

Good for kids

good for life

2006–2010: Evaluation Report



An initiative jointly funded by the NSW Ministry of Health
and Hunter New England Local Health District

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Abbreviations and acronyms

ADF	Australian Drug Foundation
AMS	Aboriginal Medical Service
ARIA	Accessibility/Remoteness Index of Australia
BMI	Body mass index
CATI	Computer assisted telephone interview
CHETRE	Centre for Health Equity Training Research and Evaluation, UNSW
COO	Former Centre for Overweight and Obesity, The University of Sydney
CPAH	Former Centre for Physical Activity and Health, The University of Sydney
CSO	Community Service Organisation
DGP	Division(s) of General Practice
DEC	NSW Department of Education and Communities
DET	Former NSW Department of Education and Training
DOCS	NSW Department of Family and Community Services
DSR	Former NSW Department of Sport and Recreation
DVD	Digital Versatile Disc
EDNP	Energy dense, nutrient poor
FMS	Fundamental movement skills
GFK	Good for Kids, Good for Life Program
GP	General Practitioner
HIA	Health Impact Assessment
HMRI	Hunter Medical Research Institute
HNE	Hunter New England
HNEAHS	Former Hunter New England Area Health Service
HNEPH	Hunter New England Population Health
K	Kindergarten
KLA	Key learning area
NBN	Newcastle Broadcasting New South Wales (NBN Television)
NGO	Non-government organisation
NHMRC	National Health and Medical Research Council
NSW Health	NSW Department of Health or NSW Ministry of Health
PA	Physical activity
PANORG	Physical Activity, Nutrition and Obesity Research Group, The University of Sydney
PDHPE	Personal Development, Health and Physical Education
PE	Physical education
CPHN	Former Centre for Public Health Nutrition, The University of Sydney
SEIFA	Socio-Economic Indices for Areas
SES	Socioeconomic status
SPANS	NSW Schools Physical Activity and Nutrition Survey
SSR	Small screen recreation
TAFE	Tertiary and Further Education
WHO	World Health Organization

Executive summary

Background

Australia, like many countries, has created an environment that encourages excessive and unhealthy weight gain among children. Until recently, the prevalence of overweight and obesity among Australian children has been steadily increasing. In recognition of the negative effects of this on children, adults and community well-being, many governments, including the NSW Government, have implemented a range of obesity prevention policy initiatives.

In NSW, a Child Obesity Summit was held in 2002 to identify child obesity prevention policy responses for the state. Since the Summit, a succession of state plans, policies and programs have been implemented to reduce child obesity and to address its determinants. The implementation of the Good for Kids, Good for Life (hereafter Good for Kids) dissemination program in the Hunter New England (HNE) region of NSW was one of those initiatives. This report describes the design, impacts and outcomes of the Good for Kids program for the period 2006–2010.

Program goals

The goals of the Good for Kids program were to reduce the prevalence of child overweight and obesity in the HNE region and to build evidence for policy and practice related to the prevention of child obesity in NSW.

Target group

The focus of the overarching program was on children aged 2–12 years. Interventions in individual community settings targeted particular age groups within this range.

Intervention program

Initial planning for the program commenced in late 2005. Intervention delivery in community settings commenced in early 2007 and concluded in December 2010. The timing and length of intervention varied between settings.

A program logic model was developed for the overarching program that focused on:

- building the capacity of organisations in community

settings to adopt practices that address the behavioural determinants of child overweight and obesity

- increasing community awareness of the behavioural determinants of child overweight and obesity.

The prioritised behavioural determinants were:

- child consumption of sweetened drinks and non-sweetened drinks
- child consumption of energy dense, nutrient poor foods
- child consumption of vegetables and fruit
- child time spent in organised and non-organised physical activities
- child time spent in small screen recreational activities.

Building the capacity of community settings to adopt practices that address behavioural determinants of child overweight and obesity

Multi-setting approach

The Good for Kids program adopted a multi-setting capacity building approach based on the view that for healthy eating and physical activity to become the norm for children, the community settings with which they interact need to foster these behaviours. The capacity building approach was implemented in seven community settings. Some of the settings had the potential to reach almost all children (for example schools) or large numbers of children (for example preschool and long day care centres (hereafter children's services), general practice and community sports clubs. Others catered for smaller numbers or specific groups of children (for example community service organisations, HNE Health Service, Aboriginal Health Services).

Practices that address child overweight and obesity

The Good for Kids program involved the implementation of separate interventions in each of the seven community settings. The setting specific interventions sought to facilitate the adoption by community organisations of practices that promote child healthy eating and physical activity, such as the implementation of specific programs or services, as well as the implementation of supportive organisational policies, systems and procedures.

The behavioural determinants of overweight and obesity that were addressed in each setting, and the manner and intensity of intervention varied according to the circumstances of each setting. For example, for the primary school setting, the primary focus of the healthy eating intervention was on the consumption of water and fruit and vegetables. For the HNE Health Service setting, the intervention focused solely on consumption of sweetened and non-sweetened drinks and energy dense, nutrient poor foods. Similarly, with respect to the behavioural determinants of physical activity, the intervention in primary schools had a primary focus on fundamental movement skill development and physical activity during the day. In a number of instances (schools, children's services), the length of intervention addressing healthy eating determinants was greater than that for addressing the prioritised physical activity determinants.

Capacity building approach

A range of evidence-based capacity building and dissemination strategies were implemented to maximise program reach and the adoption by organisations of the practices promoting healthy eating and physical activity. The strategies included: development of organisational leadership; provision of program and service resources and information; provision of funding and/or incentives; training of staff; and provision of adoption support and feedback. The number, types and intensity of such strategies varied according to the circumstances and characteristics of each setting. The characteristics and circumstances of the setting also influenced how the dissemination strategies were delivered, with delivery occurring by either contracted organisations (in sports clubs and general practice settings) or by health promotion staff in the Good for Kids project team (all other settings).

Increasing community awareness of the behavioural determinants of child overweight and obesity

Social marketing strategies were implemented through local mass media organisations to support and promote community awareness of the program messages and strategies.

Evaluation

Evaluation of the Good for Kids program involved measurement of:

- Impacts
 - Reach of the intervention and organisational adoption of practices.
 - Community awareness of the program and its key messages.
- Outcomes
 - Prevalence of healthy eating and physical activity behaviours.
 - Prevalence of overweight and obesity.

Reach and organisational adoption of practices that address behavioural determinants

The reach of the program was assessed in terms of the number of organisations in each community setting that participated in the program intervention. In addition, depending on the focus of the intervention in each setting, the evaluation assessed the adoption of one or more of the following organisational practices by community organisations: implementation of specific healthy eating and/or physical activity programs or services; healthy eating and/or physical activity policies; and implementation of supportive organisational systems and procedures.

In the primary schools and children's services settings, two separate quasi-experimental studies compared the prevalence of such practices in all children's services and primary schools in the HNE region with randomly selected samples of children's services and primary schools in the rest of NSW. Adoption of such practices in the remaining five settings was assessed using a variety of evaluation designs including pre post (community services, health service) and post-test only surveys (general practice, Aboriginal Health Services, junior sports clubs).

Community awareness

Repeated quasi-experimental studies were undertaken to determine the impact of the program's social marketing campaigns on community awareness of the program's key messages. The studies involved nine cross-sectional telephone surveys of a randomly selected sample of parents of children aged 2-15 in the HNE region and randomly selected samples of parents in the rest of NSW. At each survey, parents were asked about their awareness of the program, and of specific campaign and associated messages regarding water consumption, physical activity and vegetable and fruit consumption.

Healthy eating and physical activity behaviours

Measurement of the prevalence of child healthy eating and physical activity behaviours was undertaken in two separate studies. The first involved cross-sectional pre post field surveys of randomly selected children attending children's services and schools in the HNE region in 2007 and 2010 (hereafter field survey). Within schools, children were selected from Kindergarten (K), and Years 2, 4, 6, 8 and 10. The second, a quasi-experimental study involved telephone surveys of randomly selected samples of parents of children aged 2-15 in HNE and in the rest of NSW (hereafter telephone survey) in 2007 and 2010. Measurement of the prevalence of healthy eating and physical activity behaviours was undertaken in both studies with respect to 20 behavioural variables.

Overweight and obesity

Measurement of children's height and weight was undertaken during the field surveys to determine the prevalence of child overweight and obesity.

Results

Reach and adoption of practices that promoted healthy eating and physical activity

Children's services

At the completion of the program more than 80% (n=261) of children's services had participated in the intervention. Compared to the rest of NSW at follow up, there was a significantly greater increase in the proportion of HNE children's services that: provided only plain milk and water (HNE: 68% to 95%; NSW: 58% to 82%); had physical activity policies (HNE:21% to 49%; NSW: 34% to 38%); had such policies that limited small screen recreation (HNE:45% to 82%; NSW: 60% to 65%); had staff trained in physical activity (HNE:29% to 76%; NSW: 37% to 43%); had authorised supervisors that understood physical activity recommendations (HNE:14% to 21%; NSW: 20% to 13%); and had menus that met dietary recommendations for sweetened drinks (HNE:50% to 96%; NSW: 42% to 52%), fruit (HNE:0% to 34%; NSW: 2% to 6%) and vegetables (HNE:0% to 20%; NSW: 0% to 4%) (for services providing meals).

Primary schools

At the completion of the program 68.9% (n=435) of schools were certified as having adopted the *Crunch&Sip*® and/or *Get Skilled, Get Active, Go!* programs. Moreover, 51.9% were certified for both initiatives. Compared to the rest of NSW at follow up, there was a significantly greater increase in the proportion of HNE primary schools that had: fruit and vegetable breaks in class (HNE: 50% to 92%; NSW: 48% to 74%); a nutrition policy supporting fruit and vegetable breaks (HNE:16% to 58%; NSW: 17% to 36%) and access to water (HNE:23% to 58%; NSW: 25% to 41%); and staff trained in fruit and vegetable promotion (HNE:5% to 37%; NSW: 9% to 26%). Increases in practices promoting physical activity in HNE were not significantly greater than those in the rest of NSW.

Sports clubs

At the completion of the program, 41% (n=204) of junior sports clubs of 7 major codes in the HNE region were accredited with regard to the provision of healthy food options in canteens.

Aboriginal health services

At the completion of the program 59% (n=91) of Aboriginal Health Workers had received training in healthy nutrition.

Community service organisations

At the completion of the program 29 of 36 (80%) community service organisations had participated in the intervention. Compared to baseline, significant increases were observed in the proportion of HNE Community Service organisation staff who reported at follow up the provision of healthy eating and physical activity resources (56% to 83% for healthy eating and 35% to 74% for physical activity), advice for families (68% to 94% for healthy eating and 61% to 88% for physical activity), referrals to health professionals (25% to 43% for healthy eating and 14% to 39% for physical activity), and role modelling healthy eating and physical activity (38% to 88% for healthy eating and 26% to 78% for physical activity).

HNE Health service

All HNE Health vending machines (n=112 at baseline) and all HNE Health operated food outlets (n=5) were subject to the intervention. At the completion of the program 26% of vending machines had adopted labelling of healthier drink choices and the mean proportion of slots in machines providing healthy drinks was 51%, both reflecting significant increases from baseline. No significant improvements were observed for foods sold in vending machines or foods or beverages available in food outlets.

General practice

Approximately 30% of GPs and 70% of practice nurses attended at least one professional development session. At the completion of the program, 27% of parents reported that their general practitioner or practice nurse had provided healthy eating or physical activity advice as part of the four-year old immunisation visit, compared to 13% of parents in the rest of NSW.

Community awareness

Compared to parents in the rest of NSW (n=619), awareness of the Good for Kids program was significantly higher among parents in the HNE region (n=748), peaking at 59% (compared to 29% in NSW). After each campaign, parents in the HNE region were significantly more likely than those in the rest of NSW to identify the main message of each of the campaigns (*Think H2O*: 37% compared to 10%; *Get Active, Get Out & Play!*: 39% compared to 17%; and *Vegies - Serve 'em up*: 36% compared to 14%).

Healthy eating and physical activity behaviours

Field survey

In 2007, 4,001 children participated in the field survey, and in 2010, 3,732 children participated. Given the large number of behavioural variables and sub group analyses undertaken, only those variables and groups where statistically significant changes over time were observed are described in this executive summary. Behaviours were analysed for both genders combined and for boys and girls separately for three educational stage groups of children, those attending: children's services; school Years K, 2 and 4; and school Years 6, 8 and 10.

Consumption of sweetened and non-sweetened drinks

There were significant reductions between 2007 and 2010 in children's consumption of:

- fruit juice among the overall sample and both boys and girls in children's services; among the overall sample and girls in Years K, 2 and 4; and among the overall sample in Years 6, 8 and 10.
- soft drink among the overall sample of children and boys in children's services; and among the overall sample and girls in Years K, 2 and 4.

There were significant increases in the proportion of children drinking two or more cups of water per day across all age categories for both genders. There was a significant decrease in the daily consumption of milk for the overall sample, and for boys and girls in Years 6, 8 and 10.

Consumption of energy dense, nutrient poor foods

There were no significant improvements in the consumption of energy dense, nutrient poor foods (fatty meat products, fried potato products, salty snacks, other snack products and confectionary) overall or for any group. There were significant increases in the consumption of a number of products (fatty meat products, other snacks and salty snacks) for some age groups.

Consumption of vegetables and fruit

There were significant increases in the:

- proportion of children meeting vegetable consumption recommendations among the overall sample and both boys and girls in children's services; and among the overall sample and girls in Years K, 2 and 4.

- proportion of children meeting fruit consumption recommendations among the overall sample and boys and girls in children's services; and among the overall sample and boys in Years K, 2 and 4.
- mean serves of vegetables consumed per day for boys in children's services and for girls in Years K, 2 and 4.
- mean serves of fruit consumed per day for the overall sample, boys and girls in Years K, 2 and 4.

For the overall sample, and for boys and girls in Years 6, 8 and 10 there were significant decreases in the consumption of fruit and vegetables.

Time spent in organised and non-organised physical activities

There were significant decreases between 2007 and 2010 in the proportion of children not doing any organised physical activity among the overall sample and girls in children's services, and among girls in Years K, 2 and 4. There were significant decreases in the proportion of children that were not doing any non-organised physical activity for the overall sample and girls in school Years K, 2 and 4 and significant increases among the overall sample and boys and girls in school Years 6, 8 and 10.

Among children doing some activity, there were significant increases in the proportion of children meeting physical activity guidelines for the overall sample and boys and girls in children's services. Among children doing some activity there were also significant increases in the median minutes per day of organised physical activity for the overall samples, and both boys and girls in: children's services; Years K, 2 and 4; and Years 6, 8 and 10. There were also increases in the median minutes per day of non-organised activity for the overall samples and boys and girls in children's services, and for the overall sample and boys and girls in Years K, 2 and 4.

Time spent in small screen recreational activities

There were significant decreases between 2007 and 2010 in the proportion of children exceeding screen time guidelines for the overall sample and for boys in Years 6, 8 and 10. There were significant reductions in the median minutes of screen time per day among the overall sample and boys in Years 6, 8 and 10.

Telephone survey

In 2007, 1,631 parents of children participated in the telephone survey and in 2010, 1,618 parents participated. Behaviours were analysed for the overall sample of children aged 2-15, for each of three groups (preschool children, primary school, high school) and for boys and girls separately.

A number of statistically significant positive changes over time were observed within either HNE and/or NSW. Positive changes were observed in: the overall HNE and NSW samples and for all groups for the consumption of fruit juice; for the overall HNE and NSW samples and some groups for soft drink intake; for the overall HNE and NSW samples and for some groups for intake of some energy dense, nutrient poor foods; and among some groups for small screen variables. For the remaining variables (unsweetened drinks, consumption of vegetables and fruit, physical activity variables) there were no significant positive changes for either group.

Few variables showed statistically significant differential rates of change in prevalence between HNE and the rest of NSW. The only significant differential change consistent with an intervention effect in the HNE region occurred for consumption of fruit juice among boys. The proportion of boys consuming at least four cups of fruit juice per week decreased more in HNE (68.1% to 45.6%) than in NSW (44.4% to 26.2%).

There were significantly different changes in prevalence between HNE and NSW for soft drink consumption (NSW improved more than HNE), water intake and milk intake (NSW decreased less than HNE), mean fruit consumption (small decrease in HNE and increase in NSW), and median minutes screen time for preschool children (HNE decreased less).

Overweight and obesity

Between 2007 and 2010 the prevalence of overweight and obesity in the HNE region remained stable at 16% for children in children's services and decreased non-significantly from 21.6% to 18.3% for students in Years K, 2 and 4. An average annual rate of decline in the prevalence of overweight and obesity of approximately 1% per year was found for all children in the HNE region. The prevalence of overweight and obesity decreased significantly for K, 2 and 4 girls between 2007 (25.5%) and 2010 (18.1%). No significant changes were observed for boys.

Figure 1: Kindergarten, Years 2 and 4: overweight or obese

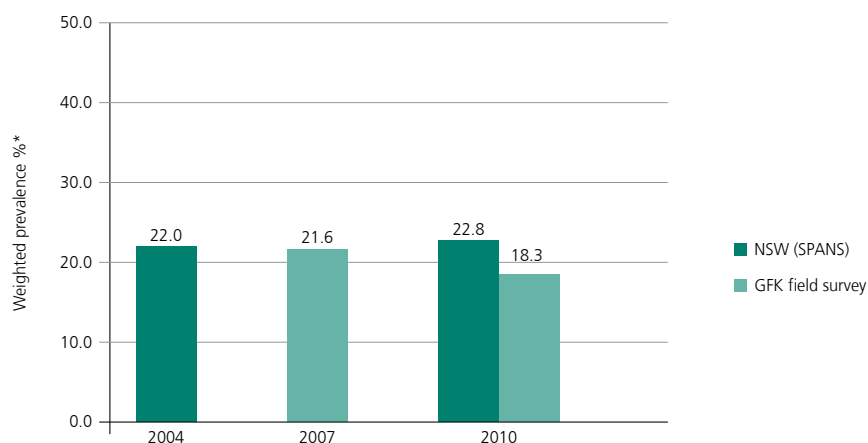
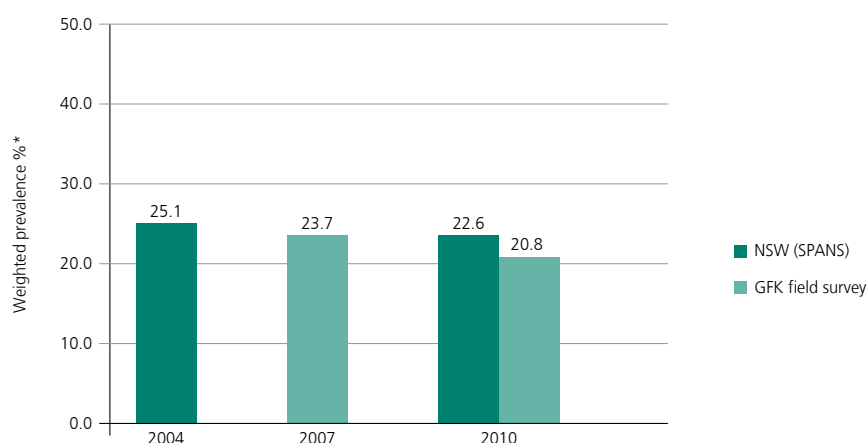


Figure 2: Years 6, 8 and 10: overweight or obese



*Weighted to the population defined by school, sector, type, year and set (See page 39).

Summary and conclusions

The Good for Kids program was undertaken as one of a number of concurrent government initiatives in NSW to reduce the prevalence of child overweight and obesity. Intervention strategies that were the same or similar to those implemented by the program were also implemented in the same community settings elsewhere in NSW during the same period. Despite the potential for the increased child obesity prevention policy focus across NSW to confound the Good for Kids program evaluation, the study findings suggest a number of positive changes in the HNE region.

In terms of the program's impact on the capacity of community organisations to address the prioritised behavioural determinants, the program reach was high in the majority of settings (49% to 80% of sites).

Importantly, the reach achieved was greatest in those settings that catered for the greatest number of children (children's services and primary schools). Community organisations' adoption of practices promoting children's eating and physical activity behaviours increased in all targeted community settings. Such adoption was greater in HNE than in NSW in a number of instances. The enhanced capacity was generally greatest with regard to those behavioural determinants that were the primary focus of the interventions, the promotion of non-sweetened drinks and fruit and vegetable consumption, and when the intervention was delivered by the Good for Kids health promotion team. In terms of the program's impact on parental awareness of obesity prevention messages, awareness was significantly greater in HNE relative to the rest of NSW.

These findings of program impact demonstrate not only the feasibility of a multi-setting approach to disseminate community-based child obesity prevention initiatives, but also that the dissemination approach taken by Good for Kids was differentially more successful in a number of settings than the approach taken elsewhere in NSW. The findings provide a strong basis for ongoing HNE community engagement in child obesity prevention, and a basis for guiding the dissemination of similar interventions across NSW.

Interpretation of the program outcomes in terms of child healthy eating and physical activity behaviours is less clear due to contrasting findings regarding the prevalence of such behaviours between the field and telephone surveys. In the field survey, significant improvement over time was observed in the prevalence of several behaviours in HNE, particularly among children attending children's services and students in school Years K, 2 and 4 for sweetened drink and water consumption, fruit and vegetable intake, and time spent in physical activity.

The telephone survey also showed significant improvements in sweetened drink consumption, and in one instance (boys consumption of fruit juice) the observed change was significantly greater among HNE children than among children in the rest of NSW. For consumption of soft drink, improvements were greater in NSW than in HNE. In contrast to the field survey, the telephone survey did not show positive changes in fruit and vegetable consumption or physical activity variables for any group, although there were some positive changes over time for HNE children for intake of some energy dense, nutrient poor foods and in time spent in small screen recreation.

During the program period, the prevalence of overweight and obesity for all children in the HNE region remained stable or trended downward. Obesity rates for NSW also remained stable during this period, as reported in the NSW Schools Physical Activity and Nutrition Surveys in 2004 and 2010. A statistically significant decrease in the prevalence of overweight and obesity was observed among HNE girls in Years K, 2 and 4, a finding that contrasts with no significant change in the prevalence of overweight and obesity for such girls in NSW between 2004 and 2010.

A number of limitations in the field and telephone surveys were evident. First, to enable direct comparison with available NSW Schools Physical Activity and Nutrition

Surveys (SPANS) data the field survey was designed using a sample stratified according to specific school Years (K, 2, 4, 6, 8 and 10). As a consequence, the survey design did not align to the whole population of children that was the focus of intervention delivery.

Similarly, despite being designed with direct comparison to the NSW SPANS data in mind, such comparisons were not undertaken. Without direct comparison it is not possible to conclude that such changes were attributable to the program. No equivalent state-wide data for children attending children's services is available for such comparisons.

Second, the follow up field survey was conducted early in the final year of the program whilst intervention initiatives were ongoing, primarily physical activity related. As a consequence, the follow up field survey data may represent an underestimate of the program effect, particularly with respect to changing physical activity behaviours.

Third, both surveys included a range of behavioural measures assessed across a number of age and gender sub groups. For a number of such measures, there was limited alignment of the evaluation to the content or focus of the setting specific interventions, for example limited focus on energy dense, nutrient poor foods in primary schools. As a consequence, the likelihood of the program having a measurable impact on such behaviours was limited.

Fourth, differential findings regarding the prevalence of child behaviours were evident between the field and telephone surveys. These differences, together with methodological differences between the two surveys such as inclusion of different age groups, limit the ability to interpret the findings of the program with regard to its effect on the prevalence of healthy eating and physical activity behaviours.

Regardless of these limitations, the findings of the evaluation suggest: a positive impact of the program on the capacity of community organisations to promote healthy eating and physical activity; a positive impact on community awareness; improvements over time within HNE in a number of behavioural and weight outcomes; and importantly, an alignment between the focus and reach of the interventions in specific settings and suggested changes in behaviours and weight status in particular age groups. In all settings there was an increased

engagement of targeted community organisations in the promotion of unsweetened drink consumption and the consumption of fruit and vegetables, particularly in primary schools and children's services.

Such findings, together with an increase in community awareness of such behaviours, were aligned with observed improvements over time in the consumption of sweetened drinks in both surveys, and fruit and vegetables among children in children's services and students in Years K, 2 and 4 as measured in the field survey. Similarly, such findings were aligned to improvements over time in weight status, particularly for girls in Years K, 2 and 4. The absence of interventions directed at adolescents, and the relative absence of changes in behaviours or weight status for children in Years 6, 8 and 10 supports such an interpretation.

Recommendations

As one of Australia's largest child obesity prevention initiatives, the impacts and outcomes of the Good for Kids program for the period 2006-2010 provide an insight into the complexities and potential impacts and outcomes of population multi-setting child obesity prevention initiatives.

Based on these impacts and outcomes it is recommended that:

1. NSW continue the development, implementation and evaluation of a multi-setting primary prevention approach to reducing the prevalence of child overweight and obesity and improving children's healthy eating, physical activity and small screen time behaviours.
2. Such an approach adopts an evidence-based focus on building and measuring obesity prevention leadership, programs, systems and skills in community settings and organisations.
3. Such an approach includes an extended period of dissemination and includes agreed standards of program and service adoption by community organisations.
4. Evaluation of such an approach involves the use of an evaluation design and measures that are aligned to the design, content, and timing of the intervention in each setting.

Introduction

The purpose of this report is to describe the planning, design, interventions and evaluation of the Good for Kids program implemented in the Hunter New England (HNE) region between 2006 and 2010. This section describes the need for the Good for Kids program and the context in which it was implemented. Section 2 details the planning, program logic and timeline for the separate intervention initiatives that constituted the Good for Kids program. Section 3 provides a description of the structure and an overview of the program evaluation initiatives. Sections 4 and 5 describe the methods and results of two specific population level outcome evaluation initiatives, a survey of children attending children's services and primary and secondary schools, and a survey of parents of children aged 2-15. The survey of children assessed the prevalence of healthy eating and physical activity behaviours, and of weight among children in the HNE region. The survey of parents assessed the prevalence of child healthy eating and physical activity behaviours among children in the HNE region and in the rest of NSW. Sections 6 to 12 describe the methods and results of impact evaluation initiatives undertaken in the each of the seven community settings that were the focus of the program. Section 13 describes the design and results of an evaluation of the program's social marketing initiatives. The report concludes with a summary and discussion of the program evaluation findings and provides a number of recommendations based on those findings.

Child obesity

Australia has created an environment that has encouraged excessive and unhealthy weight gain among children. Between 1985 and 1997, the proportion of overweight children in Australia doubled, and the proportion of obese children tripled.¹ Similarly, in NSW between 1997 and the 2004, the prevalence of objectively measured overweight and obesity among school-aged children increased from 20.6% to 25.7%.² Estimates of the annual increase in the prevalence of obesity among Australian children have ranged from 0.35% per year in children aged 5-19³ to 1.7% per year in children aged 10-17.⁴

Other countries share the problem of an increasing prevalence of child obesity. The 2002 national survey of children aged 5-14 in New Zealand found an average of 31% of children were overweight (21.3%) or obese (9.8%), with prevalence as high as 60% in Pacific boys and 63% in Pacific girls.⁵ While different definitions of overweight and obesity are used, approximately 17% of children in the United States are considered obese whilst a further 10-15% are overweight.⁶ Worldwide trends also show high rates of child overweight and obesity globally, including low and middle-income countries such as China and Brazil.⁷

More recently, a number of studies have suggested that the trend of an increasing prevalence of overweight among Australian children may have stabilised. A national survey of Australian children conducted in 2007 found 23% of school aged children were overweight or obese.⁸ Similarly, the NSW Schools Physical Activity and Nutrition Survey 2010 reported that 22.8% of school aged children were overweight or obese, which was the same as 2004 (22.0%).^{9,10} Despite these observations, the prevalence of overweight and obesity among children, and its impact on the health and well-being of children and the community remains unacceptable.

In Australia, Type 2 diabetes, a disease associated with obesity, is becoming increasingly common amongst young Australians. In NSW between 2001 to 2006 the mean annual incidence of Type 2 diabetes was found to be 2.5 cases per 100,000 person years for adolescents with the majority of those who developed diabetes being overweight or obese.¹¹ Type 2 diabetes incidence was also found to be significantly higher for Indigenous Australian children and adolescents (12.7 cases per 100,000 person years).^{12,13} A wide range of other obesity-related health issues are also seen in overweight children including hypertension, hypercholesterolemia, hyperinsulinemia, insulin resistance, gallstones, sleep apnoea, and orthopaedic abnormalities.^{14,15,16}

In addition to its negative impacts during childhood, the impact of child overweight and obesity extends into adulthood,¹⁷ with those children who are overweight or obese being more likely to be overweight as adults. As with children, adults who are overweight or obese are at greater risk of a number of weight-related conditions including diabetes and cardiovascular disease.^{18, 19} The total financial cost to Australia of overweight and obesity rose from \$3.8 billion in 2005 to \$8.3 billion in 2008, with the largest proportion of this cost being borne by NSW (\$2.7 billion in 2008).³

Policy response in NSW

In recognition of the growing prevalence of child overweight and obesity, a number of jurisdictions in Australia have implemented an increasing range of obesity prevention policy initiatives during the past decade. For example, several child obesity summits were held in States across Australia in the early part of the decade, including one convened in NSW in September 2002. The report of the NSW Child Obesity Summit: *The Prevention of Obesity in Children and Young People: NSW Government Action Plan 2003-2007* provided both the mandate and foundation for subsequent child obesity prevention programs in NSW.²⁰

The Australian Federal Government also developed a national action agenda to promote healthy weight among children, young people and their families,²¹ and the World Health Organization implemented a global strategy on diet, physical activity and health in 2004, which recommended:²²

- an integrated approach to reducing the causes of unhealthy diet and decreasing levels of physical activity as a means of reducing the future burden of non-communicable disease
- addressing unhealthy diets, inadequate physical activity and energy imbalances in children and adolescents
- that governments have a primary role in initiating and developing strategies to create an environment that empowers and encourages behaviour changes by individuals, families and communities regarding healthy eating and patterns of physical activity
- that priority should be given to initiatives that have a positive impact on the poorest population groups and communities
- that community-based demonstration projects be implemented and evaluated.

Following the 2002 NSW Child Obesity Summit, a succession of plans, policies and programmatic responses were implemented to address the prevention of child obesity in NSW.²³ A number of similarly focused policies and programs were implemented by the Commonwealth as part of its national action strategy. Enhanced child obesity prevention policy and program development also occurred at this time in the non-government sector.

To provide some understanding of the child obesity prevention policy context during the past decade in NSW, Table 1.1 summarises known major government policy and other initiatives during the period 2002 to 2010.

Table 1.1: NSW child obesity policy context 2002-2010

FACTOR	INITIATIVE	SCALE	POTENTIAL IMPACT	SETTING
Policy	NSW Summit 2002: The Prevention of Obesity in Children and Young People: NSW Government Action Plan 2003-2007	NSW	Set state standard for government action and direction for Good for Kids	All
	Australian Federal Government national action agenda to promote healthy weight among children, young people and their families, 2003	National	Set national standard for government action	All
	Australian Better Health Initiative, 2006	National (NSW-\$6.5m)	Enhanced funding for obesity prevention	All
	Global strategy on diet physical activity and health, May 2004	Global	Set global standard for government action	All
	State Plan (A new direction for NSW) 2006	NSW	Made child obesity the business of all government agencies and set target to stop the growth in child obesity	All
	State Health Plan: A New Direction for NSW towards 2010, 2007	NSW	Endorsed focus and direction of Good for Kids	All
	Annual Area Health Service Health promotion funding	NSW	Focus on obesity prevention	Unknown
	Annual NSW Health, Health Promotion Funding	NSW	Focus of Health Promotion for State including obesity prevention, tobacco and falls injury prevention	Unknown
	NSW State Plan. Investing in a better future, 2010	NSW	Target to stop the growth in child overweight and obesity	All
	NSW Government Plan for Preventing Overweight and Obesity in Children, Young People & their Families 2009 – 2011	NSW	Refers to building on the evidence base provided by Good for Kids	All
Media	Healthy Kids Check (4 year olds), 2008	National	The Healthy Kids Check promotes GP early detection of lifestyle risk factors, including height and weight assessment	General Practice
	Department of Health and Ageing <i>Physical activity recommendations for children aged 0-5</i> , 2010	National	Guideline for parents and child care centres	All
	National <i>Get Moving</i> campaign, 2006	National (\$6.2m)	Increase physical activity in intervention and comparison region	All
	NSW <i>Go for 28.5</i> ® campaign, 2007	NSW	Increase in awareness and consumption of fruit and vegetables	All
	NSW <i>Water Campaign</i> , 2008	NSW	Increase awareness of consumption of water	All
	National Active After School Communities, 2005	National (\$90m for four years)	Increase opportunities for physical activity after school	Schools and out of school hours care
	Fresh tastes at school, 2005	NSW	Increase access to healthy food choices	Schools
	NSW Health policy for health facility cafeteria and vending machines, 2007	NSW	Dilute intervention impact as health services outside HNE were 'required' to meet same goals	Health Services
	NSW <i>Crunch&Sip</i> ®, 2007	NSW (\$300K)	Opportunity for fruit and water breaks at school	Schools
	NSW <i>Munch & Move</i> , 2008	NSW (approx. \$2.7m)	Promotion of healthy eating and physical activity in children's services	Children's Services
Programs	NSW <i>Live Life Well @ School</i> , 2008	NSW (approx. \$2.7m)	Promotion of healthy eating and physical activity in schools	Schools
	Many Rivers Diabetes Program, 2005-2010	HNE Region (part) (\$1.6m)	Healthy eating and physical activity program targeting Aboriginal children in primary schools. Operated in part of HNE region	Schools
	<i>Go4Fun</i> ® program, 2009 – ongoing	NSW	Reduce intervention effect on physical activity because only offered in comparison region	Community
	Cancer Council NSW: <i>Eat It To Beat It</i>	HNE region	Increase opportunities for families with primary school aged children in part of the intervention area to increase knowledge and access to fruit and vegetables	Schools
Research	Physical Activity, Nutrition and Obesity Research Group (PANORG, formerly Centre for Overweight and Obesity)	NSW	Conduct of research, and provision of policy and practice advice to government and non-government agencies and health services	

Note: HNE = Hunter New England

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Program planning, logic, structure and timeline

Background

The Good for Kids program was one of many concurrent child obesity prevention strategies implemented in NSW following the 2002 NSW Obesity Summit. At the time of its initiation, the program represented Australia's largest ever community-based child obesity prevention program. Following a competitive NSW Government selection process, core funding of \$1.5 million per annum (2006–2010) was made available by NSW Health and the former Hunter New England Area Health Service (HNEAHS) to conduct a dissemination program that addressed child overweight and obesity in the HNE region of NSW, Australia. The program was implemented by the HNEAHS in partnership with a broad range of government, non-government organisations (NGOs) and private organisations.

Program goals

The goals of the Good for Kids program were to reduce the prevalence of child overweight and obesity in the HNE region and to build evidence for policy and practice related to the prevention of child obesity in NSW.

Setting

The HNE region is geographically large (130,000 square kilometres) with a demographically diverse population residing in metropolitan urban and suburban areas, regional centres, and rural and isolated remote communities. Figure 2.1 shows the location of the HNEAHS in NSW. The region includes pockets of wealth and poverty, and an overall socioeconomic status (SES) lower than the NSW average. The region incorporates areas of high population growth as well as areas with declining populations. Twenty-two per cent of all Aboriginal children in NSW live in the HNE region. Figure 2.2 describes the key facilities of the (former) HNEAHS.

Figure 2.1: Location of Hunter New England region in NSW

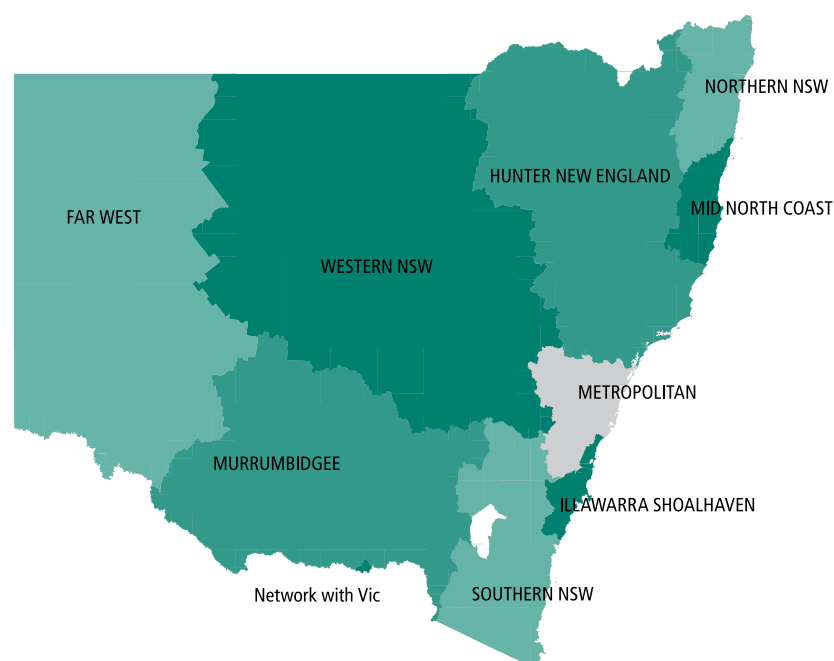
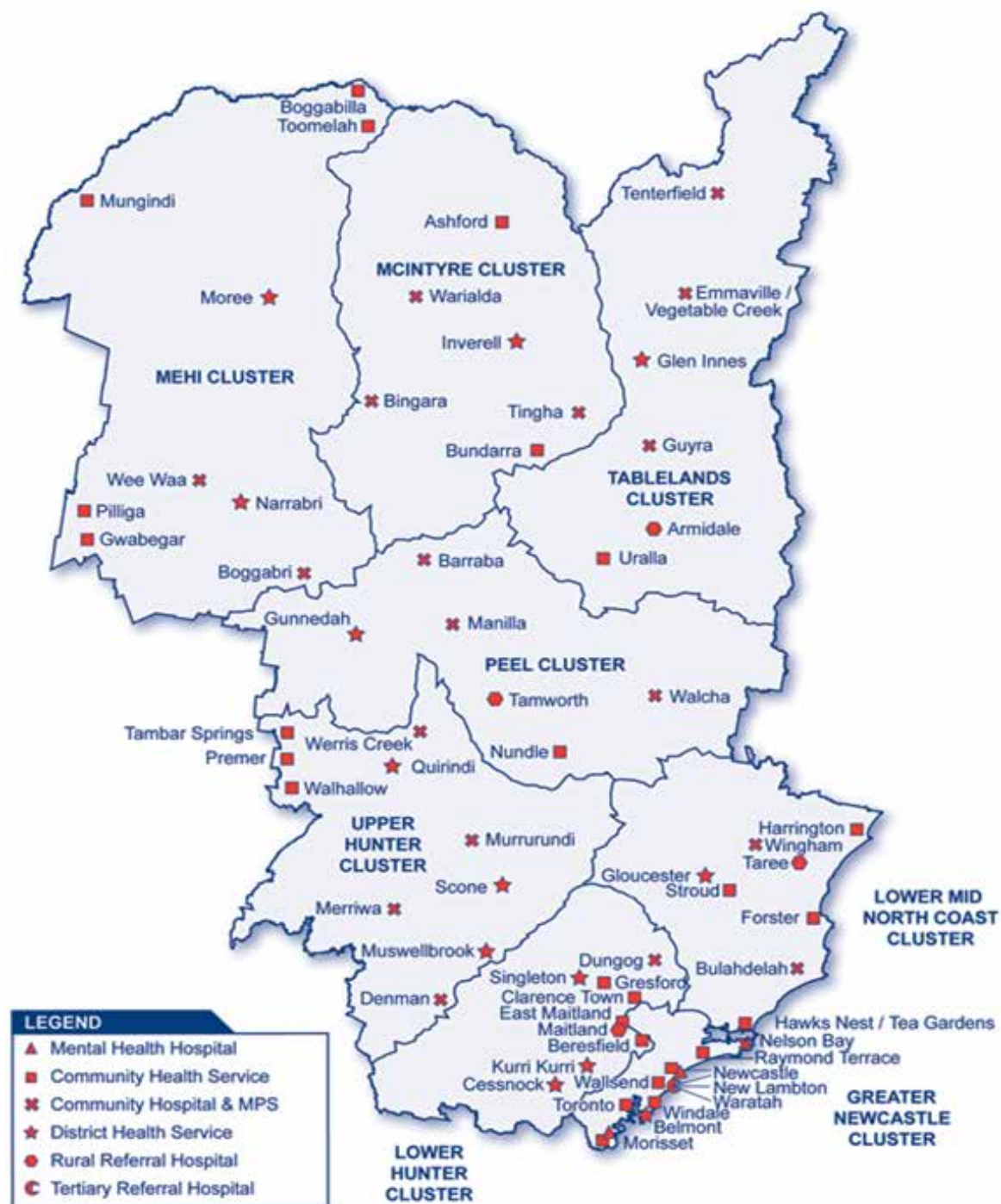


Figure 2.2: Location of Hunter New England region in NSW



At the start of the Good for Kids program the HNE region of NSW had approximately 177,600 children aged 0-15, with NSW data indicating approximately 25% of children were overweight or obese.¹

Program planning

An extended program planning process was undertaken to determine the program vision, logic and intervention focus, which were based on the Good for Kids program goals.

As an initial component of the planning process, a two day workshop was conducted that drew together local, state and national stakeholders and experts to identify:

- the most important and actionable determinants of overweight and obesity in children
- appropriate settings for addressing such determinants
- intervention strategies most likely to be effective, sustainable and equitable in modifying the identified determinants.

The resulting determinants, settings and strategies were prioritised using the National Public Health Partnership planning framework and published evidence regarding behavioural and environmental determinants of child obesity.² The prioritised determinants, settings and potential intervention strategies were subject to review by nutrition, physical activity and child obesity experts from the NSW Centre for Overweight and Obesity (COO), now known as the Physical Activity, Nutrition and Obesity Research Group (PANORG), the NSW Centre for Public Health Nutrition and the NSW Centre for Physical Activity and Health at the University of Sydney. Further planning and consultation with key relevant stakeholders resulted in the following vision, principles, intervention focus, target groups and program logic being adopted.

Program vision

All children and their families live in a community that supports them to eat healthily and to live physically active lives.

Principles

- Focus on primary prevention strategies.
- Whole of population intervention approach.
- Selection of strategies based on:
 - the need to address the marked health disadvantage of Aboriginal communities
 - use of best practice planning tools and processes
 - existing knowledge of effective or promising strategies
 - maximising investment in strategies that provide the highest potential reach
 - protection of the rights and well-being of children
 - the ability of strategies to be implemented across the whole region.

- Need for innovation in selection and implementation of strategies.
- Focus on sustainability by:
 - building on existing community infrastructure and initiatives
 - establishing partnerships with community groups and organisations
 - enhancing the capacity of community groups and organisations.
- An integrated approach to intervention delivery and evaluation.
- Strategies selected from a perspective of providing fun for children.

Target age groups

The focus of the program intervention strategies was on children aged 2-12.

Intervention focus

The program sought to achieve its goals by:

- building the capacity of organisations in community settings to adopt practices that address the behavioural determinants of child overweight and obesity
- increasing community awareness of the behavioural determinants of child overweight and obesity.

The prioritised behavioural determinants were:

- child consumption of sweetened drinks and non-sweetened drinks
- child consumption of energy dense, nutrient poor (EDNP) foods
- child consumption of vegetables and fruit
- child time spent in organised and non-organised physical activities
- child time spent in small screen recreation (SSR) activities.

The Good for Kids program adopted a capacity building approach based on the view that for healthy eating and physical activity to become the norm for children, the settings with which they interact need to foster these behaviours.

A multi-setting capacity building approach was implemented involving seven community settings. Some of the settings had the potential to reach almost all children, for example schools; or large numbers of children, for example preschool and long day care centres, hereafter children's services, general practice and community sports clubs. Others catered for smaller numbers or specific groups of children, for example community service organisations, HNE Health Service and Aboriginal Health Services.

Organisational practices that promote healthy eating and physical activity

The Good for Kids program involved the implementation of separate and distinct interventions in each of the seven community settings. The setting specific interventions sought to facilitate the adoption by community organisations of practices that promote child healthy eating and physical activity. These included the implementation of specific programs or services, as well as the implementation of organisational policies, systems and procedures that support the delivery of such programs or services.

The behavioural determinants of overweight and obesity addressed in each settings-based intervention, and the manner and intensity of such intervention varied according to the circumstances of each setting. For example, for the primary school setting, the primary focus of the healthy eating intervention was on the consumption of water and fruit and vegetables, and less on EDNP foods. For the HNE Health Service setting, the intervention focused solely on healthy eating, and particularly, on consumption of sweetened and non-sweetened drinks and EDNP foods, and less on consumption of fruit and vegetables. Similarly, with respect to the behavioural determinants of physical activity, the intervention in primary schools had a primary focus on fundamental movement skill (FMS) development and physical activity during the day, and less on SSR. In a number of instances (schools, children's services), the length of intervention addressing healthy eating determinants was greater than that for physical activity determinants.

Dissemination and organisational change strategies

A range of evidence-based dissemination strategies were implemented to maximise program reach and the adoption by organisations of the practices promoting healthy eating and physical activity. The strategies included: development of organisational leadership;

provision of program and service resources and information; provision of funding and incentives; training of staff; and provision of adoption support and feedback. The number, types and intensity of such strategies varied according to the circumstances and characteristics of each setting. The characteristics and circumstances of the setting also influenced how the dissemination strategies were delivered, with delivery occurring by either contracted organisations (for sports clubs and general practice settings) or by health promotion staff in the Good for Kids project team (all other settings).

Social marketing

Social marketing strategies were implemented through local mass media organisations to support and promote awareness of the program strategies and its messages.

The prioritised intervention focus and behavioural determinants were consistent with recommendations in a previously conducted review of the best options for promoting healthy weight in NSW.³

Program logic

The program inputs, theoretical framework, strategies and intended impacts and outcomes are summarised as a program logic model (Figure 2.3).⁴ The first four components of the model (inputs, settings, theory, and programs and services) are described in this section. The evaluation components of the model, assessing program impacts and outcomes are described in Section 3.

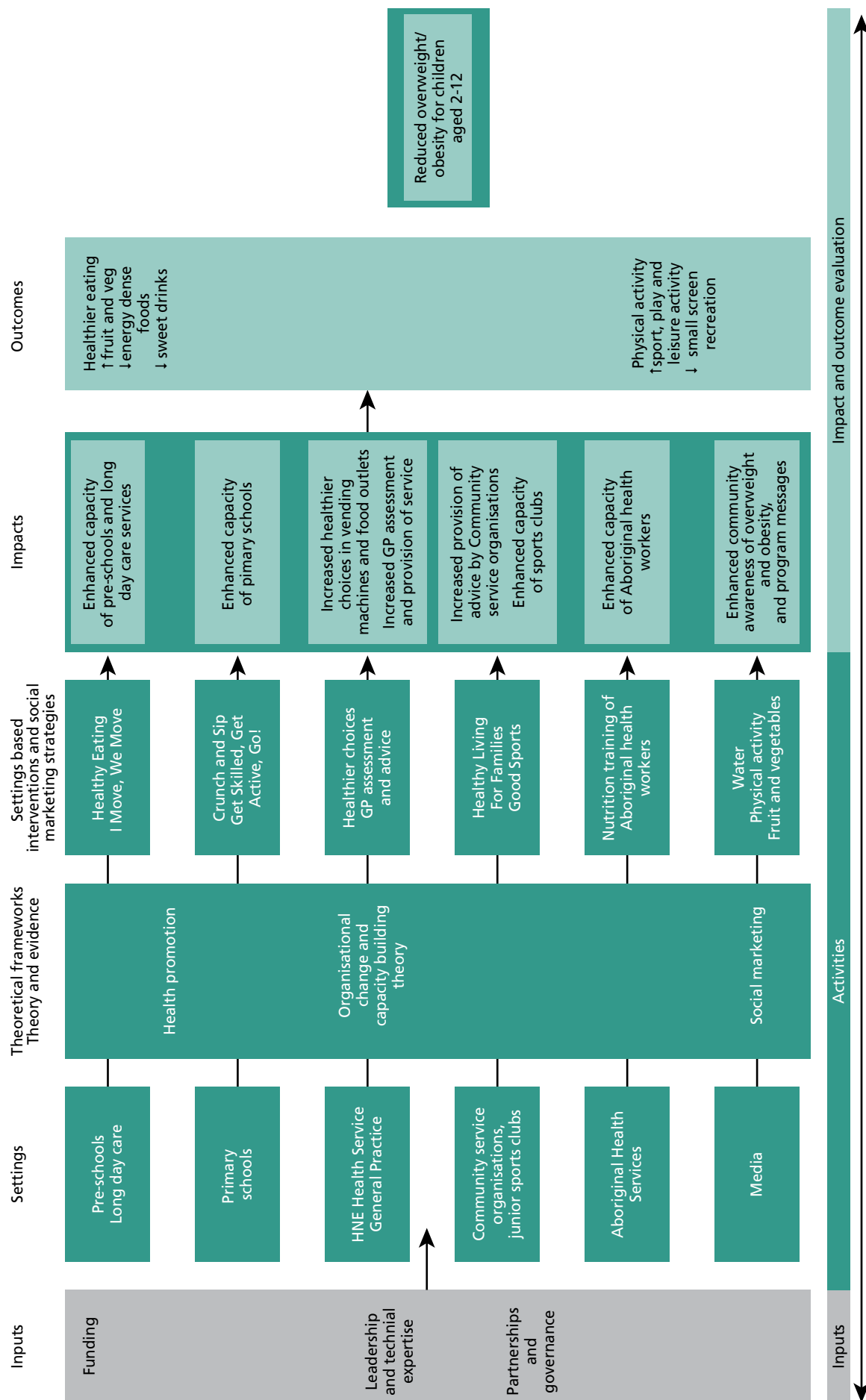
Inputs

The Good for Kids program brought together the following key inputs: funding; leadership and technical expertise; and partnerships and governance processes.

Funding

During the life of the program, in addition to the core funding provided by NSW Health and HNEAHS, further resources were obtained including in-kind contributions from HNEAHS, and grants and sponsorships. Additional funding was also provided by NSW Health for the evaluation of the initiative. On average, the program received approximately \$2.2 million per annum for its implementation and evaluation (Figure 2.4) or approximately \$16.90 per child (aged 2-12) per annum with 62% contributed by NSW Health.

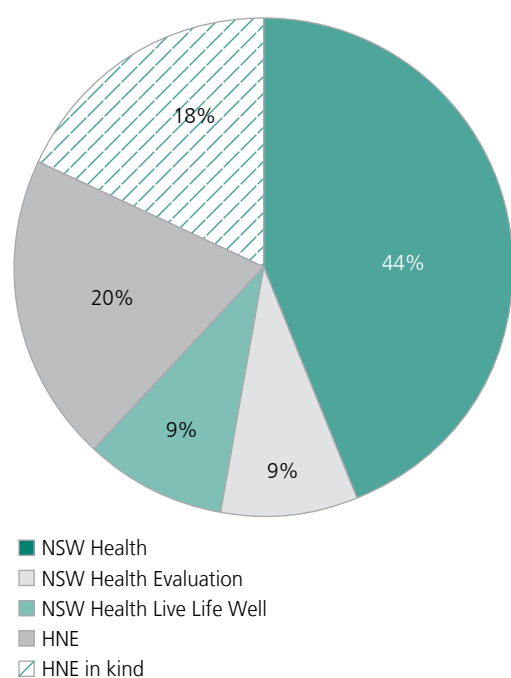
Figure 2.3: Good for Kids program logic



Funding was allocated to strategies based on the following principles:

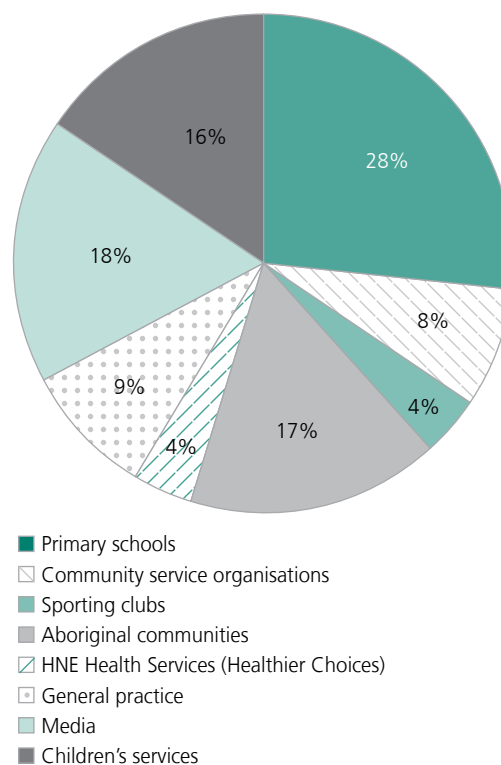
- Existing expenditure on child obesity prevention was insufficient.
- New physical activity and healthy eating programs needed to be developed or implemented in the identified settings.
- Social marketing was required to inform parents, carers, teachers and others about the significance of child overweight and obesity as a health issue and also to provide potential solutions.
- The cost of delivering interventions in rural and remote areas was considerable.

Figure 2.4: Good for Kids funding sources 2008/2009 financial year



Given the high proportion of Aboriginal children (7%) in the region and the marked social, economic and health disadvantage experienced by Aboriginal peoples, the Good for Kids program incorporated an explicit funding commitment to spend program funds at a ratio of approximately 3:1 in favour of Aboriginal children. In addition to these considerations, funds were distributed based on the ability of each setting to reach a significant proportion of the region's population of young people, to maximise exposure to the program strategies in each setting, and to address existing socioeconomic inequities. Figure 2.5 provides a summary of the overall allocation of funds by setting, based on the 2008/2009 financial year, a year that was typical of the project as a whole. Evaluation funding is not included.

Figure 2.5: Good for Kids funding allocation by setting for the 2008/2009 financial year



In 2008/2009 primary schools (28%), media (18%) and children's services (16%) received the largest funding allocations. Based on population estimates, a 3:1 funding ratio in favour of Aboriginal children equated to funding of approximately \$250,000 per annum. In 2008/2009, the total expenditure for Aboriginal children was \$436,200. This included the direct expenditure of \$265,207 shown in Figure 2.5 plus additional indirect expenditure.

Leadership and technical expertise

HNE Population Health, a unit of HNEAHS responsible for the delivery of health promotion and health protection services to the region was responsible for the development and implementation of the Good for Kids program. The unit consisted of approximately 75 full time equivalent staff and had a history of successfully implementing large-scale innovative programs and conducting translational research focused on building the capacity of community agencies to adopt health promoting practices. Existing relevant expertise within the team involved staff with skills in health promotion, capacity building, organisational change, community consultation and stakeholder negotiation, statistics, and research and evaluation across a range of health risk behaviours.

In addition to the capabilities and infrastructure of the broader unit, the establishment of the Good for Kids program involved the assembling of a core program team of approximately 12 full time equivalent staff, with the above skills, plus additional skills in Aboriginal health, public health nutrition, physical activity promotion and social marketing. Throughout the life of the program, further technical capability with respect to specific settings, strategies and tasks was procured on a contract basis. COO (and its successor PANORG) was responsible, for example, for undertaking the field survey components of the evaluation of the program.

Partnerships and governance

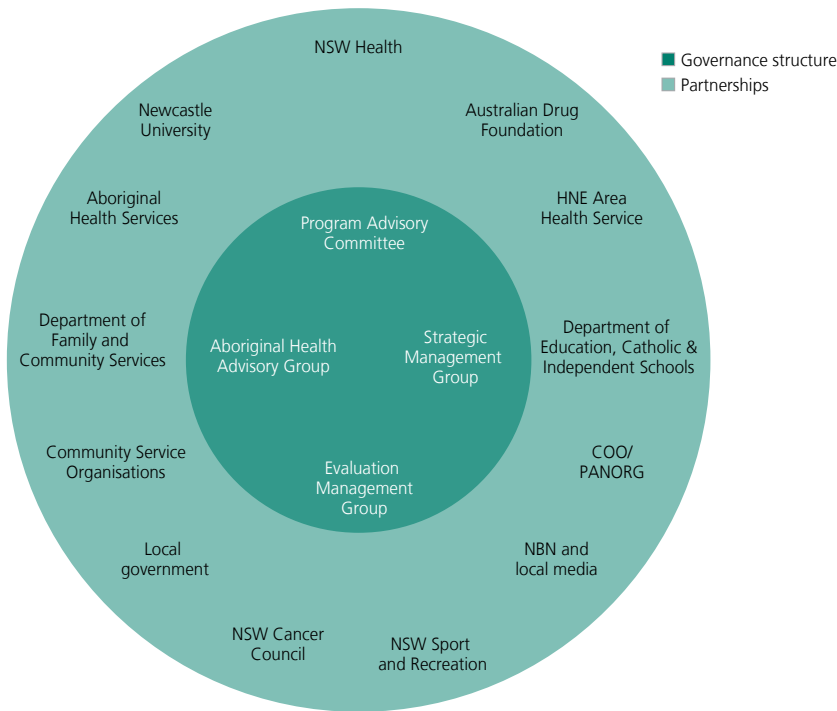
Establishment of sound partnerships with a range of community organisations, government agencies, NGOs and businesses were essential to the successful implementation of the Good for Kids program and the achievement of its goals. The Good for Kids partners are shown in Figure 2.6 along with the related program governance structures.

Four committees made up the primary governance structure for the Good for Kids program. First, the Program Advisory Committee provided state-level strategic advice and direction. Partners included COO/PANORG, the former Department of Education and Training, the former Department of Family and Community Services, the former Department of Sport and Recreation, and the HNEAHS.

Second, the Strategic Management Group included regional representatives of relevant agencies and stakeholders from the education, community service, health, and sport and recreation sectors. Third, an Aboriginal Health Advisory Group played a critical role in guiding the implementation of the program in Aboriginal settings and in ensuring the cultural appropriateness of strategies implemented by the program. Finally, an Evaluation Management Group led by PANORG, supported the evaluation of the program. This group had representation from HNE Population Health, PANORG, NSW Health, and the University of Newcastle.

The governance structures changed in line with the changing needs of the program. In addition to these core partners and governance structures a number of additional structures were implemented to address the partnership and governance needs of specific strategies and settings.

Figure 2.6: Good for Kids partners and governance structure



Settings

A key element of the Good for Kids program was its focus on addressing the prevention of child overweight and obesity across a range of community settings. This multi-setting approach was founded on the view that for healthy eating and physical activity to become the norm for children, the places where children live, learn and play need to foster such behaviours.⁵ Based on this view, seven community settings were selected for the delivery of the Good for Kids program. The community settings were selected to: maximise reach (the number of children across the region able to be exposed to an intervention in a given setting); provide multiple opportunities in the community for children to be exposed to the program messages; and to address socioeconomic disadvantage. The community settings were also chosen in terms of the feasibility of the organisations within each setting to implement the intervention strategies in a consistent and sustainable manner across the region, and in terms of the alignment between the organisation's purpose and the delivery of obesity and overweight interventions.

The selected community settings were:

- Children's services: all 128 preschools in the HNE region (children aged 0-5, average age = 4), and approximately 178 long day care centres that provided centre based care for 10 or more hours per day, five days per week catering for children from six weeks to six years.
- Primary schools: all 384 primary schools (children aged 5-12).
- HNE Health Service: 40 hospitals and health facilities and 57 community health centres of the HNEAHS.
- General practice: all five Divisions of General Practice (DGP) in the HNE region, representing approximately 700 GPs.
- Community service organisations: 36 NGOs that provided home visiting services for vulnerable families with young children.
- Junior sport clubs: approximately 500 clubs from seven sporting codes (cricket, soccer, rugby league, rugby union, netball, surf lifesaving and Australian Football League) in the HNE Region that had junior members.
- Aboriginal Health Services: Aboriginal Community Controlled Health Organisations and Aboriginal communities.

Commercial mass media organisations were also a focus of the program to promote awareness of the program and its messages through the delivery of social marketing strategies, complemented by newsletters for specific settings and initiatives.

Aboriginal communities

There is little evidence regarding the cultural appropriateness or effectiveness of multi-strategy, multi-setting interventions for Aboriginal communities, or regarding how the issue of child overweight and obesity is perceived by Aboriginal communities.⁶ For these reasons, and with the guidance of the Aboriginal Health Advisory Group, a community consultation and an equity focused health impact assessment were undertaken.

Community consultation

The community consultation was undertaken to identify the factors that facilitate or hinder Aboriginal children being able to eat healthily and to be physically active.⁷ Approximately 50 community consultation sessions were held in more than 30 Aboriginal communities in the HNE region, including sessions in remote, regional and urban communities, coastal and inland communities, and communities with large and small numbers of Aboriginal people.

All members of each community were invited to be involved in the consultation sessions, including elders, Aboriginal mothers and grandmothers and Aboriginal youth. A clear theme identified in the consultations was the need for accessible and relevant education and training within Aboriginal communities on what it means to eat healthily and how it can be done inexpensively. Time spent in SSR (television, DVD, computer and video games) was also a commonly acknowledged barrier to physical activity in Aboriginal communities, as were the costs associated with participating in organised physical activity (sporting competitions) and the lack of accessible, free sporting facilities.

Equity-focused Health Impact Assessment (HIA)

An equity-focused HIA was undertaken to ensure the Good for Kids program plan did not exacerbate existing inequalities between Aboriginal and non-Aboriginal communities.⁸ The HIA identified more than 80 areas within the program plan that required modification to meet equity goals. The recommendations included incorporating additional settings and target areas for the program for example focusing on Aboriginal Health

workers, amending Good for Kids resources to include culturally safe and appropriate material and highlighting gaps in the program where additional planning and strategies were required. All recommendations were supported and adopted.

Theoretical frameworks

While there is potential for many non-health related agencies and organisations to participate in initiatives to prevent child overweight and obesity, few have an intrinsic capacity to do so without support from health services. In addition, implementing such initiatives on a sustained basis requires significant organisational change across multiple sites. Such large-scale change across organisational systems is a relatively new concept in the field of community-based obesity prevention and is not well described in the obesity prevention literature. This approach has however, a stronger theoretical and evidentiary basis, and history of practice, in the prevention of other behavioural health risks, and in the theories and practices of health promotion, capacity building and organisational and practice change generally. In this context, the following theories and frameworks were used to guide the application of the program inputs in the selected settings.

Health promotion theory

Good for Kids was designed as a health promotion program to enable children and their families to increase control over and improve their health as it relates to weight. It was guided by the health promotion principles of the Ottawa Charter⁹ and the Jakarta Declaration¹⁰ to help ensure that disadvantaged communities were prioritised, local service agencies received resources and support, and the leadership and skills capacity of partner services were enhanced to address healthy eating and physical activity.

Evidence regarding practices that promote healthy eating and physical activity

Considerable literature suggests that a range of strategies and organisational practices are effective in promoting children's healthy eating and physical activity.^{3,11,12} Based on this evidence, the Good for Kids program encouraged community organisations to adopt one or more of the following practices:

- inclusion of the promotion of healthy eating and physical activity programs in organisational plans and/or policies
- delivery of specific programs or services and/or service delivery models and guidelines

- implementation of organisational systems and procedures that support the delivery and monitoring of such programs or services
- training staff to be competent in the delivery of such programs or services.

Capacity building, organisational and practice change, dissemination of innovations

Given the focus of the program on the sustainability of its impact, and the potentially limited initial capability of community agencies and organisations to implement child overweight and obesity prevention initiatives without support, building capability was a key focus of the Good for Kids program. For the purposes of program engagement with these settings, capacity building was taken to involve the building of organisational competencies, structures and resources to create healthier environments.^{13,14}

Considerable literature suggests that there are a range of dissemination and organisational change strategies that are effective in facilitating the adoption by an organisation of practices that promote healthy eating and physical activity among children on a sustainable basis.^{3,15-18} Based on such evidence, the Good for Kids program involved the variable application of the following strategies:

- building leadership and consensus for the initiative (developing leadership structures, processes, champions) and putting in place processes for developing consensus with regard to program implementation and strategic planning (for example advisory groups, stakeholder consultations)
- provision of program or service related resources, materials, tools and information
- provision of funding and/or incentives
- training of staff in the delivery of the initiative (enhancing understanding of why it is necessary and beneficial and how it should be delivered)
- provision of adoption support for a period of time (for example site visits, support calls, helplines for problem solving)
- provision of monitoring and feedback regarding adoption of the initiative.

The number, types and intensity of such strategies and their mode of delivery need to vary according to the circumstances and characteristics of each setting.

Social marketing

Social marketing is necessary to ensure key stakeholders and target populations are aware of an initiative, its purpose, strategies and intended benefits. In addition, social marketing can be used to support strategies designed to encourage behaviour change of both individuals and organisations, and facilitate change in community understanding of the behavioural, social and structural factors that impinge on the choices of individuals.

Setting based interventions

Based on the determinants, principles, and frameworks described above, the program involved the delivery of specific interventions in each community setting.

As the circumstances of a setting can have a considerable influence on its ability to adopt a new service program or practice, development and implementation of the interventions in each specific setting involved consideration of its purpose, policies, governance, financial status, partnerships, workforce capability, and commercial or service delivery values. Based on this consideration, the behavioural determinants of overweight and obesity to be addressed in a setting, and the timing, number and type of organisational practices to be adopted to address such determinants were tailored to the setting. For example, in the primary school setting, the primary focus of the healthy eating intervention was on the consumption of water and fruit and vegetables, and less on EDNP foods. In the HNE Health Service setting, the intervention focused solely on healthy eating, and particularly, on consumption of sweetened and non-sweetened drinks and EDNP foods, and less on consumption of fruit and vegetables. Similarly, with respect to physical activity, the intervention in primary schools had a primary focus on FMS development and physical activity during the day, and less on SSR. In a number of instances (schools, children's services), the length of intervention addressing healthy eating determinants was greater than that for physical activity determinants.

The behavioural determinants of overweight and obesity addressed and the interventions in each setting were:

- Children's services (children aged 2-5):
 - healthy eating (primary focus on provision and consumption of healthy drinks and food during the day).
 - physical activity: *I move, We move* (primary focus on physical activity during the day).
- Primary schools (children aged 5-12):
 - healthy eating: *Crunch&Sip*® (primary focus on drinks and fruit and vegetable consumption)
 - physical activity: *Get Skilled, Get Active, Go!* (primary focus on FMS development and physical activity during the day).
- HNE Health Service (vending machines and food outlet customers):
 - healthy eating: *Healthier Choices* (primary focus on sweetened drink and EDNP food availability).
- General practice (children aged four attending their scheduled immunisation):
 - weight assessment and advice (primary focus on height and weight check).
- Community service organisations (children aged 0-8):
 - healthy eating and physical activity: *Healthy Living for Families* (primary focus on food purchase (including EDNP), food preparation and physical activity (including SSR)).
- Junior sport clubs (children aged 6-16):
 - healthy eating and physical activity: *Good Sports* (primary focus on increasing availability of healthy drinks, fruit and other products in canteens).
- Aboriginal Health Services (children aged 2-15):
 - healthy eating: training of Aboriginal health workers (primary focus on food purchase, including EDNP and food preparation).

All but one of the healthy eating and physical activity programs delivered in community settings (*Crunch&Sip*®) were newly developed or modified. However, the implementation of all programs involved the establishment of new partnerships with each setting, reaching agreement regarding the content of the programs and the organisational practices to be adopted, as well as the strategies to facilitate the adoption of the practices. Similarly, the social marketing initiatives were developed specifically for the program.

As can be seen from the list above, in some settings the healthy eating and physical activity determinants of the program were addressed simultaneously in single initiatives (for example, sports clubs and community service organisations). In others, separate healthy eating and physical activity initiatives were implemented sequentially (for example, children's services, primary schools and media).

Social marketing strategies

The focus of the social marketing strategies was on promoting the program, and specific messages to all children, parents and caregivers regarding:

- consumption of water in preference to sweetened drinks
- participation in active play rather than sedentary activity
- fruit and vegetable consumption.

Program structure and timeline

The range of intervention initiatives and the timeline of their planning and implementation in each setting are shown in Table 2.1.

As can be seen from the Table, initial planning for the program commenced in late 2005. Following an extended period of establishing partnerships with stakeholders (approximately 16 months), intervention delivery commenced in early 2007 and concluded in December 2010. The length of intervention varied between settings from 12 months (community services) to 40 months (primary schools' *Crunch&Sip*[®]). Where the healthy eating and physical activity determinants were addressed in separate interventions (children's services and primary schools), the healthy eating interventions were implemented for a longer period of time.

Table 2.1 also shows the sequencing of evaluation activities for each setting, the field and telephone evaluation surveys and the social marketing surveys. In a number of evaluation initiatives the baseline data collection occurred prior to the finalisation of initial intervention design and content. The follow up field survey was conducted in early 2010, approximately nine months before the completion of the program interventions. As a consequence, the period of measured exposure to some program interventions was limited. For example, exposure of primary school children to the *Get Skilled, Get Active, Go!* physical activity program was only 12 months, and exposure of children in children's services to the *I Move We Move* physical activity intervention was nine months.

Comparison area

During the life of the Good for Kids program, multiple local, regional, state and nation-wide intervention initiatives that were the same or similar to those implemented by the Good for Kids program were implemented in the same settings across NSW. Table 2.2 provides details of state-wide initiatives during the period of the program. For example, the *Crunch&Sip*[®] program was run for 36 months in NSW primary schools, the *Munch & Move* was run for 24 months in NSW children's services and *Live Life Well @ School* programs was run for 24 months in NSW primary schools in parallel to the Good for Kids program.

Table 2.1 Good for Kids, Good for Life program timeline

[illegible]

	Initial planning	Intervention activity	Evaluation activity	Community consultation and Health Impact Assessment
X				

Note: AC=Aboriginal communities; CS=children's services; CSO=community service organisation; F = field surveys; GFK=Good for Kids brand campaign; GP=general practice; HS=health services; ME = media; PA= physical activity campaign; P5=primary schools; SC=sports clubs; T = telephone surveys; Veg=vegie campaign; Water=water campaign.

Table 2.2 Child overweight and obesity prevention programs, NSW

[illegible]

Note: AC=Aboriginal communities; All=whole community; CS=children's services; CSO=community service organisation; GP=general practice; HS=health services; ME = media; PS=primary schools; SC=sports clubs; Water=NSW water campaign.

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Evaluation

In accordance with the program logic, and recommendations regarding the evaluation of dissemination initiatives¹, evaluation of the Good for Kids program involved the measurement of:

- Impacts:
 - Reach of the intervention and organisational adoption of practices.
 - Community awareness of the program and its key messages.
- Outcomes:
 - Prevalence of healthy eating and physical activity behaviours.
 - Prevalence of overweight and obesity.

Evaluation of reach and organisational adoption of practices was undertaken through analysis of program records and separate surveys of organisations participating in each community setting. Evaluation of community awareness involved surveys of parents in the community. Assessment of the prevalence of child healthy eating and physical activity behaviours was undertaken through two population level surveys of children and their parents. Assessment of the prevalence of children's weight involved a survey of children.

The design, methods and measures for each evaluation initiative are shown in Table 3.1. The scheduling of all evaluation initiatives is shown in Table 2.1. A summary of the evaluation initiatives undertaken for each level is provided below. Specific details of each evaluation initiative for each setting are provided in the following separate setting-specific report sections.

Reach and organisational adoption of practices that promote healthy eating and physical activity

The reach of each intervention strategy was determined by analysis of program records regarding the engagement of each organisation with each relevant intervention.

Two quasi-experimental studies were conducted that compared the prevalence of organisational practices and services in children's services and schools in the HNE

region with randomly selected cohorts of the same organisations in the rest of NSW (Table 3.1). For both studies, telephone surveys were conducted with Authorised Supervisors, Principals or other senior staff of the organisations at baseline and follow up.

Depending on the specific practices and services that were the focus of intervention in each setting, the prevalence of one or more of the following practices and services was assessed in each organisation: relevant healthy eating and physical activity policies; specific programs and services that addressed healthy eating and physical activity; organisational systems and procedures to support such policies, programs and services; and trained staff in the delivery of such programs and services.

Assessment of the prevalence of such practices in the remaining five settings was assessed using a variety of evaluation studies including pre post (community services, health services) and post-test only studies (general practice, Aboriginal health services, junior sports clubs). A variety of data sources were used in the studies including telephone and pen and paper surveys, agency data, performance monitoring data and reviews of program records.

Community awareness

A quasi-experimental evaluation was undertaken to determine the impact of the social marketing campaigns on community awareness of the program and its key messages. The study involved repeated cross-sectional telephone surveys of multiple randomly selected samples of parents in the HNE region and in the rest of NSW. The measures included both prompted and unprompted recall of key messages from each campaign.

Healthy eating and physical activity behaviours

Assessment of the prevalence of 20 healthy eating and physical activity measures derived from the program determinants was undertaken in two studies. The studies assessed the prevalence of healthy eating and physical activity behaviours for all children and for specific age and gender sub-groups.

Table 3.1: Good for Kids evaluation overview

	DESIGN	PRIMARY MEASURE	COMPARISON	METHODS
ORGANISATIONAL				
Primary schools	Quasi-experimental	Implementation of <i>Crunch&Sip</i> ® and <i>Get Skilled, Get Active, Go!</i> programs and policy	Primary schools in rest of NSW	CATI survey of: presence of fruit and vegetable breaks in class; presence and content of nutrition policy; staff attended training; support resources used; FMS included as part of PDHPE; engaged in physical activity during class or whole school activities; presence and content of physical activity policy; lessons raising importance of reducing SSR time; communication with parents
Children's services	Quasi-experimental	Implementation of policy and practice promoting healthy eating (Best practice nutrition guidelines) and physical activity (<i>I Move We Move</i>)	Children's services in rest of NSW	CATI survey of: presence and content of nutrition policies; staff with nutrition and physical activity training; types of drinks provided or permitted; compliance of menus with nutrition guidelines; presence and content of physical activity policies; daily FMS training; staff knowledge of participation in and support for PA, SSR and sitting time
Health Service Facilities	Pre/Post	Availability and labelling of healthy food and drink choices	No comparison	Audit of vending machines and food outlets
General Practice	Descriptive	Medicare claims for the four year old Healthy Kids Check	NSW Medicare claims	Claims in HNE and rest of NSW
		Parent reported care	Rest of NSW parents	CATI survey assessing care during the four year old immunisation visit (physical activity; healthy eating advice; weight and height assessment) in HNE and rest of NSW
Community Services	Pre/Post with repeat cross-sections	Provision of healthy eating and physical activity support by staff	No comparison	Pen and paper survey of staff and telephone survey of community service staff and managers
Junior sports clubs	Descriptive	Number of clubs meeting accreditation criteria	No comparison	Routinely collected project record data collected by Good for Kids partner, the Australian Drug Foundation
Aboriginal Communities	Descriptive	Aboriginal Health staff receiving nutrition training	No comparison	Number of staff trained and their use of resources provided
AWARENESS				
Media	Quasi-experimental	Awareness of specific media campaigns	Rest of NSW parents	CATI surveys of a cohort of parents who were asked about their awareness of Good for Kids brand, water, physical activity and vegetable campaigns and key associated messages
BEHAVIOURS				
Children's healthy eating, physical activity and SSR time behaviour	Study 1*: Pre/Post with repeat cross-sections	Healthy eating and physical activity and consumption of unhealthy food and sedentary behaviour	No comparison	Pen and paper field survey (parents and children) of: fruit and vegetables, sweetened drink, EDNP food, water and milk consumption; time spent in organised and non-organised PA and SSR
	Study 2#: Quasi-experimental with repeat cross-sections	Healthy eating and physical activity and consumption of unhealthy food and sedentary behaviour	Rest of NSW parents	CATI survey (parents) of: fruit and vegetables, sweetened drink, EDNP food, water and milk consumption; time spent in organised and non-organised physical activity and SSR
WEIGHT				
Children's weight	Study 1*: Pre/Post with repeat cross-sections	Prevalence of overweight and obesity	No comparison	Measured weight and height, calculated BMI

Note: CATI=computer assisted telephone interview; EDNP=energy dense, nutrient poor; FMS=fundamental movement skills; HNE=Hunter New England; PA=physical activity; PDHPE=Personal Development, Health and Physical Education; SSR=small screen recreation

* = field survey

= telephone survey

The first study involved the measurement of a random sample of children attending children's services and primary and high schools across the HNE region (hereafter field survey). The second involved a quasi-experimental study of randomly selected parents of children aged 2-15 in the HNE region and in the rest of NSW, contacted by telephone (hereafter telephone survey). The same variables related to healthy eating and physical activity were used in both the field and telephone studies.

Child overweight and obesity prevalence

Assessment of the prevalence of child overweight and obesity at the population level was undertaken by the physical measurement of children in the field surveys described above.

Ethics approval

The intervention and evaluation components of the Good for Kids program were approved by the Aboriginal Health and Medical Research Council Human Research Ethics Committee (637/08), the HNE Human Research Ethics Committee (06/07/26/4.04) and the Strategic Research Directorate of the NSW Department of Education and Communities. Approval was also obtained from the Catholic Schools Offices for the Diocese of Armidale, Maitland Newcastle and Broken Bay and from the Principals of selected independent schools.

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Child weight and eating and physical activity behaviours: field survey

Authors: Louise Hardy, Lesley King, Anne Grunseit and Carmen Cosgrove.

This section describes the design and results of the field surveys undertaken to assess changes in the prevalence of healthy eating and physical activity behaviours, and of overweight and obesity among children in the HNE region.

Design

Two cross-sectional surveys of children attending children's services and schools in the HNE region were conducted commencing in early 2007 (baseline) and early in 2010 (follow up).

Sample

A sample size of approximately 4,000 children attending children's services and schools in the HNE region was sought for each survey to enable a change in the prevalence of overweight and obesity of approximately 3.7% to be detected with 80% power.

From a master list of children's services obtained from the Department of Family and Community Services (DOCS) (the licensing agency), services were stratified according to their type (preschool, long day care) and their geographic location using the Accessibility/Remoteness Index of Australia (ARIA).¹ The DOCS master list of children's services may not be a reliable measure of the number of children's services that exist in a particular area as changes in licensing tends to outdate the database over the medium term. However, it was the most complete list available at the time of the evaluation.

To survey children in children's services a random sample of 40 children's services was selected from across these strata. All parents of children aged 2-5 that were registered to attend the selected services on the scheduled day of data collection were invited to participate in the survey. Only those children whose parents signed consent forms participated in the surveys.

To survey school aged children, all government, private and independent schools, excluding schools catering for students with intellectual disabilities, hospital schools, sport schools, those with less than 50 students, and very remote schools were eligible to participate. A two stage stratified cluster design was used to select schools and classes. In the first stage, schools were selected from those eligible using a stratified probability proportionate to size methodology, where size was defined by the number of student enrolments. Schools in the sampling frame were also stratified by educational sector, location (rural or urban), socioeconomic status (SES) of the school (based on Socio-Economic Indices for Areas (SEIFA) of the school postcode) and gender composition. The second stage involved randomly selecting two classes from each selected grade in each school.

To enable comparison with NSW Schools Physical Activity and Nutrition Surveys (SPANS) data, the grades from which the two classes were selected were the same as those grades recruited in the SPANS surveys of school students, that is Kindergarten (K), and Years 2, 4 and 6, 8 and 10.² All students in the selected classes were eligible to participate in the survey. Only those students whose parents signed consent forms participated in the surveys.

Measures

Demographic data and anthropometric measurements (weight, height and waist circumference) were collected from all participating children.³ Body mass index (BMI) was calculated as weight divided by height squared (kg/m²). Weight status was assessed using International Obesity Taskforce definitions.^{4,5} Demographic information,^{1,6,7} and information on dietary and physical activity behaviours and screen time were assessed by questionnaire, self-completed by students in Years 6, 8 and 10, with household demographics completed by parents. All questions for younger children (Year 4 and below) were completed by parents.

Dietary behaviour was assessed using a short food frequency questionnaire developed for population based monitoring surveys.^{8,9} The questionnaire assessed intake of fruit, vegetables, red meat, processed meat, milk, fruit juice, water, soft drinks, hot chips, sweet and salty snack foods, confectionary and ice-cream. Food intake and consumption patterns were compared with recommendations from the *Australian Guide to Healthy Eating*:

- Fruit: children aged 2-11, one serve per day; children aged 12-18, three serves per day.
- Vegetables: children aged 2-7, two serves per day; children aged 8-11, three serves per day; children aged 12-18, four serves per day.¹⁰

Physical activity behaviours were assessed for children in children's services using measures from the NSW Population Health Survey,⁸ and for school children using the Adolescent Physical Activity Recall Questionnaire.¹¹ The frequency and duration of participation in organised games, sport, dance and non-organised activities was measured separately for week days (outside of school hours) and for weekends. Inactivity was measured by assessing time spent watching television, videos or DVDs, using the computer for fun, and playing e-games based on the Adolescent Sedentary Activities Questionnaire.¹¹ Reported physical activity and screen time were compared with Australian recommendations where they were available.^{12, 13}

Analysis

Data analyses were conducted using Stata Version 11.0 (College Station, TX, 2009).

Weighting

Post-stratification weights were calculated because of the variation in school and student response rates so that the findings were generalisable to children across the Hunter New England (HNE) region. All analyses were weighted to the population defined by a combination of the sample school participating, sector (Catholic, government, independent), type (primary, secondary), Year (K, 2, 4, 6, 8 and 10) and sex (male, female).

Variable definition and cut-points

For each variable, the best descriptive value based on the variable distribution (mean, median, or proportion of students in a specific category) was calculated. For most of the continuous variables, the median was chosen given that many of the distributions were skewed (Table 4.1). For each indicator variable, comparisons between 2007 and 2010 were conducted separately for children within each of three educational stages (that is, children attending children's services; Years K, 2 and 4; and Years 6, 8 and 10), for the overall sample and for boys and girls separately.

Cut point values for indicator variables were based on published guidelines, for example BMI, dietary, physical activity and screen time guidelines; data distributions and expert opinion. Table 4.1 summarises the cut point values used to assess the pre and post intervention change between indicator variables.

Table 4.1 Cut point values and definitions for indicator variables

VARIABLE	CUT-POINTS	DEFINITION
WEIGHT STATUS		
Body mass index (BMI)	International Obesity Taskforce cut points (age and sex adjusted) for categories of underweight, healthy weight, overweight, obese and combined overweight and obese	$\frac{\text{Weight (kg)}}{\text{height (m}^2\text{)}}$
ENERGY DENSE, NUTRIENT POOR FOODS		
Fatty meat products	≥ 3 times/week	Sausages, frankfurts, devon, salami, hamburgers, chicken nuggets, meat pies, bacon or ham
Fried potato products	≥ 1 times/week	Chips, french fries, wedges or fried potatoes
Salty snack food products	≥ 1 times/week	Potato crisps, Twisties, corn chips
Other snack food products	≥ 3 times/week	Sweet and savoury biscuits, cakes, donuts, or muesli bars
Confectionary	≥ 1 times/week	Chocolate and lollies
How often eat from takeaways	≥ 1 time/week	
SWEETENED DRINKS		
Fruit juice	≥ 0.5 cup/day (ie ≥ 4 cups/week or 0.57 cup/day)	1 cup = 250mls, a household tea cup or large popper
Soft drink, cordials, sports drinks	≥ 2 cup/week (ie 0.29 cup/day)	1 cup = 250mls, 1 can = 1.5 cups, 1 500 ml bottle Gatorade = 2 cups
Diet soft drinks	≥ 2 cup/week (ie 0.29 cup/day)	
NON SWEETENED DRINKS		
Water	≥ 2 cups/day	1 cup = 250ml, a household tea cup, 1 average bottle is 2.5 cups
Milk (includes soy)	≥ 1 cup/day	1 cup = 250ml, a household tea cup, 1 average bottle is 2.5 cups
FRUIT¹⁰		
Children aged 2-5, Years K, 2, 4 and 6	≥ 1 serve/day	1 serve = 1 medium or 2 small pieces of fruit or 1 cup of diced pieces
Years 8 and 10	≥ 3 serves/day	
VEGETABLE		
Children aged 2-5, Years K and 2	≥ 2 serves/day	1 serve = half a cup cooked or 1 cup salad vegetables, could include fresh, frozen, dried and tinned vegetables
Years 4 and 6	≥ 3 serves/day	
Years 8 and 10	≥ 4 serves/day	
PHYSICAL ACTIVITY		
Children aged 2-5	≥ 3 hours PA every day (ie frequency ≥ 7 /week and time in organised and non-organised)	3 or more hours per day for children aged 2-4 and at least 1 hour for children aged 5-15 ^{11,12}
Year K, 2, 4, 6, 8 and 10	≥ 60 minutes every day (ie frequency ≥ 7 /week and organised and non-organised)	
SCREEN TIME		
Children aged 2-5	< 1 hour/day screen time	1 hour or more per day for children aged 2-4 and 2 hours or more per day for older children ^{11,12}
Year K, 2, 4, 6, 8 and 10	< 2 hour/day screen time	

Change in prevalence from 2007 to 2010

All analyses comparing change in the outcome variable from 2007 to 2010 were adjusted for clustering within school and weighted, as described above.

Bivariate analyses of categorical data comparing 2007 with 2010 were tested using the chi-square statistic. For multivariable analyses comparing the two years, models analysing boys and girls separately were adjusted for locality, household income and maternal education. Models testing differences for all students additionally included sex as a covariate. Continuous outcomes with normal distributions were analysed using multiple linear regression. Where the data were skewed, the data were log transformed and analysed using multiple linear regression. Results were back transformed for reporting purposes. Binary multiple logistic regression was used for categorical outcomes.

Results are presented by three educational stages (children's services; Years K, 2 and 4; and Years 6, 8 and 10).

Results

School response rates

In 2007, 70 of 93 schools participated, resulting in a school response rate of 75.2% and in 2010, 75 of 104 schools participated, resulting in a school response rate of 72.1%. In 2007, 40 children's services participated as did 39 in 2010 representing a response rate of 59% in 2007 and 78% in 2010. Table 4.2 shows response rates for children's services, primary and secondary schools separately.

Table 4.2 Summary of children's services, primary and secondary school response rates

	2007	2010
CHILDREN'S SERVICES		
Services approached (n)	68	50
Services accepting (n)	40	39
Services response rate (%)	59	78
<i>Participating services (n)</i>		
Preschool	15	15
Long day care	25	24
PRIMARY SCHOOLS		
Schools approached (n)	44	49
Schools accepting (n)	36	35
Primary school response rate (%)	80	67
<i>Participating schools – sector(n)</i>		
Government	25	27
Catholic	9	6
Independent	2	2
SECONDARY SCHOOLS		
Schools approached (n)	49	55
Schools accepting (n)	35	36
Secondary school response rate (%)	71	55
<i>Participating schools – sector(n)</i>		
Government	23	23
Catholic	5	12
Independent	7	1

Student response rates

Table 4.3 shows the total enrolments and the number of children participating in the surveys by educational stage and survey year. The overall response rates were 50% in 2007 and 41% in 2010.

Table 4.3 Enrolments, participation and response rates by educational stage and survey year

	YEAR	EDUCATIONAL STAGE			OVERALL
		CHILDREN'S SERVICES	PRIMARY SCHOOL	SECONDARY SCHOOL	
Total enrolments (N)	2007	1,136	3,766	3,061	7,963
	2010	1,034	4,997	2,987	9,018
Participated (n)	2007	764	2,086	1,151	4,001
	2010	706	2,245	781	3,732
Response rate (%)	2007	67	56	38	50
	2010	68	45	26	41

Socio-demographic characteristics

The socio-demographic characteristics of the sample for both survey years are given in Table 4.4. In 2007, the mean age of children in children's services was 3.9, for primary school students 8.8, and for secondary school students 14.6. In 2010, the mean age of children in children's services was 3.8, for primary school students 8.4, and for secondary school students 14.5. The age differences between surveys were significant for primary and secondary school students. Overall, the proportion of Indigenous children participating in the surveys was 5.4% in 2007 and 5.7% in 2010. Among secondary school students, there was a higher proportion of students from urban localities (62% vs 46%, $p = 0.03$) and the middle SES tertile (59% vs 37%; $p = 0.01$) and fewer high SES tertile students (10% vs 24%; $p = 0.04$) participating in 2010 compared with 2007. In 2007 and 2010, more than 90% of the sample reported that they were born in Australia.

Household income

In 2007, almost a quarter (24.5%) of households reported an annual income of less than \$AUD40,000, more than half (53.3%) reported a household income of \$AUD40,000-\$99,000 and one fifth (22.1%) reported a household income greater than \$AUD100,000. In 2010, less than one fifth (18.3%) of households reported an annual income of less than \$AUD40,000, less than half (45.0%) reported a household income of \$AUD40,000-\$99,999 and 27.6% reported a household income greater than \$AUD100,000.

Maternal education

In 2007, the proportion of children's mothers who reported completing Year 10 was 33.4%, Year 12 was 39.1% and TAFE/university was 27.5%. Similarly, in 2010, the proportion of children's mothers who reported completing Year 10 was 28.8%, Year 12 was 42.7% and TAFE/university was 28.5%.

Participation by educational sector

In 2007 the proportion of school students attending government schools was 70.8%, Catholic schools 22% and independent schools 7.2%. In 2010 the proportion of school students attending government schools was 78.4%, Catholic schools 18.4% and independent schools 3.2%.

Table 4.4 Sample characteristics of field survey participants by survey year and educational stage

CHARACTERISTIC	2007	2010	P VALUE
CHILDREN'S SERVICES (N)	764	706	
Indigenous (%)	10.5	6.0	0.262
Mean age (years; SD)	3.9 (0.8)	3.8 (0.8)	0.863
Boys (%)	50.3	50.3	0.993
<i>Location of residence (%)</i>			
Urban	47.8	58.2	0.375
Rural	52.2	41.8	0.375
<i>Socioeconomic status (%)</i>			
Lowest tertile	41.5	36.7	0.625
Middle tertile	38.4	54.1	0.108
Highest tertile	20.2	9.2	0.066
<i>Body mass index category (%)</i>			
Underweight	9.3	7.8	0.476
Healthy weight	74.0	75.4	0.603
Overweight	12.7	12.4	0.884
Obese	4.0	4.4	0.753
PRIMARY SCHOOL (N)	2,086	2,245	
Indigenous (%)	6.3	6.0	0.697
Mean age (years; SD)	8.8 (2.3)	8.4 (2.3)	<0.001
Boys (%)	48.4	52.1	0.084
<i>Location of residence (%)</i>			
Urban residence	41.9	60.1	0.375
Rural residence	58.1	39.9	0.375
<i>Socioeconomic status (%)</i>			
Lowest tertile	40.5	32.8	0.887
Middle tertile	44.8	50.6	0.836
Highest tertile	14.8	16.5	0.677
<i>Body mass index category (%)</i>			
Underweight	6.4	6.6	0.876
Healthy weight	71.3	73.6	0.1
Overweight	15.9	14.9	0.271
Obese	6.3	4.8	0.095
SECONDARY SCHOOL (N)	1,151	781	
Indigenous (%)	4.2	5.5	0.815
Mean age (years; SD)	14.6 (1.1)	14.5 (1.1)	<0.001
Boys (%)	47.9	51.3	0.944
<i>Location of residence (%)</i>			
Urban residence	46.2	61.7	0.03
Rural residence	53.8	38.3	0.03
<i>Socioeconomic status (%)</i>			
Lowest tertile	38.2	30.7	0.308
Middle tertile	37.4	58.9	0.011
Highest tertile	24.4	10.4	0.039
<i>Body mass index category (%)</i>			
Underweight	4.8	6.5	0.114
Healthy weight	71.6	73.2	0.67
Overweight	19.1	16.7	0.525
Obese	4.5	3.6	0.296

Representativeness of the samples

Children's services

The children's services sample was selected from a master list of children's services obtained from the DOCS (the licensing agency), where services were stratified according to type (preschool, long day care) and geographic location using the ARIA classification.¹ Not all children attend early childhood services, so the master list of children's services potentially under enumerates the population of children in HNE and therefore impacts on the representativeness of the early childhood sample. Tables 4.5 and 4.6 compare the population of children aged 2-4 living in the HNE area calculated from the 2006

Census, to the children's services samples for 2007 and 2010 in terms of locality (rural or urban) and SES tertile.

In 2007, the sample of children in children's services was representative of the region's population of children aged 2-4 in terms of locality; however, there were SES differences ($p = 0.012$) compared with the population of children aged 2-4 in the HNE region. In 2010, the sample of children in children's services was representative of the region's population of children aged 2-4 in terms of locality and SES background.

Table 4.5 Number and percentage of preschool aged children by place of residence and socioeconomic status for 2007 field survey compared with the HNE population of school children aged 2-4

CHILDREN AGED 2-4	HNE POPULATION 2006 (N=154,393)	2007 FIELD SURVEY (N=764)	DIFFERENCE
	N (%)	N (%)	(X ² , P VALUE)
Locality			
Urban	72,720 (47.1)	365 (47.8)	(X ² =0.0068, 0.93)
Rural	81,673 (52.9)	399 (52.2)	
SES* (n = 151,253)			
Low	52,939(35)	317 (41.5)	(X²=8.793, 0.012)
Middle	83,189 (55)	293 (38.4)	
High	15,125 (10)	154 (20.2)	
Education sector			
Preschool	NA*	342 (44.8)	
Long day care	NA*	422 (55.2)	

*NA = not available; SES=socioeconomic status

Table 4.6 Number and percentage of preschool aged children by place of residence and socioeconomic status for 2010 field survey compared with the HNE population of school children aged 2-4

CHILDREN AGED 2-4	HNE POPULATION 2006 (N=154,393)	2007 FIELD SURVEY (N=764)	DIFFERENCE
	N (%)	N (%)	(X ² , P VALUE)
Locality			(X ² =1.616, 0.204)
Urban	72,720 (47.1)	411 (58.2)	
Rural	81,673 (52.9)	295 (41.8)	
SES* (n = 151,253)			(X ² =0.0898, 0.96)
Low	52,939(35)	259 (36.7)	
Middle	83,189 (55)	382 (54.1)	
High	15,125 (10)	65 (9.2)	
Education sector			
Preschool	NA [†]	300 (42.5)	
Long day care	NA [†]	406 (57.5)	

†NA = not available; *SES=socioeconomic status

Schools

Table 4.7 shows that in 2007, the sample was more representative of primary school children than secondary children in the HNE region in terms of locality and socioeconomic background. In the survey sample, there was a significantly higher proportion of secondary student participants from rural localities ($p = 0.009$) and from high SES tertiles compared to the comparable age group in the HNE region.

Table 4.8 shows that in 2010, the primary and secondary school sample was representative of the region's population of children aged 5-16 in terms of locality, socioeconomic background, and education sector.

Table 4.7 Number and percentage of primary and secondary school students by place of residence, socioeconomic status, and education sector for 2007 field survey compared with the HNE population of school children aged 5-16

	HNE POPULATION 2006 N (%)	2007 FIELD SURVEY N (%)	DIFFERENCE (X ² , P VALUE)
PRIMARY SCHOOLS			
Locality			
Urban	54,727 (61.7)	1,008 (48.6)	(X ² =1.9056, 0.1675)
Rural	35,378 (39.3)	1,076 (51.4)	
SES*			
Low	31,848 (35.3)	631 (30.1)	(X ² =2.2426, 0.3258)
Middle	47,142 (52.3)	1,024 (48.9)	
High	11,115 (12.3)	438 (20.9)	
Education sector			
Government	32,952 (74.8)	1,580 (75.5)	(X ² =2.8578, 0.2396)
Catholic	7,608 (17.3)	482 (23.0)	
Independent	3,486 (7.9)	31 (1.5)	
SECONDARY SCHOOLS			
Locality			
Urban	28,606 (60.1)	396 (34.7)	(X ² =6.8854, 0.0087)
Rural	18,958 (39.9)	752 (65.3)	
SES*			
Low	16,326 (34.3)	433 (37.6)	(X ² =15.4491, 0.0004)
Middle	25,367 (53.3)	393 (34.1)	
High	5,871 (12.3)	325 (28.2)	
Education sector			
Government	16,838 (74.0)	731 (63.5)	(X ² =1.4351, 0.4879)
Catholic	3,596 (15.8)	256 (22.2)	
Independent	2,311 (10.2)	164 (14.2)	

*SES=socioeconomic status

Table 4.8 Number and percentage of primary and secondary school students by place of residence, socioeconomic status, and education sector for 2010 field survey compared with the HNE population of school children aged 5-16

	HNE POPULATION 2006 N (%)	2007 FIELD SURVEY N (%)	DIFFERENCE (X ² , P VALUE)
PRIMARY SCHOOLS			
Locality			
Rural	35,378 (39.3)	911 (40.6)	
SES*			
Low	31,848 (35.3)	802 (35.7)	(X ² =0.0212, 0.995)
Middle	47,142 (52.3)	1,152 (51.3)	
High	11,115 (12.3)	291 (13.0)	
Education sector			
Government	31,393 (75.8)	1,725 (76.8)	(X ² =0.0782, 0.962)
Catholic	6,606 (16.0)	368 (16.4)	
Independent	3,408 (8.2)	152 (6.8)	
SECONDARY SCHOOLS			
Locality			
Urban	28,606 (60.1)	408 (52.2)	(X ² =0.7372, 0.391)
Rural	18,958 (39.9)	373 (47.8)	
SES*			
Low	16,326 (34.3)	240 (30.7)	(X ² =0.9142, 0.633)
Middle	25,367 (53.3)	468 (59.9)	
High	5,871 (12.3)	73 (9.3)	
Education sector			
Government	15,527 (72.4)	562 (72.0)	(X ² =2.009, 0.368)
Catholic	3,475.4 (16.2)	187 (23.9)	
Independent	2,436.9 (11.4)	32 (4.1)	

*SES=socioeconomic status

Consumption of sweetened drinks and non-sweetened drinks

Table 4.9 shows pre and post intervention prevalence of sweetened drink (soft drinks and fruit juice) consumption and Table 4.10 shows pre and post intervention prevalence of unsweetened drink (water and milk) consumption. Both are stratified by sex and educational stage and adjusted for rural or urban locality, household income and maternal education.

Soft drinks

The reported proportion of children consuming two or more cups of soft drink per week significantly declined among children attending children's services and Years K, 2 and 4 students. There was no significant change in soft drink consumption among Years 6, 8 and 10 students. When stratified by sex, the decline among children in children's services was significant only among boys and the decline in Years K, 2, and 4 students was significant only among girls. Soft drink consumption did not change among Years 6, 8 and 10 boys or girls.

Fruit juice

The reported proportion of children consuming more than half a cup of fruit juice daily significantly declined among children in each educational stage. When stratified by sex, the decline among children attending children's services was significant among boys and girls, and the decline in Years K, 2 and 4 students was significant only among girls. Fruit juice consumption did not change significantly among Years 6, 8 and 10 boys or girls.

Water

There was an approximate twofold significant increase in the odds of children consuming two or more cups of water daily and this was significant for children in each educational stage. When stratified by sex, the increases remained significant among both girls and boys.

Milk

The reported proportion of children consuming one or more cups of milk daily did not change among children in children's services or Years K, 2 and 4 students. However, among Years 6, 8 and 10 students, daily milk consumption declined significantly among girls and boys.

Table 4.9 Odds ratios for the change in prevalence of sweetened drink consumption among boys and girls by education group, in 2007 and 2010 (%)

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children's services				
Soft drink	41.0	29.4	0.57 (0.41, 0.79)	0.001
Fruit juice	60.7	42.5	0.47 (0.34, 0.64)	<0.001
Years K, 2 and 4				
Soft drink	58.0	48.9	0.72 (0.55, 0.95)	0.022
Fruit juice	61.6	54.6	0.74 (0.62, 0.88)	0.001
Years 6, 8 and 10				
Soft drink	62.9	60.7	0.87 (0.68, 1.12)	0.280
Fruit juice	53.0	49.2	0.78 (0.62, 0.98)	0.033
Boys†				
Children's services				
Soft drink	43.4	26.5	0.42 (0.27, 0.65)	<0.001
Fruit juice	60.3	45.5	0.54 (0.38, 0.77)	0.001
Years K, 2 and 4				
Soft drink	60.9	52.9	0.76 (0.55, 1.05)	0.091
Fruit juice	60.3	55.6	0.83 (0.65, 1.05)	0.119
Years 6, 8 and 10				
Soft drink	71.9	62.4	0.70 (0.49, 1.02)	0.064
Fruit juice	52.9	47.4	0.72 (0.51, 1.01)	0.059
Girls†				
Children's services				
Soft drink	38.6	32.6	0.76 (0.52, 1.12)	0.161
Fruit juice	61.0	39.2	0.36 (0.24, 0.55)	<0.001
Years K, 2 and 4				
Soft drink	55.1	44.6	0.68 (0.50, 0.94)	0.018
Fruit juice	62.8	53.5	0.65 (0.50, 0.83)	0.001
Years 6, 8 and 10				
Soft drink	53.7	59.0	1.06 (0.77, 1.46)	0.740
Fruit juice	53.0	51.1	0.88 (0.65, 1.18)	0.378

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

Table 4.10 Odds ratios for the change in prevalence of unsweetened drink consumption among boys and girls by education group, in 2007 and 2010 (%)

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children's services				
Water	69.1	83.1	1.85 (1.37, 2.51)	<0.001
Milk	68.7	72.7	1.15 (0.87, 1.52)	0.311
Years K, 2 and 4				
Water	70.9	84.0	2.22 (1.77, 2.78)	<0.001
Milk	59.8	62.3	1.1 (0.94, 1.29)	0.225
Years 6, 8 and 10				
Water	54.9	72.3	2.04 (1.59, 2.63)	<0.001
Milk	49.1	41.1	0.64 (0.5, 0.83)	0.001
Boys†				
Children's services				
Water	67.0	82.5	1.8 (1.18, 2.75)	0.007
Milk	71.2	74.4	1.12 (0.74, 1.69)	0.603
Years K, 2 and 4				
Water	69.9	81.0	2.03 (1.57, 2.63)	<0.001
Milk	61.9	64.8	1.19 (0.93, 1.52)	0.173
Years 6, 8 and 10				
Water	51.6	71.0	1.82 (1.24, 2.68)	0.002
Milk	57.0	48.2	0.56 (0.39, 0.8)	0.002
Girls†				
Children's services				
Water	71.1	83.7	2.0 (1.3, 3.09)	0.002
Milk	66.1	70.8	1.17 (0.82, 1.68)	0.379
Years K, 2 and 4				
Water	72.0	87.4	2.46 (1.84, 3.29)	<0.001
Milk	57.9	59.5	1.03 (0.81, 1.31)	0.795
Years 6, 8 and 10				
Water	58.2	73.6	2.26 (1.64, 3.11)	<0.001
Milk	41.0	33.5	0.74 (0.56, 0.98)	0.038

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

Consumption of energy dense, nutrient poor foods

Table 4.11 shows the adjusted pre and post intervention prevalence of eating energy dense, nutrient poor (EDNP) food by sex and educational stage, adjusted for locality, household income and maternal education. Overall, and when stratified by sex, there were no significant

reductions in prevalence of EDNP food consumption between survey years. Significant increases were observed among boys in Years K, 2 and 4 in the frequency of consuming fatty meat products and other snack food products and among Year 6, 8 and 10 girls, for salty snacks and other snack food products.

Table 4.11 Odds ratios for the change in prevalence of the consumption of energy dense, nutrient poor foods among children aged 2-15 by educational stage, in 2007 and 2010 (%).

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
CHILDREN'S SERVICES				
Fatty meat products ≥ 3/wk	36.7	38.2	1.13 (0.81, 1.57)	0.472
Fried potato products ≥ 1/wk	66.4	68.5	1.22 (0.89, 1.66)	0.221
Salty snack food products ≥ 1/wk	60.7	61.2	1.07 (0.79, 1.45)	0.665
Other snack food products ≥ 3/wk	56.4	56.8	0.9 (0.66, 1.21)	0.472
Confectionary ≥ 1/wk	79.3	79.4	0.84 (0.61, 1.14)	0.250
YEARS K, 2 AND 4				
Fatty meat products ≥ 3/wk	36.1	38.3	1.05 (0.87, 1.27)	0.576
Fried potato products ≥ 1/wk	73.3	72.9	0.94 (0.74, 1.21)	0.637
Salty snack food products ≥ 1/wk	80.2	76.5	0.86 (0.63, 1.17)	0.320
Other snack food products ≥ 3/wk	64	67	1.18 (0.97, 1.43)	0.093
Confectionary ≥ 1/wk	83.2	83.7	1.08 (0.84, 1.40)	0.531
YEARS 6, 8 AND 10				
Fatty meat products ≥ 3/wk	47.6	43.8	0.84 (0.64, 1.10)	0.203
Fried potato products ≥ 1/wk	65.7	71.1	1.28 (0.98, 1.66)	0.068
Salty snack food products ≥ 1/wk	77.6	79	1.03 (0.76, 1.39)	0.872
Other snack food products ≥ 3/wk	48.3	55.1	1.29 (0.98, 1.71)	0.072
Confectionary ≥ 1/wk	77.8	81.1	1.13 (0.83, 1.55)	0.437
BOYST†				
CHILDREN'S SERVICES				
Fatty meat products ≥ 3/wk	37.3	41.1	1.27 (0.83, 1.94)	0.274
Fried potato products ≥ 1/wk	66.0	68.0	1.33 (0.83, 2.13)	0.231
Salty snack food products ≥ 1/wk	60.1	61.6	1.20 (0.78, 1.84)	0.404
Other snack food products ≥ 3/wk	57.9	62.1	1.03 (0.69, 1.54)	0.883
Confectionary ≥ 1/wk	76.8	80.5	1.07 (0.69, 1.66)	0.746
YEARS K, 2 AND 4				
Fatty meat products ≥ 3/wk	36.9	43.3	1.35 (1.04, 1.75)	0.024
Fried potato products ≥ 1/wk	71.6	74.1	1.18 (0.87, 1.61)	0.286
Salty snack food products ≥ 1/wk	81.1	77.7	0.93 (0.67, 1.28)	0.653
Other snack food products ≥ 3/wk	66.2	70.5	1.29 (1.03, 1.62)	0.029
Confectionary ≥ 1/wk	81.6	82.9	1.23 (0.89, 1.70)	0.215
YEARS 6, 8 AND 10				
Fatty meat products ≥ 3/wk	55	43.6	0.71 (0.48, 1.03)	0.071
Fried potato products ≥ 1/wk	69.7	71.3	1.23 (0.85, 1.77)	0.276
Salty snack food products ≥ 1/wk	80.5	75	0.72 (0.46, 1.14)	0.165
Other snack food products ≥ 3/wk	50.5	51.5	0.98 (0.67, 1.43)	0.902
Confectionary ≥ 1/wk	77.1	80.8	1.37 (0.85, 2.22)	0.195

Table 4.11 Continued

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
GIRLS†				
CHILDREN'S SERVICES				
Fatty meat products ≥ 3/wk	36.1	35.1	1.00 (0.68, 1.47)	0.992
Fried potato products ≥ 1/wk	66.9	69	1.12 (0.78, 1.63)	0.537
Salty snack food products ≥ 1/wk	61.4	60.8	0.94 (0.65, 1.36)	0.75
Other snack food products ≥ 3/wk	54.8	51.0	0.78 (0.52, 1.16)	0.215
Confectionary ≥ 1/wk	81.9	78.2	0.62 (0.37, 1.03)	0.064
YEARS K, 2 AND 4				
Fatty meat products ≥ 3/wk	35.0	32.9	0.81 (0.63, 1.05)	0.106
Fried potato products ≥ 1/wk	75.3	71.6	0.74 (0.54, 1.01)	0.056
Salty snack food products ≥ 1/wk	79.0	75.2	0.78 (0.52, 1.16)	0.216
Other snack food products ≥ 3/wk	61.9	63.3	1.06 (0.8, 1.39)	0.692
Confectionary ≥ 1/wk	84.8	84.6	0.92 (0.65, 1.30)	0.627
YEARS 6, 8 AND 10				
Fatty meat products ≥ 3/wk	40.1	44	1.01 (0.74, 1.40)	0.937
Fried potato products ≥ 1/wk	61.7	71	1.35 (0.97, 1.88)	0.078
Salty snack food products ≥ 1/wk	74.6	83.1	1.52 (1.05, 2.20)	0.028
Other snack food products ≥ 3/wk	46.1	58.9	1.75 (1.27, 2.42)	0.001
Confectionary ≥ 1/wk	78.6	81.4	0.97 (0.66, 1.42)	0.867

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

Consumption of vegetables and fruit

Table 4.12 shows pre and post intervention prevalence of children meeting the age-appropriate Australian Guide to Healthy Eating fruit and vegetable consumption guidelines, stratified by sex and educational stage, adjusted for locality, household income and maternal education.

There were significant increases in the proportion of Years K, 2 and 4 students meeting the recommended daily intake of fruit and of vegetables. However, there were significant declines in the proportion of year 6, 8 and 10 students meeting the recommended fruit and vegetable intakes.

When stratified by sex, the proportion of Years K, 2 and 4 boys meeting the recommended daily intake of fruit significantly increased, and the proportion of Years K, 2 and 4 girls meeting the recommended daily intake of vegetables significantly increased. Among Year 6, 8 and 10 students, however, there was a significant decrease in meeting the recommended intakes of fruit for boys and for girls and vegetables for boys and for girls between baseline and follow up.

Table 4.12 Odds ratios for the change in prevalence of meeting fruit and vegetable guidelines among boys and girls by educational stage, in 2007 and 2010 (%)

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children's services				
Fruit ‡	95.0	100	-	-
Vegetable ‡	57.1	100	-	-
Years K, 2 and 4				
Fruit	91.4	95.3	2.09 (1.42, 3.08)	<0.001
Vegetable	50.3	56.3	1.27 (1.05, 1.53)	0.013
Years 6, 8 and 10				
Fruit	60.1	48.1	0.59 (0.40, 0.87)	0.008
Vegetable	47.0	29.2	0.46 (0.34, 0.61)	<0.001
BOYST†				
Children's services				
Fruit ‡	93.5	100	-	-
Vegetable ‡	54.2	100	-	-
Years K, 2 and 4				
Fruit	88.3	94.2	2.56 (1.60, 4.11)	<0.001
Vegetable	48.6	51.0	1.10 (0.85, 1.43)	0.451
Years 6, 8 and 10				
Fruit	57.8	44.9	0.58 (0.36, 0.93)	0.023
Vegetable	47.2	28.2	0.42 (0.28, 0.63)	<0.001
GIRLS†				
Children's services				
Fruit ‡	96.4	100	-	-
Vegetable ‡	60.1	100	-	-
Years K, 2 and 4				
Fruit	94.7	96.4	1.53 (0.86, 2.73)	0.150
Vegetable	51.8	62.0	1.51 (1.19, 1.92)	0.001
Years 6, 8 and 10				
Fruit	62.5	51.4	0.60 (0.39, 0.91)	0.018
Vegetable	46.7	30.2	0.49 (0.33, 0.71)	<0.001

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

‡ Survey year predicted outcome perfectly in 2010, therefore odds ratio and associated confidence interval and significance test could not be calculated

Mean daily intakes

Table 4.13 shows the change in the mean daily intake of fruit and vegetables, stratified by sex and educational stage, adjusted for locality, household income and maternal education. Overall, the mean daily intake of fruit increased significantly among students in Years K, 2 and 4, while among students in Years 6, 8 and 10 the mean daily intake of fruit and vegetables significantly declined between survey years. When stratified by sex, a significant increase in the mean daily intake of vegetables was observed among boys in children's services and fruit in

Years K, 2 and 4. Among Year 6, 8 and 10 boys, there were significant decreases in the mean daily intake of fruit and vegetables. Among girls, a significant increase in the mean daily intake of fruit and vegetables was observed for students in Years K, 2 and 4, while among Year 6, 8 and 10 girls there were significant decreases in the mean daily intake of fruit and vegetables.

Table 4.13 Change in mean daily intake of fruit and vegetables among boys and girls by educational stage, in 2007 and 2010 (serves per day)

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children's services				
Fruit	2.20	2.30	0.12 (-0.02, 0.25)	0.084
Vegetable	1.89	1.98	0.13 (-0.05, 0.30)	0.155
Years K, 2 and 4				
Fruit	1.90	2.16	0.27 (0.15, 0.38)	<0.001
Vegetable	2.06	2.15	0.11 (-0.01, 0.22)	0.062
Years 6, 8 and 10				
Fruit	2.74	2.33	-0.43 (-0.61, -0.25)	<0.001
Vegetable	3.17	2.59	-0.59 (-0.78, -0.40)	<0.001
BOYS†				
Children's services				
Fruit	2.20	2.33	0.13 (-0.05, 0.30)	0.151
Vegetable	1.80	1.95	0.22 (0.00, 0.44)	0.047
Years K, 2 and 4				
Fruit	1.80	2.06	0.28 (0.13, 0.44)	<0.001
Vegetable	2.01	2.00	-0.01 (-0.17, 0.16)	0.939
Years 6, 8 and 10				
Fruit	2.67	2.26	-0.39 (-0.65, -0.12)	0.005
Vegetable	3.10	2.54	-0.59 (-0.90, -0.28)	<0.001
GIRLS†				
Children's services				
Fruit	2.20	2.26	0.08 (-0.13, 0.28)	0.463
Vegetable	1.97	2.00	0.01 (-0.24, 0.26)	0.931
Years K, 2 and 4				
Fruit	2.00	2.26	0.26 (0.12, 0.40)	<0.001
Vegetable	2.11	2.32	0.24 (0.11, 0.38)	<0.001
Years 6, 8 and 10				
Fruit	2.81	2.40	-0.47 (-0.69, -0.25)	<0.001
Vegetable	3.23	2.64	-0.60 (-0.85, -0.36)	<0.001

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

Time spent in physical activity and in small screen recreation (SSR) activities

Due to skewed data, physical activity and SSR data are reported using medians and the ratio of the (geometric) mean of time spent in organised and non-organised physical activity or screen time in minutes per day in 2010 to the (geometric) mean of such physical activity or screen time minutes per day in 2007. Note the geometric mean is the anti-log of the arithmetic mean of log-transformed data. It is a good measure of central tendency where data are highly skewed and the more commonly used arithmetic mean of the untransformed data would be misleading.

The physical activity and SSR data here were highly skewed and therefore log-transformed for analysis. The back transformed (anti-log) of the coefficients yield the ratio (in this case 2010/2007) between the adjusted geometric means of the original variable.

Time spent in organised and non-organised physical activity

Table 4.14 shows the pre and post intervention median time spent in organised and non-organised physical activity in minutes per day stratified by sex and educational stage, adjusted for locality, household income

and maternal education. Overall, there were significant increases in the time spent in organised physical activity among children in children's services (388%) and Years K, 2 and 4 students (248%) between survey years. Similarly, there was a smaller, but significant increase in time spent in organised physical activity among Year 6, 8 and 10 students (31%). Smaller, but significant increases were reported for time spent in non-organised physical activity among children in children's services (49%) and Years K, 2 and 4 students (76%), but not among Year 6, 8 and 10

students. When stratified by sex, these findings remained constant, with significantly higher increases reported for time spent in organised physical activities among children's services and Years K, 2 and 4 boys and girls, and smaller increases in the time spent in non-organised physical activities. Time spent in organised physical activities increased significantly among Year 6, 8 and 10 boys and girls, but there was no significant increase in time spent in non-organised physical activities among Year 6, 8 and 10 boys and girls.

Table 4.14 Medians and ratio of time spent in organised and non-organised physical activities (PA) among boys and girls by educational stage in 2007 to the time spent in such activities in 2010 (%)

	MEDIAN (MINUTES PER DAY)		RATIO 2010/2007 (95% CI)‡	P VALUE
	2007	2010		
OVERALL*				
Children's services				
Organised PA	13	60	4.88 (4.27, 5.57)	<0.001
Non-organised PA	146	234	1.49 (1.35, 1.65)	<0.001
Years K, 2 and 4				
Organised PA	34	120	3.48 (3.19, 3.79)	<0.001
Non-organised PA	129	240	1.76 (1.63, 1.89)	<0.001
Years 6, 8 and 10				
Organised PA	47	63	1.31 (1.16, 1.47)	<0.001
Non-organised PA	77	77	1.04 (0.91, 1.18)	0.584
BOYST†				
Children's services				
Organised PA	13	60	5.2 (4.00, 6.76)	<0.001
Non-organised PA	154	240	1.48 (1.33, 1.65)	<0.001
Years K, 2 and 4				
Organised PA	37	135	3.56 (3.21, 3.94)	<0.001
Non-organised PA	137	240	1.62 (1.5, 1.76)	<0.001
Years 6, 8 and 10				
Organised PA	51	66	1.33 (1.15, 1.53)	<0.001
Non-organised PA	79	94	1.14 (0.98, 1.33)	0.084
GIRLS†				
Children's services				
Organised PA	17	60	4.46 (3.71, 5.36)	<0.001
Non-organised PA	141	210	1.5 (1.31, 1.71)	<0.001
Years K, 2 and 4				
Organised PA	34	120	3.41 (3.02, 3.85)	<0.001
Non-organised PA	120	240	1.91 (1.73, 2.1)	<0.001
Years 6, 8 and 10				
Organised PA	44	60	1.29 (1.11, 1.51)	0.001
Non-organised PA	70	69	0.91 (0.76, 1.08)	0.287

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

‡ Results are interpreted as the ratio of the expected number of minutes of PA in 2010 to the expected number of minutes of PA in 2007.

Children reporting no physical activity

The proportion of children who reported spending zero minutes per day in organised and or non-organised physical activities are shown in Table 4.15. Overall, there were significant decreases in the proportion of children in children's services who reported spending no time in organised physical activities and Years K, 2 and 4 students who reported spending no time in non-organised physical activities. Conversely, there was a significant increase among Year 6, 8 and 10 students who reported spending

no time in organised and non-organised physical activities. When stratified by sex, the decrease in reporting no time in organised activities was significant among only girls in children's services and Years K, 2 and 4 and for non-organised activities for girls in Years K, 2 and 4. In Years 6, 8 and 10, the declines in participating in organised or non-organised physical activity remained highly significant among boys and girls.

Table 4.15 Prevalence of children who reported spending zero minutes per day in organised and non-organised physical activity among boys and girls by educational stage in 2007 and 2010 (%)

	CHILDREN'S SERVICES		YEARS K, 2 AND 4		YEARS 6, 8 AND 10	
	2007	2010	2007	2010	2007	2010
OVERALL						
Organised PA	57.3	47.3*	26.3	21.2	7.9	50.9**
Non-organised PA	9.9	6.2	6.2	3.2**	56.2	71.7**
BOYS						
Organised PA	59.6	50.4	25.4	23.4	7.7	46.7**
Non-organised PA	10.2	6.7	5.5	3.3	56.6	71.4**
GIRLS						
Organised PA	55	43.9*	27.4	18.8*	7.9	55.3**
Non-organised PA	9.7	5.7	6.7	3.1**	55.7	72.0**

Note: bold indicates statistically significant difference at $p < 0.05^*$ and $p < 0.01^{**}$ between survey years within the same educational stage

Children meeting physical activity guidelines

The national recommendation for physical activity among children aged 2-5 is at least three hours of physical activity every day and for children aged 5-18 is at least 60 minutes of moderate to vigorous physical activity daily. Table 4.16 shows the adjusted pre and post intervention prevalence of children meeting the age appropriate physical activity guideline stratified by sex and educational stage, adjusted for locality, household income and maternal education. Overall, there was a significant increase in the proportion of children in children's services meeting the recommended physical activity guideline. In contrast, among Year 6, 8 and 10 there was a significant decrease

in the proportion of students meeting the recommended physical activity guideline. There was no significant change in the proportion of Years K, 2 and 4 students meeting the recommended physical activity guideline.

When stratified by sex, the increase in meeting the physical activity guideline was significant among boys and girls attending children's services. A decrease in prevalence in meeting the physical activity guideline was significant among Years K, 2 and 4 boys and Year 6, 8 and 10 boys and girls.

Table 4.16 Odds ratios for the change in prevalence of meeting physical activity guidelines among boys and girls by educational stage, in 2007 and 2010 (%)

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children’s services	36.1	42.1	2.64 (1.92, 3.63)	<0.001
Years K, 2 and 4	73.2	72.5	0.87 (0.69, 1.10)	0.252
Years 6, 8 and 10	80.4	37.8	0.13 (0.09, 0.18)	<0.001
BOYST†				
Children’s services	39.1	46.8	3.12 (2.11, 4.61)	<0.001
Years K, 2 and 4	80.1	73.8	0.68 (0.50, 0.92)	0.012
Years 6, 8 and 10	82.2	42.2	0.15 (0.10, 0.23)	<0.001
GIRLS†				
Children’s services	33.2	37.3	2.21 (1.43, 3.41)	<0.001
Years K, 2 and 4	66.1	71.0	1.07 (0.80, 1.42)	0.645
Years 6, 8 and 10	78.7	33.2	0.11 (0.07, 0.17)	<0.001

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

Children meeting screen time guidelines

Table 4.17 shows the adjusted pre and post intervention prevalence for the proportion of students exceeding the screen time guideline stratified by sex and educational stage, adjusted for locality, household income and maternal education. Overall, there were no significant changes in the proportion of children attending children's

services and Years K, 2 and 4 students who exceeded the recommended screen time guideline. There was, however, a significant decrease in the proportion of Years 6, 8 and 10 students who exceeded screen time guidelines. When stratified by sex, the only significant decrease in exceeding the screen time guideline was among Years 6, 8 and 10 boys.

Table 4.17 Ratios for exceeding the screen time guideline among boys and girls by educational stage, in 2007 and 2010 (%)

	SURVEY YEAR		RATIO 2010/2007‡ (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children’s services	50.1	46.3	0.92 (0.68, 1.23)	0.555
Years K, 2 and 4	67.1	63.7	0.83 (0.63, 1.11)	0.212
Years 6, 8 and 10	78.3	69.0	0.60 (0.44, 0.82)	0.002
BOYS†				
Children’s services	51.0	47.2	0.96 (0.64, 1.44)	0.837
Years K, 2 and 4	72.5	68.6	0.84 (0.57, 1.23)	0.370
Years 6, 8 and 10	85.4	75.0	0.49 (0.28, 0.85)	0.011
GIRLS†				
Children’s services	49.2	45.3	0.86 (0.6, 1.23)	0.415
Years K, 2 and 4	61.7	58.4	0.82 (0.61, 1.12)	0.214
Years 6, 8 and 10	71.2	62.6	0.71 (0.48, 1.04)	0.079

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

‡ Results are interpreted as the ratio of the expected number of minutes of screen time in 2010 to the expected number of minutes of screen time in 2007.

Daily screen time

Table 4.18 shows the adjusted pre and post intervention median daily screen time, stratified by sex and educational stage, adjusted for locality, household income and maternal education. Overall, there were no significant decreases in screen time among children attending children's services and Years K, 2 and 4 students.

However, there was a significant decrease in screen time among Years 6, 8 and 10 students. When stratified by sex, there was a significant decrease in daily screen time among Years 6, 8 and 10 boys and non-significant trends towards a decrease in daily screen time among girls in each educational stage.

Table 4.18 Median minutes per day and ratios for screen time among boys and girls by education group, in 2007 and 2010 (%)

	SURVEY YEAR		RATIO 2010/2007‡ (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children’s services	120.00	111.43	0.95 (0.85, 1.05)	0.294
Years K, 2 and 4	154.29	145.71	0.94 (0.86, 1.02)	0.118
Years 6, 8 and 10	205.71	173.57	0.83 (0.74, 0.92)	0.001
BOYS†				
Children’s services	120.00	111.43	1.00 (0.86, 1.17)	0.967
Years K, 2 and 4	171.43	158.57	0.95 (0.86, 1.06)	0.342
Years 6, 8 and 10	240.00	197.14	0.80 (0.67, 0.94)	0.008
GIRLS†				
Children’s services	115.71	102.86	0.89 (0.78, 1.00)	0.052
Years K, 2 and 4	141.43	137.14	0.92 (0.85, 1.00)	0.053
Years 6, 8 and 10	173.57	158.57	0.86 (0.75, 1.00)	0.050

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

‡ Results are interpreted as the ratio of the expected number of minutes of screen time in 2010 to the expected number of minutes of screen time in 2007.

Prevalence of overweight and obesity

Table 4.19 shows the adjusted pre and post intervention prevalence of combined overweight and obesity, stratified by sex and educational stage, adjusted for rural or urban location, household income and maternal education. Overall, the prevalence of combined overweight and obesity among children aged 2-15 remained stable during the

program period. The prevalence of combined overweight and obesity significantly decreased among Years K, 2 and 4 girls, indicating a 7.4 percentage point decrease between 2007 and 2010. A non-significant trend towards a reduction in prevalence for all school girls was evident.

Table 4.19 Odds ratios for the change in prevalence of combined overweight and obesity among boys and girls by educational stage, in 2007 and 2010 (%)

	SURVEY YEAR		ODDS RATIO (95% CI)	P VALUE
	2007	2010		
OVERALL*				
Children's services	16.7	16.8	1.07 (0.69, 1.66)	0.765
Years K, 2 and 4	21.6	18.3	0.87 (0.70, 1.07)	0.174
Years 6, 8 and 10	23.7	20.8	0.87 (0.69, 1.11)	0.262
All school children†	22.9	20.1	0.89 (0.75, 1.06)	0.180
BOYST†				
Children's services	15.6	15.4	1.20 (0.66, 2.20)	0.548
Years K, 2 and 4	18.0	18.4	1.08 (0.77, 1.51)	0.650
Years 6, 8 and 10	22.9	21.1	0.87 (0.61, 1.25)	0.452
All school boys‡	21.0	20.3	0.98 (0.74, 1.30)	0.870
GIRLS†				
Children's services	17.8	18.3	0.97 (0.57, 1.63)	0.896
Years K, 2 and 4	25.5	18.1	0.69 (0.54, 0.88)	0.003
Years 6, 8 and 10	24.5	20.6	0.83 (0.57, 1.22)	0.345
All school girls‡	24.9	19.8	0.79 (0.60, 1.03)	0.080

* Adjusted for locality, household income and maternal education and sex

† Adjusted for locality, household income and maternal education

‡ School children in Years K, 2, 4, 6, 8 and 10

Change by BMI category

The prevalence of underweight, healthy weight, overweight and obesity pre and post intervention for each educational stage are shown in Table 4.20. Among children in Years K, 2 and 4 the prevalence of healthy weight significantly increased from 70.6% in 2007 to

75.3% in 2010. Among Years K, 2 and 4 girls, the prevalence of overweight significantly decreased at 2.3% per annum and the proportion in the healthy weight category significantly increased each year by 3.1%.

Table 4.20 Prevalence of underweight, healthy weight, overweight, obesity and combined overweight and obesity among boys and girls by educational stage, in 2007 and 2010 (%)

	CHILDREN'S SERVICES		YEARS K, 2 AND 4		YEARS 6, 8 AND 10	
	2007	2010	2007	2010	2007	2010
OVERALL						
Underweight	9.3	7.8	7.9	6.4	4.8	6.6*
Healthy weight	74	75.4	70.6	75.3*	71.5	72.5
Overweight	12.7	12.4	15.9	13.9	18.0	16.9
Obese	4.0	4.4	5.7	4.4	5.7	4.0
Overweight or obese	16.7	16.8	21.6	18.3	23.7	20.8
BOYS						
Underweight	9.7	7.5	7.1	6.0	3.9	5.5
Healthy weight	74.6	77	74.9	75.5	73.2	73.4
Overweight	11.8	10.4	12.3	14.2	16.8	16.7
Obese	3.8	5.0	5.7	4.2	6.1	4.4
Overweight or obese	15.6	15.4	18.0	18.4	22.9	21.1
GIRLS						
Underweight	8.8	8.0	8.7	6.8	5.7	7.9
Healthy weight	73.4	73.7	65.8	75.0**	69.8	71.6
Overweight	13.6	14.4	19.8	13.5**	19.2	17.0
Obese	4.2	3.8	5.7	4.7	5.3	3.5
Overweight or obese	17.8	18.3	25.5	18.1**	24.5	20.6

Note: bold indicates statistically significant difference at $p < 0.05^*$ and $p < 0.01^{**}$ pre and post intervention

Summary and comment

Although the school and student response rates were low, they were comparable to other national school based surveys of Australian children.^{14,15} The characteristics of the pre and post intervention samples compared with the HNE population of school children aged 5-16 were demographically similar and showed similar socio-demographic variation, indicating that the findings of the surveys are likely to be generalisable to all school children in HNE.

The findings of the field surveys of children aged 2-15 living in the HNE area of NSW indicate that the prevalence of overweight and obesity across this age group remained stable between 2007 and 2010. This finding is consistent with the NSW state wide survey of school aged children (SPANS 2010), which also showed a stabilising of the prevalence of overweight and obesity among school children aged 5-16.¹⁵

A significant decline in the prevalence of overweight and obesity combined was observed among girls in Years K, 2 and 4, a decline that was attributable to a significant decrease of 2.3% per year in the prevalence of overweight. This decrease occurred among girls in both rural and urban areas. A similar reduction in prevalence was not found in NSW across the period 2004 to 2010, where the prevalence increased (22.9% in 2004 and 24.1% in 2010).

There were significant improvements in a number of measures of healthy eating (drinks and fruit and vegetable intake) among children attending children's services and students in Years K, 2 and 4. There were however no consistent changes in the consumption of EDNP foods. Similar to eating behaviours, there was a consistent pattern of significant improvements in measures of physical activity among children attending children's services and students in Years K, 2 and 4.

In contrast to the findings of desirable weight and behaviour changes for children attending children's services and students in Years K, 2 and 4, there were few improvements in the proportion of students in Years 6, 8 and 10 reporting such behaviours. Significant increases were recorded for fruit juice and water consumption, and median minutes per day of organised physical activity (among those who do some activity). There were also significant reductions in daily screen time, and in the proportion exceeding screen time guidelines (boys). However, for this group, other obesity-related behaviours either did not change significantly (soft drinks, most EDNP variables, median minutes per day of non-organised physical activity) or worsened (proportion undertaking no physical activity, proportion meeting physical activity, proportion meeting fruit and vegetables guidelines), a finding that is consistent with the absence of the focus of the program on secondary school aged children.

The strengths of the field surveys were: they included a large sample of children, used reliable and valid measures of diet and physical activity, had no significant differences between pre and post intervention survey samples; and had broadly similar socio-demographic characteristics of participants with children in the broader region. The latter findings suggest that the low response rates, especially among secondary school students, are unlikely to have detracted from the generalisability of the findings. It was not possible to ascertain the degree of bias which may have arisen from non-response, however, the application of post-stratification weights potentially adjusted for any biases arising from under-sampling. In the absence of a controlled evaluation design the observed changes in behaviours and weight cannot be directly attributed to the Good for Kids program.

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Eating and physical activity behaviours: telephone survey

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This section describes the results of a telephone survey undertaken to provide further data regarding changes in the prevalence of healthy eating and physical activity behaviours among children in the HNE region, and a comparison between children in the HNE region and children in the rest of NSW in the prevalence of such behaviours.

Methods

Design and setting

A quasi-experimental study was undertaken. Two cross sectional samples of randomly selected households were selected from the HNE region and from the rest of NSW prior to the intervention (2007) and in the final year of the program (2010). Data were collected via telephone interviews with parents of children aged 2-15.

Sample

The sample consisted of parents from randomly selected households within the HNE region and from the rest of NSW. Telephone numbers in the electronic white pages were geo-coded and assigned to NSW Area Health Service (AHS) boundaries. All prefixes were expanded with suffixes ranging from 0000-9999 and the resulting list matched back to the electronic white pages. Unlisted numbers were assigned to the AHS containing the greatest proportion of numbers with that prefix. Numbers matching businesses in the electronic white pages were removed.

A list of random digit telephone numbers was then obtained for households within the sampling frame. Randomly sequenced telephone numbers were dialled to recruit parents of children aged 2-15 who were able to speak English to participate in the study. For parents with more than one child aged 2-15, the child with the most recent birthday was selected. The survey thus included parents of any children within the target age range, regardless of their attendance at childcare or school.

To allow comparisons from 2007 to 2010 within each area, or comparisons between HNE and the rest of NSW, the target sample size was 800 participants per area in 2007 and 2010. This sample size was sufficient to detect a difference in the prevalence of eating or physical activity behaviours within HNE or within the rest of NSW of around 7%, or a differential change of 7% between the HNE region and NSW ($\alpha=0.05$, 80% power, assuming 50% prevalence). For subgroup analyses with samples of around 400 per area (likely for gender groups and broad age groups), the sample was sufficient to detect a difference of around 10% (with the same assumptions).

Data collection procedure

A maximum of six attempts were made to contact participants between 8am and 8pm on weekdays. Data were collected by trained interviewers using a Computer Assisted Telephone Interviewer (CATI) formatted questionnaire. Data were collected between February and May 2007 for the baseline surveys and between May and September 2010 for the follow up surveys.

Measures

The survey variables were the same as those used in the field survey (section 4). The same questions were applied in 2007 and 2010. Each survey took approximately 30 minutes to administer and included demographic, dietary, physical activity and small screen recreation (SSR) variables.

Sample demographic variables

Information was collected on the gender, age, Aboriginal or Torres Strait Islander status and education of the parent completing the survey, and on child age, gender, Aboriginal or Torres Strait Islander status, and preschool or school attendance. Parents within the HNE sample who reported their child attended school or preschool were asked to name it. Postcode of residence was used to categorise locality of residence according to the Accessibility/ Remoteness Index of Australia (ARIA).¹ Postcode was also used to estimate socioeconomic status (SES) of the participant based on the Australian Bureau of Statistics' Index of Relative Socio-Economic Disadvantage, which is one measure of the Socio-Economic Indices for Areas (SEIFA).²

Child dietary behaviours

Similar to the field survey, parents completed a short food frequency survey developed for population surveys.³ Details of the indicators used along with their cut-points and definitions are in Table 4.1. Parents specified the number of cups per day, week, month or 'rarely or never' for drink items; the number of serves per day, per week or 'doesn't eat fruit or vegetables' for vegetable and fruit items; and specified the number of times per day, week, month, or 'rarely or never' for other items.

Child physical activity and small screen recreation

Based on questions used in the NSW Population Health Survey,³ parents were asked to estimate the number of days in a school week and on a weekend that their child usually participated in organised games, sports or dance, outside of school or preschool hours (for those at school or preschool), and to estimate the total time spent engaged in the activity per day. They were asked similar questions regarding participation in non-organised physical activity and SSR. Indicators used and cut-points are in table 4.1.

Analysis

Analyses were conducted using SAS version 9.2 (SAS Institute Inc. Cary, NC; 2008). Descriptive statistics were used to summarise the characteristics of the HNE and rest of NSW samples for 2007 and 2010. Demographic differences between the HNE and NSW samples in 2007 and 2010 were assessed using Chi-square analyses and t-tests. To assess the representativeness of the samples, comparisons were made to the 2006 census data for children aged 2-15 for child age and gender, locality, and SES (SEIFA tertiles). In addition, the primary schools nominated by HNE parents were classified according to their participation in one of the two major programs promoted within the primary school intervention, the *Crunch&Sip*® program (certified or not certified by December 2010). Childcare services nominated by parents of preschool aged children were classified in terms of staff training in nutrition and physical activity and presence of nutrition and physical activity policies, as reported by service authorised supervisors during telephone interviews.

Analysis of child dietary and physical activity behaviours

Categorical variables were created to indicate whether or not children met Australian healthy eating and physical activity recommendations.^{4,5,6} Where recommendations did not exist, cut points were decided by content experts.

To determine whether changes in prevalence between 2007 and 2010 were different for HNE and the rest of NSW, logistic regression analyses were undertaken for each of the healthy eating and physical activity variables. To align the analyses with the focus of the program interventions, the regression models were developed for: the overall sample; for each of three age/educational stage groups:

- a) preschool age children (includes those who are not at school and are six years or younger, including those who do and do not attend preschool/childcare);
- b) students attending primary school (Years K-6); c) students attending high school (Years 7-10); and for boys and girls separately. The analyses by educational stage were limited by small sample sizes for preschool and high school subgroups, and hence provide a broad indication of the potential program effects.

The logistic regression models used the behaviour variable as the outcome, and included experimental condition (HNE, rest of NSW), time (2007, 2010), and the interaction term (condition x time). All models were adjusted for locality (urban ARIA 1.84 or less and rural ARIA >1.84), parental education (up to year 10 or Year 12 or TAFE/University), and SEIFA tertile. Models based on overall samples included child gender, and educational stage group (preschool or attending primary school or attending high school). The p value from the interaction term was used to determine if there was a statistically significant difference in change between HNE and the rest of NSW. A p value of <0.05 was used. Children of school age (six and older) that did not attend school were excluded from the analyses.

Linear regression analyses were also undertaken to determine whether changes between 2007 and 2010 were different for HNE and the rest of NSW, when selected nutrition and physical activity indicators were treated as continuous variables. Linear regression analyses were undertaken with each variable as the outcome (using data transformed to the natural log where distributions were highly skewed). Variables analysed were serves per day of fruit, serves per day of vegetables, minutes per day of organised physical activity, minutes per day of non-organised physical activity (children for which no physical activity was reported for each variable were excluded from the analyses) and minutes per day of screen time. The regression models included adjustment for locality, parental education and SEIFA tertile. Models based on overall samples included child gender and educational stage group.

Results

Response rates, sample characteristics and representativeness

In 2007, of the 27,038 randomly sequenced telephone numbers dialled, 2,190 eligible households were identified (n=1198 HNE; n= 992 rest of NSW). Of these, 1,631 (n=941 HNE; n=690 rest of NSW) participated in the telephone survey representing 74% of eligible households (78% HNE; 69% NSW).

In 2010, of the 45,621 randomly sequenced telephone numbers dialled, 2,550 eligible households were identified (n=1240 HNE; n=1310 rest of NSW).

Of these, 1,618 (n=815 HNE; n=803 rest of NSW) participated in the telephone survey representing 63% of eligible households (66% HNE; 61% rest of NSW).

Socio-demographic characteristics of the samples are shown in Table 5.1. The HNE and rest of NSW samples did not differ on parent or child gender, age or Aboriginality in 2007 or 2010. However, HNE samples were more likely than the rest of NSW to have higher proportions in lower parental education and SES categories and in the more rural ARIA categories. Among children who were not yet at school and six years or younger, the proportion attending preschool or childcare in the surveys were as follows: HNE 2007 76%, 2010 77%; rest of NSW 2007 80%, 2010 82%.

Table 5.1: Socio-demographic characteristics of participants in the eating and physical activity behaviours telephone survey (parents of children aged 2-15) in 2007 and 2010, HNE and rest of NSW

CHARACTERISTIC	2007			2010		
	HNE N=941	NSW N=690	P VALUE	HNE N=815	NSW N=803	P VALUE
Female (%)	82.6	82.6	0.98	80.7	81.2	0.62
Age, years (mean)	39.1	40.3	ns	39.6	40.6	ns
Aboriginal (%)	3.5	3.0	0.60	3.6	2.9	0.82
Female child (%)	49.3	49.1	0.94	47.7	48.2	0.85
Aboriginal child (%)	5.0	3.5	0.14	5.0	4.4	0.52
SEIFA (NSW)						
Lower tertile (%)	38.7	25.5	<0.001	43.6	19.9	<0.001
Middle tertile (%)	50.6	35.6		45.7	38.1	
Upper tertile (%)	10.7	38.9		10.6	42.0	
PARENTAL EDUCATION						
Up to Year 10 (%)	31.3	21.1	<0.001	19.8	14.4	<0.001
Year 12 and TAFE (%)	45.2	39.8		48.6	44.2	
University (%)	23.5	39.1		31.6	41.4	
ARIA						
Urban (%)	61.5	80.9	<0.0001	66.2	76.7	<0.0001
Rural (%)	38.5	19.1		33.8	23.3	
AGE OF CHILD						
2-4 years (%)	21.6	24.4	0.13	21.8	23.5	0.18
5-11 years (%)	46.1	47.7		46.9	48.7	
12-15 years (%)	32.3	28.0		31.3	26.8	

ARIA= Accessibility/Remoteness Index of Australia; SEIFA=Socio-Economic Indices for Areas
ns = not significant

Table 5.2 compares the study samples against 2006 census data for HNE and the rest of NSW for children aged 2-15. These comparisons show that the 2007 and 2010 samples are similar to the 2006 populations in HNE and rest of NSW in terms of child age and gender, locality and SES.

Of the HNE primary schools nominated by at least one parent participating in the telephone survey, 66% had been certified with the *Crunch&Sip*® program by Dec 2010.

This is similar to the certification rate among all HNE primary schools at that time (69%). Of the HNE children's services nominated by at least one parent participating in the telephone survey, supervisors reported that 74% employed staff who had trained in nutrition and 78% employed staff trained in physical activity, 100% had nutrition policies and 46% had physical activity policies. These rates are similar to children's services across HNE.

Table 5.2: Representativeness of telephone survey samples compared with 2006 census data, age and gender, ARIA, and SEIFA tertiles

	2007		2010		2006 CENSUS	
	HNE N=941 %	REST OF NSW N=690 %	HNE N=815 %	REST OF NSW N=803 %	HNE N=151,253 %	REST OF NSW N=1067,451 %
AGE AND GENDER						
BOYS						
2-4 years	10.8	12.6	11.2	12.8	10.0	10.6
5-11 years	25.0	23.0	23.6	25.3	25.6	25.6
12-15 years	14.9	15.2	17.6	13.7	15.6	15.1
GIRLS						
2-4 years	10.7	11.7	10.7	10.7	9.5	10.0
5-11 years	21.2	24.6	23.3	24.4	24.3	24.3
12-15 years	17.4	12.8	13.7	13.1	15.0	14.3
ARIA						
	HNE N=938 %	NSW N=686 %	HNE N=813 %	NSW N=798 %	HNE N=154,392 %	NSW N=1066,649 %
Major Cities	43.1	61.5	44.3	62.4	47.1	73.9
Other	56.9	38.5	55.7	37.6	52.9	26.1
SEIFA (NSW)						
	HNE N=941 %	NSW N=690 %	HNE N=815 %	NSW N=803 %	HNE N=151,253 %	NSW N=1067,451 %
2-4 years						
Lower tertile	35	16	29	16	35	23
Middle tertile	53	41	59	40	55	35
Upper tertile	12	43	12	44	10	41
5-12 years						
Lower tertile	30	20	34	18	36	24
Middle tertile	54	40	51	39	55	36
Upper tertile	16	40	15	44	9	40
13-15 years						
Lower tertile	33	18	40	19	35	23
Middle tertile	53	43	42	42	55	37
Upper tertile	14	37	17	38	9	40

ARIA= Accessibility/Remoteness Index of Australia; SEIFA=Socio-Economic Indices for Areas

Consumption of sweetened drinks and non-sweetened drinks

Table 5.3 shows the proportions of children within HNE and the rest of NSW consuming four or more cups of fruit juice per week, and the proportions consuming two or more cups of soft drink per week in 2007 and 2010.

Table 5.4 shows the proportions consuming two or more cups of water per day, and the proportions consuming one or more cup of plain milk per day in 2007 and 2010. The final columns of the tables show the p values for the time by experimental condition interaction terms. A value of $p < 0.05$ indicates that the degree of change in HNE and the rest of NSW is significantly different. The p values for the pre post regressions comparing 2007 and 2010 data within the HNE and the rest of NSW samples are also shown.

Fruit juice and soft drink consumption

Within both HNE and the rest of NSW, significant decreases in the consumption of fruit juice occurred from 2007 to 2010 for the overall samples, for children at each

educational stage, and for boys and girls. For soft drink consumption there were some significant within-group reductions in HNE (overall sample, primary children), and within the rest of NSW (overall sample, children at each educational stage, boys and girls).

There were no significant differences in change from 2007 to 2010 between HNE and the rest of NSW in the overall sample regarding consumption of fruit juice. Nor were there significant differences for children within any educational stage, or for girls. However, the proportion of boys consuming four cups per week or more of fruit juice decreased significantly more in HNE than in the rest of NSW.

The proportion of children consuming two cups per week or more of soft drink decreased significantly more in the rest of NSW than in HNE for the overall sample, for preschool children, primary children and for boys and girls. There was no difference for high school children.

Table 5.3: Proportion of children consuming fruit juice (four or more cups per week) and soft drink (two or more cups per week) in 2007 and 2010, for HNE and rest of NSW samples by educational stage and gender

	HNE			NSW			REGRESSION
	2007	2010	P VALUE	2007	2010	P VALUE	INTERACTION P VALUE
EDUCATIONAL STAGE							
PRESCHOOL†							
Fruit juice	63.2	43.8	<0.001	59.2	43.1	0.003	0.84
Soft drink*	23.4	17.2	0.54	29.0	10.8	<0.001	0.01
PRIMARY SCHOOL‡							
Fruit Juice	63.6	44.3	<0.001	59.2	48.5	0.006	0.11
Soft drink*	46.9	37.0	0.03	43.6	22.3	<0.001	0.006
HIGH SCHOOL‡							
Fruit juice	68.7	55.6	0.006	69.4	56.4	0.01	0.81
Soft drink*	51.0	50.4	0.72	53.9	39.4	0.007	0.06
GENDER							
BOYS							
Fruit Juice	68.1	45.6	<0.001	59.8	50.2	0.01	0.02
Soft drink*	45.5	37.6	0.12	44.4	26.2	<0.001	0.01
GIRLS							
Fruit Juice	62.1	49.4	<0.001	64.3	47.4	<0.001	0.36
Soft drink*	40.7	33.5	0.09	41.3	20.2	<0.001	<0.001
OVERALL							
Fruit Juice	65.1	47.4	<0.001	62.0	48.9	<0.001	0.25
Soft drink*	43.1	35.7	0.03	42.9	23.3	<0.001	<0.001

* Includes soft drinks, sport drinks, cordial

† Includes children not yet at primary school who do and do not attend preschool or childcare

‡ Children of school age (six and older) but not attending school excluded from these and subsequent regressions. HNE 2007 (n= 6); HNE 2010 (n=7); NSW 2007 (n=2); NSW 2010 (n=2).

Water and milk

Within both HNE and the rest of NSW, the proportions of children consuming two or more cups of water per day and the proportions consuming at least one cup per day of plain milk tended to decrease between 2007 and 2010. For water consumption there were significant within-group reductions in HNE (overall sample, all educational stage groups, boys and girls), and within the rest of NSW (overall, primary and high school children, boys and girls). For milk consumption, there were significant within-group reductions within HNE (overall sample, preschool children, high school children, boys and girls), but not within the rest of NSW.

There was no significantly different change between HNE and the rest of NSW in the proportion of children in the overall sample consuming two or more cups of water per

day (Table 5.4). There was a significantly greater decrease within HNE than in the rest of NSW in the proportion of primary children and high school children consuming two or more cups of water per day. There was no significant difference in change between HNE and the rest of NSW for preschool children, for boys or for girls.

There was a significantly greater reduction in HNE than in NSW in the proportion of children in the overall sample, and in the proportion of preschool children, consuming one or more cups of plain milk a day. There were no statistically significant different changes from 2007 to 2010 between HNE and the rest of NSW in the proportion of primary children, high school children, boys or girls consuming one or more cups of milk.

Table 5.4: Proportion of children consuming water (2 or more cups per day) and plain milk (one or more cups per day) in 2007 and 2010 for HNE and rest of NSW samples by educational stage and gender

	HNE			NSW			REGRESSION
	2007	2010	P VALUE	2007	2010	P VALUE	INTERACTION P VALUE
EDUCATIONAL STAGE							
PRESCHOOL*							
Water	86.1	72.9	0.002	85.2	84.1	0.72	0.06
Milk	92.3	82.1	0.003	87.6	86.4	0.68	0.05
PRIMARY SCHOOL							
Water	91.1	85.6	0.01	94.5	82.5	<0.001	0.04
Milk	86.6	83.2	0.21	86.8	87.4	0.87	0.34
HIGH SCHOOL							
Water	94.3	76.8	<0.001	90.7	83.6	0.02	0.03
Milk	88.0	78.2	<0.001	89.6	85.9	0.29	0.26
GENDER							
BOYS							
Water	90.6	78.8	<0.001	90.9	82.4	<0.001	0.54
Milk	90.6	82.0	<0.001	89.5	88.1	0.51	0.06
GIRLS							
Water	91.4	80.9	<0.001	91.4	84.1	0.005	0.59
Milk	86.0	80.4	0.03	86.1	85.4	0.69	0.25
OVERALL							
Water	91.0	79.8	<0.001	91.2	83.2	<0.001	0.4
Milk	88.3	81.2	<0.001	87.8	86.8	0.46	0.03

* Includes children not yet at primary school who do and do not attend preschool or childcare

Consumption of energy dense, nutrient poor foods

Table 5.5 shows the proportions of children within HNE and the rest of NSW who consumed high levels of energy dense, nutrient poor (EDNP) foods in 2007 and 2010 and shows the same information separately for boys and girls.

Table 5.5: Proportion of children consuming energy dense, nutrient poor foods* in 2007 and 2010, for HNE and rest of NSW samples, among children by educational stage and gender (%)

	HNE			NSW			REGRESSION
	2007	2010	P VALUE	2007	2010	P VALUE	INTERACTION P VALUE
EDUCATIONAL STAGE							
PRE-SCHOOL†							
Fatty meat	32.1	31.7	0.87	37.9	28.4	0.06	0.11
Fried potato	50.7	46.8	0.61	53.3	39.2	0.009	0.15
Salty snacks	52.2	37.6	0.009	51.5	34.8	0.001	0.59
Other snack	53.8	38.5	0.002	50.9	45.6	0.32	0.14
Confectionary	72.2	62.9	0.09	75.6	62.1	0.01	0.58
PRIMARY SCHOOL							
Fatty meat	35.4	35.2	0.9	36.5	33.8	0.69	0.62
Fried potato	59.2	56.4	0.92	53.4	45.6	0.03	0.21
Salty snacks	71.2	61.9	0.02	61.8	59.0	0.54	0.16
Other snack	58.5	54.9	0.27	53.1	51.7	0.56	0.74
Confectionary	74.4	70.7	0.17	73.6	71.8	0.63	0.57
HIGH SCHOOL							
Fatty meat	31.3	30.8	0.99	33.2	27.0	0.13	0.37
Fried potato	59.0	55.3	0.55	58.5	49.2	0.19	0.58
Salty snacks	69.0	65.8	0.56	62.7	54.5	0.16	0.58
Other snack	58.5	53.1	0.38	52.8	52.4	0.88	0.63
Confectionary	74.0	69.5	0.26	75.1	69.3	0.16	0.77
GENDER							
BOYS							
Fatty meat	35.0	36.2	0.4	36.2	33.4	0.45	0.21
Fried potato	58.3	56.6	0.84	54.1	48.3	0.14	0.27
Salty snacks	68.1	56.8	0.003	58.7	55.5	0.51	0.09
Other snack	56.8	49.8	0.06	55.3	50.0	0.16	0.76
Confectionary	73.0	66.7	0.06	72.6	67.0	0.13	0.88
GIRLS							
Fatty meat	32.1	29.6	0.44	35.4	27.9	0.04	0.44
Fried potato	56.7	50.3	0.16	55.5	40.8	<0.001	0.12
Salty snacks	64.1	56.5	0.1	60.4	47.4	0.001	0.24
Other snack	57.5	50.4	0.04	49.9	50.4	0.93	0.25
Confectionary	74.6	69.8	0.05	76.3	70.3	0.09	0.98
OVERALL							
Fatty meat	33.6	33.0	0.88	35.8	30.8	0.07	0.15
Fried potato	57.5	53.6	0.40	54.8	44.7	<0.001	0.06
Salty snacks	66.1	56.7	0.001	59.5	51.6	0.005	0.70
Other snack	57.2	50.1	0.006	52.6	50.2	0.31	0.28
Confectionary	73.8	68.1	0.009	74.5	68.6	0.02	0.93

* Fatty meat three or more times per week; fried potato once or more per week; salty snacks once per week; other snack products three or more times per week; confectionary once or more per week

† Includes children not yet at primary school who do and do not attend preschool or childcare

Within HNE and the rest of NSW, Table 5.5 shows that there were some significant within-group changes. For the overall sample there were significant reductions in several variables within HNE (salty snacks, other snacks, confectionary) and within the rest of NSW (fried potato, salty snacks and confectionary). For preschool children there were significant reductions in some variables within HNE (salty snacks, other snacks) and within the rest of NSW (fried potato, salty snacks and confectionary). For primary children there was a significant reduction for salty snacks within HNE and for fried potato within the rest of NSW. There were no significant changes for high school children within HNE or the rest of NSW. For boys, there was a significant reduction in salty snacks within HNE and no significant changes within the rest of NSW. For girls, there were significant reductions in several variables within HNE (other snacks, confectionary) and within the rest of NSW (fatty meat, fried potato, salty snacks).

There were no statistically significant different changes from 2007 to 2010 between HNE and NSW in the reported consumption of EDNP foods in the overall sample, or for any subgroup.

Consumption of vegetables and fruit

Meeting vegetable and fruit recommendations

Table 5.6 shows the proportion of children within HNE and the rest of NSW meeting vegetable and fruit consumption recommendations in 2007 and 2010.

There was a significant within-group reduction in the proportion of HNE preschool children meeting vegetable recommendations, but no other significant within group reductions for HNE or the rest of NSW for vegetable consumption. There were significant within-group reductions in the proportion of children meeting fruit recommendations within HNE (overall sample, all educational stage groups), and within NSW (primary children). There were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW in the proportions of children meeting vegetable or fruit consumption recommendations for overall samples or for any subgroups.

Table 5.6: Proportion of children meeting recommendations for vegetables and fruit in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION
	2007	2010	P VALUE	2007	2010	P VALUE	INTERACTION P VALUE
EDUCATIONAL STAGE							
PRESCHOOL†							
Vegetables	55.5	45.4	0.04	47.3	44.0	0.35	0.44
Fruit	92.3	84.2	0.01	93.5	91.5	0.46	0.36
PRIMARY SCHOOL							
Vegetables	44.1	44.0	0.45	42.3	42.0	0.88	0.88
Fruit	91.8	82.7	<0.001	93.5	85.7	0.001	0.86
HIGH SCHOOL							
Vegetables	19.7	17.6	0.59	16.6	19.7	0.55	0.26
Fruit	22.3	17.3	0.04	27.5	22.3	0.18	0.72
GENDER							
BOYS							
Vegetables	36.9	35.1	0.4	37.9	37.2	0.64	0.93
Fruit	69.2	62.1	0.006	74.0	72.0	0.41	0.88
GIRLS							
Vegetables	40.5	39.2	0.48	34.5	37.6	0.47	0.26
Fruit	69.6	66.9	0.33	75.7	72.5	0.27	0.20
OVERALL							
TOTAL							
Vegetables	38.7	37.1	0.27	36.2	37.4	0.92	0.38
Fruit	69.4	64.4	0.006	74.9	72.3	0.2	0.52

*Includes children not yet at primary school who do and do not attend preschool or childcare

Serves of fruit and vegetables

Table 5.7 shows the mean serves per day of vegetables and fruit for children within the HNE and the rest of NSW samples in 2007 and 2010. There was a significant within-group reduction in mean serves per day of vegetables within HNE for the overall sample and for high school children, but no other significant within group changes for HNE and no significant changes for the rest of NSW in vegetable consumption. There were significant within-group reductions in mean serves of fruit per day within HNE for the overall sample and all subgroups, and significant reductions within the rest of NSW for the overall sample, primary and high school children.

For mean vegetable consumption, there were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW for the overall samples or for any subgroups. For mean fruit consumption, there were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW for the overall samples, for primary or high school children, for boys or for girls. There was a significantly different change between HNE and the rest of NSW in mean fruit consumption for preschool children, with fruit consumption decreasing for HNE children and increasing for the rest of NSW children.

Table 5.7: Mean daily intake (serves per day) of vegetable and fruit in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION
	2007	2010	P VALUE	2007	2010	P VALUE	INTERACTION P VALUE
EDUCATIONAL STAGE							
PRESCHOOL*							
Vegetables	1.81	1.68	0.32	1.69	1.71	0.91	0.36
Fruit	2.30	2.01	0.02	2.18	2.40	0.11	0.01
PRIMARY SCHOOL							
Vegetables	2.10	2.05	0.59	2.22	2.20	0.81	0.80
Fruit	2.05	1.87	0.02	2.16	1.88	0.001	0.37
HIGH SCHOOL							
Vegetables	2.4	2.07	0.009	2.39	2.34	0.70	0.09
Fruit	1.83	1.52	0.002	1.93	1.63	0.02	0.92
GENDER							
BOYS							
Vegetables	2.06	1.93	0.14	2.13	2.07	0.53	0.41
Fruit	2.00	1.73	0.0007	2.16	1.99	0.08	0.48
GIRLS							
Vegetables	2.21	2.04	0.06	2.17	2.18	0.95	0.19
Fruit	2.05	1.87	0.03	2.02	1.91	0.19	0.56
OVERALL							
Vegetables	2.13	1.98	0.02	2.15	2.13	0.68	0.11
Fruit	2.03	1.79	<0.001	2.09	1.96	0.03	0.32

* Includes children not yet at primary school who do and do not attend preschool or childcare

Time spent in physical activity

Meeting physical activity guidelines

Table 5.8 shows the proportion of children within the HNE and the rest of NSW samples meeting physical activity guidelines in 2007 and 2010. The proportions of children meeting the guidelines decreased significantly between 2007 and 2010 within both HNE and the rest of NSW for the overall samples, for primary children and high school children. There were also significant reductions within HNE boys and the rest of NSW girls.

There were no significant within-group changes for preschool children.

There were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW in the proportions of children meeting physical activity guidelines for the overall samples or for any subgroups.

Table 5.8: Proportion of children meeting physical activity guidelines in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION
	2007	2010	P VALUE	2007	2010	P VALUE	P VALUE
EDUCATIONAL STAGE							
Preschool*	38.9	30.8	0.19	32.5	30.0	0.41	0.58
Primary school	87.5	78.9	0.008	83.6	75.3	0.02	0.97
High school	72.4	63.0	0.005	69.0	52.8	0.005	0.94
GENDER							
Boys	78.8	65.9	<0.001	68.9	63.1	0.07	0.08
Girls	63.2	55.9	0.14	62.8	51.9	0.01	0.24
Overall	71.3	61.2	<0.001	65.9	57.7	0.002	0.88

* Includes children not yet at primary school who do and do not attend preschool or childcare

Inactive children

Table 5.9 shows the proportion of children within HNE and the rest of NSW undertaking zero minutes of organised and unorganised physical activity in 2007 and 2010. There were no significant within group changes for HNE or the rest of NSW in the proportion of children undertaking no organised physical activity. The proportions of children doing no unorganised physical activity increased significantly between 2007 and 2010 within

both HNE and the rest of NSW for the overall samples, and for high school children. There were also significant increases within HNE boys and girls. There were no significant within-group changes for preschool or primary children. There were no significantly different changes between HNE and the rest of NSW in these proportions for the overall samples or for any subgroups.

Table 5.9: Proportion of children doing zero minutes of organised and non-organised physical activity (PA) in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION INTERACTION
	2007	2010	P VALUE	2007	2010	P VALUE	P VALUE
EDUCATIONAL STAGE							
PRESCHOOL*							
Organised PA	64.1	62.0	0.89	52.7	55.45	0.57	0.78
Non-organised PA	0	0.5	0.96	0.6	1.0	0.53	0.94
PRIMARY SCHOOL							
Organised PA	23.0	21.4	0.91	22.1	18.9	0.31	0.59
Non-organised PA	0.7	2.5	0.07	1.8	2.5	0.60	0.36
HIGH SCHOOL							
Organised PA	30.7	30.2	0.50	25.9	24.3	0.74	0.58
Non-organised PA	4.7	11.9	0.003	6.2	14.5	0.008	0.91
GENDER							
BOYS							
Organised PA	35.2	34.8	0.67	33.0	31.4	0.62	0.37
Non-organised PA	0.6	3.0	0.01	2.3	4.3	0.09	0.52
GIRLS							
Organised PA	34.4	33.8	0.69	28.3	27.7	0.97	0.79
Non-organised PA	3.2	7.0	0.03	3.6	5.8	0.14	0.42
OVERALL							
Organised PA	34.8	34.3	0.59	30.7	29.6	0.73	0.77
Non-organised PA	1.9	4.9	0.001	2.9	5.0	0.02	0.42

* Includes children not yet at primary school who do and do not attend preschool or childcare

Minutes per day of organised and unorganised physical activity

Table 5.10 shows the median minutes per day of organised and unorganised physical activity for children within HNE and the rest of NSW samples in 2007 and 2010 (excluding children undertaking no activity for each variable). As the physical activity data were skewed, values were transformed by taking the natural log prior to regression analyses.

Within HNE and the rest of NSW, there were no significant changes in the median minutes per day of organised activity except for primary school children in HNE.

However, there were significant reductions in the number of minutes per day of unorganised activity within both HNE and the rest of NSW for the overall samples and for all subgroups.

There were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW in the minutes per day of organised or unorganised activity for the overall samples or for any subgroups.

Table 5.10: Median minutes per day of organised and non-organised physical activity in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION INTERACTION
	2007	2010	P VALUE	2007	2010	P VALUE	P VALUE
EDUCATIONAL STAGE							
PRESCHOOL*							
Organised PA	8.6	8.6	0.76	6.4	8.6	0.10	0.91
Non-organised PA	137.1	111.4	0.003	120.0	102.9	0.02	0.74
PRIMARY SCHOOL							
Organised PA	25.7	30.0	0.008	25.7	34.3	0.12	0.65
Non-organised PA	102.9	77.1	<0.001	85.7	72.1	0.007	0.28
HIGH SCHOOL							
Organised PA	38.6	51.4	0.68	42.9	34.3	0.41	0.10
Non-organised PA	77.1	60.0	0.005	60.0	47.1	0.05	0.19
GENDER							
BOYS							
Organised PA	30.0	34.3	0.75	25.7	34.3	0.43	0.90
Non-organised PA	111.4	85.7	<0.001	90.0	78.6	0.03	0.38
GIRLS							
Organised PA	25.7	25.7	0.10	25.7	25.7	0.47	0.31
Non-organised PA	94.3	70.7	0.03	77.1	60.0	0.02	0.61
OVERALL							
Organised PA	25.7	30.0	0.16	25.7	25.7	0.27	0.41
Non-organised PA	98.6	77.1	<0.001	83.6	68.6	0.002	0.34

* Includes children not yet at primary school who do and do not attend preschool or childcare
PA=physical activity

Time spent in small screen recreation (SSR) activities

Small screen recreation guidelines¹

Table 5.11 shows the proportion of children within HNE and the rest of NSW exceeding SSR guidelines in 2007 and 2010. There were no significant changes within HNE for the overall sample or subgroups, in the proportions of children exceeding guidelines. Within the rest of NSW,

there were no significant changes for the overall sample, for educational stage groups or for boys. There was a significant reduction in the proportion of girls exceeding guidelines. There were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW in the proportions of children exceeding guidelines for the overall samples or for any subgroups.

Table 5.11: Proportion of children exceeding small screen recreation guidelines in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION INTERACTION
	2007	2010	P VALUE	2007	2010	P VALUE	P VALUE
EDUCATIONAL STAGE							
Preschool*	66.5	58.3	0.16	69.2	59.3	0.04	0.65
Primary school	47.9	47.1	0.99	41.1	42.6	0.52	0.71
High school	63.2	61.1	0.67	60.6	60.6	0.7	0.49
GENDER							
Boys	60.1	58.5	0.93	56.7	59.6	0.3	0.33
Girls	53.7	48.6	0.15	50.4	41.9	0.04	0.53
OVERALL	56.9	53.8	0.31	53.6	51.0	0.49	0.8

*Includes children not yet at primary school who do and do not attend preschool or childcare

Minutes of small screen recreation

Table 5.12 shows the median minutes per day of SSR for children within HNE and the rest of NSW samples in 2007 and 2010. As data were skewed, values were transformed by taking the natural log and adding a constant to each value (one minute) prior to analysis. Within HNE, there was a significant reduction in the median minutes per day of SSR for the overall sample and for girls.

There were no significant within-group changes for the rest of NSW. There were no significantly different changes from 2007 to 2010 between HNE and the rest of NSW children for the overall samples, for primary or high school children, for boys or for girls. For preschool children there was a greater reduction in median minutes per day of SSR in the rest of NSW than HNE.

Table 5.12: Median minutes per day of small screen recreation in 2007 and 2010, for HNE and rest of NSW samples, by educational stage and gender

	HNE			NSW			REGRESSION INTERACTION
	2007	2010	P VALUE	2007	2010	P VALUE	P VALUE
EDUCATIONAL STAGE							
Preschool*	81.6	77.3	0.14	83.7	68.7	0.71	0.04
Primary school	115.9	111.6	0.19	103.0	107.3	0.65	0.79
High school	141.6	141.6	0.06	140.1	137.3	0.34	0.87
GENDER							
Boys	121.2	120.1	0.14	111.6	120.1	0.50	0.48
Girls	105.9	98.7	0.02	103.0	94.4	0.15	0.79
OVERALL	56.9	53.8	0.31	53.6	51.0	0.49	0.8
Total	115.9	111.6	0.009	107.3	103.0	0.62	0.51

*Includes children not yet at primary school who do and do not attend preschool or childcare

1 Recommend that children aged 5-18 years should not spend more than two hours a day using electronic media for entertainment (eg computer games, TV, internet), particularly during daylight hours. Commonwealth Department of Health and Ageing. Physical Activity Recommendations for Children and Young People. 2004. Canberra, Commonwealth of Australia

Summary and comment

Some statistically significant changes from 2007 to 2010 were observed in the telephone survey for child eating and physical activity behaviours within either HNE or the rest of NSW. Changes were observed in the overall sample and for all groups for the consumption of fruit juice, for the overall sample and some groups for soft drink intake, for the overall sample, and for some groups for intake of some EDNP foods, and among some groups for SSR variables. For the remaining variables (unsweetened drinks, consumption of vegetables and fruit, and physical activity variables) there were no significant improvements for either group.

Few variables showed statistically significant differential rates of change in prevalence between HNE and the rest of NSW. The only significant differential change consistent with an intervention effect in the HNE region was for consumption of fruit juice among boys. In contrast, greater positive changes were evident in the rest of NSW compared to HNE for: consumption of soft drink for the overall sample, for preschool and primary school children, and for both boys and girls; for the mean number of fruit serves consumed per day for the overall sample; and for median minutes of SSR for preschool children.

Comparison of Field and Telephone Survey findings

Interpretation of the extent of change in the prevalence of healthy eating and physical activity behaviours in HNE is unclear due to observed differences between the field and telephone surveys in the prevalence of such behaviours, and observed differences in the change in such behaviours between the two surveys, despite the use of the same variables and cut-points.

Several characteristics of the field and telephone surveys should be considered in interpreting the results. First, the sample sizes for the telephone sample were smaller than those available for the field survey analyses, limiting the ability of the telephone survey to provide comparably precise estimates of physical activity and nutrition behaviours. Second, the telephone survey included children of preschool age who did not attend children's services and hence were not exposed to the program intervention implemented within these services. Third, the seasonal difference in timing of the telephone surveys in 2007 and 2010, and the difference in timing between these surveys and the field surveys further limits the ability of the telephone survey to either support or contradict the findings of the field survey.

Both studies used the same variables and cut-points for categorical variables and similar analytical approaches and thus the variables were handled in similar ways. However, different age groupings were used to report the results for each survey, further limiting the ability to make direct comparisons between the surveys. Further, in the field survey parental report data were obtained for children up to and including Year 4, with older children completing the survey themselves. In contrast, parents completed the survey for children of all ages in the telephone survey. Hence the telephone survey could have suffered from a greater quantum of recall (or response) bias. Finally, the mode of survey delivery differed between the two surveys, pen and paper for the field survey, and telephone for the telephone survey. The extent to which these methodological differences between the surveys account for observed variable findings regarding prevalence of child behaviours is unknown.

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Primary schools

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Background

School aged children spend a large proportion of their time at school, making schools an important setting for obesity prevention interventions.¹ Further, schools provide a unique environment in which children can learn and develop healthy eating and physical activity behaviours at a crucial stage of their development.^{1,2,3} The school environment is one that is also amenable to change and offers multiple opportunities to promote healthy nutrition and physical activity for children through the use of the school curriculum, school policies, the school canteen, physical education (PE) programs and strong links to the community.^{1,2,4}

Aim

To increase the proportion of primary schools implementing *Crunch&Sip*[®] and *Get Skilled, Get Active, Go!*

Methods Design

The evaluation employed a quasi-experimental study design. All primary and central schools (central schools are schools in remote or regional areas of NSW that cater to Years K–12) within the Hunter New England (HNE) region were offered the intervention during the period 2007 to 2010. Outcome data were collected by telephone from cohorts of schools in HNE and elsewhere in NSW between 2006/2007 and 2010/2011. Baseline data were collected in primary and central schools from November 2006 to April 2007. Two years after the baseline data was collected, mid-point data collection occurred from October 2008 to March 2009 (two year follow up). Four years after the baseline data were collected, the final outcome data were collected from primary and central schools (four year follow up). The four year follow up data were collected from November 2010 to March 2011.

Sample

In the HNE region, approximately 76% of all school students attended government schools. A database of eligible primary schools was generated from lists provided by the former NSW Department of Education and Training, Catholic Education Office and the Association of Independent Schools websites. All 422 identified public, Catholic or independent primary and central schools in the region were invited to participate in the evaluation. To serve as a comparison group, an equivalent number of similar schools, (representing 23% of primary schools) were randomly selected from the rest of NSW. Special-purpose schools (such as those for students with special needs, juvenile justice or schools serving children who are hospitalised) were excluded from the sample.

Intervention

Using similar capacity building strategies, Good for Kids implemented two intervention programs in primary schools: *Crunch&Sip*[®] and *Get Skilled, Get Active, Go!*.

Crunch&Sip[®]

The *Crunch&Sip*[®] program, endorsed by the Australian Government required schools to implement:

- a time during class for children to drink water and to eat a piece of vegetable or fruit in at least 80% of classes each day
- a school *Crunch&Sip*[®] policy which included strategies to ensure students with access, availability or affordability issues could also participate in fruit and vegetable breaks
- teaching and learning materials that reinforced key nutrition messages that could be incorporated into lessons and linked to curriculum
- strategies to promote the program to teachers, students and parents

Schools registered their interest in the *Crunch&Sip*[®] program and became certified for *Crunch&Sip*[®] when the required paperwork and policies were submitted to the NSW Healthy Kids Association (comparison schools in NSW) or HNE Population Health (intervention schools in HNE). The *Crunch&Sip*[®] program was implemented during a four year period from 2007 to 2010 (Figure 6.1).

Get Skilled, Get Active, Go!

Consistent with requirements from the NSW Board of Studies and national physical activity guidelines^{5,6,7,8,9} the *Get Skilled, Get Active, Go!* program was developed to promote school implementation of strategies to promote development of students' fundamental movement skills (FMS), to reduce time children spend in small screen recreation (SSR) and to provide opportunities for physical activity in class each day (Figure 6.1).

The program required schools to implement:

- FMS as part of Personal Development, Health and Physical Education (PDHPE) in Years K-2 and Years 3-6
- daily physical activity either during class time or as a whole of school activity (apart from Physical Education, sport, recess or lunch)

- an endorsed physical activity policy including components on FMS, daily physical activity and SSR
- teaching a curriculum unit on SSR
- strategies to promote the program to teachers, students and parents.

The *Get Skilled, Get Active, Go!* program was implemented during the two and a half year period from 2008 to 2010.

Strategies to facilitate program adoption

Strategies to increase school implementation and adoption of *Crunch&Sip®* and *Get Skilled, Get Active, Go!* were informed by the Health Promoting Schools Framework^{10,11}, and theories and evidence regarding organisational change.^{12,13} The intervention strategies to facilitate program implementation are described in Table 6.1.

Figure 6.1: Crunch&Sip® and Get Skilled, Get Active, Go! implementation and evaluation design

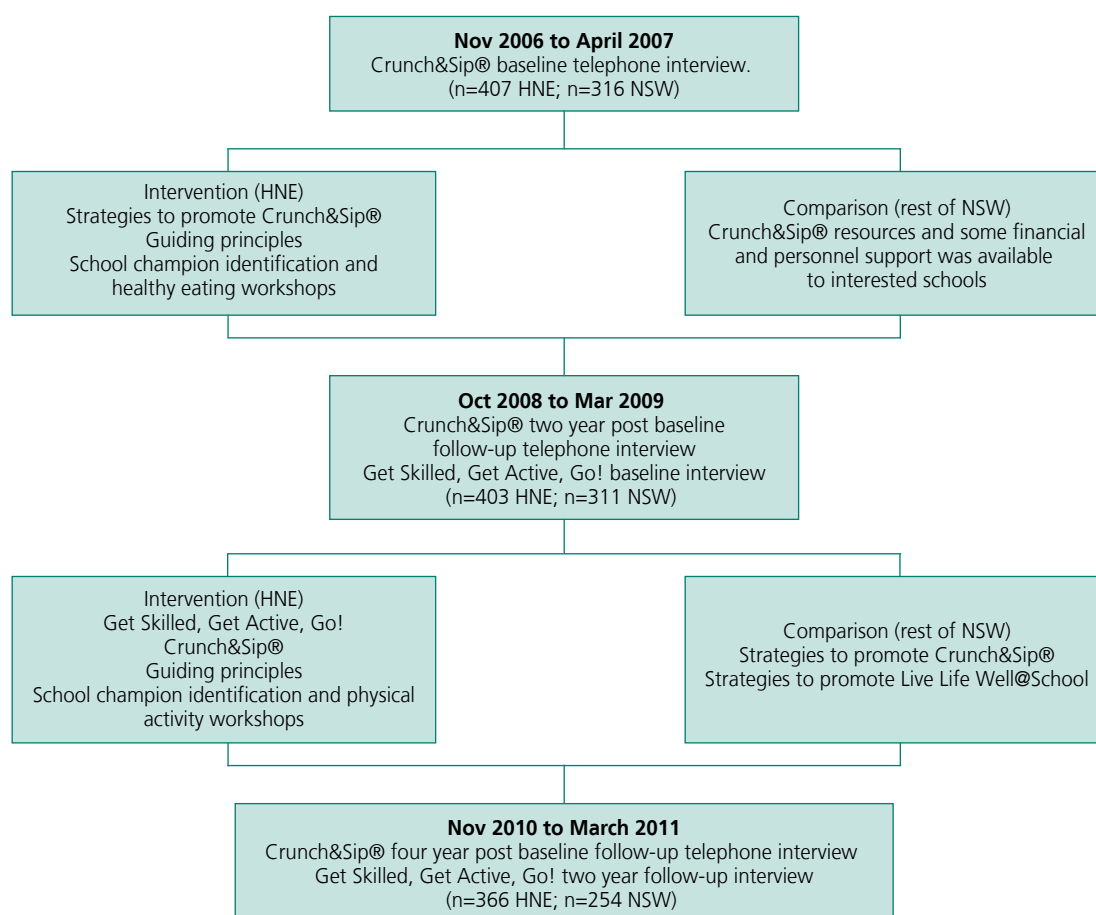


Table 6.1 Capacity building strategies to facilitate adoption of *Crunch&Sip*® and *Get Skilled, Get Active, Go!* programs

STRATEGY	PROGRAM	
Provision of Program and related resources	<i>Crunch&Sip</i> ®	<i>Get Skilled, Get Active, Go!</i>
Consensus processes, leadership support and endorsement	<ul style="list-style-type: none"> ■ Memorandum of Understanding with NSW Department of Education & Communities (DEC) and Catholic Schools Office (HNE region) supported the implementation of both programs. ■ Expert advisory group supported program planning and implementation. ■ Inclusion of Good for Kids strategies in DEC education sector regional plans. ■ Presentations at school Principal cluster meetings to promote the program. ■ Recruitment of school champions ie a staff member within each school that took responsibility for implementation. ■ Individual school nutrition and physical activity policies. 	
Staff training and professional development	One day (six hour) healthy eating workshop held across the HNE region. Online module for non-attending schools. One day teacher relief funding for small schools (less than 300 students) for staff to attend training.	One day (six hour) physical activity workshop held across the HNE region. One day teacher relief funding for small schools (less than 300 students) for staff to attend training.
Provision of information, resources and instructional materials for program adoption	Resources provided to schools: curriculum material; policy templates; parent's information; and newsletter articles.	Resources provided to schools: Booster resource (energiser and pedometer activities); FMS lesson plans; Power Down resource; policy templates; parent information; and newsletter articles.
Incentives	Following certification schools received a free water bottle for every student and teacher. <i>Crunch&Sip</i> ® fence signs.	Following certification schools received a school set of pedometers and tennis balls for each student.
Follow up support	School projects officers provided follow up support to all schools, face to face or telephone. School champion supported CATI in follow up to workshops. Additional phone support to all schools, as required. Quarterly GFK school champion newsletter. Meetings with Principal or school champion, presentations at staff meetings as requested by schools.	
Performance monitoring and feedback	Tailored school reports regarding program adoption sent to school Principals on two occasions to provide feedback regarding adoption of strategies. Cluster reports regarding program adoption sent to Regional Directors and School Education Directors each semester highlighting progress of regions.	

CATI= Computer Assisted Telephone Interviewer; FMS=fundamental movement skills; GFK=Good for Kids, Good for Life;
HNE=Hunter New England

Comparison area

The same or similar programs to those implemented by Good for Kids were implemented by NSW Health and the NSW Department of Education and Communities (DEC) in schools elsewhere in NSW. The *Crunch&Sip*® program was made available to all schools across NSW from November 2007 by NSW Health and the DEC. Similarly the *Live Life Well @ School* program supporting nutrition and physical activity was made available to public schools in NSW, from April 2008.

Strategies to facilitate adoption of both programs by primary schools in the rest of NSW similarly included school representatives being invited to attend professional development workshops. Other strategies were at the discretion of local area health services that were tasked with supporting schools to implement such programs.

Data collection procedures

Evaluation data were collected through 20-25 minute computer assisted telephone interviews (CATI) conducted with school Principals in 2006/2007, 2008/2009 and 2010/2011 by trained telephone interviewers. The surveys were developed by a working group with representation from NSW Health, NSW Centre for Public Health Nutrition, NSW Centre for Physical Activity and Health, NSW Centre for Overweight and Obesity (University of Sydney) and HNE Population Health.

Additionally, reviews of NSW Department of Education and Communities (DEC), Catholic Schools Office and independent school association websites were undertaken to obtain information regarding school addresses.

Measures

School characteristics

School type (DEC, Catholic or Independent) and the postcode of the locality of the school were obtained from school websites. During the telephone interview, Principals were asked to report the number of students attending their school.

Implementation of Crunch&Sip®

During each of the telephone surveys (2006/2007, 2008/2009 and 2010/2011) Principals were asked: 'Does your school or classes at your school have specific breaks or have permission to eat vegetables and/or fruit during class time?'; 'Does your school have a nutrition policy that includes vegetable, fruit and water breaks?'; 'Have you or any of your staff attended training specific to vegetable and fruit breaks in the last 12 months?'; 'Do teachers at the school use curriculum resources provided?'; and 'Does your school communicate information about the program to parents?'

Schools were certified as having adopted *Crunch&Sip*® if they had developed a policy that committed a school to: implementing the program daily in 80% of classes; communicating with parents regarding the program; implementing supportive curriculum resources; and incorporating equity principles.

Implementation of Get Skilled, Get Active, Go!

School uptake of strategies to promote the *Get Skilled, Get Active, Go!* program was assessed by asking school Principals: 'Does your school include the teaching of fundamental movement skills as part of Personal Development, Health and Physical Education (PDHPE) in Years K-2 and 3-6?'; 'Do classes at your school regularly engage in physical activity during class time or whole of school activities apart from PE, sport, recess and lunch?'; and 'Are lessons taught to raise awareness of the importance of reducing their small screen recreation or activities/events that require students to monitor or decrease the time they spend in small screen recreation?'

Intervention acceptability

To determine intervention acceptability Principals were asked if Good for Kids had provided appropriate support and helped the school to implement healthy eating and physical activity initiatives. Principals were also asked to respond to a series of statements on water, fruit, vegetable consumption and physical activity.

Analysis

Analyses were performed using SAS Version 9.2 (SAS Institute Inc. Cary, NC; 2008). Descriptive statistics were used to describe the study sample. Chi Square tests for categorical variables and paired t-tests for continuous variables were used to assess differences in school characteristics between intervention and comparison area schools, and between schools included in the cohort and those not included.

The reported number of enrolled students in each school was used to categorise schools as: small schools (1-159 students); medium schools (160-450 students); or large schools (451 or more students). Schools with postcodes ranked in the top 50% of NSW postcodes based on the Socio-Economic Indexes For Australia (SEIFA)¹⁴ were categorised as schools of higher socioeconomic status while those in the lower 50% were categorised as schools of lower socioeconomic status. School postcode areas were also used to categorise the school's locality as either rural (those schools in outer regional, remote and very remote areas), or urban (those in regional cities and inner regional areas) based upon the Accessibility/Remoteness Index of Australia (ARIA).¹⁵

To assess the effectiveness of the intervention to facilitate the adoption of *Crunch&Sip*®, analyses were conducted using data for Principals completing telephone surveys at baseline (2006/2007) and the two year follow up (2008/2009); and separately, Principals completing surveys at baseline and the four year follow up (2010/2011). To assess the effectiveness of the intervention to facilitate adoption of *Get Skilled, Get Active, Go!*, analyses were performed on data provided by Principals participating in both the 2008/2009 survey and the 2010/2011 survey. Logistic regression models, within a generalised estimating equation framework were used to compare change in the prevalence of *Crunch&Sip*® or *Get Skilled, Get Active, Go!* components across pre and post intervention periods and between intervention and comparison regions. The logistic regression models included terms for time, region and the interaction of time and region. The p value from the interaction term was used to determine the statistical significance of any intervention effect. School characteristics were not adjusted for in the model as the baseline score of the schools effectively controlled for potential differences in baseline characteristics between the two regions. All statistical tests were two sided. The level of significance was set at alpha=0.01 to account for multiple testing.¹⁶

Results

Sample

At baseline (2006/2007), of the 422 eligible primary and central schools in the intervention area, 407 (96%) completed the telephone survey. Of the 406 randomly selected schools from the comparison area (elsewhere in NSW), 316 (78%) completed the telephone survey.

The 2008/2009 survey was used as the two year post baseline follow up data for *Crunch&Sip*® intervention and the baseline data for *Get Skilled, Get Active, Go!*

At this time there were 424 eligible primary and central schools in the intervention area (included new schools since 2006/7), of which, 403 completed the telephone survey (95%). Of the 406 eligible schools in the comparison area, 311 completed the survey (77%).

The 2010/2011 survey was used as the four year post baseline follow up for *Crunch&Sip*® intervention and two year follow up of *Get Skilled, Get Active, Go!* intervention.

At this time there were 415 eligible primary and central schools from the intervention area, of which 366 (88%) schools completed the telephone survey. Of the 403 eligible schools in the comparison area, 254 (63%) completed the telephone survey.

The sample sizes for the cohorts used for the evaluation of the programs were as follows. For *Crunch&Sip*® a cohort of 389 HNE schools and 257 schools from the rest of NSW formed the sample for the two year evaluation. A sample of 354 HNE schools and 210 schools from the rest of NSW formed the sample for the four year evaluation. For *Get Skilled, Get Active, Go!*, a cohort of 354 HNE schools and 215 schools from the rest of NSW formed the sample. The cohorts represented between 83% and 91% of all HNE schools, and between 52% and 63% of the initial random sample of schools from the rest of NSW.

Sample characteristics of schools participating in *Crunch&Sip*®

Compared to schools from the rest of NSW, HNE schools participating in *Crunch&Sip*® were more likely to be small (1-159 students), be in rural localities and be below the NSW average with respect to socioeconomic status (Table 6.2).

Program reach

Two hundred and eighty six (65.7%) of 435 primary schools participated in *Crunch&Sip*® training, and 263 (54%) participated in the *Get Skilled, Get Active, Go!* training.

Table 6.2: *Crunch&Sip*® cohort characteristics

Characteristic	Category	Crunch&Sip® TWO YEAR FOLLOW UP SAMPLE				Crunch&Sip® FOUR YEAR FOLLOW UP SAMPLE			
		HNE	NSW	P value	Total (N=646)	HNE	NSW	P value	Total (N=562)
Type of school	Department of Education	77%	77%	0.0973	77%	77%	78%	0.1981	77%
	Catholic School Office	16%	12%		15%	17%	12%		15%
	Independent School	6.9%	11%		8.5%	6.5%	9.5%		7.7%
School size (students)	1-159	47%	35%	0.0013	42%	48%	35%	0.0003	43%
	160-449	42%	45%		43%	41%	43%		42%
	450+	12%	20%		15%	11%	22%		15%
Location	Urban	32%	47%	<0.0001	38%	31%	44%	0.0021	36%
	Rural	68%	53%		62%	69%	56%		64%
SEIFA	Lower half of state	65%	46%	<0.0001	57%	66%	49%	<0.0001	60%
	Upper half of state	35%	54%		43%	34%	51%		40%

HNE=Hunter New England; SEIFA= Socio-Economic Indices for Areas

Implementation of *Crunch&Sip*®

At baseline (2006/2007) there was no significant difference in the proportion of schools implementing initiatives consistent with *Crunch&Sip*® between schools in the intervention and comparison groups. Compared with 2007/2008, at two year follow up, implementation of five of the seven *Crunch&Sip*® components had increased significantly among intervention region schools relative to control (Table 6.3). Similarly, at the four year follow up, five of the six *Crunch&Sip*® components had increased significantly among intervention region schools

relative to control (Table 6.4). Differences in the number of schools in the baseline to two year follow up cohort, and in the baseline to four year follow up cohort account for the slight differences in the baseline number of schools shown in Tables 6.3 and 6.4.

Crunch&Sip® Certification

At the end of December 2010 the prevalence of *Crunch&Sip*® certified schools was greater in HNE (n=68%) compared to the rest of NSW (n=10%) (p=<0.0001).

Table 6.3: Prevalence of *Crunch&Sip*® components at baseline and two year follow up

VARIABLE	HNE			NSW			INTERACTION P VALUES (1-2)
	BASELINE	TWO YEAR FOLLOW UP	P	BASELINE	TWO YEAR FOLLOW UP	P	
Fruit and vegetable program in class time	50%	82%	<0.0001	45%	61%	<0.0001	<0.0001
Water in class time	85%	99%	<0.0001	86%	98%	<0.0001	0.3228
Nutrition policy supported fruit and vegetable program	17%	39%	<0.0001	19%	16%	0.2643	<0.0001
Nutrition policy supported access to water	25%	40%	<0.0001	27%	21%	0.0792	<0.0001
Staff training on fruit and vegetable program	5.9%	63%	<0.0001	8.9%	21%	<0.0001	<0.0001
Water, fruit and vegetable lessons incorporated in other KLAs	65%	63%	0.5255	69%	70%	0.6274	0.4378
Communicated with parents on healthy eating	91%	90%	0.8117	94%	82%	<0.0001	0.0041

Note: bold Indicates significant differences in the HNE region compared with NSW
HNE=Hunter New England; KLA = key learning area

Table 6.4: Prevalence of *Crunch&Sip*® components at baseline and four year follow up

VARIABLE	HNE			NSW			INTERACTION P VALUES (T1-T3)
	BASELINE	FOUR YEAR FOLLOW UP	P	BASELINE	FOUR YEAR FOLLOW UP	P	
Fruit and vegetable program in class time	49%	91%	<0.0001	47%	74%	<0.0001	<0.0001
Water in class time	86%	99%	<0.0001	88%	97%	0.0010	0.0878
Nutrition policy supported fruit and vegetable program	16%	58%	<0.0001	17%	35%	<0.0001	0.0005
Nutrition policy supported access to water	23%	57%	<0.0001	23%	40%	0.0001	0.0033
Water, fruit and vegetable lessons incorporated in other KLAs	65%	70%	0.1363	67%	74%	0.1399	0.7844
Communicated with parents on healthy eating	91%	85%	0.0107	94%	77%	<0.0001	0.0211

Note: bold Indicates significant differences in the HNE region compared with NSW
HNE=Hunter New England; KLA = key learning area

Sample characteristics of schools participating in *Get Skilled, Get Active, Go!*

Characteristics of schools participating in the *Get Skilled, Get Active, Go!* evaluation are shown in Table 6.5. Compared to the rest of NSW schools, HNE schools participating in *Get Skilled, Get Active, Go!* were more

likely to be Catholic and less likely to be independent schools, more likely to be small (1-159 students), rural and in the lower half of NSW with respect to socioeconomic status.

Table 6.5: *Get Skilled, Get Active, Go!* cohort characteristics

CHARACTERISTIC	CATEGORY	HNE	NSW	P VALUE (CATEGORY)	TOTAL (N=569)
Type of school	Department of Education	77%	77%	0.0371	77%
	Catholic School Office	17%	12%		15%
	Independent School	6.2%	11%		8.1%
School size (number of students)	1-159	49%	38%	0.0222	45%
	160-449	42%	47%		44%
	450+	9.3%	15%		11%
Location	Urban	31%	44%	0.0020	36%
	Rural	69%	56%		64%
SEIFA	Lower half of state	67%	47%	<0.0001	59%
	Upper half of state	33%	53%		41%

HNE=Hunter New England; SEIFA= Socio-Economic Indices for Areas

Implementation of *Get Skilled, Get Active, Go!*

At baseline there was no significant difference in six of the 11 variables used to report the prevalence of strategies to promote physical activity between schools in the intervention and comparison groups (Table 6.6). Differences were seen between the intervention schools and comparison groups in: the teaching of FMS in Years

3-6; having a school physical activity plan or policy; having a school plan or policy that referred to daily physical activity; having a school plan or policy that referred to PE or sport; and incorporating physical activity into other key learning areas.

Table 6.6: Baseline comparison of *Get Skilled, Get Active Go!* measures, HNE and rest of NSW

VARIABLE	BASELINE		
	HNE	NSW	P
Daily PA in class or whole of school	33%	33%	0.9697
Included teaching of FMS as part of PDHPE program (K-2)	95%	94%	0.7331
Included teaching of FMS as part of PDHPE program (3-6)	89%	83%	0.0269
Lessons to raise awareness on SSR, and/or activities to monitor or decrease time in SSR	60%	53%	0.1527
School had PA plan or policy	62%	54%	0.0461
Plan or policy referred to daily PA	55%	46%	0.0386
Plan or policy referred to teaching FMS	56%	50%	0.1726
Plan or policy referred to PE or sport	58%	49%	0.0330
School had plan or policy that limited students SSR	16%	19%	0.3897
PA incorporated in other KLAs	55%	64%	0.0311
Communicated with parents on PA	72%	66%	0.1316

FMS = fundamental movement skills; HNE=Hunter New England; KLA = key learning area; PA = physical activity; PDHPE = Personal Development, Health, And Physical Education; SSR = small screen recreation

Chi square analyses indicated there were significant increases between baseline and two year follow up in the prevalence of eight of the 11 strategies in the intervention area, and six of the 11 outcome measures in the rest of NSW (Table 6.7). Because these changes were in the

same direction and of similar magnitude in both HNE and the rest of NSW, there were no significant differences between them in change over time for any of the *Get Skilled, Get Active, Go!* components.

Table 6.7: Prevalence of strategies promoting *Get Skilled, Get Active, Go!*, baseline and two year follow up

VARIABLE	HNE			NSW			INTERACTION P VALUES (2-3)
	BASELINE	TWO YEAR FOLLOW UP	P	BASELINE	TWO YEAR FOLLOW UP	P	
Daily PA in class or whole of school	33%	37%	0.3139	33%	29%	0.2695	0.1365
Included teaching of FMS as part of PDHPE program (K-2)	95%	96%	0.2393	94%	95%	0.4386	0.8076
Included teaching of FMS as part of PDHPE program (3-6)	89%	92%	0.2076	83%	90%	0.0222	0.3934
Lessons to raise awareness on SSR, and/or activities to monitor or decrease time in SSR	60%	71%	0.0006	53%	69%	0.0005	0.4705
School had PA plan or policy	62%	78%	<0.0001	54%	67%	0.0030	0.3357
Plan or policy referred to daily PA	55%	71%	<0.0001	46%	58%	0.0029	0.3105
Plan or policy referred to teaching FMS	56%	76%	<0.0001	50%	64%	0.0011	0.1479
Plan or policy referred to PE or sport	58%	75%	<0.0001	49%	62%	0.0038	0.2498
School had plan or policy that limits students use of SSR	16%	23%	0.0157	19%	26%	0.0628	0.8665
PA incorporated in other KLAs	55%	68%	<0.0001	64%	71%	0.0874	0.2660
Communicated with parents on PA	72%	79%	0.0320	66%	72%	0.1486	0.7928

FMS = fundamental movement skills; HNE=Hunter New England; KLA = key learning area; PA = physical activity; PDHPE = Personal Development, Health, And Physical Education; SSR = small screen recreation.

Principal attitudes and intervention acceptability: *Crunch&Sip*® and *Get Skilled, Get Active, Go!*

Overall, 93% of HNE Principals surveyed agreed or strongly agreed that Good for Kids had helped their school to implement healthy eating and physical activity initiatives. In addition, primary school Principals' attitudes towards the *Crunch&Sip*® and *Get Skilled, Get Active, Go!* programs were assessed after each intervention period. Two years after the launch of *Crunch&Sip*®, significantly more Principals in HNE reported that their school was provided with adequate support and resources to implement *Crunch&Sip*® ($p<0.0001$) and that their staff had been provided with appropriate training to implement *Crunch&Sip*® ($p<0.0001$) compared to Principals in the rest of NSW (Table 6.8).

After four years, significantly more Principals in the intervention region reported it was appropriate for schools to implement *Crunch&Sip*® and that fruit and vegetable breaks did not take too much time away from other priorities compared to Principals in the rest of NSW. After the *Get Skilled, Get Active, Go!* intervention, a high proportion (90%) of Principals agreed that classroom lessons and homework were effective ways to teach about reducing SSR. Whilst a sizeable minority (40%) thought that PE and sport meet children's physical activity needs there were no significant differences with Principals in the rest of NSW.

Table 6.8: Principal attitudes towards *Crunch&Sip*® and *Get Skilled, Get Active, Go!*

PROPORTION OF PRINCIPALS WHO AGREED WITH THE FOLLOWING:	HNE	NSW	P
<i>Crunch&Sip</i>®	Two year follow up		
School was provided with adequate support and resources to implement fruit and vegetable breaks	77%	41%	<0.0001
Staff were provided with appropriate training to implement fruit and vegetable breaks	78%	55%	<0.0001
	Four year follow up		
Appropriate for schools to implement fruit and vegetable breaks	95%	90%	0.0081
Fruit and vegetable breaks do not take too much time away from other priorities	92%	83%	0.0007
<i>Get Skilled, Get Active, Go!</i>	Two year follow up		
PE and sport provide all physical activity needed*	40%	33%	0.1182
Lessons and homework are an effective way to reduce small screen recreation*	90%	88%	0.5453

* These variables were not assessed at the four year follow up.
HNE=Hunter New England; PE=physical education

Meeting the needs of Aboriginal children

A key strategy in schools was the incorporation of the Health Impact Assessment recommendations into service delivery. This included building equity principles into healthy eating and physical activity policies. For example, schools identified how they would ensure that all children had access to fruit and vegetables despite financial or other circumstances. Additionally, aspects of the program and resource development were reviewed and revised in consultation with the Aboriginal staff and the Aboriginal Health Advisory Group. An Aboriginal Schools Project Officer was recruited to provide additional support to ensure the initiatives were implemented in a culturally appropriate manner.

Comment

At four year follow up, the majority of schools in the region had introduced policy and programs to support the implementation of *Crunch&Sip*® and *Get Skilled, Get Active, Go!*. Significant differences were seen for *Crunch&Sip*® in the HNE region compared to the rest of NSW. More schools in the intervention region: were implementing vegetable, fruit and water breaks in class time; had policies to support the provision of vegetables,

fruit and water; and communicated healthy eating messages with parents, indicating a positive intervention effect. After four years of intervention the majority (91%) of HNE schools were implementing fruit and vegetable breaks within the school day and 68.9% were certified for the *Crunch&Sip*® program. This result is greater than other studies reporting adoption of nutrition program within schools. An initiative implemented in the United States across a whole state (135 schools) indicated low adoption rates with only 35% of schools agreeing to accept a fruit and vegetable program, and of those that did; very few (10%) reported its implementation after a six month intervention.¹⁷

In contrast to the findings regarding healthy nutrition program adoption, adoption of physical activity practices by schools changed little in HNE or the rest of NSW during the intervention period. However, both HNE and the rest of NSW schools demonstrated an increase in the development of school physical activity policies. The short period of time during which the physical activity intervention was implemented may explain this finding.

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Children's services

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Background

In Australia, 72% of children aged four used some form of formal childcare service.¹ Such services provide an opportunity to introduce, promote and educate children and parents about appropriate food and physical activity for children at a crucial stage in their child's development. As a consequence, children's services have been increasingly recognised as an important setting for the delivery of interventions to prevent excessive weight gain.²

Aim

To enhance the capacity of Hunter New England (HNE) children's services to implement policies and practices that promote child healthy eating and physical activity.

Methods

Design

The evaluation employed a quasi-experimental study design. Long day care services and preschools located in the HNE region received a multi-component intervention to enhance their adoption of healthy eating (2007 to 2009) and physical activity (2009 to 2010) policies and practices. Telephone surveys were conducted with authorised supervisors of all long day care and preschool services in the HNE region, and a random selection of such services from the rest of NSW. Data regarding healthy eating policies and practices were collected pre intervention (2007) and post intervention (2009). Data regarding physical activity policies and practices were collected pre intervention (2009) and post intervention (2010).

Sample

Details of all licensed long day care and preschool services for NSW were obtained from the NSW Department of Family and Community Services, Office of Childcare (the licensing agency). All services in the HNE region and a 10% simple random sample of services from the rest of NSW were invited to participate in the evaluation. Services catering for children with special needs such as

intellectual or physical disabilities were excluded from the evaluation. In NSW, long day care services provide centre based care for eight or more hours per day for five days per week and usually enrol children aged six weeks to six years. Preschools provide centre based care for 6-8 hours per day and enrol children aged 3-6. Both long day care services and preschools provide educational activities for children aged 3-5 to assist in their preparation for school.

Policies and practices promoting healthy eating (2007-2009)

The healthy eating intervention aimed to assist services to implement policies and practices to increase the consumption of fruits, vegetables and water and reduce the consumption of sweetened drinks and foods high in fat, salt or sugar. All services were encouraged to ensure that staff were trained in nutrition, to implement a nutrition policy, to adopt policy regarding the provision of sweetened drinks to children during care, and for services where parents pack foods for their children, to adopt a policy regarding the types of foods and drinks recommended to be packed for children. Additionally, for those services providing meals to children, such services were encouraged to comply with nutritional guidelines consistent with recommendations of the *Dietary Guidelines for Children and Adolescents in Australia*,³ the *Children's Services Regulation 2004*,⁴ and the *Quality Improvement and Accreditation System Quality Practices Guide*.⁵ These policies and practices were the target of intervention between 2007 and 2009 (Figure 7.1).

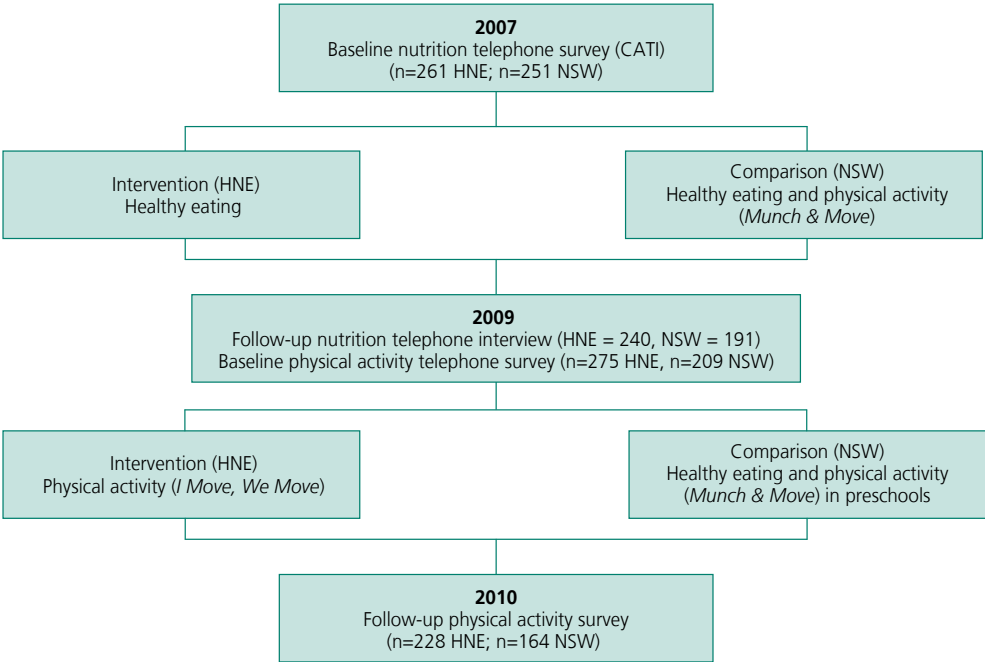
Policies and practices promoting physical activity (2009-2010)

The physical activity intervention aimed to increase the prevalence of services implementing key physical activity related practices consistent with the recommendations of the Australian *Get Up and Grow: Healthy Eating and Physical Activity for Early Childhood resources*⁶ and the *National Physical Activity Recommendations for Children 0-5 years*.⁷ The specific physical activity practices targeted by the intervention included: ensuring that services had a written physical activity policy; staff trained in child physical activity; staff providing daily structured fundamental

movement skills (FMS) sessions incorporating warm up and cool down components; skill specific feedback and demonstration being provided by staff; staff role modelling of active play; and introduction of limits on small screen recreation (SSR) and time children spent in sedentary

activities while in care. These policies and practices were the target of the intervention between 2009 and 2010 (Figure 7.1).

Figure 7.1: Design of Good for Kids evaluation in children’s services



Facilitating adoption of healthy eating and physical activity promoting policies and practices

To facilitate the implementation and adoption of the targeted healthy eating and physical activity policies and practices, a multi-component practice change intervention was developed based on practice change theory. The implementation and adoption strategies included evidence based strategies found to be effective in achieving organisational change including: training and professional development; incentives; resources tools and information; follow up support; performance monitoring and feedback. Application of these strategies to the healthy eating and activity interventions is described in Table 7.1.

Comparison area

Children’s services in the comparison area were not offered the practice change strategies. From July 2008, preschools in the comparison area were able to access an alternative government supported promotional initiative (*Munch & Move*) that aimed to promote physical activity and healthy eating by children’s services.⁸ The practice change strategies used in the state-wide initiative involved children’s services being invited to attend a full day workshop to support implementation of physical activity and healthy eating policies and practices, provision of a printed resource folder and provision of a small financial grant to support staff attendance at training or the purchase of equipment. Local health promotion services were encouraged to provide additional support strategies including site visits, demonstration activities, self-assessment checklists, equipment, and other resources. Long day care services were not provided access to *Munch & Move* resources or implementation support during the period covered in this report.

Table 7.1: Capacity building strategies to promote healthy eating and physical activity in children's services

	HEALTHY EATING IMPLEMENTATION STRATEGIES	PHYSICAL ACTIVITY IMPLEMENTATION STRATEGIES
Training staff in the delivery of the initiative	One staff member from each service was invited to a six hour nutrition workshop; CD-ROM and paper based modules of training were made available for all staff of all services; for services providing meals to children in care, a cook from each service was invited to participate in a six hour healthy menu planning workshop; staff training was conducted by Dietitians and Children's Services Advisors of the NSW Department of Family and Community Services.	Two staff from each service were invited to a six hour physical activity workshop; on-line training was made available for all staff of all services; staff training was conducted by a respected early childhood training organisation, and a local Authorised Supervisor (University lecturer who had considerable expertise in child physical activity).
Provision of program resources, materials, tools and information	All services received a nutrition resource kit including: the Good for Kids, Good for Life Best Practice Nutrition Guidelines for Children's Services; a policy template; nutrition games; activities and learning experiences; healthy lunchbox guides to assist parents to pack healthy foods and drinks; as well as a resource manual for Cooks including nutrition guidelines, menu review tools and healthy recipes.	All services received a physical activity resource kit including: a manual; instructional handbooks and DVD; games cards; posters; lanyards; policy templates; learning experiences; and information for parents.
Provision of incentives	No incentives were offered	Services adopting a physical activity policy went in a draw to win vouchers for educational toys and resources; services with staff completing on-line training went in a draw to win vouchers for educational toys and resources; staff completing on-line training went in the draw to win holiday accommodation.
Provision of adoption support overtime	All services were offered a 20 minute telephone support call to reinforce key program messages, identify barriers to practice change and provide additional advice and support; all services received five support newsletters to reinforce key messages and highlight case studies of successful services; all services were provided with a free contact number direct to a member of the project team for any further queries or support.	All services were offered two 15 minute telephone support calls to reinforce key program messages, identify barriers to practice change and provide additional advice and support; all services received two support emails or faxes and six newsletters to reinforce key messages, case study successful services and provide further information to services; all services were provided with a free contact number direct to a member of the project team for any further queries or support.
Performance monitoring and feedback	For services providing food to children and supplying a menu for audit during baseline data collection, authorised supervisors were provided feedback regarding how their menu could be improved during the telephone support call. Services were also invited to submit a future menu for review and written feedback.	Information collected during the telephone support contacts with the service was used to monitor adoption of intervention components and provide performance feedback regarding individual service implementation during telephone contacts.

Data collection

At baseline (2007) authorised supervisors (service managers) of selected eligible long day care centres and preschools were sent a letter inviting them to participate in the study. Approximately two weeks after receipt of the letter, a trained research assistant telephoned services to assess their interest in participation and confirm their eligibility. Eligible, consenting authorised supervisors completed computer-assisted telephone interviews (CATI) conducted by a trained research assistant. Requests to participate in similar surveys were made of the same cohort in 2009 and 2010. All long day care services providing lunch to children were asked to provide a copy of their menu in 2007 and 2009.

Measures

Service characteristics

A computer-assisted telephone interview was conducted with authorised supervisors of children's services by trained telephone interviewers in 2007, 2009 and 2010.

The telephone survey included items assessing service type (long day care or preschool), service size (average number of children and number of Indigenous children enrolled), postcode, and operational characteristics (average opening hours per day, number of days per week open).

Healthy eating policies and practices

In 2007 and 2009, the telephone survey included items assessing the existence of healthy eating policies and practices including: whether services had a nutrition policy; if the nutrition policy provided guidance regarding the content of foods and drinks packed by parents, that is, healthy lunch boxes, (for services where meals or snacks were provided by parents); and if the nutrition policy provided guidance on the content of food and drinks provided to children (for services where meals or snacks were provided by the service).

Physical activity policies and practices

In 2009 and 2010, the telephone survey assessed the following physical activity policies and practices: if staff participated in any professional development or training related to physical activity in the last 12 months; whether services had a written physical activity policy, and components of the policy (if the policy referred to physical activity requirements, FMS, limits on SSR, and physical activity training for staff); delivery of daily FMS sessions and the components of these sessions (warm up, cool down, skill specific feedback, extension and challenge experiences, modelling and demonstration); staff participation in active play and staff delivery of active verbal prompts; time spent in structured physical activities; the number of times per week children were allowed to watch SSR; and the number of times per day that children sat still for more than 30 minutes at a time. Knowledge regarding physical activity recommendations was also assessed by asking managers to report the recommended minutes or hours for: minimum time for participation in physical activity per day for children aged 2-5; maximum time for participation in SSR for children aged 2-5; and maximum time for children aged 2-5 being sedentary per day (based on the *Australian National Physical Activity Recommendations for Children 0-5 years*).⁷

Menu audit

In 2007 and 2009, authorised supervisors (the managers) of services providing lunch for children in their care were asked during the telephone survey to provide a copy of their current two week menu, via post or fax. A series of reminder faxes and/or telephone contacts prompted the return of menus.

To assist with completing the menu audit, authorised supervisors were asked to record specific details regarding the menu items such as the types of milk, fruit, vegetables and breads listed, and the foods included in mixed menu items, for example the type of meat and pasta in a lasagne. Services not providing sufficient information to audit their menu were contacted and the additional information was requested.

Based on a description of items included on services' menus for the first four eating occasions of each day of a two week menu (10 days), a Dietician extracted the following information:

- Number of processed foods high in fat salt and/or sugar (defined as fat: >20g of fat per 100g or >5g saturated fat per 100g; sugars: >15g of sugar per

100g; salt: >600mg of salt per 100g) excluding core dairy products (cheese milk, yoghurt, plain custard), dried fruit, ham, margarine, oils and spreads (for example vegemite, jam, peanut butter) listed on the menu.

- Number of sweetened drinks (defined as: juice, fruit drink, cordial, flavoured milk, soft drink) listed on the menu.
- Number of times water was listed on the menu.
- Number of child size serves of fruit (fresh, dried or canned) listed on the menu each day (a piece of fruit, fruit platter, mixed fruit and dried fruit were counted as one serve; fruit contained in cereals, and fruit juice was not counted). Note a child size serve is half of one standard size serve, as described in the *Australian Guide to Healthy Eating*.⁹
- Number of child size serves of vegetables listed on the menu each day (vegetable based main meal, and mixed vegetables were counted as two serves; a side salad, and a dish which includes vegetables such as chicken and vegetable pie were counted as one serve; and salad in a sandwich was counted as half a serve). Note a child size serve is half of one standard size serve, as described in the *Australian Guide to Healthy Eating*.⁹

Consistent with the Good for Kids Nutrition Guidelines, menus were then classified as follows:

- Number of processed items high in fat, salt and/or sugar
- Number of sweetened drink menu items
- Whether water was provided at every eating occasion
- Whether there was one child serve of fruit listed on the menu each day (as appropriate)

(The number of child size serves listed on the menu each day is related to the hours of opening, that is, at least one child size serve of vegetables listed on the menu each day if open less than eight hours; at least two child size serves of vegetables listed on the menu each day if open eight hours; or at least three child size serves of vegetables listed on the menu each day if open more than eight hours).

Analyses

Analyses were performed using SAS version 9.2 (SAS Institute Cary, NC; 2008). All statistical tests were two tailed with an alpha of 0.05. Descriptive statistics were used to describe the study sample. The Australian Standard Geographical Classification¹⁰ was used to classify service postcodes as from a major city, inner regional, outer regional, rural or remote area. Postcodes ranked in the top 50% of NSW according to the Socio-Economic

Indices for Areas¹¹ were classified as higher socioeconomic services. Chi Square tests for categorical variables and paired t-tests for continuous variables were used to compare changes in organisational policies and practices reported pre and post intervention within services in HNE and the rest of NSW. Logistic regression, within a generalised estimating equation framework was used to compare changes in policies and practices across pre and post intervention periods between intervention and comparison area. The logistic regression model included terms for time, region and the interaction of time and region. The p value from the interaction term was used to determine if there was a statistically significant difference in change between regions. Characteristics of services were not adjusted for in the logistic regression model as we were looking at change within services and the baseline score of the services effectively controlled for potential differences in baseline characteristics between the two regions. For menu analyses, logistic regression models were fitted to compare changes in cross-sectional assessments of compliance with menu recommendations across pre and post intervention periods between intervention and comparison regions. When the baseline for both regions was zero, the post values were compared using frequency tables and Fisher's exact tests.

Results

Healthy eating sample

In 2007, all 287 services in the intervention area (HNE) were invited to participate in the evaluation component of the study. Of these six were ineligible, five were unable to be contacted and 261 agreed to participate in the telephone survey (93% of eligible services). Similarly, of the 296 randomly selected services from the comparison area (elsewhere in NSW), five were ineligible, 16 could not be contacted and 251 (86% of eligible services) agreed to participate in the telephone survey.

In 2009, services sampled at baseline were re-contacted. Two hundred and seventy five eligible services from the intervention area (97% of eligible services) and 209 from the comparison area (72% of eligible services) completed the survey. Of these, 240 services from the intervention region and 191 from the comparison region had completed the survey in 2007 and were therefore included in analyses assessing the impact of the intervention in improving healthy eating policies and practices (Table 7.2). Of the services that participated in the 2007 survey, there were no significant differences between the socioeconomic or geographic characteristics of intervention or comparison region services that did and did not participate in the 2009 survey ($p=0.07-0.94$).

Table 7.2: Characteristics of services included in the nutrition outcome analyses by region

VARIABLE		INTERVENTION REGION (N=240)	COMPARISON REGION (N=191)
Services from higher socioeconomic areas		43%	71%
Geographic locality	Major city	38%	70%
	Inner regional	39%	18%
	Outer regional	30%	8%
	Remote or very remote	4%	2%
Services with Indigenous children		65%	39%
Number of children enrolled	mean (95% CI)	79.3 (74.6, 84.0)	73.9 (68.4, 79.4)
Number of hours open	mean (95% CI)	8.7 (8.5, 8.9)	9.3 (9.0, 9.5)
Number of days open	mean (95% CI)	4.8 (4.7, 4.9)	4.9 (4.8, 5.0)
Services with tertiary educated staff	median (min, max)	1.0 (0.0, 7.0)	1.0 (0.0, 7.0)

Menu audit sample

In 2007, 71 (27%) services in the intervention region completing the telephone survey provided lunch to children, and 36 of these (51%) provided a menu for audit compared to 50 (61%) in 2009. Of the 125 comparison region services completing the telephone survey in 2007 and providing lunch to children, 50 services (40%) provided a menu for audit compared to 52 (49%) in 2009. The characteristics of intervention and comparison services

included in the menu analysis in 2007 and 2009 are provided in Table 7.3. In 2007, services from the intervention region were less likely to be located in higher socioeconomic areas, but had a greater number of tertiary educated staff and were open for one hour less on average, relative to comparison services ($p<0.05$). Post intervention (2009) services in the intervention region providing a menu for audit were more likely to have a greater number of tertiary educated staff ($p<0.05$) relative to comparison services.

Table 7.3: Characteristics of services in menu audit analyses by region

VARIABLE		BASELINE 2007			FOLLOW UP 2009		
		INTERVENTION REGION N=36	COMPARISON REGION N=50	P VALUE	INTERVENTION REGION N=50	COMPARISON REGION N=52	P VALUE
Services from higher socioeconomic areas		27%	61%	0.003	54%	58%	0.69
Geographic areas							
Geographic locality*	Major city	68%	78%		63%	64%	
	Inner regional	18%	16%		20%	19%	
	Outer regional	15%	4%		16%	15%	
	Remote or very remote	0%	2%	0.29	0%	2%	1.00
Hours open	mean (95% CI)	10 (10.2, 10.7)	11 (10.5, 10.8)	0.04	10 (10.1, 10.8)	11 (10.6, 11.0)	0.07
Tertiary educated staff	median (min, max)	7 (3, 19)	4 (0, 10)	p < 0.01	7 (2-16)	5 (1-15)	p < 0.01

*One to three services missing; percentages compared using Fisher's Exact test, means compared using t tests, medians compared using Wilcoxon Two Sample test.

Physical activity sample

In 2010, all services completing the telephone survey in 2009 were re-contacted. Of these 228 (82%) eligible services from the intervention and 164 (78%) from the comparison regions completed the telephone survey and were included in analyses assessing the impact of the intervention in improving physical activity policies and practices. Of the services that participated in the 2009 survey, there were no significant differences between the

socioeconomic or geographic characteristics of intervention region services ($p=0.21-0.22$) between those that did and did not participate in the telephone survey in 2010.

Compared to intervention services, comparison services were more likely to be from lower socioeconomic areas, were less likely to have children of Aboriginal background enrolled and more likely to be located in major cities (all $p=0.01$) (Table 7.4).

Table 7.4: Characteristics of services included in physical activity outcome analyses by region.

VARIABLE		INTERVENTION REGION (N=228)	COMPARISON REGION (N=164)
Services from higher socioeconomic areas		42%	68%
Geographic locality	Major city	36%	68%
	Inner regional	31%	21%
	Outer regional	29%	8%
	Remote	3%	2%
Services with Indigenous children		71%	43%
Number of children enrolled	mean (95% CI)	83.6 (78.2, 89.0)	79.9 (72.6, 87.2)
Number of hours the service is open	mean (95% CI)	8.7 (8.5, 9.0)	9.2 (8.9, 9.5)
Number of tertiary educated staff	median (min, max)	1.3 (1.1, 1.4)	1.0 (1.1, 1.5)

Healthy eating policies and practices

All services in the HNE region received healthy eating program resources and 63% participated in the nutrition training workshops provided as part of the intervention. The prevalence of healthy eating policies and practices pre and post intervention in the intervention and comparison regions is provided in Table 7.5. While significant improvements in a number of nutrition policies

and practices were reported within intervention and comparison regions at the 2009 follow up survey, the increase in the proportion of services providing water or plain milk only to children and parent participation were significantly greater among services in the intervention area compared to those in the comparison area ($p=0.02$).

Table 7.5: Changes in nutrition policies and practices over time by region

VARIABLE	INTERVENTION REGION (N=240)			COMPARISON REGION (N=191)			INTERACTION P VALUE
	BASELINE 2007	FOLLOW UP 2009	P VALUE	BASELINE 2007	FOLLOW UP 2009	P VALUE	
Staff with nutrition training	53%	80%	<0.01	51%	72%	<0.0001	0.18
Services with a policy guiding the content of food and drinks provided to children by the service*	88%	65%	<0.001	85%	79%	0.19	0.06
Services with a policy guiding the content of food and drinks packed for children by parents†	91%	97%	0.03	89%	86%	0.64	0.06
Services providing only water or plain milk to children	68%	95%	<0.0001	58%	82%	<0.0001	0.02
Parent participation in nutrition policy or programs	65%	77%	<0.01	65%	59%	0.17	<0.01

* For services providing meals to children only

† For services where parents pack foods for children only

Menu audit

There was a significant increase in the proportion of services meeting three of the five recommendations regarding sweetened drinks, fruits and vegetables listed on menus of services from the intervention region (Table 7.6). No significant changes in the proportion of services meeting such recommendations were reported among services in the comparison area. The rate of increase was significantly greater among services in the intervention area compared with services in the comparison region in the proportion of services meeting recommendations regarding sweetened drinks, fruits and vegetables.

A significant reduction was observed in the average number of high fat, salt and/or sugar items on menus in intervention services (Table 7.7). Significant reductions were also observed in the number of sweetened drink items and serves of fruit. There was also a significant increase in serves of vegetables. In the comparison region, a significant increase in serves of vegetables was observed. Changes in the average number of items on menus were significantly different between the intervention and comparison region for all the items assessed.

Table 7.6: Proportion of children's services providing lunch to children who meet healthy eating recommendations

VARIABLE	INTERVENTION REGION			COMPARISON REGION			INTERACTION P VALUE
	BASELINE 2007 (N=36)	FOLLOW UP 2009 (N=50)	P VALUE	BASELINE 2007 (N=50)	FOLLOW UP 2009 (N=52)	P VALUE	
Services meeting high fat, salt, sugar recommendation (no high fat, salt and/or sugar processed food menu items)	0%	10%	0.07	2%	2%	1.00	0.11
Services meeting sweetened drink recommendation (no sweetened drink menu items)	50%	96%	<0.01	42%	52%	0.33	<0.01
Services meeting water recommendation (water with every eating occasion)	11%	20%	0.38	16%	23%	0.62	1.00
Services meeting fruit recommendation (one child serve of fruit listed on the menu each day)	0%	34%	<0.01	2%	6%	0.62	<0.01
Services meeting vegetable recommendation (number of child size serves listed on the menu each day is appropriate to hours open)	0%	20%	<0.01	0%	4%	1.00	0.01

Note: bold indicates statistically significant difference at $p < 0.05$

Table 7.7: Change in mean number of items or serves of key foods and drinks listed on menus each day over time (2006-2009) by region

VARIABLE	INTERVENTION REGION			COMPARISON REGION			INTERACTION P VALUE
	BASELINE 2007 (N=36)	FOLLOW UP 2009 (N=50)	P VALUE	BASELINE 2007 (N=50)	FOLLOW UP 2009 (N=52)	P VALUE	
High fat, salt and/or sugar processed food menu items	1.6	0.7	<0.01	1.4	1.2	0.09	0.001
Sweetened drink menu items	0.4	0.0	<0.01	0.5	0.4	0.29	<0.001
Child size serves of fruit	1.9	1.4	<0.01	2.0	1.9	0.79	0.05
Child size serves of vegetables	1.4	2.4	<0.001	1.5	1.7	0.04	<0.001

Note: bold indicates statistically significant difference at p< 0.05

Table 7.8: Changes in physical activity policies and practices over time by region

VARIABLE	HNE			NSW			INTERACTION P VALUE
	BASELINE 2009	FOLLOW UP 2010	P VALUE	BASELINE 2009	FOLLOW UP 2010	P VALUE	
Services with a physical activity policy	21%	49%	<0.01	34%	38%	0.43	<0.01
Physical activity policy referred to child FMS development*	86%	87%	0.77	80%	85%	0.43	0.72
Physical activity policy referred to limits on SSR and television*	45%	82%	<0.01	60%	65%	0.61	<0.01
Physical activity policy referred to PA training for staff*	63%	86%	<0.01	60%	68%	0.38	0.07
Services with staff trained in PA	29%	76%	<0.01	37%	43%	0.26	<0.01
Services conducting daily FMS with recommended components	13%	21%	0.01	13%	12%	0.87	0.08
Services where all staff usually participated in active play	58%	65%	0.13	61%	69%	0.19	0.95
Services where all staff usually provided verbal prompts for physical activity	72%	74%	0.56	69%	72%	0.51	0.90
Services where children were allowed to watch SSR less than once per week	23%	22%	0.74	19%	17%	0.67	0.88
Services where children spent less than 30 minutes sitting still per day	62%	63%	0.85	59%	62%	0.65	0.82
Time spent on structured physical activities (mean hours, standard deviation)	1.31 (0.98)	1.49 (1.01)	0.02	1.46 (1.08)	1.58 (0.98)	0.25	0.65
Services where the authorised supervisor knew the minimum recommendations for physical activity	14%	21%	0.07	20%	13%	0.06	<0.01
Services where the authorised supervisor knew the maximum recommendations for small screen recommendations per day (aged 2-5)	46%	40%	0.19	46%	32%	0.01	0.27
Services where the authorised supervisor knew the maximum recommendations for time children should be sedentary (aged 2-5)	5.4%	11%	0.02	2.5%	12%	<0.01	0.21

*For services with a policy

FMS=fundamental movement skills; PA=physical activity; SSR=small screen recreation

Note: bold indicates statistically significant difference at p< 0.05

Physical activity policies and practices

All services in the HNE region reviewed physical activity resources and 65% participated in the physical activity training workshops provided as part of the intervention. The prevalence of physical activity policies and practices is provided in Table 7.8. Significant post intervention increases in the proportion of services with a physical activity policy, and with a policy covering SSR time limits and staff physical activity training were reported in the intervention region. Significant increases were also evident among services in the intervention area in the time allocated for structured physical activity, the proportion of services with staff trained in physical activity, the proportion implementing daily FMS programs including all recommended components and with knowledge of recommendations regarding the maximum time children should be sedentary. Among services from the comparison area, significant increases at follow up were reported in the proportion of services with an authorised supervisor with knowledge of recommendations regarding the recommendations for SSR and maximum time children should be sedentary. The increase in such policies and practices was significantly greater among services in the intervention area compared with services in the comparison area in the proportion of services with a physical activity policy, with a policy covering SSR time for children, with staff trained in physical activity and with knowledge of the physical activity recommendations for children.

Service manager knowledge and acceptability of the intervention strategies and resources

Knowledge regarding physical activity recommendations was assessed by asking managers to report the recommended minutes or hours for: minimum time for participation in physical activity per day for children aged 2-5; maximum time for participation in SSR for children aged 2-5; and maximum time for children aged 2-5 being sedentary per day, based on the *Australian National Physical Activity Recommendations for Children 0-5 years*.⁷

Meeting the needs of Aboriginal children

A key strategy in ensuring the children's services interventions were culturally acceptable involved building equity principles into healthy eating and physical activity policies. To support the Aboriginal and Torres Strait Islander early childhood sector, Good for Kids staff provided training workshops regarding nutrition and physical activity at an Aboriginal and Torres Strait Islander Early Childhood Sector Advisory Group conference and sponsored staff from Aboriginal children's services to attend. To improve cultural relevance of the physical activity initiative, the initiative included a focus on Indigenous games.

Comment

The evaluation suggests that the Good for Kids intervention in children's services resulted in increases in the appropriate provision of foods and drinks to children in care by services, in the training of staff regarding the promotion of child physical activity, and in implementation of physical activity policies.

The observed adoption of healthy eating and physical activity policies and practices is consistent with previous efficacy trials which have reported positive changes in the adoption of policies and practices.^{12,13} Such trials have been conducted on a small number of intervention services and utilised convenience samples.^{12,13} The findings of this evaluation suggest that the intervention was effective in achieving similar improvements across an entire population (7,280) of services. Nonetheless, the findings suggest the need for more intensive and prolonged intervention support in order for comprehensive changes to the policy and practice environment of childcare services.

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Health service food and drink outlets

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Background

Health services have the potential to model a healthy environment through the provision of nutritious food and drink options for sale to staff, visitors and outpatients. Health professionals routinely provide advice to clients on healthy eating and it is important that this advice is not undermined by lack of healthy food and drink items offered for sale in the health service environment. The limited data available suggest that outlets selling food or drink items in health facilities provide predominantly unhealthy choices.^{1,2}

To improve the nutritional quality of foods available in health services, several Australian states have introduced policies requiring public health sites to provide healthier food and drink choices from vending machines and retail outlets, and to restrict unhealthy products within such outlets.³⁻⁷ Such policies primarily use a traffic light system that classifies items using the colours red, amber and green, to indicate the least healthy (red) to most healthy (green) choices. In late 2007 NSW Health released a policy relating to provision of healthier food and drink options offered for sale in health facilities.

Aim

To increase the capacity of the Former Hunter New England Area Health Service (HNEAHS) to provide healthier food and drink options in vending machines and food outlets.

Methods Design

A pre post non-controlled study design was used to evaluate the impact of an intervention implemented between 2008 and 2010. Baseline audits of vending machines and outlets selling food and drink were undertaken prior to implementation of the intervention (2007 for vending machines and 2008 for outlets).

Follow up audits were undertaken in 2011 for vending machines, and in 2010 for outlets.

Sample

Vending machines and outlets selling food and drink on HNEAHS sites were identified in 2007. There were 112 vending machines identified, excluding those selling only hot drinks, located on 30 sites, with between one and 31 machines per site. Five sites had five or more machines. At follow up in early 2011, 114 machines were identified, excluding those selling only hot drinks, and these were located on 30 sites.

In 2008 there were 19 outlets selling food and drink on 10 sites. Only five outlets operated by HNEAHS (four staff cafeterias and one kiosk) were provided the full intervention as the remaining outlets were exempt from the NSW Health Policy Directive (eight fundraising kiosks operated by volunteers, and six outlets under private contract). Effort was made to engage the fundraising kiosks in the intervention but engagement was minimal given the policy directive. Outlets under private contract were offered the intervention but declined.

Intervention

The intervention *Healthier Choices* was developed to be supportive of the NSW Health Policy Directive, first released in 2007³ and amended in 2009.⁴ The Policy Directive addresses the provision of drinks and commercial ready-to-eat or pre-packaged foods (including salads and sandwiches) for vending machines and outlets selling food and drink. It is based on an adapted version of the traffic light nutritional classification system used as part of the NSW Fresh Tastes @ School Canteen Strategy.⁸ The standards outlined in the Policy Directive required vending machines and outlets to: offer at least 80% healthier (Green or Amber) drinks and commercial ready-to-eat food items; restrict serving sizes of Red (least healthy) drinks to 375 ml or less; and label healthier options.

Prior to the intervention, no specific requirements were in place to improve the nutritional value of food and drinks sold in vending machines or outlets. Table 8.1 outlines

strategies implemented as part of the *Healthier Choices* program. Intervention development and delivery was primarily undertaken by project staff and the Area

Contracts Manager (for vending) under the reference of an Advisory Committee.

Table 8.1: Strategies implemented to improve the nutritional quality of foods in vending machines and food outlets in the HNE Area Health Service

COMPONENT	STRATEGIES IMPLEMENTED	
	VENDING MACHINES	FOOD OUTLETS
Building leadership and consensus	Area Advisory Committee Memos from HNEAHS executive to site managers to encourage support Engagement of HNEAHS contracts manager	Area Advisory Committee Memos from HNEAHS executive to site managers to encourage support
Resources, tools, information; incorporation into systems/procedures	Development of HNEAHS Vending Policy Compliance Procedure* <i>Healthier Choices</i> requirements built into tender and contract processes for supply of vending machine services HNEAHS vending contract Nov 2008 included <i>Healthier Choices</i> conditions Contractor provided with: <i>Healthier Choices</i> logo for vending machines; and classification system resource	Development of HNEAHS Outlets Policy Compliance Procedure* <i>Healthier Choices</i> Guide and resources disseminated during site visits: logo and signage for products; posters; classification of product table; taste testing kit; % calculation tool <i>Healthier Choices</i> fact sheets circulated to outlets each year Offer of revised menu board with green and amber items labelled
Training		Invitation to outlet managers to attend Healthy Canteen expo
Follow up support	Reactive- dietician advice on request†	Proactive – dietician support Site visits – two per year Telephone support calls Reactive – dietician advice available on request via email or phone
Monitoring and feedback	Reactive feedback to contractor on planograms for planned stock†	Audit monitoring and feedback –tailored written reports to outlet managers

* The Policy Compliance Procedure outlined that requirements be built into tender or contract processes. There was minimal capacity for this for outlets within this intervention period; however *Healthier Choices* requirements were built into tender and contract processes for one private outlet contract enacted during 2010. This outlet is not included in this evaluation as it had not been set up at follow up audit. Policy Compliance Procedures also included a communication strategy that included presentations to key stakeholders including health service managers and dietitians.

† Feedback provided twice for planned drinks machines and once for planned snack machines, other advice on *Healthier Choices* was not sought.

Data collection and measures

Information on products offered in each slot of vending machines (including brand, size, flavour), and on all items visible for sale or listed on menu boards in outlets, was collected by project staff on standardised audit forms. Included in the tally of commercial ready to eat foods were those in packages, and those that are eaten in the form they are received, that is, they may have needed toasting or reheating, but required no further preparation or cooking (for example cooking chips by frying raw potatoes were not included). Additional information that was recorded included the presence of signage or labels indicating healthier choices. Classification of products as red, amber or green was undertaken by project staff with dietetic training using criteria adapted from those developed by NSW Health.⁴

Analysis

Analysis was undertaken in Microsoft Excel and SAS version 9.2 (SAS Institute Inc. Cary, NC; 2008). For vending machines the data were treated as cross sectional independent samples, and the main outcome was the percentage of slots (excluding empty slots) in each machine classified as either amber or green. This was calculated for drinks and foods or snacks separately. Non-parametric Kruskal-Wallis tests were undertaken to compare baseline and follow up samples on the mean proportion of drinks (and foods) per machine that were amber or green. For outlets, the main outcome was the percentage of items offered by each outlet classified as amber or green, calculated for drinks and foods or snacks separately. Each brand, size or flavour of a product was counted as a separate item. The five outlets operated by the HNEAHS were included in analyses. Paired t-tests were undertaken to compare baseline and follow up mean percentages of drinks and foods. With only five

outlets, the tests had the power to detect mean changes of about 20 or more as being statistically significant (if standard deviation=16, alpha=0.05, power=80%).

Secondary outcome measures were whether machines or outlets met the 80% green or amber standard, whether machines or outlets had all red drinks meeting the serve size restrictions (375ml or less), and whether machines or outlets labelled green and or amber drink or food options. For vending machines labelling was defined as occurring if all green and amber products were accurately labelled and there was information explaining the labels. For outlets, labelling was defined as occurring if at least one green or amber product was accurately labelled.

Fisher's exact tests were undertaken to compare baseline and follow up data for each categorical vending outcome: machines meeting 80% amber or green standard (yes/no); machines with all red drinks 375ml or less (yes/no), machines labelling green or amber items (yes/no). Statistical tests for categorical variables were not undertaken for outlets given the small number of outlets.

Results

The baseline audit was conducted on 88 vending machines (79% of machines), located on 24 sites. The follow up sample consisted of 90 machines (80% of machines), located on 26 sites. Machines not included in the audits were either out of order during audit visits, located in

areas not accessible to non-clinical staff, or on sites that it was not possible to visit during the audit timeframes.

Table 8.2 provides information on items offered for sale from the audited machines at baseline and follow up. Of the machines audited at follow up, seven were classified as fundraising, and four were exempt from the policy as they were within a retail lease arrangement in a major hospital.

The mean proportion of amber or green drinks was significantly higher at follow up than at baseline ($p<0.05$). Few machines ($n=4$) met the 80% standard, which was not significantly different to baseline ($p>0.05$). The proportion of machines that met serve size restriction standards for all red drinks remained under half of machines at follow up and had not increased significantly from baseline ($p>0.05$). Machines typically included sports drinks, flavoured, sweetened waters and iced teas in 500-600ml sizes. Labelling of healthy drink options occurred in 26% of machines selling drinks, significantly higher than at baseline ($p=0.01$). With respect to foods in machines, the follow up values for each outcome measure were not significantly different to baseline ($p>0.05$).

Table 8.3 provides information on items offered for sale from outlets operated by the HNEAHS at baseline and follow up.

Table 8.2: Nutritional quality of food and drinks in vending machines at baseline and follow up

VARIABLE	MACHINES SELLING DRINKS*		MACHINES SELLING FOOD OR SNACKS*	
	2007 (N=61)	2011 (N=62)	2007 (N=34)	2011 (N=47)
Amber or green slots per machine, mean %	29%	51%	1%	3%
Machines with at least 80% amber or green, n (%)	0	4 (6%)	0	1 (2%) [†]
Machines with all red drinks 375ml or less, n (%)	19‡ (31%)	27 (44%)		
Machines with amber or green items labelled, n (%)	0	16 (26%)	0	3 (6%)

* Combination machines selling both drinks and snacks are included in totals. There were seven combination machines at baseline and 19 at follow up.

[†] sandwich machine

[‡] machines selling cans of drink only

Table 8.3: Nutritional quality of food and drinks in health service operated food outlets at baseline and follow up

VARIABLE	YEAR	
	2008 (N=5)	2010 (N=5)
Amber/green drinks per outlet, mean %	58%	72%
Outlets with at least 80% amber/green drinks, n	0	2
Outlets with all red drinks 375ml or less, n	1	3
Amber/green foods per outlet, mean %	60%	69%
Outlets with at least 80% amber/green foods, n	1	2

Labelling of healthier food and drink options occurred at four outlets at follow up, compared to none at baseline.

The mean improvements in the percentage of amber or green drinks and foods were not statistically significant ($p>0.05$).

Comment

The intervention was associated with significant increases in the nutritional quality and labelling of drinks available from vending machines in the HNEAHS. However, few machines met the required standard of 80% amber or green drinks. No significant changes in foods stocked in vending machines were found. Such results suggest that the introduction of a policy and subsequent changes to contracts were insufficient strategies to achieve the stated objectives. A variety of barriers exist to changing the products available in vending machines including: real or perceived financial barriers;¹ difficulties in modifying contracts; and product supply barriers such as availability of alternative products and product sizes. Alternative products, of appropriate size and price are more readily available for drinks than snacks.

The finding that changing the stocking of food or snack items in machines was less effective than changing drink items is consistent with feedback received during implementation of an equivalent policy by Queensland Health.⁹ Evaluation of the Queensland Government strategy showed that most facilities implemented more than half of the policy strategies, and 25% reported full implementation.⁹ The evaluation reported reductions in unhealthy products in vending machines. However, the Queensland study reported that such reductions were less likely with regard to changing snack vending machines.

The potential reach of the outlet focused intervention was small, and limited success was obtained among the limited number of outlets. No more than three of the five outlets met specified standards. Such findings suggest that the strategies of introducing a policy, providing resources, support visits or phone calls and audit and feedback may not have been sufficient. More formal compliance or enforcement strategies may be required to address the real or perceived financial disincentives to such a change and/or strategies that facilitate the adoption of business models that meet both healthy nutrition and financial objectives of such businesses.

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General practice

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Background

Primary health care settings such as general practices provide access to a large number of children each year.¹ General practice is a setting that is recommended to provide preventive care for children across a range of ages. With respect to the prevention of child overweight and obesity, such recommendations include the assessment of Body Mass Index (BMI), the provision of nutrition and physical activity advice, and referral to more specialist providers for the management and/or prevention of child obesity.² In addition to the provision of such care, contact between a general practitioner (GP) or practice nurse and a parent and/or child provides an opportunity to introduce, promote and educate parents and children about appropriate food and physical activity choices more broadly, and the role these behaviours can play in maintaining healthy weight in children. Given that clinicians in general practice are highly regarded sources of health advice, such advice has the potential to reinforce the importance of similar messages provided in other settings.

A Healthy Kids Check was introduced by the Australian Government in July 2008 as a recommended preventive care action for all four year olds. The check, to be delivered in conjunction with immunisation, included mandatory assessment of weight and height, and recommended the provision of nutrition and physical activity advice. Delivery of the check attracted Medicare reimbursement that could be claimed by a GP or practice nurse. The introduction of the check provided a platform for the Good for Kids program to enhance the focus on the prevention of child overweight and obesity in the general practice setting.

Aim

To enhance the capacity of Hunter New England (HNE) clinicians in general practice (practice nurses and GPs) to promote child healthy eating and physical activity through implementation of the four year old Healthy Kids Check.

Methods

Design

A descriptive evaluation was undertaken to assess the implementation, impact and acceptability of an intervention that promoted the Healthy Kids Checks as an opportunity for BMI assessment and provision of healthy eating and physical activity messages. Data were obtained from: implementation reports from Divisions of General Practice (DGP) (the organisations that delivered the intervention); Medicare data; a parent survey; and semi-structured interviews with a representative from each DGP.

Sample

All five DGP within the HNE Area Health Service (HNEAHS) region were invited to participate. The DGP collectively provided services to approximately 300 practices, with more than 520 full time equivalent GPs (at least 700 practitioners) and at least 450 practice nurses. The number of practices within each DGP varied between 18 and 148.

Intervention

All five DGP agreed to deliver the Good for Kids training and support intervention to member practices under a service agreement covering the 2008/2009 financial year. Three DGP implemented the intervention for a second year (July 2009-June 2010). The latter three DGP provided services to approximately 243 practices (81% of HNE practices). Approval for the intervention was provided by the HNE General Practice Partnership, a collaborative initiative between the five DGP and HNEAHS. DGP were funded to provide the training and support to clinicians (GPs and practice nurses). The components of the intervention are described in Table 9.1.

Table 9.1: Components of training and support intervention delivered through Divisions of General Practice

COMPONENT	APPLICATION
Training	Delivered accredited training sessions (targets for number of providers trained) Practice visits (all practices to be reached at least once). DVD of key professional development session available.
Resources and information	Offered to clinicians attending training sessions and those receiving practice visits: <ul style="list-style-type: none"> • Good for Kids, Good for Life waiting room poster (encouraged asking about Healthy Kids Check). • Good for Kids, Good for Life Healthy Family checklist (a checklist for parents to score their healthy habits and plan changes in family habits used in consultation with or given to parent). Checklist complemented the Commonwealth Resource <i>Get Set 4 Life - Habits for Healthy Kids</i> provided at Healthy Kids Checks. • National Health and Medical Research Council Guidelines on Management of Child Obesity and recent articles on practical application of guidelines. • Laminated BMI calculation tables for boys and girls. • Resources for children: Good for Kids water bottles, wrist bands, stickers, tattoos, and Good for Kids Vegies – Serve 'em up tennis balls. • Articles in clinician newsletters; Topics: Good for Kids program; Healthy Kids Check; BMI for children in general practice; sweetened drinks; fruit and vegies; snacks; physical activity; Aboriginal child health checks.
Incentives	Training and practice visits to emphasise the Medicare reimbursement for Healthy Kids Checks.
Feedback	Data from survey of clinicians attending training or during practice visits regarding BMI assessment, advice provision, use of the Healthy Kids Check and barriers. Summarised data were to be provided back to clinicians via newsletters.
Follow up support	Email or phone Divisions of General Practice contact, toll-free contact number to Good for Kids program.

Comparison area

From July 2008, the four year old Healthy Kids Medicare item and the associated parent resources became available in Australia. Support provided to practices elsewhere in NSW to make use of the Healthy Kids Check was at the discretion of the local DGP and/or area health services. In 2009/2010, free training for practice nurses regarding implementation of the Healthy Kids Check was implemented by NSW Health. The training was available on request throughout NSW, including HNE.

Data collection and measures

The following data sources were utilised:

Division of General Practice intervention implementation activity reports

Data describing the implementation of the intervention was derived from reports from DGP. Representatives were asked to record on a standard template on a six monthly basis: details of professional development events conducted; number of practice visits undertaken per period and cumulatively; cumulative totals of providers spoken to on visits; and communication strategies.

Medicare item data

Medicare item data on Healthy Kids Checks claimed were summarised. Items accessed from the Medicare Australia website and from DGP for the period between July 2008 and Dec 2010 were item number 709 (checks undertaken by GPs) and item 711 (checks undertaken by practice nurses), which was mapped to item 10986 after Medicare item changes from May 2010.

Parent Survey

Self-report data on care provided in conjunction with immunisation was obtained from a cross sectional random sample of parents from HNE and from the rest of NSW at the completion of the intervention in 2010, via the 2010 random household survey described in section 5.

In 2010, parents of children aged 4-6 were asked in the survey whether, in the past two years they had been with their child to a general practice for their four year old (preschool) immunisation. Those who had attended were asked whether the doctor or practice nurse: measured height or weight; talked with them or gave them tips about healthy eating or physical activity for their child. The survey also included items assessing parent and child characteristics (parent age, gender, Aboriginality, child age, gender and Aboriginality).

Intervention acceptability interviews

Data on intervention acceptability were collected using semi-structured interviews with a member of staff in each DGP that had been the main contact for the program. The interviews were conducted via telephone at the end of 2009 and assessed perceptions of intervention effectiveness and barriers to intervention implementation and uptake.

Analysis

Descriptive statistics were used to summarise all data. Analyses of parent survey data were performed using SAS version 9.2 (SAS Institute Inc. Cary, NC; 2008). Chi Square tests were used to compare responses from HNE and NSW parents demographic items and on care provided during the four year old immunisation.

Results

Intervention implementation by Divisions of General Practice

The data relate to the delivery of interventions across the intervention period of two years for three DGP, and one year for the remaining two DGP.

Professional development sessions, practice visits and follow up

During the intervention period, 19 professional development sessions were run, with 216 GPs (approximately 30%), and 320 practice nurses (approximately 70%) attending at least one session. With respect to practice visits during the intervention period: 10% of practices received no visits; 52% had one visit; 9% had two visits, 2% had three visits and 27% had four or more visits. Thus 38% of practices had at least one follow up after the initial visit. The number of general practice staff reached during the practice visits included 71 GPs (approximately 10%), 134 practice nurses (approximately 30%), and 83 practice managers.

Communication activities

Each DGP provided four to six newsletter articles to clinicians during the intervention period, with two DGP providing multiple other brief communications to providers. Two DGP reported Healthy Kids Check Medicare utilisation data in communication to clinicians on at least one occasion.

Feedback

All DGP undertook pen and paper provider surveys, however data were not reported back to providers as planned due to poor response levels.

Medicare item data

Data relating to item 709 were not available for one DGP and data for item 711/10986 were not available for another DGP (cells suppressed due to privacy constraints). The following counts are therefore likely to slightly underestimate HNE claims. From July 2008 to Dec 2010 Medicare data reports showed 2,762 claims for item 709 and 5,195 claims for item 711 (mapped to 10986) for the HNE region. During this period there were 14,104 claims for item 709 and 16,820 claims for item 711 (mapped to item 10986 which had been superseded) for the rest NSW. The HNE claims represent 31% of checks completed by practice nurses in NSW and 19% of those by GPs. Based on 2006 census data, in 2010 HNE had a population of 53,880 children aged 0-4 and 55,301 children aged 5-9, representing around 11% of children in these age groups in NSW.³

Parent survey

A total of 1,618 parents of children aged 2-15 completed the parent survey, representing a response rate of 63%. Of the survey participants, 471 parents with children aged 4-6 at the time of the intervention were asked whether they had attended general practice consultations with their children for the four year old immunisation in the previous two years. The characteristics of the 316 parents who had participated in a consultation (162 HNE, 154 rest of NSW) are shown in Table 9.2 along with reported provision of care regarding the promotion of healthy weight and physical activity.

Table 9.2: Parents attending general practice for four year old immunisation in last two years: characteristics and reported practices

VARIABLE	HNE (N=162)	NSW (N=154)	P VALUE
PARENT CHARACTERISTICS			
Female (%)	84	83	
Age (mean)	37.3	37.3	
Aboriginality (%)	2.5	0.6	
CHILD CHARACTERISTICS			
Female (%)	47	51	
Age (mean)	4.9	5.0	
Aboriginality (%)	3.1	2.6	
Doctor or practice nurse assessed weight and height (%)	29%	38%	0.69
Doctor or practice nurse provided healthy eating or physical activity advice (%)	27.2%	12.9%	0.002

Note: bold indicates statistically significant difference at $p < 0.05$

Intervention acceptability

One representative from each DGP provided semi-structured interview data (n=5). Benefits to clinicians was perceived to be variable, however all DGP representatives suggested that it had helped build confidence and awareness among practice nurses. Four DGP representatives reported barriers to implementing the intervention strategies, mainly around the conduct of practice visits. With the exception of one DGP in which the staff routinely visited all practices, others reported the visits were difficult to undertake due to lack of acceptability to clinicians (lack of time or priority), and/or distance involved.

All DGP representatives reported that clinicians had indicated there were barriers to routinely delivering the Healthy Kids Checks within or around the same time as immunisation, including: difficulty getting through

elements in a timely manner: low level of reimbursement for the work involved; the difficulty in how to manage a child if their BMI shows them to be at risk; absence of specialist referral options; lack of skill in providing dietary advice; cost to parents of follow up appointments especially if child was not at high risk. Three representatives indicated that it was beneficial that the item number could be undertaken by practice nurses.

Meeting the needs of Aboriginal children

DGP were contracted to offer training and support to Aboriginal Medical Services (AMS) within their areas. During the intervention period, 12 AMS clinicians attended professional development sessions and 18 AMS clinicians received practice visits.

Comment

The Medicare data suggest that the uptake of the Health Kids Check item numbers was low relative to the population of eligible children in HNE (around 8,000 claims during a two and a half year period when there are likely to have been at least 10,000 children turning four years old each year). Uptake of the item has similarly been reported to be low across Australia.⁴ Claims by practice nurses and GPs within HNE represented around one quarter of claims for the Healthy Kids Checks in NSW.

Parent reported care delivery data suggest that assessment of height and weight with the four year immunisation was not significantly lower within HNE compared to the rest of NSW, with less than 40% of parents in both areas reporting such care. However, the parent report data suggest that healthy eating and/or physical activity advice may be more likely to have occurred during immunisation visits in HNE than in the rest of NSW (27% vs 132.9%).

The reported implementation of intervention activities suggests that although the Good for Kids intervention achieved reasonable reach for some common components of practice change interventions, with most practices receiving at least one practice visit (90%) and the majority of practice nurses participating in at least one professional development session (70%), the intervention was of low intensity for clinicians. The results are consistent with past literature documenting the challenges in increasing delivery of preventive care within general practice.

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Community service organisations

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Background

The family environment is a major influence on the dietary and physical activity habits of young children.^{1,2} Creating a home environment which is supportive of obesity prevention represents a considerable challenge for families, particularly those with limited social and financial resources. Parents report that they lack the confidence, knowledge and skills to prepare and provide healthy meals,^{3,4} and find the cost of fresh foods or organised sports prohibitive to child healthy eating and physical activity.^{4,5,6}

Previous reviews have demonstrated that home-visiting services are a valuable means to engage disadvantaged families.⁷ Home-visiting services have also been found to be effective in supporting families to improve their circumstances and create an environment that promotes

healthy development.^{7,8} Such services may similarly be effective in supporting parents to encourage child healthy eating and physical activity.

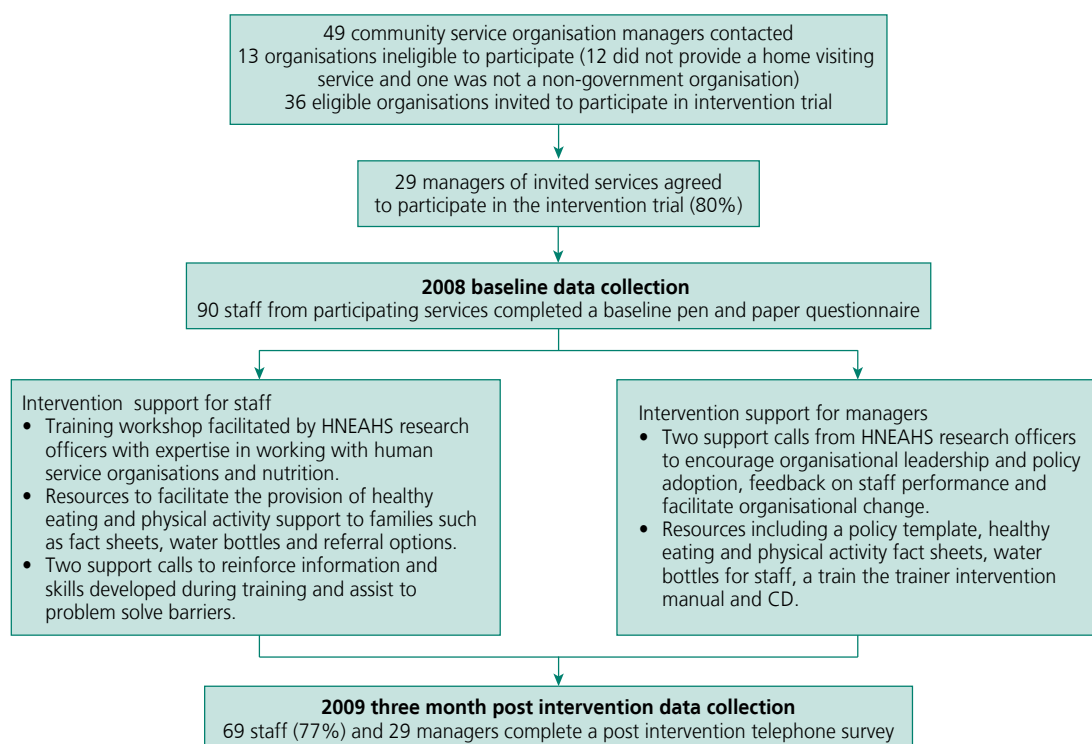
Aim

To increase the healthy eating and physical activity support provided to disadvantaged families by staff of community service organisations (CSO) during home visits.

Methods Design

The study employed a pre post non-controlled study design. All non-government CSOs in the HNE region providing a home visiting service to families were offered the intervention and invited to participate in the program evaluation. Figure 10.1 provides a summary of the intervention and evaluation design. Baseline data were collected prior to intervention delivery in 2008. Follow up data were collected post intervention in 2009.

Figure 10.1: Summary of the community service organisation evaluation



Sample

All non-government CSOs that provided a home visiting service to families with young children (primarily children aged 0-8) in the HNE region were eligible to participate in the intervention and evaluation. A snowball approach to identify services was used.⁹ These services were initially identified through NSW Family Services Inc, a non-government support service for the community services sector with voluntary membership. The managers of all eligible member services were contacted and services assessed for eligibility. Managers and staff of eligible services were invited to participate in the evaluation, and asked if they knew of other eligible services in the region. The nominated services were contacted and the procedure was repeated until no new services were identified. On average, 6,600 families and 9,300 children were supported by home visiting services in the HNE region each year.¹⁰

Intervention

An intervention was delivered by HNE project staff and targeted both managers of CSOs and their staff. A multi-disciplinary advisory group developed the intervention with membership from key government and non-government organisations (NGOs), with experience in working with disadvantaged families, managing CSOs and planning, delivering and evaluating health promotion programs.

The intervention was designed to increase the frequency with which staff of CSOs:

- provided families with simple health information and advice around physical activity and healthy eating including encouraging families to reduce consumption of energy dense, nutrient poor food and time spent in small screen recreation
- role-modelled physical activity and healthy eating to families
- taught families healthy lifestyle skills such as how to shop and prepare a healthy meal on a budget
- provided families with health information and resources
- offered health service referral to families in particular need of additional support and assistance.

The intervention included evidence based strategies found to be effective in increasing the provision of health information and support by health services staff. Application of these strategies for the healthy eating and physical activity interventions are shown in Table 10.1. Project staff initially sought the support of key organisations and individuals in the sector via presentations and meetings with senior executives, leaders and managers of CSOs and then more informally across the life of the program (three years). Staff training was conducted by a Good for

Table 10.1: Practice change strategies to promote healthy eating and physical activity in community service organisations

INTERVENTION STRATEGY	APPLICATION
Building leadership and consensus	Endorsement of the intervention by the NSW Family Services Inc. was communicated to services through print materials. Engaged CSO managers and the peak body for family services in NSW (NSW Family Services Inc.). Established a Good for Kids CSO Advisory Group. CSO managers encouraged to discuss policy development and implementation at staff meetings.
Training of staff in the delivery of the initiative	All staff of participating CSOs were invited to attend a half day training workshop. Additional training was held with a nominated member of each CSO to provide similar training to future employees or staff who were unable to attend training.
Provision of program resources, materials, tools and information	CSO managers: Policy templates, comprehensive training manual (hardcopy and CD) to train future employees, a telephone helpline service to a dietician, setting specific information on the Good for Kids website. CSO family clients: Water bottles, tennis balls, information folders, fact sheets and referral to professional assistance when required.
Provision of adoption support	CSO managers were offered a 20 minute telephone support call to reinforce key program messages, identify barriers to practice change and provide additional advice and support. Staff attending the training received two support calls six and 12 weeks post training that reinforced messages, monitored staff progress regarding the provision of healthy eating and physical activity support to families and helped staff problem solve barriers to providing support.
Performance monitoring and feedback	Information provided during calls enabled Good for Kids staff to identify areas where staff required additional assistance. Without identifying staff members, this information was provided to managers, during two telephone support calls from research officers. On these occasions opportunities for managers to provide staff with further support were identified and discussed.

CSO=Community Service Organisation

Kids nutritionist and former CSO staff member. During the training, staff received a resource package including a train the trainer materials, fact sheets for distribution to client families, sample organisational policies as well as cookbooks. All staff attending training received scripted follow up telephone support six and 12 weeks post training conducted by trained interviewers using computer assisted telephone interviewer (CATI) technology. Further, approximately two and four months following the training, a member of the Good for Kids project team telephoned managers of CSOs to provide performance feedback regarding levels of healthy eating and physical activity reported by staff (collected as part of the staff telephone support CATI), to discuss current strategies, to further assist staff to provide such support and to offer other resources such as water bottles.

Data collection and measures

On the day of the CSO training and prior to its commencement, staff from participating organisations completed a brief pen and paper survey which included items assessing gender, age, highest educational qualification, time employed at the organisation and their average frequency of home visits. Included in the pen and paper questionnaire were a series of questions to assess the healthy eating and physical activity support that staff had provided to families in the past three months. Three months post intervention, staff were invited to participate in a follow up telephone survey conducted by a trained telephone interviewer. The items in the follow up telephone survey were identical to those at baseline. Managers were invited to participate in a brief telephone survey conducted by a trained telephone interviewer three months post intervention. Managers were asked to respond to a series of statements assessing the acceptability of the specific intervention components on a four-point Likert scale (strongly agree, agree, disagree, and strongly disagree). Similarly, during the follow up telephone survey of staff, staff responded on a Likert scale to a series of statements regarding the acceptability of specific intervention components.

Analysis

Data were analysed using SAS version 9.1 (SAS Institute Inc. Cary, NC; 2008). Descriptive statistics were used to describe characteristics of participating staff and the provision of healthy eating and physical activity support that staff provided to client families during home visits. For assessments of program acceptability, strongly agree

and agree responses were combined and reported as the number and proportion of managers and staff agreeing with each statement. To assess the effectiveness of the intervention in increasing the healthy eating and physical activity support provided by staff to families, a McNemar's Test was used to compare paired values using pre and post intervention data collected from eligible staff participants at baseline and at follow up. All statistical tests were two tailed ($\alpha < 0.05$).

Results

Sample

All 49 CSO managers were contacted to determine eligibility. Twelve of these organisations did not provide a home visiting service to families, and one organisation was not a NGO. Of the remaining 36 eligible services, 29 (80%) managers agreed to participate and sent staff that provided home visitation services to attend the intervention training session. The number of home visiting staff within participating organisations ranged from 1-32, and the total number of employed staff within participating organisations ranged from 1-36. On average, each participating service employed seven home visiting staff, and had accessed 224 families of children aged 0-15 in the past year.

Ninety staff from the 29 participating organisations completed the baseline pen and paper survey and participated in the training session. Of these, 69 (77%) participants completed the follow up telephone survey. Participants who did not complete the follow up survey had either ceased employment ($n=9$, 10%), no longer had a role in their organisation which required home visiting ($n=6$, 7%), had taken extended leave ($n=3$, 3%) or refused to participate ($n=3$, 3%).

Provision of healthy eating and physical activity support by staff

Responses to survey items assessing the provision of healthy eating and physical activity support by staff at baseline and follow up are presented in Table 10.2. Prior to the intervention, less than half of all participants (13-36%) role modelled healthy eating or physical activity behaviours during family visits, helped parents prepare a healthy meal, helped parents plan a healthy shopping list, or referred family members to a health professional for further assistance. Following the intervention, a significant increase on all measures was observed ($p < 0.01$).

Table 10.2: Staff-reported provision of healthy eating and physical activity support to families before and after intervention

SURVEY ITEM	BASELINE (N=69) %	FOLLOW UP (N=69) %	P VALUE
HEALTHY EATING ACTIONS IN THE LAST THREE MONTHS			
Provided resources to assist families with any unhealthy eating habits*	38 (56)	57 (83)	<0.001
Referred a family member to a health professional for assistance regarding an unhealthy eating behaviour	17 (25)	30 (43)	0.005
Discussed unhealthy eating habits with a family and provided some suggestions or advice	47 (68)	65 (94)	<0.001
Role modelled healthy eating behaviour	25 (36)	61 (88)	<0.001
Helped prepare a healthy meal	9 (13)	22 (32)	0.003
Helped with a healthy meal plan or a shopping list	13 (19)	35 (51)	<0.001
PHYSICAL ACTIVITY ACTIONS IN THE LAST THREE MONTHS			
Provided resources to assist families increase their physical activity	24 (35)	51 (74)	<0.001
Referred a family member to a health professional for assistance regarding physical activity	10 (14)	27 (39)	0.001
Discussed inadequate physical activity habits with a family and provided some suggestions or advice	42 (61)	61 (88)	<0.001
Role modelled positive physical activity behaviours	18 (26)	54 (78)	<0.001

* Total respondents=68

Acceptability of the program

The acceptability of the intervention to both staff and service managers is presented in Table 10.3. On all measures of acceptability, 85% or more of staff and managers responded positively.

Table 10.3: Acceptability of the intervention to staff and service managers

	AGREE OR STRONGLY AGREE	
	N	(%)
STAFF ACCEPTABILITY OF INTERVENTION (N=69)		
I would recommend the training, resources and telephone support intervention to other CSOs	69	100
I thought that the intervention training that I attended was useful	69	100
I thought that the intervention resources that I received were useful	69	100
I thought that the intervention telephone support calls that I received were useful	64	93
MANAGEMENT ACCEPTABILITY OF THE INTERVENTION (N=29)		
I would recommend the GFK program, which includes the training, support calls and resources, to other CSO managers	29	100
I thought that the telephone support calls that I received were useful	27	93
I thought that the GFK resources that were provided were useful	28	97
I found that the example healthy eating and physical activity policy that was provided to our organisation was valuable	27	93
Staff have benefited from the training provided through the GFK program	28	97
Staff have benefited from the resources provided through the GFK program	28	97
Staff have benefited from the support calls provided to them through the GFK program	25	86
Families accessing our service have benefited from our involvement in the GFK program	28	97

CSO=Community Service Organisation; GFK = Good for Kids

Meeting the needs of Aboriginal children

The CSO advisory group actively sought but was unsuccessful in recruiting an Aboriginal representative. However, the group maintained communication with Aboriginal staff to ensure materials developed were reviewed by Aboriginal colleagues.

Comment

The observed significant increase in support provided to families during home visits by CSO staff suggests the intervention had a significant impact on enhancing the capacity of CSOs to promote child healthy eating and physical activity. Encouragingly, the intervention was delivered to 80% (29) of all home visiting services in the HNE region. Furthermore, the intervention was considered highly acceptable by services. These findings suggest that collaborative, practice change initiatives between community service and health sectors may be a feasible approach to increase obesity prevention support to disadvantaged families, and may be an appropriate approach for broader population based dissemination.

Acknowledgement

This section is based on the published manuscript: Falkiner M, Wolfenden L, Nathan N, Rowe S, Bell AC. Advice on healthy eating and physical activity where it is needed most: empowering home visiting human services to provide the right information at the right time to vulnerable families. *Developing Practice* 2010; 25:31-41.

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Junior sports clubs

Authors: Luke Wolfenden, Maryann Falkiner, Nicole Nathan, Colin Bell, Karen Gillham and John Wiggers.

Background

Community sports clubs have been proposed as an important setting for intervention to prevent excessive weight gain.¹ This setting provides the opportunity to access a large proportion of the community, with an estimated 4.5 million Australians involved in community sport in either a playing or non-playing capacity each year.² While sports clubs promote and provide opportunities to participate in physical activity, excessive focus on competition and practices such as the promotion and consumption of alcohol at sporting grounds can hinder child participation in organised sport. Further, while most clubs have food available for purchase, more often than not foods and drinks available at sports clubs via canteens, fundraisers, catering kitchens or onsite restaurants are unhealthy.¹

Aim

To enhance the obesity prevention capacity of community sports clubs through encouraging participation in sports and the introduction and promotion of healthier food options.

Methods

Design

The project employed a non-controlled evaluation design. Process data on the number of clubs across the HNE region meeting health promoting sports club accreditation criteria, including criteria pertaining to child physical activity participation and healthy food promotion were collected between 2007 and 2011. Data to assess practice changes consistent with accreditation criteria were obtained from routinely collected project records.

Sample

Community-level, non-elite, team based sporting clubs, with enrolled child participants younger than 16 years across the HNE region were eligible to receive the intervention.

A database of clubs was compiled based on information provided by local councils and code-based regional sporting associations and competitions in the HNEAHS region. Additional sporting clubs were identified via telephone directories and web searches. It was estimated that there were approximately 500 eligible sporting clubs across the seven major sporting codes (cricket, soccer, rugby league, rugby union, netball, surf life saving and Australian football league) in 2007 within HNE.

Intervention

The Australian Drug Foundation's (ADF) *Good Sports* accreditation program provided the basis for the intervention. The program was initially developed to assist sports clubs to manage alcohol responsibly. The program allows clubs to make changes and move through a three level accreditation process within five years. Through improving alcohol management practices, participating sports clubs in this program have been shown to create safer, family friendly environments, and attract greater membership, participation and non-alcohol club sponsorship.³

In partnership with the ADF, Good for Kids modified the *Good Sports* program so that physical activity and healthy eating criteria were included in the program accreditation.

The additional healthy eating and physical activity accreditation criteria involved three accreditation levels:

- **Level 1:** Clubs were required to register as a food business with the NSW Food Authority or local council and have one club member trained in basic nutrition and safe food handling. A minimum of three products from the *Good Sports Healthier Choices* list from different food groups was to be available at all times. The criteria for determining healthier choices was based on the *Fresh Tastes @ School NSW Healthy School Canteen Strategy*.⁴ Choices available for sale included a requirement for a variety of fruit and/or vegetables and water. Clubs were also required to prominently position the *Good Sports Healthier Choices* list at all times and coaches were required to

undertake an approved basic community coaching accreditation under the National Coaching Accreditation Scheme (or equivalent).

- **Level 2:** Criteria attained in Level 1 were to be maintained. Additionally, coaches or clubs were required to provide only fruit and/or water if providing food or drinks to junior team members. Parents were to be encouraged through coaches and the dissemination of print information to provide healthy food and drinks for children's snacks such as fruit and water. At least six products from the *Good Sports Healthier Choices* list were to be made available for sale through the club canteen and promoted at reduced prices through promotions such as meal deals. If the club sold hot chips they were to prepare the chips using the National Heart Foundation Tips on Chips guide. Clubs were to conduct at least one recruitment activity per year for juniors, and provide equal opportunities for participation in both training and games for children aged 16 and younger.
- **Level 3:** Criteria from Level 1 and Level 2 were to be maintained. Additionally, the club was required to have two club members trained in safe food handling and basic nutrition, with one trained member in charge of stocking and setting up the canteen. The canteen refrigerator was to be stocked with at least 75% of drink products from the *Good Sports Healthier Choices* list. With the exception of milk or water, drinks were to be sold in 375ml containers and milk and water positioned prominently in the upper section of the fridge. Clubs that used oil for cooking were required to use monounsaturated or polyunsaturated oils. Clubs were to prohibit the use of unhealthy foods for fundraising and develop a nutrition and participation policy.

Facilitating adoption of healthy eating and physical activity intervention activities

Delivery of the modified *Good Sports* intervention was contracted to the ADF for the period June 2007 to June 2010. As a component of routine program delivery, the ADF marketed the program to clubs through local sporting associations and local councils as well as through *Good Sports* project officers and the local media. Each club was allocated a project officer from the program who would meet with the committee to discuss the

program at each accreditation level, monitor club changes and assist clubs progress through the accreditation criteria. Participating clubs also received a resource package including a folder with a description of each of the accreditation criteria levels, sample policy templates, canteen posters, healthy eating and physical activity information for parents and coaches, signage and other resources required to comply with each accreditation criteria. Clubs also offered opportunities to enrol members in a nutrition training program for club members.

Data collection and measures

Information to evaluate the adoption of the program by community sports clubs was based on routinely collected project record data collected by the ADF. At each accreditation level, a representative of the club is required to complete a pen and paper survey and supply required documentation to the assigned project officer demonstrating compliance with the accreditation criteria. If the project officer is satisfied that the club meets the required criteria, contact is then made with a club independent (not a club committee member) nominee to also verify club compliance before formal accreditation is awarded. Information supplied by the club as part of this process, as well as its approval for accreditation is entered into a program database held at the ADF and was supplied for this report.

Analysis

All analyses were performed in Microsoft Excel. Descriptive statistics were used to describe adoption of the program across the study region. The impact of the strategy was evaluated using a simple count of accredited sports clubs across the region over time.

Results

Prior to the implementation, no community sports clubs in the HNE region were accredited with the *Good Sports* program. As of June 2011, 246 junior sports clubs in HNE were accredited representing 49% of the seven major junior sporting codes in HNE. Of these, 90% had achieved Level 1 accreditation, 9% had achieved Level 2 accreditation, and 1% Level 3 accreditation. During the same period, the number of *Good Sports* accredited clubs in NSW (all clubs including adult-focused sports clubs) increased from zero to 547.

Comment

The evaluation findings demonstrate the feasibility of recruiting volunteer, not for profit, non-elite, junior community sports clubs to participate in an accreditation program designed to improve the nutritional quality and safety of foods and drinks sold and to adopt criteria encouraging child participation in sport. Almost 250 clubs in HNE have been accredited with the program.³ Although Good for Kids program funding has ceased, the *Good Sports* initiative continues to independently provide support for clubs in the HNE region. While the findings are promising, further research is required to quantify the impact of the program on increasing community participation in sport and the nutritional quality of food and beverage purchases by children at sports club canteens.

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Aboriginal communities

Authors: Karen Gillham, Vanessa Aikman, Scott Trindall, Kate Green and Colin Bell.

Background

At the commencement of the Good for Kids program, limited information was available regarding the prevalence of overweight and obesity in Aboriginal children in Australia. A small study of primary school children from Townsville noted that, when combined, overweight (11.5%) and obesity (7.7%) were slightly more prevalent than underweight (17.3%) for Indigenous children with no differences between Indigenous and non-Indigenous children in weight status.¹ Indigenous children were found to consume fewer vegetables and less dairy and were more likely to suffer from anaemia. In contrast to such limited information for Indigenous children, information regarding obesity and associated co-morbidities among Indigenous adults has been more frequently reported. Cunningham and Mackerras have reported, for example, that overweight and obesity affects 60% of Aboriginal men and 58% of Aboriginal women.²

In addition to the lack of information regarding overweight and obesity among Indigenous children, a similar lack of information was apparent with regard to the effectiveness of intervention strategies for addressing overweight and obesity among Indigenous children. This includes a lack of evidence regarding the effectiveness of system-based approaches centred on schools, children's settings, community organisations, health services and social marketing in reducing the risk of overweight and obesity.³

Aims

To engage Aboriginal communities in the program through consultation and targeted awareness raising.

To enhance the capacity of the Good for Kids program to work with Aboriginal communities in increasing the time children spend in physical activity and in reducing children's consumption of sweetened drinks and energy dense, nutrient poor foods.

Methods

Population

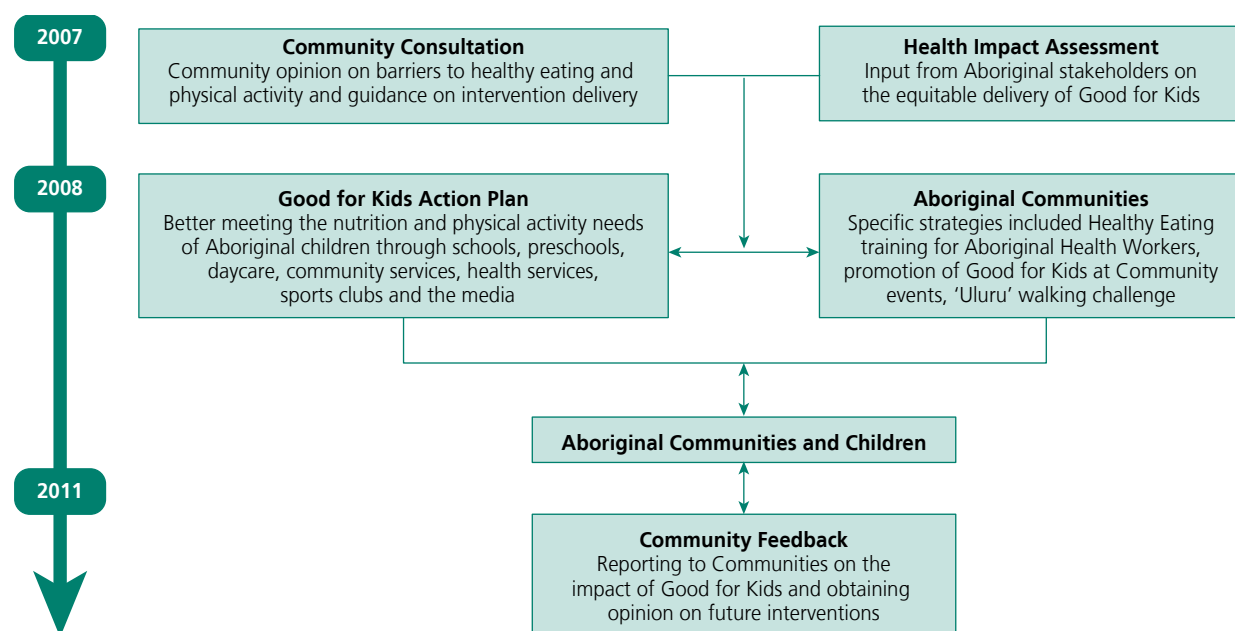
Approximately 12,432 Aboriginal children aged 0-15 resided in the communities within the HNE region in 2006, accounting for 22% of all Aboriginal children in NSW.⁴

Strategies

Development and implementation of the Good for Kids program strategies for Aboriginal Communities was informed by community input in the form of a community consultation, an equity focused health impact assessment (HIA), ongoing community advice and feedback, and formal inclusion of mechanisms for Aboriginal participation in the program leadership and management. Program strategies implemented across all the settings were modified to increase cultural acceptability for Aboriginal community members, based on guidance from the consultations, the HIA and Aboriginal leaders. In addition, specific strategies for Aboriginal community members were developed.

Figure 12.1 illustrates how the community consultation and the equity focused HIA influenced the Good for Kids action plan in each of the settings and contributed to targeted strategies for Indigenous children and their families.

Figure 12.1: Design and timeline of the Good for Kids intervention in Aboriginal communities



Results

Community advice

Community advice was obtained in part by the initial community consultation. The community consultation involved garnering the opinions of a wide range of representatives from Aboriginal Communities across the region in the early stages of the program. More than 50 community consultation sessions were held across more than 30 Aboriginal communities from September 2006 until November 2007. Table 12.1 summarises the barriers to healthy eating and physical activity identified by community members.

families

in the HNE region

Following completion of the community consultations, feedback was provided to the community regarding the program response to the advice provided, and further opinion was sought on how to continue to improve eating patterns and physical activity for Aboriginal children. In addition to community input, provision of advice and feedback from communities continued throughout the implementation of the program.

Table 12.1: Community identified barriers to healthy eating and physical activity for Aboriginal children and

THEME	TARGET AREA	MENTIONS
Cost is a barrier to providing healthy food and accessing facilities and equipment for being physically active	Healthy eating and physical activity	47
Lack of education and training for parents or caregivers, children and community generally on what healthy eating is and how to eat healthily on a budget	Healthy eating	28
Social disadvantage within Aboriginal community is a barrier to healthy eating and physical activity (unhealthy lifestyles)	Healthy eating and physical activity	17
The challenge of encouraging parents and other community members to participate in health promotion programs	Healthy eating and physical activity	15
Lack of adequate transport is a barrier to food supply and accessing sites for physical activity	Healthy eating and physical activity	12
Concern within community about underweight children, rather than overweight or obese children	Healthy weight status	11
Access to healthy foods and particularly fresh fruit and vegetables in remote areas	Healthy eating	< 5
Potential exposure to racial discrimination (during organised sporting competitions and/or at the supermarket or food shop)	Healthy eating and physical activity	< 5
Environmental influences as barriers (advertising, modern technology and lifestyles)	Healthy eating and physical activity	< 5

The community consultation identified upstream socioeconomic factors as the major barriers to child healthy eating and physical activity. The cost of food and accessing physical activity was the most commonly mentioned barrier by communities, and the socioeconomic disadvantage of Aboriginal communities was also frequently mentioned. Other major barriers were a lack of information and education on healthy eating, and difficulties in motivating parents towards health promotion.

Community members also provided advice on how to deliver Good for Kids programs in culturally safe and appropriate ways with 36 mentions during the consultation. Communities advised on how to access Aboriginal children and communities through schools and recommended concentrating on fun when promoting physical activity to youth. They also advised on Aboriginal participation in the management and leadership of the program.

Equity focused Health Impact Assessment (HIA)

The equity-focused HIA was modelled on the Equity Focused Health Impact Assessment Framework.⁵ The HIA focused on equity within the Good for Kids program for Aboriginal children and followed the established steps in HIA of screening, scoping, identification and assessment and decision-making and recommendations. The HIA was supported through the NSW HIA development site project, which provided training and access to resources to undertake HIA's from the University of NSW Centre for Health Equity Training, Research and Evaluation. The identification and assessment and decision-making and recommendations steps were conducted by a working party of Aboriginal leaders. The group included:

- Three Aboriginal Health Cluster Coordinators, HNEAHS
- CEO, Aboriginal Medical Service
- Health Programs Co-ordinator, Aboriginal Medical Service
- Program Manager, Aboriginal Health, HNEAHS
- Aboriginal Education Advisor, Catholic Education Commission
- Aboriginal Education Consultants, NSW Department of Education and Communities
- Indigenous Health Project Co-ordinator, University Department of Rural Health
- Indigenous Project Officer, University of Newcastle Many Rivers Diabetes Prevention Project
- Aboriginal Development Officer, Former NSW Department of Sport and Recreation

- Good for Kids staff: Aboriginal Health Project Coordinator and Project Officers.

The HIA working party reviewed the Good for Kids action plan and provided more than 80 recommendations to reduce inequalities between Indigenous and non-Indigenous children in the delivery of the Good for Kids program. A response was identified by the Good for Kids team for each of the recommendations and the Good for Kids action plan and its implementation was modified accordingly.

Specific strategies for Aboriginal Communities

Some of the recommendations from the community consultation and HIA warranted specific strategies for Aboriginal communities (Figure 12.1).

Program planning

Prioritising the needs of Aboriginal children was integrated into the Good for Kids annual planning processes to the extent that funding for work in a particular setting was contingent on demonstrating how the needs of Aboriginal children were being prioritised. This process led to some key innovations in the implementation of programs being offered across NSW such as the *Crunch&Sip*® program in primary schools. In the HNE region, schools wanting to participate in the program were required to sign an equity statement to ensure children who were unable to bring their own fruit could still participate in the program. It also influenced the planning process of all health promotion and health protection programs conducted by HNE Population Health more broadly.

Program leadership and governance

In addition to advice regarding the program strategies and their implementation, community advice addressed the role of Aboriginal people in the leadership and governance of the program. In response, an Aboriginal Health Advisory Group was established to be an ongoing mechanism of seeking and obtaining community advice. In terms of the operations of the program, Aboriginal leadership was provided by the implementation of an Aboriginal employment strategy that included an Aboriginal Health Manager position and a number of Aboriginal Health project officer positions.

Nutrition training

The primary strategy was to provide nutrition training for approximately 128 Aboriginal health and community workers in the HNE region. Adopting a train the trainer approach, the training aimed to: increase the awareness and knowledge and practice of healthy eating; and provide tools for Aboriginal health workers to deliver nutrition awareness programs in Aboriginal communities. The training was based on: the *Australian Guide to Healthy Eating*; *6 Feeding your mob with fruit & veg: bush tucker tips!* (NSW Government Department of Health); *The Aboriginal and Torres Strait Islander Guide to Healthy Eating* (Northern Territory Government Department of Health and Community Services); *Deadly tucker: a selection of recipes from the FOODcents for Aboriginal and Torres Strait Islander People in WA Program* (Western Australian Government Department of Health) and was delivered by Good for Kids Aboriginal staff.

The training comprised of several modules chosen based on feedback from the community consultation:

1. Introduction to Good for Kids
2. Good nutrition and eating well
3. Providing good nutrition to Aboriginal kids and parents:
 - Shopping tips for eating well
 - Practical tips for healthy eating
4. Case studies (selected based on preferences of participants):
 - Breakfast programs
 - Community gardens
 - Bulk buying fruit and vegetables
 - Community kitchens.

Each module had a set of key learning objectives and an accompanying set of factsheets, posters and other resources (a healthy eating kit) that were used as part of the training and provided to Aboriginal health workers for use with community participants.

By the end of the program a total of 54 people had received healthy eating training or 59% of all Aboriginal health workers in the HNEAHS.

Community champion

To create and maintain relationships with key stakeholders in Aboriginal communities and to raise awareness of Good for Kids messages in these communities, Nova Peris was engaged to champion healthy eating and physical activity on behalf of the program. Nova is Australia's first Aboriginal Olympic gold medallist and a passionate advocate for health and wellbeing, especially for Indigenous people. As a mother of four, and grandmother to one, Nova was an ideal champion for Good for Kids. She championed Good for Kids at strategic events, lent her name to the project for use on the website and on promotional materials and she provided voice talent for radio.



Promoting the health of Aboriginal Health Workers

A significant challenge when promoting healthy eating and physical activity to communities is making sure the health workers doing the promotion are healthy and are 'practising what they preach'. To facilitate this, the Good for Kids project introduced a walking challenge for Aboriginal health workers called *Uluru or Bust*, the aims of the program were to increase the daily physical activity of Aboriginal Health Workers in HNE and to increase awareness of the need for regular physical activity. Aboriginal Health Workers from HNE Aboriginal Health and Aboriginal Community Controlled Health Organisations were provided with pedometers for three months and were encouraged to achieve 10,000 steps per day.

Comment

In addition to the nutrition training, the most significant contribution of the Good for Kids program to the health of Aboriginal children has been the model the program established for ongoing community consultation, the use of an equity focused HIA to initiate changes to a mainstream health promotion program, and the program's ongoing efforts to ensure its initiatives were culturally appropriate and not exacerbating existing inequalities. Acknowledging that health workers need to be healthy to bring authenticity to the messages and programs they conduct in communities was an important insight learnt from interacting with community representatives. These models and processes will contribute to improve health promotion programs in the future throughout the region.

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Social marketing

Authors: Rachel Sutherland, Kylie Young, Lucy Coggan, Colin Bell and John Wiggers

Background

Social marketing is a recommended strategy as part of population wide initiatives to promote healthy eating, physical activity and prevent excessive weight gain.^{1,2}

Aim

To promote the Good for Kids program and its key messages.

Methods

Design

The evaluation employed a quasi-experimental study design. Repeated cross sectional surveys of a community cohort were conducted by telephone prior to and following each social marketing campaign.

Sample

Parents of children aged 2-15 in NSW who had participated in a baseline random digit dial telephone survey (conducted in February 2007) and who agreed to be followed up at a later date formed a cohort eligible to participate in the telephone surveys. Participants were randomly selected from the cohort for each survey. Approximately half of the participants in each survey resided within the Hunter New England (HNE) region and the remainder resided elsewhere in NSW.

Intervention

In September 2006, a social marketing workshop was held to establish the Good for Kids name, brand, messages and feel. The workshop of key stakeholders including: Population Health, Obesity/Nutrition expert (Clare Collins), Physical Activity expert (Phil Morgan), Media experts (NBN TV), HNEAHS Unit (Louise Morrissey), Communication expert (Craig Eardley) and the NSW Department of Premier and Cabinet (Jodie Calvert). This group reviewed issues relating to child obesity, healthy eating and physical activity as well as existing social marketing campaigns, considered the goals and objectives of the program, discussed key messages, identified target audience

segments and discussed the most suitable media for the social marketing of the program. Information from the workshop became the basis of a brief that was sent to three creative agencies inviting proposals to create the name, brand, messages and imagery for the program. Agency proposals were sought and the proposals received were tested with target audiences in focus groups, including Aboriginal focus groups.

The selected Good for Kids brand and key messages were delivered to the target audience via five media campaigns from 2007 to 2010. The campaigns were designed to complement the program activities in each of its targeted settings. Each campaign was subject to a government peer review process, and with the exception of the *Think H2O* campaign, all were tested with Aboriginal and non-Aboriginal target audiences. The five media campaigns promoted:

- the Good for Kids program brand
- the consumption of water in preference to sweetened drinks
- participation in physical activity (such as active play) instead of sedentary recreation
- fruit and vegetables in preference to energy dense, nutrient poor foods
- the Good for Kids program and its key messages (an additional overall campaign).

A formal partnership with the dominant regional television provider (NBN TV) was established to deliver the television based social marketing elements. The television provider's footprint covered the entire HNE region and it was the highest rating television station in the region. The partnership allowed Good for Kids to negotiate increased air time through community service announcements. The peak to off-peak split for the Good for Kids television campaigns was 70:30 or 60:40. Similar coverage arrangements were obtained with radio and print media throughout the region. Print media advertising was used to strengthen and extend the television and radio advertising.

In addition to the media campaigns, a number of other

social marketing strategies were implemented to support settings-based activities. These included gaining sponsorship, creation of the Good for Kids website (www.goodforkids.nsw.gov.au), participation in events, gaining media and editorial coverage and a free telephone information service. Further, the Good for Kids program used print media such as promotional newsletters and posters to convey key messages within settings (for example schools and preschools), the community, and to communicate with stakeholders.

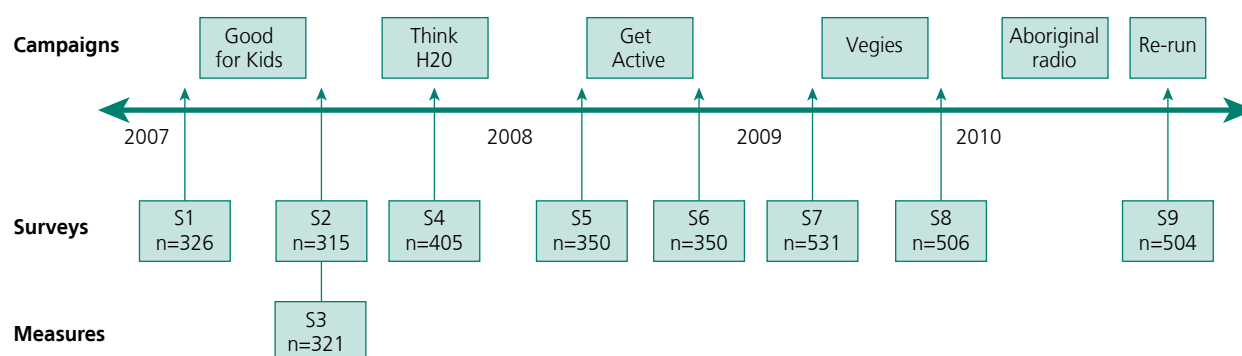
Comparison area

State and national healthy lifestyle campaigns were delivered across NSW including three phases of the NSW *Go for 2&5*[®] fruit and vegetable campaign in 2007, 2008 and 2009,³ the national *Measure Up* campaign in 2008, 2009 and 2010⁴ and the NSW Health *Think H2O* campaign in 2008.⁵ The NSW Health *Think H2O* campaign used the materials (television and radio) developed for the Good for Kids water campaign to promote consumption of water instead of sweetened drinks for children in NSW.

Data collection and measures

A schedule of the campaigns and corresponding surveys (including total sample sizes) is given in Figure 13.1.

Figure 13.1: Timeline showing Good for Kids media campaigns and awareness surveys



Measures

Program awareness was assessed by asking participants if they had recently seen, read or heard anything about the Good for Kids program in the media. Campaign awareness was assessed using questions that drew on the content of the advertisement to prompt recall, for example, 'Do you remember recently seeing a television advert with upbeat music and lyrics with images of glasses being filled with juice and water?' To assess awareness of specific campaign key messages a range of possible messages were read out and participants were asked to select the main message.

Analysis

Chi square tests were used to compare differences in brand, campaign and key message awareness between HNE and rest of NSW at each time point and within each region over time. Analyses were performed using SAS version 9.2 (SAS Institute Inc. Cary, NC; 2008), all statistical tests were two tailed with $\alpha=0.05$.

Results

Of the 1,594 parents who participated in the baseline survey and who agreed to being called back, 1,367 (86%) (n=748 intervention; n=619 control) participated in at least one of the nine social marketing telephone surveys. As shown in Table 13.1, the majority of participants in the cohort were female. Parents from the HNE region who participated in the cross sectional surveys were more likely to have been born in Australia, to have had lower levels of educational attainment and were more likely to be living in a rural area than their comparison group counterparts from the rest of NSW. HNE respondents were also more likely to identify as Aboriginal or Torres Strait Islander.

Table 13.1: Characteristics of social marketing telephone survey participants

CHARACTERISTICS*	SURVEY 1†		SURVEY 2†		SURVEY 3†		SURVEY 4‡	
	HNE (N=168) %	NSW (N=158) %	HNE (N=157) %	NSW (N=158) %	HNE (N=156) %	NSW (N=165) %	HNE (N=267) %	NSW (N=138) %
Female	84.5	84.2	79.6	81.0	83.3	82.4	84.6	87.7
Age								
<20 years	0.6	0.6	0	0	0.6	0	0	0
20-39 years	52.8	47.5	55.4	48.7	51.9	54.5	54.3	51.1
≥ 40 years	50.3	51.9	44.5	51.3	47.4	45.4	45.7	48.9
Country of birth								
Australia	91.7	69.6	90.4	74.7	93.6	75.1	87.3	76.8
Aboriginal or Torres Strait Islander status	3.6	1.3	3.2	3.2	3.2	2.4	5.1	1.1
Educational attainment								
Tertiary§	58.3	70.9	56.0	61.4	52.6	64.8	62.6	68.1
Geographic location								
Rural (defined by ARIA)	28.6	12.8	37.2	12.7	31.6	17.2	30.4	13.2
Number of children aged 2-15, mean (SD)	1.9 (0.9)	1.8 (0.8)	1.9 (0.8)	1.9 (1.0)	1.8 (0.9)	1.9 (0.8)	1.9 (0.9)	1.9 (0.9)

*Surveys 5-9 not reported as cohort was recycled for these surveys

†175 intervention and 175 comparison participants invited to participate at time 1 – 3

‡300 intervention and 149 comparison participants invited to participate at time 4

§TAFE certificate or diploma, University CAE or other tertiary institute qualification

Note: bold indicates significant difference between intervention and control group

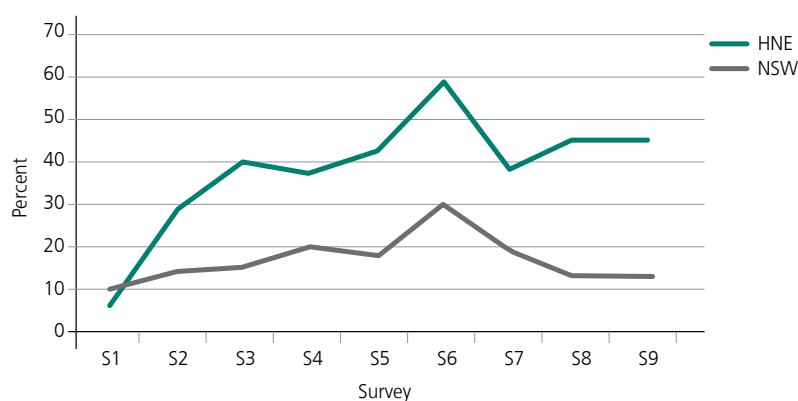
ARIA= Accessibility/Remoteness Index of Australia

Brand awareness

HNE participants were significantly more likely to have seen, read or heard about the Good for Kids program in the media than those surveyed in the rest of NSW (Figure 13.2). This was true at every survey post baseline.

From Survey 1 to Survey 9, there was a significant increase in Good for Kids brand awareness in HNE compared to no change in NSW ($p < 0.001$). Awareness of Good for Kids peaked at 60% in late 2008, just after the *Get Active, Get Out & Play!* campaign and approximately halfway through the intervention period.

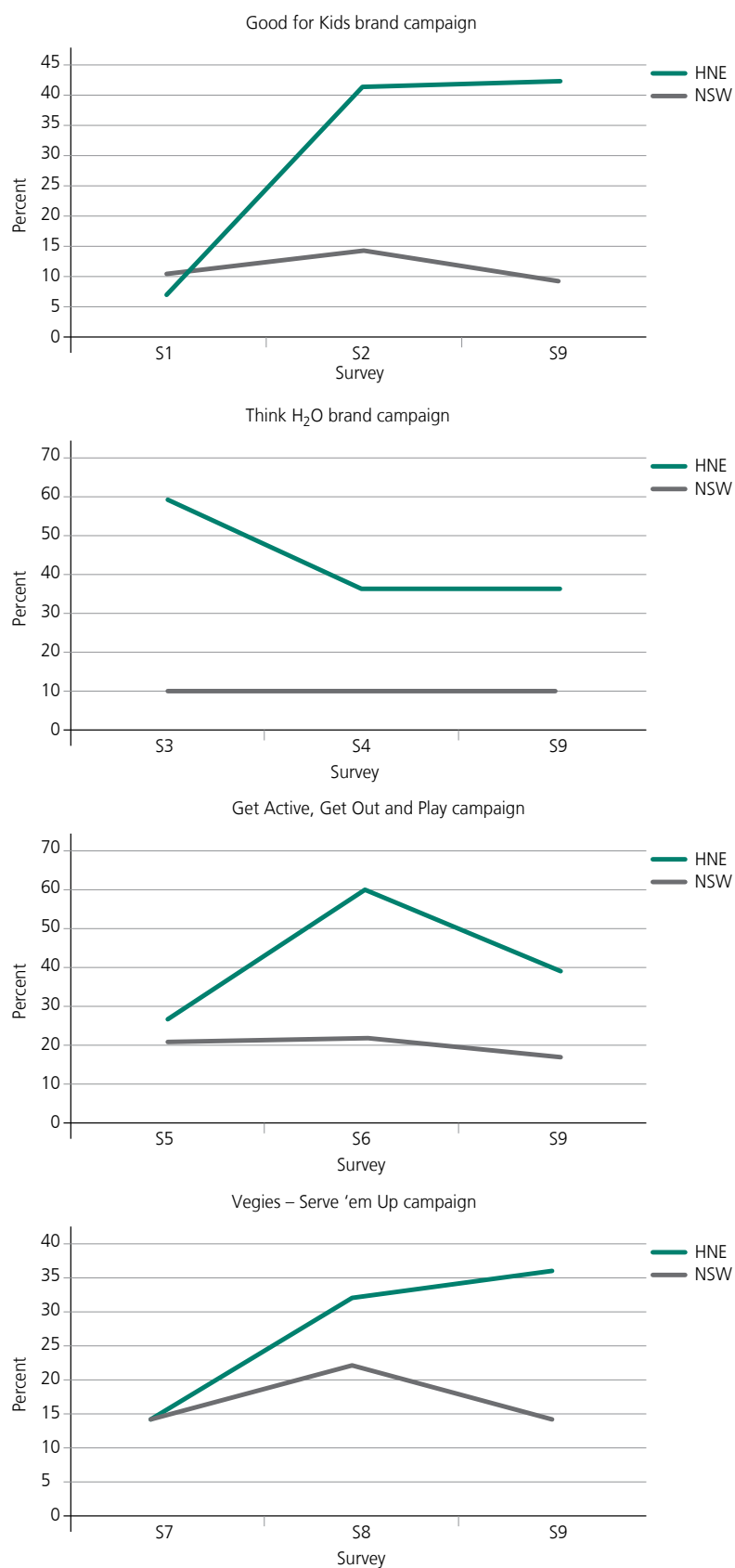
Figure 13.2: Awareness of Good for Kids in HNE compared to the rest of NSW



Campaign awareness

Campaign awareness was significantly higher ($p < 0.05$) in HNE compared to NSW after each specific Good for Kids campaign, with such higher awareness being sustained until the end of the program (Figure 13.3).

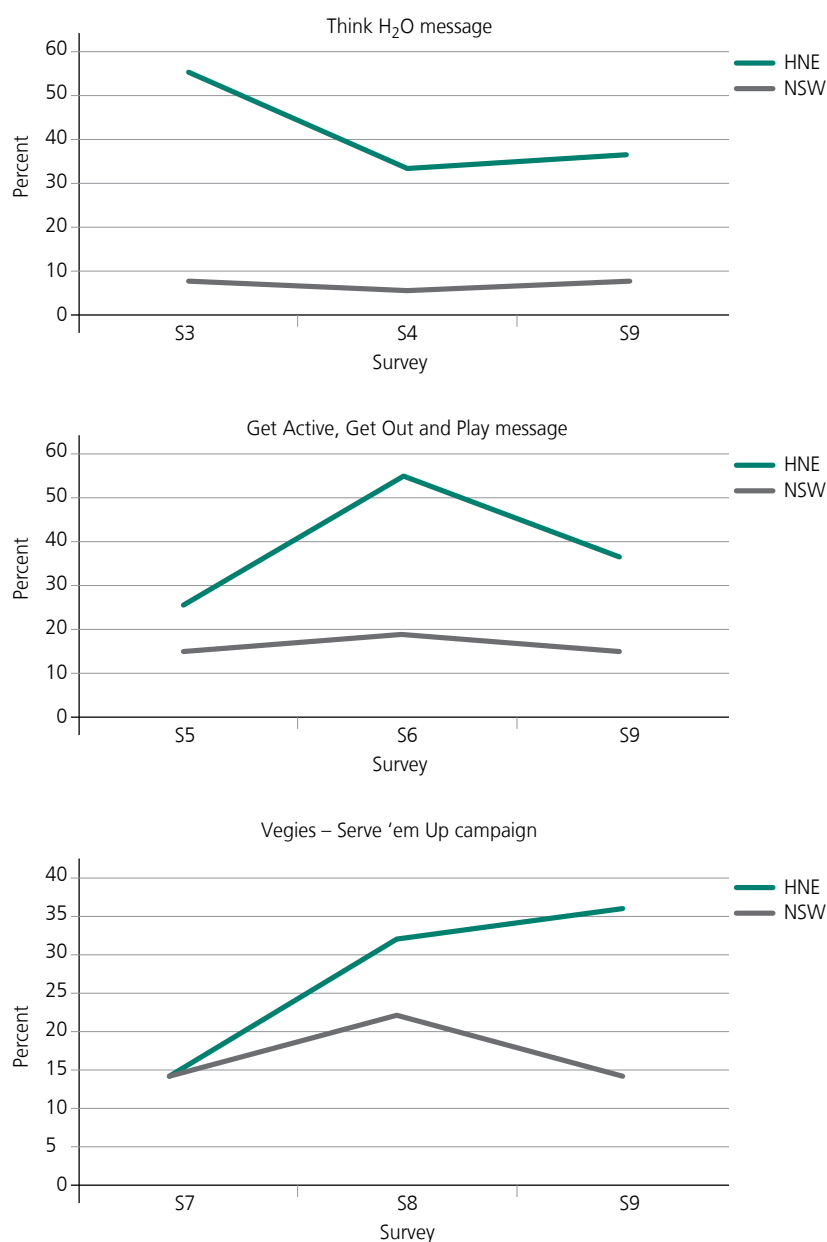
Figure 13.3: Awareness of the Good for Kids campaigns



The final level of awareness for each of the campaigns was: Good for Kids brand (41%); *Think H2O* (37%); *Get Active, Get Out & Play!* (39%); and *Vegies – Serve ‘em Up* (36%). Interestingly, baseline awareness of the *Think H2O* campaign was also high (58%). The fact that this campaign followed immediately after the Good for Kids brand campaign and that the brand campaign included a prominent message about drinking water suggests that participants were recalling this message prior to the launch of the *Think H2O* campaign. For the Good for Kids brand and *Get Active, Get Out & Play!* campaigns awareness increased significantly

($p < 0.001$) from pre-campaign to post-campaign survey in HNE compared to NSW. Awareness decreased for the *Think H2O* campaign for the above mentioned reasons. The increase over time was not significant between HNE and the rest of NSW for *Vegies – Serve ‘em up* immediately after the campaign but became significant ($p = 0.002$) by the end of the program. The small increases in awareness observed for the rest of NSW in some of the campaigns, for example the *Vegies – Serve ‘em up* campaign were not significant but suggest some degree of contamination or spillage of the messages into the comparison area.

Figure 13.4: Proportion of participants who identified the main message of the *Think H2O*, *Get Active, Get Out & Play!* and *Vegies – Serve ‘em up* campaigns



Key message awareness

The proportion of participants who identified the main message in each of the Good for Kids campaigns is shown in Figure 13.4.

HNE participants were significantly ($p < 0.05$) more likely to identify the main message of the campaigns compared to the rest of NSW comparison participants, even at baseline for the water and physical activity messages. Furthermore, these differences remained significant over time.

Meeting the needs of Aboriginal children

Aboriginal families were a key target audience for the Good for Kids media interventions. With only one exception, all media testing of campaigns included seeking the views of Aboriginal parents and/or children. Feedback from these activities led to a number of campaign initiatives being re-designed to better meet the needs of Aboriginal children and their families. Such feedback resulted in the following:

- Aboriginal children featured in all Good for Kids television commercials and most promotional materials
- redesign of the Good for Kids website to include Aboriginal graphics and a tab for Aboriginal children and their families
- use of Aboriginal voices in radio commercials
- development of red, yellow and black t-shirts, business cards and presentation templates
- identification and use of Aboriginal media.

The radio commercials developed for Aboriginal families consisted of three 30 second radio ads, using the voice of Nova Peris, that gave practical ideas and encouragement to eat healthy on a budget, with limited time or resources and to encourage kids to eat vegetables and fruit. The commercials were aired solely on stations that targeted Indigenous audiences.

Comment

The capacity of mass media outlets in the HNE region to promote healthy eating and physical activity was enhanced through the Good for Kids program, as was community awareness of the program, its campaigns and key messages.

Awareness levels achieved were similar to or higher than those achieved in the national *Get Moving* physical activity campaign⁶ (43% campaign awareness achieved compared to 60% campaign awareness in the Good for Kids physical activity campaign) and the NSW *Go for 2&5*[®] fruit and vegetable campaign⁷ (32-34% key message awareness achieved compared to 35% key message awareness for the vegetable and fruit message in Good for Kids). Increases in brand and key message awareness were also evident.



Results from the Good for Kids campaigns should be interpreted in the context of the other state-based healthy eating campaigns that were implemented in NSW during the same time period. Although the evaluation of the Good for Kids *Think H2O* campaign shows a decrease from pre- to post-campaign, the NSW re-run of the same campaign shows a significant increase in campaign awareness from 19% pre-campaign to 53% post-campaign.⁵ This difference is likely attributable to the fact that the Good for Kids water campaign ran immediately after the Good for Kids launch campaign, so parents had already been exposed to the brand when they were surveyed at pretest. Parents in the rest of NSW who were surveyed for the evaluation of the NSW Health water campaign had not previously been exposed to the Good for Kids branding prior to the campaign running.



It should be noted that the evaluation of the NSW Health Water campaign included parents from HNE where the same campaign had run earlier in the year. This may account for the higher baseline (19%)⁵ compared to the baseline we observed (10%) (Figure 13.4). Post campaign, the NSW Health water campaign achieved high awareness levels (53%).⁵ Unfortunately, by 2010 (Survey 9), the awareness of the water campaign across NSW had decreased to 9.8% compared to 37% across HNE. These differences in awareness raise the question of stand-alone campaigns, compared to those where messages are reinforced by activities across settings, as in Good for Kids.

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Summary and discussion

The Good for Kids program sought to reduce the prevalence of overweight and obesity among children in the Hunter New England region, and to build evidence for obesity prevention policy and practice in NSW. The program involved the development and delivery of commonly focused, yet separate interventions in seven different community settings. The program was one of many initiatives implemented concurrently across NSW to reduce the prevalence of child overweight and obesity.

Despite the challenges for program evaluation posed by the concurrent implementation of similar obesity prevention initiatives elsewhere in NSW, the study findings suggest that desirable and aligned changes were observed across the four levels of evaluation. First, the capacity of community organisations to contribute to improving children's eating and physical activity behaviours was enhanced in all community settings that were the focus of the program, with positive changes in service delivery practice occurring at differentially greater rates than elsewhere in NSW in a number of instances. The enhanced capacity of such organisations was most evident with regard to promoting the consumption of non-sweetened drinks and fruit and vegetables. The reach of the program was high in most settings (49% to 80%), particularly in the school and children's services settings where two-thirds or more of the sites modified such service delivery practices.

Second, evaluation of the program's impact on community awareness demonstrated a large proportion of parents in the region were aware of each of the child obesity prevention messages that were promoted by the program, proportions that were significantly greater than those elsewhere in NSW.

Third, the field survey results suggested positive changes over time in the prevalence of a number of healthy eating and physical activity behaviours among children in the HNE region. For example, statistically significant improvements over time in non-sweetened drink consumption, fruit and vegetable intake, and time spent in physical activity were observed for HNE children attending children's services and students in primary school Years K, 2 and 4. The

findings from the telephone survey of parents similarly showed positive changes in consumption of non-sweetened drinks, with improvements in consumption of fruit juice among boys being significantly greater in HNE than in the rest of NSW. In other cases the change was greater in NSW.

Fourth, during the program period the prevalence of overweight and obesity in the HNE region remained stable for preschool children, as it did across NSW, and trended downward for students in Years K, 2 and 4 in contrast to NSW trends. A statistically significant 7.4% decrease in the prevalence of overweight and obesity was observed for HNE girls in Years K, 2 and 4, a pattern that was not evident across NSW.

The findings collectively demonstrate not only the feasibility of a multi-setting approach to community-based child obesity prevention, but also that the dissemination approach taken by Good for Kids was differentially more successful than the approach taken elsewhere in NSW in mobilising the community to engage in obesity prevention initiatives. Such evidence provides a strong basis for ongoing HNE community engagement in child obesity prevention, and a basis for guiding the dissemination of similar interventions in NSW.

Evidence from other community-based child obesity studies

Limited evidence regarding the effectiveness of community-based child obesity programs is available due to the relatively recent research and policy interest in this field, and the limited number of, and difficulties in conducting well designed community-based child obesity prevention trials.^{1,2,3,4} In addition, research in this area is limited due to the complexity of the causal pathways for obesity,⁵ a complexity that is suggested to require interventions that modify child and family behaviour as well as the environment, and the development of evaluation tools to measure such outcomes.^{6,7,8,9} Very limited evidence has been reported with regard to intervention effectiveness in relation to changes to the environment.

In a recent review of the evidence base for the primary prevention of child obesity, Hillier and colleagues identified more than 30 published reviews and meta-analyses on interventions (randomised and controlled trials) regarding changes in children's weight status since 2008.¹⁰ The authors noted, despite some inconsistencies between studies, a number of consistent findings:

- Small positive or no effects of the interventions in terms of body fat.
- The most promising interventions were those which promoted healthy eating and encouraged a reduction in sedentary behaviour and an increase in physical activity (complex interventions).
- Interventions which target environments and upstream determinants appear to be more effective than those which focus on education.
- Interventions which involve the whole community (community-based interventions) appear to be more effective than those which simply target children.

To provide an indication of how the findings of the Good for Kids program align to such past studies, Table 14.1 provides a summary of the design, outcomes and other details of both the Good for Kids program and other child obesity prevention programs. Studies were included if they were similar to Good for Kids in design, were conducted during approximately the same time period, were published or conducted in Australia.

As reported by Hiller et al,¹⁰ all of the studies shown in Table 14.1, Australian and International, and the Good for Kids program, show some impact on body mass index or overweight and obesity prevalence in at least a sub-group of the target populations of preschool and school aged children. The intervention effects across the studies are small, with some evidence to suggest such changes may be sustained.¹¹

With reference to the characteristics of the intervention studies, the Good for Kids program was unique in terms of the size of its target population and the number of settings in which the intervention was conducted. Good for Kids was more than 10 times larger than the *Romp and Chomp* intervention in one setting (preschools) in Victoria, the intervention with the next largest target population. The focus of the Good for Kids program on settings, rather than individuals, makes it one of the first programs to describe efforts to prevent child obesity at a setting level. Few of the interventions in Table 14.1

reported environmental or setting level changes although reference is commonly made in these studies to the importance of implementation and enforcement of effective policy, cultural changes within organisations, and capacity building to achieve weight change.⁷

The *Eat Well Be Active* program implemented in South Australia reported preschool, school and home environment changes.¹² The following improvements occurred in preschools: uptake of healthy eating and physical activity policy, space and equipment for active play, more breastfeeding friendly environments, greater use of fruit and vegetables for fundraising and a number of socio-cultural changes supportive of healthy eating and physical activity such as higher uptake of professional development opportunities.

In schools, the study reported that students indicated that the environment was more conducive to physical activity, and school staff noted greater exposure to fruit, vegetables and water, healthier food availability in canteens and increased professional development for staff. At home, parents of primary school students reported the introduction of more rules regarding healthy eating, less availability of sweetened drinks and non-core foods, and greater consumption of at least three serves of vegetables per day, although not all such changes were significantly different from the comparison group.

Relative to the other programs, the Good for Kids program involved an expansion of the number and types of settings that were the focus of intervention.^{13,14} A number of similar initiatives are currently underway in the US.¹⁵ The California Endowment's *Healthy Eating, Active Communities Program* represents one such multi-setting program, operating in schools, after-school programs, neighbourhoods, health care, and marketing and advertising.¹⁶ A mid-point review has shown promising changes in: school and after-school physical activity programming and equipment; individual-level changes in children's attitudes and behaviours related to food and physical activity; and awareness and engagement on the part of community members, stakeholders, and policymakers. Children's environments were reported to have changed to promote healthier lifestyles across five key childhood environments in all six selected low-income communities (with populations ranging from 15,000 to 90,000). Children in intervention communities were reported to be engaging in more healthy behaviors than they were before the program's implementation. The positive findings within a

Table 14.1: Summary of Good for Kids and of similar community-based child obesity prevention programs conducted during the same period.

STUDY	TIMEFRAME	DESIGN	TARGET POPULATION	SETTING	OBESITY OUTCOMES
AUSTRALIA					
Good for Kids, NSW	2006-2010	Pre post for individuals, quasi-experimental for settings	Approximately 130,000 children aged 2-12 years	Preschools, primary schools, community service organisations, health services, Aboriginal communities, sports clubs, media	Significant decrease from 25.5% to 18.8% in overweight and obesity prevalence for girls in Years K, 2 and 4. Policy and practice change in preschools, primary schools, community service organisations, health services and sports clubs.
Eat Well Be Active community programs, South Australia ¹²	2006-2009	Quasi-experimental	Approximately 6,000 children aged 0-17	Preschools, primary and high-schools in one urban and one rural community	Significant decrease in overweight and obesity from 28.4% to 22.2% for preschool children compared to a 3.7% decrease for comparison group. Policy and practice change in preschools and schools. No significant difference in % overweight and obese between intervention and comparison group for primary children (aged 10-12). No measures of overweight and obesity for high school children.
Be Active Eat Well, Victoria ¹⁷	2003-2006	Quasi-experimental	Approximately 2,000 children aged 4-12	Primary schools in one rural community	0.9 kg less weight gain and 3.1cm less waist circumference for intervention compared to comparison group children
Romp and Chomp, Victoria ¹⁸	2004-2008	Quasi-experimental	Approximately 12,000 children aged 0-5	Preschools in one peri-urban or urban community	Significant decrease in overweight and obesity from 17.1% to 14.6% in 2 year olds and from 18.6% to 15.2% in 3.5 year olds compared to comparison group
INTERNATIONAL					
APPLES, Otago, New Zealand ¹⁹	2003-2004	Quasi-experimental	Approximately 302 children aged 5-12	Primary schools in one rural community	Mean BMI Z-score was significantly lower in intervention compared to control by 0.26 units
Shape up Somerville, Massachusetts, US ²⁰	2002-2005	Quasi-experimental	Approximately 631 children aged 6-9	Elementary schools in one urban community	Mean BMI Z-score was significantly lower in intervention compared to control by 0.10 units
Healthy Living Cambridge Kids, Massachusetts, US ²¹	2004-2007	Longitudinal	Approximately 3,561 children aged 8 at baseline	Elementary schools in one urban community	Percentage of obese children decreased significantly from 20.2% to 18.0% and percentage of healthy weight children increased significantly from 61.0% to 63.4%
School and community based programs, Northern France ²²	1992-2004	Quasi-experimental	Approximately 500-600 children aged 5-12	Two intervention towns and two comparison towns in northern France	Downward trend in overweight and obesity from 2002 to 2004

range of settings within Good for Kids suggests broad based programs can produce multiple changes, although it is not possible to discern the impact of particular interventions on the child-focused outcome data.

In summary, in the context of such past research, the observed findings of the Good for Kids program are consistent with those previously reported regarding impact on child weight, and extend past research in terms of reporting intervention benefits in modifying the broader environments in which children live, learn and play.

Opportunities for program and evaluation enhancement

Notwithstanding such positive findings, additional or enhanced dissemination strategies are required if the benefits of the intervention approach are to be shared by all children and adolescents, and are to apply to the consumption of energy dense, nutrient poor foods and to greater child engagement in physical activity. Similarly, better alignment between the evaluation designs and methods to intervention exposure will allow more accurate assessment of intervention impact.

Settings reach and program intensity

For settings-based programs such as Good for Kids, to maximise the likelihood of a measurable impact at the population level, the selected settings need to cater for a large proportion of the population of interest. In the case of the Good for Kids program, the settings were selected according to a number of principles, including number of children being catered for in a setting. Only one of the selected settings (schools) can be considered to cater for all children in the region. The remaining settings provided less population reach. For example, children's services are estimated to be attended by approximately 72% of children in Australia aged 3-6 (not in school) and 63% of Australian children are estimated to participate in organised sport. The remaining settings had very limited reach by virtue of their catering for small sub-groups of children, in accordance with the program principle of seeking to meet the needs of children who may be socioeconomically or otherwise disadvantaged. The inclusion of such settings may have contributed to a lower level of program impact at the population level.

Implementation of interventions in settings that specifically cater for disadvantaged groups represents one approach to addressing the risk of inequity that arises from the implementation of whole-of-population intervention

strategies. Tailoring of such intervention strategies to address the particular needs of disadvantaged and other sub-populations represents an additional means of addressing this risk in a manner that may have less effect on the ability of a program to achieve a measurable population impact. Such an approach was adopted by the Good for Kids program to address, in part, the particular needs of Aboriginal children, an approach that could potentially be applied to meeting the needs of other sub-population groups.

In addition to the need for settings to cater for a large number of children in order to maximise the likelihood of a measureable population level impact, a need exists for the number of sites within a setting (for example number of schools) that adopt program initiatives to be maximised. Variable levels of site exposure and adoption of program practices were achieved across the settings addressed by the Good for Kids program. In the case of schools and children's services, despite the existence of large numbers of sites, high levels of program adoption were achieved, relative to previously reported studies in these settings. Sixty four per cent of schools and 80% of children's services had a staff member attend healthy eating and/or physical activity training, and up to 68% of such services had adopted specific program initiatives (for example *Crunch&Sip*[®]). Although similarly high levels of program adoption were achieved in the Community Service setting (80%) the number of providers in this setting was low. In other settings lower levels of program adoption were achieved. For example, the junior sports club setting involved a large number of sites (approximately 500 clubs) of which slightly less than half adopted the program initiative. The intervention in the Health Service setting involved a small number of sites and achieved limited adoption of the program strategies. Such a variability of adoption outcomes suggests a complex array of factors are likely to influence the extent of program adoption in any given setting, with such factors including resource allocation, method, length and intensity of intervention delivery, and setting characteristics.

The approach to intervention delivery adopted by the Good for Kids program varied between settings. The Good for Kids health promotion project team delivered the intervention in children's services, primary schools and community service organisations. Non-government organisations were contracted to deliver the intervention in junior sports clubs and general practitioner (GP) settings. Selection of the approach to intervention

delivery in each setting was primarily a function of the skills available within the project team, the existence of other provider organisations with setting-specific skills, and the characteristics of each setting. Specific analysis of the relative effectiveness of different approaches to intervention delivery in the Good for Kids program was not undertaken, however higher rates of adoption appear to have been achieved in those settings where program delivery was undertaken by the project team with specific skills in capacity-building. An absence of research addressing the effectiveness of different service delivery approaches represents an impediment to the successful implementation of policy initiatives such as the Good for Kids program.

Setting characteristics influenced the strategies used to promote adoption of the program initiatives, and are likely to have influenced the extent of adoption of program initiatives within settings. For example, the existence of formal processes and a unified organisational structure across government schools provided a ready mechanism for central facilitation of program adoption by schools. In contrast, given the independent nature of GPs, the use of such a centralised approach was not possible. However, the existence of Divisions of General Practice provided an opportunity for the delivery of adoption support to be coordinated through the professional development structures and processes of such organisations. In the case of junior sports clubs, the primarily local, voluntary and independent nature of such organisations resulted in a more intensive individual club by club intervention delivery method being applied. No specific analysis of the relative effectiveness of the different strategies used to promote program adoption was undertaken, however higher rates of adoption appear to have been achieved in those settings where some degree of unified organisational structure was available to support intervention delivery. Such a pattern of findings suggests additional and possibly more intense intervention strategies are required to address the particular needs of settings that involve separate or loosely connected sites.

The extent to which sites within a setting adopt an innovation is suggested to be a function, in part, of the length of time during which the innovation is implemented. For example, in a number of settings such as schools and children's services, it is suggested that a period of up to three years is required to achieve successful adoption of a new program.¹ In the case of the Good for Kids program

the maximum length of intervention implementation was 40 months for *Crunch&Sip* (33 of which were prior to commencement of the follow up field survey) and interventions ran for 36 months within the junior sports and Aboriginal health settings. For other interventions, the periods of overall implementation were more limited, and in some cases the period of intervention implementation prior to commencement of the follow up field survey of children was quite short. The *Get Skilled, Get Active, Go!* intervention with schools ran for 17 months (10 of which were prior to the commencement of the follow up field survey) and the *I Move We Move* intervention ran for 13 months, of which only five months were prior to commencement of the follow up field survey.

The length of the intervention in each Good for Kids setting was the outcome of a number of factors. First, the program was implemented in an environment where limited prior investment in child obesity prevention had been made, either locally or at a state level. As a consequence, a considerable period of time (approximately 16 months) was initially required to develop and plan the program, select and establish partnerships with settings, and develop and implement novel intervention strategies for specific settings. The need for such an extended period of planning reduced the period subsequently available for actual intervention delivery. Second, due to resource constraints separate interventions addressing the program's healthy eating and physical activity determinants were implemented in a sequential fashion in the schools and children's services settings. As a consequence, the length of intervention exposure, particularly for the physical activity interventions was limited. An intervention approach that involves the use of strategies that address both types of behavioural determinants may represent a more efficient means of maximising child exposure to intervention strategies.

Third, the capacity building approach undertaken by the program to maximise the sustainability of any achieved changes resulted in incremental growth in the number of sites that had adopted the program initiatives. As a consequence, the overall level of program adoption reported for each setting reflects the level achieved at the point of evaluation, and not the level that applied throughout the intervention period. As a consequence, the duration of maximal exposure of children to an intervention in any given setting was limited. Evaluation of the program effects after an extended period of maximum child exposure to the intervention elements

would provide a more realistic estimate of the program's behavioural and weight status outcomes. Similarly, the circumstances described above combined to preclude all program interventions being implemented across the seven settings at the one time, an approach that would conceivably maximise program impacts and outcomes. Given these circumstances, not all sites within each setting having adopted the program initiatives, and given the suggestion that a period of up to three years is required to maximise the uptake of new programs by settings,¹ the observed level of program impacts and outcomes are considered to represent at best, short term indications of program effect. Further longer term evaluation is required that enables an assessment of program effect after an extended period of maximum program implementation.

The focus of the Good for Kids intervention strategies was on building the capacity of settings to deliver programs and services that promoted healthy eating and physical activity. The primary strategies for achieving this objective included: provision of program and service related resources, materials, tools and information; provision of funding and/or incentives; training of staff in the delivery of the initiative; and provision of adoption support for a period of time, for example site visits, support calls, for problem solving, monitoring and feedback. For each of these strategies the nature and extent of delivery varied between settings, with such variability being primarily determined by resource availability and the characteristics of the setting. For example, the characteristics of the selected settings and of the agreed intervention programs in these settings limited the extent to which the behavioural determinants regarding consumption of EDNP foods, and small screen recreation behaviour were addressed, and hence limited children's exposure to these messages.

In the community services setting for example, all staff were offered training, whereas in the schools and children's services settings, training was restricted to a limited number of staff. Similarly, the provision of incentives varied between settings in both their nature (cash or equipment) and extent. In terms of the provision of adoption support, individual schools were proactively contacted on 2 occasions during the initial phase of the *Crunch&Sip*[®] intervention in 2007/8, and the protocol for the second phase support for both *Crunch&Sip*[®] and *Get Skilled, Get Active, Go!* in 2009/2010 involved 4 four support contacts. In the children's services setting, sites

received two telephone support calls during a two month period, and sports clubs were allocated approximately two hours of contact. No formal evaluation of the effectiveness of the frequency and nature of support contact was undertaken by the Good for Kids program. Such research is however considered essential given its suggested central role in achieving the program adoption objectives, and its impact on the quantum of resources required for effective program dissemination.

Evaluation

According to recommendations regarding the evaluation of dissemination initiatives,²³ evaluation of the Good for Kids program was undertaken at four levels, organisational, community awareness, behavioural, and physical measurement of weight status. Where they were available, validated questions and tools were used in the evaluation, as were previously proven methods of data collection. Random selection techniques were used to ensure the representativeness of samples in key analyses; sample sizes were, with the exception of the telephone survey, sufficiently large; and key analyses utilised weighted data. Settings-based evaluation designs were tailored to the particular setting, nature of intervention and outcomes, and involved in most instances, either pre post or quasi-experimental approaches.

Notwithstanding these strengths, a number of limitations in the evaluation of the program were evident. First, the primary threat to the ability of the evaluation to measure the effect of the program strategies was the enhanced state-wide policy focus on the prevention of child overweight and obesity that coincided with the period of the Good for Kids program. This development, not evident at the time of commencement of the program, is likely to have resulted in the observed differential impacts and outcomes of the program being an under-estimate of such effects due to similar changes occurring at the state level. The likelihood of such confounding was enhanced by the implementation of initiatives elsewhere in NSW that were similar to or the same as those implemented in the same settings by Good for Kids. Such circumstances are not uncommon in the evaluation of major policy and community-based interventions.

Second, despite the substantial organisational reach achieved in all settings, and in some cases greater reach in the HNE region, the extent to which this resulted in actual changes in the delivery of services of sufficient intensity or quality to children to modify their behaviours

is unknown. Greater specificity of practice uptake and quality in the measurement of organisational change may serve to enhance both the precision of measurement and the extent of practice change in future initiatives.

Third, to enable direct comparison with available NSW Schools Physical Activity and Nutrition Surveys (SPANS) data the field survey was designed using a sample stratified according to specific school Years (K, 2, 4, 6, 8 and 10). As a consequence, the survey design did not align to the whole population of children that was the focus of intervention delivery. Despite being designed with direct comparison to the NSW SPANS data in mind, such comparisons were not undertaken. It has however been possible to interpret the field survey weight status data with reference to the separately collected NSW SPANS data (K, 2, 4, 6, 8 and 10) for 2004 and 2010. Such references suggest a number of positive changes in prevalence for the HNE region not evident across NSW. However, without direct comparison it is not possible to conclude that such changes were attributable to the program. No equivalent state-wide data for children attending children's services is available for such comparisons.

Fourth, as previously described the collection of baseline data occurred prior to the planning and development of a number of the program interventions. Similarly, the collection of follow up data occurred at a time when some interventions had been in place for only a limited period of time. This misalignment between the design of the evaluation and the focus and sequencing of the intervention strategies may have limited the ability of the evaluation to accurately reflect the impact of the program. Such a tension is similar to that experienced in community based participatory research where evolving study procedures and processes may preclude the development of evaluation designs and protocols a priori.^{24, 25, 26}

Fifth, the evaluation included a large range of behavioural impact measures (20) assessed across a number of age and gender sub groups. In a number of cases, there was limited alignment between the content, intensity and reach of the interventions and such measures, for example, with respect to the consumption of EDNP foods. A dose response analysis where change in the outcome variables of interest is examined according to the level of exposure to specific intervention components represents one approach to addressing the need to align measurement with intervention content and exposure.^{27, 6}

Inclusion of such an exposure analysis will also serve to address the impact of population migration on cross-sectional sample based evaluations of population-based interventions.²⁸

Sixth, both the field and telephone surveys did not oversample Aboriginal children, thereby limiting the ability of the evaluation to determine the impact of the program on this priority population group.

Finally, the telephone survey of parents was undertaken to provide an additional source of data regarding the effects of the program on the behavioural determinants of interest. The survey was not designed to have sufficient statistical power to provide the primary basis for determining the effects of the program on healthy eating or physical activity behaviours. As a consequence of this and other differences, interpretation of findings of the field and telephone surveys was limited.

Regardless of these limitations, the findings of the evaluation suggest: a positive impact of the program on the capacity of community organisations to promote healthy eating and physical activity; greater community awareness; improvements over time in a number of behavioural and weight outcomes; and importantly, an alignment between the focus and reach of the interventions in specific settings and suggested changes in behaviours and weight status. In all settings there was an increased engagement of targeted community organisations in the promotion of unsweetened drink consumption, consumption of fruit and vegetables and participation in physical activity, particularly in primary schools and children's services. Such findings, together with an increase in community awareness of such behaviours, were aligned with observed improvements over time in the consumption of unsweetened drinks and fruit and vegetables, and physical activity among children in children's services and students in Years K, 2 and 4. Similarly, such findings were aligned to improvements over time in weight status, particularly for girls in Years K, 2 and 4. The absence of interventions directed at adolescents, and the relative absence of changes in behaviours or weight status for children in Years 6, 8 and 10 supports such an interpretation.

Recommendations

As one of Australia's largest ever child obesity prevention initiatives the Good for Kids, Good for Life program provides a unique insight into the complexities of conducting population wide initiatives to promote health. Based on the experiences of the program and its evaluation it is recommended that:

1. NSW continue the development, implementation and evaluation of a multi-setting primary prevention approach to reducing the prevalence of child overweight and obesity and improving children's healthy eating and physical activity behaviours.
2. Such an approach adopts an evidence-based focus on developing and measuring obesity prevention leadership, programs, systems and skills in community organisations.
3. Such an approach includes an extended period of dissemination and standards of program adoption by community organisations.
4. Evaluation of such an approach involves the use of an evaluation design and measures that are aligned to the design, content and timing of the intervention in specific settings.

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