Queensland Child and Youth Clinical Network

An integrated approach for tackling childhood overweight and obesity in Queensland

An overview

Clinical Excellence Division
Creating solutions for better healthcare

Queensland Government

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Contents

Definitions

ABC	A Better Choice
ABS	Australian Bureau of Statistics
AMA	Australian Medical Association
BCR	Benefit Cost Ratio
BMI	Body Mass Index
CCHR	Centre for Children's Health Research
CDC	Centre for Disease Control
CHO	Chief Health Officer
CHQ	Children's Health Queensland
HDHFBPG	Healthier Drinks at Healthcare Facilities Best Practice Guide
HHS	Hospital and Health Service
IOTF	International Obesity Task Force
LCCH	Lady Cilento Children's Hospital
MEND	Mind, Exercise, Nutrition, DO IT!
NHMRC	National Health and Medical Research Council
NGO	Non-Government Organisation
OECD	Organisation for Economic Co-operation and Development
PEACH	Parenting, Eating and Activity for Child Health
PHB	Preventive Health Branch
PHN	Primary Health Networks
POWG	Paediatric Obesity Working Group
PwC	Pricewaterhouse Coopers
QCYCN	Queensland Child and Youth Clinical Network
QUT	Queensland University of Technology
TAPPC	The Australian Prevention Partnership Centre
UQ	University of Queensland
WHO	World Health Organisation
$	Denotes AUD unless stated otherwise

Childhood in this document refers to ages 0 to 18 years.

Executive summary

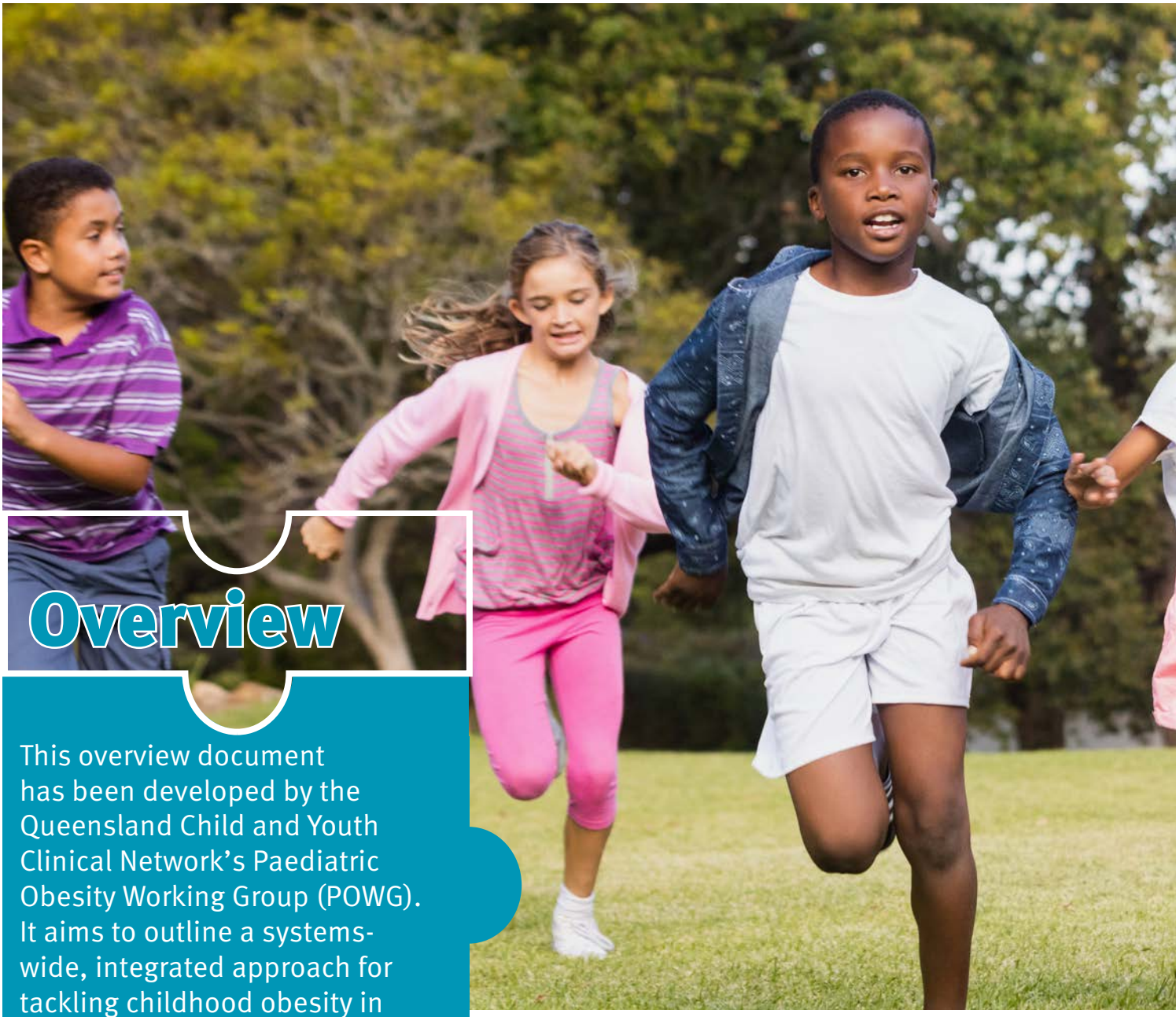
Childhood obesity is a significant health, economic and social problem globally. It is now considered to be a chronic disease and poses a substantial risk in the development of life threatening conditions and complications, and can have a significant negative impact on a child's psychosocial wellbeing, educational attainment and quality of life.

More than one in four (or 217,000) Queensland children are overweight or obese. While this rate has stabilised over the last 10 years, to date no health service has been successful in significantly reducing obesity prevalence.

The problems of childhood overweight and obesity are complex and multifactorial. It is well established that effective weight management in childhood and adolescence will minimise the risk of overweight or obesity persisting into adulthood.

A combination of coordinated, integrated, well conducted, embedded strategies targeting prevention and early intervention, treatment, education and training, and research monitoring and evaluation is required in order to induce meaningful reductions in childhood obesity prevalence. Principles underpinning these four programs include child and family focus, scalable solutions relevant across Queensland, and service development and engagement across the continuum of care.

This document provides information on the fundamental problems of childhood overweight and obesity within the current healthcare environment, the strategies, policies and documents directing existing approaches, and identifies key partners and stakeholders. It aims to provide consideration for future directions of the management of childhood overweight and obesity in Queensland, and is a platform from which to launch the comprehensive supporting document *An Integrated Approach for Tackling Childhood Overweight and Obesity in Queensland – Model of Care*.



Overview

This overview document has been developed by the Queensland Child and Youth Clinical Network's Paediatric Obesity Working Group (POWG). It aims to outline a systems-wide, integrated approach for tackling childhood obesity in Queensland.

It is supported by the documents:

- *An Integrated Approach for Tackling Childhood Obesity in Queensland – Model of Care*
- *An Integrated Approach for Tackling Childhood Obesity in Queensland – Model of Care Toolkit.*

Obesity is a significant health and economic burden globally. More than one in four Queensland children are overweight or obese (compared with 1 in 10 in the early 1990s and 1 in 50 approximately 30 years ago)[1-3].

The Chief Health Officer (CHO) Queensland report *The Health of Queenslanders 2016* highlighted a steadying in the rates of obesity in Queensland children (unchanged since 2007-2008), which is consistent with national trends[1]. However, to date, no single country has been successful in significantly reducing obesity prevalence[4].

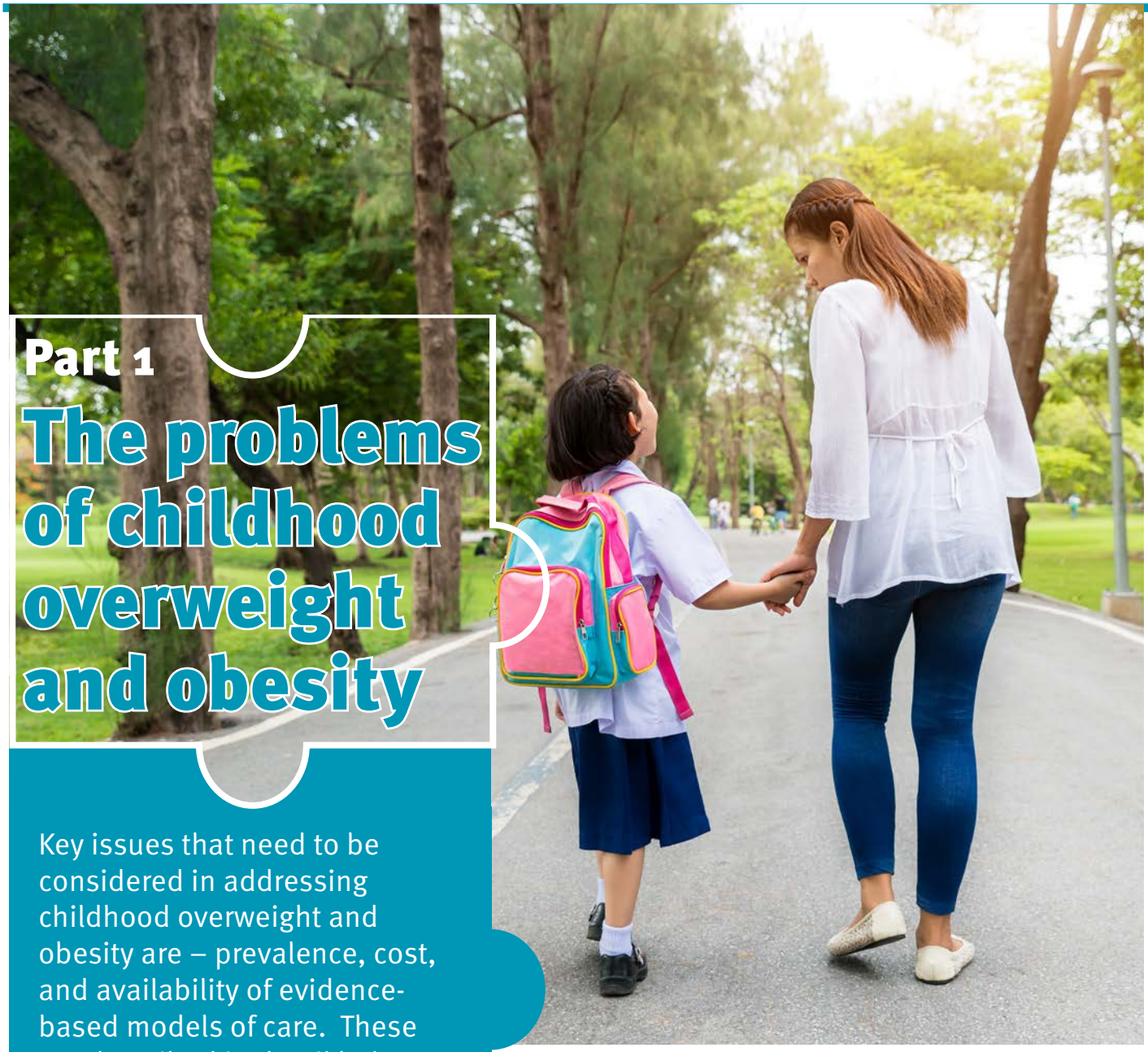
Childhood obesity is now considered a chronic disease and increases the risk of the development of life threatening conditions including type 2 diabetes, respiratory complications (e.g. obstructive sleep apnoea), orthopaedic complications and cardiovascular complications[2]. In addition, children's psychosocial wellbeing, educational attainment and quality of life can be severely effected[2].

Compounding health and quality of life related conditions have led to obesity being estimated as one of the leading causes of premature mortality in Australia[4]. Furthermore, relative body weight maintains its trajectory from childhood to adulthood, with obese children more likely to remain obese as adults with the associated comorbidity risk[5].

A combination of well conducted, coordinated and integrated strategies is necessary to induce meaningful reductions in childhood overweight and obesity prevalence. Improvement in weight status drastically reduces the risk of early morbidity and mortality, negative psychosocial consequences and obesity tracking from one generation to the next[2,3].

This document is supported by the following guiding principles:

- A child and family focused approach.
- The provision of Queensland-centric scalable solutions relevant for Queensland.
- Service development, implementation and engagement across the healthcare sector (primary, secondary, tertiary and quaternary care).
- Four main programs of focus and engagement:
  - » Prevention and early intervention
  - » Treatment
  - » Education and training
  - » Research, monitoring and evaluation.
- Statewide communication and consultation via the Paediatric Obesity Working Group (POWG).



Part 1
The problems of childhood overweight and obesity

Key issues that need to be considered in addressing childhood overweight and obesity are – prevalence, cost, and availability of evidence-based models of care. These are described in detail below.

1. The prevalence of childhood overweight and obesity

Global

Obesity is a significant public health problem globally and has the potential to negate many of the health benefits that have contributed to the increased longevity observed worldwide. In 2014, an estimated 41 million children under five years of age were classified as overweight or obese[1], and it is estimated that around 224 million school-age children are overweight[6].

Global prevalence rates differ between countries and regions, from less than five per cent in Africa and parts of Asia to more than 20 per cent in Europe and more than 30 per cent in the Americas and parts of the Middle East[6]. Additionally, as countries undergo rapid socioeconomic and/or nutrition transitions they face a double burden of disease in which inadequate nutrition and excess weight gain co-exist[2].

When comparing estimates of overweight and obesity in Australia to other Organisation for Economic Co-operation and Development (OECD) countries for children in 2013, Australian girls were ranked equal 10th highest among 33 OECD countries and boys were equal 19th highest. The prevalence rate among Australian girls was nine per cent higher than the OECD average and prevalence rate among Australian boys was nine per cent lower[1].

National

Nationally (2014-15) more than one-in-four (27 per cent) children aged 5-17 years are overweight or obese, with 20 per cent overweight and seven per cent obese[7].

The overall trend in recent decades has been one of increase. Overweight and obesity rates in children increased more than 2 ½ fold from 11 per cent in 1985 to above 27 per cent in 2014-2015. Even though the increase has slowed, the rate is still high and needs to reduce[1,7]. Additionally, the prevalence of severe and morbid childhood obesity continues to increase[8].

Queensland

Within Queensland, 26 per cent of children are overweight or obese, with 19 per cent (158,000) overweight and seven per cent (59,000) obese (2014-15)[1]. The prevalence of childhood obesity within Queensland has been steady since 2007-08.

As of 2016, Queensland now has the fourth highest childhood obesity rate among the states and there was no statistical difference from national prevelance[1].

When examining the prevalence within other communities and populations, the differences are minimal. Of note, there is no difference in the prevalence of childhood overweight and obesity between disadvantaged and advantaged areas, between boys and girls, or between rural and urban areas within Queensland in 2016. Prevalence by Hospital and Health Service (HHS) ranged between 18 per cent in Sunshine Coast to 30 per cent in Townsville (no data available for Central West, North West, South West and Torres and Cape), and by Primary Health Network (PHNs) from 21 per cent in Brisbane North to 39 per cent in Western Queensland)[1]. The prevalence of overweight and obesity in Indigenous Queensland children (5-17 years) was measured at 30 per cent (2012-13), higher than the national prevalence[1]. This highlights the need for multiple and varied approaches to the prevention and management of childhood obesity within communities and areas of socioeconomic difference.

The most recent measured data on overweight and obesity is the Australian Bureau of Statistics (ABS) National Health Survey 2014-15. The data have been released by state.

Further Queensland childhood overweight and obesity data can be found in the following sites:

- Preventive Health Branch epidemiology collated the ABS jurisdictional data in a report which is available: https://www.health.qld.gov.au/__data/assets/pdf_file/0022/465115/jurisdictional-comp-risk-factors.pdf
  (See Table 2).
- Proxy reported data (from the Preventive Health Survey) is released on the Queensland survey analytic system (QSAS): https://www.health.qld.gov.au/research-reports/population-health/preventive-health-surveys/results/regional
  You can download the data for Queensland children aged 5-17 years and select by HHS, PHN, area of socioeconomic status and by remoteness, as well as age and sex.
- Child health data from the CHO report is available: https://www.health.qld.gov.au/research-reports/population-health/data-discovery/child-health#fact
- 'Health disparities in Queensland children' key facts available: https://www.health.qld.gov.au/__data/assets/pdf_file/0018/641331/health-disparities-in-queensland-children.pdf

2. The costs of overweight and obesity

Health costs

Overweight and obesity in childhood is a complex health issue with many social, environmental, biological and individual factors contributing to weight gain[5]. It is associated with serious health concerns, both in the short and long term. Hypertension, type 2 diabetes mellitus, cardiovascular complications and transition into adulthood can all have a significant impact on overall health and wellbeing[9]. A child's psychological wellbeing, quality of life, self-image and self-esteem can also be negatively effected[10].

Financial costs across whole of population

Obesity not only results in adverse health and quality of life outcomes for individuals, but also directly and indirectly leads to negative economic consequences. Globally, obesity now has similar economic impact as smoking or armed conflict - US$2 trillion[11].

Nationally, the most recent analysis of the financial cost of obesity was estimated in 2015 at $8.6 billion[4] (about $1.72 billion in Queensland[1]). The impact of loss of wellbeing and early death due to obesity was assessed at $47.4 billion nationally ($9.5 billion in Queensland) and almost eight per cent of deaths were due to obesity in 2011. Total cost of obesity in Queensland in 2015 was $11.2billion[1]. Hayes et al report the healthcare costs for children (0-5 years) with obesity during their three year study period were 1.62 times that of children who are of a healthy weight[12]. Further, after adjusting for maternal and socioeconomic factors, excess health care costs associated with obesity during the same three year study period ranged from an additional $825 to $1332 per child aged two to under five years[12]. A 2015 Pricewaterhouse Coopers (PwC) report found that the "implementing a set of selected obesity interventions would be a positive investment with a benefit cost ratio (BCR) of 1.7 in a conservative, ten year model resulting in a benefit of $2.1 billion for Australia"[4].

The cost estimates of obesity detailed above have been mirrored in previous reports. In 2005, the total direct cost in Australia for obesity was estimated at $8.3 billion, similar to that assessed in 2015[13]. Estimations and the definition of total direct and indirect cost of obesity can vary considerably depending on methodology of analysis and it is important to recognise overall trends, as well as comparative cost to other public health expenses, rather than the individual cost figure. Additionally, providing a more conceptual measure of indirect cost is the estimated $11.8 billion lost in potential foregone earnings due to individuals not employed at their full potential secondary to obesity[4]. If no further action is taken to combat obesity prevalence within Australia, the combined direct and indirect costs of obesity are estimated to increase to $87.7 billion in 2025[4].

3. Need for evidence-based models of integrated care

Prevention

Queensland children are growing up in an obesogenic environment that encourages weight gain and obesity. No single intervention can address the growing obesity epidemic. A whole of government approach is required to address childhood obesity and to treat children who are already overweight or obese.

The Department of Health's *Health and Wellbeing Strategic Framework 2016 to 2026* sets a prevention-focused pathway for achieving improved health for all Queenslanders. It promotes integrated and complementary actions across multiple strategies which have been shown to make a difference. The framework includes 2026 targets for reducing overweight and obesity in children, improving physical activity and increasing fruit and vegetable intake in children, through healthy environments and empowering people[14].

Systems approach across the health continuum

The Australian Prevention Partnership Centre (TAPPC) [15] defines four possible dimensions of a systems approach to prevention across the healthcare sector. These dimensions may be used singularly to inform a systems approach, or they may be combined for maximum impact:

1. **Embedding prevention strategies within systems**
   Individual, short-term programs and limited investment into public health initiatives needs to be transformed into multi-faceted, cost-effective, long-term and sustainable programs to foster continual improvement of service delivery and care.

   The overarching purpose is to increase reliability, efficiency, sustainability, accountability and reach[25].

2. **Involving systems external to health**
   Collaboration should be encouraged with systems that encompass other determinants of health, such as food, transport, housing and economic systems.

3. **Empowering local systems to implement change**
   Aims to harness the potential of the local setting to create, embed and sustain change. In order to enable success and sustainability of a local intervention, action needs to be taken to nurture roles and relationships, distribute resources and complement previous preventive efforts.
4. **Translating systems concepts into policy and practice**
   Utilising a range of evidence-based sources and data points to map potential partnerships between the healthcare sector, academic institutions, policy experts, state and local political leaders and community members to inform policy and practice improvements.

There is no single solution to the obesity challenge across the world. In Australia, there have been several key reports which identify that an integrated "whole of system" approach is needed. For example, more than 20 years ago, Nutbeam et al report to the Commonwealth Department of Health, Housing and Community Services recommended the need for lead agencies, a focus on healthy environments, public health infrastructure development as well as improving the workforce and monitoring[16]. The National Health and Medical Research Council (NHMRC) recognised the need for action at the macro level with a need to focus on making it easier to undertake physical activity and to make healthier choices easier choices[5]. More recently the World Health Organisation (WHO) Report on Ending Childhood Obesity recommended that a whole of government approach is necessary in the prevention and treatment of obesity[2].

These key seminal reports identified that short-term programs, while useful in providing or developing questions, are not the solution. In Queensland, there has been no integrated approach adopted towards childhood overweight and obesity prevention and management, embedded across and within all levels of the healthcare system. There have been successful short-term projects and many schemes providing insight into strategies for particular groups, but none that span the system and provide an effective long-term solution. Furthermore, ongoing work is required to clearly identify the barriers to change at the systems level, to ensure that an integrated approach is embraced across all levels.

The *McKinsey Report (2014) Overcoming obesity: An initial economic analysis*, asserts that a strategy of sufficient scale is required as worldwide obesity is reaching crisis proportions. This analysis suggests that in order to create a sufficient impact, an ambitious, comprehensive, and sustained portfolio of initiatives by national and local governments, retailers, consumer goods companies, restaurants, employers, media organisations, educators, health-care providers, and individuals alike is necessary to support broad behavioural change[11]. This commitment and engagement from all sectors, coupled with cost-effective interventions that reset the default and make healthy behavior easy and the norm, will start to reverse the rising obesity prevalence at a global, national and local level.

Locally, within the project "*Policy and practice in managing childhood obesity: Implementation case studies in Queensland and NSW*", TAPPC reiterates that childhood overweight and obesity management programs will only produce long term success if embedded within the healthcare system[15]. Without formally embedding these programs within the healthcare system and establishing clear integration, such programs are vulnerable to termination by changes in external factors such as government leadership, funding priorities and healthcare priorities[17].

A 2015 Queensland Clinical Senate activity identified that an integrated, systems approach was needed and that despite our best efforts, very little progress has been achieved in the last two decades. Overweight and obesity prevention and management at all levels of the current healthcare system continues to be fragmented and inconsistent, with no clear approach, aims or plans for future directions[3].

Approximately 1 in 4 children are overweight or obese and to combat this issue a system wide approach is crucial.

Research investment

Obesity is an Australian National Health Priority Area however total research funding awarded in child health is low and inconsistent. A review of funding in 2010 from the national peak body found that between 2005 and 2009 a total of 2809 project grants were funded (NHMRC, Australian Research Council, National Heart Foundation, Diabetes Australia Research Program) but only 0.5 per cent of that funding was dedicated to projects targeting childhood obesity[18].

The NHMRC provides the largest research funding allocation to childhood obesity of all national funding bodies. Despite this, obesity expenditure declined to a six-year low in 2016 even though child health remains a strong overall priority (funding has increased by ~$15 million in six years — see Table 1)[19, 20].

It is acknowledged that in addition to NHMRC funding, there are other sources of potential funds that can be considered. These can come from any of level of government, non-government organisations (NGOs), private companies, universities and philanthropy. Services need to consider the best funding avenues to support their local needs.

Table 1: NHMRC obesity and child health research expenditure, 2011-2016

National Health Priority Area	$Million					
	2011	2012	2013	2014	2015	2016
Obesity	39.2	40.1	41.4	40.1	37.8	27.4
Child Health	70.1	76.8	81.4	87.5	98.7	84.3

Obesity is a significant public health problem globally and has the potential to negate many of the health benefits that have contributed to the increased longevity observed worldwide.

Nationally (2014-15) more than one-in-four (27 per cent) children aged 5-17 years are overweight or obese, with 20 per cent overweight and 7 per cent obese.

Within Queensland, 26 per cent of children are overweight or obese, with 19 per cent (158,000) overweight and 7 per cent (59,000) obese (2014-15).

Part 2

Fundamentals of childhood overweight and obesity healthcare

There are four fundamental premises that currently direct healthcare for childhood overweight and obesity. These are the strategic policies and guidelines (including supporting documents); defining childhood obesity; the benefits of weight management; and healthy lifestyle programs available.

1. Strategic policies, guidelines and supporting documents

Currently a number of Queensland, national and international governance documents identify childhood obesity as a key public health issue, provide specific recommendations and suggest tangible outcomes[3, 21-23]. This section will discuss documents related to the context in Queensland and include the following:

- Queensland Health – *My Health, Queensland future: Advancing health 2026* (2016), Direction 1: Promoting wellbeing one of the measures of success is 'reduce childhood obesity by 10 percent' by 2026[21].
- Queensland Clinical Senate and Health Consumers Queensland *Every K over is not Okay — Putting the brakes on obesity* (2015) made a number of key recommendations[3]:
  - » Establishment of a health system cross-jurisdictional taskforce to identify, develop and oversee the implementation of obesity prevention strategies
  - » HHSs create an environment within public healthcare facilities that actively promotes and models the importance of healthy weight and lifestyle
  - » Health professionals and consumers must promote and support acceptance of monitoring weight as an expectation (a vital sign) of healthcare delivery within the community.

- Statewide Children's Health Services Planning Project – this project is currently developing a statewide plan for children's health. Endorsement is planned for September 2017 (in print).
- Health and Wellbeing Strategic Framework[14] – sets a prevention-focused pathway for achieving improved health for all Queenslanders. It promotes integrated and complementary actions across multiple strategies which have been shown to make a difference. Targets for children include:
  - Reduced overweight and obesity to 22 per cent by 2026
  - Increased vegetable and fruit consumption
  - Improve physical activity.
- Queensland Health – *Overweight and obesity prevention strategy*[24] – is part of the *Health and Wellbeing Strategic Framework 2016 to 2026* which sets a prevention-focused pathway for:
  - Creating healthier places where people live, work, learn and play
  - Empowering people with the knowledge, positive attitudes, motivation and skills to live healthy lives.
- The NHMRC *Clinical Practice Guidelines for the management of Overweight and Obesity in adults, adolescents and children in Australia*[5].
- The Australian Medical Association Obesity 2016 position statement supports that a major focus and effort in preventing obesity should be on children and adolescents, with prevention and early intervention starting with pregnant mothers and unborn children, and continue throughout infancy and childhood[22].
- Additionally, the council of Presidents of Medical Colleges (adapted from the National Health Summit on Obesity) outlines a six-point plan for action on obesity including[23]:
  - Recognition of obesity as a chronic disease, not a lifestyle choice
  - Education and upskilling
  - Health professionals leading by example
  - Pre-conception planning
  - National obesity prevention strategy
  - Stronger voluntary regulation and new legislation.
- At a global level, in 2014 the WHO formed a Commission on Ending Childhood Obesity[2]. The Commission was established to review, build upon and address gaps in existing mandates and strategies. In 2016 the Commission produced a report which outlined a set of recommendations to successfully tackle childhood obesity, including:
  - Promote intake of healthy foods
  - Promote physical activity
  - Preconception and pregnancy care
  - Early childhood diet and physical activity
  - Health, nutrition and physical activity for school-age children
  - Weight management.

The report calls for a whole of government approach for obesity prevention and treatment to achieve these recommendations[2].

2. Identification of childhood overweight and obesity

According to the NHMRC *Clinical Practice Guidelines for the Management of Overweight and Obesity*, approximately 78 per cent of overweight children become overweight adults[5]. It is well known that effective weight management in childhood and adolescence will minimise the risk of overweight or obesity persisting into adulthood. Obesity increases the risk for other comorbidities including type 2 diabetes, breathing difficulties (e.g. obstructive sleep apnoea), heart complications, and orthopaedic complications[2].

While obesity during childhood and adolescence may be associated with some physical and mental health conditions, the long-term risk of diabetes and cardiovascular disease is not increased if a healthy weight is achieved by adulthood[5].

Refer to Table 2 for the classification of overweight and obesity in children and adolescents.

Table 2: Classification of overweight and obesity in children and adolescents [2, 9, 25-27]

Overweight	Weight-for-height › 2 Standard Deviation (SD) above WHO Child Growth Standards median	CDC: with a Body Mass Index (BMI) › 85th percentile and ≤ 95th percentile) WHO: 85th percentile to ‹ 97th percentile
Obesity	Weight-for-height ›3 SD above the WHO Child Growth Standards median	CDC: with a BMI ≥ 95th percentile WHO: › 97th percentile
Severe Obesity	There is no consensus on the definition of severity of obesity, the most recent International Obesity Taskforce (IOTF) recommendations suggested these definitions: • Class 2 obesity: BMI ≥120% of the 95th percentile or ≥35 kg/m2 (CDC BMI charts) • Class 3 obesity: BMI ≥140% of the 95th percentile or ≥40 kg/m2 (CDC BMI charts), or BMI Z score ›3.5	

The Centre for Disease Control (CDC) (USA) growth charts are used routinely across Australia. These charts were released in 2000 and the data was based on the growth of children in the United States between 1963 and 1994[25]. The CDC growth charts are known as a 'growth reference', as they describe how these children grew at a particular place and point in time[25].

The WHO growth charts were released in 2006 and are known as a 'growth standard' as they represent how children should grow, as subjects were chosen according to specific health behaviours that favoured full growth potential[9]. They establish the breastfed infant as the normative model, and provide a single international standard that represents the best description of growth and development. They should be used in children from birth to two years of age[9].

The use of the WHO charts will decrease the long-term risk of overweight and obesity for all children by using the growth pattern of breastfed infants as the ideal standard, which is most critical in Australia[28]. From two to eighteen years of age, it is recommended either the CDC or the WHO charts can be used, but the same chart should be used to monitor growth over time to allow for the identification of trends and obesity.

The extended international (IOTF) BMI cut-offs are used to assess childhood overweigh and obesity (age 2-18 years)[27, 28].

3. Obesogenic determinants and the benefits of weight management interventions

The causes of childhood overweight and obesity are complex and often not limited to energy imbalance[2]. Appropriate dietary intake and physical activity form the foundation of energy balance, but are directly and indirectly influenced by a vast range of environmental, behavioural, genetic, social and physiological factors. These factors often influence each other and can compound to increase overall risk of overweight and obesity[3].

Obesogenic determinants

The following factors directly affect energy balance and are the focus of individualised care:

- High intake of energy-dense, nutrient-poor foods (i.e. high in fat or sugar) (e.g. 'fast' or 'junk' foods, soft drinks) and low intake of nutrient-dense, energy-poor foods (e.g. vegetables and fruit).
- High levels of sedentary behaviour and low levels of physical activity.

The following factors are indirect causes of childhood overweight and obesity, and justify why some children and adolescents are at greater risk than others:

Genetic:

- A strong predictor of a child's weight is the weight status of their parents. Genetic contribution to obesity risk tends to present as accelerated growth in early childhood[5].
- Genetic causes of obesity include short stature for genetic potential, Cushing Syndrome, Prader Willi Syndrome, thyroid dysfunction, presence of any significant dysmorphisms or associated learning difficulties[26].
- Epigenetic changes, usually occurring intrauterine, predispose individuals to obesity by affecting the regulation of energy balance[5].

Early years:

- Poor maternal nutrition during pregnancy increases the risk that the child will become obese, as well as associated comorbidities e.g. metabolic syndrome, insulin resistance, dyslipidaemia and hypertension[30].
- A high level of weight gain during pregnancy amplifies the risk of gestational diabetes and a high birth weight. A high birth weight is associated with greater obesity risk in adulthood[5].
- Non-exclusive breastfeeding during the first six months of life is associated with a higher level of obesity in childhood, adolescence and early adulthood[5].

Environment:

- Increased availability of 'fast' and 'junk' foods at an economical price. These foods provide excess levels of energy, saturated fats, sugars and/or salt[5].
- Availability and promotion of high energy food and drinks at school tuckshops, community sporting clubs and workplaces[24].
- Slow but consistent increase in the portion sizes of packaged, takeaway and café/ restaurant meals[5].
- Urban infrastructure is obesogenic in nature, discouraging physical activity (e.g. incidental activity, walking, running, cycling) and promoting access to convenience foods[5].
- Overall increase in the cost of living encourages longer working hours and both partners engaging in active employment, reducing time for physical activity, food preparation and increasing opportunities for sedentary activity[5].

Psychological:

- Elevated stress secondary to psychosocial adversity, psychological disorders and school issues contribute to a lack of motivation in achieving a healthy lifestyle and can encourage higher levels of food consumption (i.e. emotional eating)[5].

Sociodemographic:

- Children and adolescents at a socioeconomic and geographical (i.e. rural) disadvantage are more likely to consume less fresh produce and more high energy foods, and have poorer access to health services[5].

Aboriginal & Torres Strait Islanders:

- Aboriginal and Torres Strait Islander young peoples are at a higher risk for developing overweight and obesity, and prevalence is currently higher (30 per cent) than in the non-Indigenous population (27 per cent). This is primarily due to higher levels of financial insecurity, family disruption, existing elevated levels of chronic disease and may also be linked to racial discrimination[1, 5, 31].
- "Compared to non-Indigenous adults and after adjusting for age differences, Indigenous Queenslanders were 39 per cent more likely to be obese and 25 per cent less likely to be healthy weight by measurement (12 per cent more likely to be overweight or obese). For Indigenous Queenslander children (5–17 years) in 2012–13, 30 per cent were measured as overweight or obese, 17 per cent were overweight and 13 per cent were obese.[1] The prevalence did not differ from non-Indigenous Queenslander children (27 per cent were overweight or obese in 2012–13) or Indigenous Australian children (33 per cent were overweight or obese)."[1].
- Indigenous childhood obesity prevention programs need to address social and economic factors (and not just individual factors)[32].
- The higher rates of overweight and obesity among the Indigenous population can further increase the gap in life expectancy[32].

Benefits of weight management interventions

Sustainable weight management in children and adolescents is a key enabler in reducing risk for a variety of poor and often life-threatening physiological, physical and mental health outcomes[2]. The strength of evidence supporting the following benefits to health secondary to weight management is overwhelming, and can be used as a motivating tool to encourage change towards positive lifestyle alterations, such as:

- Reduced risk of hypertension, dyslipidaemia, cardiovascular disease, type 2 diabetes (and accompanying glycaemic control), obstructive sleep apnoea, non-alcoholic fatty liver disease and some cancers[2, 9, 24].
- Reduced risk of functional mobility issues, e.g. poor exercise tolerance, chronic musculoskeletal pain[2, 9].
- Reduced risk of early puberty, premature adrenarche and polycystic ovary syndrome[9].
- Reduced risk of depressive symptoms, anxiety and bullying secondary to improved quality of life, self-esteem and self-confidence[2].
- Reduced risk of offspring becoming overweight and obese[2, 9].

Current evidence for diet, physical activity and behavioural interventions

The direct and indirect factors promoting childhood overweight and obesity are multi-faceted and numerous, requiring comprehensive and specific intervention strategies for effective treatment. To further increase the complexity of treatment options, the heterogeneity of multi-component interventions to treat childhood overweight and obesity is considerable.

Multiple Cochrane systematic reviews have been published that synthesise the evidence for diet, physical activity and behavioural interventions for the treatment of overweight and obese children. The first version was published in 2003 and subsequently updated in 2009. The latest version of the review has been split into six separate sub-reviews focusing on different treatment approaches and age groups: surgery, drugs, parent-only interventions, diet, physical activity and behavioural interventions for young children up to the age of six years, schoolchildren aged six to eleven years and adolescents aged 12–17 years.

The following summarises the current evidence and recommendations for diet, physical activity and behavioural interventions within each cohort, based on the relevant Cochrane systematic review:

0-6 years[33]:

- Multi-component interventions are more successful in reducing BMI and body weight in preschool children and the effects are maintained two years post-commencement of the intervention.
- Improvements are found in some, but not all, aspects of health-related quality of life.
- Overall quality of evidence: low.

6-11 years[34]:

- Behaviour-changing interventions compared to no treatment or usual care resulted in reductions in BMI, BMI z-score and body weight.
- Multi-component behaviour-changing interventions incorporating diet, physical activity and behaviour change components may be beneficial in achieving short-term reductions in BMI, BMI z-score and weight.
- Overall quality of evidence: low.

12-17 years[35]:

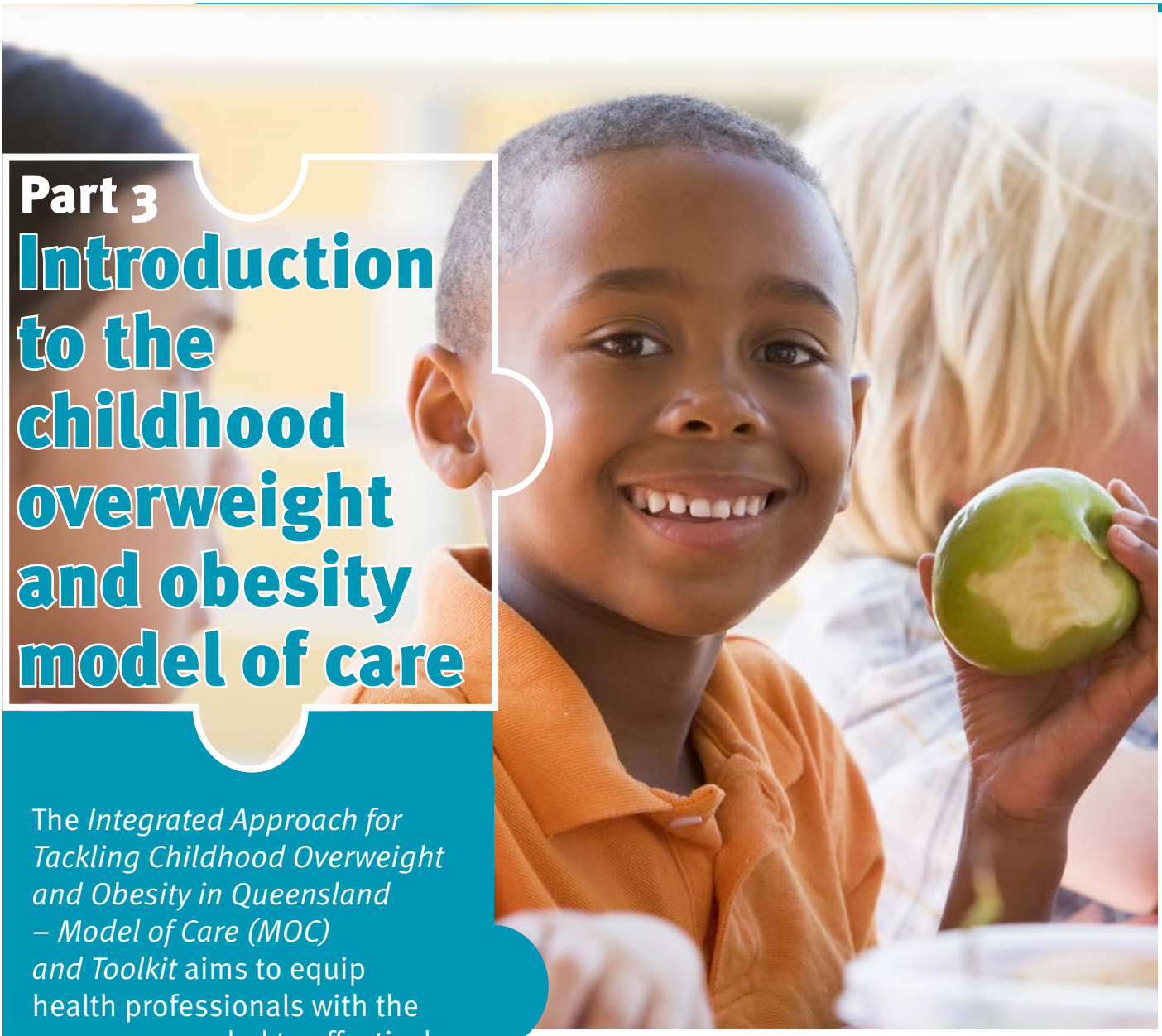
- Behaviour changing interventions reduce measures of body weight including BMI, BMI z-score and weight change in adolescents.
- Lifestyle interventions reduce indicators of adiposity such as percentage body fat, waist circumference and total fat mass.
- The effects of behaviour changing interventions were maintained at 18-24 months follow-up for BMI and BMI z-score.
- Overall quality of evidence: low-moderate.

4. Healthy lifestyle programs – prevention and early intervention programs

Currently there is no standard, consistent, best-practice approach to weight management service delivery via healthy lifestyle programs for children and young people. Programs need to be considered to ensure they are translatable to Queensland especially in terms of access, language, cultural appropriateness, duration and usability.

Multiple healthy lifestyle programs for families whose children who are overweight or obese are currently used within Australia and internationally, examples are provided in appendix A.

Sustainable weight management in children and adolescents is a key enabler in reducing risk for a variety of poor and often life-threatening physiological, physical and mental health outcomes.



Part 3 Introduction to the childhood overweight and obesity model of care

The *Integrated Approach for Tackling Childhood Overweight and Obesity in Queensland – Model of Care (MOC) and Toolkit* aims to equip health professionals with the resources needed to effectively manage overweight and obese children in all settings within Queensland. The aim of the MOC is to provide a collaborative, integrated approach to childhood overweight and obesity to guide clinicians to develop local supporting initiatives and deliver the best care to children and their families. The main principles of the MOC, the essential partnerships and the purpose of the POWG are detailed below.

1. Principles of the MOC

The MOC is an overarching, comprehensive approach to managing and supporting children aged 0 to 18 years who are at risk of or are classified as overweight or obese and is based on the most recent Queensland, nationally and internationally available evidence

The principles guiding this overview document and the MOC document align, with particular focus on:

- A child and family-centred approach.
- Service development and engagement across the continuum of care .
- Four main programs of focus and engagement:
  - » Prevention and early intervention
  - » Treatment
  - » Education and training
  - » Research, monitoring and evaluation.

- Statewide communication and consultation through the POWG:
  - » Governance is provided across Queensland under auspices of the Queensland Child and Youth Clinical Network (QCYCN) – specifically the POWG in partnership with the Preventive Health Branch (PHB), with the assertion that good health is the right of every child and young person in Queensland.
- Services should be integrated and collaborative throughout the healthcare sector and beyond – involving wider sectors invested in health such as education, housing and local councils. Services must be accessible and widely available in a variety of integrated modalities.
- Identification of gaps and inconsistencies within the system should be targeted, and solutions to remedy will be prioritised.

The MOC document includes recommendations on:

- Who is expected to provide the intervention
- How the intervention will be provided
- Toolkit - information and resources for clinicians to use in their intervention.

2. Key stakeholders

Childhood overweight and obesity can only be addressed by a collaborative group of partners and stakeholders across the health continuum and beyond. Key stakeholders will differ according to the health setting and will need to be determined at a local level. This may include consumers, community group representatives, private enterprises, schools, child care, health services, primary care providers, sporting organisations, industry and different levels of government.

3. Purpose of the POWG

In Queensland, the POWG - auspiced through the QCYCN - is a collaboration between the Clinical Excellence Division, Children's Health Queensland, Hospital and Health Services, Primary Health Networks, PHB and universities within Queensland.

The POWG is the peak body for clinical leadership regarding childhood obesity in Queensland. Membership of the POWG is multidisciplinary and includes representation from medical, nursing and allied health from across the state. Membership also includes representation from community healthcare, general practice and relevant NGOs.

The purpose of the POWG is to provide clear advice and advocacy in a cooperative and collaborative fashion by clinicians and for clinicians regarding childhood obesity services within Queensland. Refer to the POWG Terms of Reference for further information, including but not limited to:

- Support and advocate for the implementation of the recommendations from the Queensland Clinical Senate Obesity – Every K over is not Okay.
- Development of a strategy for statewide childhood overweight and obesity services and provide advice for prioritisation of service development across Queensland.
- Identification of existing clinical childhood overweight and obesity services across Queensland.
- Identification and advice to HHSs to support the implementation of existing guidelines for statewide childhood overweight and obesity services.
- Support quality improvement activities, research and funding opportunities and submissions.
- Advise on present and future workforce issues for the prevention and management of childhood overweight and obesity.
- Advocate for changes to policy as they relate to childhood overweight and obesity.

The considerations of the POWG are primarily at a strategic level and deal with issues related to the system as a whole. Accordingly, most of the considerations of the POWG relate to problems that are complex and require a systems approach for consideration, and inform service planning and delivery as part of implementing a number of key initiatives and strategies.

Future directions

There are a number of strategies that show promise in the area of childhood overweight and obesity prevention and management. HHS's, other parts of the healthcare system, NGOs, industry and other key stakeholders need to consider what will work best for them within their organisational context, and for the families they support.

The approaches detailed in Appendix B are a snapshot of what is currently being considered and/or developed for future use within Queensland. This includes a website for children and families/carers and for health professionals dedicated for prevention and management of childhood overweight and obesity (currently being developed by Children's Health Queensland (CHQ) in collaboration with QCYCN, PHB and UQ).

Summarising from the pertinent literature[2,9, 22,23] and experiences in Queensland, the following recommendations cover important aspects that should be considered in future planning for both service delivery and research in childhood obesity:

1. Evidence and expert advice highlights the need for a systems approach to childhood overweight and obesity prevention across all government sectors.
2. There must be a strong whole of government commitment and engagement in partnership with consumers to support healthy growth for children.
3. Build health professional capability in the prevention and management of childhood obesity, with an emphasis on education, training, and the provision of up to date and evidence - based resources and tools.

4. Prevention and treatment programs must be in multiple formats, adaptable and scalable, and freely and easily accessible to health professionals and consumers alike.
5. To ensure any programs' success, it needs to address critical time periods in the life-course (preconception and pregnancy, infancy and early childhood) and be embedded across the healthcare sector.
6. Health professionals need to lead by example, implementing healthy lifestyle initiatives for colleagues and clients.
7. Research institutes need to partner with the healthcare sector for effective translation of research outcomes.

Integrated evidence based services alongside strong commitment and engagement with the community, government and health professionals is needed to manage childhood obesity.

Appendix A
Examples of healthy lifestyle programs

MEND (Mind, Exercise, Nutrition....Do it!)
UK

Program aim: Healthy lifestyle program supporting families to learn how to make healthier lifestyle choices.

Target population: For childrens aged 2-4, 5-7, 7-13 years.

Program structure:

- Significant short-term outcomes: immediately post program – improvement in BMI z-score, waist circumference and psychometrics.
- Modest long-term outcomes: 2.4 years from baseline there were significant improvements in BMI z-score (-0.17), waist circumference z-score (-0.4), and psychometrics (total difficulties, body esteem and self-esteem) (boys) and body esteem (girls).
- Attrition rate in 7-13 years was 42 per cent, and 30 per cent in 5-7 years (not atypical for reports of service-level implementation).

PEACH (Parenting, Eating and Activity for Child Health)
Queensland and South Australia

The Queensland Government funded the implementation of the PEACH-QLD program from 2013-2016. The implementation of the program was overseen by QUT. Its evaluation was conducted by Flinders University South Australia.

Program aim: Parent-led healthy lifestyle program Address nutrition, physical activity and health weight for children and their families.

Target population: Overweight and obese children aged from 5-12 years.

Program structure:

- Free for registered participants, run after school, usually at school sites or community halls.
- Nine sessions (once/week in the school term), then the last session at six months post starting program, with three support phone calls in between.
- 90 minute sessions, parents and children separated. Parents learn and kids play games/ sports and learn.
- PEACH Online was developed as part of the program and run over six months.

Outcomes/findings:

- A total of 1,513 children (1216 families) enrolled, with 1,122 children (919 families) in the face-to-face program (105 groups in 50 unique venues) and 391 children (297 families) in PEACH Online.
- Families were socio-demographically representative of Queensland families. Families who participated in the program achieved statistically significant improvements in their child's weight status, diet and physical activity. These were typically made at a family level.

To implement PEACH face-to-face programs in Queensland, a licensing agreement is required with Flinders Partners (as developers of the program).

PEACH lifestyle
South Australia

This online program is available in South Australia for families with a primary school-aged child.

Awaiting preliminary evaluation results.

GO 4 FUN
NSW HEALTH

Program aim:

Healthy lifestyle program that focuses on improving eating habits, fitness and confidence.

Adapted from MEND, translated into the NSW context and embedded into NSW health system (mandatory part of deliverable KPIs).

Target population: Children aged 7-13 years, BMI≥85th percentile and no comorbidities.

Program structure:

- Developed as a 20 bi-weekly after school program run during the school term. Some local health districts adapted the program to 16, 18 or 20 session programs according to the timing of school terms, public holidays and to increase participant numbers (each LHD decided what sessions to omit and modify).
- 2 hour sessions – parents and children together, then kids do physical activity and parents undertake facilitated discussions.

Outcomes/findings: Studies have shown short-term positive changes in BMI z-score.

Better Health Program
Western Australia

Program aim: Delivered by the Better Health Company, the Better Health Program is an evidence based healthy lifestyle program.

Target population: For children aged 7–13 years who are above a healthy weight and their families.

Program structure:

- Sessions deliver combined education about nutrition, physical activity and behaviour change and children have a one hour physical activity session with a trained professional.
- The program runs for 10 weeks during each school term at various locations across Perth and is free for families to attend.

Triple P – Positive Parenting Program

Program aim: a parenting and family support system designed to prevent as well as treat behavioural and emotional problems in children and teenagers.

Target population: parents/carers of children up to 16 years.

The Queensland Government currently provides a range of Triple P programs free to parents and carers.

Infant Program – Getting healthy eating and active play right from the start
Victoria

Program aim: to promote healthy eating and active play behaviours in parents and their children. Emphasis is placed on improving knowledge, skills and strategies known to promote healthy eating (feeding styles and food provided) and active play (physical activity and sedentary behaviours) across these first years. A strong emphasis is placed on parental modelling of healthy lifestyle behaviours.

Target population: parents of young infants over the first 18 months of life,

Program structure: a six session lifestyle program.

More information: http://www.infantprogram.org/

Appendix B
Suggested future directions

Digitalised Strategy - Development of a suite of digital tools on healthy lifestyle for children and families and health professionals

The delivery of web-based/online interventions and the use of smart device applications (apps) are emerging as a promising adjunct to traditional face-to-face interventions for the delivery of family-focused healthy lifestyle interventions[36]. Further research and development, however, is required, as the majority of healthy lifestyle apps available in Australia are not evidence based[37]. The practice framework digitalised strategy will use the guiding principles and learnings from the CHQ digital strategy[38] and will include the first online personal health record[39].

Examples include:

- Healthy lifestyle web-based education programs that can be used as a stand-alone resource for children and families, or as an enhancement to a face-to face consult by a range of professionals (e.g. GP, dietitian, child health nurse), or as a tool for self-monitoring (e.g. mobile health technologies using behavioural weight control)[37].
- Healthy lifestyle apps for use by children and their families that provide interactive tools and resources to educate people on healthy eating, physical activity and behaviour change, as well as providing links to professional support as required[40].
- Digitalisation of the 'Redbook' personal longitudinal health record available to every newborn child in Queensland as:
  - » An electronic record for developmental milestones.
  - » A platform for integration with primary and tertiary care providers to enable seamless data collection and delivery of care.
  - » A tool to enable systematic risk screening of every infant for future overweight or obesity development, informing targeted, preventive interventions for those deemed "high risk".
- A Geographic Information System (GIS) model with the ability to geographically highlight areas in Queensland - rural, community or metro - where prevention and intervention efforts need to be targeted (e.g. for areas with high overweight and obesity prevalence, low levels of physical activity, or low levels of fruit and vegetable intake).
- The development of evidence based modules on healthy lifestyle for children and families to enhance existing digital parenting and education programs, possible options include:
  - » Partnering with The University of Queensland's Parenting Family Support Centre to include a healthy lifestyle module as part of Triple P online.
  - » Partnering with HitNet to develop a healthy lifestyle module for families for use in their kiosks specifically for Aboriginal and/or Torres Strait Islander peoples.
  - » Partnering with FutureLearn to develop an online education course, either for children and their families or health professionals, on healthy lifestyles and the prevention of overweight and obesity in children and young people.
  - » FutureLearn[41]: is a digital education platform (founded in December 2012 and first course launched in October 2013) launched and owned by the Open University (Milton Keynes, England). It is the first UK-led massive open online course learning platform, and has 119 partners, both university and non-university, from within the UK and internationally, including QUT, the University of Newcastle, Deakin University and Monash University. It is distinct from other online courses such as OpenLearn, which are designed for self-directed study rather than cohort learning. Courses are delivered one step at a time, and are accessible on mobile, tablet and desktop. Opportunity is provided to interact with both the course facilitators and other participants. Since September 2013, more than 5.9 million people from around the world have joined FutureLearn.

Alignment of the MOC with National Quality Framework

We aim to align the Childhood Overweight and Obesity MOC with National Quality Framework in child care services (www.mychild.gov.au)[42] relating to food education and food provision in child care services in Queensland.

The range of heterogeneous services and environments in which children spend their time during early childhood provide limited systematic opportunity to engage families and children in healthy eating, physical activity promotion and the engagement in obesity prevention efforts, with the exception of broad-based community strategies and through the accreditation process. Therefore, the accreditation criteria for the provision of food in child care services, or the food allowed to be brought from home to child care services, needs to be in line with current evidence based recommendations on the prevention of overweight and obesity in children and young people.

Additionally, ongoing sustainable service delivery and effective clinical research needs to answer important, relevant questions, and outcomes need to have a measurable, positive impact on children who are overweight and obese and their families.

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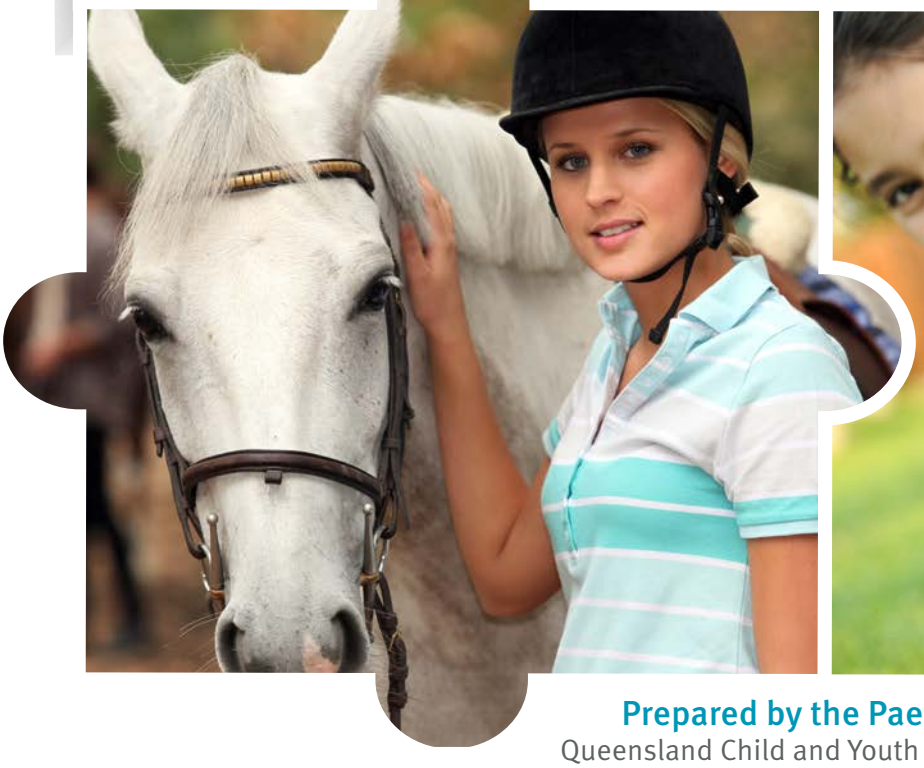

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