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*The mission of the home economics profession is to educate, inform, and to act as an advocate to government, industry and the community for families and households, so that individuals can make informed choices in order to enhance their everyday living.*

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- provide a national focus for home economics and home economists;
- promote public recognition of the role of home economics;
- set professional standards for the practice of home economics and promote the professional standing of home economists;
- encourage and assist home economists with continuing education and professional development;
- encourage, initiate and coordinate research into areas related to home economics; and
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The mission and focus of the profession are reflected in the Institute’s logo. The concentric circles symbolise the family unit within the community and the world as a whole. Through the centre runs the flame of the lamp of learning.

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Food and beverage advertising to children—A view from the trenches

Abstract
The prevalence of childhood overweight and obesity is of growing concern in Australia and efforts must be taken to halt and reverse the growing trend. A mechanism that has been proposed is extensive government regulation to restrict the marketing of foods high in fat, sugar and salt (HFSS) to children.

This paper provides an overview of the issue, including current regulatory and self-regulatory activity to moderate advertising to children, and challenges the call for government to enact legislation to further restrict the types of marketing that can be undertaken by the food and beverage industry. This is based on the evidence showing that advertising has no effect on health outcomes and advertising restrictions internationally have failed to have an impact on the prevalence of overweight and obesity in those countries.

Background
Overweight and obesity amongst Australian children
Excess body weight is one of the many risk factors for chronic diseases, including diabetes, cancer and heart disease. Current estimates show that approximately one quarter of Australian children aged 5–17 years are overweight or obese (Australian Bureau of Statistics, 2009). Whilst there is evidence to suggest that this level has plateaued (Olds, Tomkinson, Ferrar, & Maher, 2010), Australian health professionals continue to be concerned by this statistic (Gill et al., 2009; Roberts, Letcher, Gason, & Lobstein, 2009).

The reasons behind an individual carrying excess body weight are extremely complex. Dietary and health-related behaviours result from the interplay between many factors, which include the context in which an individual lives (e.g. individual characteristics, home, family) and the broader community environment (McGinnis, Appleton Gootman, & Kraak, 2006).

Figure 1 demonstrates the interplay between factors such as culture and values, economics, public policies, marketing and the community on diet and physical activity and ultimately health outcomes for children and youth.

Government and non-government organisations, both in Australia and internationally, are employing extensive resources to help halt and reverse the growing prevalence of overweight and obesity. An issue that is hotly contested is that of marketing food and beverages to children and whether government regulation is required to reduce children’s exposure to advertisements for foods that are high in fat, sugar and salt. Underlying this issue is whether regulation will, in fact, have a positive impact on overweight and obesity.

Food and beverage marketing
Marketing is a strategy used to generate consumer demand for products and services and to build brand loyalty and awareness. The four components of marketing are product (features, quality, packaging), price, place (distribution points) and promotion (advertising, sales promotion). Advertising is the most visible form of marketing, defined as the public presentation and promotion of goods and services through a variety of media channels including television, radio, print, billboards, personal contact and the internet (McGinnis et al., 2006).

In 2010 an estimated $10 billion was spent on advertising in Australia and, of the top ten advertising categories, food ranked seventh with expenditure of $418.9 million (Nielsen, 2011). Television is the medium most commonly used for food advertising (70%), followed by magazines (14%), outdoor advertising (7%) and radio (4%) (Nielsen, 2009).

The impact of food and beverage advertising on food preferences, food intake and health outcomes has been, and continues to be, heavily researched. While there is evidence to suggest that advertising can have an effect on food preferences and purchase
behaviours (Cairns, Angus, & Hastings, 2009; McGinnis et al., 2006), the effect on overall food consumption behaviour and overweight and obesity has not been proven (Cairns et al., 2009; Crowle & Turner, 2010). This aligns with the framework presented in Figure 1, which highlights the multiple influences on food intake, which may then have an effect on health outcomes (e.g. overweight and obesity). Food and beverage marketing cannot be directly implicated for influencing overall diet and subsequent health outcomes.

Approaches to addressing marketing to children
The lack of conclusive evidence to link food and beverage advertising and obesity does not negate the need to take action. The Australian Food and Grocery Council (AFGC), the peak body for Australia’s food and grocery manufacturing industry, agrees that industry must display a level of social responsibility in this area. Careful consideration must be given to the type of action taken.

Recommendations from the World Health Organization and Institute of Medicine
The World Health Organization (WHO) has issued a set of recommendations that urge member states to take action at the national level and to cooperate to put in place the means necessary to reduce the impact of marketing of HFSS foods to children (WHO, 2010). The recommendations recognise the role of self-regulation and capture both the placement and creative content of marketing activities. Industry initiatives are also recognised and recommended by the Institute of Medicine as a means of enhancing marketing practice standards, in partnership with government, scientific, public health and consumer groups (McGinnis et al., 2006).

International regulation
Since 2005, the food industry has implemented self-regulatory advertising initiatives across the globe. There are currently initiatives in the United States, the 27 countries of the European Union, the six countries of the Cooperation Council for the Arab States of the Gulf, and in Brazil, Canada, India, Mexico, Russia, South Africa, Switzerland, Thailand, Turkey and the Philippines. These initiatives primarily focus on the placement of advertisements on television, radio, print and internet sites. Many of these are relatively new; however, those that have been in place for at least two years are demonstrating high compliance from signatories (Advertising Standards Canada, 2010; Council of Better Business Bureaus, 2010; Landmark Europe, 2011).

The Swedish, Norwegian, Quebec (Canada) and the United Kingdom (UK) governments have
gone one step further and imposed restrictions on certain advertising to children. Since 1980 in Quebec, 1991 in Sweden and 2005 in Norway, it has not been permissible to advertise directly to children (less than 12 years in Sweden, 18 years in Norway and 13 years in Quebec). The regulations cover the nature and intended purpose of the products advertised, the manner of presenting the advertisement and the time and place it is shown. The Quebec regulations relate to all advertising mediums, Swedish to television only and Norwegian to television and radio. Despite these restrictions, there has been no impact on the prevalence of overweight and obesity in children in Quebec or Sweden (Lobstein & Frelut, 2003; Willms, Tremblay, & Katzmarzyk, 2003). In fact, the prevalence of childhood overweight and obesity in Quebec increased significantly from 11.5% in 1981 to 27.6% in 1996 and this rate of increase was higher than some other Canadian provinces where no restrictions are in place (Willms et al., 2003).

Since 2007 in the UK, regulations have been in place to ban television advertisements for food and beverages that are high in fat, sugar and salt in and around programs with particular appeal to children under the age of 16 years. There are additional rules on the content of advertisements aimed specifically at children of primary school age (e.g. prohibiting the use of celebrities and licensed characters). It is still too soon to assess the impact of these regulations on health outcomes.

**Australian regulation**
There are a number of regulatory activities in Australia that capture food and beverage advertising to children, comprising government directives and industry codes of practice.

**Government regulation**
The Children’s Television Standards (CTS), administered by the Australian Communication and Media Authority (ACMA), cover free-to-air television advertisements during, and immediately before and after, programs with ‘P’ (preschool) and ‘C’ (children) classifications (ACMA, 2009). The CTS governs the content of advertising to children and the amount that may be shown. While there are no explicit prohibitions on food and beverage advertising, there are provisions that provide some restrictions in this area. These include prohibitions on:

- advertising and offering prizes during P programs
- advertisements that may mislead or deceive children
- advertisements designed to place undue pressure on children to ask their parents to buy the product
- endorsements, recommendations or promotions by popular personalities or licensed characters.

There are also limits on the amount of advertising in C programs.

**Advertising Codes of Practice**
The Australian Association of National Advertisers (AANA), the industry body representing advertisers in Australia, has established a national self-regulatory scheme comprising a number of codes of practice. Those covering food and beverage advertising to children are the AANA Code for Advertising and Marketing to Children and the AANA Food and Beverages Code (AANA, 2011a, 2011b). The Children’s Code covers advertisements ‘directed to children’ (assessed through the themes, visuals and language of the advertisement), and includes restrictions on:

- advertisements that may mislead or deceive children
- advertisements that contain an appeal to children to urge their parents to buy a product for them
- using popular personalities or celebrities to advertise or market products or premiums in a manner that obscures the distinction between commercial promotions and program or editorial content.

The Food Code includes restrictions on:

- advertisements that undermine the importance of healthy or active lifestyles and the promotion of healthy balanced diets, or encourage excess consumption
- advertisements to children that aim to undermine the role of parents in guiding diet and lifestyle choices.

The Advertising Standards Bureau manages complaints in relation to the AANA Codes.

**Food industry self-regulatory initiatives**
There are currently two self-regulatory initiatives managed by the Australian Food and Grocery Council (AFGC) that specifically address food and beverage advertising to children, namely the Responsible Children’s Marketing Initiative (RCMI), which covers products found in retail outlets (AFGC, 2011a), and the Australian Quick Service Restaurant Industry Initiative for Responsible Advertising and Marketing to Children (QSR initiative), which covers food sold in quick service restaurants (Australian Association of National Advertisers, 2011c).
These initiatives aim to moderate children’s exposure to advertisements for HFSS foods. There are currently 17 signatories to the RCMI, with these companies owning some of the major food and beverage brands in Australia, and seven signatories to the QSR initiative. These signatories hold a large share of the quick-service restaurant market (see Table 1). Further details on these initiatives are outlined later in this paper.

Position of the Australian Government

The Government is indeed aware of the issues and has put forward their own directive in relation to food and beverage advertising to children. In the 2009 Preventative Health Strategy developed by the government-established Preventative Health Taskforce, a recommendation was to phase out the marketing of foods high in fat, sugar and salt to children on television (Preventative Health Taskforce, 2009). The Government responded with recognition of the important role of the current industry-led initiatives and highlighted that they will monitor their impact to ensure their effectiveness (Australian Government, 2010). The outcome of Australian Food and Grocery Council’s monitoring is made available to all stakeholders to assist with the review of these self-regulatory initiatives.

Issues of contention

Despite the current regulatory and self-regulatory approaches in Australia that govern advertising to children, there continues to be calls to government to enact tougher national legislation. Critics of the current approaches, particularly the food industry initiatives, say they do not go far enough to protect children from advertisements for foods high in fat, sugar and salt (HFSS). The main issues of contention are discussed below, namely the definitions of ‘marketing to children’, ‘children’ and ‘HFSS foods’, and administrative arrangements.

Definition of ‘marketing to children’ and media captured

Critics propose that regulation should cover all forms of food and beverage marketing that is directed to children or to which children are exposed to a significant degree. The forms of marketing addressed include free-to-air and subscription television, radio, internet, print, electronic communication, point-of-sale advertising and advertising in children’s institutions. Also captured are indirect forms of promotion such as sponsorship, fundraising and product placement (MacKay, Antonopoulos, Martin, & Swinburn, 2011).

A proposal to the government prepared by the Obesity Policy Coalition (OPC) on the regulatory approach that should be taken with respect to food and beverage marketing to children (MacKay et al., 2011) outlines that the process of determining whether an advertisement is ‘directed to children’ would be based on any one of the following three components:

1. The media where the advertisement was communicated and/or the mode, location, timing or placement. This would capture advertisements displayed in the immediate vicinity of a school and children-specific television programs. It would also capture television programs that are watched by a ‘significant’ number of children regardless of the proportion of children watching in relation to the total audience. For television advertising, the restricted time periods are where significant numbers and/or a significant proportion of children are likely to be watching (i.e. 0600 to 0900 and 1600 to 2100 Monday to Friday and 0600 to 1200 and 1600 to 2100 on weekends and school holidays).

2. The nature of the advertisement, which captures the content, presentation and design of the advertisement and whether these are likely to appeal to children.

3. The nature of the food product (or brand) advertised, which captures whether the food product is designed for children, likely to appeal to children, or typically consumed by children.

Table 1. RCMI* and QSR** signatories

<table>
<thead>
<tr>
<th>RCMI signatories</th>
<th>QSR initiative signatories</th>
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<tbody>
<tr>
<td>Campbell Arnott’s</td>
<td>McDonalds</td>
</tr>
<tr>
<td>Cereal Partners Worldwide (Australia)</td>
<td>KFC</td>
</tr>
<tr>
<td>Coca-Cola South Pacific</td>
<td>Pizza Hut</td>
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<tr>
<td>Ferrero Australia</td>
<td>Hungry Jacks</td>
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<tr>
<td>Fonterra Australia New Zealand</td>
<td>Oporto</td>
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<tr>
<td>General Mills Australia</td>
<td>Red Rooster</td>
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<tr>
<td>George Weston Foods Limited</td>
<td>Chicken Treat</td>
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<tr>
<td>Kellog (Australia)</td>
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<tr>
<td>Kraft Food Australia/New Zealand</td>
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<tr>
<td>Mars Australia</td>
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<tr>
<td>National Foods Limited</td>
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<td>Nestle Australia Limited</td>
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<td>Patties Foods</td>
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<tr>
<td>PepsiCo Australia</td>
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<td>Sanitarium Health Food Company</td>
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<td>Simplot Australia</td>
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<td>Unilever Australasia</td>
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* RCMI: Responsible Children’s Marketing Initiative (RCMI)
** QSR initiative: Australian Quick Service Restaurant Industry Initiative for Responsible Advertising and Marketing to Children

Despite these restrictions, there has been no impact on the prevalence of overweight and obesity in children in Quebec or Sweden
Industry’s self-regulatory initiatives, on the other hand, are not intended to prevent children from ever viewing an advertisement for HFSS foods; rather, their intent is to restrict advertisements that are directed to children through the nature of the advertisement and/or the medium.

Signatories to the RCMI and QSR initiative publicly commit to undertake marketing communications to children only when it will further the goal of promoting healthy dietary choices and lifestyles. These initiatives capture advertisements on television (free-to-air and pay-TV), radio, newspapers and magazines, cinema and third-party internet sites. The QSR initiative provides additional focus on outdoor billboards and posters, emails and interactive games. Other core principles of the initiatives relate to:

- use of popular personalities and licensed characters
- product placement
- use of products in interactive games
- advertising in schools
- use of premium offers
- on-pack nutrition labelling (QSR only)*
- availability of nutrition information (QSR only)*.

* For food manufacturers, nutrition information labelling on pack is a regulatory requirement.

Specific time periods are not covered in these initiatives as they capture programs that are watched primarily by adults. The view of Australian Food and Grocery Council (AFGC) is that if children are watching these programs they are likely to be doing so accompanied by an adult who can provide guidance on appropriate food consumption. Indeed, as described by Yu (2011), the more time parents spend watching television with their children the more positive the effect on attitudes to HFSS advertisements; which may assist with establishing healthy behaviours in their adult life. AFGC does, however, recognise that times when children are watching television alone and advertisements that are designed to particularly target children are a different matter and industry must act responsibly in these areas.

The forms of marketing proposed by Obesity Policy Coalition that are not captured in the initiatives include electronic communication, point-of-sale advertising, company-owned websites, sponsorship and fundraising. AFGC does not feel that these should be covered at this stage for the following reasons:

- Electronic communication is a controlled medium in which the person receiving the information has, at some point, requested to do so. In relation to communication to children, companies require the permission of parents before the children are added to the mailing list.
- The issue of product packaging and point-of-sale advertising relates to the retail environment; it may be argued that the customer has made a conscious decision to be exposed to the marketing activities that operate within.
- In relation to company-owned websites, these are primarily general websites that may have some components of interest to children. Where they do, no products are advertised and there are mechanisms in place to ensure parents are aware of children’s activities, and in some instances, have to approve the activity. Any websites designed specifically for children primarily consist of games and activities and do not have information about products.
- Sponsorship and fundraising activities are only undertaken with the support of the organising body and action to bring about change in this area should be approached through a health promotion mechanism.

**Definition of ‘children’**

Critics argue that advertising restrictions must cover, at a minimum, children younger than 16 years, which could be extended to 18 years because up to the age of 15–17 years, children remain vulnerable to the effects of food advertising, and, therefore, require ‘...protection from its influence’ (p. 30) (MacKay et al., 2011).

This age limit is not, however, supported in the literature. Two concepts related to advertising are the **selling** intent (the purpose of advertising is to ‘sell’ the product) and **persuasive** intent (advertisers attempting to make viewers do something they might not otherwise do) (Carter, Patterson, Donovan, Ewing, & Roberts, 2011). In their study, Carter et al. (2011) found children are able to recognise the **selling** intent of advertising by around 8 years of age while an understanding of **persuasive** intent develops at around 11–12 years. This indicates that an age of less than 12 years is appropriate, which is captured within the RCMI, while the QSR initiative is up to 14 years. Indeed the American Psychological Association (APA) recommends no advertising should be directed towards children below 8 years because they do not recognise the **persuasive** intent of advertising (Wilcox et al., 2004). The APA definition of ‘directed to children’ is through children-specific programs or where the audience is primarily composed of children.
Times when children are watching television alone and advertisements that are designed to particularly target children are a different matter and industry must act responsibly in these areas.

Criteria to determine foods that are high in fat, sugar and salt (HFSS)

Each signatory to the RCMI is required to specify the nutrition standards that will be applied to determine HFSS products. In many instances, companies are guided by their global nutrition criteria. However, these must align with established scientific or Australian Government Standards. Signatories to the QSR initiative use a single nutrition criterion for children’s meals (Australian Association of National Advertisers, 2011c), which was developed by a team of Accredited Practising Dietitians in consultation with relevant authorities on children’s nutrition and national nutritional guidelines.

Critics argue, however, that a single tool must be used to determine HFSS foods, with the preference being the use of a nutritional profiling tool, such as that developed by Food Standards Australia New Zealand for the regulation of health claims (MacKay et al., 2011). This system assesses nutrients in food that have an established association with chronic diseases and gives the food an overall rating that determines whether a health claim can be made.

While the nutrition criteria may differ between signatories, the industry initiatives use an outcomes-based approach where only products that represent healthy dietary choices may be advertised. In general, the products that meet the company criteria that enable the products to be advertised to children align with what would reasonably be described as healthy food choices.

Examples of products advertised in children’s programs in 2010 that meet the company nutrition criteria but not the more stringent criteria set by public health groups (Kelly, Smith, King, Flood, & Bauman, 2007; King et al., 2010) include 100% fruit and vegetable juice, McDonalds Happy Meals (‘healthy choice’ products such as wraps, fruit and water/low fat flavoured milk) and crumbed fish products. It could, however, be argued that these products are not dissimilar to the recommendations in the Australian Guide to Healthy Eating (Smith, Kellett, & Schmerlaib, 1998).

The products advertised in 2010 that do not meet either criterion include confectionery, standard QSR products (e.g. burgers, pizza), fruit straps and iced tea. As these products were advertised in children’s programs, albeit minimally, this is an area that will need to be addressed through appropriate action from the signatories.

This assessment demonstrates that while the criteria differ between signatories, the actual outcome is essentially the same whether or not a uniform criterion is applied.

Administration

Critics argue that legislation should be administered and ‘strictly and actively’ enforced by an independent agency, with activities to include compliance monitoring, so that identification of breaches is not dependent on complaints from the public, and regular review and evaluation (MacKay et al., 2011). The RCMI and QSR initiatives are managed by Australian Food and Grocery Council through a designated Code Administration Manager and operate under a formal management structure, including company reporting, external compliance monitoring, annual review and reporting to stakeholders.

The Advertising Standards Bureau (ASB) manages the complaints process for the RCMI and QSR initiative. The ASB assesses complaints about food and beverage advertisements against all the Codes they administer, regardless of whether the complaint mentions the specific initiatives. This ensures even greater accountability to signatories to the RCMI and QSR initiatives.

Complaints are assessed according to the RCMI and QSR core principles on two levels:
1. Whether the products represent a healthy choice
2. Whether the advertisement is directed to children.

The determination of whether the products represent a healthy choice is made by an independent arbiter. The determination of whether the advertisement is directed to children is made by the Board of the ASB. The Board meets twice a month to consider complaints received and can also meet between meetings if the Secretariat considers that a complaint should be considered as a matter of urgency. As such, complaints against the RCMI or QSR initiative can be dealt with in a timely manner.

If the complaint is upheld, the company must stop marketing the product to children and all outcomes of ASB adjudications are listed on the ASB website. Companies found to be in breach of the RCMI or QSR initiative are likely to use the outcomes of the ASB adjudication process to strengthen their activities in this area.

It has been claimed that the market approach is failing and that the food industry has been given sufficient opportunity in this area (MacKay et
Despite the fact that this conclusion is based on the more strict definition of ‘advertising to children’, AFGC disputes the claim that industry has been given sufficient time to act. The self-regulatory approach has been in place for two years and adequate time is needed to monitor and review the impact on moderating advertising to children. Monitoring to date has demonstrated a high level of industry compliance (AFGC, 2011b) and a review undertaken by AFGC indicates that television advertisements for HFSS foods that are directed to children make up just 2.4% of all food and beverage advertisements (AFGC, 2010). Further time is needed to adequately demonstrate the effectiveness of industry’s self-regulatory approach.

Discussion and conclusion

There is no doubt that the prevalence of childhood overweight and obesity in Australia is of concern and efforts must be taken to halt and reverse this growing trend. It is, however, necessary to consider carefully the most appropriate action to take. It is argued that the government must comprehensively regulate the marketing of food and beverages to children to make progress towards improving the health of Australian children and reducing the economic costs of overweight and obesity (MacKay et al., 2011). This argument, however, doesn’t hold given that there is no evidence to suggest that advertising has an effect on health outcomes. In fact, advertising restrictions internationally have failed to have any impact on the prevalence of overweight and obesity in those countries to date. The complex nature of the proposed advertising regulations would pose significant costs to government, which could not be justified.

It would be unrealistic for full regulation to be implemented with the thought that it may have some impact on improving health outcomes. Buckingham (2009) highlights that policy must be made with regard to the facts and to scientific objectivity. The advertising regulations recently introduced in the UK are viewed by Buckingham as a means of addressing—or at least being seen to address—a ‘social problem’ with complex and potentially quite fixed, social causes. Policy in this area serves merely as a symbolic function that potentially quite fixed, social causes. Policy in this area serves merely as a symbolic function that could not be justified.

Maintaining the status quo with regard to the self-regulatory approach to food and beverage advertising to children has numerous benefits to government and the community. The AFGC industry initiatives have support from companies through the feeling of ownership and acknowledgement of their responsibility in this area. The initiatives are supported through a robust administration arrangement, which includes a designated Code Manager within the AFGC, compliance monitoring, complaints handling, review and reporting. These industry initiatives can also be amended over time to ensure they are adequately meeting their objectives.

AFGC has made a strong commitment to managing these initiatives, which includes administrative and financial resources. Such resources would not be as readily available under government regulation. Any additional regulation in this area would be based on the ‘precautionary principle’; rather than on the evidence base, which goes against the principles of best regulatory practice. AFGC is willing to continue to work with the government on this issue to ensure the self-regulatory initiatives in Australia are achieving their aim of moderating food and beverage advertising to children. AFGC also extends this offer to non-government organisations.

Discussion and conclusion

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Maintaining the status quo with regard to the self-regulatory approach to food and beverage

References


There is no evidence to suggest that advertising has an effect on health outcomes
The effects on sensory properties of incorporating sweet potato and peanut flours into probiotic yogurt in Mwanza, Tanzania

Stephanie Varriano
This paper was the winning paper in the undergraduate category of the Dr. Elizabeth Feniak Award for Excellence in Technical Writing 2011 presented by the Canadian Home Economics Foundation.
Supervisor: Dr. Sharareh Hekmat

Abstract
Vitamin A deficiency and protein-energy malnutrition are the two most common dietary deficiencies in some resource-poor African communities. Addition of sweet potato and peanut flours in certain African staples has been an effective method to increase the pro-vitamin A content of the diet and alleviate protein-energy malnutrition, respectively. The objective of this study was to evaluate the effects of incorporating sweet potato and peanut flours on sensory properties of probiotic yogurt in Mwanza, Tanzania.

Samples of standardised milk (3.5% fat) with six different additives were prepared: 4% sweet potato flour; 6% sweet potato flour; 4% peanut flour; 3% milk powder; 5% milk powder; and one with no additives as the control. The samples were heat treated at 85°C for 30 minutes, cooled to 37°C and inoculated with standard yogurt cultures and Lactobacillus rhamnosus GR-1 (4%). All yogurt samples were fermented and cooled to 4°C. A nine-point hedonic scale was used to evaluate the samples.

The sample with 4% sweet potato flour was rated significantly (P < 0.05) higher for flavour and overall acceptability compared to those samples with 5% milk powder, 4% peanut flour, and 6% sweet potato flour. The 6% sweet potato flour sample had a significantly (P < 0.05) lower appearance score compared to other samples. The addition of 4% peanut flour was not desirable and resulted in low scores for flavour and overall acceptability.

This study suggests that the addition of moderate amounts of sweet potato flour to yogurt improves the flavour and overall acceptability of the product and can potentially be used as a nutritional additive to combat vitamin A deficiency in Africa.

Introduction
Vitamin A deficiency and protein-energy malnutrition are the two most common dietary deficiencies in some resource-poor African communities. Vitamin A deficiency in Africa significantly increases the risk of severe illness from infections such as diarrheal disease and measles (World Health Organization, 2011). Dietary vitamin A deficiency also causes health problems such as xerophthalmia, corneal lesions, keratomalacia, increased risk of transmission of HIV from mother to child and, in many instances, death (Hagenimana, K’osambo, & Carey, 1998).

HIV-infected patients in developing countries frequently have abnormal total serum carotene concentrations indicating fat malabsorption that may contribute to diarrhoea. Furthermore, total serum carotene concentrations are associated with immunologic abnormalities in those infected with HIV (Ullrich, R., et al.). The HIV/AIDS prevalence rate in Tanzania is 8.8%, higher than the prevalence rate of the sub-Saharan African region and the global rate (Sikkema, Kalichman, Kelly, & Koob, 1995).

Sufficient consumption of ß-carotene-rich foods can alleviate signs of vitamin A deficiency, and it has been suggested that ß-carotene may enhance immune cell function (Hughes, 1998; Hagenimana, K’osambo, & Carey, 1998). In East Africa, sweet potato is a staple source of calories and is consumed by all age groups. Sweet potato has remarkable pro-vitamin A qualities, and is useful for developing sustainable food production systems in the tropics due to the root’s ability to tolerate drought (Ewell, 1990). Sweet potato-based processed foods could provide sustainable, cost-effective, and much needed vitamin A in Africa. One study showed that incorporating sweet potato flour was one of the best means of increasing the carotenoid and ß-carotene content of East African staples such as chapatti (bread) and mandazi (doughnut) (Hagenimana, K’osambo, & Carey, 1998).

Making available food sources of pro-vitamin A carotenoids and improving their consumer acceptance could help combat vitamin A deficiency among rural East African communities. An
important sensory study conducted in Tanzania suggested that yogurt is a suitable carrier for both *L. rhamnosus* GR-1 and micronutrients (Hemsworth, Hekmat, & Reid, 2011). A study examining the composition of sweet potato and milk mixtures fermented with yogurt bacteria showed significant increases in values of vitamin A and retinol equivalents. In addition, sweet potato provided dietary fibre and starch, which functioned as a thickener and stabilizer (Collins, Ebah, Mount, Draughon, & Demott, 1991).

Some studies using food supplements to alleviate protein-energy malnutrition have proven effective. Peanut in the form of flour has been shown to have desirable sensory qualities in developing countries, and foods using peanuts have been developed to alleviate protein-energy malnutrition (Singh & Singh, 1991). Milk powder is often used to improve yogurt sensory aspects and fortify liquid milk for the manufacture of yogurt in the North American dairy industry. The addition of milk powder in yogurt production is feasible and desirable in Tanzanian populations.

Fermentation of food products has long been used all over the world to improve taste and to prevent spoilage (Halland, 2007). Traditional fermented foods remain the main source of nutrition for many rural communities in sub-Saharan Africa (Reid & Anukam, 2009). Yogurt, in particular, is an excellent vehicle to transfer beneficial microorganisms to the host (Hekmat & Reid, 2006; Hemsworth, Hekmat, & Reid, 2011).

The probiotic agent *Lactobacillus rhamnosus* GR-1 has therapeutic properties that include supporting the immune function of people living with HIV, treating and preventing diarrheal diseases, and preventing urogenital infections (Reid, Burton, & Delligard, 2004). Probiotic yogurt production offers a practical way to increase bioavailability of macronutrients and micronutrients and provide therapeutic effects in regions where malnutrition and HIV/AIDS are prevalent. The simple and low cost technique required for yogurt production can be easily transferred to resource-poor Tanzanian communities (Hekmat & Koba, 2006). Yogurt fortified with the *Lactobacillus rhamnosus* GR-1 strain has been introduced in Tanzania and East Africa through a grassroots community development project (www.westernheadseast.ca) to benefit populations at high risk for these diseases.

The purpose of this study was to evaluate sensory aspects of probiotic yogurt when combined with locally produced sweet potato flour, peanut flour and milk powder, and the overall acceptability of these products in a Tanzanian community.

**Methods**

**Subjects**

Thirty-nine study participants in Mwanza, Tanzania were recruited using convenience sampling based on their willingness to participate. Inclusion criteria consisted of having the ability to understand the intent of the study, being over the age of 16 years, and being able to provide informed consent through signing the letter of information and consent. Members of the Mabatini community surrounding the yogurt kitchen volunteered to be part of the study after reading flyers posted for recruitment. Study participants were 59% female and 41% male. As a token of appreciation, participants were given a voucher for 250 millilitres of probiotic yogurt from the yogurt kitchen in Mabatini.

**Preparation of probiotic culture**

*Lactobacillus rhamnosus* GR-1 probiotic mother culture was prepared at the National Institute for Medical Research in Mwanza, Tanzania. The probiotic microorganisms were added to sterilised de Man, Rogosa and Sharp broth and incubated anaerobically using BBL gas pack at 37°C overnight. Five hundred millilitres milk (3.5% milk fat) containing 0.4% yeast extract was inoculated with 1% probiotic broth mixture. The inoculated milk was then incubated anaerobically at 37°C for 18 hours.

**Preparation of probiotic yogurt containing additives**

Six samples of probiotic yogurt were prepared, each with a different additive:

- Sample 1: control
- Sample 2: 3% milk powder
- Sample 3: 5% milk powder
- Sample 4: 4% sweet potato flour
- Sample 5: 6% sweet potato flour
- Sample 6: 4% peanut flour

To prepare the samples, six litres of fresh, locally produced milk (3.5% fat) were pasteurized by heating to 85°C for 30 minutes. Six individual plastic containers were sterilised in boiling water, and labelled using arbitrary 3-digit codes (see Table 1). One litre of pasteurised milk was placed into each of the containers. Additives were added to each labelled container of milk, according to Table 1. All of the additives—dry milk powder, sweet potato flour and peanut flour were locally produced and purchased at markets in Mwanza. One container was left with no additives, to serve as the control.
Table 1. Yogurt samples

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Code</th>
<th>Additive</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>980</td>
<td>Nil (control)</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>95</td>
<td>Milk powder</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>113</td>
<td>Milk powder</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>234</td>
<td>Sweet potato flour</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>455</td>
<td>Sweet potato flour</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>317</td>
<td>Peanut flour</td>
<td>4</td>
</tr>
</tbody>
</table>

Each container of milk was then cooled to 37°C. Each sample was inoculated with standard yogurt cultures (8% by weight) *Lactobacillus delbrueckii subsp. bulgaricus* and *Streptococcus thermophilus*, and the probiotic culture (4% by weight) *Lactobacillus rhamnosus* GR-1. This was achieved by adding the yogurt cultures to each sample, then stirring 25 times with a sterilised spoon. The six samples were incubated at 37°C for six hours. The samples were then carefully removed from the incubator and refrigerated for 12 hours at 4°C prior to sensory testing.

**Sensory evaluation**

Sensory evaluation was conducted in the community yogurt kitchen in Mwanza. The Mabatini kitchen location was accessible to all participants, allowing for convenience and minimal disturbance in normal routines.

In order to reduce biased results, attempts were made to eliminate irrelevant odour and psychological distraction to provide a comfortable environment. This was difficult in a small, high-traffic environment not designed for sensory testing. The testing area was divided into two parts: a work area for sample preparation, and the actual testing area. Space was provided outside the kitchen where participants waited before or after the testing. Payment of vouchers also took place after the testing in the designated waiting area to avoid disturbances during the testing. Air temperature and humidity control were not possible in this environment. For this reason, odours from the kitchen and the outside environment may have caused slightly biased results.

Each research participant received the samples to taste in a random order; order of product presentation was varied systematically to eliminate order bias (Moskowitz, 1988). Participants were given an evaluation form translated to Swahili, a pencil and a glass of water. They were instructed (with the use of a Swahili translator) not to communicate with other participants. The six yogurt samples were placed in identical plastic cups, in standardised amounts. Plastic spoons were served with each sample separately to avoid mixing of flavours.

Participants assessed the yogurt samples for appearance, flavour, texture and overall quality on a 9-point hedonic scale (1–dislike extremely to 9–like extremely). Participants were asked to answer five questions related to the aftertaste of the yogurt samples, and their yogurt purchasing and consumption habits. Participants also completed a 24-hour dietary recall.

The Brescia University College Ethics Committee approved this study.

**Statistical analysis**

In order to determine the significance of the study results, the means of each sensory characteristic were compared for every yogurt sample. In other words, the yogurt samples were compared to each other based on each sensory characteristic (texture, flavour, appearance and overall quality) separately.

Repeated measures analysis of variance (ANOVA) was used as the statistical tool for comparing the means of each category. Repeated measures ANOVA was necessary for this study because of the correlation between responses across all categories for each participant (i.e. each participant was exposed to more than one condition/yogurt sample). Each participant had their own biases and scoring tendencies; thus, this factor had to be accounted for when analysing the results. Traditional ANOVA is not adequate as it assumes independence amongst responses.

The results of a repeated measures ANOVA outline whether there is a significant difference (in the case of this study the confidence level, $\alpha$, is set to 0.05) between any of the means. When a significant difference was found, further investigation using Tukey’s Honestly Significant Difference (HSD) test was conducted to determine how the means of each yogurt sample compared to each other. SAS statistical software (SAS/STAT, 2008) was used to perform the aforementioned analysis.

**Results**

A summary of scores on the hedonic scales for all the samples and attributes can be found in Table 2. The results for two study participants were removed because evaluation forms were not completed correctly.
Significant differences (p<0.05) between mean sensory scores were found for flavour, appearance and overall acceptability. However, at p<0.05, texture was not found to have any significance between mean scores.

The sample with added 4% sweet potato flour had the highest mean flavour and overall acceptability scores. In addition, the 4% sweet potato flour sample had the lowest inter-subject variation for flavour and overall acceptability, shown by the standard deviation. Most of the scores in these categories were close to the mean. The means for the sample with 4% sweet potato flour were found to be significantly higher than the means for the samples with 5% milk powder, 4% peanut flour and 6% sweet potato flour for both flavour and overall acceptability.

Mean scores for appearance were highest for the sample with 3% milk powder and the control sample. The sample with 6% sweet potato flour had a significantly lower appearance score compared to these samples (p<0.05).

Samples with 4% peanut flour and 6% sweet potato flour were the least desirable, with the lowest scores for flavour and overall acceptability (p<0.05).

In summary, the samples with 4% sweet potato flour had the most favourable results for flavour, texture, appearance and overall quality. When added to probiotic yogurt, this micronutrient additive showed the most promise for consumer acceptability in this population.

Table 2. Summary of mean scores on the hedonic scale for all attributes

<table>
<thead>
<tr>
<th>Yogurt Sample</th>
<th>Sample Code</th>
<th>Flavour*</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3% milk powder (A)</td>
<td>95</td>
<td>7.2 ± 2.07</td>
<td>A, B, C</td>
</tr>
<tr>
<td>5% milk powder (B)</td>
<td>113</td>
<td>6.3 ± 2.37</td>
<td>B, C</td>
</tr>
<tr>
<td>4% sweet potato flour (C)</td>
<td>234</td>
<td>7.8 ± 0.95</td>
<td>A</td>
</tr>
<tr>
<td>4% peanut flour (D)</td>
<td>317</td>
<td>6.1 ± 2.48</td>
<td>C</td>
</tr>
<tr>
<td>6% sweet potato flour (E)</td>
<td>455</td>
<td>6.4 ± 2.30</td>
<td>B, C</td>
</tr>
<tr>
<td>Control (F)</td>
<td>980</td>
<td>7.5 ± 1.34</td>
<td>A, B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yogurt Sample</th>
<th>Sample Code</th>
<th>Texture</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3% milk powder (A)</td>
<td>95</td>
<td>6.7 ± 2.51</td>
<td>--</td>
</tr>
<tr>
<td>5% milk powder (B)</td>
<td>113</td>
<td>6.4 ± 2.27</td>
<td>--</td>
</tr>
<tr>
<td>4% sweet potato flour (C)</td>
<td>234</td>
<td>6.2 ± 2.56</td>
<td>--</td>
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<tr>
<td>4% peanut flour (D)</td>
<td>317</td>
<td>5.6 ± 2.46</td>
<td>--</td>
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<tr>
<td>6% sweet potato flour (E)</td>
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<td>6.0 ± 2.41</td>
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</tr>
<tr>
<td>Control (F)</td>
<td>980</td>
<td>6.7 ± 1.82</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yogurt Sample</th>
<th>Sample Code</th>
<th>Appearance*</th>
<th>Group</th>
</tr>
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<tr>
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<td>95</td>
<td>7.1 ± 2.03</td>
<td>A</td>
</tr>
<tr>
<td>5% milk powder (B)</td>
<td>113</td>
<td>6.3 ± 2.74</td>
<td>A, B</td>
</tr>
<tr>
<td>4% sweet potato flour (C)</td>
<td>234</td>
<td>6.1 ± 2.46</td>
<td>A, B</td>
</tr>
<tr>
<td>4% peanut flour (D)</td>
<td>317</td>
<td>6.3 ± 2.33</td>
<td>A, B</td>
</tr>
<tr>
<td>6% sweet potato flour (E)</td>
<td>455</td>
<td>5.5 ± 2.54</td>
<td>B</td>
</tr>
<tr>
<td>Control (F)</td>
<td>980</td>
<td>7.4 ± 1.67</td>
<td>A</td>
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<table>
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<th>Yogurt Sample</th>
<th>Sample Code</th>
<th>Overall Acceptability*</th>
<th>Group</th>
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<tbody>
<tr>
<td>3% milk powder (A)</td>
<td>95</td>
<td>6.9 ± 2.31</td>
<td>A, B, C</td>
</tr>
<tr>
<td>5% milk powder (B)</td>
<td>113</td>
<td>6.2 ± 2.79</td>
<td>B, C</td>
</tr>
<tr>
<td>4% sweet potato flour (C)</td>
<td>234</td>
<td>7.9 ± 1.48</td>
<td>A</td>
</tr>
<tr>
<td>4% peanut flour (D)</td>
<td>317</td>
<td>6.2 ± 2.63</td>
<td>B, C</td>
</tr>
<tr>
<td>6% sweet potato flour (E)</td>
<td>455</td>
<td>6.0 ± 2.57</td>
<td>C</td>
</tr>
<tr>
<td>Control (F)</td>
<td>980</td>
<td>7.6 ± 1.74</td>
<td>A, B</td>
</tr>
</tbody>
</table>

*Significant at p<0.05
Discussion

Texture
It appears from these results that the various additives do not significantly affect texture. One explanation for this result is that adding sweet potato flour, peanut flour and milk powder did not alter the texture of yogurt a great deal. Collins et al. (1991) noted that when added to milk and fermented with yogurt bacteria in amounts of 14%, sweet potato flour adds starch and acts as a stabiliser and thickener; however, this effect may not be possible with the low amounts used in this study. This could explain insignificant differences in test subjects’ mean scores for texture. Alternatively, it is possible that participants were not concerned with the texture changes between the samples as thickening of yogurt with sweet potato flour, peanut flour and milk powder is accepted in this population.

Flavour and overall acceptability
Significant differences (p<0.05) between mean sensory scores were found for flavour and overall acceptability. The sample with added 4% sweet potato flour had the highest mean flavour and overall acceptability scores, and was more consistently desired amongst the subjects as shown by less variation around the means for overall acceptability. It is obvious that this sample was more accepted for flavour because of the added sweetness. According to subjective data collected from the follow-up questionnaires, many participants valued sweetness as a factor. Additionally, sweetness has been shown to be a likeable attribute in a variety of African populations through similar studies (Hemsworth et al., 2011).

The sample with 4% peanut flour produced lower scores for flavour and overall acceptability (p<0.05) compared to the sample with 4% sweet potato flour, but scores were similar when compared with the control. The darker colour of the sample with peanut flour may have produced a bias. Further studies should be conducted to evaluate the acceptability of yogurt products with added peanut flour in varying amounts.

Appearance
Significant differences (p<0.05) between mean sensory scores were found for appearance. Participants ranked the control sample and the sample with 3% added milk powder highest for appearance. This is likely due to their familiarity with the regular, white and creamy appearance of the plain probiotic yogurt served at the community kitchen. The sample with 6% added sweet potato flour was ranked very low in overall acceptability. This may be attributed to the unnatural and visually unappealing dark colour of the yogurt, produced by adding higher amounts of sweet potato flour. This may have contributed to a bias. The poor appearance of this sample is shown to be significant (see Table 2). The low scores in other categories for this sample could be explained by this bias.

The results show that the additives explored in this study had significant effects on participant satisfaction and confirm that further studies should be conducted to determine the additive that provides the best sensory experience as well as nutritional benefits.

Conclusion
Overall, the results of this study suggest that sweet potato flour could be a desirable additive to the yogurt produced in Mwanza, Tanzania. It was found that adding sweet potato flour in moderate amounts (4%) improves the flavour and overall acceptability of the yogurt. Higher amounts of sweet potato flour may negatively affect the acceptability of the product, as shown by the appearance and overall scores for 6% sweet potato flour. Moderate additions of peanut flour to the yogurt did not significantly alter the overall acceptability of the product when compared with the control sample. Further investigation of different peanut flour ratios could be conducted to determine the usefulness of this nutritional additive. The addition of milk powder did not differ significantly in scores from the control, and thus addition to yogurt production in the future will likely remain acceptable in this community. This study suggests promise for sweet potato as a nutritional additive for this food source to combat vitamin A deficiency in Africa.

Future directions
Based on the results of this study, it is suggested that further studies be conducted to investigate increasing the micronutrient content of the probiotic yogurt made in Mwanza, Tanzania. Possible studies that may be beneficial include:

- Sensory evaluation of different amounts of locally produced sweet potato flour (1% to 14% by weight) supplemented yogurt to further evaluate the acceptability of this product
- Sensory evaluation of probiotic yogurt with the addition of sweet potato flour in different communities in East Africa (e.g. rural vs. urban communities, Kenya vs. Tanzania vs. Rwanda, etc.)
- Studies to determine the health benefits of consuming probiotic yogurt with the addition of sweet potato flour compared to plain probiotic yogurt

Many participants valued sweetness as a factor.
Sensory evaluation of probiotic yogurt with the addition of varied quantities of peanut flour to further investigate the acceptability of this product

Evaluation of the effect of sweet potato flour and peanut flour on the viability of the probiotic L. rhamnosus strain when added to the yogurt

Sensory testing of probiotic yogurt with the addition of other locally produced micronutrient sources (e.g. moringa powder) in comparison with sweet potato flour

Sensory testing of probiotic yogurt of different textures and consistency in East African communities (e.g. lumpy, smooth, creamy, syneresis, compact, uniform)

Studies to determine the acceptability of yogurt products of different colours in East African communities

References


Promise for sweet potato as a nutritional additive for this food source to combat vitamin A deficiency in Africa
Use of a diet low in FODMAPs for the management of irritable bowel syndrome

Emily Quenneville
This paper is the winning paper in the graduate category of the Dr. Elizabeth Feniak Award for Excellence in Technical Writing 2011 presented by the Canadian Home Economics Foundation.

Abstract
Irritable bowel syndrome (IBS) is a common gastrointestinal disease. Several treatments are currently available; however, few provide much relief for the majority of patients. A relatively new approach suggests limiting the delivery of certain short-chain carbohydrates and polyols to the small intestine in order to reduce luminal distension. These short-chain carbohydrates have been collectively termed FODMAPs—Fermentable Oligo-, Di-, and Mono-saccharides And Polyols. Accordingly, a diet low in FODMAPs should decrease luminal distension, thereby also reducing the symptoms related to IBS. Although there is a growing body of evidence for the effectiveness of the diet, further research is warranted to account for previous study limitations and to show that symptom improvement is directly related to the diet and not a placebo response. Nevertheless, the results of several studies suggest that a diet low in FODMAPs is a viable treatment alternative for the management of symptoms related to IBS.

Introduction
Irritable bowel syndrome (IBS) is defined as ‘abdominal pain or discomfort that occurs in association with altered bowel habits over a period of at least three months’ (American Journal of Gastroenterology, 2009). It is a common chronic disease, with North American prevalence estimates ranging from three to 20.4 per cent, depending on which diagnosis criteria are used (Saito, Schoenfeld, & Locke, 2002). However, these figures likely underestimate the true prevalence, as approximately 33 to 90 per cent of patients do not consult health care professionals regarding their condition (Spiller et al., 2007). IBS is a heterogeneous condition whose etiology is largely unknown, making its diagnosis and treatment difficult (Camilleri, 2001; Spiller et al., 2007). Although there is currently a range of available treatment options, new treatments are still needed because only a small proportion of patients actually benefit from each (Spiller et al., 2007).

A relatively new treatment approach suggests limiting the excessive delivery of certain short-chain carbohydrates to the small intestine in order to reduce luminal distension, which has been associated with sensations of pain and bloating, as well as altered motility patterns (Barrett & Gibson, 2007). These short-chain carbohydrates have been collectively termed FODMAPs—Fermentable Oligo-, Di- and Mono-saccharides And Polyols, and include fructo-oligosaccharides (fructans) and galacto-oligosaccharides (galactans), sugar alcohols (polyols), and in some patients, fructose and lactose (Gibson & Shepherd, 2005). A diet low in FODMAPs has been suggested to be an effective approach to manage the symptoms of IBS. This paper will examine the relationship between IBS and a diet low in FODMAPs. Specifically, it will examine the basis of the FODMAP approach, efficacy of the diet, limitations related to study designs, and areas for future research.

Basis of the FODMAP approach
The low FODMAP diet first appeared as a hypothesis to link changes in environmental factors (i.e., western diet) and the incidence of Crohn’s disease (Gibson & Shepherd, 2005). Since then, the diet has been proposed to provide relief of functional gut symptoms related to various gastrointestinal (GI) disorders, including IBS (Barrett & Gibson, 2007). The low FODMAP diet is based on the premise that luminal distension causes many functional gut symptoms, including sensations of pain and bloating in the abdomen, as well as altered intestinal motility, in those with visceral hypersensitivity and abnormal motility responses (Barrett & Gibson, 2007; Ritchie, 1973; Serra et al., 2010). Thus, such symptoms could theoretically be improved by restricting the consumption of dietary factors that distend the intestine (Gibson & Shepherd, 2010). The low FODMAP diet is founded on the principle that FODMAPs exert additive effects since they all share three functional properties: i) they are poorly absorbed in the small intestine; ii) they are
small, osmotically-active molecules; and iii) they are rapidly fermented by bacteria, all of which result in luminal distension (Barrett & Gibson, 2007; Gibson & Shepherd, 2010). Accordingly, a diet low in FODMAPs should minimise luminal distension, thereby also reducing the symptoms related to IBS.

There are two key components to the low FODMAP diet. The first is that this diet restricts global intake of FODMAPs and does not focus on individual ones (Gibson & Shepherd, 2010). Restricting all poorly absorbed short-chain carbohydrates should have a greater effect on symptom control, especially if multiple FODMAPs are causing luminal distension. The second key component is that the FODMAPs themselves do not cause the underlying disease condition, but the diet is an approach to help manage and reduce symptoms, which are triggered by the response of the enteric nervous system from luminal distension, not from the malabsorption of the FODMAPs (Gibson & Shepherd, 2010).

**Dietary components of the low FODMAP diet**

**Fructose**

Fructose is a hexose sugar that is present in fruits, honey, and high fructose corn syrup (Choi, Johlin, Summers, Jackson, & Rao, 2003). It is absorbed by the intestine via two routes: low capacity facilitated diffusion via the GLUT 5 transporter or rapid diffusion with glucose (Kellert & Bro-Laroche, 2005). Thus, free-fructose on its own is slowly absorbed, but is rapidly absorbed in the presence of equimolar amounts of glucose (Shi et al., 1997). Fructose malabsorption can occur when facilitated diffusion via GLUT 5 is impaired or when fructose is fermented by intestinal bacteria before it is able to be absorbed (Nucera et al., 2005). In addition, fructose absorption capacity is saturable; therefore, consuming a high fructose load in one sitting may also result in fructose malabsorption (Riby, Fujisawa, & Kretchmer, 1993). Fructose malabsorption can be detected by hydrogen breath testing after an oral load of fructose (Barrett & Gibson, 2007). The prevalence of fructose malabsorption in the general population is similar to that found in patients with unexplained, non-specific GI complaints, making fructose malabsorption a poor predictor of IBS (Beyer et al., 2005; Choi et al., 2003; Gibson, Newnham, Barrett, Shepherd, & Muir, 2006). Moreover, the occurrence of fructose malabsorption appears to be dependent on the dose, where one study found that 53 per cent of the healthy subjects had fructose malabsorption after consuming a 12.5% solution of fructose and 73 per cent after consuming a 25% solution (Beyer et al., 2005). Consequently, those with fructose malabsorption should avoid foods high in free fructose and should not consume fructose in large amounts, which can saturate the diffusion capacity of the intestine (Barrett & Gibson, 2007).

**Lactose**

Lactose is a disaccharide of glucose and galactose that is only effectively digested and absorbed if there is sufficient lactase activity in the brush border of the proximal small intestine (Barrett & Gibson, 2007). Lactase deficiency depends on ethnicity and environmental factors, but is estimated to be present in one to 95 per cent of the population (Swagerty, Walling, & Klein, 2002). Similar to fructose malabsorption, hypolactasia can be tested via hydrogen breath testing (Gibson & Shepherd, 2010). Individuals with lactose intolerance do not require a dairy-free diet, but can generally consume small quantities of products with low levels of lactose, as well as lactose alternatives (Barrett & Gibson, 2007).

**Oligosaccharides**

Common oligosaccharides in the diet include those with fructose chains (fructo-oligosaccharides, fructans, or inulins) or galactose chains (galacto-oligosaccharides or galactans) (Barrett & Gibson, 2007). However, these compounds are largely not absorbed because the human small intestine does not produce the hydrolases required to break the fructo-fructose and galactose-galactose bonds (Gibson & Shepherd, 2005). Major sources of fructans in the diet include wheat and members of the onion and artichoke family; whereas, legumes are the most common dietary sources of galactans (Barrett & Gibson, 2007).

**Polyols**

Polyols are sugar alcohols (sorbitol, xylitol, mannitol, and maltitol) that are poorly absorbed and rapidly fermented in the bowel (Gibson & Shepherd, 2005). They are likely absorbed in the small intestine by passive diffusion, but they are not absorbed very well (Gibson & Shepherd, 2010). Moreover, their absorption worsens when co-ingested with fructose, resulting in an additive symptom effect (Nelis, Vermeeren, & Jansen, 1990). Sorbitol is the most common polyol in the diet and is found naturally in some fruits, as well as being used as an artificial sweetener (Barrett & Gibson, 2007).

**Efficacy of the low FODMAP diet**

There is a growing body of evidence for the usefulness of the low FODMAP diet for the
that each symptom significantly worsened in IBS of healthy subjects and patients with IBS found energy, macronutrient and fibre content in a group FODMAP diet (50 g of FODMAPs) of equal FODMAP diet (9 g of FODMAPs) and a high crossover intervention trial also comparing a low Similarly, a recent randomised, single-blinded, in the bowel. illustrate the physiological effects of FODMAPs not performed with IBS patients, the results help (Barrett et al., 2010). Although this study was diet compared with the high FODMAP diet be all significantly less during the low FODMAP diet (Ong et al., 2010; Weaver, Kruse, Miller & Wolin, 1986). Based on these results, it appears that a diet low in FODMAPs is a promising approach to manage the symptoms of IBS; however, few well-designed studies have evaluated the effects of the entire diet.

**Study design limitations**

Many studies have evaluated the effectiveness of a diet low in FODMAPs in patients with IBS, but there have been several problems related to their study designs, many of which are related to the nature of IBS.

One key issue is that the criteria used to diagnose IBS have changed multiple times since the 1970s; thus, patients throughout the years may have been included in studies based on the presence of different symptoms (Triantafyllou, 2002). Moreover, since it is considered a syndrome, IBS symptoms can vary greatly between individuals, as well as fluctuate over time within the same individual (Camilleri, 2004). These problems can be overcome by providing details about patient characteristics, using a broad spectrum of patients, stratifying patients by their predominant symptoms, using specific inclusion and exclusion criteria, and measuring specific end-points, all of which can help to support the generalisability of the results (Irvine et al., 2006; Spiller, 1999). The effects of these problems can also be minimised by having an appropriate sample size, but most of the studies examined within this paper had small sample sizes and none provided information regarding their sample size calculations. In addition, large treatment effects can be missed by using small sample sizes (Spiller, 1999).

Another major issue with studies evaluating the effectiveness of IBS treatments, in general, is the high placebo response rate, which has been found to range from 0 to 84 per cent (Spiller, 1999). This may partially be due to the natural variation of symptoms, where patients may begin the study with severe symptoms, but then improve over time due to the nature of the disease and not the treatment (Irvine et al., 2006). Nonetheless, attempts should be made to control the placebo
effect or else it may overshadow any specific treatment benefit (Spiller, 1999). The maximum placebo response has been estimated to occur around six to eight weeks in the study and begins to diminish after 12 weeks (Triantafyllou, 2002). It has been suggested that the ideal placebo response (<20%) may be achieved if treatment trials are at least three months in length (Spiller, 1999). However, lengthening trials may result in an increased number of drop-outs and a decline in compliance (Triantafyllou, 2002). This did not appear to be the case in the study by Shepherd and Gibson (2006), who found that 77 per cent of patients either always or frequently complied with a diet that avoided free fructose and short-chain fructans for a median of 14 months (range 2 to 40 months), but no details were provided on drop-outs. Although self-selection for treatment bias may explain such a high compliance rate, patients in this study were consecutively recruited from a private practice. Overall, placebo control groups are necessary to establish the efficacy of treatment and to determine whether improvements are actually due to the treatment being tested (Triantafyllou, 2002).

The double-blind, randomised, placebo-controlled trial is the reference standard to evaluate the effectiveness of a new treatment (Irvine et al., 2006). However, only one such study has been conducted related to a low FODMAP diet, yet its main objective did not specifically examine the efficacy of a diet low in FODMAPs, but of only restricting free fructose and fructans from the diet (Shepherd et al., 2008). Instead, several cross-over studies have been performed (Barrett et al., 2010; Ong et al., 2010), which theoretically should yield less variation among individual patient outcomes and require smaller sample sizes in order to achieve the desired statistical power (Irvine et al., 2006). Nevertheless, cross-over designs also have their disadvantages—for example, they are more severely impacted by patient drop-out and missing data than the reference standard design, as well as not being recommended for treatment trials with subjective outcomes (Irvine et al., 2006). Another major disadvantage is the possibility of carry-over effects, when symptoms fluctuate over time or the first treatment influences the response to the second (Hills & Armitage, 2004). Consequently, further high quality studies are needed to overcome these limitations.

**Conclusion**

Irritable bowel syndrome (IBS) is a common chronic disease, with current prevalence estimates likely to underestimate its true prevalence. While there is a range of treatment options presently available to manage IBS, new alternatives are needed as current strategies only offer some patients limited relief. There is however, a considerable amount of evidence and a well-substantiated mechanism of action that suggests that a diet low in FODMAPs is an effective approach to manage symptoms related to IBS (Gibson & Shepherd, 2010). Nonetheless, this dietary approach is not a cure for IBS, nor does it appear to work in all patients, but may offer improvements in some patients who have had little success with other treatments (Gibson & Shepherd, 2010). Further research is warranted, especially to develop more complete food lists and cut-offs to define ‘high’ and ‘low’ FODMAP foods. Moreover, additional high quality evidence is needed to account for previous study limitations and to show that symptom...
improvement is directly related to the diet and not a placebo response. Nevertheless, the low FODMAP diet appears to offer symptom relief in the majority of patients with IBS; therefore, it should be considered as an alternative treatment for symptoms related to IBS.

References


World Menu Report: What’s in your food?  
Global Research Findings 2011

Foreword by Mary Donkersloot RD, Nutritionist
Eating habits have changed dramatically and rapidly over the past few decades, largely as a result of more choices, larger portions and increased access to fast foods. With these widespread changes has come significant concern worldwide regarding the nutritional impact of current eating habits and fears over the long-term sustainability of the modern food industry.

So what do consumers really want when they eat out? People are demanding the right to enjoy food that is healthy but still delicious, resulting in the emergence of more nutrition-led meals on menus. However, when presented with these choices, consumers are often left confused.

Times are changing, consumers do want to know what is in their food. They need to be told in a clear, transparent way exactly what they are eating when out of home. The old attitude of ‘don’t ask don’t tell’ is simply not good enough any more—the food industry needs to be proactive in providing this much needed information.

There appears to be a world-wide movement to reset the global table—and if it is accomplished, it will take a combination of ‘stealth health’ (healthful changes in the kitchen) and transparency (allowing diners to take responsibility and interest in their own health and ask for more information on what’s on the menu).

The World Menu Report explores how much, if any, nutritional information is already on menus and to find out if consumers around the world want more. Would more information result in people making healthier meal decisions?

The World Menu Report
Cultural changes in food consumption, with people eating out more regularly and enjoying a wider range of cuisine, continue to have an impact on the world economy.

The 2011 Unilever Food Solutions World Menu Report is a definitive snapshot of out-of-home eating, polling consumers across the globe to compare and contrast changing tastes and market behaviours in today’s food industry.

The annual research was conducted by interviewing a representative sample of people from nine countries across the globe: USA, UK, China, Germany, Russia, Brazil, Turkey, Australia and New Zealand.

Executive Summary
The World Menu Report highlights that there is an overwhelming need for consumers to be provided with more information about the food they are eating when out of home. Whether this is where the food was sourced, how it was prepared, its nutritional value or the safety of the food, people are demanding more transparency.

The report demonstrates that this is a requirement in all countries. 90% of people surveyed in non-Western countries—and the clear majority in Western countries—expressed a desire for further information to be made available when eating out in order to allow them to make individual choices about the food they are eating.

A significant reason behind this desire for more information appears to lie in the apparent global aspiration to live healthier lifestyles. Offering comprehensive nutritional information in particular about the food consumed when eating out of home may help towards achieving this; however, whilst consumers agree that healthier food options are plentiful, the nutritional information available to them is not.

A clear majority of respondents across surveyed Western countries and over 70% in surveyed non-Western countries claim that knowing about the nutritional content of meals would influence the choices they make when eating out, and indicate that this would encourage them to choose healthier options.
Asked about nutrients and ingredients, people mostly claimed they would like to be made aware of fat, calorie content, additives and preservatives. In the Western world people would also like clearer direction on salt content, while people in China demand more information about the vitamins and protein contained in their food.

Overall, the information available to people when eating out is not as comprehensive as it could be. Unilever Food Solutions aims to raise awareness within the food service industry as a whole around the part they can play in delivering a solution to this issue, i.e. ensuring transparency about what’s in our food.

**International comparisons**

In all countries, there is a need for more information when eating out. However, the need is most pressing in non-Western countries. The top three things people wanted to know was the source of the food, how it was prepared and the nutritional value of the food. In China people were most concerned with the safety of the food and whether it was prepared hygienically.

1. People globally want to know more about what is in their meal when eating out.

   ![Figure 1. Would you like to know more about what is in your meal when eating out?](image)

   - ‘That it is cooked in a clean and hygienic kitchen.’ (Australia)
   - ‘I want the same information that is found in most consumer goods.’ (New Zealand)
   - ‘I want to know the source of the ingredients; are they organically sourced and are they safe to eat?’ (China)
   - ‘I would like to know the quality, ingredients and calorie content of the dish if possible.’ (Russia)
   - ‘I want to know about the ingredients used to prepare the meals and the hygiene of the kitchen.’ (Brazil)
   - ‘I want to know the origin and nutritional content of the food—vitamins, calories, etc.’ (Germany)

2. The key reason why nutritional information might be important is that it could help make healthier choices. In Australia (67%), in the UK (75%), China (80%) and Brazil (63%), a clear majority of respondents mentioned ‘health’ in their answers to why nutritional information would influence their choices.

   ‘More nutritional information would help me ensure that I get the balance between a treat and being healthy.’ (UK)
   ‘Being healthy is the most important for me and my family. Nutritious intake is a must.’ (China)
   ‘Everyone needs a little nudge to remind them to eat more healthily.’ (USA)
   ‘I would eat healthier foods to balance my weight.’ (Brazil)
   ‘Nutritional information would push people toward healthier food choices—preferably not at the expense of good taste.’ (Australia)

3. The majority of respondents claimed they would make healthier decisions when choosing what to eat if they were provided with nutritional values.

   ![Figure 2. Do you think that knowing about the nutritional content of meals will influence the choices you make when eating out?](image)

4. Around two-thirds of respondents said that food labels including low fat and calorie content would be a welcome addition to the menu when eating out.

   ![Figure 3. Please tell us how much you agree or disagree with the following statement:](image)
5. Currently, desired nutritional information seems to be lacking in all surveyed countries across the globe.

Figure 4. The last time you ate out did you receive any information about the nutritional value of your meal?

6. There is a clear global need for more transparency around what goes into our food.

7. The results of the report demonstrate that of those who believe there should be more transparency about the content of meals when eating out, the majority agreed that restaurant and canteen operators should take responsibility for providing this information.

8. Across all surveyed countries, fat, calories, preservatives and food additives top the charts for the nutrients and ingredients that people are most interested to know about when eating out. In the UK, USA, Australia and New Zealand, salt is seen as an important topic for information. In Australia and New Zealand consumers want to know about sugar in their meals. In China, people would like to know about the vitamins and proteins in their meals.

'I would choose items with less fat, salt and additives.' (USA)
'I would choose healthier foods that have various nutrients.' (China)
'I would seek out lower calorie, lower fat, lower sugar and lower salt options.' (UK)
'I would choose food that is lower in calories and fat.' (Germany)
'I would choose food that is wholesome and healthy too.' (Australia)

Conclusion
The broadest need for information appears to be in the non-Western world where people are demanding more transparency and information about the food they are eating. While people acknowledge that there are enough healthy options, they also say that they would like a gentle nudge to help them make healthier choices when eating out.

However, there appears to be no clear agreement on the way in which this information should be conveyed. Whether in the form of health logos or specific health claims, it remains a challenge for the food industry to develop an effective solution to meet consumer needs.

Of those questioned, the majority of respondents believe that it is the responsibility of those in the food service industry itself to provide a solution, i.e. chefs around the world.

Unilever Food Solutions believes that it is our responsibility, along with the rest of the industry, to help food providers satisfy their guests every day by providing them with what they want—more information about what’s in their food when eating out.

Chefs have the power to change the health of our world. And restaurants, shops, canteens, schools and cafeterias, along with food service providers, all need to be part of the solution.

The choices we make are shaped by the choices we have.
About the survey
The Unilever Food Solutions World Menu Report is released bi-annually to measure people's attitudes and behaviours towards eating out.

A definitive snapshot of global eating out of home, the survey is conducted by interviewing a representative sample of people—from nine countries across the globe: USA, UK, China, Germany, Russia, Brazil, Turkey, Australia and New Zealand.

Methodology
Unilever Food Solution’s World Menu Report was conducted by BrainJuicer in partnership with Salt PR. 4500 people (500 from each of the nine countries) who eat out at least once a week were questioned.

The report took the form of a mix of qualitative and quantitative data. The research was conducted using BrainJuicer*’s signature quali-quant tools like MindReader*, a patented approach for asking open-ended questions to deliver richer, deeper diagnostics in quantitative research and FaceTrace*, a unique and award-winning approach to measuring emotions.

Unilever Food Solutions—Who we are
At Unilever Food Solutions, we help chefs and caterers of all sizes to simplify what goes in the kitchen—without compromising on flavour or flair. Our ingredients are some of the staples of professional kitchens in 74 countries around the world: Knorr, Hellmann’s, Lipton and more.

We’ve been in food since the 1880s. We’re chefs ourselves. So we understand that critical balance between impressing your guests and making a profit. And how to keep your menus and recipes fresh and exciting, as times and tastes change.
‘Labelling Logic’—The final report of the Review of Food Labelling Law and Policy, 2011

Review panel: Neal Blewett AC (Chair), Nick Goddard, Simone Pettigrew, Chris Reynolds & Heather Yeatman

The independent Panel for the Review of Food Labelling Law and Policy, commissioned by the Australia and New Zealand Food Regulation Ministerial Council, officially presented its final Report entitled Labelling Logic to the Chair of the Ministerial Council the Hon Catherine King, Parliamentary Secretary for Health and Ageing, on 28 January 2011. The executive summary, recommendations and diagram of the hierarchy of issues of the Report are provided in this article. They are reproduced from Labelling Logic: Review of Food Labelling Law and Policy (2011) by permission of the Australian Government.

The next step in the process is the development of a whole-of-Ministerial Council response. The response is being coordinated by the Australian Government Department of Health and Ageing, who will be working with other Commonwealth Government Departments and the Australia and New Zealand Food Regulation Ministerial Council to coordinate the national process.

Executive summary

The executive summary is structured in terms of the Matters for Review outlined in the terms of reference. Numbers in brackets refer to the recommendations in the Report, a full list of which is provided at the end of this summary and in context, within the body of the Report.

The food label is the arena in which many of the most intense disputes over food take place, for the label provides the most public face for controversies over food. It is also one of the most highly valued and competitively sought after communication channels in the market place. As the battle for space on the label has intensified, and the often competing interests of consumers, industry and government come to the fore, food labelling policy has evolved in a sporadic fashion to satisfy a range of interests, including protecting consumers. The crux of the Review was therefore to address the tensions between these interests that drive policy and to seek to resolve them. The 61 recommendations contained in this Report are designed to address this ad hoc approach to food labelling and provide a clear path forward.

Examine the policy drivers impacting on demands for food labelling

The Panel suggests that a consideration of the policy drivers—consumers’ needs for information; industry’s need for marketing flexibility and minimal regulatory burdens; and government’s objectives in the area of individual and population health—provides a framework for deriving principles for regulatory intervention in order to steer the flow of labelling events. Exploration of these demands revealed the ubiquity and breadth of health concerns, particularly the growing acceptance of government’s preventative health role in reducing the risk of chronic diet-related disease. A definition of public health in the Food Standards Australia New Zealand Act 1991 would decrease ambiguity regarding the role of the food regulator and would place appropriate focus on broader public health issues [1].

As a consequence of this recognition, the Panel recommends that a comprehensive Nutrition Policy be developed that includes a framework for the roles of the food label [9, 10]. Once established, the comprehensive Nutrition Policy should inform the development or variation of labelling standards. Such an operational base will in part address the requirement for evidence of significant health or behavioural impact and economic assessments for individual food standards, a requirement which at present can act as a barrier to utilising the food label more effectively.

What principles should guide decisions about government regulatory interventions in food labelling?

The cornerstone of the Panel’s approach is an Issues Hierarchy in descending order of food
safety, preventative health, new technologies and consumer values issues. This classification, which is essentially a risk hierarchy, governs the initiation of regulatory action, the modes of intervention and where rules and oversight should lie [2]. Regulatory actions in relation to food safety, preventative health and new technologies should be initiated primarily by government and referenced in the Code. Regulatory actions in relation to consumer values issues should be initiated generally by industry [37, 38]. These would rely on the ‘misleading or deceptive’ provisions in consumer protection legislation, with the possibility of some specific methods or processes of production being referenced in the Code [36]. The most significant consequence of this referencing is that country-of-origin labelling—a consumer values issue—be provided for in a specific consumer information standard for food within consumer protection legislation rather than in the Code [41].

The modes of intervention should be mandatory for food safety, on which point there is little disagreement. For preventative health there would be a mixture of mandatory and co-regulation requirements, the choice dependent on government health priorities and the effectiveness or otherwise of co-regulatory measures. For new technologies there should be, as a general principle, mandated identification on the label of foods or ingredients treated or produced by such technologies for a period of 30 years after their introduction into the human food supply chain, at the end of which time the need for such identification should be reviewed [28]. The modes of intervention for consumer values issues should be self-regulatory but subject to more prescriptive forms of intervention in cases of market failure, as the Panel argues in the case of country-of-origin issues [40, 41] or the ineffectiveness of self-regulatory schemes [39].

Consider what policies and mechanisms are needed to ensure that government plays its optimum role

In the light of the above principles, government would play its optimum role in food labelling by ensuring labelling to guarantee food safety; by working with industry to use labelling to encourage healthy eating and population health; by taking a prudent approach to the labelling of foods and ingredients produced or processed by new technologies; and by acting to ensure that industry self-regulation in the field of consumer values provides consistent and accurate labelling to enable consumers to make informed choices.

The whole system is envisaged as one of responsive intervention that requires coordination across portfolios [4, 21, 23, 41, 59] and jurisdictions [3, 57, 58]. If softer measures fail there would be opportunity for escalation to more prescriptive modes of regulation. Moreover, where label changes are recommended, the Panel advocates a generous time period to encompass the change, as well as grandfathering for labels on products that have a long shelf life.

There is also a need to broaden the coverage of food labelling laws to reflect the range of environments within which people now purchase their foods. The significant extent to which Australians and New Zealanders now consume food outside the home has led the Panel to recommend the provision of nutrition information on menus/menu boards in chain food service outlets that have standardised menu items, and on vending machines [18].

**Consider principles and approaches to achieve compliance with labelling requirements, and appropriate and consistent enforcement**

As a general principle of good governance, it is necessary that the members of the community feel confident that the food regulatory system, which is designed to protect its health and safety, operates effectively. As such, once the case for a labelling standard has been established and becomes part of the Code, it must be monitored and enforced by the jurisdictions with as high a priority as any other food standard [3, 6, 7, 57]. A similar high priority should be given by the consumer protection agencies to consumer values issues [4, 59]. Labelling standards should also be written in such a way that they both clearly convey what is required of industry and are capable of being enforced should a prosecution occur [60]. In addition, a more versatile range of enforcement provisions should be introduced [58].

The Panel accepts that, for a range of reasons, it is desirable to leave responsibilities for the statutory requirements for compliance and prosecution as they are currently. However, if food labelling is to be taken seriously, a Food Labelling Bureau (the Bureau) should be established to advise Australian and New Zealand ministers on all aspects of labelling policy [61]. Resources for this Bureau must reflect the high profile that food labelling has as the most public face of food policies, standards and laws. The Bureau’s role would be administrative, advisory and a monitor of compliance and enforcement. It would be user-friendly for consumers and industry and would marshal and support the resources already on the ground.

“Recommend the provision of nutrition information on menus/menu boards in chain food service outlets”
Changes to the Nutrition Information Panel (NIP), including the possible explicit inclusion of trans fatty acids; the inclusion of fibre content

Evaluate existing work on health claims

The Panel proposes a responsive regime of nutrition, health and related claims covering the use of simple words that may infer health implications [19] and a hierarchy of substantiation of claims and validation through an agreed nutrient profiling system, plus further conditional requirements [20]. In addition, the Panel recognises the need to prevent the subversion of the proposed system by unscrupulous use of trade names and trademarks that could imply claims prohibited in the Code [21]. Governments may also wish to make health claims through mandatory health messages supporting preventative health strategies. These would have to meet the same substantiation requirements as industry health claims. In addition, as they involve taxpayer funds, intervention would have to be justified by reference to both the extent of the health problem and the strength of the causal links between the health problem and the messages, and only be embarked upon as part of a multifaceted social campaign [22, 24]. The introduction of health claims in the food regulatory regime will make urgent the development of a seamless regulatory approach for food, complementary medicines and dietary supplements [23].

Evaluate existing work on front-of-pack labelling

The use of interpretative symbols or endorsements on labels has the potential to convey essential nutrition information when included as one of multiple strategies to facilitate healthy eating choices [50]. As there is now a growing consensus between industry, consumers, health advocacy groups and governments in favour of front-of-pack labelling, the issue before the Panel was what form it should take. The Panel recommends that a multiple traffic lights (MTL) front-of-pack labelling system be introduced. Such a system is to be voluntary in the first instance, except where general or high level health claims are made or equivalent endorsements/trade names/marks appear on the label, in which case it should be mandatory [51, 52, 53]. The Panel also recommends that chain food service outlets across Australia and New Zealand be encouraged to display the MTL system on menus/menu boards [54], but that beverages containing alcohol be exempt from any MTL requirements [55].

Evaluate current policies, standards and laws relevant to food labelling

Using this overall framework, the Panel addressed a number of detailed issues raised in the submissions and consultations which are not dealt with elsewhere in this summary.

Public health and food safety: In relation to the ingredients list, the Panel recommends work on a number of codes of practice to enable consumers to readily identify additives, colourings and flavourings of agreed medical priority [8, 11], and changes to the declaration of added sugars, added fats and added vegetable oils [12]. The Panel recommends several changes to the Nutrition Information Panel (NIP), including the possible explicit inclusion of trans fatty acids [13]; the inclusion of fibre content [14]; clarification of salt content [15, 16]; and some simplification of presentation [17].

Alcohol: While recognising the unique features of alcohol as a food, the Panel sees no prima facie reason for excluding alcohol from the scope of the Review, given alcohol’s inclusion in the Code. The Panel is of the view that the requirement for alcohol to display additional labelling information does not automatically exempt it from adhering to other existing requirements. The Panel further believes that there are compelling reasons for applying labelling changes to alcohol in the light of the growing evidence relating to the short- and long-term adverse health effects of alcohol consumption. The Panel therefore recommends that a suitably worded warning message about the risks of consuming alcohol while pregnant be mandated on individual containers of alcoholic beverages and at the point of sale for unpackaged alcoholic beverages [25]; that the energy content be displayed on the labels of all alcoholic beverages, consistent with the requirements for other food products [26]; and that drinks that are mixtures of alcohol and other beverages comply with all general nutrition food labelling requirements [27].

New technologies: Given the general principle enunciated in this Review that there should be mandatory labelling of new technologies for 30 years after their introduction into the food supply chain and recognising that irradiated foods have been in the food supply for a generation, the Panel recommends that the necessity for mandatory labelling of irradiated foods be reviewed [34]. While recognising the difficulties, the Panel nevertheless believes it is urgent for the credibility of the regulator that a standard be established for regulating the presence of nanotechnology in the food production chain [35]. On the vexed question of genetically modified foods, the Panel assessed the various exemptions from genetic modification labelling in line with its principles and the relevant scientific evidence. The Panel endorses the exemption of foods or ingredients that have no altered characteristics or no detectable novel deoxyribonucleic acid (DNA) or protein [29]; endorses the present exemption for
adventitious presence but recommends follow-up and monitoring of any adventitious event [30], and the provision of adequate laboratories, resources and skills for this and other tasks [33]; does not support the present exemption for flavours [31]; and, given the general position the Panel has taken on foods from chain food service outlets and vending machines, does not support their exclusion from the requirement to declare genetically modified foods or ingredients [32].

**Consumer values issues:** The remaining issues in the consumer values field relate to the one presently mandated intervention—country-of-origin labelling (CoOL). While CoOL is comprehensive in Australia, there are a few inexplicable primary product exceptions, and the Panel believes the loophole should be closed and that CoOL should be extended to cover all primary products for retail sale [40]. There is extraordinary public confusion over the ‘Made in Australia’ claim and the Panel favours the development of an unambiguous and consumer-friendly Australian-origin claim based on the ingoing weight of the various components of the food, excluding water [42].

**Presentation:** The effectiveness of the recommendations in practice will depend on the consumer’s ability to notice, read and comprehend the information provided. It is a fundamental principle that food labels be presented in a clear and comprehensible manner to enhance understanding across all levels of the population [5, 43]. The Panel recommends a prescriptive minimum font style [44] and a minimum contrast level [46] for all mandatory information, and the emboldening of warning and advisory statements and of allergens [47]. The Panel would encourage government and industry to work together to establish guidelines for other presentational factors [45] and to work towards a co-location of mandatory health information presented in a standardised fashion [48]. New information technologies should be investigated both for automated label assessments [49] and for forms of extended product labelling [56].

• a fundamental shift in thinking about the remit of Food Standards Australia New Zealand (FSANZ) and the broader food regulatory system with regard to public health;
• an impetus for industry collaboration to achieve self- and co-regulatory mechanisms that ensure a level playing field while meeting the demands of consumers and governments;
• a more strategic, transparent and informative food labelling system, which instils confidence in Australian and New Zealand consumers;
• greater resourcing from governments to support food labelling that is meaningful, consistent and that addresses issues identified in a comprehensive nutrition policy; and
• a centralised body for, and source of, food labelling information for consumers, industry and government, with roles in administration, advice and monitoring.

A full list of the Panel’s recommendations is provided on the following pages.

### Recommendations

#### Food Labelling Issues Hierarchy

The recommendations are centred around this risk-based Food Labelling Issues Hierarchy, in descending order of priority from food safety, preventative health, new technologies and consumer values issues. This diagram illustrates where rules and oversight should lie and provides the basis for the recommended Principles to guide food labelling decisions. The Report proposes a range of regulatory interventions based on this hierarchy, ranging from mandatory, through co-regulation and self-regulation. The recommendations are framed in such a way that, if the designated regulatory intervention is inadequate, there are grounds for escalation.

#### Policy Drivers of Food Labelling

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Recommendation 1: That the Food Standards Australia New Zealand Act 1991 be amended to include a definition of public health to the effect that: 'Public Health is the organised response by society to protect and promote health, and to prevent illness, injury and disability.'

Principles and criteria

Recommendation 2: That food labelling policy be guided by an issues hierarchy in descending order of food safety, preventative health, new technologies and consumer values issues. Regulatory action in relation to food safety, preventative health and new technologies should primarily be initiated by government and referenced in the Food Standards Code. Regulatory action in relation to consumer values issues should generally be initiated by industry and referenced to consumer protection legislation, with the possibility of some specific methods or processes of production being referenced in the Food Standards Code.

The modes of intervention should be mandatory for food safety; a mixture of mandatory and co-regulation for preventative health, the choice dependent on government health priorities and the effectiveness or otherwise of co-regulatory measures; and mandatory with time limits for new technologies. The modes of intervention for consumer values issues should be self-regulatory but subject to more prescriptive forms of intervention in cases of market failure or the ineffectiveness of self-regulatory schemes.

Recommendation 3: That once the case for a labelling standard has been established and becomes part of the Food Standards Code, sufficient resources be allocated to ensure that it is effectively monitored and enforced.

Recommendation 4: That consumer protection concerns be accorded a high priority by the relevant government agencies and complaints be properly processed and resolved.

Recommendation 5: That information on food labels be presented in a clear and comprehensible manner to enhance understanding across all levels of the population.

Public health and food safety

Recommendation 6: That the food safety elements on the food label be reviewed with the aim to maximise the effectiveness of food safety communication.

Recommendation 7: That there be more effective monitoring and enforcement of the existing requirements in the Food Standards Code to provide mandatory warning and advisory statements and allergen declarations on packages of food not for retail sale, foods for sale at restaurants and other food outlets, foods from mobile food vendors and vending machines, and foods for catering purposes.

Recommendation 8: That the Voluntary Incidental Trace Allergen Labelling system be explored as a possible supplementary model to manage food label declarations relating to the adventitious presence of allergens in foods.

Recommendation 9: That a comprehensive Nutrition Policy be developed that includes a framework for the roles of the food label. Key aspects of the framework to be:

a. the provision of food safety and nutrition information and education strategies to protect and promote the health of the population, including articulated roles for food label elements;

b. the encouragement of the provision of healthy foods within the food supply to facilitate healthy diets;

c. the setting and application of nutrient criteria and dietary guidance;

d. the facilitation of social and other research to improve understanding of how label information is used and its impact on food selection, eating behaviours and the food supply;

e. the establishment of monitoring and surveillance systems for dietary/nutrition practices that include the use and understanding of food labels.

Such a policy should be developed as a priority, within the framework of the governments’ preventative health agendas and cognisant of the present Australian initiatives on food security and a national food plan.

Recommendation 10: That the Food Standards Australia New Zealand Act 1991 be amended to require Food Standards Australia New Zealand to ‘have regard’ to the comprehensive Nutrition Policy when developing or reviewing labelling standards.

Recommendation 11: That industry develop in consultation with government, medical authorities and relevant consumer organisations a voluntary code of practice and education initiatives to enable consumers to quickly identify label information relating to additives, colourings and flavourings that are of agreed medical priority for sensitive consumers.

Recommendation 12: That where sugars, fats or vegetable oils are added as separate ingredients in a food, the terms ‘added sugars’ and ‘added fats’ and/or ‘added vegetable oils’ be used in the ingredient list as the generic term. 

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Recommendation 13: That mandatory declaration of all trans fatty acids above an agreed threshold be introduced in the Nutrition Information Panel if manufactured trans fatty acids have not been phased out of the food supply by January 2013.

Recommendation 14: That declaration of total and naturally occurring fibre content be considered as a mandatory requirement in the Nutrition Information Panel.

Recommendation 15: That voluntary declaration of potassium content in the Nutrition Information Panel be actively considered by industry. If nutritional policy guidance recommends the reduction in consumption of potassium for at-risk population groups in the future, disclosure of potassium in the Nutrition Information Panel should become mandatory.

Recommendation 16: That social research be undertaken to determine effective mechanisms to present sodium/salt information on food labels to facilitate consumers’ understanding and use of this information.

Recommendation 17: That the declaration in the Nutrition Information Panel of amount of nutrients per serve be no longer mandatory unless a daily intake claim is made.

Recommendation 18: That declaration of energy content of standardised food items on the menu/menu boards or in close proximity to the food display or menu be mandatory in chain food service outlets and on vending machines. Further, information equivalent to that provided by the Nutrition Information Panel should be available in a readily accessible form in chain food service outlets.

Recommendation 19: That a responsive regulatory approach to the use of simple words and terms that may infer health implications be commenced, with the food industry working with Food Standards Australia New Zealand to develop a Code of Practice covering consistent use of definitions for such words and terms, with a view to their use being restricted if appropriate constraint is not implemented.

Recommendation 20: That the Standard for nutrition, health and related claims be adopted for food, complementary medicines and dietary supplements.

Recommendation 21: That applications for trade names and trademarks be scrutinised by the relevant agencies to identify and reject words and devices that have the effect of inferring health implications that are otherwise prohibited under the Food Standards Code.

Recommendation 22: That mandatory messages supporting preventative health strategies may be instigated by governments, provided the following conditions are met:
   a. substantiation requirements are fulfilled—the epidemiological evidence is strong;
   b. the message is consistent with the comprehensive Nutrition Policy;
   c. food labelling is an appropriate response to the problem; and
   d. the label is one part of a multi-faceted campaign.

Recommendation 23: That a consistent, seamless regulatory approach for nutrition, health and related claims be adopted for food, complementary medicines and dietary supplements.

Recommendation 24: That generic alcohol warning messages be placed on alcohol labels but only as an element of a comprehensive multifaceted national campaign targeting the public health problems of alcohol in society.

Recommendation 25: That a suitably worded warning message about the risks of consuming alcohol while pregnant be mandated on individual containers of alcoholic beverages and at the point of sale for unpackaged alcoholic beverages, as support for ongoing broader community education.

Recommendation 26: That energy content be displayed on the labels of all alcoholic beverages, consistent with the requirements for other food products.

Recommendation 27: That drinks that are mixtures of alcohol and other beverages comply with all general nutrition labelling requirements, including disclosure of a mandatory Nutrition Information Panel.

New technologies
Recommendation 28: That as a general principle all foods or ingredients that have been processed by new technologies (i.e. all technologies that trigger pre-market food safety assessments) be required to be labelled for 30 years from the date of processing.
time of their introduction into the human food chain; the application of this principle to be based on scientific evidence of direct impact on, or modification of, the food/ingredient to be consumed. At the expiry of that period the mandatory labelling should be reviewed.

Recommendation 29: That only foods or ingredients that have altered characteristics or contain detectable novel DNA or protein be required to declare the presence of genetically modified material on the label.

Recommendation 30: That any detection of an adventitious genetically-modified event be followed by a period of monitoring and testing of that food or ingredient.

Recommendation 31: That foods or ingredients with flavours containing detectable novel DNA or protein not be exempt from the requirements to declare the presence of genetically modified material on the label.

Recommendation 32: That foods or ingredients that have been genetically modified and would require declaration if labelled, be declared on menu/menu boards or in close proximity to the food display or menu in chain food service outlets and on vending machines.

Recommendation 33: That governments ensure effective monitoring of labelling requirements in the Food Standards Code relating to genetically modified foods or ingredients through support for sufficient Australian and New Zealand laboratories, observing world best practice protocols, and with the necessary resources and analytical skills.

Recommendation 34: That the requirement for mandatory labelling of irradiated food be reviewed.

Recommendation 35: That Food Standards Australia New Zealand and other relevant bodies develop, as a matter of urgency, a standard for regulating the presence of nanotechnology in the food production chain, consistent with the recommendations in this Report relating to new technologies.

Consumer values issues

Recommendation 36: That Food Standards Australia New Zealand consider adopting, by reference in the Food Standards Code, values-based definitions and/or standards relating to specific food production methods and processes, if requested by industry, to achieve consistency of definitions.

Recommendation 37: That the relevant livestock industries consider the benefit of establishing agreed standards under the auspices of Standards Australia or Standards New Zealand for terms related to animal husbandry (e.g. ‘free range’, ‘barn laid’ and ‘caged’ in the case of poultry).

Recommendation 38: That the value of industry-initiated self-regulatory intervention be recognised and that industry in collaboration with special interest groups further develop and apply a responsive and more structured self-regulatory approach to consumer values issues that incorporates:

a. the role that voluntary codes of practice can play in relation to the evolution of standard definitions for values-based claims;
b. the role that certification schemes can play in effectively communicating values-based messages; and
c. the development of agreed standards through existing frameworks such as International Organization for Standardization, Standards Australia or Standards New Zealand.

Recommendation 39: That a monitoring regime for self-regulatory measures be established and when evidence of systemic failure to provide accurate and consistent values-based information to enable consumers to make informed choices is found, a more prescriptive mode of regulation is triggered.

Recommendation 40: That Australia’s existing mandatory country-of-origin labelling requirements for food be maintained and be extended to cover all primary food products for retail sale.

Recommendation 41: That mandatory requirements for country-of-origin labelling on all food products be provided for in a specific consumer product information standard for food under the Competition and Consumer Act 2010 rather than in the Food Standards Code.

Recommendation 42: That for foods bearing some form of Australian claim, a consumer-friendly, food-specific country-of-origin labelling framework, based primarily on the ongoing weight of the ingredients and components (excluding water), be developed.

Presentation

Recommendation 43: That the Perceptible Information Principle be used as a guide for labelling presentation to maximise label comprehension among a wide range of consumers.

Recommendation 44: That a minimum font size of 3.5 mm in an open font style in mixed case be applied for mandated information, with the exception of small package sizes where the minimum font size should be 1.5 mm.

Recommendation 45: That a set of guidelines be developed in consultation with industry that includes reference to other presentation factors such as letter and line spacing, text justification and stroke width.
Recommendation 46: That a minimum contrast level of 70% for mandated information be stipulated in the Food Standards Code.

Recommendation 47: That warning and advisory statements be emboldened and allergens emboldened both in the ingredients list and in a separate list.

Recommendation 48: That industry be encouraged to develop a set of guidelines relating to the co-location of mandatory health information presented in a standardised manner on the label. Government should facilitate this process through the provision of appropriate resources and expertise.

Recommendation 49: That the development of an automated label assessment tool be investigated that can gauge a label’s compliance with mandated legibility requirements and those stipulated in relevant voluntary codes.

Recommendation 50: That an interpretative front-of-pack labelling system be developed that is reflective of a comprehensive Nutrition Policy and agreed public health priorities.

Recommendation 51: That a multiple traffic lights front-of-pack labelling system be introduced. Such a system to be voluntary in the first instance, except where general or high level health claims are made or equivalent endorsements/trade names/marks appear on the label, in which case it should be mandatory.

Recommendation 52: That government advice and support be provided to producers adopting the multiple traffic lights system and that its introduction be accompanied by comprehensive consumer education to explain and support the system.

Recommendation 53: That ongoing monitoring and evaluation of the multiple traffic lights system be undertaken to assess industry compliance and the effectiveness of the system in improving the food supply and influencing consumers’ food choices.

Recommendation 54: That chain food service outlets across Australia and New Zealand be encouraged to display the multiple traffic lights system on menus/menu boards. Such a system be mandatory where general or high level health claims are made or equivalent endorsements/trade names/marks are used.

Recommendation 55: That any beverages containing alcohol be exempt from nutrition-related front-of-pack labelling requirements.

Recommendation 56: That the potential of new information technologies be considered by consumer organisations, industry and government to provide extended product labelling for non-mandatory information.

Compliance and enforcement

Recommendation 57: That monitoring and enforcement of food labelling requirements of the Food Standards Code (accuracy as well as the presence of labelling information) be considered equally important as other aspects of the Food Standards Code and the responsible agencies be given the appropriate level of resources to meet their obligations.

Recommendation 58: That the Model Food Provisions and the food acts of the jurisdictions be amended to allow a more versatile range of enforcement provisions, such as the power to make orders or require user-paid compliance testing consequent on a breach or impose enforceable undertakings in relation to non-compliant labelling.

Recommendation 59: That consumer protection concerns related to food labelling be accorded a high priority by the relevant consumer protection agencies (Australian Competition and Consumer Commission, New Zealand Commerce Commission, and State and Territory consumer protection agencies) and complaints be processed and resolved in a timely and transparent manner.

Recommendation 60: That food standards always be drafted with the understanding that they are intended to be enforceable legal documents. Where current deficiencies in the labelling requirements have been identified, standards should be re-drafted to make the obligations clear.

Recommendation 61: That a new and effectively resourced entity in the form of a trans-Tasman Food Labelling Bureau be established under the Food Standards Australia New Zealand Act 1991 to undertake the functions as specified in this Report and more generally to:

a. be the primary contact for, and source of, food labelling information and advice;

b. undertake research into food labelling issues;

c. undertake a general educational role in relation to food labelling issues and requirements;

d. assist industry to comply with labelling requirements;

e. act as a clearinghouse for complaints and facilitate compliance and the resolution of complaints;

f. monitor and report on food labelling compliance; and

g. monitor consumer values issues claims on labels and liaise with consumer protection agencies in relation to confusing, misleading or deceptive food labelling.

That a minimum font size of 3.5 mm in an open font style in mixed case be applied for mandated information
Births in Australia

The following information has been compiled from the Australian Bureau of Statistics (ABS) Report 3301.0—Births, Australia, 2010 released 25 October 2011 on the ABS website www.abs.gov.au

Introduction

During 2010, there were 297,900 births registered in Australia, born to 293,300 mothers. This was 2,200 births (0.7%) more than in 2009 (295,700 births) and the highest ever recorded in a calendar year, exceeding the previous record of 296,600 births registered in 2008. In 2010, most states and territories recorded increases in the number of births registered, except for Victoria, Queensland and Tasmania.

Trends in national fertility rates

The total fertility rate (TFR) represents the average number of babies that a woman could expect to bear during her reproductive lifetime, assuming current age-specific fertility rates were experienced. The TFR measures the average number of children per woman, including those who have no children, rather than the average number of children per mother. The TFR does not measure completed fertility (the average number of live births experienced by a cohort of women over their reproductive life).

In 2010, Australia’s TFR was 1.89 babies per woman, down slightly from the 2009 TFR of 1.90 babies per woman. Trends in the TFR over the past 80 years are shown in Figure 1.

Figure 1. Total fertility rate (a), Australia 1930 to 2010

After reaching a TFR of 3.1 during the early 1920s, Australian fertility rates were relatively low during the Great Depression of the 1930s, falling to 2.1 babies per woman in 1934. In 1961, at the height of the ‘baby boom’, the TFR peaked at 3.5 babies per woman. Fertility rates then fell sharply during the early 1960s as the oral contraceptive pill became available.

Between 1966 and 1971, the TFR remained around 2.9 babies per woman. The reinterpretation of abortion law in New South Wales in late 1971 had a substantial impact on women’s ability to control their fertility (Carmichael, 1998). Subsequently, a fall in births to young women contributed to a further decrease in the TFR and an increase in the median age of mothers (Figure 5).

In 1976, the TFR fell to replacement level (2.1), and continued to fall as increasing numbers of women chose to delay or forego having children. The TFR then stabilised somewhat during the 1980s, before resuming a more gradual decline during the 1990s. The TFR reached a low of 1.73 babies per woman in 2001 before increasing to a thirty-year high of 1.96 babies per woman in 2008. The TFR has since declined to 1.90 babies per woman in 2009 and 1.89 babies per woman in 2010.

Fertility rates

• In 2010, Australia’s total fertility rate (TFR) was 1.89 babies per woman, a small decrease from 1.90 babies per woman in 2009.
• Fertility rates decreased slightly for all age groups under 35 years between 2009 and 2010.
• Fertility rates increased from 2009 for women aged 35–39 years and 40–44 years, and remained the same for women aged 45–49 years.
• Fertility rates were highest for women aged 30–34 years, recording 123 babies per 1,000 women.
• At the national level, the teenage fertility rate was 16 babies per 1,000 women aged 15–19 years in 2010.

Births

• There were 297,900 births registered in Australia in 2010, approximately 2,200 (0.7%) more than the number registered in 2009 (295,700).
• The median age of all mothers for births registered in 2010 was 30.7 years, while the median age of fathers was 33.1 years.
• In 2010, 66% of births were to parents in a registered marriage.

States and Territories

• Total fertility rates (TFRs) for New South Wales, South Australia, the Northern Territory and the Australian Capital Territory increased in 2010. The remaining states all recorded a slight decrease in TFR.
• In 2010, the Northern Territory recorded the highest TFR (2.11 babies per woman) and Victoria recorded the lowest (1.75 babies per woman).
• Fertility rates were highest for women aged 30–34 years in all states and territories in 2010, with the exception of Tasmania and the Northern Territory, where women aged 25–29 years recorded the highest fertility rate.
• The number of births in 2010 increased for most states and territories, with the exception of Victoria, Queensland and Tasmania.

Australian Aboriginal and Torres Strait Islander births and fertility rates

• There were 16,100 births registered in Australia during 2010 (5% of all births) where at least one parent reported themselves as being an Australian Aboriginal and/or Torres Strait Islander on the birth registration form.
• In 2010, the TFR for Australian Aboriginal and Torres Strait Islander women remained the same as in 2009 at 1.75 babies per woman.
Births in Australia - continued

**Tempo effects**
Care should be exercised in interpreting trends over time using the ‘period’ TFR as presented in this publication. While the TFR is widely used as a summary measure of a population’s current and historical fertility trends, it does not reflect tempo changes in fertility. Tempo changes are the effect of successive cohorts of women who delay or forego having children only to catch up in subsequent years. Analysis of age-specific fertility rates and parity may assist in understanding tempo effects in fertility over time.

**Age-specific fertility rates**
The slight decrease in Australia’s TFR between 2009 and 2010 was the result of the decline in the age-specific fertility rates for all age groups under 35 years. Fertility rates for women aged 35–39 years and 40–45 years increased, while fertility rates for women aged 45–49 years remained the same as in 2009.

Over the past few decades, the decline in Australia’s TFR has been associated with the tendency for women to have their babies at older ages. The median age of all women who registered a birth in 2000 was 29.8 years; by 2006 this had increased to 30.8 years and since 2007 has remained at 30.7 years, except for a small decline to 30.6 years in 2009.

Until the late 1970s, the distribution of fertility rates across age groups was relatively stable, with each age group peaking and troughing together; although peaks were more pronounced for some age groups than others (Figure 2). Women aged 25–29 years have had the highest fertility rates for most of the 20th century, followed by women aged 20–24 years. Over the past two to three decades, fertility rates amongst younger women have been declining.

**Figure 2. Age-specific fertility rates (a): Selected age groups, Australia 1930 to 2010**

The transition to an older age-specific fertility pattern is illustrated by the shift in peak fertility rates, from women aged 25–29 years in 1999 to women aged 30–34 years in 2000. Since then, women aged 30–34 years have continued to record the highest fertility rate of all age groups, with 123 babies per 1,000 women in 2010. Further, since 2003 the fertility rate for women aged 35–39 years has exceeded that of women aged 20–24 years.

**Replacement fertility**
Since 1976, the total fertility rate for Australia has been below replacement level. That is, the average number of babies born to a woman throughout her reproductive life (measured by the TFR) has been insufficient to replace herself and her partner. The TFR required for replacement is currently considered to be around 2.1 babies per woman. However, as the level of fertility required to achieve replacement is dependent on the number of women who survive to reproductive ages, replacement fertility has declined with decreases in female mortality. Even if female mortality declined to zero for women until the end of their reproductive lives, the replacement level would still be 2.05 (1.05 male and 1.0 female babies)—higher than the 2010 TFR of 1.89 babies per woman.

**Completed fertility**
Completed fertility refers to the number of live births that a woman born in a particular year has had by the end of her reproductive life. One limitation of this measure of fertility is that it cannot be observed until a woman’s reproductive life is complete. To overcome this limitation, a measure of completed fertility based on both observed and assumed age-specific fertility rates is used in Table 1.

**Table 1. Completed fertility (a)(b), Year of birth—Selected years**

<table>
<thead>
<tr>
<th>Year of birth</th>
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<th>Proportion based on projected births (c)</th>
<th>Median age</th>
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<tr>
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<td>1.8</td>
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- nil or rounded to zero (including null cells)

(a) Based on age-specific fertility rates. Women who have not yet completed their reproductive years are assumed to experience fertility rates used in *Population Projections, Australia* (2006 to 2101, cat. no. 3222.0) based on a total fertility rate of 1.8 babies per woman.

(b) Fertility is assumed to be completed at age 50.

(c) Proportion of the average number of children derived from assumed fertility rates.

Completed fertility rates for women born in the early 1930s are the highest recorded in Australia (3.1 children). These women were the mothers of the ‘baby boom’ generation. Since then, completed fertility has declined, while the median age of mothers has increased. The 2006 to 2101 issue of *Population Projections, Australia* (cat. no. 3222.0, Series B) assumes completed fertility of women born in 2010 to be 1.8 births per woman.

For more information on completed fertility derived from the 2006 Census, see Chapter 5: How many children do Australian women have? in the 2006 issue of *Births, Australia* (cat. no. 3301.0).

**Births**
In 2010, there were 297,900 births registered in Australia, resulting from 293,300 conceptions. During the early 1900s, the number of births registered in Australia each year remained under 140,000, with a decline occurring in the early 1930s during the Great Depression. The number of births then increased rapidly, reaching a peak of 276,400 in 1971, falling sharply during the remainder of the 1970s, then increasing from the early 1980s to reach another peak in 1992 of 264,200 births. Following 1992, the annual number of birth registrations decreased, falling to 246,400 in 2001. The number of births then increased to a peak of 296,600 in 2008, before a slight decline in 2009 to 295,700 births. However, in 2010 the number of births increased again to 297,900 to record the highest number of births ever registered within a calendar year in Australia. Figure 3 shows these trends.
Sex ratio
Just over half (51%) of all births registered in 2010 were male babies, resulting in a sex ratio at birth of 105.2 male births per 100 female births. The sex ratio for all births registered in Australia generally fluctuates around 105.5 male births per 100 female births.

Nuptial and ex-nuptial births
In 2010, 66% of births were nuptial births—that is, births to parents who were married at the time of the birth (marriage in this publication refers to a registered marriage unless otherwise indicated). Ex-nuptial births accounted for the remaining 34% of births, although many of these births may have been to mothers in de facto relationships. The proportion of ex-nuptial births has been increasing since the 1950s, and has risen strongly over the past three decades (see Figure 4).

Acknowledgement of paternity
When a birth is ex-nuptial, there is a possibility that the father may not acknowledge the birth—that is, the father has not signed the birth registration statement. While the number of ex-nuptial births has increased greatly over the past twenty years, the proportion of births for which paternity was not acknowledged has decreased. In 1990, paternity was not acknowledged for around 23% of all ex-nuptial births; however, by 2010 this proportion had decreased to 9%. Births where paternity is not acknowledged have decreased from 5% of all births in 1990 to 3% in 2010.

Median age of parents
The median age of mothers for all births registered in 2010 was 30.7 years. The median age of women who gave birth in a nuptial relationship was 31.7 years, more than four years older than those who gave birth in an ex-nuptial relationship (27.3 years). Of those who gave birth in an ex-nuptial relationship, the median age of women where paternity was not acknowledged (25.5 years) was lower than where paternity was acknowledged (27.4 years).

Until the 1930s, the median age of mothers giving birth was decreasing. During the 1930s, the median age stabilised, then rose briefly at the end of the Second World War, with an equally sharp decline immediately following the war. The median age of mothers fell substantially over the following three decades, reaching a low of 25.4 years in 1971. The reinterpretation of abortion law in New South Wales in 1971 was associated with a substantial fall in births to young women and an increase in the median age of mothers. From 1972, the median age of mothers consistently increased, reaching 30.8 years in 2006, the highest on record.

Data quality investigations during processing of 2007 birth registrations data indicated that age of parents, and therefore median age, may have been slightly overstated for some birth registrations in 2006 and previous years. Despite the uncertainty associated with information on age of mother, the increases in median age of mother apparent since the early 1970s appear to have halted. The median age of mothers has remained at 30.7 years since 2007 except for a small decline to 30.6 years in 2009, which was the lowest median age recorded since 2004. Figure 5 shows these trends.

The median age of fathers has also followed an upward trend since the 1970s. In 2010, the median age of fathers was 33.1 years. The median age of fathers excludes information from births where paternity is not acknowledged (9,300 births in 2010). Data quality investigations during 2007 processing indicated that age of parents, and therefore median age of fathers, may have been slightly overstated for some birth registrations in 2006 and previous years.

Between 1990 and 2010, the median age of fathers of nuptial births increased by almost three years, from 31.4 to 34.0 years, while the median age of fathers of ex-nuptial births who acknowledged the birth of their child also increased, from 27.3 years to 29.9 years.

Multiple births
The number of confinements resulting in a multiple birth has increased consistently since the 1970s. In 2010, there were 4,500 confinements resulting in a multiple birth; of these, 65 were triplets and 4 were quads or higher order. This was 43% higher than the number recorded in 1990 (3,200 confinements), and 2% higher than the number recorded in 2009 (4,400 confinements).

Births by remoteness area
In 2010, 70% of births were registered to mothers who lived in major cities of Australia. A further 27% of births were to mothers in inner and outer regional areas, and 3% to mothers in remote and very remote areas. These proportions reflect the proportions of the Australian population living in these areas. Major cities had the lowest total fertility rate (1.82 babies per woman, based on a three-year average ending in 2010), while remote and very remote areas had the highest (2.49 babies per woman). Furthermore, the median age of mother was highest in major cities (31.3 years), and lowest in remote and very remote areas (27.8 years). A data cube containing more detailed birth and fertility statistics by remoteness area has been released and is available for download from the ABS website.
States and Territories - continued

Total fertility rate

Total fertility rates varied substantially between the states and territories in 2010, ranging from 1.75 babies per woman in Victoria to 2.11 babies per woman in the Northern Territory. In 2010, New South Wales, South Australia, the Northern Territory and the Australian Capital Territory recorded an increase in TFR from 2009, with Victoria, Queensland, Western Australia and Tasmania recording decreases in TFR. All states and territories except the Northern Territory have recorded an overall increase in the TFR since 2005 (see Figure 6).

Age-specific fertility rates

In 2010, fertility rates were highest for women aged 30–34 years in all states and territories with the exception of Tasmania and the Northern Territory, where women aged 25–29 years recorded the highest fertility rate. Between 2009 and 2010, most states recorded decreases in fertility rates for women aged 30–34 years, while New South Wales, South Australia and the Australian Capital Territory all recorded small increases. Of all the age-specific fertility rates for the states and territories, the Northern Territory recorded the largest increase with women aged 25–29 years having 105 babies per 1,000 women (up from 96 babies per 1,000 women in 2009), while Queensland recorded the largest decrease with women aged 25–29 years having 111 babies per 1,000 women (down from 119 babies per 1,000 women in 2009).

Teenage fertility rates

At the national level, the teenage fertility rate in 2010 was 16 babies per 1,000 women aged 15–19 years, however, the rate differs amongst the states and territories (see Figure 7). In 2010, Victoria and the Australian Capital Territory recorded the lowest teenage fertility rates in Australia (both 9 babies per 1,000 women), while the Northern Territory recorded the highest (48 babies per 1,000 women).

The majority of births to teenage mothers in Australia in 2010 were to women aged 18 and 19 years (28% and 44% respectively), which is reflected in the fertility rates for women at these ages. In 2010, the fertility rates for women aged 18 and 19 years were 21 babies per 1,000 women and 33 babies per 1,000 women respectively. In comparison, only 4% of births to teenage mothers were to women aged 15 years or younger; resulting in a fertility rate of 3 babies per 1,000 women aged 15 years.

Births

The three most populous states accounted for over three-quarters (78%) of births registered in Australia in 2010: 95,900 in New South Wales (32%), 70,600 in Victoria (24%) and 64,500 in Queensland (22%). These proportions reflect the proportions of the Australian female population in reproductive ages living in these states.

Between 2009 and 2010, most states and territories recorded increases in registered births, except for Victoria, Queensland and Tasmania.

Caution should be exercised when comparing year-to-year changes in state and territory data as changes in Registry processing systems may impact on these data.

Median age of parents at confinement

Of the states and territories, Victoria and the Australian Capital Territory recorded the oldest median ages of mother (31.6 years and 31.5 years respectively). The Northern Territory had the youngest mothers, with a median age of 28.5 years, followed by Tasmania (29.2 years). The median age of all mothers who registered a birth in Australia in 2010 was 30.7 years. The Northern Territory and Tasmania also had the youngest fathers in 2010, with median ages of 31.5 and 31.7 years respectively. Victoria and the Australian Capital Territory had the oldest fathers, both with a median age of 33.7 years. For Australia, the median age of all fathers in 2010 (where age is known) was 33.1 years.

Nuptiality

In 2010, Victoria and the Australian Capital Territory both recorded the highest proportion of births to parents in a registered marriage (both 73%), followed by New South Wales (71%).

The highest proportions of ex-nuptial births were recorded in the Northern Territory (60%) and Tasmania (49%), however, the number of ex-nuptial births in Tasmania may be understated (see paragraphs 31 to 33 of the Explanatory Notes for more information). The Northern Territory also recorded the highest proportion of births where paternity was not acknowledged (16%), followed by Queensland (5%).

Births as a component of population change

Births are an important component of population change (see Table 2). In 2010, there were roughly twice as many births as deaths. Although the number of births per woman is low, there are enough women currently in childbearing ages to retain a relatively high total number of births. Conversely, there are relatively few people at older ages, resulting in a relatively low number of deaths per year. As the population ages, the difference between numbers of births and deaths will decrease. Based on Series B of the most recent ABS population projections (Population Projections, Australia, 2006 to 2101, cat. no. 3222.0), the number of births is projected to remain higher than the number of deaths throughout the projection period (see Figure 8).

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International fertility rates

According to the United Nations, the projected world average TFR for 2005–2010 is 2.5 babies per woman. This is a decline from the relatively constant 5 births per woman that existed until the 1960s, however, TFRs for individual countries vary considerably. There are many factors that can influence a country’s fertility rate, such as differences in social and economic development and contraceptive prevalence. In general, less developed countries have higher fertility rates than more developed countries (see Table 3).

Australia’s TFR, according to the United Nations, for 2005–2010 of 1.9 babies per woman is well below the world average (2.5), although it is above the average TFR for developed countries (1.7). According to United Nations projections, a number of European and developed Asian countries will have low fertility rates in 2005–2010. Hong Kong’s projected TFR of 1.0 is one of the lowest in the world. Middle Eastern and African countries have the highest fertility rates, with Niger (7.2), Afghanistan (6.6) and Uganda (6.4) some of the highest.

Projected fertility rates for the United States of America and New Zealand (both 2.1) are higher than that for Australia, while the rate for Canada is lower (1.7).
Families in Australia 2011:
Sticking together in good and tough times

Report for National Families Week 2011
Demographics and social change

Australian Institute of Family Studies

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This article is a chapter from the Report for National Families Week, 2011, produced by the Australian Institute of Family Studies (AIFS). The full report is on the AIFS website www.aifs.

As in all other developed countries, Australia’s population is ageing, with the key drivers being low fertility rates and increased life expectancy. The representation of older people has increased progressively over the last century (from 4% in 1901 to 14% in 2010). In contrast, the proportion of the population aged under 15 years fell from 35% in 1901 to 24% in 1940–45, then increased to 30% in 1957–66 (the peak of the ‘Baby Boom’), and fell thereafter to 19% in 2007–10. These two groups are traditionally considered as dependents.

The Australian Bureau of Statistics (ABS) has projected that, by 2056, the older dependent-aged people will represent 23–25% of the Australian population, while the younger dependent-aged group will make up only 15–18%; by 2101, 25–28% will be in the older group and 14–17% will be in the young group. The development of strategies to minimise and handle the associated economic and social implications of having an ageing population represents a key priority, explored since 2002–03 by the Australian Government in its Intergenerational Report.

Despite its challenges, an ageing population is also a prime reflection of a nation’s success in preventing maternal and infant mortality and improving health, thereby increasing life expectancy. It also has profound implications within and beyond families.

Demographic changes such as these have marked impacts, not only on the nation, but also on families. In addition, extended periods of participation in education and increased involvement, especially of women, in paid employment, contribute to shaping patterns of couple formation and dissolution, which today differ substantially from the patterns apparent during most of the 20th century. Family size has become smaller, and many women now become mothers much later than was the case for previous generations. Many children also live with only one parent and have the other parent living elsewhere.

Marriage rates have fallen markedly in recent decades, while cohabitation rates have increased. In fact, marriage rates in recent years have been lower than at any time in the 20th century. In 2006, fewer than 50% of the Australian population aged 15 years and older were in a registered marriage, falling from 65% in 1971. And those who marry tend to do so at a later age than in the past. The median age at first marriage rose between 1971 to 2008 from 23.4 years to 29.6 years for men and from 21.1 years to 27.7 years for women. On the other hand, cohabitation has become increasingly common. According to the 2006 Census, 15% of couples were cohabiting rather than married, increasing from 6% in 1986. Cohabitation is particularly common among young people; in fact, people under 25 years are more likely to be in a cohabiting relationship than to be married.

The rise in the divorce rate during the second half of the 20th century, especially after the introduction of the Family Law Act 1975, represents one of the most spectacular changes in family relationships in Australia. The Act allowed for ‘no-fault’ divorce based on just one ground—‘irretrievable breakdown’—as measured by at least 12 months of separation. Current trends suggest that one in three marriages will end in divorce. It is also worth noting that just under half of all divorces occur among couples with children under 18 years old. This means that, each year, around 50,000 such children experience the divorce of their parents.

These changes form the backdrop to family and community life in contemporary Australia. They frame the economic and social participation of families, the support they give and receive, and their economic and subjective wellbeing.

Another factor that sets the scene for contemporary family life is the evolving cultural character of Australia. Since Federation, the Australian population has changed dramatically in terms of cultural background. Ethnic diversity accelerated after World War II, and since this period Australia has become one of the most ethnically diverse countries in the world. According to the 2006 Census, migrants from the United Kingdom and Ireland represent 31% of all migrants who arrived in Australia before 1991, but only 12% of those who arrived subsequently. In contrast, the proportions of migrants from Asian countries rose from 18% to 42% across these two periods. Because they have settled in Australia over a shorter period of time than other immigrants, the Asian-born population tends to be younger than the other overseas-born population, and is especially concentrated in the 25–45 year age bracket (41% compared with 28% of migrants from other countries).

Only a small proportion of the Australian population identify as Indigenous (2.3% according to the 2006 Census). While this report focuses on Australians in general, it is important to acknowledge some of the ways in which Indigenous people and others in Australia differ. The Indigenous people’s spiritual attachment to the land and its flora and fauna and their distinctive forms of art have gained increasing recognition within and beyond Australia. Probably less well known is the fact that the meaning of the family systems and structures of Indigenous Australians in some remote communities not only differs between groups, but also cannot readily be aligned with the system understood in the dominant culture in Australia. Indigenous Australians have a...
larger number of children than other Australians, and are more likely to live in multi-family and multi-generational households. They are also more likely to live in regional and remote areas. Indigenous Australians tend to fare considerably less well than other Australians in terms of a range of social, economic, and health indicators, and closing this gap represents an important policy focus of all governments in Australia.

Footnotes
1. In this document, the term ‘older people’ is used to refer to those who are aged 65 years and over. Percentages have been rounded to the nearest whole number throughout.
2. Traditionally, the ‘working-age’ population is defined as 15–64 years, and those in the other two age groups (under 15 years and older than 64 years) are treated as ‘dependents’. However, as illustrated in this report, young people aged 15–19 years are most commonly engaged solely in education, and substantial proportions of men and women aged 60–64 years are not employed.

Mothers spend most time with children post-separation

Media release, 1 February 2011 from the Australian Institute of Family Studies

Children in separated families still spend considerably more time with their mother than their father despite 2006 family law reforms that promoted shared care arrangements, a new study has found. The study by the Australian Institute of Family Studies reveals about 80 per cent of children spent most nights of the year with their mother and one-third of children never stayed overnight with their father.

The national study involved 10,000 parents who had been separated on average for 15 months and involved children aged up to 17 years old. The study follows the 2006 changes to the family law system encouraging greater involvement of both parents in their children’s lives after separation.

Australian Institute of Family Studies Director, Professor Alan Hayes said although children spent more time with their mother than their father following a family break up, most parents in the study believed the arrangements worked well.

‘The study found that traditional care arrangements involving more nights with the mother than the father remain the most common for children of all age groups, but particularly for preschool aged children,’ he said. ‘However the study showed that across all age groups, most parents believed that their arrangements were working in the best interests of their children.

The key findings of the study include:
• one-third of children never stayed with their father, with 11 per cent never seeing their father and 23 per cent seeing their father only during the daytime
• 16 per cent of children experienced a shared care arrangement (35–65 per cent of nights in the care of each parent)
• Shared-care was most commonly experienced by children aged 5–11 years old
• The proportion of children who spent most or all nights with their father increased as the children got older
• The youngest (under 3) and the oldest (15–17 years) groups were the most likely to never see one parent, with this parent far more likely to be the father.

One of the study’s authors, Ms Ruth Weston said the study revealed parents with shared-care arrangements were most likely to believe their arrangements were working well for all parties. The study shows that the level of satisfaction of parents about the care arrangement of their children is lower when the time spent with the children is less equally shared.

Fathers with shared-care were more likely than the mothers with these arrangements to indicate their parenting arrangements were flexible.

‘Not surprisingly, parents who never see their children most commonly indicate that their parenting arrangements were not working well for them or their children,’ said Ms Weston.

The study shows that overall the different care arrangements did not affect the wellbeing of the child unless there had been a history of family violence. Ms Weston said the study also revealed parents who adopted shared-care arrangements tended to have a higher socio-economic status.

Parents with shared-care arrangements are more likely to have been very involved in their children’s life before separation, live less than 10 km or a 15-minute drive from the other parent, to have been married to the other parent, and to have higher income levels. These parents also indicated they had arrived at their shared arrangements through discussions with the other parent rather than use the court system, although they may have sought some formal assistance.
Families in regional, rural and remote Australia

Jennifer Baxter, Alan Hayes and Matthew Gray
Fact sheet published by Australian Institute of Family Studies, March 2011
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Introduction
Australia is one of the most urbanised countries in the world, with over two-thirds (69%) of the population living in major cities. It also has one of the lowest population densities outside of its major cities. Despite the vastness of Australia and the profound impact that this has on the lives of the peoples living in rural and remote areas, relatively little is known about families living in these areas of Australia compared to those living in major cities.

This Facts Sheet describes how the characteristics of families differ between the ‘city’ and the ‘country’ or ‘bush’. While words such as these are used in everyday parlance, it is very difficult to identify exactly where the city ends and the country begins. One way of categorising regions is in terms of the road distance from services, and this is the standard method to define remoteness for statistical purposes in Australia. Most of the information in this Facts Sheet is provided for: major cities, and inner regional, outer regional, remote, and very remote regions.1 Figure 1 shows the areas of each of these regions across Australia.2

Figure 1. Geographic remoteness in Australia

Geographic distribution of Australian families
Over two-thirds (69%) of Australians live in major cities, one in five (20%) live in inner regional areas, one in ten (9%) in outer regional areas and around one in forty (2.3%) live in remote or very remote areas (1.5% remote and 0.8% very remote). These figures represented, in 2009, 15.1 million people living in major cities, 4.3 million in inner regional areas, 2.1 million in outer regional areas, 324,000 in remote areas and 174,000 in very remote areas (Australian Bureau of Statistics [ABS], 2010).3

While Australians of all backgrounds reside in the different regions across Australia, the Indigenous population has a much greater concentration in the more remote areas.

Although 2.4% of Australia’s population are Indigenous, their geographic distribution across Australia is quite different. Indigenous people comprise 1% of the population in major cities, 3% in inner regional areas, 6% in outer regional areas, 15% in remote areas and 49% in very remote areas.

Given the much higher proportion of the population that is Indigenous in remote and very remote areas, some of the information in this Facts Sheet is presented separately for Indigenous and non-Indigenous Australians in these areas.

There are also differences between geographic regions in the percentage of the population born overseas. While overall, the proportion is 29%, the distribution across different types of areas varies considerably:
• major cities: 31%
• inner regional areas: 14%
• outer regional areas: 14%
• remote areas: 13%
• very remote areas: 8%.

Household type
Most Australians (79%) live in one-family households, with 3% in multi-family households (households consisting of two or more families), 9% in lone-person households, 3% in group households and 6% in non-private dwellings or not-classifiable households (Figure 2). There are few differences in the composition of households between major cities, inner regional, outer regional and remote areas. However, in very remote areas a lower proportion of people live in one-family households (64%) and a higher proportion in multi-family households (18%).

Figure 2. Household type, by geographic remoteness, 2006

Source: Census 2006
The difference between very remote areas and the rest of Australia is largely the result of a higher proportion of the population in very remote areas being Indigenous. In very remote areas, about three-quarters of non-Indigenous people live in one-family households and 2% in multi-family households. This compares to 57% of Indigenous people who live in one-family households and 38% who live in multi-family households.4

Family structure
Among Australian family households, the distribution of family types is similar between major cities, inner regional, outer regional and remote areas, with 57–61% of people living in couple families with children, 24-29% in couple families with no children, and 13–14% in one-parent families (Figure 3). In contrast, in very remote regions, a smaller proportion of people live in couple families with no children (19%) and a higher proportion live in one-parent families (19%).
Figure 3. Family type, by geographic remoteness, 2006

These differences for remote regions largely reflect different family structures among Indigenous people. In remote areas, 35% of Indigenous people live in one-parent families compared to 9% of non-Indigenous people, and in very remote areas, 30% of Indigenous people live in one-parent families compared to 7% of non-Indigenous people. Indigenous people in these remote and very remote areas are less likely to be living as childless couple families than are non-Indigenous people. In very remote areas, 8% of Indigenous people and 32% of non-Indigenous people live as couple families without children.

Age distribution
Australia’s population is ageing, as is the population in many other countries. The proportion of the population aged 65 years and over relative to those of working age (15–64 years)—known as the old age dependency ratio—is increasing. For example, in inner regional areas there are 24 elderly people for every 100 people of working age. This has significant implications for a wide range of government policies and programs, including the types of services needed. It also has implications for the social and economic life of communities. The old age dependency ratios for each area are:
- 19% in major cities
- 24% in inner regional areas
- 21% in outer regional areas
- 14% in remote areas
- 9% in very remote areas.

The higher old age dependency ratio in inner regional areas reflects, in part, the migration of retired people from major cities to inner regional areas. The lower old age dependency ratios in remote and very remote regions reflects the higher proportion of the population that is Indigenous. Also, many younger people move to remote and very remote areas for employment (e.g., to work in the mining industry).

Access to services
One of the defining features of geographic remoteness is that many services are less accessible. The General Social Survey 2006 (GSS 2006) provides data on the extent to which respondents to the survey had difficulty accessing services such as doctors, employment services, telecommunication services, Centrelink, banks and other financial institutions, disability services, family assistance offices or Medicare. Respondents to the GSS 2006 were asked if they had difficulties for reasons such as transport/distance, cost or inadequate services in the area.3

As expected, people living in major cities are less likely to have problems accessing a range of services than those living in other areas. Those in outer regional or remote areas are the most likely to have difficulties accessing services. This is true irrespective of family type.

For couple-parent families, of those who had sought access to service providers, the proportion having problems accessing services are:
- 19% in major cities
- 27% in inner regional areas
- 40% in outer regional areas.

For lone-parent families, the proportions having problems accessing services are:
- 29% in major cities
- 31% in inner regional areas
- 43% in outer regional areas.

For couples without children living with them (including both childless couples and those with grown-up children), the proportions having problems accessing services are:
- 16% in major cities
- 23% in inner regional areas
- 36% in outer regional areas.

These data illustrate that while geographic remoteness is an important factor in not having access to services, it is not a complete explanation. Even in major cities some people have experienced difficulties in accessing such services. This may reflect lack of affordable transport, cost of services, waiting lists, or because of the inappropriateness of available services.

Do children’s lives differ according to geographic remoteness?
The geographic remoteness of the area in which children live can have a significant impact upon their experiences and how they spend their time. These can affect their future life trajectory. This Facts Sheet provides information about how the following aspects of children’s lives vary according to whether they are growing up in a major city, or a regional or remote area:
- children’s preferences about how to spend their free time
- amount of time children spent outside compared to inside
- children’s extracurricular activities
- parents’ expectations about their children’s educational attainment;
- parents’ views on the safety and desirability of their neighbourhood for their children.

The data presented in this section are for children aged 8–9 years in 2008, from Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC). There were insufficient numbers of children from remote and very remote areas in this study to allow reliable estimates to be produced for these regions, so we focus on children in major cities, inner regional and outer regional areas.

Children’s preferences about how to spend their free time
The LSAC survey asks parents about whether their children prefer to spend their free time in mostly active pastimes, in mostly inactive pastimes, or have no clear preference.

There are differences according to geographic remoteness in how children prefer to spend their time (Figure 4). In all areas, boys are more likely to prefer active pastimes than girls. A higher proportion of children in more geographically remote areas

Notes: Data relates to people living in family households. Source: Census 2006
Families in regional, rural and remote Australia - continued

prefer active pastimes than children in less geographically remote areas. The proportion of children who prefer inactive pastimes is correspondingly higher in major cities.

**Figure 4. Children’s preferences about how they spend their free time, by gender and geographic remoteness**

![Graph showing preferences about how children spend their free time by gender and geographic remoteness]

Notes: As reported by parents of children aged 8–9 years. Source: LSAC 2008

**Amount of time children spent outside compared to inside**

While boys and girls living in outer regional areas spend more time outside than those living in major cities, the differences are no more than half an hour per day (Figure 5). In all areas boys spent more time outside than girls.

**Figure 5. Amount of time children spend outside, by gender and geographic remoteness**

![Graph showing amount of time children spend outside by gender and geographic remoteness]

Notes: As reported by parents of children aged 8–9 years using a child time use diary. Source: LSAC 2008

**Children’s extracurricular activities**

LSAC collects data on a range of organised activities in which children may participate, including team sports, individual sports, or art, music or dance classes. The majority of boys aged 8–9 years participate in a team sport (64–69% across geographic remoteness areas), compared to a minority of girls (36–40% across geographic remoteness areas) (Figure 6). While regional differences are very small, boys in outer regional areas are the most likely to participate in team sports (69%).

**Figure 6. Extracurricular activities, by gender and geographic remoteness**

![Graph showing extracurricular activities by gender and geographic remoteness]

Notes: As reported by parents of children aged 8–9 years. Source: LSAC 2008

Across geographic regions, differences in the proportions of boys and girls participating in individual sports, such as swimming lessons and gymnastics, are also apparent, with lower participation rates for these activities in outer regional areas.

Significant differences in participation in extracurricular art, music or dance classes according to geographic remoteness were also found. Participation in these types of classes is more common in major cities than outer regional areas. For example, the proportion of boys participating in these types of activities is 31% in major cities and 17% in outer regional areas. For girls, the pattern is similar, although the difference between major cities and outer regional areas is smaller than is the case for boys.

**Parents’ expectations about their children’s educational attainment**

Parents’ expectations for their children’s future education levels provide interesting insights into their possible educational outcomes. Figure 7 shows that in all geographic areas, parents have quite high expectations regarding their children obtaining some post-school qualifications, although boys are somewhat more likely than girls to be expected to obtain a trade or vocational qualification, rather than a university-level qualification.

**Figure 7. Parents’ expectations of children’s future educational level, by gender and geographic remoteness**

![Graph showing parents’ expectations of children’s future educational level by gender and geographic remoteness]

Notes: As reported by parents of children aged 8–9 years. Source: LSAC 2008

Parents in major cities have relatively high expectations for their children’s future education levels, when compared to parents in the less geographically accessible regions. For example, for 8–9 year old girls:

- In major cities, 78% of parents expect their daughter to obtain a university-level qualification (67% degree level, 11% postgraduate level). Only 9% expect girls to obtain a trade or vocational qualification and 14% expect them to complete no post-school qualification.
- In outer regional areas, 59% of parents expect their daughter to complete a university-level qualification (56% degree level, 3% postgraduate level). Another 15% expect girls to obtain a trade or vocational qualification and 26% expect them to complete no post-school qualification.

For 8–9 year old boys:

- In major cities, 62% of parents expect their son to complete a university-level qualification (51% degree level, 11% postgraduate level). Another 22% expect boys to obtain a trade or vocational qualification and 16% to complete no post-school qualification.
In outer regional areas, 40% of parents expect their son to obtain a university-level qualification (36% degree level, 4% postgraduate level). Significant percentages expect boys to obtain a trade or vocational qualification (36%) or to complete no post-school qualification (24%).

The differences in expectations of qualifications for girls compared to boys is greatest in the outer regional areas.

**Parents’ views on the safety and desirability of their neighbourhood for their children**

The nature of the neighbourhood in which children grow up can have impacts upon how children develop (e.g., Edwards & Bromfield, 2009). Very few Australian parents think that the neighbourhood in which they live is unsafe. There is little difference according to geographic remoteness, with those in outer regional areas slightly less likely to disagree that the neighbourhood is safe (4%) than in major cities or inner regional areas (7%) (Figure 8).

**Figure 8. Parents’ views about neighbourhood safety, quality of parks and access to basic services, by geographic remoteness**

There are big differences in terms of the perceived quality of parks and playgrounds, with parents living in major cities being the least likely to express unfavourable views compared to those living in inner and outer regional areas. Views about access to services also vary by region. About three in ten parents in inner regional areas (31%) and outer regional areas (29%) disagree that they have access to basic services such as banks and medical clinics. In major cities, however, only 14% of parents say they do not have access to basic services.

**Children’s developmental outcomes**

The differences in the physical, economic and social environments between major cities, inner regional and outer regional areas may have an effect on children’s developmental trajectories.

Children’s physical, social-emotional and learning outcomes were measured and used to rank them according to whether they did very well or poorly relative to each other. Figure 9 shows these relative outcomes for children aged 8–9 years:

- **physical development**: children were more likely to do very well in major cities and outer regional areas compared to those in inner regional areas
- **social-emotional outcomes**: children showed very little difference across the geographic areas
- **learning outcomes**: children were more likely to do very well in major cities, followed by inner regional areas and then outer regional areas.

**Figure 9. Children’s physical, social emotional and learning outcomes by geographic remoteness, 8–9 year olds**

Similar observations were seen at the other end of the scale; for example, a higher percentage of children in inner regional areas had poorer physical development than children in the other areas (data not shown).

The differences in children’s developmental outcomes across geographic areas are likely to be explained in part by the impact of living in these areas and in part by differences in the characteristics of families across these areas.

**Concluding comments**

This analysis of regional statistics shows that families living in the ‘bush’ may differ in some important ways compared to those living in the city. Those in remote or very remote areas are more likely to be Indigenous than those living in inner regional areas or major cities; and a greater proportion of those in very remote areas live in multi-family households. While family structure does not do much to vary regions in remoteness, Indigenous people are more likely to live in one-parent families, especially in remote and very remote areas. Old-age dependency ratios are higher in inner regional areas, reflecting trends for many Australians to leave major cities on retirement.

Access to services and educational aspirations are generally more limited in outer regional areas. Geographic area has some effect on how children spend their time, with increasing remoteness being associated with more time spent outdoors. On the other hand, engagement in extracurricular activities is higher in major cities. Compared to parents in inner and outer regional areas, those in major cities are less likely to provide an unfavourable view of their neighbourhood parks and playgrounds, and access to basic services. There are also differences in children’s developmental outcomes across geographic areas, with children in major cities doing better for physical development and learning outcomes than children in other areas.

While there are many similarities in the nature of families and their lives across areas of varying remoteness, overall distance still exercises some ‘tyrannous’ influences on the lives of Australians and their families.

**References**


Families in regional, rural and remote Australia - continued


Endnotes
1. Based upon the Australian Standard Geographic Classification remoteness classification.

2. The statistical information in this Facts Sheet is derived from the Census 2006, the General Social Survey 2006 (GSS 2006) and Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC). The Census data are for all Australians, irrespective of age (unless otherwise stated). Area of residence is based upon place of enumeration on Census night. Those who were not at home on Census night are excluded from the analysis. The GSS 2006 is a household survey, with respondents aged 18 and over.

3. ABS Estimated Resident Population statistics are based on 2006 Census data, updated to take account of births, deaths, international and interstate migration.

4. An important feature of many Indigenous households is that there is a significant amount of mobility through the household, which can result in complex and dynamic household structures (Morphy, 2004). In addition, the categories and terms generally used to describe kin relationships are those that apply to the standard Anglo-Celtic system that is used to collect data about family type and household structure in the Census and other national data collections; many traditionally oriented Indigenous people have kinship systems that differ markedly in their structure from the Anglo-Celtic system (Morphy, 2006). This Facts Sheet does not attempt to engage with these complexities.

5. The full list also included disability restrictions, lack of support networks, cannot trust them, and any other reason. Respondents could also say they had not tried to access any service providers; these people are excluded from calculations. The GSS regional classification combines remote and very remote regions.

6. Data on time spent outdoors are derived from child time use diaries.

This paper uses unit record data from Growing Up in Australia: The Longitudinal Study of Australian Children. The study is conducted in partnership between the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). The findings and views reported in this paper are those of the author and should not be attributed to FaHCSIA, AIFS or the ABS.

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Does marriage matter for children?

Media release, Wednesday 16 November 2011 from the Australian Institute of Family Studies

New research by the Australian Institute of Family Studies finds that children of married couples have higher levels of learning and social and emotional development than children of de-facto parents or single mothers. However, according to the authors, the differences in children’s development were explained by the family’s financial circumstances, mother’s educational level and parenting approaches rather than the marital status of their parents.

The study by Australian Institute of Family Studies researchers, Lixia Qu and Ruth Weston analysed data collected on almost 5,000 children across Australia, from the time the children were 4–5 years old until they were 8–9 years old.

‘The study shows that 31 per cent of the married mothers had a university degree or higher level of education compared to 15 per cent of single and cohabiting mothers,’ she said. ‘Married mothers were also more likely to be employed and married couple families were less likely to experience financial hardships. A family’s financial circumstances are clearly very important for the wellbeing of the children.’

De-facto parent families were slightly worse off financially than married parent families but slightly better off than families headed by single mothers. ‘However, of particular concern is the fact that the gaps between the children of single mothers and those living with married parents appeared to widen over time.’

Ms Weston said the study also compared parents’ reports on their approaches to parenting across the three types of families. She said that overall, parents in each of the family forms indicated that they tended to express warmth and affection to their children and enjoyed listening to them and participating in activities with them. Parents also tended to use reasoning with their children, explaining why they were being corrected. Ms Weston noted that although parents in all family types reported some level of anger and difficulty in parenting, this was at much lower levels than the use of reasoning and warmth shown to their children.

However, differences between the groups emerged regarding the extent to which they adopted a consistent approach to parenting. Married parents reported greater consistency in parenting than de-facto couples or single mothers.

Ms Weston said the results suggest that, regardless of family type, improvements in family income, in mothers’ access to education and in parenting skills are likely to benefit a significant proportion of children who are behind in their learning and social and emotional development.

CORRECTION
The last sentence of paragraph 5, page 40 of the Journal of the Home Economics Institute of Australia, 18 (1) should read as follows:

Both the Healthy Living Pyramid and the Australian Guide to Healthy Eating are included in the book. However, when a task is put to students to compare these two food selection guides, it is surprising that both images are not included on the same page; only the Healthy Living Pyramid is featured.

The Editor apologises for any misunderstandings that may have arisen as a result of the original text.
INFORMATION FOR CONTRIBUTORS

Frequency of Publication
Three times per annum

Focus
The Journal of the Home Economics Institute of Australia reflects the focus of the home economics profession:

… to educate, inform, and to act as an advocate to government, industry and the community for families and households, so that individuals can make informed choices in order to enhance their everyday living

The Editor welcomes submissions for journal inclusion which address educational, welfare, business and/or industrial issues relevant to home economics. This includes papers related to: social issues; economic, environmental and technological developments; updating professional knowledge; research; and evaluations of programs or teaching materials. Relevant topic areas include:

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The following are examples of references:

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