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Research review

Promoting consumption of fruit and vegetables for better health. Have campaigns delivered on the goals?

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ABSTRACT

Daily intake of fruits and vegetables worldwide remains well below the recommended WHO levels, despite the established health benefits associated with fruit and vegetable consumption. A diversity of policy interventions designed to increase consumption have been conducted in the developed economies around the globe for over a decade, involving significant monetary outlays. The impact of these initiatives remains at best, modest to low, in effecting a significant increase in daily consumption on a sustained basis. Several factors have been identified in both promoting and impeding the increase in fruit and vegetable consumption, including the effects of consumer behaviour. This paper reviews several of the major promotional campaigns from around the world and provides analysis of their level of success, with a view to developing novel approaches for formulating more effective marketing and promotional interventions that will prompt significant change.

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Introduction

Medical and nutritional research has, for decades, emphasised the health benefits from consuming fruits and vegetables which include reduced risk of diseases such as cardiovascular conditions, certain cancers, Type II diabetes and obesity. Such foods are relatively low in calories, nutrient rich and contain fibre to promote health and well-being. The [World Health Organization \(WHO\) \(2013\)](#) estimates that approximately 1.7 million (2.8%) deaths per annum worldwide are linked to low fruit and vegetable consumption and are therefore, important components of a healthy, balanced diet. The WHO recommends a minimum consumption of 400 g of fruit and vegetables per day, excluding potatoes and other starchy tubers, to help prevent chronic disease and nutritional deficiencies. As a result, promoting fruit and vegetable consumption is a key objective of food and nutrition policy interventions conducted around the world by government and non-government stakeholders.

To facilitate change in consumer behaviour for increasing consumption of fruit and vegetables, a wide variety of health, promotional and social marketing interventions have been conducted around the world for more than a decade. However, the success of these initiatives, measured in terms of increase in daily consumption per person per serve, remains modest. This review examines the major campaigns and interventions conducted around the world over the last 10 years and their success in achieving this goal. It also

reviews the literature that explores and investigates the promoters and barriers to growth in fruit and vegetable consumption including consumer psychology and behaviour. Finally, the review highlights some recommendations regarding further research required to make these interventions more effective in bringing about a meaningful increase in fruit and vegetable consumption.

How much fruits and vegetables are consumed?

Recent research conducted by [Reiss, Johnston, Tucker, Desesso, and Keen \(2012\)](#) has concluded that “if one-half of the U.S. population were to increase fruit and vegetable consumption by one serving each per day, an estimated 20,000 cancer cases might be avoided each year.” However, the current average consumption of fruits and vegetables globally is much lower than the WHO recommended intake. In Europe, consumption stands at only 220 g per person per day for adults, which is half the daily recommended quantity ([The Louis Bonduelle Foundation, 2011](#)). In the U.S. only 6–8% of individuals achieve their recommended daily target for vegetables and fruit, with the average American consuming only 1.8 cups of fruits and vegetables per day ([Produce for Better Health Foundation, 2010](#)).

The Australian Health Survey 2011–2012 reported that 48.3% of Australian adults met the recommended guideline for daily fruit intake, while only 8.3% met the guideline for daily vegetable intake ([Australian Bureau of Statistics, 2012](#)). Overall, only 5.6% of Australian adults had an adequate daily consumption of fruit and vegetables in 2011–2012. Furthermore, older Australians, aged

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65–74 years, are more likely to meet the recommended guideline with 9.6% of this sector consuming the daily recommended consumption, while only 3% of Australian adults aged 25–34 years met the daily recommended guideline for fruit and vegetables (Australian Bureau of Statistics, 2012).

The Australian Guide to Healthy Eating recommends consumption of two to eight serves of vegetables and legumes and one to five serves of fruit per day, based on age and other factors (Australian Institute of Health and Welfare, 2012). The simplified message to the consumer is two serves of fruit and five serves of vegetables per day. In this context, the definition of a serve of fruit and vegetables is important. One serve of fruit is 150 g and equal to about 1 cup of chopped or canned fruit, while one serve of vegetables is 75 g or about 1 cup of salad vegetables or half a cup cooked vegetables (Australian Institute of Health and Welfare, 2012).

The U.S. ran the “5 A Day for Better Health” programme for 15 years promoting consumption of five or more servings of vegetables and fruit daily for better health. This programme has now been replaced by “Fruits & Veggies – More Matters” (Fruits & Veggies More Matters, 2013a). The U.S. Department of Agriculture (USDA) recommends that Americans fill half their plate with colourful fruits and vegetables for meals and eating occasions under its “My Plate” dietary recommendation (Fruits & Veggies More Matters, 2013b).

Canada’s Food Guide to Healthy Eating recommends between five and 10 servings of fruit and vegetables everyday while the Danish “6 om dagen” or six a day campaign promotes six a day or 600 g of fruit and vegetables daily (The International Fruit and Vegetable Alliance, 2013; Uetrecht, Greenberg, Dwyer, Sutherland, & Tobin, 1999). The New Zealand “5+ A Day” initiative promotes consumption of five or more servings of fruit and vegetables a day. Given there is consensus among the developed world about the recommended daily intake of fruit and vegetables, there needs to be a unified message promoted to the consumer around the world (World Health Organization, 2013).

Fruit and vegetable interventions promoting consumption

In the developed world, various promotional interventions have been initiated by the government, industry and not-for-profit organisations promoting consumption of fruits and vegetables, to help reduce the risk of disease and promote well-being. Over the past decade, Australia, USA, Canada, New Zealand and several countries in the European Union have conducted informational and educational campaigns, costing millions of dollars, to promote increased consumption without significant and sustained success. For example, it is estimated that approximately DKK 4 million (USD 0.73 million) per annum is the current cost of the Danish “6 a day” campaign (S. W. Johannessen, personal communication, January 7, 2014). The national “Go for 2&5” campaign conducted between 2005 and 2007 in Australia cost AUD 4.76 million (USD 4.17 million) (Rowley, 2006), while in the U.S., approximately USD 3–5 million per annum has been outlayed for the “Fruits & Veggies – More Matters” campaign since its launch in 2007 (E. Pivonka, personal communication, January 8, 2014). Another example is the “Food Dudes” programme in the U.K., which has cost more than GBP 10 million (USD 16.58 million) since its inception in 1992 (C. F. Lowe, personal communication, December 22, 2013). The aims and strategies of several key promotional programmes are discussed below and the evaluations of the campaigns are listed in Table 1.

Australian “Go for 2&5” campaign

In 2002 the Western Australian (WA) Department of Health launched a multi-strategy social marketing campaign, targeted at adults, to promote knowledge of recommended daily intakes

and consumption of fruit and vegetables. This campaign, known as “Go for 2&5”, had three main communication objectives: increasing awareness; building positive attitudes towards consuming more fruit and vegetables; and creating intention among adults to consume two serves of fruit and five serves of vegetables daily (Woolcott Research Pty Ltd, 2007). Analysis of the campaign after 3 years showed that there was an average net increase of 0.8 serves per day for overall consumption of fruits and vegetables (Table 1) or 11.4% increase of the total recommended intake of fruits and vegetables (Pollard et al., 2008b). This included a 0.2 serve increase for fruit (10% of recommended fruit intake) and 0.6 serve increase for vegetables (12% of recommended vegetable intake) during this period, demonstrating only a modest impact on the consumption behaviour over the long term among the target group (Pollard et al., 2008b).

After the introduction of the WA campaign, the “Go for 2&5” campaign was launched nationally in April 2005 and was initially run as a collaborative effort between the Commonwealth and all state and territory health departments, except in Victoria, and not-for-profit organisations such as the Cancer Institute and the fruit and vegetable industry (Australian Institute of Health and Welfare, 2012; Morgan, 2009). The \$4.76 million national intervention was managed by the fruit and vegetable industry body, Horticulture Australia Ltd (HAL) and used television (TV), radio, print media, point-of-sale advertising, a range of publications, branded merchandise, editorials and a well-tailored website to promote the message. The campaign was aimed at a specific segment of the market which was defined by the following characteristics: the primary shopper and meal preparer at home, who wanted to provide their family with a healthy diet, was busy or short of time, and had exposure to health and nutrition promotional messages (Rowley, 2006, 2009).

The national campaign was evaluated by two telephone follow-up surveys which were conducted between mid-July and early September 2005. The target audience for these surveys were parents of children aged 0–17 years and children themselves aged 9–12 years (Woolcott Research Pty Ltd, 2007). The findings indicated that a high proportion of parents (60%) already consumed the recommended two serves of fruit daily and the campaign only resulted in an increased awareness and knowledge among both parents and children about the recommended daily intake of vegetables (Table 1). The report suggests that knowledge of optimum vegetable consumption could possibly bring about behavioural change among the targeted groups in the longer term, but there was no detectable change in the proportion of parents consuming the recommended five daily serves of vegetables, reported over the survey period (Australian Institute of Health and Welfare, 2012; Woolcott Research Pty Ltd, 2007).

The national “Go for 2&5” campaign supported by the Commonwealth Government of Australia ended in 2007 due to withdrawal of federal government funding and subsequent exit of HAL from the co-ordinating role. It continued in some states in subsequent years, supported by the respective state departments of health and the not-for-profit organisations with an interest in public health; however, it was not backed by support from the fruit and vegetable industry. Lack of industry participation is purported to be attributed to the highly fragmented nature of the fruit and vegetable sector; the non-existence of a vegetable marketing levy to support a generic promotional campaign; licencing issues related to the use of “Go for 2&5” brand; the health driven focus as opposed to a consumption driven initiative; and insufficient involvement of the retail sector (a significant stakeholder group in the value chain) in the programme. State government health sector resource allocations and priorities also changed over time and as a result new programmes were rolled out at national and state levels. Given that only 5.6% of Australian adults met the daily recommended intake for fruit and vegetable consumption in 2011–2012, the campaign has fallen short of its targeted goal.

Table 1

Summary of promotional campaigns to increase fruit and vegetable consumption adopted by major developed countries.

Promotional campaign	Target audience	Criteria for success	Evaluation methodology	Results
Australia – Go for 2&5 (i) Western Australia (2002–2005)	Western Australian adult population	<p>1) Increase awareness of the recommended servings of fruit and vegetables</p> <p>2) Increase in the mean number of servings of fruit and vegetables per day</p>	<p>1) Campaign Tracking Survey – campaign recall, attitudes and beliefs (Pollard et al., 2008b)</p> <p>2) Health Department's Health & Well-being Surveillance System Survey (Pollard et al., 2008b)</p>	<p>1) Campaign recall increased during the intervention: 62.4% of respondents spontaneously aware of the campaign after 3 years (in 2004/2005) and 90.2% were aware when prompted with a description of the campaign. Significant decline 12 months post intervention in 2005/2006) to 42.2% (spontaneous) and 77.7% (prompted).</p> <p>2) After 3 years, increase in total consumption of fruits and vegetables by 0.8 mean number of servings per day (0.2 serves per day of fruit and 0.6 serves per day of vegetables).</p>
(ii) National (2005–2007)	<p>1) Parents and carers of children and youth (aged 0–17 years)</p> <p>2) Children (aged 5–12 years) and youth (aged 13–17 years)</p>	<p>1) Consumption of recommended serves of fruit and vegetables per day</p> <p>2) Attitudes and beliefs regarding fruit and vegetable consumption</p> <p>3) Changes to fruit and vegetable consumption</p> <p>4) Healthy eating and physical activity campaign awareness</p> <p>5) Go for 2&5 campaign awareness</p> <p>6) Reported action taken as a result of the campaign</p>	<p>Three National Telephone Surveys – initial Baseline Survey (30 March–22 April 2005); Follow up 1 Survey (15–17 July 2005); and Follow up 2 Survey (18 August–5 September 2005) (Woolcott Research Pty Ltd, 2007)</p>	<p>1) Sixty per cent of parents consumed the recommended intake for fruit and this remained unchanged over the period of the three surveys; 10% of parents consumed the recommended intake for vegetables and this remained unchanged over the period of the surveys; the proportion of children who consumed fruit 7 days/week increased from 43% to 49% while the proportion of children who consumed vegetables 7 days/week remained unchanged at 55%.</p> <p>2) Fifty-five per cent of parents believed that they should eat more fruit; 40% of parents believed that they should eat more vegetables; Knowledge of the recommended vegetable intake among parents increased from 24% to 32%; among children, the importance of eating fruit and vegetables remained unchanged at 92%; the perception among children about two or more serves of fruit per day required to maintain good health increased from 83% to 89%; the perception among children about five or more serves of vegetables per day required to maintain good health increased from 16% to 33%.</p> <p>3) Forty per cent of parents indicated they attempted to increase family fruit consumption and less than 30% indicated an attempt to increase vegetable consumption.</p> <p>4) The parents' unprompted recall of nutrition and physical activity advertising in the media increased from 59% to 66%.</p> <p>5) The parents' prompted recall of Go for 2&5 television (TV) commercials increased from 21% to 63%; the children's prompted recall of Go for 2&5 TV campaign increased from 24% to 83%.</p> <p>6) The 'campaign recaller' parents who took action (increased consumption) as a result of the campaign grew from 29% to 42%; the 'campaign recaller' children who took action (increased consumption) as a result of the campaign grew from 50% to 62%.</p>

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Table (continued)

Promotional campaign	Target audience	Criteria for success	Evaluation methodology	Results
U.S. – Fruits & Veggies – More Matters (2007–Present)	Mothers of children aged 10 years and below (E. Pivonka, personal communication, January 8, 2014)	<p>1) Short to medium term goals – number of unique web visitors; brand awareness; mothers who ‘intend to serve more’ fruit and vegetables; mothers likely to purchase product with brand logo; industry contributions</p> <p>2) Long term goal – increase fruit and vegetable consumption</p>	<p>1) Quarterly and annual reviews (Produce for Better Health Foundation, 2013b)</p> <p>2) Consumption data collected every 5 years from The National Panel of Diaries (NPD) – Nutrient Intake Database (Produce for Better Health Foundation, 2010)</p>	<p>1) The number of unique web visitors increased by 110% between 2009 and 2012; brand awareness increased from 11% in 2007 to 26% in 2012; proportion of mothers who ‘intend to serve more’ fruit and vegetables increased from 69% in 2007 to 79% in 2012; mothers more likely to purchase product with brand logo increased from 40% in 2007 to 49% in 2012; industry contributions increased from USD 1.78 million in 2009 to 1.987 million in 2012.</p> <p>2) Fruit and vegetable consumption for individuals (average cups per person per day) remains unchanged at 1.81 between 2004 and 2009; fruit and vegetable consumption for children less than 6 years old and between 6 and 12 years old (average cups per person per day) has increased by 7% and 5% respectively between 2004 and 2009; fruit and vegetable consumption for adult males (average cups per person per day) has declined by 2% between 2004 and 2009; fruit and vegetable consumption for adult males 18–34 years old and 35–44 years old (average cups per person per day) has increased by 4% and 2% respectively between 2004 and 2009; fruit and vegetable consumption for adult females (average cups per person per day) has declined by 1% between 2004 and 2009; fruit and vegetable consumption for adult females 18–44 years old (average cups per person per day) has increased by 4% between 2004 and 2009; fruit and vegetable consumption for males and females 65+ years old (average cups per person per day) has declined by 7–9% between 2004 and 2009.</p>
U.K. – Food Dudes (1992–Present)	2- to 11-year-olds (C. F. Lowe, personal communication, December 22, 2013)	<p>1) Sustained increase in fruit and vegetable consumption</p> <p>2) Decline in unhealthy snackfood consumption</p>	Controlled trials and ongoing evaluations after the initial intervention, in Primary Schools and Nurseries/Early Years Centres (Bangor University, 2013)	<p>1) Increase in fruit and vegetable consumption ranging from 60% to 200%.</p> <p>2) Decrease in consumption of unhealthy foods ranging from 20% to 100%.</p>
Denmark – 6 a Day (6 om dagen) (1999–Present)	2008–2011: Groups that ate the least fruit and vegetables – families with children; men; and young (S. W. Johannessen, personal communication, January 7, 2014)	<p>1) Increase in intake of fruit and vegetables</p> <p>2) Increase in knowledge of the recommendation for the intake of fruit and vegetables</p>	Data from Danish National Survey of Dietary Habits and Physical Activity (Danish National Centre for Social Research, 2005 , Danish National Centre for Social Research, 2009)	<p>1) (i) Vegetable consumption (grams per person per day): for the 4- to 10-year-old group, increased by 29% and for the 11- to 75-year-old group, increased by 41% between 1995 and 2004.</p> <p>1) (ii) Fruit consumption (grams per person per day): for the 4- to 10-year-old group, increased by 58% and for the 11- to 75-year-old group, increased by 75% between 1995 and 2004.</p> <p>1) (iii) The average intake of vegetables and vegetable products for adults (18–75 years) stood at 162 g/day for the period 2003–2008. The average intake of fruit and fruit products for adults (18–75 years) was 283 g/day for the period 2003–2008.</p> <p>2) Data on increase in knowledge of the recommended intake of fruit and vegetables are not publicly available.</p>
New Zealand – 5+ A Day (1994–Present)	Household shoppers and children	<p>1) To raise awareness of the need to eat ‘5+ A Day’ (five or more servings a day) of fruit and vegetables (P. Dudley, personal communication, January 10, 2014)</p> <p>2) Increase consumption of fruit and vegetables</p>	5+ A Day Awareness and Consumption Research – telephone surveys, face-to-face street intercept, online surveys, Nielsen data (The 5+ A Day Charitable Trust, 2012 , United Fresh, 2012)	<p>1) In 1995, 65% of the population were familiar with the ‘5+ A Day’ logo. In 2008, 93% children and 69% parents correctly identified the meaning of ‘5+ A Day’. In 2012, 88% identified one of the ‘5+ A Day’ messages (‘To be healthy you should try to eat five or more servings of fruit and/or vegetables a day’).</p> <p>2) (i) In 1995, 31% of the population reported consuming 5+ servings a day. In 2012, 38% reported consuming 5+ servings a day, an increase of 23% over 1995.</p> <p>2) (ii) In 2011, 60.4% of the population was reported to be consuming the recommended two serves of fruit daily (a rise from 46% in 1997) and 66% of the population was consuming the recommended three serves of vegetables a day (no significant change since 1997).</p>

In October 2008, the national “Measure Up” campaign was launched in Australia to build awareness about the adverse health impacts of excess abdominal fat, focusing on the benefits of leading a healthy lifestyle, healthier eating and making healthier shopping choices (Australian Institute of Health and Welfare, 2012). This was followed by a second phase in 2011, called “Swap It Don’t Stop It” campaign focused on promoting the small, everyday changes one can make to move towards a healthier lifestyle, without the feeling of sacrifice (Australian Government, 2013). There are other initiatives of the Australian Government which promote healthy eating and regular exercise such as the “Get set for Life – *Habits for healthy kids*” interactive guide, initiated in 2008, that provides practical information to help parents/carers encourage and promote the importance of establishing healthy life habits among children (Department of Health and Ageing, 2013). These more holistic interventions support research that suggests that promoting a group of inter-related behaviours such as diet and exercise, with a health and lifestyle focus are likely to have a higher success rate compared with just campaigning for increasing daily fruit and vegetable consumption (Dutta-Bergman, 2005).

U.S. “5 A Day for Better Health” programme and “Fruits & Veggies – More Matters” brand

The “5 A Day” Programme was a joint public/private initiative which ran in the U.S. from 1991 to 2006 to increase the consumption of fruit and vegetables for improving health and well-being (Produce for Better Health Foundation, 2013a). The programme was jointly sponsored by the National Cancer Institute (NCI), who was the lead health authority initially, and the Produce for Better Health Foundation (PBH) from the private sector, with the subsequent involvement of the Centers for Disease Control & Prevention (CDC) in 2005 as the lead health authority (Produce for Better Health Foundation, 2013a). Supporting research highlighted that one of the barriers to increasing consumption included meeting quantified targets in terms of daily number of serves. The “5 A Day” initiative was replaced by the “Fruits & Veggies – More Matters” programme in March 2007 as a result of changing dietary recommendations for fruit and vegetable intake and this new brand continues to be implemented by the PBH and CDC in partnership (Produce for Better Health Foundation, 2013a).

Based on research and discussions conducted with key stakeholders including government, non-profit organisations such as the Cancer Society, Diabetes Association, PBH, Aprifel, retailers, growers/manufacturers, food service fast food chains, consumers and others, it emerged that “a compelling emotional benefit” was required to inspire consumers to consume more fruits and vegetables and that the message needed to be repeatedly relayed in the national, state and local campaigns (Produce for Better Health Foundation, 2009; Produce for Better Health Foundation, 2013c). Research clearly suggested that mothers were the ideal target audience and the best platform for influencing behaviour change, because of the personal gratification in exercising their responsibility of keeping their family healthy and “at their best” (Produce for Better Health Foundation, 2009). Furthermore, the strategy of promoting small steps for increasing consumption, using terminology such as “enough” rather than a specified quantity and focusing on promoting the functional benefits of fruits and vegetables, such as health, energy, heritage and variety, was proposed as an effective message for the success of this intervention (Produce for Better Health Foundation, 2009; Produce for Better Health Foundation, 2013c).

Survey results between the period 2004 and 2009 have shown that although fruit and vegetable consumption for individuals remained unchanged at 1.81 cups per person per day, it did increase for children less than 6 years old and between 6 and 12 years old, by 7% and 5% respectively (Produce for Better Health Foundation,

2010) (Table 1). Importantly, brand awareness of the “Fruits & Veggies – More Matters” slogan and logo has increased from 11% in 2007 to 26% in 2012 (Produce for Better Health Foundation, 2013b) (Table 1). Brand awareness sends an effective message, holding further potential for promoting fruit and vegetable consumption.

Danish “6 a day” campaign

This programme is a public–private initiative involving a variety of stakeholders which include the Danish Veterinary and Food Administration, the National Board of Health, The Danish Fitness and Nutrition Council, The Danish Cancer Society, The Danish Heart Foundation and the Danish Fruit, Vegetable and Potato Board (The International Fruit and Vegetable Alliance, 2013). Launched in 1999 as a 5-year project, it is one of the best known programmes in the European Union, promoting vegetable and fruit consumption through increased accessibility in schools, worksite canteens and the food-service industry (Halicka & Rejman, 2007). The campaign promotes the daily consumption of six fruits and vegetables or 600 g of fruits and vegetables. The number six has an important part in the communication of the message as it is pronounced as “sex” in Danish and is claimed to be easier to recall, especially for men (The International Fruit and Vegetable Alliance, 2013).

Between 1995 and 2004, the Danish National Survey of Dietary Habits and Physical Activity reported that vegetable and fruit consumption for the 4- to 10-year-old group increased by 29% and 58% respectively (Table 1). For the 11- to 75-year-old group, vegetable and fruit consumption increased by 41% and 75% respectively, during the same period (Danish National Centre for Social Research, 2005). For the period 2003–2008, the average intake of vegetables for adults (18–75 years old) was reported to be 162 g per person per day, while the average intake of fruit for this group stood at 283 g per person per day (Danish National Centre for Social Research, 2009) (Table 1). This equals 445 g per person per day, higher than the minimum WHO recommended level of 400 g per person per day, demonstrating the success of the Danish campaign in increasing fruit and vegetable consumption above the recommended minimum WHO levels. The Danish Veterinary and Food Administration believes that the “6 a day” campaign has contributed significantly to the increase in fruit and vegetable consumption and therefore, continues to offer the programme nationally.

U.K.’s “Food Dudes” programme

To combat obesity among children, a unique programme based on a variety of behaviour change principles involving role modelling, rewards and repeated tastings, has been developed by Bangor University’s Food and Activity Research Unit (Bangor University, 2013; Lowe & Horne, 2009). The programme aims to increase children’s intake of fruit and vegetables and decrease their consumption of unhealthy foods, on a sustainable long term basis, at school and at home. The programme is structured around a series of DVD adventures starring young heroes called Food Dudes seen as positive role models by the children. By eating fruit and vegetables, the Dudes are projected to develop superpowers needed to fight “General Junk and his Junk Punks” who are seen as energy sapping and a barrier to eating healthy foods (Lowe & Horne, 2009). After watching the DVD adventure series, the children are encouraged to try and taste a variety of fruits and vegetables with the incentive of earning “Food Dudes Rewards” (Lowe & Horne, 2009).

The programme encourages repeat tastings of more fruits and vegetables based on the influence of role models and rewards, and promotes development of a taste profile and liking for different fruits and vegetables, ultimately resulting in a sustainable change in eating behaviour. This is assisted by the positive school culture of regular consumption of fruits and vegetables. The programme also incor-

porates a “home-pack” to help parents encourage similar eating habits at home (Bangor University, 2013).

Controlled trials on the “Food Dudes” programme conducted in the U.K., Italy and U.S. among primary school children (4–11 years old) and nurseries/child care centres (2–4 years old), report that there is a 60–200% increase in fruit and vegetable consumption and where monitored, an associated decline in consumption of unhealthy foods by 20–100% (Bangor University, 2013) (Table 1). The impact is highest among children who are the poorest eaters with significant success in “Special Schools.” This programme is perceived as extremely effective and has received several awards over the last 7 years including the 2013 “Local Area Research and Intelligence Association – Best Use of Health Research Award” (Bangor University, 2013).

New Zealand’s “5+A Day” Programme

In 1994, United Fresh New Zealand Incorporated launched the “5+ A Day” initiative to motivate New Zealanders to consume five or more servings of fruit and vegetables daily for better health and well-being (United Fresh, 2013). By 2007, the focus was refined towards two key objectives: fruit and vegetable industry goals and public good (United Fresh, 2013). The “5+ A Day Charitable Trust” was formed the same year to focus on the public campaign while United Fresh took the role of promoting the industry objectives and partnerships under this programme (United Fresh, 2013). The primary activity of the programme is targeted at children and focused on developing educational tools, which are curriculum linked for educational staff in early childhood centres, primary and intermediate schools.

Survey results report that in 2008, 93% children and 69% parents correctly identified the meaning of “5+ A Day” and in 2012, 88% of the target audience identified one of the “5+ A Day” messages, which is ‘to be healthy you should try to eat five or more servings of fruit and/or vegetables a day’ (The 5+ A Day Charitable Trust, 2012) (Table 1). In 2012, 38% of the population reported consuming five or more servings of fruit and vegetables a day, an increase of 23% over 1995 (The 5+ A Day Charitable Trust, 2012) (Table 1). The 2008/2009 New Zealand Adult Nutrition Survey updated by the New Zealand Ministry of Health in late 2011, reported that 60.4% of the population were consuming the recommended two serves of fruit daily, a rise from 46% in 1997, while 66% of the population consumed the recommended three serves of vegetables a day (United Fresh, 2012).

Local research suggests that demographic influences continue to impact the behaviour and related compliance with advice to consume more fruits and vegetables, which implies that targeted efforts could be made for increasing consumption focused on certain groups within the New Zealand population such as men, low income families and individuals with a lower level of education (Pauline, 2006). Industry involvement and leadership also played a key role in the success of the programme.

All of the above campaigns belong to the International Fruit and Vegetable Alliance (IFAVA) which promotes efforts to increase fruit and vegetable consumption globally by facilitating international collaboration (Hawkes, 2013). IFAVA states that majority of the programmes are some form of public/NGO and private partnership and over time these campaigns have become more “sophisticated” based on ongoing research and evaluations supporting the campaigns (Hawkes, 2013).

How effective are the promotional interventions?

Analysis of the effectiveness of these promotional campaigns is difficult because there is very little peer reviewed published data available, and the definition of what constitutes success is not always clearly stated. Furthermore, comparison between the different cam-

paigns discussed above is challenging as each programme has its own unique set of assumptions, target audience, criteria and methodology for measuring success. Some goals are short to medium term and include measuring campaign awareness, number of licenced supermarkets using the campaign logo to roll out the programme, consumer impressions of advertising, consumer familiarity with the campaign logo, to name a few variables. Other goals are longer term and are based upon the measurement of increase in consumption of fruits and vegetables, over a period of 5 years or more. Also, baseline consumption figures are not always apparent or publicly available and therefore, it is unclear whether the gains are starting from a low base or from already reasonable existing levels of consumption. Research reports also highlight the lack of understanding among consumers about what constitutes a serve of fruit or vegetable (Dixon, Mullins, Wakefield, & Hill, 2004), leading to further confounding of results. Furthermore, the methodology applied to assess each of the individual campaigns is not always clearly stated in the published reports. For example, it is not clear if the campaigns measuring consumption are based on purchase/sales data or on actual consumption at home and if waste in the home has been accounted for in these calculations.

Bearing in mind these limitations, the campaigns have overall resulted in increased awareness and some modest gains in consumption over the short term but significantly, despite the tremendous cost and effort put into these campaigns, most have been unable to realise the target levels for consumption over the longer term. The Danish “6 om dagen” campaign and the “Food Dudes” programme in the U.K. have been more successful in achieving the goal of increasing fruit and vegetable consumption to meet recommended levels. The other campaigns such as the national “Go for 2&5”, “Fruits & Veggies – More Matters” and “5+ A Day” have made inroads in increasing awareness but still fall short of the goal of realising the target levels for intake on a sustained, long term basis. Despite targeting behaviour, the aforesaid interventions have led to only small increases in fruit and vegetable intake when compared with the increases required to meet the recommended daily levels of consumption (Thomson & Ravia, 2011).

Success is higher for those campaigns where there is a high degree of collaboration between industry (producers), retail, government and quasi-government organisations, such as the Heart and Cancer Foundations/Societies, in rolling out and administering the interventions. Collaboration helps in promoting a consistent message across all stakeholders and the community and assists in the creation of a larger pool of funds available for promotional initiatives.

The programmes have differed based on the intensity and clarity of the message. In addition, the primary factors which have contributed to their effectiveness have been based on behaviour change (Lock, Pomerleau, Knai, & McKee, 2004). Those which have brought about a significant change in consumption, such as the “Food Dudes” programme, promoted the following: behavioural change; goal-setting; simple and unambiguous messages; were run intensively for longer time-frames; encouraged the proactive involvement of all family members; and were interactive rather than just promotional (Lock et al., 2004). Furthermore, there is increasing evidence that personal values such as “Universalism” (focused on harmony, nature, beauty) have an impact on the food attitudes and behaviours of consumers and therefore, should be taken into consideration in the design and formulation of fruit and vegetable interventions (Worsley, Thomson, & Wang, 2011).

Many information and education based social marketing campaigns such as dietary pyramids, “5-a-day” programmes and nutrition labels would have a greater degree of success if they were culturally targeted and focused on promoting consumption frequency rather than serving size (The Louis Bonduelle Foundation, 2011). Given frequency of intake has been found to have a greater impact on increasing consumption compared with portion size, USA

has replaced their "5 A Day" Programme with the new initiative called "Fruit & Veggies – More Matters" (Ashfield-Watt, Welch, Day, & Bingham, 2004; Produce for Better Health Foundation, 2013c). Generic campaigns aimed broadly at a variety of target segments and covering a large product base such as all fruits and vegetables have a lower impact compared with highly targeted interventions, focused on an age or income or community group in the population such as the younger generation (The Louis Bonduelle Foundation, 2011). Glasson, Chapman, and James (2011) report that factors such as consumption levels, an understanding of serving size, and readiness for change are universally higher for fruits than for vegetables. This suggests that fruit and vegetables should be targeted separately in interventions, with a greater focus on improving vegetable consumption.

Other studies have shown that the provision of information for raising awareness and knowledge is insufficient to bring about a sustainable change in fruit and vegetable consumption behaviour over the long term (Halicka & Rejman, 2007). Health based promotional campaigns may need to be supported with a variety of initiatives including economic subsidies, reduced taxes and other policy measures to lower the price of fruits and vegetables for increasing accessibility and availability to consumers at all levels of the economic strata (Halicka & Rejman, 2007; Monsivais & Drewnowski, 2007).

Key factors influencing consumption of fruits and vegetables

Focus-group sessions conducted by Uetrecht et al. (1999), with parents, workplace employees, health centre clients and community members, examined factors influencing vegetable and fruit consumption and related strategies for promotion. Factors impacting fruit and vegetable consumption could be grouped into three broad categories, namely, produce related, distribution channel related and consumer related. Produce related factors cover issues such as price, seasonality, perishability, nutritional content, origin and quality of produce. Seasonality of produce has a significant influence on availability, variety, taste, quality, freshness, price/cost and form in which they are purchased such as fresh, frozen or canned (Carter, Pollard, Atkins, Marie Milliner, & Pratt, 2011; Uetrecht et al., 1999).

Fruits and vegetables in season are generally more appealing in the fresh form and are more reasonably priced, compared with those out of season (Uetrecht et al., 1999). Consumers, therefore, have the opportunity to substitute off season produce with fruits and vegetables in season. Compared with processed foods high in sugars and fats and providing instant taste gratification, fruit and vegetables are perceived as costly and less value for money, thus adversely impacting their consumption (Peta, 1999; The Louis Bonduelle Foundation, 2011).

The degree of perishability of the produce also impacts consumption patterns (The Louis Bonduelle Foundation, 2011). For example, highly perishable products with a short shelf life may not be as popular or bought as often to avoid potential wastage (Uetrecht et al., 1999). They are also generally more expensive.

Although knowledge of the nutritional value and associated health benefits of each type of fruit and vegetable influences its purchase and consumption, it is not a major driver for change (Uetrecht et al., 1999). However, some education about the specific nutritional components and related health claims has a positive influence on purchase decisions. Orange vegetables such as carrots are known to be high in beta-carotene and kiwi fruit and citrus are associated with high vitamin C content. Blueberries and walnuts are considered super foods due to their high antioxidant properties (Hoy, 2009). Therefore, fruit and vegetables, which are perceived as highly nutritious, providing health related benefits to consumers, may have a higher probability of purchase, leading to greater consumption.

The origin of the produce impacts its purchase and consumption. Locally grown produce may be favoured over imported produce to promote local production and farmers and the domestic industry (Uetrecht et al., 1999). It also has an influence on the quality, freshness and safety standards, with a greater degree of confidence generally in locally grown produce (Uetrecht et al., 1999).

High quality produce is usually favoured over poor quality produce (Lock et al., 2004). However, beyond a certain point, price becomes the main determinant. Quality affects colour, taste, freshness and nutritional content in fresh produce, which are very important determinants especially when consumed raw (Baxter & Schroder, 1997). Consumer concerns related to pesticide residues and perceived genetic modification also negatively impact the level of fruit and vegetable consumption (Pollard, Lewis, & Binns, 2008a). However, only 10 cancer cases per year are predicted to result from pesticide residues on fruits and vegetables consumed, and the positive effects of consuming more fruits and vegetables far outweigh the negative effects (Reiss et al., 2012).

Distribution channel related factors impacting fruit and vegetable consumption include accessibility and variety of produce (European Food Information Council, 2012; The Louis Bonduelle Foundation, 2011). This is evident in the type, packaging and display of fruits and vegetables at retail and food service outlets. Restricted supply negatively impacts consumption (European Food Information Council, 2012). A greater variety of fruits and vegetables offers more choice in their consumption. Fruits and vegetables can be better adapted to snacking too, if there was more diversity in type, taste, texture and how they could be eaten (The Louis Bonduelle Foundation, 2011).

Consumer related factors such as income, education, gender, age, household composition, cultural background, convenience, cooking skills, sensory factors, lifestyle, serving size awareness, attitudes, beliefs and personal values also have a significant influence on the level of fruit and vegetable consumption.

The socio-economic status (SES) of the family has a direct bearing on the consumption of fruit and vegetables. Generally, higher income translates to higher education and knowledge, which tends to be directly proportional to higher consumption (European Food Information Council, 2012; The Louis Bonduelle Foundation, 2011). Low income households are more price-sensitive and generally less informed about the benefits of eating healthy and therefore, may maximise their dollar by buying cheaper food alternatives such as processed foods, high in salt, sugar and fat (Kamphuis, Giskes, de Bruijn, Wendel-Vos, Brug, & van Lenthe, 2006; Peta, 1999). Results of studies have shown that since consumers with higher SES consume higher quantities of fruit and vegetables and this association is more prevalent among women and younger people, it may therefore, be more beneficial to target fruit and vegetable promotional interventions on older people and women from low socio-economic levels (Kiadaliri, 2013).

Girls and women consume more fruits and vegetables on average compared with boys and men in all age groups (European Food Information Council, 2012). A positive correlation has been noted between age and fruit and vegetable consumption which continues to rise until about 60–65 years of age after which it tends to decline (The Louis Bonduelle Foundation, 2011).

Family factors such as composition, marital status, presence of children, family and cultural background all impact fruit and vegetable consumption (Baxter & Schroder, 1997; Kamphuis et al., 2006). Certain cultures traditionally use a variety of fruits and vegetables as part of their meals and food rituals. Vegetarianism, prevalent in different parts of the world, impacts fruit and vegetable consumption and this influence is co-related with culture and the level of economic development. For example, in the U.K., studies have shown that vegetarians and vegans are twice as probable as non-vegetarians and non-vegans to be high fruit and vegetable consumers, al-

though this association may not hold in the developing part of the world (Pollard, Greenwood, Kirk, & Cade, 2001). Research highlights that in India, where a significant proportion of the population is vegetarian, the mean intake of fruit and vegetables is only 265 g per person per day, significantly lower than the WHO recommended intake of 400 g per person per day, and is attributed to non-affordability of fruit and vegetables and high levels of export of local produce to overseas markets (Radhika, Sudha, Mohan Sathya, Ganesan, & Mohan, 2008).

Also, the type and frequency of produce that an individual consumed as a child impacts their food habits as an adult (New South Wales. Dept. of Health, N. S. W. C. F. H. P. N., Public Activity, B., & Nutrition, N. S. W. C. F. P. H., 2003). Being married has a positive influence on consumption of fruits and vegetables (European Food Information Council, 2012). Social support and family values around healthy eating impact consumption and those families in which parents are good role models and encourage children to eat healthy, have a long term positive influence on fruit and vegetable consumption (European Food Information Council, 2012; New South Wales. Dept. of Health et al., 2003). Shared family meals and food consumed in a shared environment also have a positive effect on fruit and vegetable consumption. On the other hand, forcing children to eat vegetables or punishing them if they did not has a negative effect on consumption (European Food Information Council, 2012; New South Wales. Dept. of Health et al., 2003; Uetrecht et al., 1999). Through involving and engaging children in a vegetable garden at home or school and in the shopping and cooking of vegetables and fruits, there is greater degree of interest generated among them which has a positive influence on consumption (Uetrecht et al., 1999).

Convenience and time are very important factors today as the pace of life has increased exponentially and the consumer is constantly looking for ways to make life more convenient (Dixon et al., 2004). This is reflected in people's food habits and preferences. Therefore, purchasing, preparing and cooking decisions involving fruit and vegetables take the convenience factor into consideration. Consumers tend to buy produce that is familiar and easy to use and prepare (Carter et al., 2011; Uetrecht et al., 1999). Furthermore, those fruits and vegetables that are ready-to-eat as snacks or are packaged to fulfil that need are always more popular because of the associated convenience (Carter et al., 2011; Baxter & Schroder, 1997). Many producers are responding to the market and offering innovative packaging in convenient serve sizes for pre-cut vegetables and fruits for use in salads or stir-frys, offering convenience and suggested recipes for cooking.

Fruits are generally consumed raw and require minimal preparation. However, vegetables, apart from salads, are usually eaten cooked and require some skill and cooking knowhow including the different ways in which they can be used. Some vegetables which are perceived as unfamiliar or exotic by the consumer, require education and knowledge about their taste, selection, storage and preparation (Uetrecht et al., 1999). Retailers that offer recipes and supporting information for cooking, preparation and use, run demonstrations for cooking and tasting, especially for vegetables, along with a large variety of produce on offer in their stores, assist consumers in their buying decisions and in promoting consumption and use (Marieke, Anthony, & Brian, 2004; Peta, 1999).

Taste, texture, smell and colour are important elements impacting consumption of fruits and vegetables (Baxter & Schroder, 1997; Uetrecht et al., 1999). These factors also influence the form in which the produce is consumed such as fresh, canned or frozen. Some consumers prefer a crispy and crunchy product texture as opposed to softer textures, and cooking styles also influence that preference (Uetrecht et al., 1999). Generally, it is easier to motivate children to eat fruit because of its favourable taste, texture and smell compared with vegetables, which often have a different sensory profile (Baxter & Schroder, 1997).

Lifestyle and dietary factors such as alcohol consumption, cigarette smoking, physical activity, stress and eating habits also affect fruit and vegetable consumption (The Louis Bonduelle Foundation, 2010). Individuals who are more conscious and aware of the importance of health and well-being associated with these factors, have a propensity to consume more fruits and vegetables compared with processed foods, as opposed to those who may indulge in unhealthy behaviours and lifestyles.

A major impediment to promotional campaigns is the lack of clarity among consumers regarding what constitutes a serving (Glasson et al., 2011). Furthermore, surveys conducted in 1995, 1998 and 2001 in Western Australia (WA) indicated that one of the biggest barriers to increasing consumption of vegetables among WA adults was the perception among two-thirds of the group that they already ate enough vegetables, which was three servings per day on average and much lower than the recommended intake (Carter et al., 2011). It is further suggested that the 2&5 recommendation under the WA "Go for 2&5" fruit and vegetable campaign was considered by the targeted consumer group as "aspirational" and "purposely exaggerated" to push greater overall consumption and was not in reality the recommended daily intake (Carter et al., 2011).

Research suggests that self-efficacy, self-esteem and "perceived healthfulness" of fruits and vegetables are strong predictors of fruit and vegetable consumption as they impact personal values, which in turn influence behaviour and attitudes (European Food Information Council, 2012; Marieke et al., 2004).

Given the large diversity of factors influencing consumption of fresh produce, the strategies designed to help achieve an increase in individual daily uptake, need to take all these elements into careful consideration for maximum effectiveness.

Strategies for increasing consumption of fruits and vegetables

Consumer behaviour theory offers a potent tool kit of strategies for promoting fruit and vegetable consumption decisions for better health and well-being (Produce for Better Health Foundation, 2012). These strategies offer food-for-thought to industry players and other stakeholders on possible mechanisms which can be applied for increasing fruit and vegetable consumption at the level of the individual.

Direct approaches such as advising consumers to generally eat more fruit and vegetables for better health appear to be insufficient to change consumption behaviour on a sustained, long-term basis as shown by the evaluation of the national "Go for 2&5" campaign. Therefore, more subtle and proactive strategies need to be introduced to facilitate a change that is sustainable. One targeted approach includes food service outlets, such as cafes and fast food chains, choosing to automatically include fruits and vegetables as a side dish in their meals, with the consumers having to request a substitute, if they so desire (Produce for Better Health Foundation, 2012). Changing the default option requires thinking and effort and acts as a disincentive for asking for an alternative, promoting fruit and vegetable consumption.

Visibility and prominence at the point of purchase help consumers in making choices in favour of fruits and vegetables (Produce for Better Health Foundation, 2012). High visibility at the retail level in multiple locations of stores also helps increase consumption (Glanz & Yaroch, 2004). Generally, greater consumption results where fruits and salads have high visibility and are in abundant supply, in cafeterias, canteens, in the home and in the workplace (Anderson & Cox, 2000). Furthermore, in school canteens and worksites, where meals are provided, if there was a choice of two or more vegetables on offer, the increased variety may lead to greater consumption (Produce for Better Health Foundation, 2012). Another strategy to consider includes reducing the unhealthy food alternatives such

as those available from vending machines in schools, universities and work settings (Produce for Better Health Foundation, 2012).

Offering fruits and vegetables throughout the day as snacks and including them in all meals, increases the opportunity for their consumption (Dixon et al., 2004). Furthermore, cost-effective, convenient packaging alternatives such as single serves for salads and stir fries also encourage snacking (Produce for Better Health Foundation, 2012). By displaying and selling snack type fruits and vegetables at the checkout in supermarkets and retail stores in place of confectionery and chips increases consumer propensity to buy them as snack items (Peta, 1999).

Fast food chains often remind consumers at the time of placing their order if they want a drink or fries with the order placed. As an alternative, they could provide choice of a side dish of fruit or vegetable salad which they might like to include in their order, provided the cost of the additional item is perceived as reasonable (Produce for Better Health Foundation, 2012). By offering price discounts on fruits and vegetables in supermarkets, workplace and school cafes for a specific period of time, research shows that consumption increases during the period of the intervention and is sustained beyond as well after the return to original prices. Bonus packs are also a good strategy as consumers feel they are getting a good deal on purchase with the extra quantity received (Produce for Better Health Foundation, 2012). These cost saving strategies help overcome the barrier of price which some consumers perceive as limiting to their fruit and vegetable consumption.

Using positive role models in a social context, for example in schools, or using verbal praise and offering small monetary rewards for healthy eating, motivates children to increase their consumption of fruits and vegetables, as evidenced by the "Food Dudes" programme in the U.K. Workplace cafes and school canteens could consider offering options to order food in advance, for example, for a week or longer, which helps consumers pre-commit to healthy food choices including fruits and vegetables. This restricts the impulse to buy less healthy alternatives which are high in sugar, salt and fat, offering instant gratification and in conflict with the long term goals of leading a healthy lifestyle (Produce for Better Health Foundation, 2012).

When underpinned with key messages and affirmations, factors such as self-assessment, customised feedback, setting of diet-related goals and promoting healthy lifestyle behaviours, help in increasing consumption of fruits and vegetables on a consistent, long term basis (Kerr et al., 2012). By creating simple tracking tools to self monitor compliance with behaviours, having goals related to healthy eating, and sharing reports with family and friends, helps consumers change and maintain a specific behaviour such as increasing consumption of fruit and vegetables (Produce for Better Health Foundation, 2012). New food habits can be incorporated in new routines at strategic times such as during vacations when families have more time and motivation to make changes (Produce for Better Health Foundation, 2012).

"Food neophobia," particularly among young children, plays a significant role in limiting fruit and vegetable consumption (New South Wales. Dept. of Health et al., 2003). Repeated exposure to different kinds of fruits and vegetables in a positive environment helps them develop new tastes and builds acceptance of these flavours over a period of time that continues into adulthood, as demonstrated by the success of the "Food Dudes" campaign (New South Wales. Dept. of Health et al., 2003; Produce for Better Health Foundation, 2012). The Stephanie Alexander Kitchen Garden Programme is an Australian initiative, aimed at 8- to 12-year-olds, who are engaged in the growing and cooking of seasonal fruit and vegetables, as part of the "veggie garden and home-style kitchen" modules built into their regular school experience (Block et al., 2012). The programme, which provides a "seed to table" experience for children, was initiated in 2001 and eventually introduced in 180 schools across all Australia

and territories by 2011. Survey results report that the programme has been successful in increasing student confidence, engagement and interest in a range of healthy foods, and building social connections between the schools and the broader community (Block et al., 2012).

Consumers associate fruit and vegetables with vitamins, minerals and high nutritional value which help in building energy and vitality needed for leading an active, enjoyable life and achieving goals (Kirchhoff, Smyth, Sanderson, Sultanbawa, & Gething, 2011). At present, labels do not inform the consumer about specific health benefits of each product and the impact of the message is diluted by its general nature. Appropriate labelling regarding nutritional content and value on produce packaging and highlighting health benefits, assist consumers make informed decisions about the food they purchase and consume. Another approach to consider in a promotional campaign is to highlight the potential of missing out on vital nutrients if consumers did not eat the required fruits and vegetables daily (Produce for Better Health Foundation, 2012). However, studies also show that "pleasure-seeking" is a bigger motivator than "nutrition knowledge" in eating behaviour and therefore, marketing interventions should aim to promote that healthy eating goes hand-in-hand with appealing, flavourful food, and one is not in competition with the other (Dixon et al., 2004).

Fruits and vegetables have the unique attribute of being able to be consumed raw and unprocessed and this "naturalness" and "freshness" can be leveraged in promotional interventions as they are very appealing to a majority of consumers (Produce for Better Health Foundation, 2012). Fruits and vegetables have the potential to be well branded and packaged and priced accordingly to make them more attractive. Fruit baskets are commonly available as gift items and in some countries such as Japan they are even sold in the luxury category at high prices (Produce for Better Health Foundation, 2012).

The tool kit of strategies discussed above provides some pointers to industry, public health organisations, government, consumers and other interest groups, for tailoring some of these ideas to their specific needs, targeted at increasing daily individual consumption of fruit and vegetables. The strategies would be most effective when they are customised according to the requirements of the specific target group and market segment and there is active participation secured from the various stakeholders along the value chain to meet this overall goal. Further research in this space will assist in developing innovative promotional initiatives and unique tools that make a lasting impact on behaviour change for increasing consumption.

Conclusion

There is global awareness, prompted by WHO findings and recommendations, promoting consumption of fruits and vegetables for better health and well-being. Public and private partnerships have been forged in many countries to educate and inform consumers about the recommended daily intake in terms of serving size, nutrition and strategies to increase consumption among children and adults. A variety of factors influence consumption and associated with those factors are barriers which might limit intake. The interventions have had mixed results with some campaigns having been more successful than others in raising awareness and increasing consumption.

Success is reported to be higher for those promotional campaigns which demonstrate a greater spirit of collaboration between industry, retail, government and not-for-profit organisations promoting public health. Furthermore, the effectiveness of the programmes is greater when the campaign includes a variety of factors such as behavioural change; goal setting; clear messages; run over longer time-frames; proactive involvement of family; and an interactive approach. In addition, programmes that are culturally tar-

geted or relevant to a specific age or income group, focused on promoting consumption frequency (as opposed to serve size), promote fruits and vegetables separately and are supported by a suite of other initiatives such as economic subsidies, reduced taxes and other policy measures to lower price and increase accessibility, are reported to have a higher probability of effecting a significant change in consumption.

Research and reviews conducted by Mozaffarian et al. (2012) concludes that “focused, national, community, and school-based media and educational campaigns are effective in increasing knowledge and consumption of specific healthful foods.” They also state that changes in behaviour are likely to result when the media and education campaigns are run over a number of years and use multiple communication channels with a focus on specific foods such as fruits and vegetables, for the targeted population group.

This subject remains high on the list of priorities for further research to develop novel approaches for formulating more effective marketing interventions to facilitate a significant and sustained change in behaviour, for increasing daily consumption of fruits and vegetables at the level of the individual. Benefits flow to the industry via growth in sales and to the consumer, in the form of better health, ultimately reducing the burden of chronic disease on the society and economy.

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