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Nutrition and Physical Activity in Children and Adolescents

Barwon-South Western Region

Sentinel Site Series Report 1: Methods and Tools

Report prepared for Department of Human Services
(Victoria)

By the WHO Collaborating Centre for Obesity Prevention
Deakin University

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4. Executive summary

Introduction

This report covers the methods and tools and instruments that were associated with the collection of data across three obesity prevention projects in the Barwon South-Western Region: *Romp & Chomp* (under 5 year olds), *Be Active Eat Well* (mainly primary school age, 4-12 year olds) and *It's Your Move!* (secondary school age, 12-18 year olds). All three intervention projects aimed to increase the community capacity to promote healthy eating and physical activity and to prevent unhealthy weight gain in children.

Methods

All three intervention projects used a quasi-experimental design with measurements in the intervention and comparison populations at baseline and after three years of intervention. Apart from *Be Active Eat Well*, only baseline data are included in these reports. For *Romp & Chomp*, only the baseline data for the intervention site (City of Greater Geelong) are included and not the other comparison local government areas in Victoria (n=41). The main sets of measurements were: anthropometry and community capacity (the outcome variables for the interventions); behaviours, attitudes, and knowledge questionnaires and settings environmental audits (impact variables).

- For *Romp & Chomp*, anthropometry and questionnaires were collected for 950 children during their 2 and 3.5 year old routine check up with Maternal and Child Health nurses (response rate 950/2946, 32.2%) and environmental audits were conducted in early childhood settings (response rate 101/143, 70.6%).
- For *Be Active Eat Well*, the intervention site was Colac and the comparison site was the rest of the Barwon South-Western Region. The baseline survey for this longitudinal follow up study included anthropometry (n=2184/4413, response rate 49.5%), parent-reported child behaviours (n=1944), grade 5 and 6 self-report surveys (n=416), school environmental audits (response rate 100%), and measures of community capacity.
- For *It's Your Move!* the intervention site was East Geelong/Bellarine and the comparison population was the rest of the Barwon-South Western Region. The baseline survey for this longitudinal follow up study included anthropometry, body composition, questionnaires on behaviours, attitudes and knowledge (n=3075, with a response rate of 48.6%), school environmental audits (8/13, response rate, 69.2%), and measures of community capacity.

Tools

Assessment tools for the under 5's (*Romp & Chomp*) included:

- Anthropometry (height and weight) for 2 and 3.5 year olds
- A parent-reported Eating and Physical Activity Questionnaire (EPAQ) for 2 and 3.5 year olds
- Settings Environments Audits for long day care, family day care, and kindergartens

Assessment tools for the primary school age group (*Be Active Eat Well*) included:

- Anthropometry measures of height, weight and waist circumference
- Computer Assisted Telephone Interview (CATI) of parents for child behaviours and household environmental factors
- School Food Checklist (for lunchboxes and food eaten at school)



- School Children’s Questionnaire (self-report behaviours for grades 5 and 6)
- School Environments Audit
- Community Readiness to Change tool

Assessment tools for the secondary school age group (*It’s Your Move!*) included:

- Anthropometry measures of height, weight, waist circumference and body composition analysis by bioelectrical impedance
- Adolescent Behaviour, Attitude and Knowledge Questionnaire (ABAKQ)
- Quality of Life assessments using the AQoL2 and PedsQoL instruments
- School Environments Audit
- Community Readiness to Change
- Community Capacity Index

The tools for use within the ANGELO Process (Analysis Grids for Elements Linked to Obesity) are also included. This process was used by the projects in their planning phase for priority-setting and the creation of an action plan.

Conclusions

The collection of baseline data for the three intervention studies provides excellent detail on the patterns of eating, physical activity, body size, and environmental support in the region. Such information is valuable for monitoring trends over time, comparing the impacts of interventions in the demonstration projects, and providing information to other regions of Victoria and Australia where patterns are likely to be similar. The tools described in this report have come from a variety of sources and have varying levels of validation. The relevance and validity of measurement tools need to be considered for each application of the tools. The ANGELO process is a versatile approach to engage communities in creating their plans to prevent unhealthy weight gain in children and adolescents.

Recommendations

Some summary points from the experiences in evaluating the projects in the Barwon-South Western Region and recommendations in relation to the selection of tools for evaluation of community-based programs for obesity prevention are:

Formative evaluation

- The ANGELO Process, as described in this report, has proven to be a robust, flexible, empowering and efficient process to bring a community through the early stages of engagement and planning to arrive at an agreed action plan.
- Expertise is needed to: bring evidence (from local to international) to the planning processes; to facilitate the prioritisation so that the ‘could do’ options are turned into ‘will do’ objectives, and; to write SMART objectives (Specific, Measurable, Achievable, Relevant, Time-bound) – the major challenges being to specify objectives tightly enough to be measurable and to ensure that there is the capacity to deliver (achievable).

Process evaluation

- It is important to know who did what to whom, when and for how what cost so that outcomes can be better explained.
- The action plan, which served as a living document that evolved over multiple iterations, plus an ongoing diary of activities proved to be a good system for recording processes.



Impact evaluation

- This was primarily defined as changes in the environments and behaviours which would be considered mediators in the pathway to changing outcomes.
- Environmental Audits in settings can trace the changes in policies, physical amenities, costs (eg cost of food in canteens), and socio-cultural factors (eg teachers as role models). The settings audit tools could potentially be further streamlined and managed as a web-based system with immediate feedback and (in time) bench-marking with best practice.
- Behaviours are critical to assess, although there are issues around the validity of many self-reported or parent-reported behaviours. If the aim is to follow the pattern of critical behaviours for a population (eg primary school children), then simple, self-reported indicator questions, like the School Children's Questionnaire used for the grade 5 and 6 pupils, would suffice. This has the advantage of being short, having low recall bias, and being well validated for most of its indicators.

Outcome evaluation

- We defined this as changes in anthropometry and community capacity since one is the objective hallmark of making a difference to childhood obesity in the community and the other is the hallmark of sustainability.
- Height and weight are the minimum to measure but waist may be a better, early indicator of change. These can be measured sensitively.
- The two tools we used for assessing community capacity were both somewhat cumbersome to use. If they can be streamlined for a more rapid assessment they could be valuable in the formative stages and be better used to follow change.



5. Background

Childhood obesity

Overweight and obesity arguably pose the single biggest threat to the health of Australian children. The prevalence of childhood and adolescent obesity has been steadily increasing in Australia [1] and around the world [2]. The negative impacts on health and psychological well being have been well described and they are substantial [2, 3]. Indeed, recent estimates suggest that the health impacts of obesity may be so great that today's children will be the first generation for many centuries to experience a lower life expectancy than their parents [4]. Despite the seriousness of childhood obesity, the latest national figures for Australia are from 13 years ago. Nevertheless, from national and regional surveys, it is clear that childhood overweight and obesity in Australia are increasing and, together, are now likely to be over 25% with much higher rates in some ethnic groups [1, 5, 6].

Sentinel Site for Obesity Prevention, Barwon South-Western Region

The Sentinel Site for Obesity Prevention located at Deakin University, Waterfront Campus in the Barwon-South West region has been established and supported by the Australian Department of Health and Ageing and the Victorian Department of Human Services to provide the platform of expertise and support for demonstration projects in the region. Three demonstration projects have been established: *Romp & Chomp* project (Under-5s), *Be Active Eat Well* (mainly primary school age) and the adolescent project, *It's Your Move!* Each aims to build the capacity of the local community in areas of healthy eating and regular physical activity within their respective target group.

Each of these projects was designed to incorporate healthy eating and physical activity objectives that related to their context and settings, but all had similar evaluation components to measure the impact and outcomes of the interventions. These tools (Table 1) were administered at the baseline and 3 year follow up time points.

This report

This report focuses on the design and methods of the evaluation and tools used for each of the projects. In general, tools were used to measure:

- Anthropometry
- Behaviours, attitudes, and knowledge
- Environments (eg schools, early childhood settings, homes)
- Community capacity
- Quality of life

The tools associated with the ANGELO Process (Analysis Grids for Elements Linked to Obesity) are included. This process was used to engage the community in the prioritisation of targets for intervention and for developing the community action plan.

The strengths and limitations of each tool are discussed including the source of tool components and any quality assessment (eg validity, repeatability). Some recommendations are made on the design of program evaluation for obesity prevention and on the choice of tools.



Table 1: Summary of the evaluation tools used across the three projects

	Romp & Chomp (Under 5s)	Be Active Eat Well (Primary School)	It's Your Move! (Secondary School)
Anthropometry	Height, weight	Height, weight, waist circumference	Height, weight, waist circumference, body composition
Behaviours	Eating and Physical Activity Questionnaire (EPAQ)	Computer Assisted Telephone Interview (CATI) Survey of parent-reported child behaviours and home and local environments School Children's Questionnaire (grades 5 & 6) School Food Checklist ('lunchbox audit')	Adolescent Behaviours, Attitudes and Knowledge Questionnaire (ABAKQ)
Environments	Kindergarten Environmental Audit Long Day Care Environmental Audit Family Day Care Environmental Audit	School Environmental Audit	School Environmental Audit
Community Capacity Quality of Life		Community Capacity Index	Community Readiness to Change PedsQoL AQoL

6. Evaluation Design

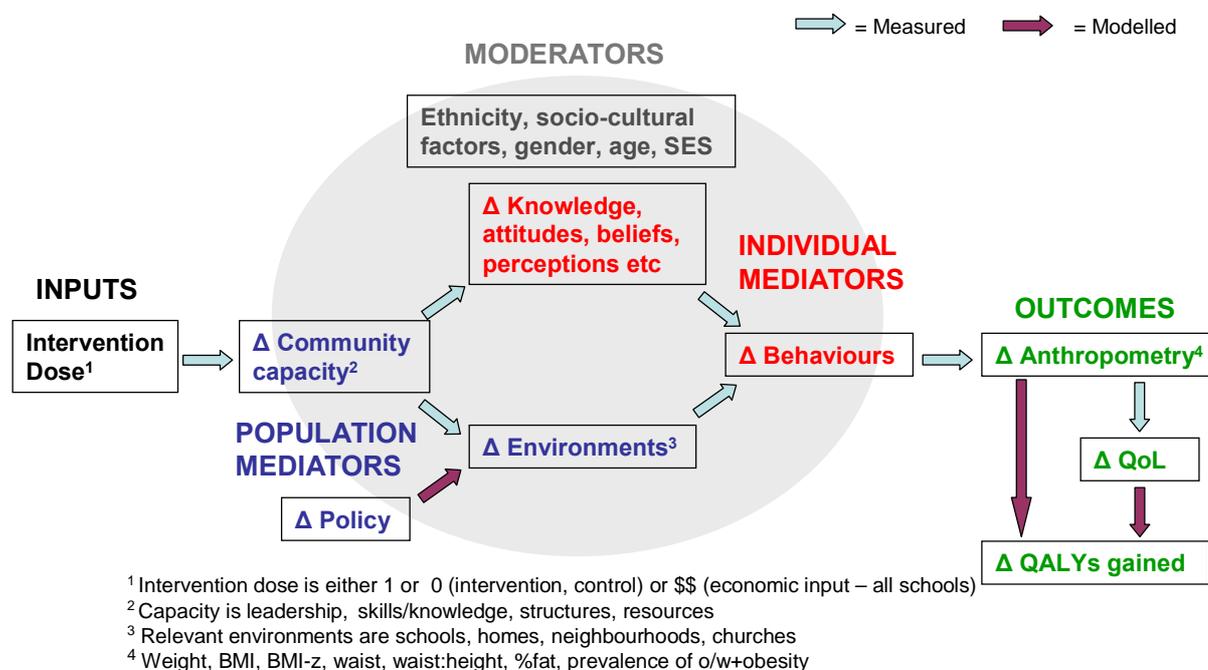
Each of the projects included three standard objectives. The first objective, 'Building Community Capacity' related to the community's capacity to promote physical activity and healthy eating. The second, 'Social Marketing', focused on the promotion of the project messages among the relevant target groups. The third, 'Evaluation', included: *Formative evaluation*, which involved monitoring the establishment of the project, engagement of key stakeholders and formation of steering committee; *Process evaluation*, which recorded the amount of time and costs associated with an objective, the actions taken to implement a strategy, and recorded some of the lessons learnt along the way; *Impact and outcome evaluation* which measured the achievements of the project each of the objectives of the project action plan. For the secondary school project, socio-cultural, economic and Quality of Life measures were also included in the evaluation objective.

Logic Model

The general logic model for the interventions is shown in Figure 1. Not all features apply to all projects. The input can be assessed as either 0 (no intervention) or 1 (intervention) or as a graded input through the economic evaluation (i.e. amount of resource use including paid and volunteer time). The mediators of behavioural change at a population level are policy and environmental change and at the individual level they are changes in attitudes, knowledge, beliefs etc. The changes in behaviour then influence body size, quality of life and eventually disability-adjusted life years gained. The influences moderating these proposed direct links include age, gender, ethnicity and socio-economic factors.



Figure 1: The logic model for the interventions



Romp & Chomp (under 5s)

Overview

Romp & Chomp was a whole of community-based obesity prevention demonstration project that targeted preschool children within the City of Greater Geelong from 2005-2008 (~12,000 children under 5 years of age). It received a small amount of funding from the Department of Human Service, Barwon-South Western Region and support from other organisations in Geelong, including Barwon Health and the City of Greater Geelong.

In 2005, 19 long day care facilities, 44 family day care centres and 38 kindergartens consented to being involved in the evaluation of the project.

The project had a strong focus on developing sustainable changes in areas of policy, socio-cultural, physical and economic environments. The action plan (Table 2) shows the eight objectives which were summarized into five key messages (daily water, daily active play, daily fruit and vegetables, less screen time).



Table 2: Action Plan of *Romp & Chomp*

<i>Romp & Chomp</i> – Initial Draft of the Action Plan
Objective 1: To increase the capacity to promote healthy eating and physical activity
Objective 2: To increase awareness of the project’s key messages in homes and early childhood settings
Objective 3: To evaluate the process, impact and outcomes of the project
Objective 4: To significantly decrease high sugar drinks and promote the consumption of water and milk
Objective 5: To significantly decrease energy dense snacks and increase consumption of fruit & vegetables
Objective 6: To significantly increase home/ family-based active play and decrease television-viewing time
Objective 7: To increase structured active play in kindergarten and day care
Objective 8: To achieve an integrated population growth monitoring program within Maternal and Child Health and school health systems

Note that the term ‘significantly’ meant statistically significant since the study had multiple indicators per objective, so that an objective would be fully met, partially met or not met depending on whether all, some or none of the indicators showed statistically significant changes compared with the comparison population.

Design

The intervention site chosen was the City of Greater Geelong (COGG). Other local government authority areas (n=41) with available electronic data on height and weight from the 2 and 3.5 year Maternal and Child Health (MCH) nurse ‘Age and stage’ check ups being the comparison population. The project outcome was assessed by comparing the changes in overweight and obesity prevalence in Geelong against the changes in the other local government areas. These data are not presented here. Other cross-sectional



surveys of anthropometry, behavioural patterns and environmental audits in the early childhood settings were done at baseline and follow up after 3 years intervention.

Sample

For the **Eating and Physical Activity Questionnaire (EPAQ)** (which included anthropometry measured by the MCH nurse), 950 completed surveys filled in by parents who visited MCH nurses for the 2 and 3.5 year visits were returned over the assessment time period (July 2005-June 2006). The total attendance for those visits during the study period was 2946, giving a response rate of 32.2%. The sample was skewed towards the higher socio-economic groups compared to the general population.

For the **environmental settings audits**, the overall response rate was 70.6% with settings specific rates as follows:

- Long Day Care: 73.1% (19/26)
- Family Day Care: 66.7% (44/66)
- Kindergartens: 74.5% (38/51)

Tools used

- Anthropometry: Height and weight from routinely collected MCH data for 2 and 3.5 year 'Age and stage' visits
- Behaviours: Parent-reported behaviours of the child using the Eating and Physical Activity Questionnaire
- Environmental audits: Audit surveys of early childhood settings (Kindergartens, Long Day Care, Family Day Care)

Be Active Eat Well (4-12 year olds)

Overview

Be Active Eat Well (BAEW) was the first Australian community-based initiative designed to provide the opportunity, resources and support to build a community's capacity to promote healthy eating and physical activity and reduce unhealthy weight gain in children. The target population for BAEW was children aged 4-12 years and their families in the rural Australian town of Colac. From an intervention perspective, this project used a multi-setting, multi-strategy approach and was based on community capacity building principles. Thus, BAEW was designed to build the community's ability to create its own solutions to promoting healthy eating, physical activity and healthy weight. The intervention program was designed, planned and implemented by the key organisations in Colac, particularly Colac Area Health (lead agency), Colac Otway Shire, and the Colac Neighbourhood Renewal. Primary schools were the major setting for action but other settings such as kindergartens, neighbourhoods, and fast food outlets were involved. Use was made of the media and other social marketing opportunities. The initial action plan for Be Active Eat Well is shown in Table 3. The intervention program was funded by Department of Human Services Victoria from 2002-2006 (one year of preparation, 3 years of intervention). Deakin University provided the support, training and evaluation for the project which was funded by the Department of Human Services, Australian Department of Health and Ageing and VicHealth.



Table 3: Action Plan of *Be Active Eat Well*

***Be Active, Eat Well* – Initial draft of the Action Plan**

Objective 1:

To achieve a high awareness of the “Be Active Eat Well” messages among parents and children

Objective 2:

To build Colac community capacity to promote physical activity and healthy eating

Objective 3:

To evaluate the process, impact and outcomes of the ‘Be Active Eat Well’ project

Objective 4:

To significantly decrease the time spent watching TV & playing on computers or electronic games

Objective 5:

To significantly decrease the consumption of high sugar drinks and to promote the consumption of water

Objective 6:

To significantly decrease the consumption of packaged, energy dense snacks and significantly increase consumption of fruit

Objective 7:

To significantly increase the proportion of primary school children living within 1.5km who walk/cycle to school

Objective 8:

To significantly increase the amount of active play in the after-school to pre-dinner (3-6pm) & weekends

Objective 9:

To investigate the potential for improving the quality (fat content and type of fat) of deep-fried foods

Objective 10:

To provide a service to improve the food and physical activity choices for children with or at risk of overweight

Note that the term ‘significantly’ meant statistically significant since the study had multiple indicators per objective, so that an objective would be fully met, partially met or not met depending on whether all, some or none of the indicators showed statistically significant changes compared with the comparison population.



Design

This project incorporated a quasi-experimental and longitudinal design, with the same children being measured at baseline and follow up. The town of Colac was the intervention site with all kindergartens (n=4, age 4 years) and primary schools (n=6, age 5-12 years) in Colac with enrolments > 20 students being included in the sample frame. Colac was purposefully selected as the intervention site as it had not previously been engaged in similar community-based projects, it was geographically contained, it had good infrastructure and community networks to support the intervention program, and it was close to the support and evaluation team at Deakin University in Geelong.

The remainder of the Barwon-South Western region of Victoria (population 323,000) was the comparison site. The region (one of eight in Victoria) includes Geelong (population of 199,684 in 2003) as the regional centre and covers the south-west coast of Victoria and is further divided into 8 networks. It is socio-economically disadvantaged compared to state-wide averages and in 2003, 12% of the population were born overseas. The sample frame for the comparison group was a stratified, random sample of the Barwon-South Western region with the Colac school network and any schools within a 30km radius excluded to minimise potential contamination. The schools and pre-schools across the remaining seven networks were stratified according to enrolment size (large: >150; small: 20-150; not included: < 20) and probability proportional to size (PPS) sampling was used to select large schools across the seven networks. Small schools and pre-schools were drawn from one network (simple random selection) and then PPS was used to select the actual schools and pre-schools.

Data collection involved a series of measures including anthropometry (height, weight and waist circumference), a computer assisted telephone interview (CATI) survey of parents, a grade 5 and 6 self-report survey, a lunchbox survey, school environmental audit, and an assessment of capacity building using the Community Capacity Index. Baseline data collection occurred in 2003 in Colac and 2003/4 for the comparison schools. Follow up data collection occurred for both sites in early/mid 2006. This meant that the duration between measurements for the Colac group was about 3 years, whereas for the comparison group the duration was closer to 2 years. This meant statistical adjustments were needed in the analyses to account for the differences in duration.

The CATI survey of parents elicited parent-reported childhood behaviours and judgements on some environmental factors in their home and neighbourhood. In addition, baseline and follow up environmental audits were done in the schools and community capacity was assessed using key informants. A brief (2-page) survey (School Children's Questionnaire) filled out by grade 5 and 6 students was administered in a serial cross sectional manner. A School Food Checklist (SFC or 'lunch box survey') was completed on primary school children at baseline and follow up. In other words, at baseline, the SFC was NOT administered to kindergarten children and at follow up, it was NOT administered to children who had left primary school for secondary school.

Sample

There were 4 kindergartens and 6 primary schools within the intervention sample at baseline (2003). In all, 1001/1726 Colac children consented, providing an overall, response rate of 58.0%. At longitudinal follow up in 2006, 841 completed follow up measures, giving a follow-up response rate: 84.0%. The comparison sample was a stratified random selection of preschools (n=4) and primary schools (n=12) from the rest of the Barwon-South Western region of Victoria. The baseline sample in 2003/4 was 1183/2687, giving a response rate of 44.0%. At follow-up in 2006, 979 were measured



providing a follow-up rate of 82.7%. Overall, 2184 children, aged 4-12 years old at baseline from the Colac and Barwon-South Western region of Victoria (overall response rate 49.5%) and 2126 parents from 2101 households that participated in the evaluation of BAEW. Details of the flow of participants through the project are included in report 6 of this series as well as in Sanigorski et al.[7].

Tools used

- Anthropometry: Height, weight and waist circumference in 4-12 year olds
- Behaviours: Parent-reported child behaviours using the CATI survey
School Children's Questionnaire in grade 5 and 6 children
School Food Checklist in primary school children
- Environmental audits: Audit surveys of primary schools
- Community capacity: Community Capacity Index administered to key informants

It's your Move! (12-18 year olds)

Overview

It's your Move! was the third project that implemented a community-based approach to obesity prevention and it had a particular focus on secondary school students. In the Barwon-South Western Region there are 49 secondary schools (31 government, 5 Catholic, 13 private) with a combined enrolment of approximately 49,000. The intervention sample was selected as all secondary schools from the East Geelong and Bellarine Peninsula regions of Geelong. The five schools in the selected area (Newcomb Secondary College, Bellarine Secondary College, Geelong High School, St Ignatius College, and Christian College [years 7-9 only]) had a total available enrolment of 3406. The comparison sample was a stratified random sample of schools (n=8) from the Barwon-South Western Region.

The project was primarily funded through the Department of Human Services (via the Victorian Government initiative 'Go for your life'), VicHealth and the National Health and Medical Research Council (NHMRC). The project is also part of the Pacific Obesity Prevention In Communities (OPIC) project which was funded through a joint grant from the Wellcome Trust, and NHMRC and the Health Research Council (NZ) from 2004-2009. In addition to the community-based intervention, the OPIC project had economic, socio-cultural and policy sub-studies (not included in this report).

It's Your Move! involved several components:

- Developing and implementing the *It's Your Move!* intervention activities to promote healthy eating, physical activity and a healthy body shape and size among youth
- Evaluating *It's Your Move!* (process, costs, impacts, and outcomes)
- Supporting the economic, socio-cultural and policy sub-studies
- Building the community capacity to promote healthy eating and physical activity and building research and evaluation capacity in Australia

The action plan (Table 4) for the project was developed in early 2005 with key stakeholders from the Department of Human Services, Department of Education and Early Childhood Development (principals and teachers) and students from the intervention schools. The role of students throughout the project as leaders and implementers was a central part of the process.



Table 4: Action Plan for *It's Your Move!*

<i>It's Your Move!</i> – Initial Draft of Action Plan
Objective 1 To build the capacity of families, schools, and community organisations to promote healthy eating and physical activity
Objective 2: To achieve a high awareness of the project's key messages
Objective 3: To evaluate the process, impact and outcomes of the <i>It's Your Move!</i> Project
Objective 4: To significantly decrease the consumption of high sugar drinks and to promote the consumption of water
Objective 5: To significantly increase the proportion of young people eating breakfast
Objective 6: To significantly increase fruit and vegetable consumption
Objective 7: To significantly increase the healthiness of school food
Objective 8: To significantly increase active transport
Objective 9: To significantly increase participation in organised sports and other active recreation
Objective 10: To create an acceptance of different healthy body sizes/ shapes and decrease episodes of inappropriate dieting

Note that the term 'significantly' meant statistically significant since the study had multiple indicators per objective, so that an objective would be fully met, partially met or not met depending on whether all, some or none of the indicators showed statistically significant changes compared with the comparison population.

Design

This design was quasi-experimental using a longitudinal cohort follow up, rather than serial cross-sectional design to increase study power. The outcome measures included change in Body Mass Index (BMI), change in BMI Z-score (BMI score which is standardised by age and sex), and change in percentage body fat. Overall, the outcome of the project will be determined by two main factors: the degree to which the intervention objectives have been achieved, including increasing the community's capacity to maintain the healthy eating and physical activity promotion; and the changes in BMI Z-scores. The economics component will also allow outcomes of cost-effectiveness,



quality of life and modelled disability-adjusted life years (DALYs) saved. Baseline measurements were taken in 2005 and follow up in 2008. Only the data from the baseline surveys are included in these reports.

The baseline data measurements for this study included anthropometry measures of body fat, height, weight, waist circumference; a Behaviours, Attitudes and Knowledge Questionnaire which was an 84 question survey self-administered using Personal Diary Assistants (PDAs); School Environmental Audits which entailed a 3 part survey, completed by the principal, canteen manager and three teachers; and two quality of life instruments: AQoL (The Assessment of Quality of Life (AQoL2) Instrument, modified for use with adolescents, and the Paediatric Quality of Life Inventory (PedsQL), generic module for 13-18 year olds.

In order to enhance the credibility of the quality of life measurement in *It's Your Move!* (and the wider OPIC project), a decision was made to use to the AQoL2 instrument in conjunction with the PedsQL. The PedsQL is a paediatric general health profile instrument specifically designed for use with adolescents and children, and which is shown to have high validity and reliability[8, 9] The AQoL, a utility-based instrument originally developed for Australian adults [10, 11] was recalibrated for use with adolescents. The two quality of life instruments were piloted in 95 students in the *It's Your Move!* schools, before being administered at baseline.

Sample

The selection of the intervention community was based on a number of criteria. The community had to have sufficient numbers of youth to reach the sample sizes; sufficient numbers of settings (mainly schools, community organisations) to provide the structures for interventions; a degree of geographical cohesiveness to be able to define the sampling frame; and reasonable proximity to the intervention and evaluation teams.

Sample size estimates were determined for the principal quantitative outcome variable for the intervention and control cohorts; being change in BMI (which is closely related to changes in weight, BMI Z-score and prevalence of overweight/obesity). Weight (SD=16.8 kg) and BMI (SD=5.22kg/m²) from the Auckland High School Survey were used for sample size calculations. For a within-person correlation of 0.8, a sample of about 1000 in each arm of the study would detect a difference in weight of 1.3 kg and BMI of 0.41 kg/m² (equivalent to about 4 percentage points difference in overweight/obesity prevalence) with 80% power and alpha=0.05. The Auckland High School Survey showed no design effect associated with the clustered sampling for analyses restricted to Pacific Island students once other variables were accounted for. A target initial sample size of ~1500 in each arm was used to allow for drop-outs and loss to follow up.

The baseline sample of 3,075/6327 participants represented a response rate of 48.6%.¹ There was a 69.2% response rate for the school environmental audits.

¹ Note that the response rate is calculated as 2954/5912 since data for 121 participations were included but had no denominator because the school withdrew after commencement of measuring



Tools used

- Anthropometry: Height, weight and waist circumference in 12-18 year olds
Body composition (Tanita bio-electrical impedance)
- Child behaviours: Self-reported Adolescent Behaviours, Attitudes and Knowledge Questionnaire (ABAKQ)
- Quality of Life: AQoL2 (Assessment of Quality of Life version 2, adapted for adolescents), PedsQL (Paediatric Quality of Life version for 13-18 year olds)
- Environmental audits: Audit surveys of secondary schools plus some environment perception questions in ABAKQ
- Community capacity: Community Readiness to Change questionnaire administered to key informants

Sample characteristics

Details of the baseline samples for the three studies are summarised in Table 2. For the purposes of presentation of the findings sample numbers have been aggregated according to year level. For the *Romp & Chomp* project, year levels are distinguished as EC 2 years and EC 3.5 years although these “year levels” are arbitrary since the age at which children were surveyed varied within these survey points.

Table 5: Characteristics of samples

	n ¹	Mean (years)	SD (years)	Range (years)	Female (%)	Lower SES (%)	Upper SES (%)
<i>Romp & Chomp</i>							
EC 2 years	421	2.1	0.1	1.9-2.6	47.3	29.9	70.1
EC 3.5 years	511	3.7	0.2	3.3-4.7	53.0	25.3	74.7
ALL	932 ²	2.9	0.1		50.2	27.6	72.4
<i>Be Active Eat Well</i>							
Kindergarten	248	4.8	0.4	3.9-5.8	53.2	63.5	36.5
Prep-Year 2	834	6.8	0.9	4.6-8.9	51.6	69.9	30.1
Years 3-4	624	9.3	0.7	7.9-11.3	50.8	67.8	32.2
Years 5-6	478	11.3	0.7	9.5-12.9	52.7	71.0	29.0
ALL	2184	8.0	0.7		51.9	68.0	32.0
<i>It's your Move!</i>							
Years 7-8	1475	13.5	0.7	11.4-15.4	43.0	39.3	60.7
Years 9-11	1551	15.7	0.8	12.6-18.3	44.9	41.9	58.1
ALL	3026 ³	14.6	0.8		44.0	40.6	59.4

SES refers to socio-economic status (as outlined below) and ‘lower’ and ‘higher’ refer to above or below the state median.

¹ Note that for some of the analyses the n may be smaller than the n shown in the table

²18 did not have a specified MCH age category because they were either too young or too old for the ‘Age and stage’ criteria

³49 had missing data for the year level

It should be noted that there is some age overlap between the studies. There are 4 year-olds in the *Romp & Chomp* survey (from the 3.5 year check up) and some 4 year olds in the *Be Active Eat Well* (kindergarten surveys). Similarly, there were some 11-12 year



olds in *Be Active Eat Well* surveys and also in *It's Your Move!*. The other important factor to note is the difference in SES distribution across the samples. The *Romp & Chomp* sample is skewed towards higher SES, the *Be Active Eat Well* sample is skewed towards lower SES with the *It's Your Move!* sample being in between. There may be some discrepancies in the sample sizes due to missing data.

Socio-economic Status (SES)

The Socio-Economic Index For Areas (SEIFA) used across the projects was the index of relative socio-economic advantage/disadvantage [12]. The index is based on data collected from the 2001 Australian census of population and housing, and incorporates variables such as income, education, occupation, living conditions, access to services and wealth. The SEIFA classification used was based on geographic postal area, with a higher score on the index indicating that an area has a relatively high proportion of people with high incomes or a skilled workforce, and a low proportion of people with low incomes or unskilled people in the workforce. Upper and lower SES was defined using the state median as the cut point [12].



7. Anthropometry Measures

Romp & Chomp

Anthropometric measures used in the *Romp & Chomp* project evaluation were from the routine height and weight data collected by experienced nurses as part of Maternal and Child Health (MCH) visits. This project used data from the 2 and 3.5 year 'Age and stage' MCH visits. Typically, the attendance in the Geelong region for these visits is about 60% and 50% respectively. The data were used in two ways. Firstly, electronic databases with anthropometry information for all attendees available over several years were sourced for the Geelong area and for other local government authorities that had such systems in place. These trends over time in Geelong versus other Victorian local government areas formed the basis of the outcome measures for the project. In addition, parents were asked to include height and weight as measured by the MCH nurse on the EPAQ. It is only these latter data that are included in these reports.

Be Active Eat Well

Children in this project had their height and weight measured in accordance with standard methods for the collection of anthropometric data in children [13] by trained researchers. All measures were taken in light clothing and without shoes. Weight was measured to the nearest 0.05kg using electronic scales (A&D Personal Precision Scale UC-321) and height was measured to the nearest 0.1cm using a portable stadiometer (PE87 portable stadiometer). Waist circumference was measured at the level of the umbilicus using a plastic tape measure. Two measurements were recorded for each parameter and where there was disagreement between these measures (>0.1kg for weight, >0.5cm for height, >0.3 cm for waist) a third measure was recorded. The mean of all measures recorded was used for analysis.

It's Your Move!

The students involved in *It's Your Move!* were measured using a portable stadiometer to measure height and standard tape measure was used to measure children's waist circumference. A TANITA Body Composition Analyser (Model BC 418) was used to collect bio-electrical impedance data. Individual data could be either printed in hard-copy format or exported directly to a prepared Excel spreadsheet file via connection interface between the TANITA device a laptop PC. A customised program (provided by Wedderburn Australia) was used to derive the values and to facilitate data transfer between the TANITA and the PC. Specific equations to estimate lean mass and fat mass from the impedance data were developed for the project in a separate study based in Auckland. The body composition findings have not been included in this report.

Protocols and body size calculations

An explanation of the protocols for measuring height and weight is included in Appendix A. BMI (weight in kg/(height in m)²), waist/height ratio and BMI-Z score (calculated against the 2000 CDC growth reference from the United States using the zanthro module in STATA) were calculated. The International Obesity Task Force (IOTF) age-specific BMI cut-offs were also used to classify children's weight status as either thinness grades 1-3, healthy weight, overweight or obese [14, 15] using the LMS Growth Microsoft Excel module [15].



8. Behavioural Measures

Eating and Physical Activity Questionnaire (EPAQ)

Purpose

The Eating and Physical Activity Questionnaire (EPAQ) (see Appendix B) was developed and piloted for specific use in the *Romp & Chomp* project to examine eating and activity behaviours that are likely to be risk or protective factors for obesity development.

Content

EPAQ is a two page (one sheet, double-sided) survey which asks a series of general questions about the child and family and specific questions about diet and physical activity behaviours. The complete survey contained questions about demographic characteristics, activity levels and dietary information including the intakes of fruit juice, cordial and soft drink, water, plain milk, flavoured milk, vegetables, packaged snacks, fruit, chocolate and confectionary, and cake and sweet biscuits.

The dietary questions required categorical responses and focused on 'key foods' which are known to have a positive or negative association with body weight. The response categories varied by food and beverage, and the options for beverages ranged from zero (none) to 6 or more serves, while the food categories allowed for ½ a serve. All beverages had a serving size of 125ml (½ cup), while the food categories varied but were clearly stated and pictured. Most portion sizes, excluding beverages, were based on the recommended serves in the Australian Guide to Healthy Eating [16] Parents were provided with a series of pictures showing various foods and the recommended servings, and instructed on how to use, the 'How many servings of...? Guide' (Appendix C) prior to independent completion of the EPAQ questionnaire.

Data on children's activity levels, preferences and time spent watching television were also captured using the questionnaire. Parents were asked to recall the amount of time their child spent watching television, videos/DVDs or playing computer games during the previous day. Activity levels and activity preferences were also ascertained.

Source and validation

In the development of the EPAQ questionnaire, two questions previously used in major national surveys – the question about usual vegetable intake was taken from the short dietary question in the 1995 National Nutrition Survey [17, 18], and the question about usual choice of activity was taken from the 'Growing up in Australia – the Longitudinal Study of Australian Children' [19] were integrated into the survey.

To determine the relative validity of EPAQ for 2-5 year-old children, a convenience sample of 90 parents in Geelong, Australia provided dietary and activity level data for their child via EPAQ and interview-administered 24-hour dietary and physical activity recall (24hr-recall). For comparison of food group servings between the EPAQ and 24hr recall, Wilcoxon signed-rank tests were used. Means and standard deviations were compared and a correlation coefficient (Spearman's rho) was computed to examine the strength of the relationship between serves and energy assessed by the two methods. Contingency tables were used to determine the degree of association between EPAC and 24hr recall. Bland-Altman tests of agreement between methods were computed for television viewing time.



Relative validity correlations were significant for both serves per day, (ranging from 0.55-0.87 for chocolate/confectionary, and fruit juice, respectively), and kJ per day (0.38-0.87 for vegetables and fruit juice, respectively). Overall EPAQ overestimated food but not beverage servings. The 24-hour recall data revealed that the energy density for vegetables was underestimated, but was overestimated for fruit juice (as parents diluted the juice for their children). Fifty-two percent of children were correctly classified into the same tertile of food group intake. Significant correlations were found between television viewing obtained from the questionnaire and the recall interview, $r=0.7$ morning viewing, and $r=0.6$ for afternoon viewing. The EPAQ questionnaire produced an acceptable level of relative validity for both food serves and energy. This tool is considered suitable for assessing the food and beverage choices of children aged 2 to 5 years of age.

Administration

The EPAQ was distributed to parents of children who visited the MCH nurse at key age and stage visits of 2 and 3.5 years old. At these visits, the child's height and weight were measured by the nurse as part of the consultation.

Nurses entered height and weight measures into the child health record and parents completing the survey were asked to copy the values on to the EPAQ survey form. The form took only about 10 minutes to complete. Parents then had the option of completing the survey at the centre and leaving in a box or taking a reply paid envelope and returning the survey directly to Deakin University.

Notes

It is acknowledged that at the individual level there is significant daily variation in eating and activity behaviours, but that at a population level the EPAQ responses should provide a good indication of behaviours. While the EPAQ performed well, some changes to the wording of questionnaire are recommended, specifically the phrasing of the questions or an additional clarification statement for the milk and vegetable categories. To assist with improved reporting of plain milk, the example of "including milk on cereal" would prompt parents to consider this in addition to other servings. Similarly, including examples for flavoured milk, such as Milo/Quik/topping/honey would assist with a clearer understanding of what beverages should be reported. Thirdly, to better assess vegetable consumption, the questionnaire could be altered to include the phrase "excluding hot chips" with an extra category specifically for hot potato chips added.

Computer Assisted Telephone Interview (CATI) Survey

Purpose

Parents and guardians of children attending kindergarten or primary school in the *Be Active Eat Well* survey were invited to participate in a computer-assisted telephone interview (CATI). The CATI survey aimed to measure parent-reported child behaviours plus some other parent-reported questions on the home and neighbourhood environment. The CATI also included parents' socio-demographic characteristics, including maternal and paternal education level and household income.

Content

The interview schedule (Appendix D) was administered by trained interviewers on a day and time nominated by the parent (or guardian). Each interview took approximately 15 minutes per child. Questions contained within the interview schedule included:

- children's food and beverage intake, activity, mode of transportation to and from school;
- parent's socio-demographics, attitudes towards their child(ren)'s weight



- household rules and practices in relation to nutrition and physical activity
- the suitability and safety of the neighbourhood for access to fruit and vegetables, physical activity and active transport

As a number of the CATI questions referred specifically to food intakes or physical activity 'yesterday' the CATI surveys were conducted on days when 'yesterday' was a school day.

Source and validation

The questions for this survey came from a variety of sources. The fruit and vegetable questions were taken from the National Nutrition Survey 1995 [20] and other questions asking about 'usual' behaviours were taken from the School Physical Activity and Nutrition (SPANS) questionnaire [21] or the Health of Young Victorians Survey [22]. The questionnaire was piloted prior to the main survey.

The 2001 Socio-Economic Index for Areas (SEIFA) (index of advantage/disadvantage) which is an area-level indicator of SES was used based on geographic postal area of the child's residential address and a low score on the SEIFA Index indicates an area of social disadvantage [12]. For analysis, SEIFA scores were classified into high SES and low SES based on the state-wide median [12].

Education attainment was categorised as: has completed a University degree; has a (Technical and Further Education (TAFE) qualification (eg. diploma, trade qualification); completed secondary school; didn't complete secondary school. Household income was categorised as \$100,000+, \$75,000-\$99,999, \$50,000-\$74,999, \$30,000-\$49,999, < \$30,000.

Administration

Where possible, the CATI was conducted within 3 weeks of the child's anthropometric measurements being taken at school. The interview was conducted by trained interviewer on a day (Tuesday–Saturday) and time nominated by the parent (or guardian) as requested on the consent form. Some parents had more than one child participating in the survey and thus at times the interview was scheduled over more than one interview time.

Notes

CATI is a valuable method of efficient and consistent interviewing, although it is quite expensive. Multiple call-backs are often needed to try to maximise the response rates.

School Children's Questionnaire (SCQ)

The SCQ was developed for the *Be Active Eat Well* project and was based on the structure and content 'Day in the Life' questionnaire which focused on the fruit and vegetable intake of children aged 7-9 year old [23].

Purpose

The SCQ was designed to be a quick, valid method of obtaining self-reported data from young children including physical activity and nutrition behaviours, dieting practices, episodes of teasing and satisfaction with their body shape and size. For *Be Active Eat Well* it was administered to grades 5 and 6 children (aged 10-12 years).



Content

The SCQ (Appendix E) comprised 16 questions. The first four questions focused on what children did 'yesterday' which included how much fruit, packaged snacks, soft drink and cordial they had (quantified). Children were then asked whether they had breakfast that morning, amount of time spent watching television and playing computer games and time spent outside on the previous day. They were then asked about active transport, which focused on how they get to/from school and what their favourite method of transport was. The last five questions asked about body image among students, questions focused on perception of weight status, incidence of dieting, the frequency of teasing and self esteem of children in grades 5 and 6.

Source and validation

The SCQ is heavily based on the Day in the Life Questionnaire (DILQ) which has been tested for use among children for measures of fruit and vegetables consumption [23]. The DILQ uses words and pictures to encourage the child to recall and describe a range of activities from the previous day, including their food intake. It was tested for validity and reliability for children aged 7-9 years (n = 255) in four English schools. Reliability, validity and sensitivity to change were assessed through repeated rounds of data collection. Comparisons were made of observations during school breaks and classroom completion of the DILQ. Children enjoyed completing the DILQ and teachers thought it appropriate for the age group. The questionnaire performed either well or acceptably on all validity, reliability and sensitivity tests. The DILQ can be recommended as a method of collecting data for fruit and vegetable consumption from children aged 7-9 in the classroom. The results suggest that it would be a sensitive measure for descriptive studies, before and after studies and controlled trials. A few other questions from standard psychology instruments were added, such as on self esteem and body size perception, to make the SCQ.

Administration

At baseline, students completed the questionnaire in a hard copy format (paper based version) in small groups of eight students. Research assistants guided students into a separate classroom to complete the questionnaire, which took a maximum of 10 minutes to complete. If there were any difficulties with terms, research assistants were on hand to explain concepts and terms that they did not comprehend. For follow up measures, students completed the survey on a hand held personal digital assistant (PDA)

Notes

This questionnaire has some key indicators for eating and activity patterns and some questions around self esteem and body size perception. It should be used for population-level analyses (eg frequency distributions) and is much less reliable for individual-level analyses (eg linking fruit consumption to vegetable consumption). All 'snapshot' questions of behaviours have low reliability for individual analyses because of substantial day-to-day variability within each individual. The strength is that there is much less recall bias and complexity to single questions such as transport mode to school that day.



School Food Checklist

Purpose

The School Food Checklist (SFC) was developed for the *Be Active Eat Well* project. It examines the energy from foods and beverages consumed at school as it is able to give an indicative representation of population-level, school food patterns. The SFC is like an expanded 'lunchbox survey' which records the number of serves and source (home, canteen, vending machine) of 20 food and beverage categories.

Content

The School Food Checklist (SFC) included 20 food and beverage categories that are coded according to the number of serves (including space to write down the actual weight available on the packaging), specific descriptors (eg. reduced fat), and food source (home, canteen or vending machine).

Sources and validation

Specific foods in each of the categories were included based on frequency of consumption at school by children aged 5 to 15 years of age in the National Nutrition Survey (NNS95) [18]. Serve sizes were based on standard serves included in FoodWorks Professional Edition (version 3; Xyris Software, Highgate Hill, QL, Australia). Where these were not available, recommended serves from specific food and beverage products were used or, where several foods with varying serve sizes were included in a food group (eg. fast foods), an average serve size was calculated based on typical serve sizes from NNS95. Energy per serve was calculated from the energy density (kJ/g) of each of the foods included in the food (or beverage) category, weighted by their frequency of consumption by children aged 5 to 15 years in NNS95. In this way, foods consumed most commonly in the category contributed the most to the energy density value for that category. For single food item categories, energy per serve was obtained from FoodWorks.

The SFC was validated against weighed records (WR) of school food [24]. WR were collected from a sample of 106 and a second sample (n=46) had intake measured twice using the SFC to assess inter-recorder reliability. Mean energy values were 2992 kJ \pm 924 and 3008 kJ \pm 952 for the SFC and WR respectively and the correlation coefficient was strong (Pearson $r = 0.77$). The mean difference between the WR and SFC methods was 15 kJ (95% CI, -107 kJ to 138 kJ) and the limits of agreement (± 2 standard deviations) were ± 1270 kJ. The SFC overestimated the energy/serve of breads and fruit drinks and under-estimated energy/serve from fat spreads, biscuits/crackers, muesli/fruit bars and fruit. Inter-recorder reliability was good (kappa 0.51). The SFC was designed to measure energy from food and beverages in schools. It has good accuracy and reliability and the recalibrated version should further improve accuracy of the instrument. This recalibrated version is included in Appendix F along with some notes for administration. For further details of the validation study see Kremer et al [24].

Administration

Data were collected at each school in the morning, prior to children consuming food at either recess or lunch. A recorder entered the foods and beverages from the child's lunch box and/or lunch order using the SFC. Foods from all sources were recorded including those from home, vending machines, school canteen or lunch services and shops. For sandwiches, the type of bread was recorded (white or brown) and the fillings or spreads included. Where it was difficult to determine what a sandwich contained the student was



asked to open the sandwich for viewing (where possible) and/or to describe the contents. The protocol for unusual foods was to place them in the most appropriate category or omit them based on consensus between at least two recorders. During the recording procedure children were asked if they had previously consumed any food/beverage from their school lunch box and if they had, these were included on their record. Similarly, children were also asked if they had consumed or would be consuming food or beverage obtained from a vending machine, school canteen or lunch order service. Where this occurred the information was recorded as usual and the source noted (ie vending machine or canteen) in a corresponding column on the SFC. Few children reported that they would be going home for lunch, and those that did were excluded. Children were unaware that records relating to their lunch food and beverages were to be collected, and recording was conducted for 1 day only. Each recorder had attended a training session outlining data collection procedures and had experience recording dietary information. A serve-size manual containing pictures of a standard serve for various foods and beverages was also provided to each of the SFC recorders.

Notes

This is an objective, validated, efficient way of assessing school food consumption in primary schools. While it does represent a minor invasion of privacy, no complaints or negative responses were received from parents or students. It may not be an appropriate measure for secondary school use. Training is important for consistent categorisation of certain foods such as packaged products.

Adolescent Behaviours, Attitudes, and Knowledge Questionnaire (ABAKQ)

Purpose

The ABAKQ (Appendix G) consisting of four sections: 1. demographics survey, 2. behaviours, attitudes and knowledge survey; 3. a quality of life scale (AQoL); and 4. a child quality of life measure (PedsQoL) (these QoL instruments are described in further detail below). The final survey instrument was set-up using the e-STEPS Questionnaire Designer program. The constructed questionnaire was then copied across to each of the PDAs.

Content

The first section of the PDA survey incorporated a short demographic survey that included questions about the child's date of birth, gender, school, year level, and adults in the household. This was supplemented by a paper demographics survey which had more personal identifying data on it: ID number, date of birth, date of testing (all used to cross check with PDA and other data), student's full name, home address, including house number, street name, suburb and postcode (the latter collected for the purposes of area-level SES).

The behaviour, attitudes and knowledge questions were developed and used across the four sites of the Pacific Obesity Prevention in Communities (OPIC) Study. The survey comprised 87 questions which took approximately 15-20 minutes to complete and focused on key behaviours such as: nutrition / dietary practices, amount physical activity, perceptions of the school environment (teachers, canteens, participation in sport), home environment (the role of parents / siblings), neighbourhood environment and other perception and attitudinal questions. Some of the questions included in the



survey were country / community specific such as the role of the church, various food practices, perceived food and physical activity practices within their culture.

Source and validation

The ABAKQ included several questions from the 1995 Australian National Nutrition Survey [18], New Zealand 2002 National Children's Survey [25] and National Health and Medical Research Council (NHMRC) Dietary Key Indicators Study. Of these studies, some questions had good reliability data; some were from standard questionnaires and provided scope to develop questions to specifically measure the objectives of the *It's Your Move!* action plan.

The survey was initially piloted in 95 students in Australia. The feedback from the students about the wording and comprehensibility of the questions plus the range of responses were used to further modify the questionnaire. Upon using the survey for the baseline measures, students felt that the survey was easily understood, comprehensible, relevant and produced a reasonable spread of answers and is both age and ethnically appropriate.

The first section of the survey spanning from Q1-4 and Q6-12 are standard questions. Due to their widespread and common use, they don't require any validity or reliability testing. All of these questions relate to the adolescent's demographics and are straightforward. Question 5 which addresses the student's ethnicity is taken from the Australian Census data. The greater part of the questions in the survey have been either taken directly from or been adapted from existing large surveys. Questions 15, 17 and 19 were taken from the 1995 NNS [18]. The basis for these questions was related to how many days a week something was eaten for breakfast. We adapted it to ask about the last 5 school days instead of in the last week and applied it to morning tea and lunch. In the NNS, all respondents provided a useable answer with only <0.5% unable to recall their frequency of breakfast intake.

Questions 20 and 21 are directly from the NNS [18] and 99% of the sample provided useable answers for both questions. The results of these questions suggest that it is possible to derive a quantitative estimate of overall consumption based on a question that asks about consumption on a usual day. All of the question numbers 27, 33, 35, 36, 37, 38, 39, 40, 41, 46, 47, 48, 49 were either used directly or adapted slightly from the National Children's Nutrition Survey which was used in New Zealand in 2002 [25]. Most of the adaptations revolved around giving specific time periods. Therefore, instead of saying 'on how many school days' we asked 'In the last 5 school days'. Instead of asking how much time do you normally spend... we asked, 'On the last school day...'. The basis of the questions are identical, and if anything, our way of asking allows for a more specific response and ensures a more user friendly way of recalling information.

Questions 28 – 32 were adapted from the 1996 NHMRC Dietary Key Indicators Study [26]. These questions used the same base of the questions used in that large survey but have been changed to ask about 'after school' and different foods have been added in to account for better qualitative information. This basic question from the Dietary Key Indicators Study revealed a good spread of responses across the board. The remainder of the questions developed for use in this survey were specifically designed for this project and were piloted amongst adolescents in the existing sample. Overall, very few of the questions are amenable to true validity testing but comprehensibility and repeatability are important and testable.



Administration

The baseline survey was from July to November 2005 in year 7-12 students in participating schools across the Barwon-South Western Region. Students were given a period (55 minutes) to complete the survey and anthropometry measures. The familiarisation with the PDA before they started was very rapid. As students completed the survey, research assistants would call up students individually to complete the anthropometry measures in a discrete/private area.

Notes

The use of the PDA made the filling out of the questionnaire rather novel for students and it kept their concentration high while filling it out. Some of the adolescents in similar projects in Fiji and Tonga had never seen such an instrument but they very quickly understood how to use the PDA. It would have been a long and tedious paper questionnaire, and the PDA also allowed a more complex questionnaire to be developed with multiple skips over 'not applicable' questions. However, there were some technical issues with using the PDA. Within the earlier programs, the skips sometimes were not activated, generation of new id codes did not always occur and the stability of the PDA (hardware, software and battery life) have also caused problems over the three years.

Quality of Life instruments (AQoL-2 and PedsQL)

It is best practice to combine a utility-based instrument (i.e. one that can be used for economic analyses using quality-adjusted life-years [QALYs] or disability-adjusted life-years [DALYs]) with a condition-specific instrument. In the *It's Your Move!* study, we elected to run with the Australian Quality of Life instrument Mark-2 (AQoL-2, a utility-based instrument designed for Australian adults) coupled with the Paediatric Quality of Life Inventory (PedsQL), a paediatric general health profile instrument. The latter was chosen given the absence of readily available condition-specific instrument suitable for adolescents.

Content

The AQoL2 is a multi-attribute utility instrument developed in Australia by a team led by Professor Jeff Richardson, Monash University [11, 27]. The AQoL2 comprises 20 health state questions across six dimensions, namely physical ability, social and family relationships, mental health, coping, pain, sensory. With respect to the sensitivity of the AQoL-2, the developers of the instrument are firmly of the opinion that there is no other utility-based instrument available, which is suitable for economic evaluation, and that will provide greater sensitivity.

The PedsQL is a paediatric general health profile instrument, specifically designed for use with adolescents and children. We used the generic module for 13-18 year olds. The PedsQL has been adapted for specific conditions (eg cancer, asthma, and diabetes), but not as yet for obesity. The questions, however, fit quite neatly with obesity, and, in this study, are being employed as a proxy condition specific instrument. The PedsQL is a brief (one page) instrument, comprising 23 questions. It covers four dimensions of physical functioning, emotional functioning, social functioning, and school functioning.



Source and validation

The AQoL, a utility-based instrument suitable for economic evaluation, was originally developed for Australian adults using 'state of the art' psychometric procedures [10, 11]. It was recalibrated for use with adolescents. It is acknowledged, however, that population-based interventions such as *It's Your Move!* may not produce a detectable effect on AQoL2 at a population level. The instrument is rated highly in terms of validity and reliability with internal consistency of $\alpha = 0.81$.

As the AQoL2 was developed for Australian adults, its use in *It's Your Move!* (and the wider OPIC study) required its adaptation for use with adolescents, and for use in cultural settings other than Australia. The questions were originally tested for cultural and language appropriateness in two focus groups of adolescents (in each of the countries). In order to preserve the psychometric qualities of the AQoL, adaptation meant that changes were kept to a minimum and preserved the original intent of the question. Given that the utility values reflected the preferences of Australian adults, the values were recalibrated to reflect those of Australian adolescents. This was done using the 'time-trade-off' method, the same method as employed in the original development of the instrument. Sixty-eight students participated in this exercise in a classroom setting, each completing a set of ten scenarios. The recalibration of the AQoL2 for Australian adolescents, means that there is now a utility-based quality of life instrument (AdQoL2) available suitable for use in other studies involving Australian adolescents.

The PedsQL is a paediatric general health profile instrument specifically designed for use with adolescents and children [28], and which is shown to have high validity and reliability [8, 9]. Whilst the PedsQL is not a preference based instrument, it still provides an index score which is obtained through simple arithmetic addition with all dimensions weighted equally (i.e. no utility trade-off weights are involved). The PedsQL index score can be compared to that produced by the AQoL-2. The comparability of the relationship in the study population between BMI and QoL as established by the two different instruments will increase the level of confidence with which the QoL results from the AQoL2 are viewed.

The two quality of life instruments were piloted in 95 students in the *It's Your Move!* schools, before being administered at baseline.

Administration

The instruments were completed by students using PDAs as part of the baseline batch of surveys. The length of the AQoL questions and the response categories meant that a question and the associated response categories could not fit on a single screen. As a result, the students completed the questions by using the PDA in conjunction with a hard copy of the instrument. This process was piloted and found not to impact on the results.

The PedsQL added little to the cognitive burden of participants, was easily administered and lent itself to electronic administration using the PDAs. It is very easy to score. The items on the scale are reversed scored and linearly transformed to a 0-100 scale, such that higher scores indicate better health-related quality of life, (never 0=100; almost never 1=75; sometimes 2 = 50; often 3 = 25; almost always 4 = 0). To create scale scores, the mean is computed as the sum of the items divided by the number of items answered (thereby taking into account missing data). Separate scores can also be calculated for each of the four scales (physical functioning, emotional functioning, social functioning and school functioning) using the same method.



Notes

Both instruments are suitable for use with adolescents. The two surveys take approximately 10 to 15 minutes in total to administer (the PedsQL alone is only about two minutes). The PedQL has deficit-based questions asking adolescents about various problems or difficulties they may have and this gives it a rather 'negative feel'.



9. Environmental Audit Tools

Background

Changes at the settings level (policies, practices, attitudes, facilities etc) are important to capture as part of the evaluation. Settings, including family day centres, long day care, kindergartens, primary and secondary schools were audited at baseline and follow-up.

Pre-school settings

Long Day Care, Family Day Care and Kindergarten Audit Tool

Purpose

The three environmental audit tools (Kindergarten – Appendix H, Long Day Care- Appendix I and Family Day Care - Appendix J) for *Romp & Chomp* contain measures of general characteristics of the settings (ie, number of children cared for) as well as factors in the physical, policy, socio-cultural and economic environments of the setting that may enhance or inhibit efforts to promote healthy eating and active play for children who attend the setting. Several questions also enquire about staff training, resource requirements, confidence and perceived effectiveness in influencing parents.

Contents

Responses for the various measures include visual analog scales for ranking subjective perceptions for items such as support and availability of resources and tick-box categories for items such as the frequency of particular activities within the settings.

Source and validation

The measures used in the audit tools were developed specifically for this project. Initially, they were based on the ANGELO (Analysis Grid for Elements Linked to Obesity) framework of obesogenic environments described by Swinburn & Egger [29], incorporating the physical, economic, policy and socio-cultural aspects of environment. Adaptations of the environmental audits for schools (below) were made to make it relevant and appropriate for early childhood settings. The tools were refined during consultation and piloting with key stakeholders within the community and settings. Many measures are common to all three audits and can be compared between settings, however there are also a significant number of questions which are specific to the setting, especially those relating to food provision (as this is done quite differently between settings) and questions which were changed in response to piloting for acceptability and appropriateness in the settings.

Administration

The early childhood settings audits were posted directly to kindergartens and long day care centres in the Geelong region, and were posted to family day care providers on behalf of researchers by staff at the coordinating unit at the City of Greater Geelong. Reply paid envelopes were provided for staff to return the survey directly to Deakin University. Approximately one week after the deadline for survey return, a reminder letter was sent to non-responding kindergartens and day care centres by researchers and to all family day care providers by coordinating units. A further 2 weeks later a repeat survey was sent to non-responding kindergartens and long day care centres, but no further follow up was possible for family day care.



Notes

The survey has been further developed for state-based distribution and was processed by Deakin Computer Assisted Research Facility so that surveys could be electronically scanned to reduce the burden of data entry. The state-wide distribution was done by the Office for Children for kindergartens and long day care centres in 33 Local Government Authorities. Family day care surveys were distributed in 20 Local Government Authorities by the councils.

Schools

Primary School Environmental Audit

Purpose

The aim of the Primary School Environmental Audit (Appendix K) was to assess the schools as settings for promoting healthy eating and physical activity. This included assessments of the physical (what is available), economic (what are the financial factors), policy (what are the rules) and socio-cultural (what are the attitudes, beliefs and perceptions) environments in relation to nutrition, physical activity and the promotion of healthy body size [29].

Content

The primary School Environment Questionnaire was made up of 7 sections (53 questions) which included: Demographics, Internal Canteen Service, External Canteen Service, School Food/Nutrition Policies, Nutrition Environment, School Physical Activity Policies and Physical Activity Environment.

Source and validation

The audit tool was adapted from a similar tool developed by Carter and Swinburn [30] from a series of semi structured interviews with 11 primary and secondary health and physical education teachers within the Auckland region. The questions were designed around the key elements of the physical, economic, policy and socio-cultural environments in schools for nutrition and physical activity. Food sold at the canteen/ food service was also included as an index of foods eaten. Academic staff of the University of Auckland reviewed the questionnaire to ensure that the questions were free from bias and easily understood. The questionnaire was then pre-tested in three primary and three secondary schools with health and physical education teachers to ensure that that the questions were interpreted and answered by respondents as the researcher had intended.

Administration

The questionnaire was administered by a member of the research team to a small group of 2-3 school staff who acted as key informants. More than one person was needed because different topics (eg canteens, physical education, policies) required the knowledge of different staff members. Also, some of the questions about the school 'ethos' were judgements (eg rating teachers as role models for healthy eating) where a consensus was needed (in general, having the principal as one of the informants was avoided because of concerns about bias in answering some of the judgement questions). Overall, the questionnaire took approximately 30 minutes to complete (provided the information on school policies was to hand).

Notes

There was an issue with being able to get three staff members in one place at one time to undertake the audit, and often school policies were difficult to locate.



Secondary School Environmental Audit

Purpose

The aim of the Secondary School Environmental Audit (Appendix L) was to assess the schools as settings for promoting healthy eating and physical activity. This included assessments of the physical (what is available), economic (what are the financial factors), policy (what are the rules) and socio-cultural (what are the attitudes, beliefs and perceptions) environments in relation to nutrition, physical activity and the promotion of healthy body size [29].

Content

There were three parts to the Audit. Part 1 was filled out by the principal or a senior administrator and focused on elements of policy, food service, physical education / physical activity, facilities and staff professional development. Part 2 was filled out by the canteen manager and centred on the food service operation, food preparation, pricing and promotion and external facilities such as vending machines and water fountains. Part 3 comprised of 24 questions and was completed by 3 teachers at the school. The questions examined food, nutrition, physical education/activity practices in the curriculum. It also assessed the awareness of policies within the school to support healthy eating and physical activity and whether teachers complied/ supported the policy. Questions were also asked about parental support, adequacy of indoor/outdoor space (including bicycle storage) and the strength of community links.

Source and validation

Questions for the Secondary School Environmental Audit primarily came from the Primary School Audit tool (above) with added questions from a Queensland audit tool 'Assessing your school the Active-Ate Way: a nutrition and physical activity needs assessment and planning guide' [31] and the Centre for Disease Control's School Health Index which is a school self-assessment and planning guide [32] developed by CDC in partnership with school administrators and staff, school health experts, parents, and national nongovernmental health and education agencies.

Administration

The Audit tool is divided into the three parts which can be sent to the key people in the school for self-administration or be administered. Each survey took approximately 10 minutes to fill out each part. All parts of the questionnaire are self-administered.

Notes

There is potential for this survey to be further developed so that it could be administered in a web based version. This would allow surveys to be sent to key informants within each school, monitored and collated electronically. This could allow a greater representation of the school population and less labour intensive way of administering the survey.



10. Community Capacity Measures

Community Capacity Index

Purpose

The Community Capacity (CC) Index (Appendix M) was developed to assist communities or networks identify the extent of existing capacity available within a network of organisations and groups working together at a local level [33]. Its purpose is to gather evidence about the capacity of the network and to map that evidence against a set of indicators within four domains: network partnerships, knowledge transfer, problem solving and infrastructure. The Index was developed as a practical tool designed to facilitate action.

Content

Within the Index, community capacity's defined as a collection of characteristics and resources which, when combined, improve the ability of a community to recognise, evaluate and address key problems.

The index examines capacity within four domains:

- Network Partnerships - the relationships between groups and organisations within a community or network.
- Knowledge Transfer - the development, exchange and use of information within and between the groups and organisations within a network or community
- Problem Solving - the ability to use well-recognised methods to identify and solve problems arising in the development and implementation of an activity or program
- Infrastructure - the level of investment in a network by the groups and organisations that make up the network. Infrastructure includes investment in the development of policy, social capital, human capital and financial capital.

For each of the first three domains, three levels of capacity are identified, with each level measured by a set of indicators. The fourth domain, infrastructure, is not constructed of three levels but rather four sub-domains and their indicators. The indicators within the CC Index represent the abilities, behaviours or characteristics of the network.

Source and validation

The CC Index was developed by Robert Bush, Jo Dower and Allyson Mutch from the University of Queensland and the CC Index Manual outlines its development and validation process [33, 34].

Administration

To date, the Community Capacity (CC) Index has only been implemented for the *Be Active Eat Well* Project. A mini workshop was conducted during one of the project steering committee meetings at baseline (February 2003) to provide members with an overview of the Index, agree on common definitions and provide an opportunity for comments and discussion before each respondent completed the Index individually in their own time. The CC Index was completed by members within the following two weeks and was assessed retrospectively prior to the training session that was conducted in Colac in November, 2002. For each level of each domain, a brief overview of supporting evidence from each respondent accompanied the capacity assessment. Upon



completion of all of the indicators within the Index, each member was required to summarise current capacity of the network to achieve its objectives and identify further plans to build capacity to achieve program objectives. These were collated and summarised.

Notes

The CC Index can be administered in a variety of ways. Users of the Index can: 1) individually interview key informants, 2) conduct a focus group with members within a network, 3) conduct a network meeting or workshop with members, or 4) conduct the Index as a self-reflective tool based on experiences within a network. It was anticipated that the Index might produce some concerns so it was decided to opt for a workshop type approach. However respondents noted when completing the Index individually, they still found it a difficult tool to use. In terms of analysis, the Index is quick and easy to collate and analyse providing both quantitative and qualitative measures.

Community Readiness to Change

Purpose

The aim of implementing the Community Readiness to Change assessment was to score the communities involved in *Be Active Eat Well* and *It's Your Move!* obesity prevention projects on six dimensions using Community Readiness Stages (how well equipped is the community to undertake the promotion of healthy eating and physical activity environments and behaviours?).

Content

The six dimensions are: community knowledge about the issue, existing community efforts, community knowledge of the efforts, leadership (includes appointed leaders & influential community members), community attitudes, and resources related to the issue (people, money, time, space, etc) (Appendix N).

In theory, the Community Readiness assessment potentially offers an accurate way to measure readiness before, during and after interventions, and also provides essential qualitative data to help guide the community and or program toward development of effective prevention strategies. Based on information from the baseline Community Readiness assessment, interventions that are appropriate to the community's level of readiness can be implemented with a higher potential of success and in a more cost effective manner.

The 'readiness score' of the community served as a means for diagnosing the community's needs. It formed the basis of understanding the community's overall level of readiness to act. The Community Readiness assessment can give insight into key factors explaining success or failure of community based activities, for example shifts in community norms, and support of local leadership. This can be especially useful because evaluation of obesity prevention interventions representing a multi-component, community-wide effort can be challenging and certain aspects of change might not be captured by the baseline and follow-up evaluation.

The lessons learned from the baseline Community Readiness assessment are expected to contribute to program development for the interventions and together with the findings from the follow-up assessment, they can directly contribute to recommendations for ensuring sustainability of the obesity prevention efforts beyond the life-span of the projects.



The results allowed the community to determine which dimension(s) they should address as priorities and begin the development of appropriate strategies appropriate for moving them to the next level of readiness. At the completion of the projects, the Community Readiness assessment assisted in explaining changes in the outcome variables of the projects and contributed to recommendations for ensuring sustainability.

Source and validation

The Community Readiness Model and methodology for applying it were developed at the Tri-Ethnic Center for Prevention Research at Colorado State University, USA [35]. The Model was adapted with permission from the authors and changes in the accompanying handbook were made by the WHO Collaborating Centre staff. The Handbook provides an overview on the key concepts of the Community Readiness Model and shows the practical, step-by-step application to a specific issue/setting.

Administration

The Community Readiness Model was administered at baseline and follow up for *It's Your Move!* and at follow-up for *Be Active Eat Well*. Key project personnel and stakeholders were identified to participate in a one-on-one interview taking between 45-60 minutes. Each interview was audio-taped and transcribed. The scoring process is outlined in detail in the CRC Handbook, but was modified to allow the scores to be determined from a written script rather than listening to a tape. Twelve key stakeholders were interviewed for *Be Active Eat Well* and for *It's Your Move!*, five interviews were completed at each of the secondary schools involved (principal, 2 teachers, parent, pupil).

Notes

In practice, the Community Readiness to change instrument was time consuming to implement. The number of questions (n=39) meant that interviews took between 45 and 75 minutes. Project coordinators, some key stakeholders (partnership staff), principals and teachers contributed well, taking up to 75 minutes to complete. Students and parents who were interviewed felt more intimidated by the process and hence the interviews were shorter in duration. Care needs to be taken not to over-burden respondents with evaluation tools. The prescribed analysis process, where two people independently score and meet to determine a consensus score was difficult to administer when working with a small evaluation team. A more efficient method was to have the interview tapes transcribed and to score from the written transcripts which made the process more manageable. The prolonged scoring process meant that results were not available in time for the communities to be of any significant value to inform the development of the action plans.



11. Development of an Action Plan using the ANGELO Framework

Purpose

The ANGELO (Analysis Grids for Elements Linked to Obesity) Process provided an efficient and responsive way of achieving an agreed action plan for obesity prevention with a community (Appendix O). It provided a framework for prioritising the seemingly large number of potential activities into a plan of action for obesity prevention for a community with a defined target group and for key settings.

Content

The ANGELO Framework was originally developed to dissect environments that drive the obesity epidemic [29]. It was subsequently expanded to include non-environmental elements (potential behaviours and knowledge/skill gaps) that require addressing and is now used to help identify solutions. The overall ANGELO Process enables communities to overcome the inertia which stems from not knowing where to begin or how to tackle prevention efforts for obesity. The resultant action plan from the ANGELO process responds to the expressed needs of the community gives ownership to the community and ensures the targeted interventions are achievable within the capacity to deliver.

Source and validation

The ANGELO process is essentially the health promotion planning process (situation assessment, stakeholder engagement, prioritisation, and specifying objectives and strategies for implementation) with some specific tools to apply it to obesity prevention. The process was first developed in the late 1990s and has been used in many obesity prevention projects involving different target age groups (pre-school, primary school, and secondary school children) and several different ethnic groups in four countries (Australia, New Zealand, Fiji, Tonga).

Administration

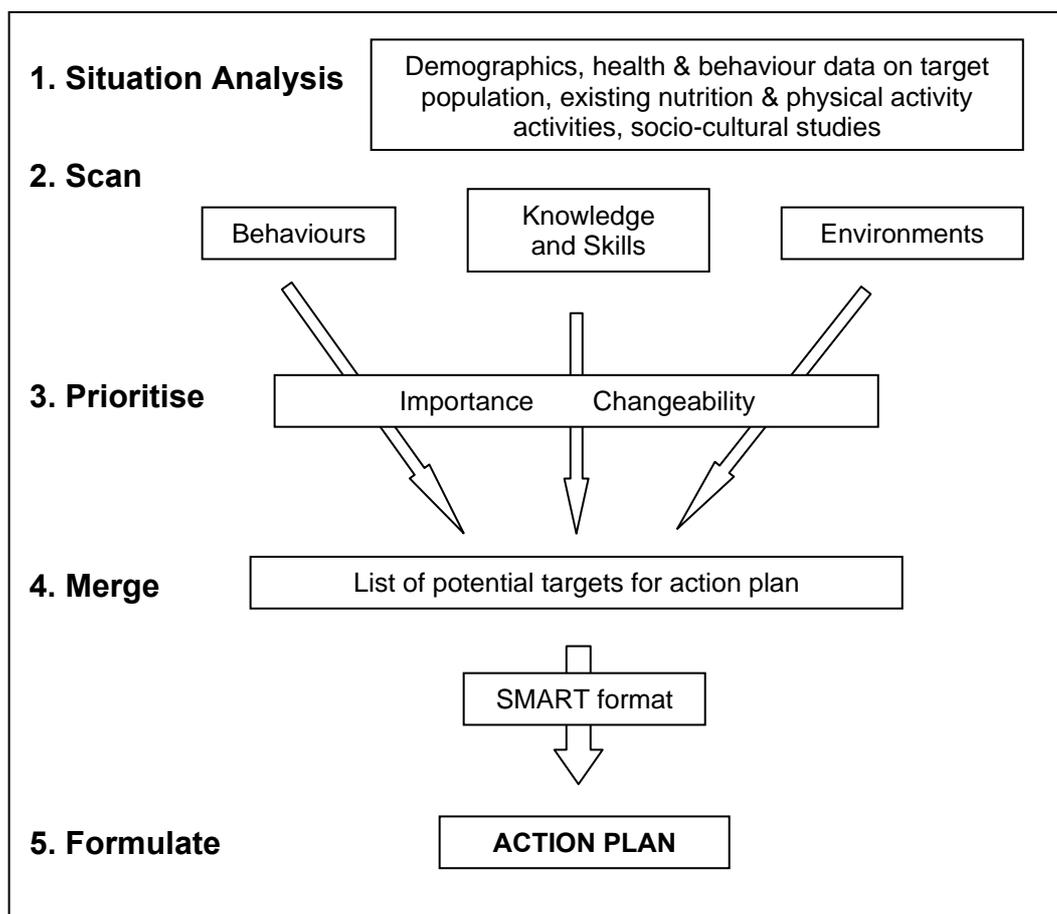
The ANGELO Process involves the following four phases:

1. community consultation and engagement of key stakeholders
2. assessment of the social and cultural contexts related to food and physical activity and body image and any existing health promotion activities
3. identifying potential environmental and behavioural components, and knowledge and skill gaps using the ANGELO worksheets (Appendix O)
4. conducting a 2-day stakeholder workshop to discuss the available 'intelligence' (evidence from the literature and local contextual information from point 2) and to develop a draft plan as shown in Figure 2.

ANGELO worksheets are provided at the workshop to facilitate the development of a draft action plan. Worksheets have been developed for communities targeting the under-five age group, primary school aged children and adolescents. An example of the worksheets for the 5-12 year old aged group is included in Appendix O. The worksheets have been developed from evidence from the literature and previous experience but they need to be modified for each community based on the intelligence gathered for that community. They contain a list of up to about 18 potential behaviours, up to about 20 knowledge and skill gaps and between 10 and 30 environmental barriers in each of the relevant settings to the target population, with space to add additional elements suggested by workshop participants.



Figure 2: The ANGELO Process



Notes

The process requires expert facilitation with skills and knowledge of community-based programs. Alternative approaches using, for example, traditional focus group methodology can produce a similar outcome; however, experience has shown that the ANGELO Process is an efficient and engaging process for achieving that point. At the ANGELO workshop key stakeholders could work collectively to participate, inform and 'own' a resultant action plan within two days.

This framework using practice based evidence may not suit all communities, as to date it has only been applied in relatively small towns or communities. Hence this approach may not apply in all situations and may be too prescribed for some settings.

Experience with the development of community-based action plans lead us to believe the ANGELO process is a comprehensive yet efficient and flexible practical application, lending itself to a 'train the trainer' model for facilitation to conduct the ANGELO process that potentially could be used in a wider variety of communities.



12. Conclusions and recommendations

Evaluation of community intervention programs to prevent childhood obesity is essential. To do so, a number of assessment tools are needed for formative, process, impact and outcome evaluation. The tools used in the evaluation of three whole of community obesity prevention programs in the Barwon-South Western Region of Victoria have been described in this report. From this experience, we can offer some recommendations on the tools needed for the program evaluation of similar projects.

Formative evaluation

- The ANGELO Process, as described in this report, has proven to be a robust, flexible, empowering and efficient process to bring a community through the early stages of engagement and planning to arrive at an agreed action plan.
- Expertise is needed to: bring evidence (from local to international) to the planning processes; to facilitate the prioritisation so that the 'could do' options are turned into 'will do' objectives, and; to write SMART objectives (Specific, Measurable, Achievable, Relevant, Time-bound) – the major challenges being to specify objectives tightly enough to be measurable and to ensure that there is the capacity to deliver (achievable).

Process evaluation

- It is important to know who did what to whom, when and for how what cost so that outcomes can be better explained.
- The action plan, which served as a living document that evolved over multiple iterations, plus an ongoing diary of activities proved to be a good system for recording processes.

Impact evaluation

- This was primarily defined as changes in the environments and behaviours which would be considered mediators in the pathway to changing outcomes.
- Environmental Audits in settings can trace the changes in policies, physical amenities, costs (eg cost of food in canteens), and socio-cultural factors (eg teachers as role models). The settings audit tools could potentially be further streamlined and managed as a web-based system with immediate feedback and (in time) bench-marking with best practice.
- Behaviours are critical to assess, although there are issues around the validity of many self-reported or parent-reported behaviours. If the aim is to follow the pattern of critical behaviours for a population (eg primary school children), then simple, self-reported indicator questions, like the School Children's Questionnaire used for the grade 5 and 6 pupils, would suffice. This has the advantage of being short, having low recall bias, and being well validated for most of its indicators.

Outcome evaluation

- We defined this as changes in anthropometry and community capacity since one is the objective hallmark of making a difference to childhood obesity in the community and the other is the hallmark of sustainability.
- Height and weight are the minimum to measure but waist may be a better, early indicator of change. These can be measured sensitively.
- The two tools we used for assessing community capacity were both somewhat cumbersome to use. If they can be streamlined for a more rapid assessment they could be valuable in the formative stages and be better used to follow change.



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13. Appendices

APPENDIX A	Protocols for measuring height and weight of children and adolescents
APPENDIX B	Eating and Physical Activity Questionnaire (EPAQ) for pre-school children
APPENDIX C	'How many servings of?' Pictures to accompany the EPAQ
APPENDIX D	Computer Assisted Telephone Interview (CATI) for parents of primary school children
APPENDIX E	School Children's Questionnaire (SCQ) for primary school children
APPENDIX F	School Food Checklist (SFC) for primary school children
APPENDIX G	Behaviours, Attitudes and Knowledge Questionnaire (BAKQ) for secondary school children
APPENDIX H	Settings Environmental Audit – Kindergarten
APPENDIX I	Settings Environmental Audit – Long Day Care
APPENDIX J	Settings Environmental Audit – Family Day Care
APPENDIX K	Settings Environmental Audit – Primary School
APPENDIX L	Settings Environmental Audit – Secondary School
APPENDIX M	Community Capacity Index
APPENDIX N	Community Readiness to Change tool
APPENDIX O	ANGELO worksheets and tools

