vegetables’ increased with age (OR=1.14, 95% CI=1.10 to 1.19; $p<0.001$) and income (OR=1.14, 95% CI=1.04 to 1.24; $p<0.004$). There were increases in the proportion of the population that perceived lack of variety, poor quality, lack of time and effort to prepare, and difficulty changing habits as barriers from 1995 to 2004.

Discussion

This study demonstrated significant changes in knowledge, beliefs and some behaviors relating to fruit and vegetable consumption between 1995 and 2004. Most changes occurred following the “Go for 2&5[®]” fruit and vegetable campaign that took place in 2002. Approximately twice as many respondents correctly identified the minimum recommended intake for both fruit and vegetables in 2004 compared to 1995. These findings are consistent with results from the 2004 monthly campaign tracking survey reported elsewhere(18). The main change in knowledge of the fruit recommendation was a reduction in the proportion reporting three or more servings per day and a corresponding increase in those reporting two servings, in line with the campaign message. This did not appear to have had an immediate adverse impact on consumption although future trends in knowledge and consumption should be monitored.

The average fruit intake between 2001 and 2004 was stable following the significant decline seen between 1998 and 2001. Although there was a significant increase in the proportion correctly identifying the minimum recommended intake of vegetables, the average number of cups of vegetables reported eaten declined by 12% between 1995





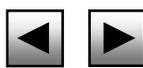
and 2004. Compared to 1995, there was also a significant decline in the average number of types of vegetables eaten on the day prior to the survey, by 15% in 2001 and seven percent in 2004. Knowledge of the recommended number of servings has been associated with higher intake (19), however the association is not always strong (20, 21), suggesting that other factors are important influencers of consumption.

The main barriers to increasing consumption differed for fruit and vegetables particularly in the extent of the main barrier, the perception that current intake was adequate. Approximately one-third of respondents felt their intake of fruit was adequate and two-thirds felt their intake of vegetables was adequate. These figures were consistent across the surveys, although there was a slight decrease in this perception for both fruit and vegetables in 2004. This confirms the previously identified importance of investigating influences on fruit and vegetable consumption separately (22). Our data supports the view that complacency surrounding the need to increase fruit and vegetable intake is related to an optimistic assessment of current intakes (9, 23).

The actual and perceived adequacy of intake of vegetables was similar. Fifty nine percent of respondents said they already ate enough vegetables in 2004 compared to 35% who actually ate three or more cups (six servings) of vegetables on the day prior to the survey and a further 24% who reported eating two cups (4 servings) of vegetables. Although 59% ate two or more pieces of fruit per day only 35% said they believed that they already ate enough fruit.

Valid and reliable measurement of fruit and vegetable consumption is a challenge for population monitoring surveys (24-26). The measurement method influences the proportion of the population categorized as meeting fruit and vegetable guidelines (25, 27, 28). A combination of 24-hour food recall and semi-quantified food frequency is recommended (27). Whilst regular nutrition monitoring is paramount; the method is often limited to a few short answer questions, as in this study, due to respondent burden and funding constraints. This survey self-reported intake in cups of vegetables eaten on the day before the survey rather than usual number of servings a day, therefore did not distinguish between the standard serving size of ½ cup of cooked vegetables and one cup of salad vegetables. Studies using self-reporting tend to over-estimate fruit and vegetable consumption (7). At over 35%, the proportion of the population in this study who met the recommended vegetable intake (five serves or 2½ cups), was inconsistent with other Australian studies in 2004, only 15% in WA (18), and 5% in a Victorian survey (29). Adequate fruit intake was more consistent across different surveys; 59% in this study compared to 53% in WA (18) and 61% in Victoria (29). Although these methodological differences make comparisons more difficult, it is still clear that as with other Australian and US population-based studies (29-31), a substantial proportion of the Perth population do not meet the recommended intakes for fruit and vegetables.

In addition to the perception that their fruit and vegetable intake is adequate, the availability, cost, and quality of fruits and vegetables increased as factors influencing intake. The time and effort taken to prepare vegetables was also a major barrier. These factors may become more significant as intention and attempts to change behaviour increase. Although consumer perception of the cost of fruit and vegetables as a barrier decreased slightly from 1995, it remained an important issue for fruit intake in 2004. Similarly, the lack of variety and poor quality of fruit increased as an issue over the survey period. Cost as a perceived barrier is complex, Dibsall et al. (2003) suggest that consumers budget for the amount of fruit and vegetables they





routinely buy, but are unwilling to purchase more than this amount, and therefore see this as the expense(23).

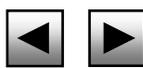
'Time scarcity' has been identified as an independent predictor of fruit and vegetable intake, (32) including convenience and time taken in preparation. A "lack of time" was increasingly identified as a barrier to eating more fruit, and the time and effort taken to prepare vegetables increased as a barrier. It is therefore important to consider convenience and the ease of preparation when promoting increases in fruit and vegetable consumption.

This study found that women were generally more knowledgeable about the recommended intake of fruit and vegetables than men. Over the four surveys combined, women were 2½ times more likely than men to identify the correct number of serves of vegetables, and 28% less likely to say they already ate enough vegetables. Women also ate more types of vegetables, and had a slightly lower vegetable intake, a higher fruit intake, and were more likely than men to have attempted to increase their fruit and vegetable intake. Ashfield-Watt et al. (2003) also found that UK women ate more fruit than men but fewer vegetables (33) as did Guenther et al (2006) when assessing intake of the US population (10). Reasons may be that women eat smaller portion sizes or that as the main food preparer they have a more realistic assessment of their intake than men.

The low survey response rate of between 32 and 58%, should be considered when generalizing the findings of this study. The improved participation rate in 2004 may be due to using electronic white pages instead of random digit dialling and more callbacks compared to previous years. The improved rate did not appear to change the overall sample characteristics. Higher incomes were reported across the years, probably a result of the use of salary cut-off values reflecting increasing salaries over time rather than changes in sample characteristics. Self-reported surveys are subject to reporting bias; however, the same questions were asked across all four surveys so that this bias should not affect the findings.

A limitation of this research is that the surveys were not specifically designed to evaluate the Go for 2&5® campaign. Data relates as much to changes across time as to changes since its implementation in 2002, therefore, it is not possible to say which factors influenced the changes in comparisons of 2004 with 1995, however, the similarity of findings between the two surveys prior to the campaign, and the changes reported following are of interest. As reported elsewhere 90% of the population were aware of the Go for 2&5® campaign, between 2002 and 2004(18). The changes in knowledge of recommended intake that occurred between the 2001 and 2004 surveys suggest that the campaign that was initiated in 2002 had an influence on knowledge about what constitutes a healthy diet. Also, the 2004 shifts in perception of adequacy of current intake and the effort to prepare vegetables suggest a re-assessment of intake in response to the campaign message. The data derived from this series of regular nutrition monitoring is also useful to assist the further development and implementation of the Go for 2&5® campaign.

The proportion of the population that know the recommended intake for vegetables remains lower than that for fruit. There were consistent differences each year between the barriers to eating fruit and those for vegetables. For these reasons communicating the ideal number of servings of fruit and vegetables separately and providing practical solutions to addressing the barriers to increasing vegetable consumption in particular, is a priority when developing new interventions. Despite improvements in knowledge, the proportion below the recommended intake of fruit and vegetables highlights the need to continue to encourage a healthy diet.



**Table 1 Sample demographics by survey year (Percentage of sample)**

Year	1995	1998	2001	2004
Participation rate¹ (%)	34	32	33	58
Hearing loss/language/age range	7	2	6	20
Refusals/not avail for duration	14	8	20	15
Terminations	<1	<1	<1	<1
<i>n</i>	748	751	754	601
Sex				
Male	274 (37%)	375 (50%)	405 (54%)	300 (50%)
Female	474 (63%)	376 (50%)	349 (46%)	301 (50%)
Education	<i>n</i> 747	751	746	580
Year 10, Junior Achievement Cert	248 (33%)	235 (31%)	210 (28%)	117 (20%)
Year 12, Certificate Secondary Ed	194 (26%)	187 (25%)	210 (28%)	137 (24%)
Tertiary Education Degree Uni	238 (32%)	251 (34%)	264 (36%)	245 (42%)
Apprenticeship/trade qualification	67 (9%)	78 (10%)	62 (8%)	81 (14%)
Income (Aus \$)	<i>n</i> 714	717	709	581
<\$15,000	81 (11%)	64 (9%)	61 (9%)	28 (5%)
\$15,000-3	239 (34%)	185 (26%)	147 (21%)	103 (18%)
\$35,000-5	188 (26%)	151 (21%)	125 (17%)	98 (17%)
>\$50,000	206 (29%)	317 (44%)	376 (53%)	352 (60%)
Age category yr	<i>n</i> 748	751	754	601
18 to 19	30 (4%)	17 (2%)	28 (4%)	16 (3%)
20 to 24	55 (7%)	67 (9%)	61 (8%)	51 (8%)
25 to 29	74 (10%)	63 (8%)	71 (9%)	59 (10%)
30 to 34	111 (15%)	90 (12%)	99 (13%)	64 (11%)
35 to 39	111 (15%)	109 (15%)	101 (13%)	61 (10%)
40 to 44	105 (14%)	121 (16%)	128 (17%)	78 (13%)
45 to 49	98 (13%)	103 (14%)	81 (11%)	64 (11%)
50 to 54	62 (8%)	74 (10%)	85 (11%)	72 (12%)
55 to 59	49 (7%)	55 (7%)	58 (8%)	91 (15%)
60 to 64	53 (7%)	52 (7%)	42 (6%)	45 (7%)

¹Participation rate: completed interviews (CI)/CI + refusals + terminations

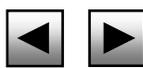


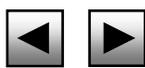


Table 2: Knowledge of recommended number of serves of fruit and vegetables per day, and beliefs about diet, percentage by year

Year	1995	1998	2001	2004
<i>n</i>	748	751	753	601
Serves of fruit recommended per day (%)				
One	8.6	4.0	5.3	3.7
Two	23.8	23.8	29.4	52.7
Three+	60.5	66.5	59.6	40.2
Other	1.3	0.3	0.7	0.0
Don't know	5.8	5.2	5.0	3.3
Correctly answered minimum 2 servings of fruit by year				
OR (CI) ¹	1.00	1.01 (0.78, 1.29)	1.36 (1.06, 1.73)	3.66 (2.85, 4.70)
P-value ¹	na	0.955	0.015	<0.001
Serves of vegetables recommended per day (%)				
One	7.6	3.7	3.3	0.8
Two	12.9	9.5	10.1	4.5
Three	27.0	29.0	26.4	17.1
Four	18.6	20.0	17.4	11.0
Five	30.1	32.4	34.8	64.3
Six+	3.9	5.4	8.0	2.4
Correctly answered minimum 5 servings of vegetables by year				
OR (CI) ¹	1.00	1.12 (0.88, 1.43)	1.25 (0.99, 1.58)	4.50 (3.49, 5.80)
P-value ¹	na	0.344	0.064	<0.001
Tried changing amount of fruit eaten in the last 12 months day (%)				
Increased	39.4	39.3	36.2	40.7
Decreased	2.0	1.1	2.0	3.4
Not tried	58.6	59.7	62.8	55.9
OR (CI) ²	1.00	1.00(0.80, 1.25)	0.89 (0.72, 1.12)	1.08 (0.86, 1.37)
P-value ²	na	0.978	0.324	0.496
Tried changing amount of vegetables eaten in the last 12 months day (%)				
Increased	33.8	30.5	29.3	33.5
Decreased	1.4	0.7	0.2	0.5
Not tried	64.9	68.9	70.6	66.4
OR (CI) ²	1.00	0.86(0.68, 1.10)	0.86 (0.67, 1.09)	1.09 (0.85, 1.41)
P-value ²	na	0.232	0.207	0.496

¹Multi-variate analysis Odds Ratio (OR) and 95% Confidence Interval (CI), and p-values refer to comparisons with 1995 (referent category) for correctly answering minimum recommended intake of fruit [vegetables]. Percentages are sample-weighted values. Effect estimates are adjusted for 5-year age group and gender.

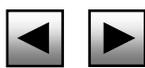
²The Odds Ratio (OR) and 95% changes to fruit [vegetables] intake in last 12 months. Effect estimates are adjusted for 5-year age group, gender and income category see Table 1.



**Table 3: Self-reported fruit and vegetables consumption on day prior to survey.**

Year	1995	1998	2001	2004
<i>n</i>	748	751	753	601
Number of pieces of fruit eaten on day prior to the survey (%)				
None	23.0	21.0	26.3	20.3
One	21.0	19.7	17.3	20.9
Two	23.4	26.2	25.6	30.2
Three	16.8	15.3	18.0	17.3
Four	10.7	8.6	7.4	7.4
Five	2.4	4.2	3.3	2.8
Six	2.7	5.1	2.0	1.1
RR (CI) ¹	1.00	1.08 (0.99, 1.18)	0.95 (0.87, 1.04)	0.97 (0.89, 1.06)
P-value ²	na	0.098	0.304	0.483
Mean pieces of fruit eaten on day prior to survey (95% CI)				
Mean	1.94(1.81,2.07)	2.14(1.98, 2.30)	1.85(1.73,1.97)	1.85(1.72,1.97)
Consumed fruit on day prior to the survey² (95% CI)				
RR (CI) ¹	1.00	0.85 (0.58, 1.24)	0.60 (0.41, 0.86)	0.86 (0.56, 1.32)
P-value ²	na	0.405	0.006	0.500
Amount of vegetables eaten on day prior to survey, cups (%)				
None	9.0	11.4	14.4	16.1
One	19.8	21.6	19.7	24.2
Two	27.4	28.5	24.1	24.4
Three	20.0	17.9	19.1	14.0
Four	12.4	8.9	9.8	8.5
Five	4.9	6.1	6.1	6.7
Six	6.5	5.7	6.8	6.1
RR (CI) ¹	1.00	0.94 (0.87, 1.01)	0.95 (0.88, 1.02)	0.88 (0.82, 0.96)
P-value ²	na	0.080	0.179	0.003
Mean cups of vegetables eaten on day prior to survey (95% CI)				
Mean	2.81(2.67,2.95)	2.70(2.56, 2.83)	2.72 (2.57, 2.86)	2.55 (2.40, 2.71)
Consumed vegetables on day prior to the survey² (95% CI)				
RR (CI) ¹	1.00	0.76 (0.48, 1.03)	0.47 (0.33, 0.68)	0.47 (0.32, 0.68)
P-value ²	na	0.074	<0.001	<0.001
Number of different types of vegetables eaten on day prior to survey (%)				
None	6.0	5.7	11.2	8.8
One	5.4	3.5	8.5	3.6
Two	8.2	8.3	13.1	12.6
Three	19.3	18.3	20.1	17.9
Four	21.6	22.1	18.7	22.7
Five	16.2	18.8	13.2	14.3
Six	23.2	23.3	15.3	20.1
RR(CI) ¹	1.00	1.03 (0.98, 1.08)	0.85(0.80, 0.90)	0.93(0.88, 0.98)
P-value ²	na	0.283	<0.001	0.009
Mean number of types of vegetables eaten on day prior to survey (95% CI)				
Mean	4.09(3.93,4.26)	4.24(4.08, 4.40)	3.41(3.25, 3.57)	3.95(3.68, 4.22)

¹The rate ratio(95% confidence interval) RR (CI), and p-values refer to comparisons with 1995 (referent category) in the cups of fruit/[vegetables] or type and cups of vegetables eaten for each year



**Table 4: Main things that make it difficult to eat more fruit and vegetables**

	Year <i>n</i>	1995 748	1998 751	2001 753	2004 601
Make it difficult to eat more...					
Fruit		%	%	%	%
Nothing, I already eat enough		33.4	41.3	45.2	34.5
Not enough variety in store		7.0	11.9	9.3	12.2
Cost/too expensive		11.8	7.7	8.1	7.9
Don't have enough time		4.1	10.3	7.2	10.3
Hard to find good quality		5.5	6.1	4.6	9.1
Don't like		8.8	8.5	7.0	7.0
Difficulty changing habit		4.2	7.5	6.7	8.7
Doesn't appeal in cold weather		4.8	4.3	3.8	4.7
Other		21.5	6.1	9.4	9.5
Don't know		1.2	0.7	1.5	1.4
Vegetables		%	%	%	%
Nothing/- I already eat enough		64.0	66.2	67.7	59.3 ¹
Time taken to prepare		8.0	13.6	10.7	14.3
Effort to prepare		1.9	0.32	6.4	12.5
Don't like vegetables		7.7	6.7	6.5	5.5
Cost/too expensive		5.9	3.2	3.1	3.5
Not enough variety in store		2.1	3.7	3.4	3.7
Good quality hard to find		1.4	2.7	1.6	4.5
Other		20.0	3.9	7.1	8.2
Don't know		0.5	0.9	1.9	1.7

Note: Figures for each year do not add to 100% since multiple responses were allowed

¹In 2004 respondents were 29 percent less likely than in 1995 to say I already eat enough vegetables.
OR=0.71, 95% CI=0.55 to 0.92, p<0.008





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Veggie man could be the new David (to tackle Goliath)

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Debate about the approach to take to temper the disproportionate exposure of Australian children to television advertising of junk foods is raging. Australian children's television has a high prevalence of junk food advertising and healthy eating is rarely promoted.¹⁻³ In fact, Chapman et al. found in 2005 that the Federal Government's Go for 2&5[®] advertising represented about 5% of all food adverts, leading to the conclusion that "present Government investment in seemingly worthwhile social marketing campaigns constitutes a drop in the ocean of food advertising".³

The obvious question is: "How to gain influence and cut through in the face of the big advertisers?" If dollars were all that mattered, you would expect minimal impact of health campaigns.

The Go for 2&5[®] campaign was developed by the Western Australian Health Department in 2002 to promote increased consumption of fruit and vegetables in an environment of very limited healthy food advertising (this is still the case). Despite competing advertising, the Go for 2&5[®] campaign achieved a 0.8 serve increase in fruit and vegetable consumption over three years in Western Australia.⁴

In 2005, the Federal Government adopted the Go for 2&5[®] as Australia's national fruit and vegetable campaign in response to the obesity epidemic.⁵ The \$4.7 million, 10-week advertising spend achieved impressive results.^{5,6} In 2006, Australian advertising spend by one of the major high fat/high sugar foods advertisers alone, Cadbury Schweppes, was nine times this (see Table 1).

Chapman and Wakefield (2001) remind us that Australia was one of the first democracies to ban all tobacco advertising and sponsorship,⁷ backing this up with a comprehensive range of anti-smoking interventions, including mass-reach campaigns, to reinforce this measure. This 'hard option' approach tackles the health issue head on with decisive action. This scenario suggests that regulation to limit or ban less nutritious food advertising may well be part of the ultimate solution.

Daube (2001) asserts that the decline in advertising funding following these campaigns was in part due to the emphasis on legislation, including banning advertisements, and that this may have led to temporary complacency and the stalling of a decline in smoking.⁸

Like tobacco, the nutrition battle is again of David and Goliath proportions. Australia has an excessive rate of junk food advertising and advertising restrictions to protect children are a priority.⁹ In reviewing options for food advertising restrictions for children, Kelly et al. found that a scenario that prohibited only foods considered non-core according to the Australian food

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Table 1: Australian food industry advertising ranks in top 50 advertisers in 2006.

Rank	Advertiser	Spend (\$A m)	Key brands
1	Coles Group	165-170	Coles Supermarkets, Kmart, Target, Officeworks
5	Nestle Australia/L'Oreal	105-110	L'Oreal, Nescafe, Garnier, Milo
6	Woolworths	90-95	Woolworths, Safeway Supermarkets, Big W, Dick Smith
15	McDonald's Family Restaurants	55-60	McDonald's Family Restaurants
30	Kellogg	40-45	Kellogg's Cereals
31	Masterfoods	35-40	Mars, Pedigree, Kan Tong, M&M's, Starburst
34	Cadbury Schweppes	35-40	Cadbury, Schweppes, Cottees
35	Yum Restaurants	35-40	KFC, Pizza Hut
43	Competitive Foods	30-35	Hungry Jack's, Domino's Pizza
45	Coca-Cola Amatil	30-35	Coca-Cola, SPC Ardmona

Source: AdNews. Australia's Top Advertisers: 2006. 23 March 2007.

selection guide was preferable.¹⁰ This model produced the greatest reduction in total food advertisements and was considered to have the greatest benefit. Well-targeted nutrition promotion campaigns, such as Go for 2&5®, are successful in promoting healthy eating. While unable to compete in terms of competitive advertising dollars, an improved regulatory environment would provide even greater impact for carefully targeted government healthy eating campaigns.^{1,10} Indeed, it is timely to build on government investment in fruit and vegetable social marketing campaigns ... and help vegie man deliver a fatal sling shot to the Philistine.

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9 DISCUSSION

The review of the literature and research undertaken as part of this thesis identified some factors that influenced fruit and vegetable consumption among adults in Perth Western Australia. The results of the analysis data from a number of datasets identified some demographic, individual and environmental factors that are associated with consumption. These factors should be taken into account when developing interventions to promote fruit and vegetables.

9.1 Knowledge of the recommended intake of fruit and vegetable was associated with increased consumption levels.

Knowledge of the types and amounts of fruit and vegetables recommended for good health was associated with fruit and vegetable consumption. The Go for 2&5[®] social marketing campaign used high-profile television advertising to generate awareness of the campaign and reach the target audience. Go for 2&5[®], featuring the recommended amount of fruit and vegetables was a key communication objective of the campaign. In 2005, three years after launching the campaign, over 90 percent of respondents were aware of the campaign when prompted. There were significant increases in: the proportion of the population who correctly reported the recommended servings of fruit and vegetables; more accurate perception of current intake; and self-reported consumption (particularly vegetables). Population estimates showed significant increases in mean vegetable intake over the intervention period, particularly for men. Increases in intake were seen across the continuum of intakes, with the greatest effect at lower intakes. Analysis of data collected during the 12 months following the intervention when there was no television advertising showed that there was an intervention effect and a significant decline in consumption of fruit and vegetables after 12 months without any intervention.

9.2 Awareness, perceptions, intentions relating to fruit and vegetable consumption were associated with consumption

Trends in awareness, perceptions, intentions and consumption were consistent with Go for 2&5[®] campaign advertising and suggested a causal relationship. There were no similar campaigns at the time and no obvious or logical influences other than the Go for 2&5[®] campaign over the tracking period. However, analyses are descriptive and are limited in determination of causal relationships.





There was no control group as the intervention was a population based, however, two independent survey methodologies were used and comparisons were made with other Australian states using similar survey design. Results in the other states were similar to those pre-intervention results in Western Australia.

9.3 Measurement of fruit and vegetable consumption

Measurement of fruit and vegetable consumption is challenging. Short answer questionnaires are increasingly being used to monitor intake, as they are cheap and quick to administer compared to food frequency and dietary recall or record methods. The questions used to measure vegetable consumption varied between the three surveys. The HWSS and the CTS asked about number of servings of vegetables usually eaten, and the Nutrition Monitoring surveys asked about cups of vegetables eaten on the day prior to the survey. For monitoring purposes, the self-reported servings, with a description of serving size provided, was useful in measuring changes. The cup measure for vegetables may not be specific enough to measure changes in intake.

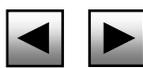
As fruit and vegetables are consumed as part of a total diet, the 24-hour food record or diet recall would give more information about the types and amounts of fruits and vegetables consumed and the relationship to total diet. This type of information is essential to ascertain whether dietary guidelines relating to fruit and vegetable subgroups are being met and can also be used to determine the adequacy of self-assessment of current intake. The frequency of consumption of fruit and vegetables and the number of types eaten provides valuable information relating to patterns of intake and interpreting dietary recommendations.

9.4 Serving size recommendations

Consumers need simple, clear messages and information to assist them to apply nutrition recommendations. The literature review and analysis conducted as part of this thesis suggests that adults interpret and assess fruit and vegetable serving sizes, that these interpretations differ for fruit and vegetables, and knowing the standard serving size is associated with consumption. Results suggest that the use of a prescriptive message is valuable in shifting attitudes, beliefs and consumption.

9.5 Using nutrient profiling to assess recipes that can be used to promote fruit and vegetables consistent with dietary recommendations

Health campaigns and programs aim to promote fruit and vegetables consistent with dietary guidelines and policies. The nutrition-profiling model developed to assess





recipes for inclusion as Go for 2&5[®] campaign materials was tested against its intended purpose. Unlike existing criteria, which will usually result in fruit and vegetables rating positively when assessed, the recipe criteria developed for this study insisted on the inclusion of fruit and vegetables as the starting criteria. The criteria performed well when current point-of-sale recipes were assessed and the study demonstrates the need to support industry and other stakeholders with practical tools to promote nutrition messages in the total diet context. Future development of the criteria may include defining the type of fat and adjusting criteria to support policy changes based on changes to nutrient reference values and food selections guides.

10 CONCLUSIONS

10.1 Demographic, individual and environmental factors determine fruit and vegetable consumption

The review of the literature identified demographic, individual, and environmental factors associated with fruit and vegetable consumption. Demographic factors determining consumption included age, gender, socio-economic status, ethnicity, education, geographic location, and employment. Socio-economic status includes household income, educational attainment, occupation, marital status, social class, and area of residence (Shohaimi et al. 2004).

Individual factors including knowledge, attitudes, beliefs, food budgeting, preparation and cooking skills, life course events and experiences (food upbringing, dietary changes for health, social roles, food skills, practising food traditions) and intentions determine fruit and vegetable consumption (Ball, Crawford & Mishra 2006; Beydoun & Wang ; C. M. Devine et al. 1999; Dibsall et al. 2003).

Environmental influences on health behaviour have been defined as all factors external to the individual (Kamphuis et al. 2006). Many environmental factors influence fruit and vegetable consumption including availability, marketing and promotion. The proximity of food outlets (Booth, Pinkston & Poston 2005), media marketing and promotion of foods (Swinburn, Egger & Raza 1999), workforce food service, variety of foods available, and portion sizes (Katrina Giskes et al. 2007) may determine consumption. Cost and availability seems to play an important role in fruit and vegetable intake (Bogers et al. 2007; S. A. French et al. 1997), however the





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influence on fruit and vegetable consumption varies (Latham & Moffat 2007; Pearson et al. 2005).

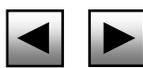
Identification of determinants of fruit and vegetable consumption is required to assist the development of interventions. Both personal and environment factors influence human behaviour and need to be considered when developing interventions to achieve health outcomes (Swinburn, Egger & Raza 1999). Interventions to change behaviour need to be aimed at the modifiable determinants of that behaviour.

10.2 Gender, age, knowledge of standard fruit and vegetable serving sizes, and awareness of the Go for 2&5[®] campaign were associated with fruit and vegetable consumption among adults in Perth Western Australia.

Analysis of trends in attitudes, knowledge and behaviours related to fruit and vegetable consumption among Perth adults prior to, during, and following the WA fruit and vegetable campaign, identified factors associated with consumption. Self-reported intakes of adults were lower than the recommended two servings of fruit and five of vegetables per day at baseline, the mean fruit intake was 1.8 (95% CI =1.7, 1.8) servings per day and the mean vegetable intake was 2.8 servings per day (95% CI =2.7, 3.0). Vegetable intake was positively associated with being female (P=0.006), increasing age (P<0.001), awareness of the Go for 2&5[®] campaign (P=0.031), and knowledge of standard vegetable serving size (P=0.006). Fruit consumption was associated with being female (P=0.007). Fruit and vegetable intakes were not associated with educational attainment or household income.

10.3 The Go for 2&5[®] fruit and vegetable social marketing campaign was successful in reaching its target audience, increasing awareness of the need to eat more fruit and vegetables, and encouraging increased consumption.

Analysis of the DHWA monitoring and evaluation surveys identified a number of factors for consideration when developing campaigns to promote fruit and vegetable consumption. The Go for 2&5[®] fruit and vegetable social marketing campaign was implemented between 2002 and 2005 to increase awareness of the need to eat more fruit and vegetables and encourage increased consumption. Two independent surveys tracked attitudes, beliefs and consumption prior to, during and 12 months after the campaign. The Go for 2&5[®] fruit and vegetable campaign was a successful intervention. Over the campaign period there was an increased consumption of 0.8 serving population net increase in the mean number of serves of fruit and vegetables per day (0.2 for fruit and 0.6 for vegetables) significant at (p<0.05). Knowledge of





fruit and vegetable serving size was the specific modifiable determinants of fruit and vegetable behaviour targeted by the Go for 2&5[®] campaign. The message communication targeted barriers to consumption including perception of difficulty of preparation of vegetables, and the over-optimistic assessment of current intake.

10.4 Consumer understanding of standard serving sizes differ for fruit and vegetables

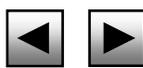
An over-optimistic perception of adequacy of current intake is a barrier to increasing fruit and vegetable consumption. An understanding of fruit and vegetable serving size is required to accurately assess adequacy of current intake against recommendations, for example the prescriptive Go for 2&5[®] message. Consumer understanding of what constituted a serving of fruit and of vegetables was assessed in 2002 in a survey of 1108 Western Australian adults. Respondents were more likely to report the standard serving size for fruit (42 percent) than for vegetables (14.5 percent). Many campaigns use a generic 80 gram serving size for both fruit and vegetables and a combined recommendation, for example '5 A-Day'. Consumer understanding and interpretation of different fruit and vegetable serving sizes suggest that there is value in separating fruit and vegetable recommendations in messages to encourage increased consumption.

10.5 Nutrition criteria with inclusion criterion based on fruit and vegetable servings and limiting macro-nutrient criteria, are a practical way to assess the suitability of meals and snacks for campaign promotions

Recipe nutrition criteria, consistent with Australian dietary guidelines, were developed to assess suitability of recipes for branding with the Go for 2&5[®] campaign message. Analysis of 128 'Healthy' industry recipes found that recipes promoting fruit and vegetables were often high in fat and sodium and low in cereal foods. The Go for 2&5[®] nutrition criteria developed for this study provided a practical way of assessing specific meals and snacks consistency with dietary guideline recommendations.

10.6 Regular monitoring of nutrition knowledge, attitudes and behaviours is useful for developing effective interventions to increase fruit and vegetable consumption

Analysis of the 1995, 1998, 2001 and 2004 WA Nutrition Monitoring surveys provided useful insights for the development and evaluation of nutrition interventions. The self-report surveys measured changes in knowledge, attitudes,





beliefs and behaviours relating to fruit and vegetable consumption. In 2004, respondents were more likely to report two servings of fruit per day (OR 3.66, 95% CI=2.85, 4.70) and five servings of vegetables per day (OR 4.50, 95% CI=3.49, 5.80) as optimum compared to 1995. Perception of adequacy of current intake, time scarcity, dislikes, and cost were identified barriers and should be considered when designing nutrition interventions.

There were several different questions used to assess fruit and vegetable intake in the various surveys considered in this thesis, self-reported fruit and vegetables intake (usual intake with specified standard serving sizes), cups eaten on the day prior to the survey, frequency of consumption per week, and number of different types of fruit and vegetables eaten. Each measure provides a different perspective that can be used to monitor intake and design interventions. It was useful to have different measures to compare to assess changes over time. However, in some cases it did not allow for meaningful comparisons, for example, the knowledge of recommended servings could not be directly compared to cups of vegetables consumed. A limitation of the evaluation framework is that it relies on self-reported fruit and vegetable intake rather than more detailed measure of total diet. Dietary recall or food record would enable an assessment of the changes to the total diet, nutrients of interest, and fruit and vegetable subgroups. Health interventions to increase fruit and vegetable intake are based on the assumption that diets high in fruit and vegetables provide nutrients and non-nutrient components that protect health, and that these foods will displace less nutritious foods, resulting in even further health benefit. More robust dietary survey methodology is required for this type of analysis.

The research design was not ideal to determine the impact of the specific intervention. The design did not have both an intervention and a control group as it is not possible to restrict television advertising to a proportion of the population in Western Australia, particularly when the intervention is a whole of population public health government initiative.

11 RECOMMENDATIONS

11.1 A comprehensive monitoring and evaluation framework is required to develop effective dietary interventions.

Systematic monitoring of behaviours and other health indicators is important when determining the impact of public health policies and activities on health risk factors





beliefs and behaviours relating to fruit and vegetable consumption. In 2004, respondents were more likely to report two servings of fruit per day (OR 3.66, 95% CI=2.85, 4.70) and five servings of vegetables per day (OR 4.50, 95% CI=3.49, 5.80) as optimum compared to 1995. Perception of adequacy of current intake, time scarcity, dislikes, and cost were identified barriers and should be considered when designing nutrition interventions.

There were several different questions used to assess fruit and vegetable intake in the various surveys considered in this thesis, self-reported fruit and vegetables intake (usual intake with specified standard serving sizes), cups eaten on the day prior to the survey, frequency of consumption per week, and number of different types of fruit and vegetables eaten. Each measure provides a different perspective that can be used to monitor intake and design interventions. It was useful to have different measures to compare to assess changes over time. However, in some cases it did not allow for meaningful comparisons, for example, the knowledge of recommended servings could not be directly compared to cups of vegetables consumed. A limitation of the evaluation framework is that it relies on self-reported fruit and vegetable intake rather than more detailed measure of total diet. Dietary recall or food record would enable an assessment of the changes to the total diet, nutrients of interest, and fruit and vegetable subgroups. Health interventions to increase fruit and vegetable intake are based on the assumption that diets high in fruit and vegetables provide nutrients and non-nutrient components that protect health, and that these foods will displace less nutritious foods, resulting in even further health benefit. More robust dietary survey methodology is required for this type of analysis.

The research design was not ideal to determine the impact of the specific intervention. The design did not have both an intervention and a control group as it is not possible to restrict television advertising to a proportion of the population in Western Australia, particularly when the intervention is a whole of population public health government initiative.

11 RECOMMENDATIONS

11.1 A comprehensive monitoring and evaluation framework is required to develop effective dietary interventions.

Systematic monitoring of behaviours and other health indicators is important when determining the impact of public health policies and activities on health risk factors





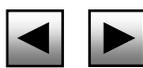
of total populations and sub-groups. Routinely collected information provides timely feedback to policy makers and health authorities. This thesis provides examples of the use of routine monitoring data to assess the impact of health interventions. The analysis demonstrated how to use monitoring and evaluation data to provide feedback for those planning and implementing public health initiatives.

The factors determining fruit and vegetable consumption can be identified through various types of research including literature and program review, baseline data collect and a variety of qualitative and quantitative research methodology. Intervention effectiveness is increased when interventions are designed to address specific barriers to and promoters of fruit and vegetable consumption. Consumption, attitudes, knowledge and beliefs relating to fruit and vegetables should be assessed and monitored. Factors determining fruit and vegetable consumption including demographic, individual and environmental, should be considered. Detailed dietary survey data should be collected to determine fruit and vegetable intake in relation to total diet patterns, form of fruit and vegetables, sub-groups and preparation methods. Further analysis of the possible clustering effects of risk factors and demographic variables, including those to determine social disparity is recommended.

Evaluation frameworks should include formative evaluation (literature and program review, focus groups, baseline data collection), monitoring and surveillance collections (similar to the NMS) and short term intervention analysis (such as the CTS). All dietary interventions need to be developed, monitored and assessed in the total diet context using dietary record/recall instruments to assess individual food and nutrient consumption levels and to enable the assessment of impact of any changes on the total.

11.2 Multi-component approaches are required reduce diet-related disease

Multi-component approaches to increasing fruit and vegetable consumption, addressing modifiable individual factors (e.g. knowledge, attitudes, skills, social influences and behaviours) as well as environmental factors (e.g. access, cost, quality and supply) are more effective (Karen Glanz & Hoelscher 2004; Knai et al. 2006; J. Pomerleau et al. 2005a; Joceline Pomerleau et al. 2005b). Demographic differences relating to fruit and vegetable intake also need to be considered when developing population-wide strategies. Analysis presented here suggest that the Go for 2&5[®] campaign may be an effective population-based intervention promoting fruits and vegetable consumption. There is increasing interest in the development of dietary



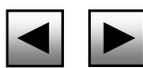


interventions across the food supply chain to increase fruit and vegetable consumption. Further research into the potential impact of fiscal and regulatory changes to food supply, advertising and promotion, and cost effectiveness of interventions is suggested.

11.3 Social marketing can increase fruit and vegetable consumption

Social marketing is an effective method to encourage increased fruit and vegetable consumption. The Go for 2&5® campaign strategy demonstrated the key characteristics essential to effective social marketing interventions: set specific behavioural goals; informed by consumer research, pretested to determine consumer orientation; used theory for message communication strategy; followed insights; applied market segmentation; used more than one marketing element; creative was attractive and used motivational exchanges; paid attention to competition to the desired behaviours; considered motivation to desired behaviour; considered strategies to minimize competing behaviours and monitored environmental influences; and involved non-health sectors (Donovan & Henley 2003; French & Blair-Stevens 2006; Hastings G 2007; Stead et al. 2007).

The next stages of campaigning should place more emphasis on specific strategies to address issues identified by consumers, competing behaviours and environmental influencers. There are a number of potential communication opportunities that have been associated with increased consumption include communicating fruit and vegetable sub-categories, particularly green leafy and legumes, salad vegetables, or soups (Baghurst et al. 1999). For example, 'colour' has been used to promote these sub-categories, e.g. Orange or red vegetables high in Vitamin A. The frequency of consumption is an important component of the message. A planned seasonal or local produce promotion may address consumer issues related to price, quality and availability of fresh fruit and vegetables. Consumer perception of value in relation to cost of product should be considered. It is important to address low food literacy and develop food purchase and preparation skills, for example, food budgeting and cooking skills. Hospitality, foodservice, and point-of-sale are emerging as important areas for fruit and vegetable promotions.





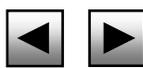
11.4 Specifying nutrition recommendations in messages to promote fruit and vegetables

There is a need to develop specific vegetable serving size recommendations consistent to increase consumer understanding and relevance of the campaign message. Many countries are implementing global dietary recommendations by encouraging increased fruit and vegetable consumption in their dietary guidelines and through specific campaigns. However, dietary recommendations vary in standard serving definitions, the number of servings and fruit and vegetable sub-group recommendations.

The study findings support the use of prescriptive messages to increase knowledge of recommended amounts of foods. Nutrition messages should be communicated in simple language, as part of whole diet and whole food dietary guideline recommendations. Separating fruits and vegetables in messages to increase consumption is important, as consumers perceive these foods differently, in both terms of serving size, perceptions and barriers and promoters to increasing consumption.

11.5 Future directions in public health nutrition interventions

A comprehensive approach to achieving health gain through improving dietary intake and nutrition requires the development, implementation and evaluation of multi-component strategies to address the determinants of consumption. An adequate intake of fruit and vegetables reduces the risk of chronic disease resulting in considerable savings to the health care system. Interventions to increase fruit and vegetable consumption are a priority and highlight the need to work across the whole food chain to address environmental issues that are considered barriers to consumption. Commitment to formalising partnerships and collaborative action, both across and outside government is essential for these strategies to be successful. Advertising and promotion of food leads to increased consumption. There is an over investment in ‘junk’ food advertising in Australia, counter advertising to promote core foods is essential to assist consumers to make healthful food choices. The need for credible, reliable consumer nutrition information is a key component of an effective intervention framework. There is an urgent need to promote dietary behaviours consistent with dietary guidelines and influence environmental factors to assist consumers to make good choices. The portfolio of interventions considered to address diet-related illness is widening as political and public opinion move towards





taking the 'harder' options including stronger food policy, regulatory and incentive initiatives.





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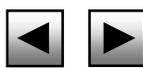
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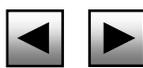


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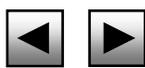


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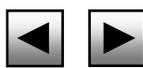


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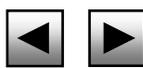


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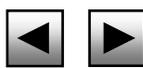
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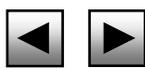
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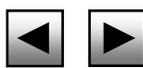


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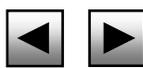


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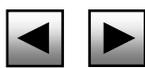


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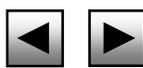
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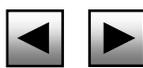
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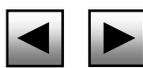
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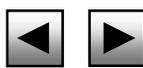


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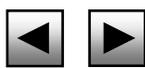




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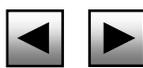
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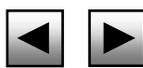
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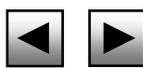
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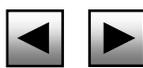
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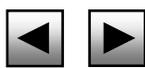
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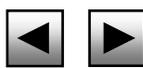
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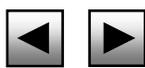
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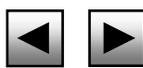
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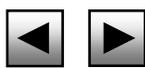


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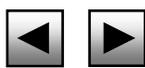


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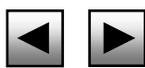


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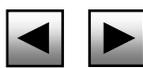


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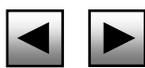


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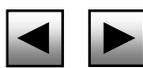


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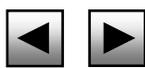


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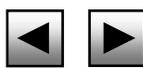


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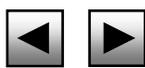


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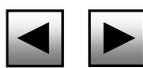


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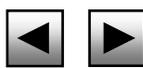


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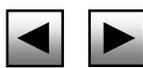


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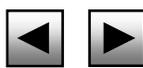


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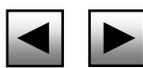


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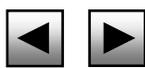
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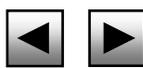
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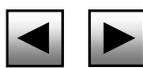


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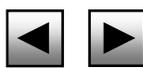


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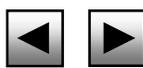


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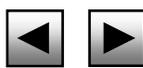


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**NUTRITION MONITORING SURVEY
1998**

Interviewer **ID** :

Time Started am/pm

Time Finished am/pm

Time Taken Mins (6-7)

Date/...../98

(Office use only)

QNA _____ (1-4)

LINE 1 (5)

SUPERVISOR

- Checked : _____

- Validated : _____

CODER

- Listed : _____

- Edited : _____

- Coded : _____

READY FOR PUNCHING

Good ... (morning/afternoon/evening). My name is.....
WE ARE NOT SELLING ANYTHING. Your household has been selected at random for an official survey being conducted in Western Australia on important nutrition issues.

May I speak with the person aged from 18 to 64 years old whose birthday falls next?

SEEK INTERVIEW WITH NEXT BIRTHDAY PERSON. MAKE APPOINTMENT IF PERSON NOT AVAILABLE.

REPEAT INTRODUCTION AS NECESSARY. DO NOT MENTION DETAILS ABOUT THE NATURE OF THE SURVEY. SELL SURVEY TO THE RESPONDENT IF NECESSARY. It is important to get the views of a wide cross section of people. Your opinion will be kept strictly confidential, and no surnames will be recorded. The interview will take about 30 minutes.

QA	RECORD AREA.	Perth Metro 1 (8) Albany 2 Bunbury 3 Derby 4 Kalgoorlie 5	
QB	RECORD SEX. (DON'T ASK)	Male 1 Female 2	(9)





QC Before we start, I'd like to ask you what you think are the major problems, if indeed there are any, with the average Australian diet? **PROBE FULLY**

Too much alcohol/beer.....01
 Too much fast/junk food.....04
 (8r2)
 Too much fat/wrong sorts of fat/saturated fats.....05
 Too much salt10
 Too much sugar/sweet things/chocolates/confectionery/cakes/lollies.....13
 Not enough fruit/vegies/salads35
 Not eating a balanced diet/not eating wide enough variety of foods52
 No time to eat-cook properly/too lazy to cook/rely too much on pre-prepared foods.....53

 Others (write in detail) _____

 Nothing/none/no problems98
 Don't know99

QD Which of the following statements would best describe how you feel about diet and nutrition? **READ OUT**

I really do pay a lot of attention to the health aspect of the food I eat to make sure my diet is as healthy as possible.....1
 (1r1)
 I take a bit of notice of the health aspect of the food I eat to make sure I have a fairly good diet2
 I honestly don't really go around thinking about the health aspect of food.....3

PART 1 CONSUMPTION

This survey consists of two parts.

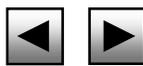
Firstly, I am going to ask you about the foods you ate yesterday. Then, I will be asking some more general questions about the food you eat.

Q1. How many pieces of fruit did you eat yesterday?

A piece of fruit would be, for example, an apple, a small bunch of grapes, 3 prunes, a quarter of a rock melon or half a cup of stewed, pureed or canned fruit.

Detail: _____ **(Office use only)**
 (1r4) _____

 _____ TOTAL NUMBER OF PIECES





Didn't eat fruit yesterday.....9 (1r1)

Q2a How many different types of vegetables, did you eat yesterday? Include salad, fresh, frozen, canned, raw and cooked vegetables. **WRITE IN NUMBER OF TYPES, USE ZERO IF NONE IF NONE SKIP TO Q2c** (1r2)

Q2b How many cups of each type did you eat? As an example, one medium potato equals one cup of vegetables. **INCLUDE PART CUPS**

<u>WRITE IN</u> <u>TYPE OF VEGETABLE</u>	<u>AMOUNT</u> <u>IN/CUPS</u> <u>PART CUPS</u> (WRITE IN)
a) _____	_____
b) _____	_____
c) _____	_____
d) _____	_____
e) _____	_____
f) _____	_____

(Office use only) (1r4)

TOTAL NUMBER OF CUPS

Didn't eat vegetables yesterday9 (1r1)

Q2c Just to check....did you remember to include salad, fresh, frozen, canned, raw and cooked vegetables you ate yesterday?

Yes.....1 →Q3a

No.....

2 →Q2a (1r1)

Q3a How many slices of bread or bread rolls did you eat yesterday?
IF BREAD ROLL: Was that a large or small roll?

WRITE IN SECOND COLUMN TO NEAREST HALF SLICE OR HALF ROLL IF NONE SKIP TO Q4a

	<u>ATE</u> <u>YESTERDAY</u> (RING CODE)	<u>AMOUNT</u> (WRITE IN)
Slices of bread	1	_____
Large roll	2	_____
Small roll	3	_____
Didn't eat bread/bread rolls yesterday		9

(1r1) *Office use only*
(1r4)





TOTAL INCLUDE
HALF SLICES/ROLLS

--	--	--	--

Q3b IF RESPONDENT ATE BREAD/BREAD ROLL YESTERDAY:

What type of bread/bread rolls did you mainly eat yesterday?

Was it brown, wholemeal, multigrain, wholegrain, white, white with extra fibre, or another type? **DON'T PROMPT CODE TYPE(S) MAINLY EATEN BELOW**

- Brown or wholemeal..... 1
(3r1)
- Multigrain or wholegrain 2
- White with extra fibre..... 3
- White..... 4
- Other (SPECIFY) _____ 5
- _____
- _____

Q4a What other bread substitutes did you eat yesterday, such as bread muffins, pita bread, crumpets, scones, rice cakes, crackers or damper? **RING CODE**

Q4b And how many/how much of did you eat?

**WRITE IN SECOND COLUMN TO NEAREST RICE CAKE, OR HALF SCONE/
CRUMPET/ MUFFIN/PITA BREAD. CHECK LARGE OR SMALL CRACKER AND
WRITE IN**

	<u>ATE YESTERDAY (RING CODE)</u>	<u>AMOUNT (WRITE IN)</u>
Bread muffins	1	_____
Pita bread	2	_____
Crumpets.....	3	_____
Scones	4	_____
Rice cakes.....	5	_____
Large crackers.....	6	_____
Small crackers.....	7	_____
Damper	8	_____
Didn't eat any other bread products yesterday.....	9	_____

(1r1)

TOTAL INCLUDE
PART SERVES
(1r4)

(Office use only)

--	--	--	--

Q5a How many cups of cooked rice did you eat yesterday? **WRITE IN,** _____
INCLUDE PART CUPS. USE ZERO IF NONE AND GO TO 6a **(Office use only)**





(1r4)

)

Q5b What type of rice was it, white or brown? **CODE MAIN TYPE**

- White.....1
(1r1)
- Brown.....2
- Both white and brown eaten equally.....3

Q6a How many cups of cooked pasta or spaghetti did you eat yesterday? **WRITE IN, INCLUDE PART CUPS. USE ZERO IF NONE AND GO TO 7a** **(Office use only)**

(1r4)

)

Q6b What type of pasta or spaghetti was it, that is regular or wholemeal? **CODE MAIN TYPE**

- Regular1
(1r1)
- Wholemeal2
- Both regular and wholemeal eaten equally....3

Q7a What type(s) of breakfast cereal, if any, did you eat yesterday?

WRITE IN COLUMN A

Q7b How many cups of did you eat?

WRITE IN COLUMN B

FOR PORRIDGE ASK FOR NUMBER OF CUPS OF COOKED PORRIDGE; WEETBIX/ VITABRIT = NUMBER OF BISCUITS; ALL OTHER CEREALS, NUMBER OF CUPS.

A TYPE OF CEREAL	B AMOUNT IN CUPS /PART CUPS (WRITE IN)	
_____ (1r2)	_____	(1r2)
Didn't eat cereals yesterday..... 9		(1r1)

(Office use only)

TOTAL

(1r4)

Q8a How many cups of milk did you have yesterday? Include milk used in cereal, tea, coffee, other drinks or cooking (including powdered).

INCLUDE PART CUPS. USE ZERO IF NO MILK DRUNK AND SKIP TO Q9a

(milk in tea or coffee = 1/8 cup)

WRITE IN _____

(Office use only)

NUMBER (1r4)
OF CUPS





Q8b And what was the main type(s) of milk you had yesterday? Was it ...? **READ OUT. CODE ALL GIVEN.** Any other types? **WRITE IN AND CODE 'OTHER' BELOW**

(3r2)	MAIN	OTHER	(1r2)
	Skim/non fat.....	01	01
	Skim/non fat, calcium fortified (eg Dairy Slim)02.....	02	02
	Low fat/2% fat (eg HiLo, Lite).....	03	03
	Low fat/2% fat, calcium fortified.....	04	04
	Whole milk	05	05
	Flavoured milk	07	07
	Soy milk.....	08	08
	Other (WRITE IN)		
<hr/>			
	Don't Know	99	99

Q9a How many cups of yoghurt did you eat yesterday? **WRITE IN, INCLUDE PART CUPS. USE ZERO IF NONE AND SKIP TO 10a**

(Office use only)

NUMBER OF CUPS

(1r4)
WRITE IN _____

Q9b And what type(s) of yoghurt did you eat? Was it ...? **READ OUT. CODE ALL GIVEN.** Any other types? **WRITE IN AND CODE 'OTHER' BELOW**

Skim/non-fat.....	1
(3r1)	
Low fat/2% fat	2
Whole/traditional/regular	3
Other (WRITE IN)	
.....	4
Don't know	9

Q10a What type(s) of cheese, if any, did you eat yesterday? Include hard and soft cheese and any used in cooking or mixed dishes. **WRITE IN COLUMN A. IF NONE SKIP TO Q11. PROMPT: ANY OTHERS?**

Q10b How much of each did you eat? **WRITE IN COLUMN B. RECORD AS SLICES (A SLICE = A PRE-WRAPPED CHEESE 'SINGLE', A ROUNDED TABLESPOON OF SOFT OR GRATED CHEESE, OR A 2.5cm CUBE OF HARD CHEESE) INCLUDE PART SLICES**

A TYPE OF CHEESE	B <u>NUMBER OF SLICES/ PART SLICES</u> (WRITE IN)
_____	_____
_____	_____
_____	_____





 Didn't eat cheese yesterday..... 9

(1r1)

(Office use only)

NUMBER OF SLICES/PART

SLICES

(1r4)

Q10c Was the cheese you ate yesterday mainly regular, reduced fat or low fat cheese? **CODE ALL GIVEN.** Any other types? **CODE 'OTHER' BELOW**
NB PARMESAN = REGULAR CHEESE

Low fat, like ricotta or cottage 1
 (3r1)
 Reduced fat cheese 2
 'Regular' cheese..... 3
 Other (WRITE IN) _____ 4

 Don't know 9

Q11 How many sweet biscuits did you eat yesterday?

WRITE IN , USE ZERO IF NONE

NUMBER OF
BISCUITS

(1r2)

Q12 How much regular, not diet, soft drink did you drink yesterday? Please tell me how many cups or cans you drank yesterday? **WRITE IN , INCLUDING PARTS OF CUPS/CANS.**
USE ZERO IF NONE. DO NOT INCLUDE UNFLAVOURED MINERAL OR SODA WATER

A) CUPS (NUMBER) _____

B) CANS (NUMBER) _____

(1r4)

(Office use only)

TOTAL MLS

Q13 How much beef, lamb or veal, including hamburgers and mince did you eat yesterday?
ASK FOR TYPE (EG. STEAK, MINCE, ETC) AND AMOUNT IF NOT GIVEN

ONE SERVE
EQUALS

AMOUNT OF
SERVES/PART SERVES
(WRITE IN)

Steak 1 palm size..... _____
 Chop..... 2 small chops..... _____
 Roast meat..... 3 slices..... _____
 Mince..... ½ cup..... _____
 Hamburger /patty..... 1½ patties (1 patty = 0.7 serves) _____

Other (WRITE IN)

None..... 9

(1r1)





(Office use only)					
TOTAL NUMBER OF SERVES/PART SERVES	<table border="1"> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </table>				
	(1r4)				

Q14 Some people try to avoid eating foods which are high in fat. Other people don't really mind about the amount of fat that they eat.

How often do you try to avoid eating foods which are high in fat? **READ OUT**

- Always 1
(1r1)
- Often 2
- Sometimes 3
- Rarely or never 4
-
- Don't** Don't know which foods are high in fat..... 5
- Read** Don't know 9

Q15 Some people use mono or polyunsaturated fats while others don't really mind about the kind of fat they use. What about you? When you use fat or oil in food preparation, how often is it mono or polyunsaturated fat? **READ OUT**

- Always 1
(1r1)
- Often 2
- Sometimes 3
- Rarely or never 4
-
- Don't** Don't use fat or oil..... 5
- Read** Don't understand terms 6
- Don't know 9

Q15b Some people try to choose healthy foods when they buy a meal, while others don't really mind on the occasions they buy a meal

When you buy a meal how often do you try to choose healthy foods? **READ OUT**

- Always 1
(1r1)
- Often 2
- Sometimes 3
- Rarely or never 4
-
- Don't** Don't buy meals..... 5
- Read** Don't know 9

Q16 Yesterday which meals did you buy from a restaurant, take-away, lunch bar, canteen or other prepared food outlet? **READ OUT MEALS, AND RING CODE**

- Breakfast 1
(3r1)
- Lunch 2
- Evening Meal..... 3
- DO NOT READ** None 9





THOSE THAT PURCHASED A MEAL YESTERDAY. GO TO Q18

Q17 I now have some questions about the **last** occasion that you bought a meal from a restaurant, take-away, lunch bar, canteen or other prepared food outlet. Thinking back to that meal was it breakfast, lunch or evening meal?

- Breakfast..... 1
(1r1)
- Lunch2
- Evening Meal.....3

Q18 Thinking about the last meal that you bought, were there enough healthy choices available at the restaurant/shop?

- Yes..... 1
(1r1)
- No2
- Don't know3
- Didn't want/not interested4

Q19 How important is it for you to have healthy choices available when you buy a meal?

- Very important..... 1
(1r1)
- OR Quite important.....2
- Not important.....3
- Not sure.....4

PART 2 DIETARY CHANGES

A. FRUIT

Now I would like to ask you some more general questions, firstly on fruit.

Q1a In the past 12 months, have you tried to change the amount of fruit you eat?

IF YES: is that increase or decrease?

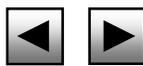
(1r1)

- Yes, tried to increase amount.....1 →
- Q1B
- Yes, tried to decrease amount.....2 ↵
- Q2
- No, haven't tried to change.....3 →
- Q2

Q1b What influenced you to try and eat more fruit? **PROBE** Anything else?

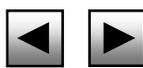
CODE ALL MENTIONED

- Improve **health in general** /feeling tired/healthier life/health reasons (unspec).....06
- Lose-control **weight** / went on a diet / diet that I'm on01
- Advertising** campaigns / TV campaigns 5 veg & 3 fruit /magazine advertising.....14
- To improve **fitness** / for sports.....07
- Influence others/ family-children** /encourage children /family to eat more12
- Advice from family/friends** / influence of others I cook for09
- It's good for you** / I wasn't eating enough / more nutritious /fruit is better for you19
- To reduce **bowel problems**/constipation / to improve digestive performance04
- I like it** / we just like eating fruit / it tastes good20
- Other (specify)





	Have not tried to increase the amount of fruit eaten .....98 Don't know / no particular reason .....99	(5r2)
Q1c	What steps have you taken to try and increase the amount of fruit you eat? PROBE Anything else? CODE ALL MENTIONED	
	Buying more / asking my partner - wife to buy-cook more-change our diet.....03 Eating more making fruit a larger part of diet/making sure I eat some every day .....40 Substituting for other food /fruit as snack/having fruit for morning tea/lunch.....43 Taking fruit to work /uni.....10 Having fruit on display at home/trying to have more fruit around .....12 Trying-buying-eating-using a bigger variety /more choices avail/different types .....01 Having fruit with-for dessert .....22 Other (specify Have not tried to increase the amount of fruit eaten .....98 Don't know / no particular reason .....99 (6r2)	
Q1d	Do you feel you eat more, less, or about the same amount of fruit as you did <u>12 months</u> ago?	
	More.....1 Less .....2 The same .....3 Don't know .....9	(1r1)
Q2	Which of the following best <u>currently</u> describes you? READ OUT	
	A. I am currently trying to eat more fruit .....1 B. I am thinking about trying to eat more fruit .....2 C. I am not thinking about increasing the amount of fruit I eat .....3	(1r1)
Q3	What are the main things that make it difficult for you to eat more fruit? PROBE Anything else? CODE ALL MENTIONED	
	Cost/too expensive 02 Don't like fruit / lack of interest in fruit / I get bored with it..... 03 Not enough variety in types of fruit available/ seasonal availability 08 Hard to find good quality fruit 07 Doesn't appeal in cold weather /not tempting in winter 15 The time it takes to buy-prepare fruit to eat / I don't have enough time/ too busy..... 06 Difficulty in changing eating habits / I just don't think of it 04 Other (WRITE IN) Nothing / I already eat enough / I can't fit anymore in 97 Don't know 99	(5r2)
Q4	What do you think is the recommended number of serves of fruit that should be eaten each day? One serve of fruit is equal to one medium piece of fruit or half cup of cooked or canned fruit. DO NOT PROMPT	
	One serve per day 1 (1r1) Two serves per day.....2 Three serves per day .....3 Four serves per day .....4 Five or more serves per day.....5	





Other (WRITE IN) _____ 6
 Don't know _____ 9

B. VEGETABLES

Now I would like to ask some questions on vegetables.

Q1a In the past 12 months, have you tried to change the amount of vegetables you eat?
IF YES: Is that increase or decrease? (1r1)

Yes, tried to increase amount.....1 →
 Q1b
 Yes, tried to decrease amount2 }
 No, haven't tried to change3 }
 Q2.....

Q1b What influenced you to try and eat more vegetables? **PROBE** Anything else? **CODE ALL MENTIONED**

- Improve **health in general** /feeling tired/healthier life/health reasons (unspec)..... 07
- To lose-control **weight** / went on a diet / diet that I'm on 01
- Influence of others/person who buys/prepares food is eating more 12
- Advice from family/friends** / influence of others I cook for 10
- Advertising** campaigns / TV campaigns / 5 veg & 3 fruit/ magazine advertising..... 14
- Substitute for other foods/trying to eat less/no red meat..... 26
- I like them** / we just like eating vegetables / they tastes good..... 20
- To improve **fitness** / for sports..... 08
- Influence others/ family-children** /encourage children / family to eat more 17
- Good for you** /wasn't eating enough /more nutritious /vegies are better for you..... 19
- Other (specify)_____

Have not tried to increase the amount of vegetables eaten 98
 Don't know / no particular reason 99 (5r2)

Q1c What steps have you taken to try and increase the amount of vegetables you eat?
PROBE Anything else? **CODE ALL MENTIONED**

- Buying more** / asking my partner - wife to buy-cook more-change our diet.....03
- Cooking more** vegetables each meal52
- Trying-buying-eating-using a **bigger variety** / more choices /buying different types01
- Eating more** making vegies a larger part of diet /ensuring I eat some every day.....40
- Tried **different recipes**/vegetarian recipes54
- Growing** my own vegetables80
- Substituting for other foods** /using vegies as snack food/ morning tea/lunch.....43
- Cutting down on red meat**/substituting with vegetables.....31
- Other (specify)_____

Have not tried to increase the amount of vegetables eaten98
 Don't know / no particular reason99 (6r2)

Q1d Do you feel you eat more, less, or about the same amount of vegetables as you did
12 months ago?

More1
 (1r1)
 Less.....2





The same.....3
 Don't know.....9

Q2 Which of the following best currently describes you? **READ OUT**

- A. I am currently trying to eat more vegetables.....1
- B. I am thinking about trying to eat more vegetables2
- C. I am not thinking about increasing the amount of vegetables I eat3

(1r1)

Q3 What are the main things that make it difficult for you to eat more vegetables?
PROBE Anything else? **CODE ALL MENTIONED**

- The **time** it takes to prepare vegies to eat / I don't have enough time / too busy06
 - The **effort** it takes to prepare vegies to eat/ I'm not organised enough.....05
 - Don't like vegetables/** the children don't like them.....03
 - Cost/too **expensive**02
 - Not enough **variety** in types of vegetables available08
 - Hard to find good **quality** vegetables07
 - Other (WRITE IN) _____
 - Nothing / I already eat enough / I can't fit anymore in97
 - Don't know99
- (5r2)

Q4 What do you think is the recommended number of serves of vegetables that should be eaten each day? One serve of vegetables is equal to one medium potato, half a cup of cooked vegetables or one cup of salad vegetables. **DO NOT PROMPT**

- One serve per day.....1
(1r1)
- Two serves per day2
- Three serves per day3
- Four serves per day4
- Five serves per day5
- Six or more serves per day.....6
- Other (WRITE IN) _____ 7
- Don't know9

C. CEREALS

The following questions are about cereal foods. This includes foods like breakfast cereal, pasta, rice, bread and other bread products.

Q1a In the past 12 months, have you tried to change the total amount of cereal foods that you eat? **IF YES:** Is that to increase or decrease?

- (1r1)
- Yes, tried to increase amount.....1 →
 - Q1b
 - Yes, tried to decrease amount2
 - No, haven't tried to change3 →
 - Q2

Q1b What influenced you to try and eat more cereal foods? **PROBE** Anything else? **CODE ALL MENTIONED**





- To improve **health in general**.....07
- To lose-control **weight**.....01
- To increase my **fibre** intake16
- To reduce **bowel problems**/constipation/speeds up metabolism.....04
- To improve **fitness** / more energy.....08
- To increase **carbohydrates** in my diet/better balance in my diet in general.....13
- Getting hungry at work later/decided to **eat breakfast**/wasn't eating breakfast15
- Special diet for **medical reasons**/ doctor/ dietitian advised me.....06
- Advertising** campaigns / Health Dept campaign/cooking shows on TV.17
- Other (specify)_____

Have not tried to increase the amount of cereal foods eaten.....98
 Don't know / no particular reason.....99 (7r2)

Q1c Which types of cereal foods have you tried to increase?

Have you tried to increase ... **READ OUT IN TURN AND RING CODES. YES/NO**

FOR EACH ONE TRIED TO INCREASE, ASK

What steps have you taken to try and increase the amount you eat of ... ?

PROBE FULLY FOR STEPS TAKEN

i) Breakfast Cereal Yes.....1
 (1r1) No.....2 (4r2)

ii) Pasta Yes..... 1
 (1r1) No.....2 (4r2)

iii) Rice Yes.....1 (1r1) No..... 2 (4r2)

iv) Bread Yes.....1 (1r1) No..... 2 (4r2)





- v) Other bread-like products
 Yes.....1 (1r1)
 No..... 2 (4r2)

- Q1d Do you feel you eat more, less, or about the same amount of cereal foods in total than you did 12 months ago? (1r1)
- | | | |
|------------------|---|--|
| More..... | 1 | |
| Less | 2 | |
| The same | 3 | |
| Don't know | 9 | |

Q2 Which of the following best currently describes you? **READ OUT**

- | | | |
|---|---|-------|
| A. I am currently trying to eat more cereal foods..... | 1 | |
| B. I am thinking about trying to eat more cereal foods..... | 2 | |
| C. I am not thinking about increasing the amount of cereal foods I eat..... | 3 | (1r1) |

Q3 What are the main things that make it difficult for you to eat plenty of cereal foods?

PROBE Anything else? **CODE ALL MENTIONED**

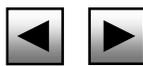
- Don't like** cereal foods/the children don't like them.....02
 (5r2)
- I don't have **time to eat breakfast**/ get out of bed too late13
- The **time it takes to prepare** pasta and rice/ time it takes to make fresh muesli09
- I don't like eating in the morning/**don't eat breakfast**10
- Other (WRITE IN) _____
-
- Nothing/ Already eat plenty97
- Don't know99

Q4 What do you think is the recommended minimum number of serves of cereal foods that should be eaten each day? One serve of cereal food is equal to one slice of bread, one cup of breakfast cereal or half a cup of cooked rice or pasta. **DO NOT PROMPT**

- | | | |
|---------------------------------|----|--|
| One serve per day..... | 01 | |
| (1r2) | | |
| Two serves per day | 02 | |
| Three serves per day..... | 03 | |
| Four serves per day..... | 04 | |
| Five serves per day | 05 | |
| Six serves per day..... | 06 | |
| Seven serves per day..... | 07 | |
| Eight serves per day..... | 08 | |
| Nine serves per day..... | 09 | |
| Ten or more serves per day..... | 10 | |
| Other (WRITE IN) _____ | | |
| Don't know _____ | 99 | |

D. **FAT**
 Now I would like to ask about fats.

Q1a Can you think of any recommended ways of reducing fat in the diet? **CODE ALL MENTIONED. PROBE** Anything else? **DO NOT PROMPT**



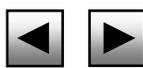


(10r2)	Choose lean meat/trim fat from meat/remove skin from chicken	04
	Use less fat/oil in cooking	02
	Eat less- don't eat fatty take away foods/eat home cooked meals	01
	Switch to low fat cooking methods (ie Grill, steam, microwave, drain fat off)	08
	Choose polyunsaturated fats (polyunsaturated margarine/vegetable oils)	12
	Use less butter margarine on bread.....	05
	Switch to low fat milk /cheese/yoghurt.....	07
	Eat more/ buy more low fat foods (ie bread, cereals, fruit, vegetables, legumes)	09
	Avoid fatty meats (sausages, salami, bacon).....	06
	Eat less cakes /biscuits/chocolates/nuts/potato chips/cool drinks	03
	Eat less saturated fat /animal fats	11
	Eat less red meat /meat in general/shift to white meat.....	10
	Check the fat content in packaged/precooked/processed foods	15
	Other (WRITE IN).....	
	
	Don't know	99

Q1b	Can you think of any general recommendations about the type of fat you should eat? DO NOT PROMPT	
	Eat less saturated fat/animal fats	1 (6 r1)
	Choose polyunsaturated fats (polyunsaturated margarine, vegetable oils).....	2
	Don't eat any fat/avoid all fats	3
	Eat low cholesterol foods	4
	Heart Foundation recommendations	5
	Omega 3 fats/eat essential fats from fish	6
	Other (WRITE IN).....	
	
	Don't know	9

Q2a	In the past 12 months, have you tried to cut down on the <u>amount</u> of fat and fatty food in your diet?	
	(1r1)	
	Yes, tried to cut down	1 Q2b
	No, haven't tried to cut down	2 Q2c

Q2b	What steps have you taken to try and cut down on the <u>amount</u> of fat and fatty foods you eat? PROBE FULLY FOR STEPS TAKEN	
	Eating less/avoiding	
	Just by eating less (not specific)	01 (6r2)
	Not eating/using/ cut down butter /margarine.....	02
	Avoid certain foods (Like bacon/fatty meats/pies, pasties/sausage rolls).....	03
	Cutting down on red meat /reduced meat in my diet/became vegetarian	04
	Eating other leaner meats in general \like chicken (not fish).....	43
	Eating leaner meat/ skinless chicken / mince with less fat	77
	Avoid/ eat less ice cream /cakes/biscuits/chocolates/nuts/potato chips	07
	Eating less fast foods /no/less takeaways	09





Reducing dairy products /milk, cheese	11
Eating low-fat products	27
Buying foods with lower fat content /substituting fatty foods	76
Cooking	
Changing to unsaturated (polyunsaturated, monounsaturated) margarine	25
Changing from polyunsaturated fats to monounsaturated fats	26
Changing to olive oil/canola /grape seed/ Pure and simple	63
Don't fry /bake or grill instead/ steam vegies	60
Minimum/ no oil/fat / cream in cooking/cutting down on oil	61
Trim fat off meat/skin off chicken	62
Eating more	
Eating fruit and vegies instead on fatty foods	40
Eating more fish	42
Other (WRITE IN) _____	

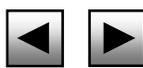
Don't know	99

Q2c	Do you now feel you eat more, less, or about the same <u>amount</u> of fat and fatty foods as you did 12 months ago?	
		More .....1 (1r1)
		Less .....2
		The same .....3
		Don't know .....9

Q3a	In the past 12 months, have you tried to change the <u>types</u> of fat you include in your diet? (1r1)	
	Yes, tried to change	1 →
	Q3b	
	No, haven't tried to change	2 →
	Q4	

Q3b What steps have you taken to try and change the types of fat you eat? **PROBE FULLY FOR STEPS TAKEN**

Eating less/avoiding	
Not eating/using/ cut down butter /margarine	02
(6r2)	
Avoid certain foods (Like bacon/fatty meats/pies, pasties/sausage rolls).....	03
Cutting down on red meat /reduced meat in my diet/became vegetarian	04
Eating other leaner meats in general \like chicken (not fish).....	43
Eating leaner meat/ skinless chicken / mince with less fat	77
Eating less fast foods /no/less takeaways	09
Eating low-fat products	27
Buying foods with lower fat content /substituting fatty foods	76
Cooking	
Changing to unsaturated (polyunsaturated, monounsaturated) margarine	25
Changing from polyunsaturated fats to monounsaturated fats	26
Changing to olive oil/canola /grape seed/ Pure and simple	63
Don't fry /bake or grill instead/ steam vegies	60
Minimum/ no oil/fat / cream in cooking/cutting down on oil	61
Trim fat off meat/skin off chicken	62
Eating more	





Eating fruit and vegies instead on fatty foods40

Other (WRITE IN) _____

Don't know99

Q4 Which of the following best currently describes you?

- A. I am currently trying to eat less fat and fatty foods..... 1
.....(1r1)
- B. I am thinking about cutting down on the amount of fat and fatty foods I eat.....2
- C. I am not thinking about cutting down on the amount of fat and fatty foods I eat.....3
- D. I am not thinking about cutting down on the amount of
fat and fatty foods I eat because I already eat a low fat diet.....4

Q5 **IF CODED 1 (YES) AT Q2A OR Q3A ASK Q5, IF NOT GO TO Q6.**

You said earlier you had tried to either cut down the amount, or change the type of fat that you eat. What influenced you to change either the amount or type of fat that you eat? **PROBE** Anything else? **CODE ALL MENTIONED.**

- To lose/control weight.....01
(7r2)
- To reduce the risk of **heart disease**02
- To reduce **cholesterol** levels.....03
- Special diet for **medical reasons**.....06
- To improve **health in general**.....07
- To improve **fitness**.....08
- Advice from family** and friends.....10
- Advertising**/media/Heart Foundation/Health Dept.....13
- Education**/became aware of fat in diet/reading15
- Other (Specify) _____
- Don't know99

Q6 What are the main things which make it difficult for you to eat less fat and fatty foods? **PROBE** Anything else? **CODE ALL MENTIONED**

- Foods I enjoy** tend to be high in fat/fatty food is tempting06
- Difficult to change **eating habits**/families habits07
- Eat out/have **takeaways** a lot13
- The **time it takes** to prepare/shop for low fat foods.....09
- Low fat foods **not readily available** at lunchtime or when eating out.....12
- Person buying/preparing** my food buys/uses fat and fatty foods01
(7r2)
- The **effort it takes** to prepare low fat foods/I'm not organised.....10
- Other (WRITE IN) _____
- Nothing97
- Don't know99

E. CALCIUM

Q1 In the past 12 months have you tried to change the amount of calcium-rich foods you eat? **IF YES:** Is that to increase or decrease?

(1r1)

Yes, tried to increase amount.....1





Yes, tried to decrease amount.....2
 No, have not tried to change3

Q2 Which of the following best currently describes you? **READ OUT**

- A. I am currently trying to increase the amount of calcium rich foods I eat.....1
 - B. I am thinking about trying to increase the amount of calcium rich foods I eat2
 - C. I am not thinking about increasing the amount of calcium rich foods I eat.....3
-(1r1)

F. BODY WEIGHT

Q1a **ASK FEMALES:**

I am now going to ask some questions about weight.
 Can you tell me if you are currently pregnant?

Yes1
 No

.....2 (1r1)

IF PREGNANT ASK RESPONDENT TO ANSWER QUESTIONS THINKING OF USUAL PRE-PREGNANCY WEIGHT

Q1b How much do you weigh?

IF RESPONDENT UNSURE, ALLOW APPROXIMATION
 (1r3)

kg

OR

stone lbs
 (1r4)

OR

lbs
 (1r3)

Refused.....7
 Don't know9
 (1r1)

Q1c How tall are you, without shoes? box

IF RESPONDENT UNSURE, ALLOW APPROXIMATION
 (1r3)

cm

OR

feet inches
 (1r3)

Refused.....7
 Don't know9
 (1r1)

Q1d How do you consider your weight? Would you say you are: **READ OUT**

- Very overweight.....1
- Somewhat overweight2
- Only a little overweight.....3
- About right.....4
- Underweight5





Refused.....7
DON'T READ OUT Don't know9
 (1r1)

Q2a In the last 12 months, have you tried to lose or gain weight? **IF YES:** Which one?
 (1r1)

Yes, to lose weight1
 Yes, to gain weight.....2
 Q2b
 No, not tried to change weight.....3
 Q2d

Q2b What influenced you to try to lose/gain weight? **PROBE** Anything else? **CODE ALL MENTIONED**

To **look better**09
 (7r2)
 To **improve fitness**/I felt tired sluggish/short of breath08
 Had **put weight on**/I felt fat/I was overweight12
 To **improve health** in general/want to get pregnant.....04
 My **clothes wouldn't fit**.....11
Feeling uncomfortable(unspecified)/general discomfort/to feel better18
Advice from family and friends.....14
 To reduce risk of **heart disease**02
 Other (specify) _____

 Don't know99

Q2c What steps have you taken to try to ...? **ASK AS APPROPRIATE**
PROBE FULLY FOR STEPS TAKEN

i) Lose weight

More exercise/walking more/play tennis/more activity.....01
 (7r2)
Changed diet/eating habits(unspecified)/went on diet20
Cut out fat(saturated, animal fats)/less butter/ cut down on fatty food41
 Eat **smaller portions** in general/eat less/less food intake.....22
 Eating **more fruit and vegies**.....44
 Began to be **concerned about nutrition**/began to eat more balanced diet21
 Eat **smaller portions of high calorie food**/avoid high calorie food/chocolate, sweets.42
Stopped eating junk food/cut down take aways/fast food48
 Joined **weight watchers**/a diet place/Easy slim weight loss49
Stopped snacking between meals/cut down on snacking.....47
 Other (specify) _____
 Don't know99

ii) Gain weight

More exercise/walking more/play tennis/more activity.....01
 (4r2)
 Began to be **concerned about nutrition**/began to eat more balanced diet21
Eat more/a lot more /quantity24
Eat regularly and often.....25
Eat lots of eggs/steaks/similar foods.....40





High carbohydrate diet	42
Other (specify) _____	
Don't know	99

Q2d And how does your current weight compare with your weight 12 months ago?

Weigh more	1
(1r1)	
Weigh less	2
Weigh the same	3
Don't know	9

Q3 Which of the following best currently describes you? **READ OUT**

A. I am currently trying to lose or gain weight	1
B. I am thinking about trying to lose or gain weight	2
C. I am not thinking about trying to lose or gain weight	3
(1r1)	

Q4 What are the main things that make it difficult for you to control your weight?
PROBE Anything else? **CODE ALL GIVEN**

Enjoy my food /food helps me get through	07
(8r2)	
No will power to eat better	16
Difficult to change eating habits	06
I like fattening /sweet food/I have a sweet tooth	21
Eat out regularly/ have take-aways	13
No time to exercise /work long hours	10
No will power to exercise	17
I don't exercise (unspecified whether time or inclination)	20
Don't like exercise	09
I am a shift worker/long hours I work/work commitments	18
I like my alcohol/beer/wine /friends convince me to drink	33
Medical problems (unspecified)	26
Other (WRITE IN) _____	
Nothing	97
Don't know	99

G. HEALTH BENEFITS OF DIETARY CHANGE

What health problems do you think are associated with the following behaviour? **TICK**
AND VARY ORDER OF QUESTIONS

[] QA Eating too much fat or fatty foods? **PROBE FULLY** Anything else? (9r2)

Heart disease /heart attack/heart problems	07
Obesity /gaining weight/overweight	65
High cholesterol	63
High blood pressure /hypertension/blood pressure	10
Artherosclerosis /hardening/blocked arteries	08
Diabetes /high blood sugar/sugar problems	62
Lethargy /low energy/fatigue/low stamina/tired/run down/sluggish	90
Stroke	16
Unfit /lack of fitness	91
Circulation problems (unspecified)	06
Cancer (unspecified)	01





Other (WRITE IN)_____	
Doesn't cause health problems	98
Don't know	99

[] QB Not eating enough fruit and vegetables? **PROBE FULLY** Anything else?
(9r2)

Vitamin & mineral deficiencies /lack of nutrition(unspecified).....	68
Lethargy /low energy/fatigue/low stamina/tired/run down/sluggish	90
Constipation /poor irregular bowel movements/lack of regularity	35
Skin problems (inc unspecified)/bad skin/acne.....	55
Poor immunity /prone to colds/flu/low resistance to disease.....	69
General health problems /unwell/sick/run down.....	92
Scurvy /beri beri/rickets.....	60
Intestinal disorders/ bowel problems /bowel obstructions/diverticulosis.....	41
Heart disease /heart attack/heart problems.....	07
Not enough fibre -roughage	73
Anaemia/ iron deficiency /lack of iron.....	70
Bowel cancer /colon cancer.....	02
Obesity /gaining weight/overweight	65
Digestion problems (unspecified)/acid reflux	36
Other (WRITE IN)_____	
Doesn't cause health problems	98
Don't know	99

[] QC Not eating enough bread and cereal foods? **PROBE FULLY** Anything else?
(9r2)

Constipation /poor irregular bowel movements/lack of regularity	35
Intestinal disorders/ bowel problems /bowel obstructions/diverticulosis.....	41
Not enough fibre -roughage	73
Lethargy /low energy/fatigue/low stamina/tired/run down/sluggish	90
Bowel cancer /colon cancer.....	02
Vitamin & mineral deficiencies /lack of nutrition(unspecified).....	68
Digestion problems (unspecified)/acid reflux	36
Heart disease /heart attack/heart problems.....	07
General health problems /unwell/sick/run down.....	92
Other (WRITE IN)_____	
Doesn't cause health problems	98
Don't know	99

[] QD Being overweight? **PROBE FULLY** Anything else?
(9r2)

Heart disease /heart attack/heart problems.....	07
High blood pressure /hypertension/blood pressure.....	10
Lethargy /low energy/fatigue/low stamina/tired/run down/sluggish	90
Diabetes /high blood sugar/sugar problems.....	62
Respiratory problems /shortness of breath/breathing problems(unspecified).....	30
High cholesterol	63
Low self esteem /depression/feel bad/horrible/uncomfortable	80
Unfit /lack of fitness	91
Joint problems /knee problems	45
Circulation problems (unspecified)	06
Stroke	16
Obesity /gaining weight/overweight	65
Strain on muscular/ skeletal system /immobility/not walking well.....	50





General health problems/unwell/sick/run down	92
Back problems	46
Other (WRITE IN).....	
Doesn't cause health problems	98
Don't know	99

H. BREASTFEEDING

I'd now like to ask about breast feeding.

Q1a How important do you think it is for mothers to breast feed their babies. Do you think it is:

Not at all important	1
(1r1)	
Not very important	2
Somewhat important	3
Very important.....	4

Don't know	9

Q1b What do you think are the benefits of breast feeding for babies? **PROBE FOR 3 BENEFITS**

Bonding/security/love/emotional	55
(5r2)	
Immunity.....	01
Vitamins & minerals/nutrition	02
Health benefits/good for baby (unspec) ..	10
Tailor made/ perfect food	09
No chemicals/natural	51
Convenience/easier	54
Don't know.....	99

Other (WRITE IN) _____

Q2 For how long do you think mothers should breast feed their babies? **DO NOT PROMPT**

Less than one month	1
(1r1)	
Two months.....	2
Three months	3
Four months	4
Five months.....	5
Six months.....	6
Over six months.....	7
As long as possible.....	8
Don't know.....	9

Q3a What things do you think make it difficult for women to continue to breast feed their babies for at least six months? **DO NOT PROMPT**

Need to return to work.....	01
(5r2)	
Poor supply of breast milk.....	02
Problems with breast feeding (eg. sore nipples).....	03
No public acceptance.....	12
Stress/pressure/no time	16
Convenience of bottle/ inconvenience.....	08
Don't Know	99

Other (WRITE IN) _____





Q3b What do you think would make it easier for women to continue to breast feed their babies for at least six months? **PROBE FULLY**

- Public acceptance/community support/change attitudes12
- Not having to work01
(5r2)
- Education about breast feeding.....05
- More breast feeding facilities.....04
- Lack of stress/pressure/more time03
- Information about diet & nutrition to keep up supply06
- Support/encouragement and cooperation from husband.....11
- Don't Know/don't see there is a problem99
- Other (WRITE IN) _____

Q4a Do you think it is acceptable for women to breast feed their babies in public places such as ...? **READ OUT PLACES**

Q4b **IF NOT ACCEPTABLE, ASK FOR THAT PLACE: (NOT PUBLIC TRANSPORT)**
Would it be acceptable if a room was provided for women to breast feed their babies in ...?

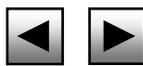
	ACCEPTABLE			ACCEPTABLE WITH ROOM	
	Yes	No	Depends How Obvious	Yes	No
Shopping Centres	1	2	3	4	2
.....	(2r1)				
Workplaces	1	2	3	4	2
.....	(2r1)				
Restaurants.....	1	2	3	4	2
.....	(2r1)				
On public transport (buses & trains)	1	2	3	Don't Ask	
.....	(1r1)				

I. DIETARY INFLUENCES AND INFORMATION

Now some more general questions.

Q1 In the last 12 months, what have been your main sources of nutrition and dietary information? **DO NOT PROMPT. IF PAMPHLETS/BROCHURES** where did you get these from? **CODE ALL RESPONSES**

- | | | | |
|-------------------------------|----|-------------------------------|----|
| Books | 01 | Newspaper articles | 13 |
| Community Health Centres.. | 02 | Nurses/Health workers | 35 |
| Dietitians..... | 03 | Pamphlets/Brochures | 14 |
| Doctors | 04 | Source(WRITE IN) _____ | |
| Family and friends | 05 | Radio interviews | 15 |
| Food manufacturers..... | 06 | Schools..... | 16 |
| Health Department..... | 07 | TV ads..... | 17 |
| Health Food Shops..... | 08 | TV programs..... | 18 |
| Magazine articles..... | 10 | Other (WRITE IN) | |
| National Heart Foundation ... | 11 | ..... |  |
| (9r2) | | | |





Q2a In your opinion, how important is it that governments financially support the following nutrition activities? For each, please say whether it is very important, quite important or not important.

TICK AND VARY ORDER	<u>Very important</u>	<u>Quite important</u>	<u>Not important</u>	<u>Not sure</u>
<input type="checkbox"/> Research investigating what Western Australians are eating and how their diet is changing over time 1 2 3 4 (1r1)				
<input type="checkbox"/> Monitoring the quality of the food supply 1 2 3 4 (1r1)				
<input type="checkbox"/> Providing nutrition publications for the general public 1 2 3 4 (1r1)				
<input type="checkbox"/> Advertising campaigns to promote healthy eating to the public 1 2 3 4 (1r1)				
<input type="checkbox"/> Working with the food industry to increase the availability of healthy foods 1 2 3 4 (1r1)				

ASK LAST Are there any other nutrition activities that governments should financially support? What? **WRITE IN** And how important is that? **CODE 1-4**

IF NONE CODE AND GO TO Q2b (1r2) **No other activities** **99**

_____ 1 2 3 4
(1r3)

_____ 1 2 3 4
(1r3)

_____ 1 2 3 4
(1r3)

Q2b I am going to read out 5 potential Government community education program topics. I would like you to tell me which one should be given the highest priority? Which one the second highest priority/ Which one the third?

READ OUT WHOLE LIST BEFORE ACCEPTING ANSWERS. REPEAT IF NECESSARY. WRITE IN PRIORITY FROM 1(HIGHEST) to 5 (LOWEST)

(5r1)

- Fat _____
- Fruit and vegetables _____
- Bread and cereals _____
- Weight and weight control _____





Q2c Are there any other areas of nutritional or nutrition-related information that you feel ought to be given equal or higher priority than these areas? **IF YES ASK** which area(s) would that be? **WRITE IN**
No other areas.....99

(3r2)

Q3a Which, if any, of the following would make it easier for you or your family to eat a healthy diet? **READ OUT. TICK AND VARY ORDER**

- | | <u>Yes,
Easier</u> | <u>No,
Not
Easier</u> | <u>Don't
Know</u> |
|---|------------------------|-------------------------------|-----------------------|
| <input type="checkbox"/> If healthy foods were cheaper..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If more take-away and fast food outlets provided healthy foods..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If I knew more <u>easy</u> ways of preparing healthy foods..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If I knew more <u>quick</u> ways of preparing healthy foods..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If I had more information to help me decide which foods were healthy | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If I knew more about cooking..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If my family/partner enjoyed healthy foods..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If I could buy more healthy snack foods..... | 1..... | 2..... | 3 |
| (1r1) | | | |
| <input type="checkbox"/> If healthier foods were easier to find in supermarkets..... | 1..... | 2..... | 3 |
| (1r1) | | | |

Q3b Are there other activities which would make it easier for you and your family to eat a healthy diet? **IF YES, What? WRITE IN**
Yes1
(1r1)
No.....2

(3r2)

Q4a I am going to read out a statement that has been made about school canteens. Please tell me whether you agree or disagree with the statement. **READ OUT ASK:** Is that strongly or slightly?

School canteens should restrict sales of high fat foods such as Strongly Agree Disagree Disagree Don't





pies, chips, sausage rolls and fatty snack foods (1r1)

Agree 1 Slightly 2 Slightly 3 Strongly 4 Know 9

Q4b Who do you think should decide which types of foods are sold in school canteens?
DO NOT PROMPT. CODE ALL GIVEN

Children1
 (5r1)
 Parents2
 Teachers/principal of school.....3
 Education Dept.....4
 Canteen Manager/ Manageress5
 Health Dept6
 Other.....7
 (WRITE IN) _____
 Don't know9

Q5 In the last 12 months, has anyone in your household eaten less than they should because you couldn't afford enough food?

Yes1
 (1r1)
 No2
 Refused/no answer ...3
 Don't know9

Q6 In the last six months, have you experienced vomiting and/or diarrhea which you suspect may have been food poisoning?
1 (1r1)

Yes
 No2

IF YES Was food poisoning positively identified by a doctor or nurse?
 (1r1)

Yes1
 No2

J. DEMOGRAPHICS

Finally, I would like some information on you and your household, to ensure I have spoken to a good cross section of the population.

Q1 Firstly, into which of the following age groups do you fall? **READ OUT**

18 to 19 years.....01
 (1r2)
 20 to 24 years.....02
 25 to 29 years.....03
 30 to 34 years.....04
 35 to 39 years.....05
 40 to 44 years.....06
 45 to 49 years.....07
 50 to 54 years.....08
 55 to 59 years.....09
 60 to 64 years.....10
 Refused.....99





Q2 And what is the highest level of education you have completed? **DO NOT PROMPT**

- Year 10, Junior Achievement Certificate or less1
(1r1)
- Year 12, Certificate of Secondary Education, Leaving,
TEE, TEA, etc2
- Tertiary education/Degree/University diploma3
- Tertiary education - post-graduate qualification4
- Apprenticeship/trade qualification5
-
- None of the above - other (SPECIFY) _____ 6
- Refused.....9

Q3a In which country were you born?

- AustraliaIf Australian
(1r1)
- Are you an Aboriginal or Torres Strait Islander
Overseas
(WRITE IN COUNTRY) _____
(1r2)

Q3b IF OVERSEAS, ASK: In what year did you first arrive in Australia to live?

1	9		
---	---	--	--

(1r2)

Q4 Are you currently employed outside the home? **IF 'YES', ASK:** Is that full-time or part-time?

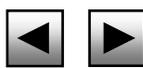
- Full-time.....1
(1r1)
- Part-time.....2
- Not currently employed.....3

Q5 What is your current occupation? **IF RETIRED OR UNEMPLOYED ASK FOR LAST OCCUPATION. PROBE FULLY**

DO NOT CODE

- Manager/Administrator01
(1r2)
- Professional.....02
- Para-Professional03
- Tradesperson04
- Clerk.....05
- Sales or Service Worker06
- Plant Operator or Driver.....07
- Labourer.....08
- Home Duties.....10
- Student.....11
- Never worked (not home duties)

Q6a Do you have any responsibility for doing the food shopping in your household?





Responsibility.....2

Yes/sole responsibility1
(1r1)
Shared

.....3

No.....

SKIP TO Q6c

Q6b How often do you put your cold or frozen food in an esky to transport it from the shops to home?

Always 1 Most
times 2
Occasionally 3
Never 4 (1r1)

Q6c Do you have any responsibility for choosing and preparing meals in your household?

Yes/sole responsibility1
(1r1)
Shared Responsibility.....2
No3

Q6d Do you have a working thermometer in your fridge at home?

Yes

No (1r1)

Don't have a fridge

What is the maximum temperature your fridge should operate at?

Q6e Which of the following best describes your cooking skills?

Can't cook.....1
Can boil an egg, or BBQ meat or heat frozen meals2
Can cook basic meat and 3 veg type meals3
Can cook a wide variety of meals.....4
Can cook almost anything.....5
.....(1r1)

Q7a How many adults, aged 18 or over, are there in your household? Please exclude full-time students who mainly live away from home.

CODE COLUMN A

Q7b And how many children under 18 are there in your household?

CODE COLUMN B

Q7c IF CHILDREN IN HOUSEHOLD: How old are your children? **WRITE IN**





	<u>7A</u> Adults (1r1)	<u>7B</u> Children (1r1)	<u>7C</u> Child
(1r2) One	1	1	Child 1 <input type="checkbox"/> <input type="checkbox"/>
(1r2) Two	2	2	Child 2 <input type="checkbox"/> <input type="checkbox"/>
(1r2) Three	3	3	Child 3 <input type="checkbox"/> <input type="checkbox"/>
(1r2) Four	4	4	Child 4 <input type="checkbox"/> <input type="checkbox"/>
(1r2) Five	5	5	Child 5 <input type="checkbox"/> <input type="checkbox"/>
(1r2) Six or more	6	6	Child 6 <input type="checkbox"/> <input type="checkbox"/>
(1r2) None	9	9	

Q7d ASK Q7D IF ANY CHILDREN AGED 5 OR UNDER IN HOUSEHOLD

Is the child (are any of the children) under 5 in the household currently being breast fed?

- (1r1) Yes1
No2

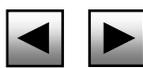
Q8 Which of the following best describes your household? READ OUT

- Live alone1
(1r1)
Couple2
Couple with children3
Single parent4 } TM
- Related adults5
Related adults with children6
Unrelated adults7 } TM
- Unrelated adults with children8 -

Q9a Which category does your total household income fall into? READ OUT (GROSS)

- A. Less than \$15,0001
(1r1)
B. \$15,000 - \$25,0002
C. \$25,000 - \$35,0003
D. \$35,000 - \$50,0004 } TM GO
- E. \$50,000 - \$60 0005
CLOSE
F. \$60 000 and over6
Refused9 -

Q9b Which category does the income available to you/your family in your household fall into? READ OUT (GROSS)





- A. Less than \$15,0001
(1r1)
- B. \$15,000 - \$25,0002
- C. \$25,000 - \$35,0003
- D. \$35,000 - \$50,0004
- E. \$50,000 - \$60 0005
- F. \$60 000 and over6
- Refused9

THANK YOU FOR YOUR CO-OPERATION

CHRISTIAN NAME: _____

PHONE: _____

I certify that this is a true, accurate and complete interview, conducted in accordance with IQCA standards and the ICC/ESOMAR International Code of conduct. I will not disclose to any other person the content of this questionnaire or any other information relating to this project.

INTERVIEWER'S SIGNATURE: _____

DATE: _____





Project: NUTRITION

PERTH INTERVIEWING

Job: 10278P

Good morning/afternoon/evening. My name is _____ from NCS Pearson, the social research company. WE ARE NOT SELLING ANYTHING. Your household has been selected at random for an official survey being conducted in Western Australia on important nutrition issues. May I speak with the person aged 18 to 64 years old whose birthday falls next?

SEEK INTERVIEW WITH NEXT BIRTHDAY PERSON. MAKE APPOINTMENT IF PERSON NOT AVAILABLE

REPEAT INTRODUCTION AS NECESSARY. DO NOT MENTION DETAILS ABOUT THE NATURE OF THE SURVEY. SELL SURVEY TO THE RESPONDENT IF NECESSARY: It is important to get the views of a wide cross section of people. Your opinion will be kept strictly confidential, and no surnames will be recorded. The interview will take about 30 minutes.

Phone Number _____

Interviewer Name _____

Interviewer ID _____

- Location
- Perth.....1
 - Albany2
 - Bunbury3
 - Derby.....4
 - Kalgoorlie5

(55)

QB.

RECORD SEX

DON'T ASK

- Male.....1
- Female2

(58)

QC.

Before we start, I'd like to ask you what you think are the major problems, if indeed there are any, with the average Australian diet?

DO NOT READ

PROBE FULLY

- Too much alcohol/beer01
- Too much fast/junk food.....04
- Too much fat/wrong sorts of fat/saturated fats05
- Too much salt.....10
- Too much sugar/sweet things/chocolates/confectionery/cakes/lollies13
- Not enough fruit/vegies/salads.....35
- Not eating a balanced diet/not eating wide enough variety of foods.....52
- No time to eat-cook properly/too lazy to cook/rely too much on pre-prepared foods.....53
- Others SPECIFY.....97
- Nothing/none/no problems.....98
- Don't know.....99





(60)

QD.

Which of the following statements would best describe how you feel about diet and nutrition?

READ OUT

- I really do pay a lot of attention to the health aspect of the food I eat to make sure my diet is as healthy as possible 1
- I take a bit of notice of the health aspect of the food I eat to make sure I have a fairly good diet..... 2
- I honestly don't really go around thinking about the health aspect of food.....3

PART 1 - CONSUMPTION

Q1.

This survey consists of two parts.

Firstly, I am going to ask you about the foods you ate yesterday.

Then, I will be asking some more general questions about the food you eat.

How many pieces of fruit did you eat yesterday?

A piece of fruit would be, for example, an apple, a small bunch of grapes, 3 prunes, a quarter of a rock melon or half a cup of stewed, pureed or canned fruit.

Pieces of fruit: (62)_____

Q2a.

How many different types of vegetables, did you eat yesterday?

Please remember to include salad, fresh, frozen, canned, raw and cooked vegetables.

TYPE IN NUMBER OF TYPES, USE 0 IF NONE

Types of vegetables: (63)_____

IF: (63)(0) SKIP to: (96)

(64)

Q2b.

Please tell me, what are those types of vegetables, that you ate?

- Red-yellow.....1
- Leafy green.....2
- Cruciferous3
- Potato4
- Peas and beans.....5
- Corn.....6
- Mushrooms.....7
- Legumes and pulses.....8
- Onions9
- Other10

(65)

Q2b.

How many cups of ... did you eat?

RECORD CUPS OR PART CUPS

(66)

Q2b





(65) Q-65S

- Red-yellow..... 1 _____
- Leafy green..... 2 _____
- Cruciferous 3 _____
- Potato 4 _____
- Peas and beans..... 5 _____
- Corn..... 6 _____
- Mushrooms..... 7 _____
- Legumes and pulses..... 8 _____
- Onions 9 _____
- Other 10 _____

(96)

Q3a.

Please tell me if you ate any slices of bread or bread rolls yesterday?

DO NOT READ
IF BREAD ROLL:

Was that a large or small roll?

- Slices of bread..... 1 _____
- Large roll 2 _____
- Small roll..... 3 _____

DO NOT READ

Didn't eat bread/bread roll yesterday 9 _____

IF: (96)(1) CONTINUE else SKIP to: (101)

Q3a.

How many slices of bread did you eat yesterday?

Slices of bread: (100) _____

IF: (96)(2) CONTINUE else SKIP to: (102)

Q3a.

How many large rolls did you eat yesterday?

Large rolls: (101) _____

IF: (96)(3) CONTINUE else SKIP to: (103)

Q3a.

How many small rolls did you eat yesterday?

Small rolls: (102) _____

IF: (96)(1 *TO* 3) CONTINUE else SKIP to: (105)

(104)

Q3b.

What type of bread/bread rolls did you mainly eat yesterday?

Was it brown, wholemeal, multigrain, wholegrain, white, white with extra fibre, or another type?

DO NOT READ

- Brown or wholemeal 1 _____
- Multigrain or wholegrain..... 2 _____
- White with extra fibre 3 _____
- White 4 _____
- Other SPECIFY 5 _____





2001 NUTRITION SURVEY - QUESTIONNAIRE

(106)

Q4a.

What other bread substitutes did you eat yesterday, such as bread muffins, pita bread, crumpets, scones, rice cakes, crackers or damper?

- Bread muffins1
- Pita bread2
- Crumpets.....3
- Scones4
- Rice cakes.....5
- Large crackers.....6
- Small crackers.....7
- Damper.....8
- Didn't eat any other bread products yesterday9 **Skip - (109)**

IF (106)(5)

Q4b.

How many rice cakes did you eat?

ROUND TO NEAREST RICE CAKE

Rice Cakes: (108) _____

ELSE (106)(1 *TO* 4)

Q4b.

And how many (106) did you eat?

ROUND TO NEAREST HALF SCONE/CRUMPET/MUFFIN/PITA BREAD

Amount: (108) _____

ELSE (106)(6 *OR* 7)

Q4b.

And how many (106) did you eat?

Crackers: (108) _____

ELSE

Q4b.

How many serves of damper did you eat?

Damper serves: (108) _____

END

(108)

Q4b.

(107)

Q4b

- Bread muffins1 _____
- Pita bread2 _____
- Crumpets.....3 _____
- Scones4 _____
- Rice cakes.....5 _____
- Large crackers.....6 _____
- Small crackers.....7 _____
- Damper.....8 _____





Q5a.

How many cups of cooked rice did you eat yesterday?

INCLUDE PART CUPS. TYPE ZERO IF NONE

Cups of cooked rice: (111) _____

IF:(111)(0) SKIP to:(116)

(114)

Q5b.

What type of rice was it, white or brown?

CODE MAIN TYPE

- White 1
- Brown 2
- Both white and brown eaten equally 3

Q6a.

How many cups of cooked pasta or spaghetti did you eat yesterday?

IF NONE, TYPE "0"

Cups of cooked pasta: (116) _____

IF: (116)(0) SKIP to: (122)

(121)

Q6b.

What type of pasta or spaghetti was it, that is regular or wholemeal?

- Regular..... 1
- Wholemeal..... 2
- Both regular and wholemeal eaten equally 3

(122)

Q7a.

What type(s) of breakfast cereal, if any, did you eat yesterday?

- | | | |
|-----------------------|-------|-------------|
| 1st Type | _____ | ...1 |
| 2nd Type | _____ | ...2 |
| 3rd Type | _____ | ...3 |
| 4th Type | _____ | ...4 |
| 5th Type | _____ | ...5 |
| 6th Type | _____ | ...6 |
| Didn't eat any cereal | ...9 | Skip |

- (125)

Q7b.

How many cups of (123) did you eat?

FOR PORRIDGE ASK FOR NUMBER OF CUPS OF COOKED PORRIDGE
IF WEETBIX/VITA-BRITS OR SIMILAR:
ASK HOW MANY BISCUITS

Cups: (124) _____





Q9a.

How many cups of yoghurt did you have yesterday?

TYPE IN, INCLUDE PART CUPS. USE "0" IF NONE

Cups of yoghurt: (149)_____

IF:(149)(0) SKIP to:(153)

(152)

Q9b.

And what type(s) of yoghurt did you eat? Was it ...?

READ OUT
CODE ALL GIVEN.

Any other types?

CODE OTHER BELOW
CODE "YUKULT" AS OTHER

- Skim/non-fat1
- Low fat/2% fat.....2
- Whole/traditional/regular3
- Other _____ 4
- Don't know.....9

(153)

Q10a.

What type(s) of cheese, if any, did you eat yesterday?
Include hard and soft cheese and any used in cooking or mixed dishes.

- 1st Type _____1
- 2nd Type _____2
- 3rd Type _____3
- 4th Type _____4
- 5th Type _____5
- 6th Type _____6
- Didn't eat any cheese9

Skip - (179)

Q10b.

How much of (154) did you eat?
RECORD AMOUNT. RECORD AS SLICES (A SLICE = A PRE-WRAPPED CHEESE ; SINGLE, A
ROUNDED TABLESPOON OF SOFT OR GRATED CHEESE, OR A 2.5cm; CUBE OF HARD CHEESE)

Amount of cheese: (155)_____

(155)

Q10b.





2001 NUTRITION SURVEY - QUESTIONNAIRE

(154) Q-154

- 1st type.....1 _____
- 2nd type.....2 _____
- 3rd type3 _____
- 4th type.....4 _____
- 5th type.....5 _____
- 6th type.....6 _____

(178)

Q10c.

Was the cheese you ate yesterday mainly regular, reduced fat or low fat cheese?

DO NOT READ

CODE ALL GIVEN Any other types? CODE OTHER BELOW

NB PARMESAN = REGULAR CHEESE

- Low fat, like ricotta or cottage1
- Reduced fat cheese.....2
- 'Regular' cheese3
- Other SPECIFY _____ 4
- Don't know.....9

Q11.

How many sweet biscuits did you eat yesterday?

WRITE IN, USE ZERO IF NONE

Sweet biscuits: (179) _____

Q12.

How much regular, not diet, soft drink did you drink yesterday?

Please tell me how many cups or cans you drank yesterday?

TYPE IN, INCLUDING PARTS OF CUPS/CANS.

USE ZERO IF NONE

THIS INCLUDES RED BULL ETC

DO NOT INCLUDE UNFLAVOURED MINERAL OR SODA WATER

Cups: (181) _____

Cans: (182) _____

Q12.

How much diet soft drink did you drink yesterday?

Please tell me how many cups or cans you drank yesterday?

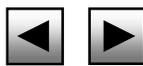
TYPE IN, INCLUDING PARTS OF CUPS/CANS.

USE ZERO IF NONE

DO NOT INCLUDE UNFLAVOURED MINERAL OR SODA WATER

Cups: (183) _____

Cans: (184) _____





(186)

Q13.

Did you eat any beef, lamb or veal, including hamburgers and mince, yesterday?

ASK FOR TYPE (EG. STEAK, MINCE, ETC)

- Steak1
- Chop.....2
- Roast meat3
- Mince.....4
- Hamburger / patty5
- Other SPECIFY _____ 6
- Sausages7

DO NOT READ

- None.....9

Q13.

How much (188) did you eat yesterday?

Serves: (189) _____

(189)

Q13.

(188) Q-188

- Steak (1 palm size)1 _____
- Chop (2 small chops).....2 _____
- Roast meat (3 slices)3 _____
- Mince (1/2 cup)4 _____
- Hamburger / patty (1 1/2 patties - 1 patty = 0.7 serves)5 _____
- Other6 _____
- Sausages (1 regular sausage).....7 _____

(192)

Q14.

Some people try to avoid eating foods which are high in fat.
Other people don't really mind about the amount of fat that they eat.

How often do you try to avoid eating foods which are high in fat?

READ OUT

- Always1
- Often.....2
- Sometimes.....3
- Rarely or never.....4

DO NOT READ

- Don't know which foods are high in fat....5

DO NOT READ

- Don't know.....9





2001 NUTRITION SURVEY - QUESTIONNAIRE

(194)

Q15.

Some people use mono or polyunsaturated fats while others don't really mind about the kind of fat they use.

What about you? When you use fat or oil in food preparation, how often is it mono or polyunsaturated fat?

READ OUT

- Always1
- Often.....2
- Sometimes.....3
- Rarely or never.....4

DO NOT READ

Don't use fat or oil.....5

DO NOT READ

Don't understand terms.....6

DO NOT READ

Don't know.....9

(196)

Q15b.

Some people try to choose healthy foods when they buy a meal, while others don't really mind on the occasions they buy a meal.

When you buy a meal how often do you try to choose healthy foods?

READ OUT

- Always1
- Often.....2
- Sometimes.....3
- Rarely or never.....4

DO NOT READ

Don't buy meals.....5

Don't know.....9

(198)

Q16.

Yesterday which meals did you buy from a restaurant, take-away, lunch bar, canteen or other prepared food outlet?

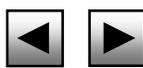
READ OUT MEALS

- Breakfast..... ..1
- Lunch..... ..2
- Evening Meal..... ..3

DO NOT READ

None..... ..9

IF: (198)(1 *TO* 3) SKIP to: (201)





2001 NUTRITION SURVEY - QUESTIONNAIRE

(200)

Q17.

I now have some questions about the last occasion that you bought a meal from a restaurant, take-away, lunch bar, canteen or other prepared food outlet.

Thinking back to that meal was it breakfast, lunch or evening meal?

- Breakfast1
- Lunch.....2
- Evening Meal.....3
- DO NOT READ
- Can't remember/Don't buy prepared meals ...9

(201)

Q18.

Thinking about the last meal that you bought, were there enough healthy choices available at the restaurant/shop?

- Yes1
- No.....2
- DO NOT READ
- Don't know3
- DO NOT READ
- Didn't want/not interested4

(203)

Q19.

How important is it for you to have healthy choices available when you buy a meal?
Would you say ...

- READ OUT
- Very important1
- Quite important.....2
- Not important.....3
- DO NOT READ
- Not sure.....4

PART 2 – DIETARY CHANGES

A. FRUIT

(220)

Q1a.

Now I would like to ask you some more general questions, firstly on fruit.
In the past 12 months, have you tried to change the amount of fruit you eat?

IF YES:

Is that increase or decrease?

- Yes, tried to increase amount1
- Yes, tried to decrease amount2 **Skip - (227)**
- No, haven't tried to change3 **Skip - (227)**





2001 NUTRITION SURVEY - QUESTIONNAIRE

(221)

Q1b.

What influenced you to try and eat more fruit?

PROBE:

Anything else?

CODE ALL MENTIONED

Lose-control weight / went on a diet / diet that I'm on.....	01
To reduce bowel problems/constipation / to improve digestive performance.....	04
Improve health in general /feeling tired/healthier life/health reasons (unspec)	06
To improve fitness / for sports.....	07
Advice from family/friends / influence of others I cook for.....	09
Influence others/ family-children /encourage children /family to eat more	12
Advertising campaigns / TV campaigns 5 veg & 3 fruit /magazine advertising	14
It's good for you / I wasn't eating enough / more nutritious /fruit is better for you.....	19
I like it / we just like eating fruit / it tastes good.....	20
Other SPECIFY _____	97
Have not tried to increase the amount of fruit eaten.....	98
Don't know / no particular reason.....	99

(224)

Q1c.

What steps have you taken to try and increase the amount of fruit you eat?

PROBE:

Anything else?

CODE ALL MENTIONED

Trying-buying-eating-using a bigger variety /more choices avail/different types	01
Buying more / asking my partner - wife to buy-cook more-change our diet	03
Taking fruit to work /uni.....	10
Having fruit on display at home/trying to have more fruit around.....	12
Having fruit with-for dessert	22
Other SPECIFY _____	23
Eating more making fruit a larger part of diet/making sure I eat some every day	40
Substituting for other food /fruit as snack/having fruit for morning tea/lunch.....	43
Have not tried to increase the amount of fruit eaten.....	98
Don't know / no particular reason.....	99

(226)

Q1d.

Do you feel you eat more, less, or about the same amount of fruit as you did 12 months ago?

Now more	1
Now less.....	2
Now about the same.....	3
Don't know.....	9





(227)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat more fruit..... 1
- I am thinking about trying to eat more fruit..... 2
- I am not thinking about increasing the amount of fruit I eat 3

(230)

Q3.

What are the main things that make it difficult for you to eat more fruit?

PROBE:

Anything else?

CODE ALL MENTIONED

- Cost/too expensive02
- Don't like fruit / lack of interest in fruit / I get bored with it.....03
- Difficulty in changing eating habits / I just don't think of it.....04
- The time it takes to buy-prepare fruit to eat / I don't have enough time/ too busy06
- Hard to find good quality fruit07
- Not enough variety in types of fruit available/seasonal availability08
- Doesn't appeal in cold weather/not tempting in winter.....15
- Other SPECIFY _____...96
- Nothing / I already eat enough / I can't fit anymore in.....97
- Don't know.....99

(232)

Q4.

What do you think is the recommended number of serves of fruit that should be eaten each day?
One serve of fruit is equal to one medium piece of fruit or half cup of cooked or canned fruit.

DO NOT READ

- One serve per day 1
- Two serves per day 2
- Three serves per day..... 3
- Four serves per day..... 4
- Five or more serves per day 5
- Other SPECIFY _____ ...6
- Don't know..... 9

B. VEGETABLES

(234)

Q1a.

Now I would like to ask some questions on vegetables.
In the past 12 months, have you tried to change the amount of vegetables you eat?

IF YES:

Is that increase or decrease?

- Yes, tried to increase amount 1
- Yes, tried to decrease amount 2 Skip - (240)
- No, haven't tried to change 3 Skip - (240)





(235)

Q1b.

What influenced you to try and eat more vegetables?

PROBE:

Anything else?

CODE ALL MENTIONED

- To lose-control weight / went on a diet / diet that I'm on.....01
- Improve health in general /feeling tired/healthier life/health reasons (unspec)07
- To improve fitness / for sports.....08
- Advice from family/friends / influence of others I cook for.....10
- Influence of others/person who buys/prepares food is eating more.....12
- Advertising campaigns / TV campaigns / 5 veg & 3 fruit/ magazine advertising14
- Influence others/ family-children /encourage children / family to eat more.....17
- Good for you /wasn't eating enough /more nutritious /vegies are better for you19
- I like them / we just like eating vegetables / they taste good20
- Substitute for other foods/trying to eat less/no red meat26
- Other SPECIFY97
- Have not tried to increase the amount of vegetables eaten.....98
- Don't know / no particular reason.....99

(237)

Q1c.

What steps have you taken to try and increase the amount of vegetables you eat?

PROBE:

Anything else?

CODE ALL MENTIONED

- Trying-buying-eating-using a bigger variety / more choices /buying different types01
- Buying more / asking my partner - wife to buy-cook more-change our diet03
- Cutting down on red meat/substituting with vegetables.....31
- Eating more making vegies a larger part of diet /ensuring I eat some every day40
- Substituting for other foods /using vegies as snack food/ morning tea/lunch.....43
- Cooking more vegetables each meal.....52
- Tried different recipes/vegetarian recipes54
- Growing my own vegetables.....80
- Other SPECIFY97
- Have not tried to increase the amount of vegetables eaten.....98
- Don't know / no particular reason.....99

(239)

Q1d.

Do you feel you eat more, less, or about the same amount of vegetables as you did 12 months ago?

- More1
- Less.....2
- The same3
- Don't know.....9





2001 NUTRITION SURVEY - QUESTIONNAIRE

(240)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat more vegetables 1
- I am thinking about trying to eat more vegetables..... 2
- I am not thinking about increasing the amount of vegetables I eat..... 3

(242)

Q3.

What are the main things that make it difficult for you to eat more vegetables?

PROBE:

Anything else?

CODE ALL MENTIONED

- Cost/too expensive02
- Don't like vegetables/ the children don't like them03
- The effort it takes to prepare vegies to eat/ I'm not organised enough05
- The time it takes to prepare vegies to eat / I don't have enough time / too busy..... 06
- Hard to find good quality vegetables.....07
- Not enough variety in types of vegetables available.....08
- Nothing / I already eat enough / I can't fit anymore in.....97
- Other SPECIFY98
- Don't know.....99

(244)

Q4.

What do you think is the recommended number of serves of vegetables that should be eaten each day?
One serve of vegetables is equal to one medium potato, half a cup of cooked vegetables or one cup of salad vegetables.

DO NOT PROMPT

- One serve per day1
- Two serves per day2
- Three serves per day.....3
- Four serves per day.....4
- Five serves per day5
- Six or more serves per day6
- Other SPECIFY7
- Don't know.....9

(246)

CEREAL FOODS

Q1a.

The following questions are about cereal foods. This includes foods like breakfast cereal, pasta, rice, bread and other bread products.

In the past 12 months, have you tried to change the total amount of cereal foods that you eat?

IF YES:

Is that to increase or decrease?

- Yes, tried to increase amount 1
- Yes, tried to decrease amount2 **Skip - (257)**
- No, haven't tried to change3 **Skip - (257)**





(248)

Q1b.

What influenced you to try and eat more cereal foods?

PROBE :

Anything else?

CODE ALL MENTIONED

- To lose-control weight.....01
- To reduce bowel problems/constipation/speeds up metabolism.....04
- Special diet for medical reasons/ doctor/ dietitian advised me06
- To improve health in general07
- To improve fitness / more energy.....08
- To increase carbohydrates in my diet/better balance in my diet in general.....13
- Getting hungry at work later/decided to eat breakfast/wasn't eating breakfast15
- To increase my fibre intake.....16
- Advertising campaigns / Health Dept campaign/cooking shows on TV17
- Other SPECIFY _____...97
- Have not tried to increase the amount of cereal foods eaten98
- Don't know / no particular reason.....99

~IF (249) ITERATION(1)

Q1c.

Which types of cereal foods have you tried to increase?

Have you tried to increase (249)?

~ELSE

Q1c.

Have you tried to increase (249)?

~END

(250) Q1c

(249) Q-249

Yes

No

Breakfast Cereal	1	.....1	.....2
Pasta	2	.....1	.....2
Rice	3	.....1	.....2
Bread	4	.....1	.....2
Other bread-like products	5	.....1	.....2

IF:(249)(1) *AND* (250)(1) CONTINUE else SKIP to:(252)

(251)

Q1c.

What steps have you taken to try and increase the amount you eat of breakfast cereal ?

IF: (249)(2) *AND* (250)(1) CONTINUE else SKIP to: (253)

(252)

Q1c.

What steps have you taken to try and increase the amount you eat of pasta?

IF:(249)(3) *AND* (250)(1) CONTINUE else SKIP to:(254)





(253)

Q1c.

What steps have you taken to try and increase the amount you eat of rice

IF: (249)(4) *AND* (250)(1) CONTINUE else SKIP to: (255)

(254)

Q1c.

What steps have you taken to try and increase the amount you eat of bread?

IF: (249)(5) *AND* (250)(1) CONTINUE else SKIP to: (256)

(255)

Q1c.

What steps have you taken to try and increase the amount you eat of other bread products?

(256)

Q1d.

Do you feel you eat more, less, or about the same amount of cereal foods in total than you did 12 months ago?

- Now more 1
- Now less..... 2
- Now about the same..... 3

DO NOT READ

- Don't know..... 9

(257)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat more cereal foods 1
- I am thinking about trying to eat more cereal foods..... 2
- I am not thinking about increasing the amount of cereal foods I eat..... 3

(258)

Q3.

What are the main things that make it difficult for you to eat plenty of cereal foods?

PROBE:

Anything else?

CODE ALL MENTIONED

- Don't like cereal foods/the children don't like them..... 02
- The time it takes to prepare pasta and rice/ time it takes to make fresh muesli 09
- I don't like eating in the morning/don't eat breakfast..... 10
- I don't have time to eat breakfast/ get out of bed too late 13
- Nothing/Already eat plenty 97
- Don't know..... 99





(260)

Q4.

What do you think is the recommended minimum number of serves of cereal foods that should be eaten each day?

One serve of cereal food is equal to one slice of bread, one cup of breakfast cereal or half a cup of cooked rice or pasta.

DO NOT PROMPT

- One serve per day01
- Two serves per day02
- Three serves per day03
- Four serves per day04
- Five serves per day05
- Six serves per day06
- Seven serves per day07
- Eight serves per day08
- Nine serves per day09
- Ten or more serves per day10
- Other SPECIFY _____ 97
- Don't know99

FATS

(263)

Q1a.

Now I would like to ask about fats.

Can you think of any recommended ways of reducing fat in the diet?

DO NOT READ

PROBE:

Anything else?

- Eat less-don't eat fatty take away foods/eat home cooked meals..... 01
- Use less fat/oil in cooking 02
- Eat less cakes/biscuits/chocolates/nuts/potato chips/cool drinks 03
- Choose lean meat/trim fat from meat/remove skin from chicken 04
- Use less butter margarine on bread..... 05
- Avoid fatty meats (sausages, salami, bacon) 06
- Switch to low fat milk/cheese/yoghurt 07
- Switch to low fat cooking methods (ie Grill, steam, microwave, drain fat off)..... 08
- Eat more/ buy more low fat foods (ie bread, cereals, fruit, vegetables, legumes)..... 09
- Eat less red meat/meat in general/shift to white meat 10
- Eat less saturated fat/animal fats 11
- Choose polyunsaturated fats (polyunsaturated margarine/vegetable oils) 12
- Check the fat content in packaged/precooked/processed foods..... 15
- Other SPECIFY _____ 97
- Don't know 99





(265)

Q1b.

Can you think of any general recommendations about the type of fat you should eat?

DO NOT PROMPT

- Eat less saturated fat/animal fats 01
- Choose polyunsaturated fats (polyunsaturated margarine, vegetable oils) 02
- Don't eat any fat/avoid all fats 03
- Eat low cholesterol foods 04
- Heart Foundation recommendations 05
- Omega 3 fats/eat essential fats from fish 06
- Don't know 09
- Other SPECIFY _____ 97

(267)

Q2a.

In the past 12 months, have you tried to cut down on the amount of fat and fatty food in your diet?

- Yes, tried to cut down ...1
- No, haven't tried to cut down ...2

IF: (267)(1) CONTINUE else SKIP to: (270)

(269)

Q2b.

What steps have you taken to try and cut down on the amount of fat and fatty foods you eat?

DO NOT READ

PROBE FULLY FOR STEPS TAKEN

- Just by eating less (not specific) 01
- Not eating/using/cut down butter/margarine..... 02
- Avoid certain foods (Like bacon/fatty meats/pies, pasties/sausage rolls)...03
- Cutting down on red meat/reduced meat in my diet/became vegetarian 04
- Avoid/eat less ice cream/cakes/biscuits/chocolates/nuts/potato chips07
- Eating less fast foods/no/less takeaways 09
- Reducing dairy products/milk, cheese..... 11
- Changing to unsaturated (polyunsaturated, monounsaturated) margarine ...25
- Changing from polyunsaturated fats to monounsaturated fats 26
- Eating low-fat products 27
- Eating fruit and vegies instead on fatty foods..... 40
- Eating more fish..... 42
- Eating other leaner meats in general \like chicken (not fish) 43
- Don't fry/bake or grill instead/ steam vegies..... 60
- Minimum/no oil/fat/ cream in cooking/cutting down on oil..... 61
- Trim fat off meat/skin off chicken 62
- Changing to olive oil/canola/grape seed/ Pure and simple 63
- Buying foods with lower fat content/substituting fatty foods..... 76
- Other SPECIFY _____ 97
- Don't know..... 99





(271)

Q2c.

Do you now feel you eat more, less, or about the same amount of fat and fatty foods as you did 12 months ago?

- Now more1
- Now less.....2
- Now about the same.....3

DO NOT READ

- Don't know.....9

(272)

Q3a.

In the past 12 months, have you tried to change the types of fat you include in your diet?

- Yes, tried to change.....1
- No, haven't tried to change2 **Skip - (274)**

(273)

Q3b.

What steps have you taken to try and change the types of fat you eat?

DO NOT READ

PROBE FULLY FOR STEPS TAKEN

- Not eating/using/cut down butter/margarine..... 02
- Avoid certain foods (Like bacon/fatty meats/pies, pasties/sausage rolls)...03
- Cutting down on red meat/reduced meat in my diet/became vegetarian 04
- Eating less fast foods/no/less takeaways 09
- Changing to unsaturated (polyunsaturated, monounsaturated) margarine ...25
- Changing from polyunsaturated fats to monounsaturated fats 26
- Eating low-fat products 27
- Eating fruit and vegies instead on fatty foods..... 40
- Eating other leaner meats in general like chicken (not fish) 43
- Don't fry/bake or grill instead/ steam vegies..... 60
- Minimum/no oil/fat/ cream in cooking/cutting down on oil..... 61
- Trim fat off meat/skin off chicken 62
- Changing to olive oil/canola/grape seed/ Pure and simple 63
- Buying foods with lower fat content/substituting fatty foods..... 76
- Eating leaner meat/skinless chicken/mince with less fat 77
- Other SPECIFY _____ 97
- Don't know..... 99

(274)

Q4.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat less fat and fatty foods 1
- I am thinking about cutting down on the amount of fat and fatty foods I eat 2
- I am not thinking about cutting down on the amount of fat and fatty foods I eat ... 3
- I am not thinking about cutting down on the amount of fat and fatty foods I eat because I already eat a low fat diet 4

IF: (267)(1) *OR* (272)(1) CONTINUE ELSE SKIP TO: (278)





(276)

Q5.

You said earlier you had tried to either cut down the amount, or change the type of fat that you eat. What influenced you to change either the amount or type of fat that you eat?

PROBE:

Anything else?

CODE ALL MENTIONED

- To lose/control weight..... 01
- To reduce the risk of heart disease..... 02
- To reduce cholesterol levels 03
- Special diet for medical reasons 06
- To improve health in general 07
- To improve fitness 08
- Advice from family and friends 10
- Advertising/media/Heart Foundation/Health Dept 13
- Education/became aware of fat in diet/reading 15
- Other SPECIFY _____ 97
- Don't know..... 99

(278)

Q6.

What are the main things which make it difficult for you to eat less fat and fatty foods?

PROBE:

Anything else?

CODE ALL MENTIONED

- Person buying/preparing my food buys/uses fat and fatty foods 01
- Foods I enjoy tend to be high in fat/fatty food is tempting..... 06
- Difficult to change eating habits/families habits..... 07
- The time it takes to prepare/shop for low fat foods..... 09
- The effort it takes to prepare low fat foods/I'm not organised 10
- Low fat foods not readily available at lunchtime or when eating out..... 12
- Eat out/have takeaways a lot 13
- Nothing 97
- Other SPECIFY _____ 98
- Don't know..... 99

CALCIUM

(283)

Q1.

In the past 12 months have you tried to change the amount of calcium-rich foods you eat?

IF YES:

Is that to increase or decrease?

- Yes, tried to increase amount 1
- Yes, tried to decrease amount 2
- No, have not tried to change..... 3





(284)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to increase the amount of calcium rich foods I eat1
- I am thinking about trying to increase the amount of calcium rich foods I eat.....2
- I am not thinking about increasing the amount of calcium rich foods I eat.....3

CONTINUE else SKIP to:(287)

BODY WEIGHT

(286)

Q1a.

I am now going to ask some questions about weight.

Can you tell me if you are currently pregnant?

- Yes1
- No.....2

(287)

~IF (286)(1)

Q1b.

Now, I am going to ask you, how much do you weigh ?

Please think about your answer during your normal pre-pregnancy weight.

Will you give your answer in

READ OUT

~ELSE

Q1b.

Now I am going to ask you how much you weigh ?

Will you give your answer in

READ OUT

~END

- Kilograms1
- Stones and pounds.....2 **Skip - (289)**
- Pounds.3 **Skip - (289)**

DO NOT READ

- Refused.....7 **Skip - (289)**

DO NOT READ

- Don't know.....9 **Skip - (289)**

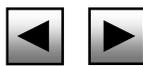
Q1b.

So, how much do you weigh?

IF RESPONDENT UNSURE, ALLOW APPROXIMATION

Weight in kilograms: (288) _____ kg

IF:(287)(2) CONTINUE else SKIP to:(291)





Q1b.

So, how much do you weigh?

1 stone = 14 pounds

IF RESPONDENT UNSURE, ALLOW APPROXIMATION

Weight in Stones: (289) _____ stone

Weight in pounds: (290) _____ lb

IF: (287)(3) CONTINUE else SKIP to: (292)

Q1b.

So, how much do you weigh?

IF RESPONDENT UNSURE, ALLOW APPROXIMATION

Weight in pounds: (291) _____ lb

(293)

Q1c.

I am now going to ask you how tall are you, without shoes?

Will you give your answer in

READ OUT

Centimetres1

Feet and inches2

Skip - (295)

DO NOT READ

Refused7

Skip - (295)

DO NOT READ

Don't know9

Skip - (295)

Q1c.

So, how tall are you, without shoes?

Height in centimetres: (294) _____ cm

IF: (293)(2) CONTINUE else SKIP to: (297)

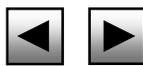
Q1c.

So, how tall are you, without shoes?

1 foot = 12 inches

Height in feet: (295) _____

and inches : (296) _____





2001 NUTRITION SURVEY - QUESTIONNAIRE

(298)

Q1d.

How do you consider your weight?

Would you say you are:

READ OUT

- Very overweight.....1
- Somewhat overweight2
- Only a little overweight.....3
- About right4
- Underweight5

DO NOT READ

- Refused7

DO NOT READ

- Don't know9

(299)

Q2a.

In the last 12 months, have you tried to lose or gain weight?

IF YES:

Which one, lose or gain weight?

- Yes, to lose weight.....1
- Yes, to gain weight.2
- No, not tried to change weight3

IF:(299)(1) CONTINUE else SKIP to: (305)

(301)

Q2b.

What influenced you to try to lose/gain weight?

PROBE:

Anything else?

CODE ALL MENTIONED

- To reduce risk of heart disease..... 02
- To improve health in general/want to get pregnant 04
- To improve fitness/I felt tired sluggish/short of breath 08
- To look better..... 09
- My clothes wouldn't fit..... 11
- Had put weight on/I felt fat/I was overweight..... 12
- Advice from family and friends..... 14
- Feeling uncomfortable (unspecified)/general discomfort/to feel better.... 18
- Other SPECIFY _____ 97
- Don't know..... 99





2001 NUTRITION SURVEY - QUESTIONNAIRE

(302)

~IF (299)(1)

Q2c.

What steps have you taken to try to lose weight?

ASK AS APPROPRIATE PROBE FULLY FOR STEPS TAKEN

~ELSE

Q2c.

What steps have you taken to try to gain weight?

ASK AS APPROPRIATE PROBE FULLY FOR STEPS TAKEN

~END

More exercise/walking more/play tennis/more activity.....	01
Changed diet/eating habits(unspecified)/went on diet.....	20
Began to be concerned about nutrition/began to eat more balanced diet.....	21
Eat smaller portions in general/eat less/less food intake.....	22
Eat more/a lot more /quantity.....	24
Eat regularly and often.....	25
Eat lots of eggs/steaks/similar foods.....	40
Cut out fat(saturated, animal fats)/less butter/ cut down on fatty food.....	41
High carbohydrate diet.....	42
Eating more fruit and vegies.....	44
Stopped snacking between meals/cut down on snacking.....	47
Stopped eating junk food/cut down take aways/fast food.....	48
Joined weight watchers/a diet place/Easy slim weight loss.....	49
Eat smaller portions of high calorie food/avoid high calorie food/chocolate, sweets...90	
Other SPECIFY _____	97
Don't know.....	99

(305)

Q2d.

And how does your current weight compare with your weight 12 months ago?

Would you say you:

READ OUT

Now weigh more.....	1
Now weigh less.....	2
Now weigh the same.....	3

DO NOT READ

Don't know.....	9
-----------------	---

(306)

Q3.

Which of the following best currently describes you?

READ OUT

I am currently trying to lose or gain weight.....	1
I am thinking about trying to lose or gain weight.....	2
I am not thinking about trying to lose or gain weight.....	3





(308)

Q4.

What are the main things that make it difficult for you to control your weight?

PROBE:

Anything else?

CODE ALL GIVEN

Difficult to change eating habits	06
Enjoy my food /food helps me get through.....	07
Don't like exercise.....	09
No time to exercise /work long hours	10
Eat out regularly/have take-aways	13
No will power to eat better	16
No will power to exercise	17
I am a shift worker/long hours I work/work commitments	18
I don't exercise (unspecified whether time or inclination)	20
I like fattening /sweet food/I have a sweet tooth.....	21
Medical problems (unspecified)	26
I like my alcohol/beer/wine/friends convince me to drink.....	33
Nothing.....	97
Other SPECIFY	98
Don't know.....	99

(311)

QA.

What health problems do you think are associated with the following behaviour?

Eating too much fat or fatty foods?

PROBE FULLY:

Anything else?

Cancer (unspecified).....	01
Circulation problems (unspecified).....	06
Heart disease/heart attack/heart problems.....	07
Artherosclerosis/hardening/blocked arteries	08
High blood pressure/hypertension/blood pressure	10
Stroke.....	16
Diabetes/high blood sugar/sugar problems.....	62
High cholesterol.....	63
Obesity/gaining weight/overweight.....	65
Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish	90
Unfit/lack of fitness.....	91
Other SPECIFY	97
Doesn't cause health problems.....	98
Don't know.....	99





(312)

QB.

What health problems do you think are associated with the following behaviour?
Not eating enough fruit and vegetables?

PROBE FULLY:

Anything else?

Bowel cancer/colon cancer	02
Heart disease/heart attack/heart problems.....	07
Constipation/poor irregular bowel movements/lack of regularity.....	35
Digestion problems (unspecified)/acid reflux.....	36
Intestinal disorders/bowel problems/bowel obstructions/diverticulosis...	41
Skin problems (inc unspecified)/bad skin/acne	55
Scurvy/beri beri/rickets.....	60
Obesity/gaining weight/overweight.....	65
Vitamin & mineral deficiencies/lack of nutrition (unspecified)	68
Poor immunity/prone to colds/flu/low resistance to disease	69
Anaemia/iron deficiency/lack of iron.....	70
Not enough fibre-roughage	73
Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish	90
General health problems/unwell/sick/run down	92
Other SPECIFY _____	97
Doesn't cause health problems	98
Don't know.....	99

(313)

QC.

What health problems do you think are associated with the following behaviour?
Not eating enough bread and cereal foods?

PROBE FULLY:

Anything else?

Bowel cancer/colon cancer	02
Heart disease/heart attack/heart problems.....	07
Constipation/poor irregular bowel movements/lack of regularity.....	35
Digestion problems (unspecified)/acid reflux.....	36
Intestinal disorders/bowel problems/bowel obstructions/diverticulosis...	41
Vitamin & mineral deficiencies/lack of nutrition (unspecified)	68
Not enough fibre-roughage	73
Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish	90
General health problems/unwell/sick/run down	92
Other SPECIFY _____	97
Doesn't cause health problems	98
Don't know.....	99





(314)

QD.

What health problems do you think are associated with the following behaviour?

Being overweight?

PROBE FULLY:

Anything else?

- Circulation problems (unspecified).....06
- Heart disease/heart attack/heart problems.....07
- High blood pressure/hypertension/blood pressure 10
- Respiratory problems/shortness of breath/breathing problems (unspecified)...30
- Joint problems/knee problems 45
- Back problems..... 46
- Strain on muscular/skeletal system/immobility/not walking well 50
- High cholesterol..... 63
- Obesity/gaining weight/overweight..... 65
- Low self-esteem/depression/feel bad/horrible/uncomfortable..... 80
- Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish 90
- Unfit/lack of fitness..... 91
- General health problems/unwell/sick/run down 92
- Other SPECIFY _____ 97
- Doesn't cause health problems..... 98
- Don't know..... 99

(315)

BREASTFEEDING

(321)

Q1a.

How important do you think it is for mothers to breast feed their babies.

Do you think it is:

READ OUT

- Not at all important..... 1
- Not very important2
- Somewhat important.....3
- Very important4

DO NOT READ

- Don't know.....9

(322)

Q1b.

What do you think are the benefits of breast-feeding for babies?

PROBE FOR 3 BENEFITS

- Immunity.....01
- Vitamins & minerals/nutrition02
- Tailor made/ perfect food09
- Health benefits/good for baby (unspec)... 10
- No chemicals/natural51
- Convenience/easier54
- Bonding/security/love/emotional55
- Other SPECIFY _____ 98
- Don't know.....99





(323)

Q2.

For how long do you think mothers should breast-feed their babies?

DO NOT READ

- Less than one month01
- Two months.....02
- Three months03
- Four months04
- Five months.....05
- Six months.....06
- Seven to twelve months.....07
- Over 12 months08
- As long as possible.....09
- Don't know.....10

(325)

Q3a.

What things do you think make it difficult for women to continue to breast-feed their babies for at least six months?

DO NOT READ

- Need to return to work 01
- Poor supply of breast milk..... 02
- Problems with breast feeding (eg. sore nipples) 03
- Convenience of bottle/ inconvenience..... 08
- No public acceptance 12
- Stress/pressure/no time 16
- Other SPECIFY _____ 98
- Don't Know 99

(327)

Q3b.

What do you think would make it easier for women to continue to breast-feed their babies for at least six months?

DO NOT READ

PROBE FULLY

- Not having to work 01
- Lack of stress/pressure/more time 03
- More breast feeding facilities 04
- Education about breast feeding 05
- Information about diet & nutrition to keep up supply..... 06
- Support/encouragement and cooperation from husband..... 11
- Public acceptance/community support/change attitudes 12
- Other SPECIFY _____ 98
- Don't Know/don't see there is a problem..... 99

Q4a.

Do you think it is acceptable for women to breast feed their babies in public places such as (329)?





Q4b.

Would it be acceptable if a room was provided for women to breast feed their babies in (329)?

READ OUT

(330) Q4a	(331) Q4b		DO (332)		Dummy	
	Yes	No	NOT READ OUT Depen ds how obvious	Yes	No	
Shopping Centres	1 ...1	...2	...3	...1	...2	_____
Workplaces	2 ...1	...2	...3	...1	...2	_____
Restaurants	3 ...1	...2	...3	...1	...2	_____
On public transport (buses & trains)	4 ...1	...2	...3	...1	...2	_____

DIETARY INFLUENCES AND INFORMATION

(334)

Q1.

Now some more general questions.

In the last 12 months, what have been your main sources of nutrition and dietary information?

DO NOT READ
IF PAMPHLETS/BROCHURES:

Where did you get these from?

CODE ALL RESPONSES

- Books 01
- Community Health Centres..... 02
- Dietitians..... 03
- Doctors 04
- Family and friends 05
- Food manufacturers..... 06
- Health Department..... 07
- Health Food Shops 08
- Magazine articles..... 10
- National Heart Foundation 11
- Newspaper articles 13
- Pamphlets/Brochures SPECIFY SOURCE 14
- Radio interviews 15
- Schools..... 16
- TV ads 17
- TV programs..... 18
- Nurses/Health workers..... 35
- Other SPECIFY 97

(335)

Q2a.

In your opinion, how important is it that governments financially support the following nutrition activities?
For each, please say whether it is very important, quite important or not important.

PRESS ENTER TO CONTINUE





Q2a.

In your opinion, how important is it that governments financially support (336)?
Would you say it is:

READ OUT ALL EXCEPT NOT SURE

(337) Q2a

(336) Q2a Statements

	Very important	Quite important	Not very important	Not sure
1. Research investigating what Western Australians are eating and how their diet is changing over time.....	1	2	3	4
2. Monitoring the quality of the food supply	1	2	3	4
3. Providing nutrition publications for the general public	1	2	3	4
4. Advertising campaigns to promote healthy eating to the public	1	2	3	4
5. Working with the food industry to increase the availability of healthy foods	1	2	3	4

(338)

Q2a.

Are there any other nutrition activities that governments should financially support?

What would they be?

Nutrition activity 1 SPECIFY _____	...01
Nutrition activity 2 SPECIFY _____	...02
Nutrition activity 3 SPECIFY _____	...03
No other activities	...99 Skip - (341)

Q2a.

And in your opinion, how important is it that governments financially support (339)?

Would you say it is:

READ OUT ALL EXCEPT NOT SURE

(340) Q-340

	Very important	Quite important	Not very important	Not sure
1. Nutrition activity 1 SPECIFY _____	1	2	3	4
2. Nutrition activity 2 SPECIFY _____	1	2	3	4
3. Nutrition activity 3 SPECIFY _____	1	2	3	4

(348)

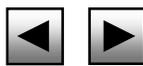
Q2b.

I am going to read out 5 potential Government community education program topics. I would like you to tell me which one should be given the highest priority?

So, which out of these 5, which should be given the highest priority?

READ OUT

Fat	1
Fruit and vegetables	2
Bread and cereals.....	3
Weight and weight control.....	4
Sugar.....	5





(349)

Q2b.

And, which should be given the 2nd highest priority?

READ OUT

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(350)

Q2b.

And, which should be given the 3rd highest priority?

READ OUT

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(351)

Q2b.

And, which should be given the 4th highest priority?

READ OUT

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(352)

Q2b.

CODE LAST ONE

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(360)

Q2c.

Are there any other areas of nutritional or nutrition-related information that you feel ought to be given equal or higher priority than these areas?

Other SPECIFY _____ ...01
 No other areas _____ ...99

Q3a.

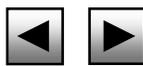
Which, if any, of the following would make it easier for you or your family to eat a healthy diet?

READ OUT

Q3a.

(362),

would this make it easier for you or your family to eat a healthy diet?





2001 NUTRITION SURVEY - QUESTIONNAIRE

(366) Q51b

(362) Q3a

	Yes, Easier	No Not easier	Don't know
1. If healthy foods were cheaper	1	2	3
2. If more take-away and fast food outlets provided healthy foods	1	2	3
3. If I knew more easy ways of preparing healthy foods	1	2	3
4. If I knew more quick ways of preparing healthy foods	1	2	3
5. If I had more information to me decide which foods were healthy	1	2	3
6. If I knew more about cooking	1	2	3
7. If my family/partner enjoyed healthy foods	1	2	3
8. If I could buy more healthy snack foods	1	2	3
9. If healthier foods were easier to find in supermarkets.....	1	2	3
10. If there was detailed and easy to understand information on food labels	1	2	3

(364)

Q3b.

Are there other activities which would make it easier for you and your to eat a healthy diet?

Other SPECIFY 1
No others..... 2

Q3c.

How concerned are you about

(365)?

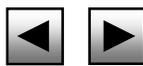
Would you say you are:

(366) Q51b

(365) Q-365

READ OUT SCALE EXCLUDING 'NOT SURE'

	Very concerned	Quite concerned	Not concerned	Not sure
1. The sale of high caffeine drinks to children 12 years	1	2	3	4
2. The health effects of eating genetically modified foods.....	1	2	3	4





(367)

Q4a.

I am going to read out a statement that has been made about school canteens.

Please tell me whether you agree or disagree with the statement.

School canteens should restrict sales of high fat foods such as pies, chips, sausage rolls and fatty snack foods.

READ OUT ASK:

Is that strongly or slightly?

- Strongly Agree.....1
- Agree Slightly2
- Disagree Slightly.....3
- Disagree Strongly4
- DO NOT READ Don't know9

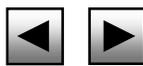
(369)

Q4b.

Who do you think should decide which types of foods are sold in school canteens?

DO NOT READ
CODE ALL GIVEN

- Children1
- Parents2
- Teachers/principal of school3
- Education Dept.....4
- Canteen Manager/ Manageress.....5
- Health Dept.....6
- Other SPECIFY7
- Don't know.....9





(370)

Q5.

In the last 12 months, has anyone in your household eaten less than they should because you couldn't afford enough food?

- Yes1
- No.....2
- DO NOT READ
- Refused/no answer.....3
- DO NOT READ
- Don't know.....9

(372)

Q6.

In the last six months, have you experienced vomiting and/or diarrhoea, which you suspect, may have been food poisoning?

- Yes1
- No.....2
- Skip - (374)**

(373)

Q6.

Was food poisoning positively identified by a doctor or nurse?

- Yes1
- No.....2

DEMOGRAPHICS

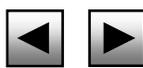
(379)

Q1.

Finally, I would like some information on you and your household, to ensure I have spoken to a good cross section of the population.

Firstly, into which of the following age groups do you fall?

- READ OUT
- 18 to 19 years.....01
- 20 to 24 years.....02
- 25 to 29 years.....03
- 30 to 34 years.....04
- 35 to 39 years.....05
- 40 to 44 years.....06
- 45 to 49 years.....07
- 50 to 54 years.....08
- 55 to 59 years.....09
- 60 to 64 years.....10
- DO NOT READ
- Refused.....99





2001 NUTRITION SURVEY - QUESTIONNAIRE

(381)

Q2.

And what is the highest level of education you have completed?

DO NOT PROMPT

- Year 10, Junior Achievement Certificate or less.....1
- Year 12, Certificate of Secondary Education, Leaving, TEE, TEA,...2
- Tertiary education/Degree/University diploma.....3
- Tertiary education - post-graduate qualification4
- Apprenticeship/trade qualification5
- None of the above - other SPECIFY _____6
- Refused.....9

(382)

Q3a.

In which country were you born?

- Australia01
- Overseas SPECIFY _____ 99 **Skip - (384)**

(383)

Q3a.

Are you an aboriginal or Torres Strait Islander?

- Yes1
- No.....2
- Refused.....3

IF: (382)(99) CONTINUE else SKIP to: (386)

Q3b.

In what year did you first arrive in Australia to live?

Year: 19 (385) _____

(386)

Q4.

Are you currently employed outside the home?

IF YES:

Is that full-time or part-time?

- Full-time.....1
- Part-time.....2
- Not currently employed.....3

Q5.

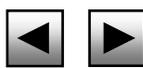
What is your current occupation?

IF RETIRED OR UNEMPLOYED ASK FOR LAST OCCUPATION.

PROBE FULLY

IF SELF EMPLOYED OR MANAGER, ASK WHICH INDUSTRY

Occupation:
(388)_____





Q6a.

Do you have any responsibility for doing the food shopping in your household?

- Yes/sole responsibility1
- Shared responsibility2
- No.....3 **Skip - (393)**

(392)

Q6b.

How often do you put your cold or frozen food in an esky to transport it from the shops to home?

- Always1
- Most times2
- Occasionally3
- Never.....4

(394)

Q6c.

Do you have any responsibility for choosing and preparing meals in your household?

- Yes/sole responsibility1
- Shared Responsibility2
- No.....3

Q6d

What do you think is the maximum temperature a fridge should operate at?

PROMPT IF NECESSARY:

To keep food in good condition

IF RESPONDENT DOES NOT KNOW, TYPE D

Degrees Celsius: (395) _____

(396)

Q6d.

Do you have a thermometer in your main fridge at home?

- Yes1
- No.....2

DO NOT READ

Do not have a fridge3

(398)

Q6e.

Which of the following best describes your cooking skills?

- Can't cook.....1
- Can boil an egg, or BBQ meat or heat frozen meals...2
- Can cook basic meat and 3 veg type meals.....3
- Can cook a wide variety of meals4
- Can cook almost anything.....5





2001 NUTRITION SURVEY - QUESTIONNAIRE

(399)

Q7a.

How many adults, aged 18 or over, are there in your household?
Please exclude full-time students who mainly live away from home.

- One1
- Two2
- Three.....3
- Four.....4
- Five5
- Six or more6
- None.....9

(400)

Q7b.

And how many children under 18 are there in your household?

- One1
- Two2
- Three.....3
- Four.....4
- Five5
- Six or more6
- None.....9

Skip - (403)

Q7c.

How old is your (401)?

(402) 7c

Child

Under 12 months old



(401) Q7c

1 st child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
2 nd child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3 rd child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4 th child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
5 th child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6 th child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

IF: (401)(1 *TO* 6) *AND* (402)(0 *TO* 5) CONTINUE else SKIP to: (411)

(410)

~IF (400)(1)

Q7d.

Is the child under 5 in the household currently being breast-fed?

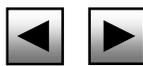
~ELSE

Q7d.

Are any of the children under 5 in the household currently being breast-fed?

~END

- Yes1
- No.....2





2001 NUTRITION SURVEY - QUESTIONNAIRE

(411)

Q8.

Which of the following best describes your household?

READ OUT

- Live alone1
- Couple2
- Couple with children3
- Single parent4
- Related adults.....5
- Related adults with children6
- Unrelated adults7
- Unrelated adults with children8

DO NOT READ

Other SPECIFY _____ 9

IF: (411)(1 *TO* 6) CONTINUE else SKIP to: (416)

(414)

Q9a.

Which category does your total household income fall into?

READ OUT

- A. Less than \$15,0001
- B. \$15,000 - \$25,0002
- C. \$25,000 - \$35,0003
- D. \$35,000 - \$50,0004
- E. \$50,000 - \$60 0005
- F. \$60 000 and over.....6

DO NOT READ

Refused.....9

IF: (411)(7 *TO* 9) CONTINUE else SKIP to: (417)

(416)

Q9b.

Which category does the income available to you/your family in your household fall into?

READ OUT

GROSS INCOME

- A. Less than \$15,0001
- B. \$15,000 - \$25,0002
- C. \$25,000 - \$35,0003
- D. \$35,000 - \$50,0004
- E. \$50,000 - \$60 0005
- F. \$60 000 and over.....6
- Refused.....9





Project: NUTRITION

PERTH INTERVIEWING

Job: 10278P

Good morning/afternoon/evening. My name is _____ from NCS Pearson, the social research company. WE ARE NOT SELLING ANYTHING. Your household has been selected at random for an official survey being conducted in Western Australia on important nutrition issues. May I speak with the person aged 18 to 64 years old whose birthday falls next?

SEEK INTERVIEW WITH NEXT BIRTHDAY PERSON. MAKE APPOINTMENT IF PERSON NOT AVAILABLE

REPEAT INTRODUCTION AS NECESSARY. DO NOT MENTION DETAILS ABOUT THE NATURE OF THE SURVEY. SELL SURVEY TO THE RESPONDENT IF NECESSARY: It is important to get the views of a wide cross section of people. Your opinion will be kept strictly confidential, and no surnames will be recorded. The interview will take about 30 minutes.

Phone Number _____

Interviewer Name _____

Interviewer ID _____

- Location
- Perth.....1
 - Albany2
 - Bunbury3
 - Derby.....4
 - Kalgoorlie5

(55)

QB.

RECORD SEX

DON'T ASK

- Male.....1
- Female2

(58)

QC.

Before we start, I'd like to ask you what you think are the major problems, if indeed there are any, with the average Australian diet?

DO NOT READ

PROBE FULLY

- Too much alcohol/beer01
- Too much fast/junk food.....04
- Too much fat/wrong sorts of fat/saturated fats05
- Too much salt.....10
- Too much sugar/sweet things/chocolates/confectionery/cakes/lollies13
- Not enough fruit/vegies/salads.....35
- Not eating a balanced diet/not eating wide enough variety of foods.....52
- No time to eat-cook properly/too lazy to cook/rely too much on pre-prepared foods.....53
- Others SPECIFY.....97
- Nothing/none/no problems.....98
- Don't know.....99





(60)

QD.

Which of the following statements would best describe how you feel about diet and nutrition?

READ OUT

- I really do pay a lot of attention to the health aspect of the food I eat to make sure my diet is as healthy as possible 1
- I take a bit of notice of the health aspect of the food I eat to make sure I have a fairly good diet..... 2
- I honestly don't really go around thinking about the health aspect of food.....3

PART 1 - CONSUMPTION

Q1.

This survey consists of two parts.

Firstly, I am going to ask you about the foods you ate yesterday.

Then, I will be asking some more general questions about the food you eat.

How many pieces of fruit did you eat yesterday?

A piece of fruit would be, for example, an apple, a small bunch of grapes, 3 prunes, a quarter of a rock melon or half a cup of stewed, pureed or canned fruit.

Pieces of fruit: (62)_____

Q2a.

How many different types of vegetables, did you eat yesterday?

Please remember to include salad, fresh, frozen, canned, raw and cooked vegetables.

TYPE IN NUMBER OF TYPES, USE 0 IF NONE

Types of vegetables: (63)_____

IF: (63)(0) SKIP to: (96)

(64)

Q2b.

Please tell me, what are those types of vegetables, that you ate?

- Red-yellow.....1
- Leafy green.....2
- Cruciferous3
- Potato4
- Peas and beans.....5
- Corn.....6
- Mushrooms.....7
- Legumes and pulses.....8
- Onions9
- Other10

(65)

Q2b.

How many cups of ... did you eat?

RECORD CUPS OR PART CUPS

(66)

Q2b





(65) Q-65S

- Red-yellow..... 1 _____
- Leafy green..... 2 _____
- Cruciferous 3 _____
- Potato 4 _____
- Peas and beans..... 5 _____
- Corn..... 6 _____
- Mushrooms..... 7 _____
- Legumes and pulses..... 8 _____
- Onions 9 _____
- Other 10 _____

(96)

Q3a.

Please tell me if you ate any slices of bread or bread rolls yesterday?

DO NOT READ
IF BREAD ROLL:

Was that a large or small roll?

- Slices of bread..... 1 _____
- Large roll 2 _____
- Small roll..... 3 _____

DO NOT READ

- Didn't eat bread/bread roll yesterday 9 _____

IF: (96)(1) CONTINUE else SKIP to: (101)

Q3a.

How many slices of bread did you eat yesterday?

Slices of bread: (100) _____

IF: (96)(2) CONTINUE else SKIP to: (102)

Q3a.

How many large rolls did you eat yesterday?

Large rolls: (101) _____

IF: (96)(3) CONTINUE else SKIP to: (103)

Q3a.

How many small rolls did you eat yesterday?

Small rolls: (102) _____

IF: (96)(1 *TO* 3) CONTINUE else SKIP to: (105)

(104)

Q3b.

What type of bread/bread rolls did you mainly eat yesterday?

Was it brown, wholemeal, multigrain, wholegrain, white, white with extra fibre, or another type?

DO NOT READ

- Brown or wholemeal 1 _____
- Multigrain or wholegrain..... 2 _____
- White with extra fibre 3 _____
- White 4 _____
- Other SPECIFY 5 _____





(106)

Q4a.

What other bread substitutes did you eat yesterday, such as bread muffins, pita bread, crumpets, scones, rice cakes, crackers or damper?

- Bread muffins1
- Pita bread2
- Crumpets.....3
- Scones4
- Rice cakes.....5
- Large crackers.....6
- Small crackers.....7
- Damper.....8
- Didn't eat any other bread products yesterday9 **Skip - (109)**

IF (106)(5)

Q4b.

How many rice cakes did you eat?

ROUND TO NEAREST RICE CAKE

Rice Cakes: (108) _____

ELSE (106)(1 *TO* 4)

Q4b.

And how many (106) did you eat?

ROUND TO NEAREST HALF SCONE/CRUMPET/MUFFIN/PITA BREAD

Amount: (108) _____

ELSE (106)(6 *OR* 7)

Q4b.

And how many (106) did you eat?

Crackers: (108) _____

ELSE

Q4b.

How many serves of damper did you eat?

Damper serves: (108) _____

END

(108)

Q4b.

(107)

Q4b

- Bread muffins1 _____
- Pita bread2 _____
- Crumpets.....3 _____
- Scones4 _____
- Rice cakes.....5 _____
- Large crackers.....6 _____
- Small crackers.....7 _____
- Damper.....8 _____





Q5a.

How many cups of cooked rice did you eat yesterday?

INCLUDE PART CUPS. TYPE ZERO IF NONE

Cups of cooked rice: (111) _____

IF:(111)(0) SKIP to:(116)

(114)

Q5b.

What type of rice was it, white or brown?

CODE MAIN TYPE

- White 1
- Brown 2
- Both white and brown eaten equally 3

Q6a.

How many cups of cooked pasta or spaghetti did you eat yesterday?

IF NONE, TYPE "0"

Cups of cooked pasta: (116) _____

IF: (116)(0) SKIP to: (122)

(121)

Q6b.

What type of pasta or spaghetti was it, that is regular or wholemeal?

- Regular..... 1
- Wholemeal..... 2
- Both regular and wholemeal eaten equally 3

(122)

Q7a.

What type(s) of breakfast cereal, if any, did you eat yesterday?

- | | | |
|-----------------------|-------|-------------|
| 1st Type | _____ | ...1 |
| 2nd Type | _____ | ...2 |
| 3rd Type | _____ | ...3 |
| 4th Type | _____ | ...4 |
| 5th Type | _____ | ...5 |
| 6th Type | _____ | ...6 |
| Didn't eat any cereal | ...9 | Skip |

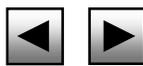
- (125)

Q7b.

How many cups of (123) did you eat?

FOR PORRIDGE ASK FOR NUMBER OF CUPS OF COOKED PORRIDGE
IF WEETBIX/VITA-BRITS OR SIMILAR:
ASK HOW MANY BISCUITS

Cups: (124) _____





Q9a.

How many cups of yoghurt did you have yesterday?

TYPE IN, INCLUDE PART CUPS. USE "0" IF NONE

Cups of yoghurt: (149)_____

IF:(149)(0) SKIP to:(153)

(152)

Q9b.

And what type(s) of yoghurt did you eat? Was it ...?

READ OUT
CODE ALL GIVEN.

Any other types?

CODE OTHER BELOW
CODE "YUKULT" AS OTHER

- Skim/non-fat1
- Low fat/2% fat.....2
- Whole/traditional/regular3
- Other _____4
- Don't know.....9

(153)

Q10a.

What type(s) of cheese, if any, did you eat yesterday?
Include hard and soft cheese and any used in cooking or mixed dishes.

- 1st Type _____1
- 2nd Type _____2
- 3rd Type _____3
- 4th Type _____4
- 5th Type _____5
- 6th Type _____6
- Didn't eat any cheese9

Skip - (179)

Q10b.

How much of (154) did you eat?
RECORD AMOUNT. RECORD AS SLICES (A SLICE = A PRE-WRAPPED CHEESE ; SINGLE, A
ROUNDED TABLESPOON OF SOFT OR GRATED CHEESE, OR A 2.5cm; CUBE OF HARD CHEESE)

Amount of cheese: (155)_____

(155)

Q10b.





(154) Q-154

- 1st type.....1 _____
- 2nd type.....2 _____
- 3rd type3 _____
- 4th type.....4 _____
- 5th type.....5 _____
- 6th type.....6 _____

(178)

Q10c.

Was the cheese you ate yesterday mainly regular, reduced fat or low fat cheese?

DO NOT READ

CODE ALL GIVEN Any other types? CODE OTHER BELOW

NB PARMESAN = REGULAR CHEESE

- Low fat, like ricotta or cottage1
- Reduced fat cheese.....2
- 'Regular' cheese3
- Other SPECIFY _____ 4
- Don't know.....9

Q11.

How many sweet biscuits did you eat yesterday?

WRITE IN, USE ZERO IF NONE

Sweet biscuits: (179) _____

Q12.

How much regular, not diet, soft drink did you drink yesterday?
Please tell me how many cups or cans you drank yesterday?

TYPE IN, INCLUDING PARTS OF CUPS/CANS.

USE ZERO IF NONE

THIS INCLUDES RED BULL ETC

DO NOT INCLUDE UNFLAVOURED MINERAL OR SODA WATER

Cups: (181) _____

Cans: (182) _____

Q12.

How much diet soft drink did you drink yesterday?
Please tell me how many cups or cans you drank yesterday?

TYPE IN, INCLUDING PARTS OF CUPS/CANS.

USE ZERO IF NONE

DO NOT INCLUDE UNFLAVOURED MINERAL OR SODA WATER

Cups: (183) _____

Cans: (184) _____





(186)

Q13.

Did you eat any beef, lamb or veal, including hamburgers and mince, yesterday?

ASK FOR TYPE (EG. STEAK, MINCE, ETC)

- Steak1
- Chop.....2
- Roast meat3
- Mince.....4
- Hamburger / patty5
- Other SPECIFY _____ 6
- Sausages7

DO NOT READ

- None.....9

Q13.

How much (188) did you eat yesterday?

Serves: (189) _____

(189)

Q13.

(188) Q-188

- Steak (1 palm size)1 _____
- Chop (2 small chops).....2 _____
- Roast meat (3 slices)3 _____
- Mince (1/2 cup)4 _____
- Hamburger / patty (1 1/2 patties - 1 patty = 0.7 serves)5 _____
- Other6 _____
- Sausages (1 regular sausage).....7 _____

(192)

Q14.

Some people try to avoid eating foods which are high in fat.
Other people don't really mind about the amount of fat that they eat.

How often do you try to avoid eating foods which are high in fat?

READ OUT

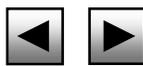
- Always1
- Often.....2
- Sometimes.....3
- Rarely or never.....4

DO NOT READ

- Don't know which foods are high in fat....5

DO NOT READ

- Don't know.....9





(194)

Q15.

Some people use mono or polyunsaturated fats while others don't really mind about the kind of fat they use.

What about you? When you use fat or oil in food preparation, how often is it mono or polyunsaturated fat?

READ OUT

- Always1
- Often.....2
- Sometimes.....3
- Rarely or never.....4

DO NOT READ

Don't use fat or oil.....5

DO NOT READ

Don't understand terms.....6

DO NOT READ

Don't know.....9

(196)

Q15b.

Some people try to choose healthy foods when they buy a meal, while others don't really mind on the occasions they buy a meal.

When you buy a meal how often do you try to choose healthy foods?

READ OUT

- Always1
- Often.....2
- Sometimes.....3
- Rarely or never.....4

DO NOT READ

Don't buy meals.....5

Don't know.....9

(198)

Q16.

Yesterday which meals did you buy from a restaurant, take-away, lunch bar, canteen or other prepared food outlet?

READ OUT MEALS

- Breakfast..... ..1
- Lunch..... ..2
- Evening Meal..... ..3

DO NOT READ

None..... ..9

IF: (198)(1 *TO* 3) SKIP to: (201)





(200)

Q17.

I now have some questions about the last occasion that you bought a meal from a restaurant, take-away, lunch bar, canteen or other prepared food outlet.

Thinking back to that meal was it breakfast, lunch or evening meal?

- Breakfast1
- Lunch.....2
- Evening Meal.....3
- DO NOT READ
- Can't remember/Don't buy prepared meals ...9

(201)

Q18.

Thinking about the last meal that you bought, were there enough healthy choices available at the restaurant/shop?

- Yes1
- No.....2
- DO NOT READ
- Don't know3
- DO NOT READ
- Didn't want/not interested4

(203)

Q19.

How important is it for you to have healthy choices available when you buy a meal?
Would you say ...

- READ OUT
- Very important1
- Quite important.....2
- Not important.....3
- DO NOT READ
- Not sure.....4

PART 2 – DIETARY CHANGES

A. FRUIT

(220)

Q1a.

Now I would like to ask you some more general questions, firstly on fruit.
In the past 12 months, have you tried to change the amount of fruit you eat?

IF YES:

Is that increase or decrease?

- Yes, tried to increase amount1
- Yes, tried to decrease amount2 **Skip - (227)**
- No, haven't tried to change3 **Skip - (227)**





(221)

Q1b.

What influenced you to try and eat more fruit?

PROBE:

Anything else?

CODE ALL MENTIONED

Lose-control weight / went on a diet / diet that I'm on.....	01
To reduce bowel problems/constipation / to improve digestive performance.....	04
Improve health in general /feeling tired/healthier life/health reasons (unspec)	06
To improve fitness / for sports.....	07
Advice from family/friends / influence of others I cook for.....	09
Influence others/ family-children /encourage children /family to eat more	12
Advertising campaigns / TV campaigns 5 veg & 3 fruit /magazine advertising	14
It's good for you / I wasn't eating enough / more nutritious /fruit is better for you.....	19
I like it / we just like eating fruit / it tastes good.....	20
Other SPECIFY _____	97
Have not tried to increase the amount of fruit eaten.....	98
Don't know / no particular reason.....	99

(224)

Q1c.

What steps have you taken to try and increase the amount of fruit you eat?

PROBE:

Anything else?

CODE ALL MENTIONED

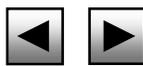
Trying-buying-eating-using a bigger variety /more choices avail/different types	01
Buying more / asking my partner - wife to buy-cook more-change our diet	03
Taking fruit to work /uni.....	10
Having fruit on display at home/trying to have more fruit around.....	12
Having fruit with-for dessert	22
Other SPECIFY _____	23
Eating more making fruit a larger part of diet/making sure I eat some every day	40
Substituting for other food /fruit as snack/having fruit for morning tea/lunch.....	43
Have not tried to increase the amount of fruit eaten.....	98
Don't know / no particular reason.....	99

(226)

Q1d.

Do you feel you eat more, less, or about the same amount of fruit as you did 12 months ago?

Now more	1
Now less.....	2
Now about the same.....	3
Don't know.....	9





(227)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat more fruit..... 1
- I am thinking about trying to eat more fruit..... 2
- I am not thinking about increasing the amount of fruit I eat 3

(230)

Q3.

What are the main things that make it difficult for you to eat more fruit?

PROBE:

Anything else?

CODE ALL MENTIONED

- Cost/too expensive02
- Don't like fruit / lack of interest in fruit / I get bored with it.....03
- Difficulty in changing eating habits / I just don't think of it.....04
- The time it takes to buy-prepare fruit to eat / I don't have enough time/ too busy06
- Hard to find good quality fruit07
- Not enough variety in types of fruit available/seasonal availability08
- Doesn't appeal in cold weather/not tempting in winter.....15
- Other SPECIFY _____...96
- Nothing / I already eat enough / I can't fit anymore in.....97
- Don't know.....99

(232)

Q4.

What do you think is the recommended number of serves of fruit that should be eaten each day?
One serve of fruit is equal to one medium piece of fruit or half cup of cooked or canned fruit.

DO NOT READ

- One serve per day 1
- Two serves per day 2
- Three serves per day..... 3
- Four serves per day..... 4
- Five or more serves per day 5
- Other SPECIFY _____ ...6
- Don't know..... 9

B. VEGETABLES

(234)

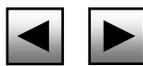
Q1a.

Now I would like to ask some questions on vegetables.
In the past 12 months, have you tried to change the amount of vegetables you eat?

IF YES:

Is that increase or decrease?

- Yes, tried to increase amount 1
- Yes, tried to decrease amount 2 Skip - (240)
- No, haven't tried to change 3 Skip - (240)





(235)

Q1b.

What influenced you to try and eat more vegetables?

PROBE:

Anything else?

CODE ALL MENTIONED

- To lose-control weight / went on a diet / diet that I'm on.....01
- Improve health in general /feeling tired/healthier life/health reasons (unspec)07
- To improve fitness / for sports.....08
- Advice from family/friends / influence of others I cook for.....10
- Influence of others/person who buys/prepares food is eating more.....12
- Advertising campaigns / TV campaigns / 5 veg & 3 fruit/ magazine advertising14
- Influence others/ family-children /encourage children / family to eat more.....17
- Good for you /wasn't eating enough /more nutritious /vegies are better for you19
- I like them / we just like eating vegetables / they taste good20
- Substitute for other foods/trying to eat less/no red meat26
- Other SPECIFY97
- Have not tried to increase the amount of vegetables eaten.....98
- Don't know / no particular reason.....99

(237)

Q1c.

What steps have you taken to try and increase the amount of vegetables you eat?

PROBE:

Anything else?

CODE ALL MENTIONED

- Trying-buying-eating-using a bigger variety / more choices /buying different types01
- Buying more / asking my partner - wife to buy-cook more-change our diet03
- Cutting down on red meat/substituting with vegetables.....31
- Eating more making vegies a larger part of diet /ensuring I eat some every day40
- Substituting for other foods /using vegies as snack food/ morning tea/lunch.....43
- Cooking more vegetables each meal.....52
- Tried different recipes/vegetarian recipes54
- Growing my own vegetables.....80
- Other SPECIFY97
- Have not tried to increase the amount of vegetables eaten.....98
- Don't know / no particular reason.....99

(239)

Q1d.

Do you feel you eat more, less, or about the same amount of vegetables as you did 12 months ago?

- More1
- Less.....2
- The same3
- Don't know.....9





(240)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat more vegetables 1
- I am thinking about trying to eat more vegetables..... 2
- I am not thinking about increasing the amount of vegetables I eat..... 3

(242)

Q3.

What are the main things that make it difficult for you to eat more vegetables?

PROBE:

Anything else?

CODE ALL MENTIONED

- Cost/too expensive02
- Don't like vegetables/ the children don't like them03
- The effort it takes to prepare vegies to eat/ I'm not organised enough05
- The time it takes to prepare vegies to eat / I don't have enough time / too busy..... 06
- Hard to find good quality vegetables.....07
- Not enough variety in types of vegetables available.....08
- Nothing / I already eat enough / I can't fit anymore in.....97
- Other SPECIFY98
- Don't know.....99

(244)

Q4.

What do you think is the recommended number of serves of vegetables that should be eaten each day?
One serve of vegetables is equal to one medium potato, half a cup of cooked vegetables or one cup of salad vegetables.

DO NOT PROMPT

- One serve per day1
- Two serves per day2
- Three serves per day.....3
- Four serves per day.....4
- Five serves per day5
- Six or more serves per day6
- Other SPECIFY7
- Don't know.....9

(246)

CEREAL FOODS

Q1a.

The following questions are about cereal foods. This includes foods like breakfast cereal, pasta, rice, bread and other bread products.

In the past 12 months, have you tried to change the total amount of cereal foods that you eat?

IF YES:

Is that to increase or decrease?

- Yes, tried to increase amount 1
- Yes, tried to decrease amount2 **Skip - (257)**
- No, haven't tried to change3 **Skip - (257)**





(248)

Q1b.

What influenced you to try and eat more cereal foods?

PROBE :

Anything else?

CODE ALL MENTIONED

- To lose-control weight.....01
- To reduce bowel problems/constipation/speeds up metabolism.....04
- Special diet for medical reasons/ doctor/ dietitian advised me06
- To improve health in general07
- To improve fitness / more energy.....08
- To increase carbohydrates in my diet/better balance in my diet in general.....13
- Getting hungry at work later/decided to eat breakfast/wasn't eating breakfast15
- To increase my fibre intake.....16
- Advertising campaigns / Health Dept campaign/cooking shows on TV17
- Other SPECIFY _____...97
- Have not tried to increase the amount of cereal foods eaten98
- Don't know / no particular reason.....99

~IF (249) ITERATION(1)

Q1c.

Which types of cereal foods have you tried to increase?

Have you tried to increase (249)?

~ELSE

Q1c.

Have you tried to increase (249)?

~END

(250) Q1c	Yes	No
(249) Q-249		
Breakfast Cereal .....1	1	2
Pasta .....2	1	2
Rice .....3	1	2
Bread .....4	1	2
Other bread-like products .....5	1	2

IF:(249)(1) *AND* (250)(1) CONTINUE else SKIP to:(252)

(251)

Q1c.

What steps have you taken to try and increase the amount you eat of breakfast cereal ?

IF: (249)(2) *AND* (250)(1) CONTINUE else SKIP to: (253)

(252)

Q1c.

What steps have you taken to try and increase the amount you eat of pasta?

IF:(249)(3) *AND* (250)(1) CONTINUE else SKIP to:(254)





(253)

Q1c.

What steps have you taken to try and increase the amount you eat of rice

IF: (249)(4) *AND* (250)(1) CONTINUE else SKIP to: (255)

(254)

Q1c.

What steps have you taken to try and increase the amount you eat of bread?

IF: (249)(5) *AND* (250)(1) CONTINUE else SKIP to: (256)

(255)

Q1c.

What steps have you taken to try and increase the amount you eat of other bread products?

(256)

Q1d.

Do you feel you eat more, less, or about the same amount of cereal foods in total than you did 12 months ago?

- Now more 1
- Now less..... 2
- Now about the same..... 3

DO NOT READ

- Don't know..... 9

(257)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat more cereal foods 1
- I am thinking about trying to eat more cereal foods..... 2
- I am not thinking about increasing the amount of cereal foods I eat..... 3

(258)

Q3.

What are the main things that make it difficult for you to eat plenty of cereal foods?

PROBE:

Anything else?

CODE ALL MENTIONED

- Don't like cereal foods/the children don't like them..... 02
- The time it takes to prepare pasta and rice/ time it takes to make fresh muesli 09
- I don't like eating in the morning/don't eat breakfast..... 10
- I don't have time to eat breakfast/ get out of bed too late 13
- Nothing/Already eat plenty 97
- Don't know..... 99





(260)

Q4.

What do you think is the recommended minimum number of serves of cereal foods that should be eaten each day?

One serve of cereal food is equal to one slice of bread, one cup of breakfast cereal or half a cup of cooked rice or pasta.

DO NOT PROMPT

- One serve per day01
- Two serves per day02
- Three serves per day03
- Four serves per day04
- Five serves per day05
- Six serves per day06
- Seven serves per day07
- Eight serves per day08
- Nine serves per day09
- Ten or more serves per day10
- Other SPECIFY _____ 97
- Don't know99

FATS

(263)

Q1a.

Now I would like to ask about fats.

Can you think of any recommended ways of reducing fat in the diet?

DO NOT READ

PROBE:

Anything else?

- Eat less-don't eat fatty take away foods/eat home cooked meals..... 01
- Use less fat/oil in cooking 02
- Eat less cakes/biscuits/chocolates/nuts/potato chips/cool drinks 03
- Choose lean meat/trim fat from meat/remove skin from chicken 04
- Use less butter margarine on bread..... 05
- Avoid fatty meats (sausages, salami, bacon) 06
- Switch to low fat milk/cheese/yoghurt 07
- Switch to low fat cooking methods (ie Grill, steam, microwave, drain fat off)..... 08
- Eat more/ buy more low fat foods (ie bread, cereals, fruit, vegetables, legumes)..... 09
- Eat less red meat/meat in general/shift to white meat 10
- Eat less saturated fat/animal fats 11
- Choose polyunsaturated fats (polyunsaturated margarine/vegetable oils) 12
- Check the fat content in packaged/precooked/processed foods..... 15
- Other SPECIFY _____...97
- Don't know 99





(265)

Q1b.

Can you think of any general recommendations about the type of fat you should eat?

DO NOT PROMPT

- Eat less saturated fat/animal fats 01
- Choose polyunsaturated fats (polyunsaturated margarine, vegetable oils) 02
- Don't eat any fat/avoid all fats 03
- Eat low cholesterol foods 04
- Heart Foundation recommendations 05
- Omega 3 fats/eat essential fats from fish 06
- Don't know 09
- Other SPECIFY _____ 97

(267)

Q2a.

In the past 12 months, have you tried to cut down on the amount of fat and fatty food in your diet?

- Yes, tried to cut down ...1
- No, haven't tried to cut down ...2

IF: (267)(1) CONTINUE else SKIP to: (270)

(269)

Q2b.

What steps have you taken to try and cut down on the amount of fat and fatty foods you eat?

DO NOT READ

PROBE FULLY FOR STEPS TAKEN

- Just by eating less (not specific) 01
- Not eating/using/cut down butter/margarine..... 02
- Avoid certain foods (Like bacon/fatty meats/pies, pasties/sausage rolls)...03
- Cutting down on red meat/reduced meat in my diet/became vegetarian 04
- Avoid/eat less ice cream/cakes/biscuits/chocolates/nuts/potato chips07
- Eating less fast foods/no/less takeaways 09
- Reducing dairy products/milk, cheese..... 11
- Changing to unsaturated (polyunsaturated, monounsaturated) margarine ...25
- Changing from polyunsaturated fats to monounsaturated fats 26
- Eating low-fat products 27
- Eating fruit and vegies instead on fatty foods..... 40
- Eating more fish..... 42
- Eating other leaner meats in general \like chicken (not fish) 43
- Don't fry/bake or grill instead/ steam vegies..... 60
- Minimum/no oil/fat/ cream in cooking/cutting down on oil..... 61
- Trim fat off meat/skin off chicken 62
- Changing to olive oil/canola/grape seed/ Pure and simple 63
- Buying foods with lower fat content/substituting fatty foods..... 76
- Other SPECIFY _____ 97
- Don't know..... 99





(271)

Q2c.

Do you now feel you eat more, less, or about the same amount of fat and fatty foods as you did 12 months ago?

- Now more1
- Now less.....2
- Now about the same.....3

DO NOT READ

- Don't know.....9

(272)

Q3a.

In the past 12 months, have you tried to change the types of fat you include in your diet?

- Yes, tried to change.....1
- No, haven't tried to change2 **Skip - (274)**

(273)

Q3b.

What steps have you taken to try and change the types of fat you eat?

DO NOT READ

PROBE FULLY FOR STEPS TAKEN

- Not eating/using/cut down butter/margarine..... 02
- Avoid certain foods (Like bacon/fatty meats/pies, pasties/sausage rolls)...03
- Cutting down on red meat/reduced meat in my diet/became vegetarian 04
- Eating less fast foods/no/less takeaways 09
- Changing to unsaturated (polyunsaturated, monounsaturated) margarine ...25
- Changing from polyunsaturated fats to monounsaturated fats 26
- Eating low-fat products 27
- Eating fruit and vegies instead on fatty foods..... 40
- Eating other leaner meats in general like chicken (not fish) 43
- Don't fry/bake or grill instead/ steam vegies..... 60
- Minimum/no oil/fat/ cream in cooking/cutting down on oil..... 61
- Trim fat off meat/skin off chicken 62
- Changing to olive oil/canola/grape seed/ Pure and simple 63
- Buying foods with lower fat content/substituting fatty foods..... 76
- Eating leaner meat/skinless chicken/mince with less fat 77
- Other SPECIFY _____ 97
- Don't know..... 99

(274)

Q4.

Which of the following best currently describes you?

READ OUT

- I am currently trying to eat less fat and fatty foods 1
- I am thinking about cutting down on the amount of fat and fatty foods I eat 2
- I am not thinking about cutting down on the amount of fat and fatty foods I eat ... 3
- I am not thinking about cutting down on the amount of fat and fatty foods I eat because I already eat a low fat diet 4

IF: (267)(1) *OR* (272)(1) CONTINUE ELSE SKIP TO: (278)





(276)

Q5.

You said earlier you had tried to either cut down the amount, or change the type of fat that you eat. What influenced you to change either the amount or type of fat that you eat?

PROBE:

Anything else?

CODE ALL MENTIONED

- To lose/control weight..... 01
- To reduce the risk of heart disease..... 02
- To reduce cholesterol levels 03
- Special diet for medical reasons 06
- To improve health in general 07
- To improve fitness 08
- Advice from family and friends 10
- Advertising/media/Heart Foundation/Health Dept 13
- Education/became aware of fat in diet/reading 15
- Other SPECIFY _____ 97
- Don't know..... 99

(278)

Q6.

What are the main things which make it difficult for you to eat less fat and fatty foods?

PROBE:

Anything else?

CODE ALL MENTIONED

- Person buying/preparing my food buys/uses fat and fatty foods 01
- Foods I enjoy tend to be high in fat/fatty food is tempting..... 06
- Difficult to change eating habits/families habits..... 07
- The time it takes to prepare/shop for low fat foods..... 09
- The effort it takes to prepare low fat foods/I'm not organised 10
- Low fat foods not readily available at lunchtime or when eating out..... 12
- Eat out/have takeaways a lot 13
- Nothing 97
- Other SPECIFY _____ 98
- Don't know..... 99

CALCIUM

(283)

Q1.

In the past 12 months have you tried to change the amount of calcium-rich foods you eat?

IF YES:

Is that to increase or decrease?

- Yes, tried to increase amount 1
- Yes, tried to decrease amount 2
- No, have not tried to change..... 3





(284)

Q2.

Which of the following best currently describes you?

READ OUT

- I am currently trying to increase the amount of calcium rich foods I eat1
- I am thinking about trying to increase the amount of calcium rich foods I eat.....2
- I am not thinking about increasing the amount of calcium rich foods I eat.....3

CONTINUE else SKIP to:(287)

BODY WEIGHT

(286)

Q1a.

I am now going to ask some questions about weight.

Can you tell me if you are currently pregnant?

- Yes1
- No.....2

(287)

~IF (286)(1)

Q1b.

Now, I am going to ask you, how much do you weigh ?

Please think about your answer during your normal pre-pregnancy weight.

Will you give your answer in

READ OUT

~ELSE

Q1b.

Now I am going to ask you how much you weigh ?

Will you give your answer in

READ OUT

~END

- Kilograms1
- Stones and pounds.....2 **Skip - (289)**
- Pounds.3 **Skip - (289)**

DO NOT READ

- Refused.....7 **Skip - (289)**

DO NOT READ

- Don't know.....9 **Skip - (289)**

Q1b.

So, how much do you weigh?

IF RESPONDENT UNSURE, ALLOW APPROXIMATION

Weight in kilograms: (288) _____ kg

IF:(287)(2) CONTINUE else SKIP to:(291)





Q1b.

So, how much do you weigh?

1 stone = 14 pounds

IF RESPONDENT UNSURE, ALLOW APPROXIMATION

Weight in Stones: (289) _____ stone

Weight in pounds: (290) _____ lb

IF: (287)(3) CONTINUE else SKIP to: (292)

Q1b.

So, how much do you weigh?

IF RESPONDENT UNSURE, ALLOW APPROXIMATION

Weight in pounds: (291) _____ lb

(293)

Q1c.

I am now going to ask you how tall are you, without shoes?

Will you give your answer in

READ OUT

Centimetres1

Feet and inches2

Skip - (295)

DO NOT READ

Refused7

Skip - (295)

DO NOT READ

Don't know9

Skip - (295)

Q1c.

So, how tall are you, without shoes?

Height in centimetres: (294) _____ cm

IF: (293)(2) CONTINUE else SKIP to: (297)

Q1c.

So, how tall are you, without shoes?

1 foot = 12 inches

Height in feet: (295) _____

and inches : (296) _____





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(298)

Q1d.

How do you consider your weight?

Would you say you are:

READ OUT

- Very overweight.....1
- Somewhat overweight2
- Only a little overweight.....3
- About right4
- Underweight5

DO NOT READ

- Refused7

DO NOT READ

- Don't know9

(299)

Q2a.

In the last 12 months, have you tried to lose or gain weight?

IF YES:

Which one, lose or gain weight?

- Yes, to lose weight.....1
- Yes, to gain weight.2
- No, not tried to change weight3

IF:(299)(1) CONTINUE else SKIP to: (305)

(301)

Q2b.

What influenced you to try to lose/gain weight?

PROBE:

Anything else?

CODE ALL MENTIONED

- To reduce risk of heart disease..... 02
- To improve health in general/want to get pregnant 04
- To improve fitness/I felt tired sluggish/short of breath 08
- To look better..... 09
- My clothes wouldn't fit..... 11
- Had put weight on/I felt fat/I was overweight..... 12
- Advice from family and friends..... 14
- Feeling uncomfortable (unspecified)/general discomfort/to feel better.... 18
- Other SPECIFY _____ 97
- Don't know..... 99





(302)

~IF (299)(1)

Q2c.

What steps have you taken to try to lose weight?

ASK AS APPROPRIATE PROBE FULLY FOR STEPS TAKEN

~ELSE

Q2c.

What steps have you taken to try to gain weight?

ASK AS APPROPRIATE PROBE FULLY FOR STEPS TAKEN

~END

More exercise/walking more/play tennis/more activity.....	01
Changed diet/eating habits(unspecified)/went on diet.....	20
Began to be concerned about nutrition/began to eat more balanced diet.....	21
Eat smaller portions in general/eat less/less food intake.....	22
Eat more/a lot more /quantity.....	24
Eat regularly and often.....	25
Eat lots of eggs/steaks/similar foods.....	40
Cut out fat(saturated, animal fats)/less butter/ cut down on fatty food.....	41
High carbohydrate diet.....	42
Eating more fruit and vegies.....	44
Stopped snacking between meals/cut down on snacking.....	47
Stopped eating junk food/cut down take aways/fast food.....	48
Joined weight watchers/a diet place/Easy slim weight loss.....	49
Eat smaller portions of high calorie food/avoid high calorie food/chocolate, sweets...90	
Other SPECIFY _____	97
Don't know.....	99

(305)

Q2d.

And how does your current weight compare with your weight 12 months ago?

Would you say you:

READ OUT

Now weigh more.....	1
Now weigh less.....	2
Now weigh the same.....	3

DO NOT READ

Don't know.....	9
-----------------	---

(306)

Q3.

Which of the following best currently describes you?

READ OUT

I am currently trying to lose or gain weight.....	1
I am thinking about trying to lose or gain weight.....	2
I am not thinking about trying to lose or gain weight.....	3





(308)

Q4.

What are the main things that make it difficult for you to control your weight?

PROBE:

Anything else?

CODE ALL GIVEN

Difficult to change eating habits	06
Enjoy my food /food helps me get through.....	07
Don't like exercise.....	09
No time to exercise /work long hours	10
Eat out regularly/have take-aways	13
No will power to eat better	16
No will power to exercise	17
I am a shift worker/long hours I work/work commitments	18
I don't exercise (unspecified whether time or inclination)	20
I like fattening /sweet food/I have a sweet tooth.....	21
Medical problems (unspecified)	26
I like my alcohol/beer/wine/friends convince me to drink.....	33
Nothing.....	97
Other SPECIFY	98
Don't know.....	99

(311)

QA.

What health problems do you think are associated with the following behaviour?

Eating too much fat or fatty foods?

PROBE FULLY:

Anything else?

Cancer (unspecified).....	01
Circulation problems (unspecified).....	06
Heart disease/heart attack/heart problems.....	07
Artherosclerosis/hardening/blocked arteries	08
High blood pressure/hypertension/blood pressure	10
Stroke.....	16
Diabetes/high blood sugar/sugar problems.....	62
High cholesterol.....	63
Obesity/gaining weight/overweight.....	65
Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish	90
Unfit/lack of fitness.....	91
Other SPECIFY	97
Doesn't cause health problems.....	98
Don't know.....	99





(312)

QB.

What health problems do you think are associated with the following behaviour?
Not eating enough fruit and vegetables?

PROBE FULLY:

Anything else?

Bowel cancer/colon cancer	02
Heart disease/heart attack/heart problems.....	07
Constipation/poor irregular bowel movements/lack of regularity.....	35
Digestion problems (unspecified)/acid reflux.....	36
Intestinal disorders/bowel problems/bowel obstructions/diverticulosis...	41
Skin problems (inc unspecified)/bad skin/acne	55
Scurvy/beri beri/rickets.....	60
Obesity/gaining weight/overweight.....	65
Vitamin & mineral deficiencies/lack of nutrition (unspecified)	68
Poor immunity/prone to colds/flu/low resistance to disease	69
Anaemia/iron deficiency/lack of iron.....	70
Not enough fibre-roughage	73
Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish	90
General health problems/unwell/sick/run down	92
Other SPECIFY	97
Doesn't cause health problems	98
Don't know.....	99

(313)

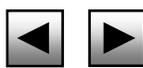
QC.

What health problems do you think are associated with the following behaviour?
Not eating enough bread and cereal foods?

PROBE FULLY:

Anything else?

Bowel cancer/colon cancer	02
Heart disease/heart attack/heart problems.....	07
Constipation/poor irregular bowel movements/lack of regularity.....	35
Digestion problems (unspecified)/acid reflux.....	36
Intestinal disorders/bowel problems/bowel obstructions/diverticulosis...	41
Vitamin & mineral deficiencies/lack of nutrition (unspecified)	68
Not enough fibre-roughage	73
Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish	90
General health problems/unwell/sick/run down	92
Other SPECIFY	97
Doesn't cause health problems	98
Don't know.....	99





(314)

QD.

What health problems do you think are associated with the following behaviour?
Being overweight?

PROBE FULLY:

Anything else?

- Circulation problems (unspecified).....06
- Heart disease/heart attack/heart problems.....07
- High blood pressure/hypertension/blood pressure 10
- Respiratory problems/shortness of breath/breathing problems (unspecified)...30
- Joint problems/knee problems 45
- Back problems..... 46
- Strain on muscular/skeletal system/immobility/not walking well 50
- High cholesterol..... 63
- Obesity/gaining weight/overweight..... 65
- Low self-esteem/depression/feel bad/horrible/uncomfortable..... 80
- Lethargy/low energy/fatigue/low stamina/tired/run down/sluggish 90
- Unfit/lack of fitness..... 91
- General health problems/unwell/sick/run down 92
- Other SPECIFY _____ 97
- Doesn't cause health problems..... 98
- Don't know..... 99

(315)

BREASTFEEDING

(321)

Q1a.

How important do you think it is for mothers to breast feed their babies.
Do you think it is:

READ OUT

- Not at all important..... 1
- Not very important2
- Somewhat important.....3
- Very important4

DO NOT READ

- Don't know.....9

(322)

Q1b.

What do you think are the benefits of breast-feeding for babies?

PROBE FOR 3 BENEFITS

- Immunity.....01
- Vitamins & minerals/nutrition02
- Tailor made/ perfect food09
- Health benefits/good for baby (unspec)... 10
- No chemicals/natural51
- Convenience/easier54
- Bonding/security/love/emotional55
- Other SPECIFY _____ 98
- Don't know.....99





(323)

Q2.

For how long do you think mothers should breast-feed their babies?

DO NOT READ

- Less than one month01
- Two months.....02
- Three months03
- Four months04
- Five months.....05
- Six months.....06
- Seven to twelve months.....07
- Over 12 months08
- As long as possible.....09
- Don't know.....10

(325)

Q3a.

What things do you think make it difficult for women to continue to breast-feed their babies for at least six months?

DO NOT READ

- Need to return to work 01
- Poor supply of breast milk..... 02
- Problems with breast feeding (eg. sore nipples) 03
- Convenience of bottle/ inconvenience..... 08
- No public acceptance 12
- Stress/pressure/no time 16
- Other SPECIFY _____ 98
- Don't Know 99

(327)

Q3b.

What do you think would make it easier for women to continue to breast-feed their babies for at least six months?

DO NOT READ

PROBE FULLY

- Not having to work 01
- Lack of stress/pressure/more time 03
- More breast feeding facilities 04
- Education about breast feeding 05
- Information about diet & nutrition to keep up supply..... 06
- Support/encouragement and cooperation from husband..... 11
- Public acceptance/community support/change attitudes 12
- Other SPECIFY _____ 98
- Don't Know/don't see there is a problem..... 99

Q4a.

Do you think it is acceptable for women to breast feed their babies in public places such as (329)?





Q4b.

Would it be acceptable if a room was provided for women to breast feed their babies in (329)?

READ OUT

(330) Q4a	(331) Q4b		DO (332) NOT READ OUT		Dummy	
	Yes	No	Depen ds how obvious	Yes	No	
(329) Q- 329						
Shopping Centres	1 ...1	...2	...3	...1	...2	_____
Workplaces	2 ...1	...2	...3	...1	...2	_____
Restaurants	3 ...1	...2	...3	...1	...2	_____
On public transport (buses & trains)	4 ...1	...2	...3	...1	...2	_____

DIETARY INFLUENCES AND INFORMATION

(334)

Q1.

Now some more general questions.

In the last 12 months, what have been your main sources of nutrition and dietary information?

DO NOT READ
IF PAMPHLETS/BROCHURES:

Where did you get these from?

CODE ALL RESPONSES

- Books 01
- Community Health Centres..... 02
- Dietitians..... 03
- Doctors 04
- Family and friends 05
- Food manufacturers..... 06
- Health Department..... 07
- Health Food Shops 08
- Magazine articles..... 10
- National Heart Foundation 11
- Newspaper articles 13
- Pamphlets/Brochures SPECIFY SOURCE 14
- Radio interviews 15
- Schools..... 16
- TV ads 17
- TV programs..... 18
- Nurses/Health workers..... 35
- Other SPECIFY 97

(335)

Q2a.

In your opinion, how important is it that governments financially support the following nutrition activities?
For each, please say whether it is very important, quite important or not important.

PRESS ENTER TO CONTINUE





Q2a.

In your opinion, how important is it that governments financially support (336)?
Would you say it is:

READ OUT ALL EXCEPT NOT SURE

(337) Q2a

(336) Q2a Statements

	Very important	Quite important	Not very important	Not sure
1. Research investigating what Western Australians are eating and how their diet is changing over time.....	1	2	3	4
2. Monitoring the quality of the food supply	1	2	3	4
3. Providing nutrition publications for the general public	1	2	3	4
4. Advertising campaigns to promote healthy eating to the public	1	2	3	4
5. Working with the food industry to increase the availability of healthy foods	1	2	3	4

(338)

Q2a.

Are there any other nutrition activities that governments should financially support?

What would they be?

Nutrition activity 1 SPECIFY _____	...01
Nutrition activity 2 SPECIFY _____	...02
Nutrition activity 3 SPECIFY _____	...03
No other activities	...99 Skip - (341)

Q2a.

And in your opinion, how important is it that governments financially support (339)?

Would you say it is:

READ OUT ALL EXCEPT NOT SURE

(340) Q-340

	Very important	Quite important	Not very important	Not sure
1. Nutrition activity 1 SPECIFY _____	1	2	3	4
2. Nutrition activity 2 SPECIFY _____	1	2	3	4
3. Nutrition activity 3 SPECIFY _____	1	2	3	4

(348)

Q2b.

I am going to read out 5 potential Government community education program topics. I would like you to tell me which one should be given the highest priority?

So, which out of these 5, which should be given the highest priority?

READ OUT

Fat	1
Fruit and vegetables	2
Bread and cereals.....	3
Weight and weight control.....	4
Sugar.....	5





(349)

Q2b.

And, which should be given the 2nd highest priority?

READ OUT

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(350)

Q2b.

And, which should be given the 3rd highest priority?

READ OUT

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(351)

Q2b.

And, which should be given the 4th highest priority?

READ OUT

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(352)

Q2b.

CODE LAST ONE

- Fat1
- Fruit and vegetables2
- Bread and cereals.....3
- Weight and weight control.....4
- Sugar.....5

(360)

Q2c.

Are there any other areas of nutritional or nutrition-related information that you feel ought to be given equal or higher priority than these areas?

Other SPECIFY _____ ...01
 No other areas _____ ...99

Q3a.

Which, if any, of the following would make it easier for you or your family to eat a healthy diet?

READ OUT

Q3a.

(362),

would this make it easier for you or your family to eat a healthy diet?





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(366) Q51b

(362) Q3a

	Yes, Easier	No Not easier	Don't know
1. If healthy foods were cheaper	1	2	3
2. If more take-away and fast food outlets provided healthy foods	1	2	3
3. If I knew more easy ways of preparing healthy foods	1	2	3
4. If I knew more quick ways of preparing healthy foods	1	2	3
5. If I had more information to me decide which foods were healthy	1	2	3
6. If I knew more about cooking	1	2	3
7. If my family/partner enjoyed healthy foods	1	2	3
8. If I could buy more healthy snack foods	1	2	3
9. If healthier foods were easier to find in supermarkets.....	1	2	3
10. If there was detailed and easy to understand information on food labels	1	2	3

(364)

Q3b.

Are there other activities which would make it easier for you and your to eat a healthy diet?

Other SPECIFY 1
 No others..... 2

Q3c.

How concerned are you about

(365)?

Would you say you are:

(366) Q51b

(365) Q-365

READ OUT SCALE EXCLUDING 'NOT SURE'

	Very concerned	Quite concerned	Not concerned	Not sure
1. The sale of high caffeine drinks to children 12 years	1	2	3	4
2. The health effects of eating genetically modified foods.....	1	2	3	4





(367)

Q4a.

I am going to read out a statement that has been made about school canteens.

Please tell me whether you agree or disagree with the statement.

School canteens should restrict sales of high fat foods such as pies, chips, sausage rolls and fatty snack foods.

READ OUT ASK:

Is that strongly or slightly?

- Strongly Agree.....1
- Agree Slightly2
- Disagree Slightly.....3
- Disagree Strongly4
- DO NOT READ Don't know9

(369)

Q4b.

Who do you think should decide which types of foods are sold in school canteens?

DO NOT READ
CODE ALL GIVEN

- Children1
- Parents2
- Teachers/principal of school3
- Education Dept.....4
- Canteen Manager/ Manageress.....5
- Health Dept.....6
- Other SPECIFY7
- Don't know.....9





(370)

Q5.

In the last 12 months, has anyone in your household eaten less than they should because you couldn't afford enough food?

- Yes1
- No.....2
- DO NOT READ
- Refused/no answer.....3
- DO NOT READ
- Don't know.....9

(372)

Q6.

In the last six months, have you experienced vomiting and/or diarrhoea, which you suspect, may have been food poisoning?

- Yes1
- No.....2
- Skip - (374)**

(373)

Q6.

Was food poisoning positively identified by a doctor or nurse?

- Yes1
- No.....2

DEMOGRAPHICS

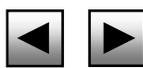
(379)

Q1.

Finally, I would like some information on you and your household, to ensure I have spoken to a good cross section of the population.

Firstly, into which of the following age groups do you fall?

- READ OUT
- 18 to 19 years.....01
- 20 to 24 years.....02
- 25 to 29 years.....03
- 30 to 34 years.....04
- 35 to 39 years.....05
- 40 to 44 years.....06
- 45 to 49 years.....07
- 50 to 54 years.....08
- 55 to 59 years.....09
- 60 to 64 years.....10
- DO NOT READ
- Refused.....99





(381)

Q2.

And what is the highest level of education you have completed?

DO NOT PROMPT

- Year 10, Junior Achievement Certificate or less.....1
- Year 12, Certificate of Secondary Education, Leaving, TEE, TEA,...2
- Tertiary education/Degree/University diploma.....3
- Tertiary education - post-graduate qualification4
- Apprenticeship/trade qualification5
- None of the above - other SPECIFY _____6
- Refused.....9

(382)

Q3a.

In which country were you born?

- Australia01
- Overseas SPECIFY _____ 99 **Skip - (384)**

(383)

Q3a.

Are you an aboriginal or Torres Strait Islander?

- Yes1
- No.....2
- Refused.....3

IF: (382)(99) CONTINUE else SKIP to: (386)

Q3b.

In what year did you first arrive in Australia to live?

Year: 19 (385) _____

(386)

Q4.

Are you currently employed outside the home?

IF YES:

Is that full-time or part-time?

- Full-time.....1
- Part-time.....2
- Not currently employed.....3

Q5.

What is your current occupation?

IF RETIRED OR UNEMPLOYED ASK FOR LAST OCCUPATION.

PROBE FULLY

IF SELF EMPLOYED OR MANAGER, ASK WHICH INDUSTRY

Occupation:
(388)_____





Q6a.

Do you have any responsibility for doing the food shopping in your household?

- Yes/sole responsibility1
- Shared responsibility2
- No.....3 **Skip - (393)**

(392)

Q6b.

How often do you put your cold or frozen food in an esky to transport it from the shops to home?

- Always1
- Most times2
- Occasionally3
- Never.....4

(394)

Q6c.

Do you have any responsibility for choosing and preparing meals in your household?

- Yes/sole responsibility1
- Shared Responsibility2
- No.....3

Q6d

What do you think is the maximum temperature a fridge should operate at?

PROMPT IF NECESSARY:

To keep food in good condition

IF RESPONDENT DOES NOT KNOW, TYPE D

Degrees Celsius: (395) _____

(396)

Q6d.

Do you have a thermometer in your main fridge at home?

- Yes1
- No.....2

DO NOT READ

Do not have a fridge3

(398)

Q6e.

Which of the following best describes your cooking skills?

- Can't cook.....1
- Can boil an egg, or BBQ meat or heat frozen meals...2
- Can cook basic meat and 3 veg type meals.....3
- Can cook a wide variety of meals4
- Can cook almost anything.....5





2004 NUTRITION SURVEY - QUESTIONNAIRE

(399)

Q7a.

How many adults, aged 18 or over, are there in your household?
Please exclude full-time students who mainly live away from home.

- One1
- Two2
- Three.....3
- Four.....4
- Five5
- Six or more6
- None.....9

(400)

Q7b.

And how many children under 18 are there in your household?

- One1
- Two2
- Three.....3
- Four.....4
- Five5
- Six or more6
- None.....9

Skip - (403)

Q7c.

How old is your (401)?

(402) 7c

Child

Under 12 months old



(401) Q7c

1 st child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
2 nd child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3 rd child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4 th child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
5 th child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6 th child	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

IF: (401)(1 *TO* 6) *AND* (402)(0 *TO* 5) CONTINUE else SKIP to: (411)

(410)

~IF (400)(1)

Q7d.

Is the child under 5 in the household currently being breast-fed?

~ELSE

Q7d.

Are any of the children under 5 in the household currently being breast-fed?

~END

- Yes1
- No.....2





(411)

Q8.

Which of the following best describes your household?

READ OUT

- Live alone1
- Couple2
- Couple with children3
- Single parent4
- Related adults.....5
- Related adults with children6
- Unrelated adults7
- Unrelated adults with children8

DO NOT READ

- Other SPECIFY _____ 9

IF: (411)(1 *TO* 6) CONTINUE else SKIP to: (416)

(414)

Q9a.

Which category does your total household income fall into?

READ OUT

- A. Less than \$15,0001
- B. \$15,000 - \$25,0002
- C. \$25,000 - \$35,0003
- D. \$35,000 - \$50,0004
- E. \$50,000 - \$60 0005
- F. \$60 000 and over.....6

DO NOT READ

- Refused.....9

IF: (411)(7 *TO* 9) CONTINUE else SKIP to: (417)

(416)

Q9b.

Which category does the income available to you/your family in your household fall into?

READ OUT

GROSS INCOME

- A. Less than \$15,0001
- B. \$15,000 - \$25,0002
- C. \$25,000 - \$35,0003
- D. \$35,000 - \$50,0004
- E. \$50,000 - \$60 0005
- F. \$60 000 and over.....6
- Refused.....9





Fruit and vegetable campaign – POST-CAMPAIGN QUESTIONNAIRE

Interview schema and schedule for telephone interviewer

- Hello, is this “+phone+”
- Good afternoon/evening, my name is, I am calling from the Survey Research Centre at the University of Western Australia on behalf of the Department of Health.
- We are conducting a survey on an important health issue. The research results will assist in the planning of future health and lifestyle programs. Your telephone number has been selected randomly from the White Pages.
- Could I speak to the person in your household aged between 20 and 50 who had the last birthday? Would that be you or somebody else?
- Could I please speak to [CHOSEN RESPONDENT] or
- Could I please speak to that person [ie LAST BIRTHDAY – BETWEEN 20 and 50]

WHEN REQUIRED PERSON IS ON PHONE ASK:

- Hello, my name is, I am calling on behalf of the Survey Research Centre of the UWA for the Western Australian Department of Health.
- We are conducting a survey to find out about the health of the Australian population. The research results will be important for the planning of future health and lifestyle programs. Your telephone number has been selected randomly from the White Pages. All that is involved is answering a few questions over the phone.
- The survey should take no more than 15 minutes. If there are any questions you prefer not to answer just tell me and I will move to the next question. Can you help us with this survey? [IF YES] Would now be a convenient time to talk to you?
- When would be the best time to call back to speak to you?

1 Which best describes your TV watching habits? [READ OUT EACH OF THE FOLLOWING CATEGORIES]

- I watch TV most days 1
- I usually watch TV 2
- I occasionally watch TV 3
- I really don't watch TV 4

2 Would you say you usually read the newspaper?

1=YES / 2=NO

3 Would you say you usually listen to the radio?

1=YES / 2=NO





4 Which best describes how you feel about cooking? (READ OUT)

- I love to cook, do it as often as possible 1
- I love to cook, but don't do it too often 2
- I cook regularly, but don't enjoy it 3
- I don't really like it, avoid it where possible 4
- Never cook [DO NOT READ OUT].....5

5 Which best describes how you usually prepare food? (READ OUT)

- I cook using mostly fresh ingredients 1
- I cook using fresh and shelf ingredients 2
- I mainly eat pre-prepared meals 3
- I mainly eat take-away 4
- Never prepare food [DO NOT READ OUT].....5

6 Which of the following applies to you? (READ OUT)

- I am the main grocery buyer 1
- I have shared responsibility 2
- I have little or no responsibility 3

7 How often do you shop? (READ OUT)

- One large weekly/fortnightly shop 1
- One large shop with regular top ups 2
- Small shops as needed 3
- Never/rarely shop 4

8 In the last couple of months, have you tried to make any changes to your diet?

- Yes** 1
- No** 2 **Go to Q9**
- Don't know** 3 **Go to Q9**

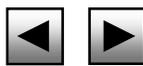
8a What changes have you tried to make?

[PROMPT FULLY - Any other changes?]
<<USE 1/2 -AND->> <<USE 3/4 -AND->> <<USE 5>>

- More fruit** 1
- Less fruit** 2 **Go to Q8e**
- More vegetables** 3 **Go to Q8e**
- Less vegetables** 4 **Go to Q8e**
- Anything other than fruit or vegetables** 5 **Go to Q8e**

8b Were you successful in trying to increase your intake of fruit?

- Yes** 1
- No** 2 **Go to Q8d**
- Don't know** 3 **Go to Q8e**





8c Why were you successful? <<IF:Q8b (Yes)>> <<SKIP to:Q8e>>

8d Why were you not successful? <IF:Q8a (*NOT* more veges)> <SKIP to:Q9>

8e Were you successful in trying to increase your intake of vegetables?

- Yes 1
- No 2 Go to Q8g
- Don't know 3 Go to Q9

8f Why were you successful? <<IF:Q8e (Yes)>> <<SKIP to:Q9 >>

8g Why were you not successful?

9 Have you heard or seen any advertising campaigns about food and health in the last two months?

- Yes 1 (continue)
- No 2 (Go to 10)
- Don't know 9 (Go to 10)

9a IF YES, What campaign messages do you remember? Any others? Any others?

10 In the last two months, did you see or hear any advertising campaigns about fruit and vegetables?

- Yes 1 (continue)
- No 2 (Go to 11)
- Don't know 9 (Go to 11)

10a IF YES: What campaign messages do you remember? Any others? Any others?

11 The Department of Health has recently conducted a campaign about fruit and vegetables. Do you recall hearing or seeing anything about this?

- Yes 1 (continue)
- No 2 (Go to 12)
- Don't know 9 (Go to 12)





11a Where did you see or hear about the campaign? Anywhere else? Anywhere else? Anywhere else? [Don't prompt; accept multiples]

TV ads	1
Supermarkets	2
Cookbooks/recipe book	3
Taxi tops	4
Boom gates	5
Newspapers	6
Radio	7
Website	8
Family or friends	9
Other (specify)	10

11b IF YES, What was the main message of the campaign?

12 Do you remember seeing any TV commercials showing a face made of fruit and vegetables?

Yes	1	(continue)
No	2	(Go to 23)
Don't know	9	(Go to 23)

13 What do you think is the main message of these commercials? Anything else? Anything else? PROBE FULLY

14 How much did you enjoy watching these commercials? (READ OUT SCALE)

I enjoyed watching them a lot	1
I quite enjoyed watching them	2
I didn't mind watching them	3
I didn't enjoy watching them much	4
I didn't enjoy watching them at all	5

15 How easy was it to understand what was going on in these commercials? (READ OUT SCALE)

They were very easy to follow	1
They were quite easy to follow	2
They were quite hard to follow	3
They were very hard to follow	4

16 How relevant did you personally find the commercials? (READ OUT SCALE)

Very relevant	1
Somewhat relevant	2
Not at all relevant	3
Don't know	4





**17 How believable did you find what was being put across in the commercials?
(READ OUT SCALE)**

- | | |
|---|---|
| Very believable | 1 |
| I'm inclined to believe what they say | 2 |
| I would have to check it out before I believed it | 3 |
| I find it difficult to believe | 4 |

18 How much new information did the commercials give you which you hadn't been told before? [READ OUT SCALE]

- | | |
|--------------------------|---|
| A lot of new information | 1 |
| Some new information | 2 |
| A little new information | 3 |
| No new information | 4 |

19 Which of these statements apply to the commercials? [READ OUT EACH STATEMENT]

They were the type of commercials that stick in my mind

1=AGREE / 2=DISAGREE

They made me think again about this issue

1=AGREE / 2=DISAGREE

They were commercials I quite enjoyed

1=AGREE / 2=DISAGREE

They told me something new about the issue

1=AGREE / 2=DISAGREE

They made me want to find out more about what was being advertised

1=AGREE / 2=DISAGREE

They didn't appeal to me

1=AGREE / 2=DISAGREE

They were just like any other commercials

1=AGREE / 2=DISAGREE

I'm getting fed up seeing these types of commercials

1=AGREE / 2=DISAGREE

20 There are some commercials that people remember but never know what they are for. Which of these statements applies to these commercials? [READ OUT EACH STATEMENT]

1 = These commercials are very good at making you remember it is about eating more vegetables

2 = These commercials are quite good at making you remember it is about eating more vegetables

3 = These commercials are not all that good at making you remember it is about eating more vegetables

4 = They could have been commercials for any health issues, but I wouldn't know what





21 How strongly do you agree or disagree that the commercials give you the following impressions? [READ OUT SCALE] [READ OUT EACH STATEMENT]

- 1 = It is easy to get an extra serve of vegetables in my diet
- 2 = I only need to eat a few more vegetables to be eating enough in my diet
- 3 = At the moment I'm not getting enough vegetables in my diet

SCALE
 1 = Strongly agree
 2 = Slightly agree
 3 = Slightly disagree
 4 = Strongly disagree

22 How do you think the commercials will affect your vegetable consumption? [READ OUT SCALE]

- I am much more likely to try to include more vegetables in my diet 1
- I am a little more likely to try to include more vegetables in my diet 2
- They will have no influence on me even though I understand I should eat more vegetables 3
- They will have no influence on me as I already eat enough vegetables 4

23 What do you think "Go for 2 and 5" means? What is it actually saying?

23a What do you think a serve of vegetables equals? [Don't prompt]

- one piece 1
- one type of vegetables eg carrot 2
- ½ cup 3
- an amount [specify _____] 4
- what I put on my plate 5
- Don't know 6
- Other [specify _____] 7

23b What do you think a serve of fruit equals? [Don't prompt]

- one piece 1
- one type of fruit eg apple 2
- ½ cup 3
- an amount [specify _____] 4
- Don't know 5
- Other [specify _____] 6

24 Is there any information you would like to know to help you to eat more fruit and vegetables? Anything else? Anything else? Probe fully.





F&V behaviour and beliefs

25 On average, how many days per week do you eat fruit?

- 1 day 1
- 2 days 2
- 3 days 3
- 4 days 4
- 5 days 5
- 6 days 6
- 7 days 7
- Varies (*try to get estimate*) 8
- None 9

26 When you eat fruit, how many pieces or serves per day do you eat?

27 How do you feel about the amount of fruit that you currently eat? [READ OUT]

- Should be eating more 1
- The amount is about right 2
- Should be eating less 3
- Don't know 9

28 To maintain good health, how many serves of fruit do you think you should eat per day? (READ OUT: one serve is about one piece of fruit or 1 cup of salad).

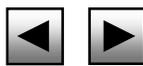
- Don't know 9

29 On average, how many days per week do you eat vegetables?

- 1 day 1
- 2 days 2
- 3 days 3
- 4 days 4
- 5 days 5
- 6 days 6
- 7 days 7
- Varies (*try to get estimate*) 8
- None 9

30 When you eat vegetables how many serves a day do you eat?

31 If we now say a serve is 1/2 cup cooked, tinned or frozen vegetables (potatoes included) or 1 cup of salad, how many serves a day on average do you eat?





32 How do you feel about the amount of vegetables that you currently eat?
[READ OUT]

- Should be eating more 1
- The amount is about right 2
- Should be eating less 3
- Don't know 9

33 To maintain good health, how many serves of vegetables do you think you should eat per day?

Don't know 9

Intentions to increase F&V intake

The following statements are about the amount of fruit and vegetables you intend to eat in the near future.

34 Which of the following statements best describes how you feel at present?
[READ OUT]

- I DO NOT intend to increase my intake of fruit 1
- I INTEND to increase my intake of fruit in the next month 2
- I INTEND to increase my intake of fruit sometime in the next six months 3

34a Why is that? What is the reason for that?

35 Which of the following statements best describes how you feel at present?
[READ OUT]

- I DO NOT intend to increase my intake of vegetables 1
- I INTEND to increase my intake of vegetables in the next month 2
- I INTEND to increase my intake of vegetables sometime in the next 6 months 3

35a Why is that? What is the reason for that?





Self-efficacy

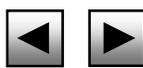
- 36 How confident are you that you could [INSERT STATEMENT]? [READ OUT SCALE]**
- a. Eat an extra serve of fruit on *one to two* days of the week** [If “NOT AT ALL CONFIDENT”, go to STATEMENT D]
 - b. Eat an extra serve of fruit on *three to four* days of the week** [If “NOT AT ALL CONFIDENT”, go to STATEMENT D]
 - c. Eat an extra serve of fruit on *five or more* days of the week**
 - d. Eat an extra serve of vegetables on *one to two* days of the week** [If “NOT AT ALL CONFIDENT”, go to Q.16]
 - e. Eat an extra serve of vegetables on *three to four* days of the week** [If “NOT AT ALL CONFIDENT”, go to Q.16]
 - f. Eat an extra serve of vegetables on *five or more* days of the week**

- SCALE:
- 1. Not at all confident**
 - 2. Somewhat confident**
 - 3. Moderately confident**
 - 4. Very confident**
 - 5. Don't know [don't read – last resort]
 - 6. Refused [don't read]

- 37 To what extent do you agree or disagree with the following statements?**
[Read out one statement, followed by the scale, repeat for each statement in RANDOM order]

- a. It takes too much time to prepare vegetables**
- b. It takes too much effort to prepare vegetables**
- c. Vegetables are too expensive**
- d. Fruit is too expensive**
- e. The quality of fruit is good where I shop**
- f. The quality of vegetables is good where I shop**
- g. Eating an extra serve of fruit each day is easy**
- h. Eating an extra serve of vegetables each day is easy**
- i. There aren't enough different types of fruit and vegetables where I shop**

- SCALE:
- 1. Strongly agree**
 - 2. Agree**
 - 3. Neither agree nor disagree**
 - 4. Disagree**
 - 5. Strongly disagree**
 - 6. Don't know [don't read – last resort]
 - 7. Refused [don't read]





Demographics

Finally, a few questions to help classify your answers.

38 Who in your household is mainly responsible for preparing the meals?

- | | |
|------------------------|---|
| Respondent | 1 |
| Spouse/partner | 2 |
| Other [specify: _____] | 3 |

39 Who does most of the shopping for fruit and vegetables in your household?

- | | |
|------------------------|---|
| Respondent | 1 |
| Spouse/partner | 2 |
| Other [specify: _____] | 3 |

40 What is your sex? [OBSERVE OR ASK]

1=Male / 2=Female

41 How old are you?

42 What is your MARITAL STATUS?

- 1 = Never married
- 2 = Married / Defacto
- 3 = Separated, Divorced or widowed
- 9 = Refused

43 What is the highest level of education you have COMPLETED?

- 1 = Never attended school/some primary school
- 2 = Completed primary school
- 3 = Some high school
- 4 = School certificate/intermediate/year 10/4th form
- 5 = TEE/TAE.HC/Leaving/Year 12/6th form
- 6 = TAFE certificate/diploma
- 7 = University, CAE or other tertiary institution degree
- 8 = Other [specify]

44 Which of the following best describes your current employment? [READ OUT]

- | | |
|---|---|
| Full-time paid work | 1 |
| Part-time paid work | 2 |
| Home duties | 3 |
| Studying | 4 |
| Currently looking for work or receiving government assistance | 5 |
| (DO NOT READ OUT) Other (please specify) _____ | 6 |
| (DO NOT READ OUT) Refused | 7 |





45 Are there children under 18 years in your household?

IF YES, ASK: **How many are there?**
IF NO, RECORD AS "ZERO" AND GO TO Q27

**46 Into which range does your annual combined household income fall?
Please stop me when I read the correct category.**

- Less than \$15,000 1
- \$15,000 to \$25,000 2
- \$25,000 to \$35,000 3
- \$35,000 to \$50,000 4
- \$50,000 to \$65,000 5
- \$65,000 and over 6
- DO NOT READ: Refused 9

47 How much do you weigh without clothes and shoes?

_____ Kilograms or _____ Stone/ _____ pounds or Don't know

48 How tall are you without shoes?

_____ Centimetres or _____ Feet/ _____ inches or Don't know

49 Do you consider yourself to be _____? [READ OUT EACH OF THE FOLLOWING CATEGORIES]

- Acceptable weight 1
- Underweight 2
- Overweight 3

50 What is your postcode? _____

IF UNKNOWN, ASK: **What suburb do you live in?**





PRE CAMPAIGN QUESTIONNAIRE

Interview schema and schedule for telephone interviewer

- Hello, is this “+phone+”
- Good afternoon/evening, my name is, I am calling on behalf of the UWA/Western Australian Department of Health.
- We are conducting a survey on an important health issue. The research results will be important for the planning of future health and exercise programs. Your telephone number has been selected randomly from the White Pages. A member of your household will be asked to answer a few questions over the phone.
- Could you please tell me how many people aged between 20 and 54 live in your household?
- Could I speak to the person aged between 20 and 54 who had the last birthday? Would that be yourself?
- Could I please speak to [CHOSEN RESPONDENT] or
- Could I please speak to that person [ie LAST BIRTHDAY – BETWEEN 20 and 54]

WHEN REQUIRED PERSON IS ON PHONE ASK:

- Hello, my name is, I am calling on behalf of the UWA/Western Australian Department of Health.
- We are conducting a survey to find out about the health of the Australian population. The research results will be important for the planning of future health and exercise programs. Your telephone number has been selected randomly from the White Pages. All that is involved is answering a few questions over the phone.
- The survey should take NO MORE THAN 15 minutes. If there are any questions you prefer not to answer you can tell me and I will move to the next question. Can you help us with this survey? [IF YES] Is it OK to talk to you now?
- When would be the best time to call back to speak to this person?

Question: Q2. Have you heard or seen any message about exercise or physical activity IN THE PAST MONTH?

Skip: If Q2 not equal to 1, go to Q4a





Question: Q3a. What is one message that you remember?
Question: Q3b. Are there any other messages that you remember?

Question: Q4a. In the last month, have you seen a TV advert that shows how regular physical activity is easy to fit into your day?

Question: Q5. Have you heard of the exercise and physical activity campaign "Find Thirty. It's not a big exercise."

Question: Q5a. What messages from the TV advertisement do you remember?

Physical activity behaviour questions.

We would like to ask you about the physical activity you did in the last week.

Question: Q8. **IN THE LAST WEEK** how many times have you walked continuously, for at least 10 minutes, for recreation/exercise or to get to or from places?

Question: Q9. What do you estimate was the total time that you spent walking in this way **IN THE LAST WEEK?** [INTERVIEWER: THIS IS 'CONTINUOUS' WALKING]

The next question does not include gardening:

Question: Q10. **IN THE LAST WEEK** how many times did you do any vigorous household chores, which made you breathe harder or puff and pant?

Question: Q11. What do you estimate was the total time that you spent doing these vigorous household chores **IN THE LAST WEEK?**

Question: Q12. **IN THE LAST WEEK** how many times did you do any vigorous gardening or heavy work around the yard, which made you breathe harder or puff and pant?

Question: Q13. What do you estimate was the total time that you spent doing vigorous gardening or heavy work around the yard **IN THE LAST WEEK?**

The next question excludes household chores or gardening:

Question: Q14. **IN THE LAST WEEK,** how many times did you do any vigorous physical activity, which made you breathe harder or puff and pant? (eg tennis, jogging, cycling, keep fit exercises)





Question: Q15. What do you estimate was the total time that you spent doing this vigorous physical activity IN THE LAST WEEK?

The next question excludes household chores or gardening:

Question: Q16. IN THE LAST WEEK how many times did you do any other more moderate physical activity that you haven't already mentioned? (eg lawn bowls, golf, gentle swimming, etc)

Question: Q17. What do you estimate was the total time that you spent doing these activities IN THE LAST WEEK?

Intentions to be more active

The following statements are about the amount of exercise you intend to do in the near future.

[RANDOM ordering of the following statements]

Question: Q18. Which one best describes how, you feel at present?

Question: Q18a. What kind of physical activities would you normally do?

Question: Q18b. What kind of physical activities would you choose?

Knowledge (understanding) items scored on a five point Likert scale.

[RANDOM ordering of the following statements]

Question: Q19. To what extent do you agree or disagree with the following statements about physical activity and health? [Read out scale]

Field name:

- Q19P1** Taking the stairs at work or generally being more active for at least 30 minutes each day is enough to improve your health.
- Q19P2** Half an hour of brisk walking on most days is enough to improve your health.
- Q19P3** To improve your health it is essential for you to do vigorous exercise for at least 20 minutes each time, 3 times a week.
- Q19P4** Exercise doesn't have to be done all at one time – blocks of 10 minutes are okay.
- Q19P5** 30 minutes of daily moderate exercise, which leaves you slightly out of breath, can improve your health.
- Q19P6** Even if you haven't been active for a while, starting moderate activity can have a positive impact on your health.

- I don't have to do high level exercise to be healthy – moderate physical activity if fine.





- Regular physical activity is easier than you think
- I need to do 30 minutes of physical activity a day.
- Physical activity is easy to fit into my day.

Self-efficacy

We would like to find out how confident you are to exercise in certain situations.

[RANDOM ordering of the following statements]

Question: QN20. What confidence rating best describes how you feel in the following situations? [Read out scale]

Field name:

- QN20P1** You could exercise when you are tired.
QN20P2 You could exercise when you are in a bad mood.
QN20P3 You could exercise when you feel you don't have time.

Miscellaneous

Question: Q37. Do you have a dog at home?

Question: Q38. Approximately how much time did you spend walking your dog IN THE LAST WEEK?

Question: Q39. Last time you saw your GP, did he/she give you any advice about physical activity or exercise?

Question: Q40. How physically active are you compared to most other [MEN/WOMEN] of your age? [Read out scale]

Reasons why not active

[RANDOM ordering of the following statements]

Question: Q43. Do any of these reasons why people choose not to participate in physical activity apply to you? Please answer YES or NO to the following.

Field name:

- Q43P1** You find it too uncomfortable to exercise in the heat.
Q43P2 You have a health problem, which limits the amount of physical activity you can do.
Q43P3 You don't have anyone to exercise with.
Q43P4 You have difficulty walking up and down stairs.
Q43P5 You experience pain if you exercise.
Q43P6 You're afraid that you might be attacked by a dog.





- Q43P7** You're afraid of falling when you're out walking.
Q43P8 You're afraid that you could be attacked or assaulted when you're out exercising.
Q43P9 You're afraid of being knocked down by a car or a skateboard rider.
Q43P10 You don't have enough time.

Question: Q44. How confident are you that you can participate in at least 30 minutes of moderate level physical activity, such a walking, on five or more days per week?

- Not at all confident
- Some what confident
- Moderately confident
- Very confident
- [DO NOT READ OUT] Don't know
- [DO NOT READ OUT] Refused

Finally, a few questions to help classify your answers.

Question: Q25. What is your sex? [OBSERVE OR ASK]

Question: Q26. Could I ask your age please?

Question: Q27. What is your MARITAL STATUS?

Question: Q32. What is the highest level of education you have COMPLETED?

Question: Q34. What language do you usually speak at home?

Question: Q35. What is your postcode?

Question: Q35s. What suburb do you live in?

Question: Q36. Would you be willing to participate in a similar survey in the future?

Contact details were recorded. Name and address information is contained in the database called NAME2B.DBF, which is described in the next section.



HEALTH TRACK SURVEY

Good afternoon/evening, my name is, I am calling from TNS Social Research for the Western Australian Department of Health.

We are conducting a survey on some important health issues.

Could you please tell me how many people aged between 25 and 45 live in your household?

Could I speak to the person aged between 25 and 45 who had the last birthday? Would that be yourself? **IF YES, SKIP REPEATED GREETING.**

WHEN REQUIRED PERSON IS ON PHONE :

Good afternoon/evening, my name is, I am calling from TNS Social Research on behalf of the Department of Health.

We are conducting a survey on some important health issues.

The survey should take approximately 10 minutes. Can you help us with this survey? **IF YES ASK** : Is it OK to talk to you now or would you prefer us to call back?

SCREENING QUESTIONS

S1 RECORD GENDER [DO NOT ASK]

- 1 Male
- 2 Female

S2 How old are you? Are you ... READ OUT

- 1 Less than 24 years **CLOSE INTERVIEW**
 - 2 25-29
 - 3 30-34
 - 4 35-39
 - 5 40-45
 - 6 Over 45 years **CLOSE INTERVIEW**
 - 9 Refused (**DO NOT READ**)
-





NUTRITION

S3 Would you say you are mainly / jointly responsible for food preparation in your household?

- 1 Mainly
- 2 Jointly
- 3 No

Q1 Which of the following applies to you? **READ OUT**

- 1 I am the main grocery buyer
- 2 I have shared responsibility
- 3 I have little or no responsibility

Q2 Which best describes how you usually prepare meals? **READ OUT**

- 1 I always use a recipe when I cook
- 2 I usually use a recipe when I cook
- 3 I sometimes use a recipe when I cook
- 4 I never/rarely use a recipe when I cook
- 5 I never prepare food **(DO NOT READ)**

Q4a On average, how many days per week do you eat fruit? **(DO NOT READ)**

- 1 1 day
- 2 2 days
- 3 3 days
- 4 4 days
- 5 5 days
- 6 6 days
- 7 7 days
- 8 Varies **TRY TO GET ESTIMATE**
- 9 None

Q4b When you eat fruit, how many serves do you usually eat each day? **READ OUT:** A serve is equal to one medium piece, two small pieces of fruit, or 1 cup of diced fruit

_____ serves per day

99 Don't know

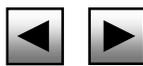
Q4c How do you feel about the amount of fruit that you currently eat? **READ OUT**

- 1 Should be eating more
- 2 The amount is about right
- 3 Should be eating less
- 9 Don't know **(DO NOT READ)**

Q4d To maintain good health, how many serves of fruit do you think you should eat per day? **READ OUT:** A serve is equal to one medium piece, two small pieces of fruit, or 1 cup of diced fruit.

_____ serves per day

99 Don't know





Q4e In the last couple of months, have you tried to change the amount of fruit you eat?

READ OUT

- 1 Yes, tried to increase the amount of fruit I eat
- 2 Yes, tried to decrease the amount of fruit I eat
- 3 No, haven't made any changes to the amount of fruit I eat

Q4f **IF CODE 1 AT Q4E ASK:** What influenced you to try and eat more fruit?

ASK ALL

Q4g Do you feel you eat more, less, or about the same amount of fruit as you did 12 months ago?

- 1 More now
- 2 Less now
- 3 About the same now
- 4 Don't know **(DO NOT READ)**

Q5a On average, how many days per week do you eat vegetables? **(DO NOT READ)**

- 1 1 day
- 2 2 days
- 3 3 days
- 4 4 days
- 5 5 days
- 6 6 days
- 7 7 days
- 8 Varies **TRY TO GET ESTIMATE**
- 9 None

Q5b When you eat vegetables how many serves a day do you usually eat? **READ OUT:** A serve is equal to ½ a cup of cooked vegetables, one small potato, or 1 cup of salad vegies

_____ serves per day

99 Don't know

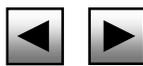
Q5c How do you feel about the amount of vegetables that you currently eat? **READ OUT**

- 1 Should be eating more
- 2 The amount is about right
- 3 Should be eating less
- 9 Don't know **(DO NOT READ)**

Q5d To maintain good health, how many serves of vegetables do you think you should eat per day? **READ OUT:** A serve is equal to ½ a cup of cooked vegetables, one small potato, or 1 cup of salad vegies

_____ serves per day

99 Don't know





Q5e In the last couple of months, have you tried to change the amount of vegetables you eat? **READ OUT**

- 1 Yes, tried to increase the amount of vegetables I eat
- 2 Yes, tried to decrease the amount of vegetables I eat
- 3 No, haven't made any changes to the amount of vegetables I eat

Q5f **IF CODE 1 AT Q5E ASK:** What influenced you to try and eat more vegetables?

Q5g Do you feel you eat more, less or about the same amount of vegetables as you did 12 months ago?

- 1 More now
- 2 Less now
- 3 About the same now
- 4 Don't know **(DO NOT READ)**

Q6 Have you heard or seen any ads about fruit and vegetables in the last two months?

- 1 Yes → continue
- 2 No → Q8
- 9 Don't know → Q8

Q7 **IF YES AT Q7,** Can you please describe the ads you have seen or heard? **PROBE FULLY FOR DESCRIPTIONS**

The Department of Health has recently shown some ads about fruit and vegetables. As part of the campaign a series of TV ads has been shown. (ROTATE THE AD DESCRIPTIONS)

Q8 A male face made of fruit and vegetables based on the character of "Aristos". Have you seen it?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**

Q9a A female face made of fruit and vegetables talking about cooking with fruit and vegetables. Have you seen it?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**

Q9b Dame Edna talking to a TV interviewer, and her nose getting bigger through the ad as she talks. Have you seen it?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**





Q9c A male fruit and vegetable character flying around the world looking at what he eats for breakfast, lunch and dinner. Have you seen it?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**

Q9d A female vegetable character of a mother with two kids saying there is nothing to eat. Have you seen it?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**

**INSTRUCTIONS:
IF NO / DON'T KNOW TO Q8 AND Q9 GO TO 19**

Q10 What do you think were the main messages these TV ads were trying to get across? Anything else? Anything else? **DO NOT PROMPT. MULTIPLES ACCEPTED. PROBE CAREFULLY**

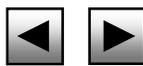
- 01 Eat more fruit
- 02 Eat more vegetables
- 03 Eat 2 fruit and 5 vegetables
- 12 Eat 5 serves of vegetables each day
- 04 There is a cookbook which is available now
- 05 Buy the cookbook
- 06 Fruit and vegetables are quick and/or easy to prepare
- 07 Eat less junk food
- 08 It's easy to eat more vegetables
- 09 It's easy to eat more fruit
- 13 Telling you how much a serve of fruit is
- 14 Telling you how much a serve of vegetables is
- 15 Telling you how much a serve is
- 11 Don't know / Can't recall
- 90 Other (please specify)

Q11 To what degree do the ads communicate that... Would you say... **READ OUT**

(DO NOT READ)

ROTATE ORDER.

	A lot	A little	Not at all	D/K
It is easy to get an extra serve of vegetables each day.....	1.....	2.....	3.....	9
It is easy to increase the amount of fruit you eat.....	1.....	2.....	3.....	9
You only need to eat a few more vegetables to be getting enough.....	1.....	2.....	3.....	9
At the moment most West Australians are not eating enough vegetables in their diet.....	1.....	2.....	3.....	9





Q12 How much did you enjoy watching the ads? **READ OUT**

- 1 I enjoyed watching them a lot
 - 2 I quite enjoyed watching them
 - 3 I didn't mind watching them
 - 4 I didn't enjoy watching them much
 - 5 I didn't enjoy watching them at all
-
- 9 Don't know / no opinion **(DO NOT READ)**

Q13 How relevant did you personally find the ads? Would you say... **READ OUT**

- 1 Very relevant
 - 2 Somewhat relevant
 - 3 Not at all relevant
-
- 4 Don't know **(DO NOT READ)**

Q14 Have you done or do you intend to.... as a result of the campaign?
VARY ORDER. READ OUT SCALE. READ EACH STATEMENT

	Yes, done	Yes, intend to	No, don't intend to
ROTATE ORDER.			
Talk about diet with family and/or friends	1	2	3
Think about the amount of fruit and vegetables I eat.....	1	2	3
Buy more fruit when shopping.....	1	2	3
Buy more vegetables when shopping.....	1	2	3
Add an extra serve of veges to a meal	1	2	3
Try to increase the amount of fruit I/and or my family eats.....	1	2	3
Try to increase the amount of vegetables I/and or my family eats.....	1	2	3
Use recipes to help me increase the amount of fruit and vegetables I eat.....	1	2	3

Q15 Do you recall a slogan that was used in the ads?

- 1 Yes
- 2 No

IF YES, ASK:

Q16 What was the slogan? (DO NOT READ)

- 1 Go for 2 and 5.
- 97 Other (please specify)

IF CODE 1 AT Q16, GO TO Q18

Q17 Have you heard the slogan "Go for 2 and 5" ?

- 1 Yes
- 2 No
- 3 Don't know **(DO NOT READ)**





Q18 What do you think “Go for 2 and 5” means? What is it actually saying? **PROBE:**
Anything else?

Q19 To what extent do you agree or disagree that...? **IF ASKED: THIS IS FOR THE WHOLE FAMILY OVERALL** - To what extent do you agree or disagree that...?

(DO NOT READ)

ROTATE ORDER	Agree	Neither	Disagree	D/K	Refused
It takes too much time and effort to prepare vegetables.....	2	3	4	6	7
Vegetables are too expensive.....	2	3	4	6	7
Fruit is too expensive.....	2	3	4	6	7
There isn't enough variety in the types of fruit and vegetables where I shop.....	2	3	4	6	7
It's hard to find good quality fruit and vegetables.....	2	3	4	6	7
I / we already eat enough fruit and vegetables.....	2	3	4	6	7
I / my family don't like vegetables.....	2	3	4	6	7

Q21a Have you heard any ads on the radio about fruit and vegetables in the last two months?

- 1 Yes → continue
- 2 No → Q21c
- 9 Don't know → Q21c

Q21b Can you please describe the ads you have heard? **PROBE FULLY FOR DESCRIPTIONS**

Q21c The Department of Health has recently had some ads on the radio that promote how easy it is to eat fruit and vegetables using different jiggles. Have you heard any of these?

- 1 Yes
- 2 No
- 9 Don't know (DO NOT READ)

Q20a Are you aware of a cookbook called “Healthy Food Fast” ?

- 1 Yes → continue
- 2 No → Q20e
- 9 Don't know → Q20e





Q20b Where did you see or hear about this cookbook? Anywhere else? Anywhere else?
Anywhere else? **(DO NOT READ, CODE ALL RESPONSES)**

- 1 TV ads
- 2 Supermarkets, Fruit and Veg shop, Newsagents
- 3 Bookstores
- 4 Newspapers/ads, Information pamphlets
- 5 Radio, Health professional
- 6 Website
- 7 Family or friends
- 8 Other (specify) _____
- 9 Can't remember
- 10 Magazines

Q20c Do you have a copy of this cookbook in your household?

- 1 Yes → continue
- 2 No → Go to Q20e
- 9 Don't know → Go to Q20e

Q20d Have you personally (or anyone in your family) tried to make any of the recipes in the cookbook?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**

Q20e Each week in the Sunday Times newspaper lift-out, the Department of Health has published a recipe with different ideas for cooking fruit and vegetables. Have you seen any of these?

- 1 Yes → continue Q20f
- 2 No → Q22
- 9 Don't know → Q22

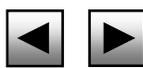
Q20f Have you personally (or anyone in your family) tried to make any of these recipes that you saw? **(DO NOT READ)**

- 1 Yes, I have
- 2 No, I haven't
- 3 No, I haven't yet, but I am intending to
- 9 Don't know

Q22 The Department of Health has also published ads in some magazines with a description of what a serve is, and tips for eating fruit and vegetables. Have you seen any of these?

- 1 Yes
- 2 No
- 9 Don't know **(DO NOT READ)**

Q23 And have you seen any other advertising for the Go for 2 & 5 campaign anywhere else over the last two months?





BACKGROUND INFORMATION

D1 What is your marital status? **READ OUT**

- 1 Never married
- 2 Married / Defacto
- 3 Separated, Divorced or widowed
- 9 Refused **(DO NOT READ)**

D2 What is the highest level of education you have completed? **(DO NOT READ)**

- 1 Never attended school/some primary school
- 2 Completed primary school
- 3 Some high school
- 4 School certificate/intermediate/year 10/4th form
- 5 TEE/TAE.HC/Leaving/Year 12/6th form
- 6 TAFE certificate/diploma
- 7 University, CAE or other tertiary institution degree
- 8 Other [specify]_____
- 9 Refused **(DO NOT READ)**

D3 Which of the following best describes your current employment? **READ OUT**

- 1 Full-time paid work
- 2 Part-time paid work
- 3 Home duties
- 4 Studying
- 5 Currently looking for work or receiving government assistance
- 8 Retired
- 6 Other (please specify)_____
- 9 Refused **(DO NOT READ)**

D4 How many children aged under 18 years are there in your household?

99 Refuse

IF NO, RECORD AS “ZERO” AND GO TO D6

D5 How many children under 12 years of age are there in your household?

99 Refuse

IF NO, RECORD AS “ZERO”

D6 Into which range does your annual combined household income fall? Please stop me when I read the correct category. **(READ OUT)**

- 1 Less than \$15,000
- 2 \$15,000 to less than \$25,000
- 3 \$25,000 to less than \$35,000
- 4 \$35,000 to less than \$50,000
- 5 \$50,000 to less than \$65,000
- 6 \$65,000 and over
- 9 Refused **(DO NOT READ)**





This study is carried out in compliance with the Privacy Act and the information you provided will be used only for research purposes. Your contact details will be removed from your questionnaire within three months.

You also have the right to request access to the information you have provided. If you have any queries, you can call Lighthouse Data Collection on (03) 8878 0000, or Christina Pollard at the Department of Health Western Australia Nutrition and Physical Activity Branch on 9222 2062 during office hours.

If requested: supply after hours numbers.

Thank you very much for your cooperation with our survey. In case my supervisor needs to contact you to check the validity of this interview, could I please ask for your name?

Can I just check the phone number I called?

In case you missed it earlier my name is... from Lighthouse Data Collection Services. If you would like to contact my supervisor to check the validity of this study, you can call our office on Ph: (03) 8878 0000.

Thank you for your time.

I certify that this is a true, accurate and complete interview, conducted in accordance with IQCA standards and the ICC/ESOMAR International Code of conduct. I will not disclose to any other person the content of this questionnaire or any other information relating to this project.

INTERVIEWER'S SIGNATURE: _____ DATE: _____



ADULT

CATI Health and Wellbeing Survey

We recently sent you a letter telling you about the survey. Did you receive the letter?

(Single Response)

1. Yes []
2. No []
3. Don't know [999]

DETERMINE THE AGE REQUIRED AS PER THE RANDOM ASSIGNMENT.

IF RESPONDENT NOT THE ONE WHO ANSWERED THE TELEPHONE, REPEAT INTRODUCTION 1 AND ADD INTRODUCTION 2.

INTRODUCTION 2

I can assure you that information given will remain confidential. The answers from all people interviewed will be gathered together and presented in a report. No individual answers will be passed on.

ASK THE AGE OF THE RESPONDENT.

A1. What was your age last birthday?

(Single Response)

1. Enter age []
 2. Not stated/Refused [999]
- If Q A1<9999, go to A4

**A2. Which age group are you in?
Would it be**

(Read Options. Single Response)

1. 18 to 24 []
2. 25 to 34 []
3. 35 to 44 []
4. 45 to 54 []
5. 55 to 64 []
6. 65 to 74 []
7. 75 years or older []
8. Refused [999]

Terminate interview

RECORD THE SEX

A3. Sex (ask if unsure)

1. Male []
2. Female []

GENERAL HEALTH

These next few questions ask you about your health.

B1. Overall, how would you rate your health during the past 4 weeks?

(Read options. Single response)

1. Excellent []
2. Very good []
3. Good []
4. Fair []
5. Poor []
6. Very poor []

B2. During the past 4 weeks, how much did physical health problems limit your usual physical activities (such as walking or climbing stairs)?

(Read Options. Single Response)

1. Not at all []
2. Very little []
3. Somewhat []
4. Quite a lot []
5. Could not do physical activities []

B3. During the past 4 weeks, how much difficulty did you have doing your daily work, both at home and away from home, because of your physical health.

(Read Options. Single Response)

1. None at all []
2. A little bit []
3. Some []
4. Quite a lot []
5. Could not do daily work []

B4. How much bodily pain have you had during the past 4 weeks?

(Read Options. Single Response)

1. None []
2. Very mild []
3. Mild []
4. Moderate []
5. Severe []
6. Very severe []

B5. During the past 4 weeks, how much energy did you have?

(Read Options. Single Response)

- 1. **Very much** []
- 2. **Quite a lot** []
- 3. **Some** []
- 4. **A little** []
- 5. **None** []

B6. During the past 4 weeks, how much did your physical health or emotional problems limit your usual social activities with family or friends?

(Read Options. Single Response)

- 1. **Not at all** []
- 2. **Very little** []
- 3. **Somewhat** []
- 4. **Quite a lot** []
- 5. **Could not do social activities** []

B7. During the past 4 weeks, how much have you been bothered by emotional problems (such as feeling anxious, depressed or irritable)?

(Read Options. Single Response)

- 1. **Not at all** []
- 2. **Slightly** []
- 3. **Moderately** []
- 4. **Quite a lot** []
- 5. **Extremely** []

B8. During the past 4 weeks, how much did personal or emotional problems keep you from doing your usual work, school or other daily activities?

(Read Options. Single Response)

- 1. **Not at all** []
- 2. **Very little** []
- 3. **Somewhat** []
- 4. **Quite a lot** []
- 5. **Could not do daily activities** []

B9. Compared to one year ago, how would you rate your health in general now?

(Read options. Single response)

- 1. **Much better now than one year ago** []
- 2. **Somewhat better now than one year ago** []
- 3. **About the same as one year ago** []
- 4. **Somewhat worse now than one year ago** []

5. **Much worse now than one year ago** []

CO-MORBIDITY

I'm going to read you a list of health problems that some people have.

C1. Please tell me if a doctor has ever told you that you have:

(Read Options. Multiple Response)

Code Yes=1 No=2 Can't

Remember/Don't Know=998

- 1. **Arthritis** []
(If yes) Was it diagnosed within the last 12 months? []
- 2. **Heart disease** []
(If yes) Was it diagnosed within the last 12 months? []
- 3. **Stroke** []
(If yes) Was it diagnosed within the last 12 months? []
- 4. **Cancer** []
(If yes) Was it diagnosed within the last 12 months? []
- 5. **Migraines** []
(If yes) Were they diagnosed within the last 12 months? []
- 6. **Osteoporosis** []
(If yes) Was it diagnosed within the last 12 months? []
- 7. **Eczema** []
(If yes) Was it diagnosed within the last 12 months? []
- 8. **Allergies** []
(If yes) Were they diagnosed within the last 12 months? []
- 9. **High Cholesterol** []
(If yes) Was it diagnosed within the last 12 months? []
Do you still have high cholesterol []
Do you take any medication for high cholesterol? []
- 10. **High Blood Pressure** []
(If yes) Was it diagnosed within the last 12 months? []
Do you still have high blood pressure? []
Do you take any medication for high blood pressure? []
- 11. **Other than Asthma, a respiratory problem such as Bronchitis, Emphysema, Chronic Lung Disease** []
(If yes) Was it diagnosed within the last 12 months? []

Do you still have this respiratory problem? []

11. High sugar levels in your blood or urine []

(If yes) Was it diagnosed within the last 12 months? []

Do you still have high sugar levels in your blood or urine?

C2. Has a doctor ever told you that you had diabetes ?

(Single Response)

1. Yes []

2. No [] **Go to C 8**

3. Can't Remember/Don't Know [998] **Go to C 8**

C3. Were you pregnant when you were first told you had diabetes or high blood sugar?

(Single Response.)

1. Yes [] **Go to C 7**

2. No []

C4. What type of diabetes were you told you had?

(Single Response.)

1. Type 1 – Insulindependent, Juvenile onset []

2. Type 2 – Non-insulin dependent, Mature onset []

3. Don't know []

4. Other (*specify*) []

C5. How old were you when you first were told you had diabetes or high blood sugar?

(Single Response)

1. Age in Years []

2. Don't know/Can't Remember [998]

C6. When you were first told you had diabetes or high blood sugar, what treatment did the doctor put you on?

(Multiple Response)

1. Dietary change []

2. Insulin []

3. Tablets []

4. Lose weight []

5. Exercise []

6. Monitor blood glucose daily []

6. Nothing []

7. Other []

Code 8888 in any of the fields where the response is don't know/can't remember

C7. Do any of the other people living in the same house as you have diabetes?

(Single Response Code don't know/Unsure 998)

1. Yes []

2. No []

C8. Have you ever been told by a doctor [or nurse] that you have asthma?

(Single Response)

3. Yes []

4. No [] **Go to C 12**

5. Can't Remember/Don't know [998] **Go to C 12**

C9. In the last twelve months, have you had symptoms of asthma?

(Single Response)

1. Yes []

2. No []

3. Can't Remember/Don't know [998]

C10. In the last twelve months, have you taken treatment for asthma?

(Single Response)

1. Yes []

2. No []

3. Can't Remember/Don't know [998]

C11. Do any of the other people living in the same house as you have asthma?

(Single Response Code Unsure/don't know 998)

1. Yes []

2. No []

C12. Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed or a special telephone?

(Single Response Code don't know=998 Refused=999)

1. Yes []

2. No []

C13. In the last 12 months how many injuries have you had that required treatment from a health professional?

(Single Response. Interviewer note: The Royal Flying Doctors is included) Code None as 0

Enter number []

Can't Remember/Don't know [998]

KESSLER PSYCHOLOGICAL DISTRESS SCALE

The next questions are about how you have been feeling in the last 4 weeks.

D1. In the past four weeks, about how often did you feel tired out for no good reason?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D2. In the past four weeks, about how often did you feel nervous?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

Sequence guide: If D2 = 5 Go to D4

D3. In the past four weeks, about how often did you feel so nervous that nothing could calm you down?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D4. In the past four weeks, about how often did you feel hopeless?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D5. In the past four weeks, about how often did you feel restless or fidgety?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

Sequence guide: If D5 = 5 Go to D7

D6. In the past four weeks, about how often did you feel so restless you could not sit still?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D7. In the past four weeks, about how often did you feel depressed?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D8. In the past four weeks, about how often did you feel everything was an effort?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D9. In the past four weeks, about how often did you feel so sad that nothing could cheer you up?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

D10. In the past four weeks, about how often did you feel worthless?

(Read Options. Single Response)

1. All of the time []
2. Most of the time []
3. Some of the time []
4. A little of the time []
5. None of the time []

The next few questions are about your level of physical activity.

E1. In the last week, how many times have you walked continuously, for at least 10 minutes, for recreation, exercise or to get to or from places?

(Single Response. Enter number of times. Enter 0 if none)

2. Enter number of times ___ ___ **If number of times=0 Go to E3**
3. Can't Remember/Don't know [998] **Go to E3**

E2. What do you estimate was the total time that you spent walking in this way in the last week?

(Single Response. Enter number of hours AND/OR minutes.)

Hours ___ ___
 Minutes ___ ___
 Can't Remember/Don't know [998]

E3. This question excludes household chores or gardening. In the last week, how many times did you do any vigorous physical activity which made you breathe harder or puff and pant? (e.g. tennis, jogging, cycling, keep fit exercises).

(Single Response. Enter number of times. Enter 0 if none)

1. Enter number of times ___ ___ **If number of times=0 Go to E5**
2. Can't Remember/Don't know [998] **Go to E5**

E4. What do you estimate was the total time that you spent doing this vigorous physical activity in the last week?

(Single Response. Enter number of hours AND/OR minutes.)

Hours ___ ___
 Minutes ___ ___
 Can't Remember /Don't know [998]

E5. This question excludes household chores or gardening. In the last week how many times did you do any other more moderate physical activities that you have not already mentioned?

(Single Response. Enter number of times. Enter 0 if none)

1. Enter number of times ___ ___ **If number of times=0 Go to E7**
2. Can't Remember/Don't know [998] **Go to E7**

E6. What do you estimate was the total time that you spent doing these activities in the last week?

(Single Response. Enter number of hours AND/OR minutes.)

Hours ___ ___
 Minutes ___ ___
 Can't Remember/Don't know [998]

E7. How many hours per week do you spend watching TV, videos or playing video or computer games?

(Single Response. Enter number of hours. Enter 0 if none)

Hours ___ ___
 Can't Remember/Don't know [998]

RISK FACTORS

F1. What is your height without shoes?

(Single Response)

Centimetres ___

OR

Feet ___

Inches ___

Can't Remember/Don't know [998]

Refused [999]

F2. What is your weight?

(Single Response)

Kilograms (Kg) ___

OR

Stones ___

Pounds ___

Can't Remember/Don't know [998]

Refused [999]

Now we are going to ask some questions about your lifestyle.

F3. On how many days of a week do you usually drink alcohol?

(Single Response. Code don't drink as 0 and less than once a week =.5)

1. Enter number of days [] **If number =0 Go to F3**
2. Can't Remember/Don't know [998] **Go to F5**
3. Refused [999] **Go to F5**

F4. A Standard Drink is equivalent to a schooner or midi of full strength beer, a glass of wine or a nip of spirits. On a day when you drink alcohol, how many standard drinks do you usually have?

(Single Response)

1. Enter number of drinks []
2. Refused [999]

The following questions are about tobacco smoking. This includes cigarettes, cigars and pipes.

F5. Which of the following best describes your home situation?

(Single Response. Read options)

1. My home is smoke free []
(includes smoking is allowed outside only)
2. People occasionally smoke in the house []
3. People frequently smoke in the house []
4. Don't know [999]

F6. Which of the following best describes your smoking status?

(Single Response. Read options Code can't remember 998 and refused 999)

1. I smoke daily []
2. I smoke occasionally []
3. I don't smoke now but I used to []
4. I've tried it a few times but never smoked regularly []
5. I've never smoked []

F7. Do any of the other people living in the same house as you smoke?

(Single Response Code don't know 998)

3. Yes []
4. No []

Now I would like to ask you a few questions about smoking in public places.

F8. How do you feel about being exposed to other people's cigarette smoke? Would you say that you were:

5. Not concerned at all
6. A little concerned
7. Neither concerned nor unconcerned
8. Reasonably concerned
9. Very concerned

F9. In your opinion, can the health of non-smokers be affected by other people's cigarette smoke?

(Single Response Code Unsure=998 refused 999)

1. Yes []
2. No []

F10. Do you avoid places where you may be exposed to other people's cigarette smoke?

(Single Response)

1. Yes []
2. No []
3. Don't Know/Uncertain/Unsure [998]
4. Refused [999]

F11. To what extent would you support the banning of smoking in all workplaces, excluding pubs and clubs?

(Single Response. Read options Code refused =999)

1. Definitely support
2. Probably support
3. Unsure whether or not I would support
4. Probably not support
5. Definitely not support

F12. To what extent would you support the banning of smoking in all workplaces, including pubs and clubs?

(Single Response. Read options Code refused =999)

1. Definitely support
2. Probably support
3. Unsure whether or not I would support
4. Probably not support
5. Definitely not support

F13. To what extent would you support legislation that banned smoking in all enclosed public places including pubs and clubs?

(Single Response. Read options Code refused =999)

1. Definitely support
2. Probably support
3. Unsure whether or not I would support
4. Probably not support
5. Definitely not support

F14. What do you think would happen to your social activities if the pubs and clubs become smoke-free?

(Single Response. Read options Code refused =999)

1. I would stop going to pubs and clubs
2. I would go to pubs and clubs less often
3. I am unsure how often I would go to pubs and clubs
4. It wouldn't change how often I go to pubs and club Yes, always
5. I would go to pubs and clubs more often

F14. How likely do you think it is that pubs and clubs will become completely smoke-free in the next five years?

(Single Response. Read options Code refused =999)

1. Very likely
2. Somewhat likely
3. Unsure
4. Quite unlikely
5. Very unlikely

Now to some questions about food.

G1. What do you think a serve of vegetables equals?

(Single Response – UNPROMPTED)

1. One piece
2. One type of vegetables eg carrot
3. ½ cup
4. Other amount [Specify]
5. What I put on my plate
6. Other [Specify]
7. Don't know [998]
8. Refused [999]

G2. How many serves of vegetables do you usually eat each day? A serve of vegetables is equal to half cup of cooked vegetables or 1 cup of salad.

(Single Response. Code NONE 0 and less than one a day =.5)

1. Enter number []
2. Don't know/Can't Remember [8888]
3. Refused [999]

G3. What do you think a serve of fruit equals?

(Single Response – UNPROMPTED)

1. One piece
2. One type of fruit eg apple
3. ½ cup
4. Other amount [Specify]
5. Other [Specify]
6. Don't know [998]

G4. How many serves of fruit do you usually eat each day? A serve of fruit is equal to one medium piece, two small pieces of fruit or one cup of diced.

(Single Response. Code NONE as 0 and less than one a day=.5)

1. Enter number []
2. Don't know/Can't Remember [8888]
3. Refused [999]

G5. The Department of Health has recently conducted a campaign about fruit and vegetables. Do you recall hearing or seeing anything about this?

(Single Response)

1. Yes []
2. No []
3. Can't Remember/Don't know [998]

G6. Do you remember seeing any TV commercials showing a face made of fruit and vegetables?

(Single Response)

1. Yes []
2. No []
3. Can't Remember/Don't know [998]

G7. What type of milk do you usually consume?

(Single Response. Prompt if necessary)

1. Whole milk []
2. Low / reduced fat []
3. Skim []
4. Soya []
5. Other []
6. Don't use milk []
7. Can't Remember/Don't know [998]

G8. How many times a week on average, do you have meals or snacks such as burgers, pizza, chicken or chips from places like McDonalds, Hungry Jacks, Pizza Hut or Red Rooster?

(Single Response. Code don't have any as 0 and less than once a week =.5)

- Enter number ____
- Can't Remember/Don't know [998]
- Refused [999]

PSYCHOSOCIAL QUESTIONS

The next three questions are about your life in general.

H1. During the past four weeks how much of the time did you feel a lack of control over your life in general:

(Read options. Single response)

1. Never []
2. Rarely []
3. Sometimes []
4. Often []
5. Always []

H2. During the past four weeks how much of the time did you feel a lack of control over your personal life:

(Read options. Single response)

1. Never []
2. Rarely []
3. Sometimes []
4. Often []
5. Always []

H3. During the past four weeks how much of the time did you feel a lack of control over your health:

(Read options. Single response)

1. Never []
2. Rarely []
3. Sometimes []
4. Often []
5. Always []

H4. In the last 12 months have you been told by a doctor that you have any of the following conditions?

(Read Options. Multiple Response – code Yes=1 No=2 and refused as 9999)

1. Anxiety []
2. Depression []
3. A stress related problem []
4. Any other mental health problem []
5. Refused [999] **Go to I1**

H5. Do you still have any of these conditions?

(Single Response)

1. Yes []
2. No []
3. Refused [999]

H6. Are you currently receiving treatment for anxiety, depression, stress related problems or any other mental health problem?

(Single Response. Interviewer note: includes phone treatment)

1. Yes []
2. No []
3. Refused [999]

H7. Is there someone you confide in about things that are important to you?

(Single Response)

1. Yes []
2. No []
3. Don't know [998]
4. Refused [999]

SOCIAL CHARACTERISTICS

Now some more general questions.

I1. Were you born in Australia?

(Single Response)

1. Yes []
2. No [] **Go to I3**
3. Refused [888] **Go to I3**

I2. Are you of Aboriginal or Torres Strait Islander origin?

(Single Response)

1. Yes []
2. No []
3. Don't Know []
4. Refused [999]

I3. What is the highest level of education you have completed?

(Single Response. Prompt if necessary)

1. University or other tertiary degree including post graduate degrees []
2. TAFE or Trade Certificate or Diploma []
3. Completed Year 12 []
4. Completed Year 10 []
5. Completed Primary School []
6. Some Primary school []
7. Never attended school []
8. Other (specify) []

I4. Are you currently studying?

(Single Response)

1. Yes []
2. No []
3. Refused [999]
- 4.

15. Which ONE of the following best describes your current employment status? Are you.

(Single Response. Read options)

1. Self employed []
2. Employed for wages, salary or payment in kind? []
3. Unemployed? [] [Go to I7](#)
4. Engaged in home duties? [] [Go to I8](#)
5. Retired? [] [Go to I8](#)
6. Unable to work? [] [Go to I8](#)
7. A student? [] [Go to I8](#)
8. Other [] [Go to I8](#)

16. If you are in paid employment, how many hours per week do you work ?
(If asked, it is the total number of hours put in rather than the hours paid for.)

Hours per week _____
Can't Remember/Don't know [998]
Refused [999]

17. Are you looking for employment?
(Single Response)

1. Yes []
2. No []
3. Refused [999]

18. During the last four weeks, how many days were you unable to work or carry out your normal duties because of your health?

(Single Response. Interviewer note: enter number of days off – code no days off as 0)

1. Enter Days _____
2. Can't Remember/Don't know [998]

19. Which best describes your household money situation?

(Read Options. Single Response)

1. [I am / we are] spending more money than [I / we] get []
2. [I / we] have just enough money to get us through to the next pay day []
3. There's some money left over each week but [I / we] just spend it []
4. [I / we] can save a bit every now and then []
5. [I / we] can save a lot []
6. Don't know [998]
7. Refused [999]

10. What is your marital status?

(Read Options. Single Response)

1. Married []
2. Living with a partner []
3. Widowed []
4. Divorced []
5. Separated []
6. Never Married []
7. Don't know [998]
8. Refused [999]

11. What best describes your current living arrangements?

(Read Options. Single Response)

1. Living with my parent(s) [] [Go to J12](#)
2. Living with other family members []
3. Living with friends [] [Go to J12](#)
4. Living with a partner []
5. Living alone [] [Go to J12](#)

12. How would you best describe your family structure? Please listen to the options and then tell me which one is the closest to your family situation.

(Read Options. Single Response)

1. A family with a child or children living with both biological or adoptive parents []
2. A step or blended family []
3. A sole parent family []
4. A couple with no dependent children[]

13. Can you tell me the approximate annual gross income of your household? That is, for all people in the household before tax is taken out. I'll read out some categories and could you please tell me into which one your household's income falls?

(Read Options. Single Response Code don't know=998 refused=999)

1. Up to \$12,000 []
2. \$12,001 - \$20,000 []
3. \$20,001 - \$40,000 []
4. \$40,001 - \$60,000 []
5. \$60,001 - \$80,000 []
6. More than \$80,000 []

I14. Including yourself how many people aged 18 years and over usually live in this household?

(Single Response)

1. *Enter number* []
2. Not stated/Refused [999]

I15. How many children (including babies) under 18 years live in your household?

(Single Response)

1. *Enter number* []
2. Not stated/Refused [999]

I16. What is your postcode?

(Single Response)

1. *Enter postcode* []
2. Not stated/Refused [999]

I17. What is your suburb, town or community?

(Single Response.)

- Enter town /suburb* _____
- Not stated/Refused [999]

I18. How many listings do you have in the White Pages telephone book?

1. *Enter number* --
2. Don't know [998]
3. Refused [999]

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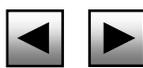
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