



Australian Government
Australian Institute of
Health and Welfare



Childhood overweight and obesity: The impact of the home environment



Childhood overweight and obesity—the impact of the home environment



The Australian Institute of Health and Welfare is a major national agency whose purpose is to create authoritative and accessible information and statistics that inform decisions and improve the health and welfare of all Australians.

© Australian Institute of Health and Welfare 2021 

This product, excluding the AIHW logo, Commonwealth Coat of Arms and any material owned by a third party or protected by a trademark, has been released under a Creative Commons BY 3.0 (CC BY 3.0) licence. Excluded material owned by third parties may include, for example, design and layout, images obtained under licence from third parties and signatures. We have made all reasonable efforts to identify and label material owned by third parties.

You may distribute, remix and build upon this work. However, you must attribute the AIHW as the copyright holder of the work in compliance with our attribution policy available at <www.aihw.gov.au/copyright/>. The full terms and conditions of this licence are available at <<http://creativecommons.org/licenses/by/3.0/au/>>.

ISBN 978-1-76054-797-4 (PDF)

ISBN 978-1-76054-798-1 (Print)

Suggested citation

Australian Institute of Health and Welfare 2021. Childhood overweight and obesity—the impact of the home environment. Cat. no. PHE 283. Canberra: AIHW.

Australian Institute of Health and Welfare

Board Chair

Mrs Louise Markus

Chief Executive Officer

Mr Barry Sandison

Any enquiries about or comments on this publication should be directed to:

Australian Institute of Health and Welfare

GPO Box 570

Canberra ACT 2601

Tel: (02) 6244 1000

Email: info@aihw.gov.au

Published by the Australian Institute of Health and Welfare.

Please note that there is the potential for minor revisions of data in this report.
Please check the online version at <www.aihw.gov.au> for any amendments.

Contents

Summary	v
Individual factors.....	v
Family and community factors	v
What can be done about childhood overweight and obesity?	vi
1 Introduction	1
Obesity and the home environment.....	2
Family influences affect childhood health and wellbeing	4
Community, society and socioeconomic circumstances influence the home environment	4
2 Individual factors in the home environment	6
Preconception, pregnancy and birth	6
Breastfeeding.....	7
Food intake	7
Physical activity.....	10
Sedentary behaviour and screen time	12
Sleep	13
Disability.....	14
Self-esteem and mental health	14
3 Family and home environment surroundings	16
Habits.....	16
Family meals and eating behaviours	17
Convenience and discretionary foods	17
Food cost.....	19
Packaging and marketing.....	20
Food environment.....	21
Home and neighbourhood physical environment.....	22
Home environment stressors.....	23
4 What can be done about childhood overweight and obesity?	25
Current government initiatives	25
Actions to address childhood overweight and obesity.....	26

Acknowledgments	28
Glossary	29
References	31
List of boxes.....	41
Related publications.....	42

Summary

Childhood overweight and obesity is a major public health issue in Australia. In 2017–18, 1 in 4 (25%) children and adolescents aged 2–17 were overweight or obese, and about 1 in 12 (8.2%) were obese. Overweight and obesity in children is associated with a significant risk of developing chronic diseases, as well as remaining overweight or obese as an adult, which further adds to the risk of disease.

Overweight and obesity is mainly caused by an energy imbalance (where too much energy is taken in through food and drink, and not enough energy is expended through physical activity). But many different interconnected factors drive this energy imbalance, making overweight and obesity complex to address.

This report aims to provide a resource to inform overweight and obesity prevention strategies and policies for children and their families. It looks at the individual and family factors in the home environment—where a child lives and grows—that affect childhood overweight and obesity. These factors, along with broader community and society influences, affect a child's likelihood of becoming overweight or obese.

Individual factors

Individual factors are those that vary between children living within the same household.

A child's first 1,000 days—that is, from conception until the age of 2—is a particularly important period for their body's development.

Many factors in the home environment influence overweight and obesity, including:

- breastfeeding
- eating a healthy diet with age-appropriate meal sizes
- activities children do throughout the day—getting the right balance of sleep, physical activity and sedentary behaviour in a 24-hour period
- whether a child has a disability
- self-esteem
- mental health.

Family and community factors

Family and community factors are those that all children in a household experience. Most children, particularly pre-adolescents, depend on their parents and carers for food, transport and care. Therefore, factors affecting parents and carers (such as local amenities, food costs, stress, packaging and marketing of foods) will affect how parents and carers provide food and activities.

Family habits play an important role in overweight and obesity. The underlying attitudes and beliefs of parents and carers influence their parenting style. This includes the rules and expectations they use to influence children's behaviour within the home (for example, demonstrating and encouraging positive attitudes and healthy behaviours around food and exercise, eating meals together and screen time limitations).

Siblings and other family members also play a key role, by encouraging physical activity through play, and demonstrating and encouraging positive attitudes and healthy behaviours.

The environment where a home is situated can affect the types of foods and activities available to children. Having access to healthy food options, as well as a local area where people can use active transport and easily get to parks and amenities, all support a healthy lifestyle for children and their families and reduce the risk of overweight and obesity.

What can be done about childhood overweight and obesity?

Many evidence-based actions can help address childhood overweight and obesity.

Reviewing the literature on overweight and obesity can identify patterns and trends, to help Australian policymakers develop and improve national prevention strategies.

Some examples of these strategies include the:

- National Obesity Prevention Strategy
- National Preventive Health Strategy
- review of the Australian Dietary Guidelines.

These initiatives aim to find ways to help Australians live healthier by eating healthier food, drinking healthier drinks and doing more physical activity.

1 Introduction

In Australia in 2017–18, 1 in 4 (25%) children and adolescents aged 2–17 were overweight or obese, and about 1 in 12 (8.2%) were obese (ABS 2019). Rates of obesity have risen considerably between 1995 and 2017–18 for 5–17 year olds, from 4.9% to 8.1% (AIHW 2020d). As children enter adolescence, the prevalence of overweight and obesity increases. For example, the proportion of children who were overweight or obese rose from 21% at age 4–5 to 31% at age 16–17 (AIHW 2020c).

Dietary factors also play a role in the development of overweight and obesity. Dietary risks (such as low intake of whole grains, fruits and vegetables) were responsible for 7.3% of the disease burden in Australia in 2015, making it the third-leading risk factor contributing to disease burden (after tobacco use and overweight and obesity) (AIHW 2019a).

Overweight and obesity is also associated with significant health care costs. If no further action is taken to slow the rise in obesity, there will be an estimated \$87.7 billion in additional direct and indirect costs due to obesity between 2015–16 and 2024–25. These estimates did not include the costs of childhood obesity, due to limited available evidence to estimate costs (PwC Australia 2015). Projecting future obesity costs likely underestimates the actual costs, as health inflation is generally higher than general inflation (consumer price index) (AIHW 2019b).

In 2015, compared with children with a body mass index (BMI) in the normal range, the annual (non-hospital) Medicare cost was:

- \$63 (28%) higher for each child who was overweight
- \$103 (45%) higher for each child who was obese (Black et al. 2018).

This was mainly due to a higher number of general practitioner and specialist visits. This represents an estimated additional annual cost of \$43.2 million (in 2015 Australian dollars) to the Australian Government in Medicare costs due to childhood overweight and obesity (Black et al. 2018).

Childhood overweight and obesity and related factors also feature prominently as child health issues among the Australian public. The first Australian Child Health Poll in 2015 found Australians considered the top 4 biggest health issues to be:

1. excessive screen time—58% rated excessive screen time as a big health problem for Australian children and young people
2. obesity (55%)
3. not enough physical activity (54%)
4. unhealthy diet (54%) (Rhodes 2015).

Obesity and the home environment

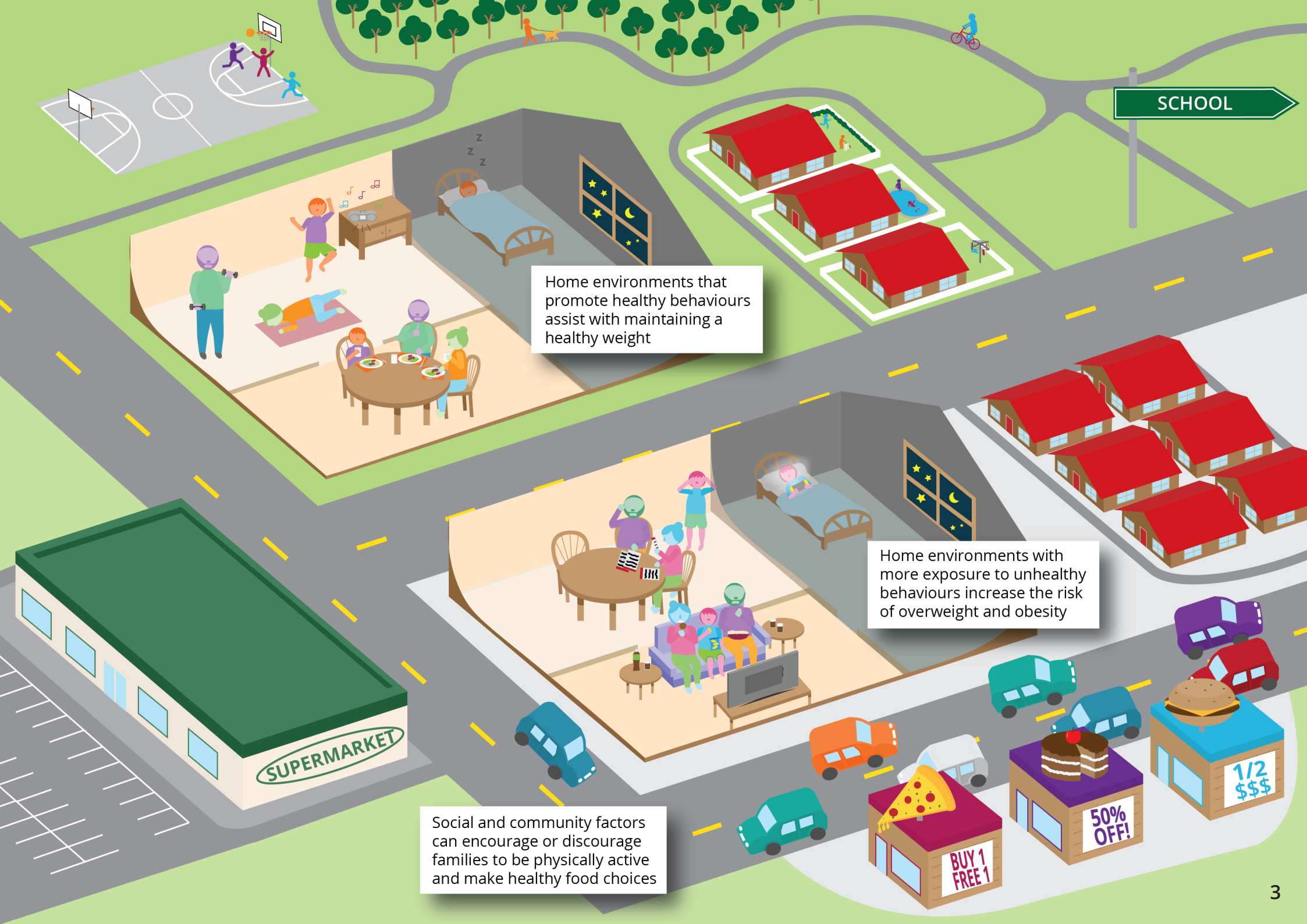
This report looks at the individual and family factors relating to children in their home environment.

Energy imbalance is the main cause of overweight and obesity—where energy intake through eating and drinking is greater than the energy expended through physical activity. Among children, even a small persistent energy surplus (on average around 200–300 kilojoules per day) in excess of daily energy requirements can result in children of a healthy weight becoming overweight or obese if not offset by enough physical activity (Plachta-Danielzik et al. 2008). While energy imbalance seems to be a simple explanation, the factors driving the energy imbalance are very complex, including individual, family, community and societal factors (Butland et al. 2007; Mahrshahi et al. 2018b).

The factors that promote, or increase risk of overweight and obesity—by influencing the amount and type of food eaten and physical activity undertaken—are often referred to as the ‘obesogenic environment’ (Egger & Swinburn 1997; Swinburn et al. 1999). For children, these factors all come together in the home environment, where parents and caregivers mediate a child’s interaction with the broader environment, community and society (page 3). The level of parental and caregiver influence generally decreases as children age.

1

Introduction



SCHOOL

Home environments that promote healthy behaviours assist with maintaining a healthy weight

Home environments with more exposure to unhealthy behaviours increase the risk of overweight and obesity

Social and community factors can encourage or discourage families to be physically active and make healthy food choices

SUPERMARKET

BUY 1 FREE 1

50% OFF!

1/2 \$\$\$

Family influences affect childhood health and wellbeing

Families, in particular parents and carers, are the gatekeepers of a child's day—children depend on adults for food, transport and care, although this dependence diminishes with age.

Parents and carers influence their children's dietary intake and movement in many ways, especially through parenting styles and practices. Parenting practices are strategies used by parents and carers to influence children's behaviour (for example, demonstrating and encouraging behaviours, eating meals together, and screen time limitations). Positive parenting practices promote child health and wellbeing—for example, those involving parental warmth, encouragement and responsiveness (Chen et al. 2019; Davids et al. 2017; Nicholls et al. 2014).

This report looks at how parenting practices relate to individual and family factors that influence childhood overweight and obesity.

Community, society and socioeconomic circumstances influence the home environment

Many community and society factors—such as laws, policies, industry, and economic conditions—shape the environment around the home. The socioeconomic circumstances of a family and the home environment are influenced by the social and community context (such as nearby amenities, built environment, and food marketing). These factors affect the options available, and can affect whether families' are physically active and make healthy food choices (Friel & Goldman 2019; Halliday et al. 2014; Mhrshahi et al. 2018b).

For more information on obesogenic environments see *A picture of overweight and obesity* (AIHW 2017).

The social and economic circumstances of a household (for example, education, employment, occupation, and income) are often referred to as socioeconomic position. Higher (more well off) socioeconomic position is associated with a healthier weight, healthier eating and greater physical activity in children (Friel & Goldman 2019). Children from the lowest socioeconomic areas are more likely to be overweight or obese than those from the highest socioeconomic areas (AIHW 2020c; Wu et al. 2015).

Education

The education level of parents and caregivers affects their health literacy—that is, their ability to access, understand and use health information in ways that benefit their health. This in turn, affects other members of the household such as children. Health literacy is higher in those with higher education (Martin et al. 2009), and people with low health literacy are at higher risk of worse health outcomes and poorer health behaviours (DeWalt & Hink 2009).

A higher level of education also provides parents and caregivers with the knowledge and skills to increase their wealth and socioeconomic position, with more skilled jobs and higher income.

Employment

Employment provides income for families, and important resources for children's health and wellbeing. But it can also affect parents' stress levels, wellbeing and availability. In OECD (Organisation for Economic Co-operation and Development) countries, research has shown that children whose mothers work longer hours are at greater risk of being overweight or obese than those whose mothers work less (Mindlin et al. 2009). The risk is greater among children of high-income families.

Some behaviours appear to be more common among the children of mothers working more than 35 hours per week, such as, not eating breakfast regularly and watching more than 3 hours of television a day. The reasons for this are likely to be complex, but might be related to time pressures and expectations put on working mothers, compounded by the lack of change in expectations in gender roles (Fitzsimons & Pongiglione 2019).

The literature on paternal employment is limited, likely due to fathers historically having low rates of part-time employment and little change in this over time.

Income

Income (either via employment or other means) is important for families to be able to make healthy choices. When income is insufficient to meet the needs of a family, financial stress might affect the availability of healthy food in the household, ability to fund physical activity and provide secure housing.

A contributing factor is high housing costs, which can reduce the available financial resources and cause housing stress. In 2016, about 22% of Australian children aged 0–14 lived in households experiencing housing stress (AIHW 2020a).

2 Individual factors in the home environment

Individual factors relate specifically to the child, and are different for each child in a household. Parents and carers can influence these factors with rules and expectations, particularly at younger ages, but as children grow, they will also have control over these factors.

Some individual factors play a particularly important role in a child's likelihood of being overweight or obese, and their general health into the future.

A child's first 1,000 days—that is, from conception until the age of 2—is a particularly important period for their body's development. Factors like their environment before birth (including their parents' health), and whether or not they were breastfed (and for how long) can play an important role in their long-term health. Each child's environment during these first 1,000 days can have other long-term effects on their health, including increasing the risk of conditions such as coronary heart disease, diabetes and cancer (Moore et al. 2017; Woo Baidal et al. 2016). The environment and circumstances will also be different for each child.

Other individual factors can also affect a child's likelihood of being overweight or obese, including their sleep patterns, physical activity, dietary intake, self-esteem and mental health.

Genetics are also different for each child and determine how the body is made and works. Unlike sleep and other factors, genetics cannot be changed. Together with other individual and environmental factors, genetics explain some of the similarities in body composition often seen among family members, and can be the cause of some disabilities. An estimated 30%–40% of the variation in BMI for unrelated individuals is hereditary (Yang et al. 2015). A review of twin and adoption studies also shows evidence that BMI in children can be inherited from biological parents (Silventoinen et al. 2010).

The environmental factors explored in this report often interact with individual genetics to contribute to overweight and obesity (for example, a person who has genes to store fat more easily still needs to consume more energy than their body needs for it to be stored as fat).

Preconception, pregnancy and birth

Preconception is the time before the conception of a baby. Parents' health during this period has an effect on the health and wellbeing of the baby. In addition to genetic material, egg and sperm cells also contain other components that are shaped by the nutritional intake of the parent and inherited by the child (Haire-Joshu & Tabak 2016).

During pregnancy, the mother's nutrition, level of stress and exposure to environmental toxins affect the baby's development. As the baby grows, its body adapts to the world it is living in. During this period, some factors play a role in the baby's likelihood of being overweight or obese later in life. For example, the babies of mothers who smoke or have a higher BMI before pregnancy are more likely to become overweight or obese. The children of mothers who gain a substantial amount of weight during pregnancy or develop gestational diabetes are also more likely to go on to be overweight or obese (Larqué et al. 2019; Moore et al. 2017; Woo Baidal et al. 2016).

Box 1: How many mothers are affected by risk factors for childhood overweight and obesity during pregnancy?

Of mothers who gave birth in Australia in 2018:

- almost half were overweight or obese at their first antenatal visit
- 1 in 7 (14%) had gestational diabetes
- 1 in 10 (9.6%) smoked at some time during their pregnancy (AIHW 2020b).

Breastfeeding

Breastfeeding following birth (compared with formula-feeding) is associated with a reduced risk of becoming obese in childhood, adolescence and early adulthood (NHMRC 2012).

After adjusting for confounders, research shows that children who received any form of breastfeeding were 13% less likely to be overweight or obese (Victora et al. 2016). Whilst further research has shown that the risk of childhood obesity was 22% lower in breastfed children than in those who were never breastfed (Yan et al. 2014). The longer a child is breastfed, the lower the risk of becoming obese, with children who are breastfed for 7 months or more having the lowest risk (Yan et al. 2014).

Box 2: How many children are breastfed in Australia?

In 2017–18:

- 93% of children under 3 years had received some breastmilk
- 66% were still receiving breastmilk at 6 months (ABS 2019).

Food intake

The home environment influences food intake through factors such as the quality and amount of food purchased, and the way in which this food is usually prepared or cooked.

For children, particularly when young, the home is where they eat most of their meals, and parents and carers usually select the types of foods a child eats. This includes the groceries purchased, the meals cooked, lunches packed for school or daycare and the choice to dine out or get takeaway.

As well as playing a role in choosing the food, parents, caregivers and other family members also instil habits and values in children by demonstrating and encouraging behaviours (such as what foods they eat or avoid, when and where eating occurs and a willingness to try new foods) (Østbye et al. 2013; Palfreyman et al. 2014; Reicks et al. 2015; Scaglioni et al. 2018). So, the home environment can help establish healthy eating behaviours in children, which can continue later on in life (Daniels et al. 2014; Guerrero et al. 2016; Pesch et al. 2016).

What is a healthy diet for children?

The Australian Dietary Guidelines (NHMRC 2013) provide advice on eating to promote overall health and wellbeing, reduce the risk of diet related disease and protect against chronic conditions.

Guideline 1 is to achieve and maintain a healthy weight, ensuring nutrient requirements are met, but total energy intake does not exceed energy expenditure.

Guideline 2 follows on with recommendations to drink plenty of water and enjoy a wide variety of nutritious foods from these 5 groups every day:

- plenty of vegetables, including different types and colours, and legumes/beans
- fruit
- grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, such as bread, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley
- lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans
- milk, yoghurt, cheese and/or their alternatives, mostly reduced fat (noting that reduced fat milks are not suitable for children aged under 2).

The number of recommended serves per day of each food type varies with age (NHMRC 2013). But most children, regardless of age, do not meet the guidelines (Table 1).

What do Australian children eat?

The Australian Dietary Guidelines outline the number of serves of the 5 food groups for children and adolescents (NHMRC 2013).

Large portion sizes are linked to increased overall energy intake, which might, over time, increase the risk of overweight and obesity (Albar et al. 2014; Elliott et al. 2011; Syrad et al. 2016).

There are similarities between the amount parents serve themselves and the amount they serve to their children, suggesting parents struggle to gauge the amount of food that is appropriate for children (Johnson et al. 2014). When children are served a double portion size, they consume on average 20% more food (Zlatevska et al. 2014).

Many parental factors influence the amount served to children, including:

- awareness of the correct portion sizes for children
- environmental influences on children's intake and appetite
- maternal hunger or intake
- size of packaged snacks or dishware
- perceived healthiness of the food (Reale et al. 2019a; Reale et al. 2019b).

Parents and carers who use parenting practices that pressure children to eat after they feel full disrupt a child's ability to interpret and listen to their hunger and fullness cues (Birch et al. 2003; Fisher & Birch 2002; Gregory et al. 2010). So, it is important to allow children to self-regulate their intake by responding to these cues (Tan & Holub 2011).

As well as outlining the number of serves of the 5 food groups, the Australian Dietary Guidelines also recommend that discretionary foods—that is, foods high in energy but low in nutrients—should be limited or only occasionally consumed (NHMRC 2013).

But, in the 2011–12 National Nutrition and Physical Activity Survey, the proportion of energy intake from discretionary foods accounted for:

- 30% of energy intake in children aged 2–3 (3 serves of discretionary foods per day)
- 41% of energy intake in adolescents aged 14–18 (7 serves of discretionary foods per day) (AIHW 2018a).

While family meals are an important factor for overall food intake, parents and carers also provide food for their children outside the home, such as school lunches. It has been estimated that children consume more than one-third of their total energy intake at school (Bell & Swinburn 2004), much of this from discretionary foods (Casado & Rundle Thiele 2015; Kelly et al. 2010; Sanigorski et al. 2005).

An Australian study that assessed the contents of preschool children’s lunchboxes found that:

- most (93%) included sandwiches or home cooked meals
- 60% contained more than 1 serve of an extra (discretionary) food or beverage (for example, sweet biscuits, savoury snacks and sugar sweetened drinks)
- 49% contained extra beverages (for example, soft or fruit drinks)
- 75% contained fruit
- 5.4% had vegetables
- 22% contained dairy foods (Kelly et al. 2010).

Other Australian research has shown that in New South Wales, 1 in 10 children and almost 1 in 3 adolescents frequently (twice a week or more often) bought lunch from the school canteen. After adjusting for other factors (for example, physical activity and other takeaway consumption), primary school children who frequently bought lunch were significantly more likely to be overweight or obese than those who bought lunch infrequently (once a week or less often) (Hardy et al. 2018).

Table 1: Are the majority of children meeting the Australian Dietary Guidelines?

	Age (years)				
	2–3	4–8	9–11	12–13	14–18
Boys					
Vegetables	No	No	No	No	No
Fruit	Yes	Yes	No	No	No
Grains	No	Yes	Yes	No	No
Meat and alternatives	No	No	No	No	No
Dairy and alternatives	Yes	No	No	No	No
Girls					
Vegetables	No	No	No	No	No
Fruit	Yes	Yes	No	No	No
Grains	No	No	Yes	No	No
Meat and alternatives	No	No	No	No	No
Dairy and alternatives	Yes	No	No	No	No

Source: AIHW 2018a.

Physical activity

Being physically active is important across all ages, and contributes to healthy growth and development in children and adolescents (WHO 2018). Physical activity increases the body's energy expenditure, and balancing this energy expenditure with a healthy diet is particularly important for preventing overweight and obesity.

The Australian 24-hour Movement Guidelines (the Guidelines) outline the recommended amount and types of physical activity required for health benefits (Department of Health 2019). The Guidelines also provide advice for limiting sedentary behaviour and getting adequate sleep (Department of Health 2019).

The evidence behind the Guidelines suggest that children gain the greatest health benefits when each day they participate in at least:

- 30 minutes of tummy time during awake periods from birth to 1 year, including reaching and grasping, pushing and pulling, and crawling spread throughout the day
- 180 minutes of physical activity for toddlers aged 1–2, including energetic play spread throughout the day
- 180 minutes of physical activity for children aged 3–5, including 60 minutes of energetic play spread throughout the day (noting that this only includes those up to pre-school age)
- 60 minutes of moderate to vigorous intensity physical activity for school age children, aged 5–17 (Department of Health 2019).

Children should also participate in various types of physical activity in different environments (for example, home, school, community) and contexts (for example, play, recreation, hobbies, sport).

Adhering to the Guidelines has been associated with improvements in weight and fat distribution, cardiorespiratory and musculoskeletal fitness, cardiovascular and metabolic health, academic achievement, mental health, motor development, emotional regulation and quality of life (Okely et al. 2019).

What organised sport activities do Australian children do?

In 2019–20, AusPlay data showed that the top 3 organised sport activities:

- for boys were swimming (33%), football/soccer (21%) and Australian football (12%)
- for girls were swimming (36%), dancing (20%) and gymnastics (18%) (Clearinghouse for Sport 2020).

Participation in organised sport activities outside of school hours increased with age, at:

- 49% for children aged 0–4
- 85% for children aged 5–8
- 90% for children aged 9–11
- 84% for children aged 12–14 (Clearinghouse for Sport 2020).

Children living in *Remote* or *very remote* areas or low-income households, were less likely to be involved in organised activity outside of school hours (Clearinghouse for Sport 2020).

Barriers for children who did not participate in organised sport activities outside of school hours differed by age group. While time constraints and issues or costs associated with transportation were reported, the highest barriers were that children:

- were too young (79% for those aged 0–4 and 30% for those aged 5–8)
- didn't like physical activity (31% for those aged 9–11 and 26% for those aged 12–14) (Clearinghouse for Sport 2020).

The behaviours that parents and carers show and encourage—such as enjoying and taking part in physical activities—are some of the strongest influencers of children's physical activity (Clemens & Lincoln 2018; Hendrie et al. 2011; Smith et al. 2010; Zecevic et al. 2010). In 2016, 72% of children who had an active parent were physically active, compared with 53% of children who had an inactive parent (based on information provided from only 1 parent) (Australian Sports Commission 2017).

Additionally, doing physical activities together provides families with the opportunity to spend time together, bond and connect, and for children to talk with their parents, practise their skills, and challenge themselves (Freire et al. 2019). Children with siblings are also more likely to play and be physically active than only children (Crawford et al. 2010; McMinn et al. 2013).

Children who receive support for physical activity from parents and carers engage in more movement and less screen time (Hendrie et al. 2011; Smith et al. 2010; Yao & Rhodes 2015; Zecevic et al. 2010). Parents can provide support to help their children participate in physical activity by:

- encouraging children to be active
- providing transportation to activities
- watching their child participate in activities
- exercising with their child
- using and encouraging the use of active transport
- educating their child on the health benefits of physical activity (Langer et al. 2014; Mah et al. 2017; Zecevic et al. 2010).

Additionally, children aged 5–10 who were either overweight or at risk of being overweight and received parental support (for example, encouragement or transportation) participated in 4–5 minutes more physical activity per day for each area of additional support (Langer et al. 2014).

Box 3: Are children meeting the physical activity component of the guidelines?

In the 2011–12 National Nutrition and Physical Activity Survey:

- 61% of children aged 2–5 met the physical activity guideline to complete at least 180 minutes of physical activity per day
- 26% of children aged 5–12 and 7.8% of children aged 13–17 met the physical activity guideline to complete at least 60 minutes of physical activity per day (AIHW 2018b).

Sedentary behaviour and screen time

Children often spend much of their waking day sitting (Salmon et al. 2011). Common sedentary activities for children and adolescents include:

- screen-based activities (for example, watching television, and using devices such as smartphones and computers for school work or leisure)
- sitting in cars and classrooms (Active Healthy Kids Australia 2018).

Screen-based activities are strongly linked to obesity in both adults and young people. Higher overweight and obesity rates are associated with high screen time, independent of physical activity (Banks et al. 2011; Boone et al. 2007; Salmon et al. 2011). Fewer hours of screen time in adolescence reduces the likelihood of obesity in adulthood (Boone et al. 2007).

The sedentary behaviour component of the Guidelines captures all types of activities, such as reading or puzzles, prolonged sitting and recreational screen-time. Not all sedentary behaviours are equal, as some are educational while others are not.

Spending more time on recreational sedentary screen-based activities increases the risk of overweight and obesity in children by:

- reducing time spent on physical activity
- increasing snacking (often on energy dense foods)
- exposing them to unhealthy food advertising
- reducing sleep time (Miguel-Berges et al. 2019; Olds et al. 2010; Pearson et al. 2014; Shang et al. 2015; Tambalis et al. 2018; Viner et al. 2019).

Compared with those who have low screen time and high physical activity levels, boys aged 9–16 who have high screen time and low physical activity time are 3.5 times more likely to be obese, while girls are 2.7 times more likely (Maher et al. 2012).

Watching television contributes to children's sedentary time, and is associated with increased weight (Fuller-Tyszkiewicz et al. 2012; Shakir et al. 2018; Yu & Baxter 2016). Each additional hour of television per day is associated with a 13% increased risk in childhood obesity (Zhang et al. 2016).

The home environment and parenting practices also influence the availability, rules, enforcement and subsequent amount of time children spend on sedentary screen-based behaviours (Jago et al. 2011; Nwankwo et al. 2019; Sanders et al. 2016; Yu & Baxter 2016).

Children are less likely to engage in high screen time use when parents establish limits and model healthy screen time use (Lauricella et al. 2015; Lee et al. 2018). Family rules around screen time can be less effective as children get older and more independent, and screen-based activities increase (Yu & Baxter 2016).

2

Box 4: Are children meeting the sedentary screen-based behaviours guidelines?

In the 2011–12 National Nutrition and Physical Activity Survey:

- 25% of children aged 2–5 met the guideline of no more than 60 minutes of sedentary screen time per day
- 35% of children aged 5–12 and 20% of children aged 13–17 met the sedentary screen-time behaviour guideline of no more than 120 minutes of recreational screen use per day (AIHW 2018b).

Sleep

Sleep is essential for children’s growth and development. There is strong evidence of an association between not getting enough sleep and childhood overweight and obesity.

Children who sleep for the recommended time are more likely to be of a healthy weight than those who do not (Fatima et al. 2015; Li et al. 2017; Matricciani et al. 2019). For each additional hour of sleep, the risk of being overweight or obese reduces by an average of 9% (Chen et al. 2008).

The healthy amount of sleep varies considerably with age, with the Guidelines recommending the following:

- 14–17 hours for those aged 0–3 months
- 12–16 hours for those aged 4–11 months
- 11–14 hours for those aged 1–2 years
- 10–13 hours for those aged 3–5 years
- 9–11 hours for those aged 5–13 years
- 8–10 hours for those aged 14–17 years (Department of Health 2019).

Within the home, the family’s routines affect when and for how long children sleep, as well as the quality of their sleep (Allen et al. 2016; Mindell et al. 2015). Parents and carers can influence the sleep of children through their parenting practices, such as setting consistent sleep and wake times and bedtime routines (Pyper et al. 2017).

Box 5: How many children are getting inadequate sleep?

In Australia, the proportion of Australian children not meeting the minimum sleep requirements on school nights increases with age at:

- less than 1 in 8 of those aged 6–11
- 1 in 4 of those aged 12–15
- 1 in 2 of those aged 16–17 (Evans-Whipp & Gasser 2018).

Disability

In 2017–18, Australian children aged 5–14 who had a disability were more likely to be overweight or obese (30%) than those without a disability (24%) (AIHW 2020a).

This might be because these children are limited in the:

- physical activities they can participate in
- foods they are able to eat (Abeysekara et al. 2014).

Box 6: How many children in Australia have a disability?

7.4% of children aged 0–14 had some form of disability in 2015 (AIHW 2020a).

2

Individual factors in the home environment

Self-esteem and mental health

The mental health of children, particularly their self-esteem, is an important factor that influences their health and wellbeing.

Self-esteem is a child's or person's attitude towards themselves as a whole, or attitude towards specific features, like physical appearance. The home environment influences children's self-esteem development from a young age, through the quality of child–parent relationships, parental support, cognitive stimulation and physical environment (Harter 2012; Orth 2018). Low self-esteem is an indicator of depression or risk of depression in later childhood and adolescence, which can lead to decreased desire to participate in physical activity, poorer educational outcomes and behavioural problems (Russell-Mayhew et al. 2012).

In 2013–14, based on self-reported data, Australian adolescents aged 11–17 with major depressive disorders were more likely to report being overweight or obese than those with no disorders (Lawrence et al. 2015). At age 10, children who have low self-esteem and those who believe that things happen due to circumstances outside of their own control are more likely to gain larger amounts of weight into adulthood than children who do not have these problems (Ternouth et al. 2009).

The relationship between overweight and obesity and mental health and self-esteem goes both ways—body satisfaction generally decreases as BMI increases. About 48% of boys aged 8–9 and 66% of boys aged 10–11 who were a healthy weight were satisfied with their body size. But this fell to 25% and 19% for those who were overweight. For girls, 52% aged 8–9 and 67% aged 10–11 who were a healthy weight were satisfied with their body size. But this fell to 27% and 23% for those who were overweight (Daraganova 2014).

When compared with normal weight children, overweight and obese children report having poorer self-esteem (Gibson et al. 2017; Sikorski et al. 2015), and high levels of dissatisfaction with their bodies (Harriger & Thompson 2012).

Children and adolescents with a healthier diet and who participate in organised and non-organised sport are more likely to have positive self-perception and self-esteem (Arvidsson et al. 2017; Wu et al. 2016). This could reflect an environment that is safe, secure and where parents are supportive of these behaviours. These are also important factors in children maintaining a healthy weight.

Box 7: How many Australian children report indicators of low self-esteem and mental health conditions?

In 2013–14, based on the Young Minds Matter Study:

- 6.9% of children aged 4–17 had an anxiety disorder
- 2.8% of children aged 4–17 had a major depressive disorder
- 20% of children aged 11–17 had high or very high levels of psychological distress (Lawrence et al. 2015)
- about 3% of children aged 11–17 reported levels of low self-esteem that were associated with an increased risk of a major depressive disorder and/or self-harm (Hafekost et al. 2017).

3 Family and home environment surroundings

Most children, particularly pre-adolescents, depend on their parents and carers for daily food, transport and care. Siblings and other family members also play a key role, by encouraging play and movement, and modelling behaviours.

The underlying attitudes and beliefs of parents and carers influence their parenting style—that is, the rules and expectations they use to influence children’s behaviour within the home. Examples of these are demonstrating positive attitudes and behaviours towards food and exercise, eating meals together, and limiting screen time (Guerrero et al. 2016; Russell et al. 2018; Vaughn et al. 2018; Vollmer 2014; Wood & Shukla 2019).

Having consistent practices and rules around food, activity and sleep in the family home might lead to children making better and healthier choices in the long term (Adamson & Blight 2014; O’Connor et al. 2010).

Habits

Habitual behaviours are those that through repetition in a regular environment (for example, a place or time of day) do not require much thought to perform when in that same environment in the future (Neal et al. 2006). Household routines, rules or expectations, such as regularly eating meals together or enforcing restrictions on screen time, help form healthy habits. By demonstrating and encouraging behaviours, parents and carers can strongly influence the behaviours of children.

Parents and carers can help promote the consumption of healthy foods by encouraging their child to eat these foods in a similar context each day (for example, eating an apple for morning tea each day). Similarly, physical activity behaviours can start small (such as going for a 10-minute walk before school) and over weeks or months be extended into longer periods of movement (Gardner et al. 2012).

Unhealthy habits also form in the same way. In the case of eating behaviours, habits might even override hunger and taste. For example, the automatic consumption of food when in front of a television might contribute to consuming excess energy over time. Children and adolescents who have strong habits in using screen-based technologies, participating in physical activity or increased unhealthy snacking behaviours are more likely to continually engage in these behavioural patterns (De Vet et al. 2015; Marchant et al. 2016).

Breaking unhealthy habits requires more effort than forming healthy habits, as regular environments are already associated with an undesired behaviour that needs disruption (Verplanken & Wood 2006). Parents and carers can help break habits by demonstrating and encouraging positive behaviours, setting clear expectations along with reinforcement, enhancing children’s knowledge and beliefs on healthy behaviours, and providing accessibility to healthy eating and physical activity options (Davison et al. 2012).

There are limited studies in Australia that assess children’s habits and their relationship with overweight and obesity. So, it is not possible to report specific data on this area.

Family meals and eating behaviours

Regularly sharing meals as a family is associated with eating more healthy foods (like fruit and vegetables) and a reduced likelihood of being overweight or obese (Dallacker et al. 2018; Hammons & Fiese 2011). Children who regularly eat meals with their families are 24% more likely to eat healthy foods (particularly fruits and vegetables), and maintain these behaviours, than those who don't (Christian et al. 2013; Hammons & Fiese 2011). Similarly, adolescents who eat at least 5 family meals together a week are 35% less likely to have disordered eating, such as bingeing and weight control behaviours (Hammons et al. 2011).

In contrast, eating meals while watching television is associated with a greater intake of unhealthy foods, such as fast food and sugar sweetened drinks instead of healthy foods (Miller et al. 2008; Pearson & Biddle 2011). Setting rules and expectations around eating meals together as a family can help develop healthy behaviours among children.

Regularly eating breakfast leads to reduced snacking, better weight management, better appetite control and higher diet quality (Leidy 2013; Lundqvist et al. 2019; Timlin et al. 2008). Children who eat breakfast daily are more likely to have a lower BMI. Australian data show that children and adolescents were 1.4 times more likely to be overweight or obese when they did not eat breakfast daily than those who did (Mihirshahi et al. 2018a).

Healthy food policies implemented in childcare settings can also influence food choices and behaviours in the home. For example, the 2012 Munch and Move program implemented in New South Wales aimed to influence healthy eating and physical activity behaviours of young children. Evaluation of the program 3 years later showed improvements in intake of water or age appropriate drinks, healthy eating learning experiences, and providing healthy information to families (Lockeridge et al. 2015).

Encouraging children from a young age to help with preparing family meals can also assist with having healthier diets, consuming a wider variety of new foods and increasing vegetable consumption (Berge et al. 2016; Chu et al. 2013; Metcalfe et al. 2018).

Box 8: How many Australian families eat meals together?

In 2014:

- 43% of children aged 6 months to 6 years ate family dinner together every night
- 10% of children ate dinner when watching television on 5 or more nights of the week (Litterbach et al. 2017).

Convenience and discretionary foods

Convenience foods are those that are pre-prepared in some way to save time for consumers, and include all products except fresh foods. Some convenience foods involve minimal processing (for example, frozen or tinned fruits and vegetables), while others require more (such as ready to eat meals) or are completely manufactured (for example lollies, soft drinks and processed meats).

Discretionary foods are foods that are not necessary for a healthy diet, as they are high in saturated fat, added sugars, added salt or alcohol, and low in fibre (for example lollies, chocolates, chips and biscuits) (NHMRC 2013).



Compared with foods prepared at home, more highly processed convenience foods and most discretionary foods are energy dense and nutrient poor, with higher amounts of saturated fat, salt and sugar (Farrand & Santos 2017; Mackay et al. 2017; The George Institute for Global Health 2019; Webster et al. 2010). Regular consumption of these foods can lead to weight gain and subsequent development of overweight and obesity (NHMRC 2013). So, the Australian Dietary Guidelines recommend to avoid or only occasionally eat small amounts of discretionary foods (NHMRC 2013).

The increasing supply of convenience and discretionary foods, combined with Australians becoming more time poor, has increased the consumption of these foods (Di Nunzio 2014; Monteiro et al. 2013). Australian families' spending on fast food and meals out of home as a proportion of total food spending rose from 25% in 1988–89 to 31% in 2009–10 and 34% in 2015–16 (Hogan 2018). In 2015–16, Australian couple families with dependent children spent on average \$53 on restaurant meals each week, and single-parent families with dependent children spent \$21. Additionally, couple families with dependent children spent \$46 on takeaway and fast food and single-parent families with dependent children spent \$28 (ABS 2017).

Research has shown that consumption of fast food increases total daily energy intake by 530 kilojoules among children and 1,300 kilojoules in adolescents, and increases intake of sugar, saturated fat and sodium (Powell & Nguyen 2013).

Meal kit subscription services are also becoming more common, and provide families with the convenience of having pre-measured ingredients and recipes to cook at home. In Australia, meal kits, on average, provide adequate serves of core foods, particularly vegetables but are also high in energy content, fat and sodium, while being low in fibre (Gibson & Partridge 2019). They are also based on a one-size-fits-all approach to portion size, which is not appropriate for everyone, particularly children (Gibson & Partridge 2019).

Within the home, the rules and expectations parents and carers have for discretionary foods can affect overweight and obesity. Restricting the discretionary foods available in the home and when they can be eaten will reduce the contribution to daily energy intake. Using discretionary food as a reward can lead to children having an increased desire for the food, making them more likely to eat excessive amounts when it is made available (Gregory et al. 2010; Jansen et al. 2008; Rodgers et al. 2013; Rollins et al. 2014).

Box 9: How often do Australian families eat convenience or discretionary foods?

- In New South Wales, 41% of children ate takeaway food at least once per week in 2016, a similar proportion to 2012 (NSW Ministry of Health 2017).
- In New South Wales, in 2016, children ate more takeaway food at least once a week the older they got—from 28% of those aged 2–4, to 37% of those aged 5–11 and 48% of those aged 12–15 (NSW Ministry of Health 2017).
- In 2011–12, discretionary food contributed towards 39% of average daily energy intake in those aged 2–18 (ABS 2014).

Food cost

The cost of food and household income influence the types and amounts of foods people buy. Families often have food budgets to keep grocery spending under control, where value for money (quantity, weight or number of serves) is important (Drewnowski & Darmon 2005).

In lower socioeconomic areas and in more remote areas, diet quality decreases and overweight and obesity increases (AIHW 2018a). Differences in diet quality across socioeconomic areas might, in part, be driven by issues of affordability. One study estimated that for a family of 2 adults and 2 dependent children, low-income households would need to spend about 28% of their income to afford a healthy diet, compared with 8.9% for high-income households (Ward et al. 2013).

At a national level, spending patterns on food and beverages as a proportion of goods and services also reflected this trend. In 2015–16, food and non-alcoholic beverages accounted for 19% of household spending on goods and services for low-income households, compared with 14% for high-income households (ABS 2017). Across remoteness areas, highly accessible areas have more choices for fruits and vegetables and lower average costs for food than more remote areas (Chapman et al. 2014; Queensland Health and Queensland Treasury 2012).

Analysis comparing the fortnightly cost and affordability of different diets based on supermarket baskets showed that healthy diets consistent with the Australian Dietary Guidelines, are less expensive than unhealthy diets (Lee et al. 2016). Despite this, Australians are spending a high proportion of their food expenditure on discretionary foods. The average family of 2 adults and 2 children spends more than 58% of their food budget on discretionary choices, but only 10%–15% on fruit and vegetables, rather than the 29% needed for the family members to meet the recommended number of serves per day (Lee et al. 2016).

In 2019, more than 1 in 5 Australians (21%) experienced food insecurity in the previous 12 months, where they ran out of food and were unable to buy more (Foodbank Australia 2019). This could be due to various factors, such as high or unexpected bill payments, unemployment, lower income or being single parent families (Foodbank Australia 2019). Nearly 1 in 5 parents who are experiencing food insecurity report that their children go a whole day without eating at least once a week (Foodbank Australia 2019). The risk of obesity is 20%–40% higher in people who are food insecure, possibly due to increased consumption of cheap energy-dense foods that are high in fat and sugar, poor health awareness, and lifestyle behaviours (Burns 2004).

Box 10: How much does the average Australian family with children spend weekly on groceries?

In 2015–16, for families with dependent children, the average weekly household spending on food and drink (excluding alcohol) was:

- \$328 (about 14% of disposable income) for a couple family
- \$201 (about 16% of disposable income) for a single-parent family (ABS 2017).

Packaging and marketing

Food packaging and marketing—the design, colours, symbols and claims made—influence the food purchased and brought into the home.

The wide variety of entertainment mediums available in the home (including television, streaming services, websites such as YouTube, social media and mobile phone apps) is exposing children to more advertising than in the past.

Children are highly vulnerable to food marketing and packaging, as they are yet to understand the persuasive intent, and lack the skills to correctly interpret advertising (Wilcox et al. 2004). As a result, food advertising and marketing can influence the types of food children ask for, prefer and the amount they eat (Boyland et al. 2011; Halford et al. 2008; Scully et al. 2012). Unhealthy food advertisements mean children are more likely to consume unhealthy food and drinks (Baldwin et al. 2018; Coates et al. 2019; Norman et al. 2018; Russell et al. 2019).

Overweight or obese children are also more likely to eat higher amounts of unhealthy food after exposure to television adverts than children of healthy weight, suggesting that food advertising is more effective among children with a higher weight (Norman et al. 2018; Russell et al. 2019).

Food advertising affects what children want and what they eat. Children who have high television usage and medium to high non-school related internet usage are:

- more likely to pester their parents for, or purchase, the advertised food products
- more likely to be overweight or obese than those with low to medium television and low non-school related internet usage (Boyland et al. 2018).

Marketing techniques are used to make products appeal to children. Research shows that graphics, cartoons, celebrities and health claims are the most influential factors to promote children's food products (Elliott & Truman 2020; Mehta et al. 2012).

Children are more likely to show a preference for foods that have promotional characters on the packaging (McGale et al. 2016). Yet these products are more likely to be healthier choices (Elliott 2019; Hebden et al. 2011).

In Australia, confectionary, chocolate, snacks and dairy foods accounted for more than half of food products marketed towards children (Mehta et al. 2012). Nearly half (46%) of the breakfast cereals marketed to children were classified as 'less healthy' options than similar products not marketed towards children (Tong et al. 2018).

Additionally, interventions have shown that reducing and substituting the merchandising of high sugar discretionary foods with healthy core foods can help reduce the purchasing of discretionary products, and influence people to buy healthier foods (Brimblecombe 2019).

Health and nutrition claims on food products also influence what parents buy for their children. While Australia does have standards for nutrition and health claims, the claims used by companies might not provide a complete picture, and can distract from the overall nutritional content and quality of food products (Al-Ani et al. 2016).

Companies adding nutrition related claims such as ‘wholegrain’ or ‘source of calcium and vitamin D’ can persuade parents on the perceived healthfulness of the product and subsequently increase willingness to buy it (Abrams et al. 2015; Dixon et al. 2011; Elliott 2012; Harris et al. 2011; Russell et al. 2017).

The Australian Health Star Rating is a front-of-pack labelling system that provides a quick, easy, standard way to compare similar packaged foods—the more stars, the healthier the choice. It is an important tool to help parents and carers when choosing healthy foods. The Australian Government and state and territory governments developed the system in collaboration with industry, public health and consumer groups (Commonwealth of Australia 2019).

Box 11: How often are children exposed to food advertising?

In 2016, during children’s peak television viewing time, on average:

- discretionary food was advertised 2.3 times an hour
- healthy food was advertised 1.0 time an hour
- the duration of discretionary food advertising was more than double that of healthy food advertising (Smithers et al. 2018).

Food environment

The food that is available in shops influences the types of food and beverages people buy. Some areas (for example, low socioeconomic areas) have poor access to healthy food and fresh produce, such as fruit and vegetables (Dutko et al. 2012). Other areas have adequate access to healthy food, but also an overabundance of energy-dense foods like fast foods (Rose et al. 2009).

In rural and remote areas of Australia, healthy food options are limited, and, when they are available, they are more expensive than the same options in capital and regional cities (Lewis & Lee 2016). For instance, in a Victorian study, the availability of food service outlets was much higher than food stores in rural areas, and only 23% of the outlets offered at least 1 healthy main meal option, with this being more limited for children (Whelan et al. 2018).

Internationally and in Australia, fast food restaurants are more common in more disadvantaged areas (Fleischhacker et al. 2011). In Victoria, a higher proportion of low socioeconomic areas had at least 1 fast food restaurant than high socioeconomic areas. The lowest socioeconomic areas also had a higher average number of fast food restaurants than the highest socioeconomic areas (Thornton et al. 2016).

In the same study, both primary and secondary schools in the lowest socioeconomic areas of *Major cities* had a greater density of, and access to, fast food outlets than those in the highest socioeconomic areas (Thornton et al. 2016). The food environment of these areas has the potential to influence unhealthy dietary choices and increase the risk of overweight and obesity among children living in these areas or attending school there.

Box 12: How many children are overweight or obese in low socioeconomic areas or rural and remote areas?

In 2017–18, of children and adolescents aged 2–17:

- a higher proportion of those living in *Inner regional* (29%) and *Outer regional and remote* (27%) areas were overweight or obese than those living in *Major cities* (23%)
- rates of obesity were 2.4 times as high in the lowest socioeconomic areas (11%) as in the highest (4.4%) (AIHW 2020d).

Home and neighbourhood physical environment

The surroundings of a child's home can encourage physical activity. This includes the home play space, neighbourhood, layout, natural environment, and facilities available nearby.

Children who can access play equipment at home are more likely to engage in moderate to vigorous physical activity in place of light physical activity or screen time (Crawford et al. 2010; Moss et al. 2019). Equipment at home might also encourage parents to actively play with their children, and increase physical activity for everyone (Hnatiuk et al. 2016).

Children who use active transport to travel to school (such as cycling), are more likely to have a lower BMI and smaller waist circumference than those who use non-active modes of transport (such as travelling by car) (Sarmiento et al. 2015).

Neighbourhoods that are more connected and have walking facilities, or have higher residential density (which means more children living nearby and playing together) are associated with lower risk of overweight and obesity (Jia et al. 2019; Timperio et al. 2010). Children who live in areas with less green space, no access to a garden or near major roads and commercial areas have a higher likelihood of being overweight or obese (Schalkwijk et al. 2018). The safety of neighbourhoods is also important—children and adolescents who reported problems with their neighbourhood support (characterised by trust and reciprocity) and safety were more likely to be obese than children who did not report these issues (Borrell et al. 2016).

Box 13: How many children live in areas that support physical activity?

In 2018:

- 37% of primary school students and 36% of secondary school students used active transport as their usual mode to get to school
- 85%–86% of children aged 10–11 and 14–15 had parks near their home
- 76%–77% of children aged 10–11 and 14–15 did not experience heavy or problematic traffic on their street and had good roads and footpaths in their neighbourhood
- 76% of those aged 12–17 had a playground or play space near their home
- 71% of those aged 12–17 lived in a neighbourhood that they perceived to be safe (Active Health Kids Australia 2018; Schranz et al. 2018).

Home environment stressors

Children can experience various stressors in the home that can affect their wellbeing and increase their risk of overweight or obesity. Exposure to stress early in a child's life can affect parts of the developing brain. This can result in children having a reduced ability to control and adjust how much they eat, potentially leading to poorer eating behaviours and subsequent obesity (Miller et al. 2017).

Stressors that children can experience within the home environment include:

- poor family functioning and cohesion (for example, a lack of clear open communication, defined roles and rules)
- financial stress (for example, insecure housing, low income or poverty)
- life events (for example, separation/divorce, relocation, severe illness or death)
- mental or physical health problems within the family
- parental stress (for example, feelings of being overwhelmed or anxious in response to these stressors or other reasons).

High levels of parental stress, poor maternal health and maternal psychological distress in the home are all linked to lower physical activity levels, lower fruit and vegetable intake and increased consumption of high fat and sugar foods in children (Baskind et al. 2019; Webb et al. 2018). Children of mothers who experience any type of parental stress are more likely to be overweight or obese (Tate et al. 2015).

Children are particularly vulnerable to poverty in the household, as they lack the resources to deal with stressful experiences, and this can lead to impacts on health and psychosocial development throughout life. Poverty can also challenge parents, particularly in terms of inadequate food, energy and housing (Council on Community Pediatrics 2016). Over time, children who experience recurrent poverty are more likely to have unhealthy eating and physical activity behaviours, and are 1.5 times more likely to be overweight or obese (Min et al. 2018).

Children who live in poorer functioning families are more likely to be overweight or obese (Halliday et al. 2014). This highlights the importance of parents and carers having consistent rules and expectations in the house around food, physical activity, screen time and sleep.

It is not always possible to control stressors, such as financial hardship, housing stress or mental and physical ill health. But developing healthy stress coping strategies could reduce reliance on unhealthy coping behaviours, such as stimulants, substances and comfort food. Childhood stress can have impacts into adulthood (Miller et al. 2017; Wall et al. 2019).



Box 14: What stressors do some families experience?

- In 2014, 13% of children aged 0–14 had a parent or guardian who was unable to get help when needed from their family network.
- In 2016, 22% of children were living in households with housing stress, a decrease from 26% in 2011.
- In 2016, an estimated 0.4% of children aged 0–14 (about 19,400) were homeless on census night, and 0.4% (about 18,900) were living in an overcrowded situation.
- In 2013–14, 10% of children aged 4–12 had their social and emotional wellbeing scored within the ‘of concern’ range. This was more than twice as high for children in the lowest socioeconomic areas (16%) as for those in the highest socioeconomic areas (7.2%) (AIHW 2020a).



4 What can be done about childhood overweight and obesity?

Obesity is a complex issue, requiring a comprehensive strategy with many interventions. Individually, interventions might have a small effect but when combined they act together to produce a larger effect (The Sax Institute 2019).

Changing behaviour is not as simple as a person stopping or starting an action. Many factors affect how successfully children and families can change their behaviour, including:

- personal and individual factors—habits, beliefs (including shared beliefs of what is ‘right’ or ‘wrong’), translating intention into action, attitudes, knowledge, skills and genetics
- social factors—interaction with and influence of other people, including family, friends and the community
- environmental factors—schools, workplaces, local facilities, shops, technology and the economy (Butland et al. 2007; Central Office of Information 2009).

Many factors influence childhood overweight and obesity, and to bring about effective behaviour change, it is important to address all those factors.

Focusing interventions solely on education and behaviour change does not necessarily work for everyone. For example, people from lower socioeconomic areas are less likely to have access to resources to help them make changes. Rather, interventions that change the environment and involve broad scale community action can have a more positive impact (Sacks et al. 2019). Additionally, behavioural factors do not act in isolation, and are often connected (Central Office of Information 2009).

Interventions aimed at changing behaviour are more effective when they are delivered across various settings, such as in the home, childcare, school and workplace environments (Sacks et al. 2019).

Current government initiatives

To address overweight and obesity as a significant public health challenge, Australian governments are currently undertaking a number of initiatives.

Australian National Breastfeeding Strategy: 2019 and beyond

The Australian National Breastfeeding Strategy: 2019 and beyond was developed by the Department of Health on behalf of the Australian Health Ministers’ Advisory Council.

The strategy seeks to provide an enabling and empowering environment that protects, promotes, supports and values breastfeeding. The strategy provides a framework for integrated, coordinated action to shape and inform Commonwealth, state, territory and local government policies and programs, as they support mothers, fathers/partners and their babies with breastfeeding.

National Obesity Prevention Strategy

The Australian Government and state and territory governments (through the then Council of Australian Governments Health Council) agreed to develop a national obesity strategy. The strategy will guide sustained preventive action over the next 10 years to reduce overweight and obesity in Australia. A National Obesity Strategy Working Group is developing the draft strategy for the Council of Australian Governments Health Council or equivalent to consider.

National Preventive Health Strategy

The National Preventive Health Strategy forms part of the third pillar for mental health and preventive health in Australia's Long Term National Health Plan. It will align to, and build on, the work of other strategies such as the National Obesity Prevention Strategy. It aims to help Australians improve their health at all stages of life, through early intervention, better information, and targeting risk factors and the broader causes of health and wellbeing.

Review of the Australian Dietary Guidelines

The Australian Government Department of Health has funded the National Health and Medical Research Council to review the 2013 Australian Dietary Guidelines. This will ensure dietary advice is based on the best and most recent scientific evidence about the types and amount of food we need to have a long and healthy life.

Actions to address childhood overweight and obesity

There have been many reviews of population level actions aimed at changing behaviour and addressing overweight and obesity by promoting healthier lifestyles. Internationally, both the OECD (2019) and World Health Organization (2013, 2016) have published recommendations for actions to reduce overweight and obesity.

In Australia, recent publications have also outlined evidence-based actions, including:

- the report *Tipping the scales: Australian Obesity Prevention Consensus* (The Obesity Policy Coalition 2017)
- the final report of the Senate Select Committee into the Obesity Epidemic in Australia (Parliament of Australia 2018)
- 2 rapid evidence reviews by the Sax Institute to inform the National Obesity Prevention Strategy (Friel & Goldman 2019; Sacks et al. 2019).

There is broad consensus across all of these reports on effective strategies for tackling overweight and obesity, particularly in childhood.

In the home, some of these actions are to:

- develop education campaigns to support individuals, families and communities with overweight and obesity and improve attitudes and behaviours around weight, health literacy and wellbeing
- improve prenatal care, including nutrition guidance
- support breastfeeding

4

What can be done about childhood overweight and obesity?

- develop mass media campaigns to promote and increase intake of healthy food and drink
- restrict marketing of unhealthy food and drinks to children
- develop, support, update and monitor national dietary guidelines
- improve regulation for food reformulation (such as reducing energy, sugar, sodium and saturated fat in food products to make them healthier)
- make the Health Star Rating system mandatory
- place a levy on sugar sweetened drinks
- increase the price of unhealthy food and drink, while reducing the price of healthy food and drink
- improve food and drink labelling, including adopting front-of-pack nutrition warning labels for products high in sodium, saturated fat, added sugar and/or energy content
- restrict temporary price reductions or promotions on unhealthy food and drink products
- implement a welfare policy to support housing and food for people on low incomes
- implement interventions that offer direct financial incentives for promoting physical activity
- improve parks and playgrounds, including access
- improve infrastructure to enable walking and cycling
- improve public transport and/or provide incentives to encourage increased use of active travel
- support prescription of physical activity by primary care health professionals for overweight and obesity
- develop, support, update and monitor a national physical activity strategy and guidelines.

Acknowledgments

Jennifer Kerrigan, Micaella Watson, Chris Rompotis and Rebecca Evans of the Population Health Unit at the Australian Institute of Health and Welfare (AIHW) authored this report, under the guidance of Richard Jukes and Claire Sparke. Chloe Groves, Sarp Kaya, Kevin Monahan and Shirleen Mutisya provided assistance.

Sally Mills and Justin Harvey from the AIHW reviewed the report and provided valuable input and advice. The authors would also like to acknowledge the comments and feedback provided by members of the Obesity Expert Advisory Group: Steven Allender, Ian Caterson, Stephen Colagiuri, Annette Dobson, Roger Magnusson, Anna Peeters and Boyd Swinburn.

The Department of Health funded this report. The authors thank individual staff members at the Department of Health for their constructive comments and advice.

Glossary

active transport: Includes non-motorised forms of transport that involve physical activity, such as walking and cycling or using public transport for longer journeys.

Australian Dietary Guidelines: Guidelines providing information on the types and amounts of foods, food groups, and dietary patterns that can promote health and wellbeing, reduce the risk of diet related conditions, and reduce the risk of chronic disease.

Australian Statistical Geography Standard (ASGS): Common framework defined by the Australian Bureau of Statistics for collection and dissemination of geographically classified statistics. The ASGS replaced the Australian Standard Geographical Classification in July 2011.

body mass index (BMI): The most commonly used method of assessing whether a person is normal weight, underweight, overweight or obese (see obesity). It is calculated by dividing the person's weight (in kilograms) by their height (in metres) squared; that is, $\text{kg} \div \text{m}^2$. For both men and women:

- underweight is a BMI less than 18.5
- acceptable weight is from 18.5 to less than 25
- overweight is from 25 to less than 30
- obese is 30 and over.

Sometimes overweight and obese is combined, and is defined as a BMI of 25 and over.

built environment: The human-made surroundings that provide the setting for people to live, work and play. It incorporates the building and transportation design of a setting, including elements such as open green spaces, bikepaths, footpaths, shopping centres, business complexes, and residential accommodation, together with their supporting infrastructure (such as transport, water and energy networks).

convenience foods: Foods that are typically processed at varying levels and commercially prepared to save cooking time and effort for consumers. Convenience foods tend to be either frozen, dried, or canned.

discretionary food: Foods and drinks that are not necessary to provide the nutrients the body needs but might add variety. Many of these are high in saturated fats, sugars, salt and/or alcohol, so are described as energy dense. They can be included sometimes in small amounts by those who are physically active, but are not a necessary part of the diet.

disposable income: The income available to a person or household, after income tax, the Medicare levy and the Medicare levy surcharge (if applicable).

energy dense food: Energy density is the amount of energy or kilojoules in a particular weight or food. Foods that have a lower energy density provide less kilojoules per gram than foods that have a high energy density. Typically, low energy density foods have a high water and fibre content—for example, fruits, vegetables, and wholegrains. High energy density foods usually have high fat contents—for example, butter and deep-fried foods.

food insecurity: Where individuals or households have limited or uncertain physical, social, or economic access to sufficient, safe, nutritious and culturally relevant food.

gestational diabetes: A form of diabetes that is first diagnosed during pregnancy (gestation). It might disappear after pregnancy, but signals a high risk of diabetes occurring later in life.

health literacy: The ability of people to access, understand and apply information about health and the health care system to make decisions about their health.

home environment: Includes the physical surroundings such as cleanliness and safe play areas, as well as parents providing children with stimulation and learning experiences and emotional warmth and interaction.

obesity: Marked degree of overweight, defined for population studies as a body mass index of 30 or over. See also **overweight**.

obesogenic environment: An environment that promotes obesity among individuals and populations. It includes physical, economic, political and sociocultural factors.

overweight: Defined for the purpose of population studies as a body mass index of 25 or over. See also **obesity**.

portion size: The amount of food eaten and might be more or less than the **serve size**.

remoteness classification: Each state and territory is divided into several regions, based on their relative accessibility to goods and services (such as to general practitioners, hospitals and specialist care) as measured by road distance. These regions are based on the Accessibility/Remoteness Index of Australia and defined as Remoteness Areas by either the Australian Standard Geographical Classification (before 2011) or the **Australian Statistical Geographical Standard (ASGS)** (from 2011 onwards) in each Census year. The 5 Remoteness Areas are *Major cities, Inner regional, Outer regional, Remote* and *Very remote*. See also **rural**.

rural: Geographic areas outside urban areas such as towns and cities. In this report, rural and remote encompasses all areas outside Australia's Major cities according to the **remoteness classification** of the **Australian Statistical Geographic Standard**. In many instances, the term 'rural and remote' is used interchangeably with the classification terms 'regional and remote'.

sedentary screen-based activities: Sedentary behaviours that involve the use of electronic media, such as watching television, playing video games, or using a computer.

serve size: A standardised amount of food that does not change, but depends on the type of food. It is used to quantify the recommendations outlined in the Australian Dietary Guidelines for different age groups.

Socio-Economic Indexes for Areas: A set of indexes, created from Census data, that aim to represent the **socioeconomic position** of Australian communities and identify areas of advantage and disadvantage. The index value reflects the overall or average level of disadvantage of the population of an area; it does not show how individuals living in the same area differ from each other in their socioeconomic group. This report uses the Index of Relative Socio-Economic Disadvantage.

socioeconomic position: An indication of how 'well off' a person or group is. In this report, socioeconomic areas are mostly reported using the **Socio-Economic Indexes for Areas**, typically for 5 groups (quintiles)—from the most disadvantaged (worst off or lowest socioeconomic area) to the least disadvantaged (best off or highest socioeconomic area).

References

- Abeysekera P, Turchi R & O'Neil M 2014. Obesity and children with special healthcare needs: special considerations for a special population. *Current Opinion in Pediatrics* 26(4):508–15.
- Abrams KM, Evans C & Duff BR 2015. Ignorance is bliss. How parents of preschool children make sense of front-of-package visuals and claims on food. *Appetite* 87:20–9.
- ABS (Australian Bureau of Statistics) 2014. Australian Health Survey: nutrition first results—foods and nutrients, 2011–12. ABS cat. no. 4364.0.55.007. Canberra: ABS.
- ABS 2017. Household Expenditure Survey, Australia: summary of results, 2015–16. ABS cat. no. 6530.0. Canberra: ABS.
- ABS 2019. National Health Survey: first results, 2017–18. ABS cat. no. 4364.0.55.001. Canberra: ABS.
- Active Healthy Kids Australia 2018. Muscular fitness: it's time for a jump start—the 2018 Active Healthy Kids Australia report card on physical activity for children and young people. Adelaide: Active Healthy Kids Australia.
- Adamson M & Blight EJ 2014. Bringing dads to the table: comparing mother and father reports of child behaviour and parenting at mealtimes. *Journal of Family Studies* 20(2):118–27.
- AIHW (Australian Institute of Health and Welfare) 2017. A picture of overweight and obesity in Australia. Cat. no. PHE 216. Canberra: AIHW.
- AIHW 2018a. Nutrition across the life stages. Cat. no. PHE 227. Canberra: AIHW.
- AIHW 2018b. Physical activity across the life stages. Cat. no. PHE 225. Canberra: AIHW.
- AIHW 2019a. Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015. Australian Burden of Disease Study series no. 19. Cat. no. BOD 22. Canberra: AIHW.
- AIHW 2019b. Health expenditure Australia 2017–18. Health and welfare expenditure series no.65. Cat. no. HWE 77. Canberra: AIHW.
- AIHW 2020a. Australia's children. Cat. no. CWS 69. Canberra: AIHW.
- AIHW 2020b. Australia's mothers and babies 2018—in brief. Cat. no. PER 108. Canberra: AIHW.
- AIHW 2020c. Overweight and obesity among Australian children and adolescents. Cat. no. PHE 274. Canberra: AIHW.
- AIHW 2020d. Overweight and obesity: an interactive insight. Cat. no. PHE 251. Canberra: AIHW.
- Al-Ani HH, Devi A, Eyles H, Swinburn B & Vandevijvere S 2016. Nutrition and health claims on healthy and less-healthy packaged food products in New Zealand. *British Journal of Nutrition* 116(6):1087–94.
- Albar SA, Alwan NA, Evans CE & Cade JE 2014. Is there an association between food portion size and BMI among British adolescents? *British Journal of Nutrition* 112(5):841–51.
- Allen SL, Howlett MD, Coulombe JA & Corkum PV 2016. ABCs of sleeping: a review of the evidence behind pediatric sleep practice recommendations. *Sleep Medicine Reviews* 29:1–14.
- Arvidsson L, Eiben G, Hunsberger M, De Bourdeaudhuij I, Molnar D, Jilani H et al. 2017. Bidirectional associations between psychosocial well-being and adherence to healthy dietary guidelines in European children: prospective findings from the IDEFICS study. *BMC Public Health* 17(1):926.
- Australian Government Department of Health 2019. Australian 24-hour Movement Guidelines for Children and Young People (5–17 years)—an integration of physical activity, sedentary behaviour and sleep. Canberra: DoH. Viewed 11 May 2020, www1.health.gov.au/internet/main/publishing.nsf/Content/health-24-hours-phys-act-guidelines.
- Australian Sports Commission 2017. Australian kids need active, sporty parents. Canberra: ASC. Viewed 5 November 2020, www.clearinghouseforsport.gov.au/__data/assets/pdf_file/0019/762130/34780_AusPlay_Factsheet_April_2017_accessible.pdf.
- Baldwin HJ, Freeman B & Kelly B 2018. Like and share: associations between social media engagement and dietary choices in children. *Public Health Nutrition* 21(17):3210–5.
- Banks E, Jorm L, Rogers K, Clements M & Bauman A 2011. Screen-time, obesity, ageing and disability: findings from 91,266 participants in the 45 and Up Study. *Public Health Nutrition* 14(1):34–43.

- Baskind MJ, Taveras EM, Gerber MW, Fiechtner L, Horan C & Sharifi M 2019. Parent-perceived stress and its association with children's weight and obesity-related behaviors. *Preventing Chronic Disease* 16:180368.
- Bell AC & Swinburn BA 2004. What are the key food groups to target for preventing obesity and improving nutrition in schools? *European Journal of Clinical Nutrition* 58(2):258–63.
- Berge JM, MacLehose RF, Larson N, Laska M & Neumark-Sztainer D 2016. Family food preparation and its effects on adolescent dietary quality and eating patterns. *Journal of Adolescent Health* 59(5):530–6.
- Birch LL, Fisher JO & Davison KK 2003. Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *The American Journal of Clinical Nutrition* 78(2):215–20.
- Black N, Hughes R & Jones AM 2018. The health care costs of childhood obesity in Australia: an instrumental variables approach. *Economics & Human Biology* 31:1–13.
- Boone JE, Gordon-Larsen P, Adair LS & Popkin BM 2007. Screen time and physical activity during adolescence: longitudinal effects on obesity in young adulthood. *International Journal of Behavioral Nutrition and Physical Activity* 4:26.
- Borrell LN, Graham L & Joseph SP 2016. Associations of neighborhood safety and neighborhood support with overweight and obesity in US children and adolescents. *Ethnicity & Disease* 26(4):469.
- Boyland EJ, Harrold JA, Kirkham TC, Corker C, Cuddy J, Evans D et al. 2011. Food commercials increase preference for energy-dense foods, particularly in children who watch more television. *Pediatrics* 128(1):e93–100.
- Boyland E, Whalen R, Christiansen P, McGale L, Duckworth JJ, Halford J et al. 2018. See it, want it, buy it, eat it: how food advertising is associated with unhealthy eating behaviours in 7–11 year old children. United Kingdom: Cancer Research UK.
- Brimblecombe J 2019. *Healthy stores 2020 reducing merchandising of discretionary food to improve health*. Melbourne: Monash University.
- Burns C 2004. A review of the literature describing the link between poverty, food insecurity and obesity with specific reference to Australia. Melbourne: VicHealth. 1–26.
- Butland B, Jebb S, Kopelman P, McPherson K, Thomas S, Mardell J & Parry V 2007. *Tackling obesity: future choices-project report 2nd edition*. London: Department of Innovation, Universities and Skills.
- Casado FC & Rundle-Thiele S 2015. Breaking it down: unpacking children's lunchboxes. *Young Consumers* 16(4):438–53.
- Central Office of Information 2009. *Communications and behaviour change*. London: COI.
- Chapman K, Kelly B, Bauman A, Innes-Hughes C & Allman-Farinelli M 2014. Trends in the cost of a healthy food basket and fruit and vegetable availability in New South Wales, Australia, between 2006 and 2009. *Nutrition and Dietetics* 71:117–26.
- Chen X, Beydoun MA & Wang Y 2008. Is sleep duration associated with childhood obesity? A systematic review and meta-analysis. *Obesity* 16(2):265–74.
- Chen Y, Haines J, Charlton BM & VanderWeele TJ 2019. Positive parenting improves multiple aspects of health and well-being in young adulthood. *Nature Human Behaviour* 3(7):684–91.
- Christian MS, Evans CE, Hancock N, Nykjaer C & Cade JE 2013. Family meals can help children reach their 5 a day: a cross-sectional survey of children's dietary intake from London primary schools. *Journal of Epidemiology Community Health* 67(4):332–8.
- Chu YL, Farmer A, Fung C, Kuhle S, Storey KE & Veugelers PJ 2013. Involvement in home meal preparation is associated with food preference and self-efficacy among Canadian children. *Public Health Nutrition* 16(1):108–12.
- Clearinghouse for Sport 2020. *AusPlay National data tables, July 2019 to June 2020*. Canberra: Clearinghouse for Sport. Viewed 21 May 2020, www.clearinghouseforsport.gov.au/research/ausplay/results#previous_data_releases.
- Clemens SL & Lincoln DJ 2018. Where children play most: physical activity levels of school children across four settings and policy implications. *Australian and New Zealand Journal of Public Health* 42(6):575–81.
- Coates AE, Hardman CA, Halford JC, Christiansen P & Boyland EJ 2019. Social media influencer marketing and children's food intake: a randomized trial. *Pediatrics* 143(4): e20182554.
- Commonwealth of Australia 2019. *About Health Star Ratings*. Canberra: Commonwealth of Australia. Viewed 15

- September 2020, www.healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/About-health-stars.
- Council on Community Pediatrics 2016. Poverty and child health in the United States. *Pediatrics* 137(4):e20160339.
- Crawford D, Cleland V, Timperio A, Salmon J, Andrianopoulos N, Roberts R et al. 2010. The longitudinal influence of home and neighbourhood environments on children's body mass index and physical activity over 5 years: the CLAN study. *International Journal of Obesity* 34(7):1177–87.
- Dallacker M, Hertwig R & Mata J 2018. The frequency of family meals and nutritional health in children: a meta-analysis. *Obesity Reviews* 2018(19):638–53.
- Daniels LA, Mallan KM, Battistutta D, Nicholson JM, Meedeniya JE, Bayer JK et al. 2014. Child eating behavior outcomes of an early feeding intervention to reduce risk indicators for child obesity: the NOURISH RCT. *Obesity* 22(5):e104–11.
- Daraganova G 2014. Body image of primary school children. In: *The Longitudinal Study of Australian Children annual statistical report 2013*. Melbourne: Australian Institute of Family Studies. 111–33.
- Davids EL, Roman NV & Leach L 2017. The link between parenting approaches and health behavior: a systematic review. *Journal of Human Behavior in the Social Environment* 27(6):589–608.
- Davison KK, Lawson HA & Coatsworth JD 2012. The family-centered action model of intervention layout and implementation (FAMILI) the example of childhood obesity. *Health Promotion Practice* 13(4):454–61.
- De Vet E, Stok FM, De Wit JBF & De Ridder DTD 2015. The habitual nature of unhealthy snacking: how powerful are habits in adolescence? *Appetite* 95:182–7.
- DeWalt DA & Hink A 2009. Health literacy and child health outcomes: a systematic review of the literature. *Pediatrics* 124(Supplement 3):S265–74.
- Di Nunzio J 2014. *Consumption patterns and food demand in Australia to 2050*. Nedlands: Future Directions International.
- Dixon H, Scully M, Wakefield M, Kelly B, Chapman K & Donovan R 2011. Parents' responses to nutrient claims and sports celebrity endorsements on energy-dense and nutrient-poor foods: an experimental study. *Public Health Nutrition* 14(6):1071–9.
- Drewnowski A & Darmon N 2005. The economics of obesity: dietary energy density and energy cost. *The American Journal of Clinical Nutrition* 82(1):265S–273S.
- Dutko P, Ver Ploeg M & Farrigan T 2012. *Characteristics and influential factors of food deserts*. Washington: United States Department of Agriculture.
- Egger G & Swinburn B 1997. An 'ecological' approach to the obesity pandemic. *British Medical Journal* 315(7106):477–80.
- Elliott CD 2012. Packaging fun: Analyzing supermarket food messages targeted at children. *Canadian Journal of Communication* 37(2):303–18.
- Elliott C 2019. Tracking kids' food: comparing the nutritional value and marketing appeals of child-targeted supermarket products over time. *Nutrients* 11(8):1850.
- Elliott C & Truman E 2020. The power of packaging: a scoping review and assessment of child-targeted food packaging. *Nutrients* 12(4):958.
- Elliott SA, Truby H, Lee A, Harper C, Abbott RA & Davies PS 2011. Associations of body mass index and waist circumference with: energy intake and percentage energy from macronutrients, in a cohort of Australian children. *Nutrition Journal* 10(1):58.
- Evans-Whipp T & Gasser C 2018. Are children and adolescents getting enough sleep? *Growing Up In Australia—The Longitudinal Study of Australian Children annual statistical report 2019*. Melbourne: Australian Institute of Family Studies.
- Farrand C & Santos J 2017. *Changes in salt levels in ready meals, Australia (2010–2017)*. Camperdown: The George Institute for Global Health.
- Fatima Y, Doi SAR & Mamun AA 2015. Longitudinal impact of sleep on overweight and obesity in children and adolescents: a systematic review and bias-adjusted meta-analysis. *Obesity Reviews* 16(2):137–49.
- Fisher JO & Birch LL 2002. Eating in the absence of hunger and overweight in girls from 5 to 7 years of age. *The American Journal of Clinical Nutrition* 76(1):226–31.

- Fitzsimons E & Pongiglione B 2019. The impact of maternal employment on children's weight: Evidence from the UK. *SSM-Population Health* 7:100333.
- Fleischhacker SE, Evenson KR, Rodriguez DA and Ammerman AS 2011. A systematic review of fast food access studies. *Obesity Reviews*, 12: e460–71. doi:10.1111/j.1467 789X.2010.00715.x
- Foodbank Australia 2019. Foodbank hunger report 2019. North Ryde: Foodbank Australia.
- Freire K, Pope R & Coyle J 2019. What are the drivers of cross-generational physical activity? Exploring the experiences of children and parents. *Journal of Public Health* 27(5):591–601.
- Friel S & Goldman S 2019. Addressing the social and commercial determinants of healthy weight: an evidence check rapid review. Queensland: Sax Institute.
- Fuller-Tyszkiewicz M, Skouteris H, Hardy LL & Halse C 2012. The associations between TV viewing, food intake, and BMI: a prospective analysis of data from the Longitudinal Study of Australian Children. *Appetite* 59(3):945–8.
- Gardner B, Lally P & Wardle J 2012. Making health habitual: the psychology of 'habit-formation' and general practice. *British Journal of General Practice* 664–66.
- Gibson AA & Partridge SR 2019. Nutritional qualities of commercial meal kit subscription services in Australia. *Nutrients* 11(11):2679.
- Gibson LY, Allen KL, Davis E, Blair E, Zubrick SR & Byrne SM 2017. The psychosocial burden of childhood overweight and obesity: evidence for persisting difficulties in boys and girls. *European Journal of Pediatrics* 176:925–33.
- Gregory JE, Paxton SJ & Brozovic AM 2010. Pressure to eat and restriction are associated with child eating behaviours and maternal concern about child weight, but not child body mass index, in 2-to 4-year-old children. *Appetite* 54(3):550–6.
- Guerrero AD, Chu L, Franke T & Kuo AA 2016. Father involvement in feeding interactions with their young children. *American Journal of Health Behavior* 40(2):221–30.
- Hafekost K, Boterhoven de Haan K, Lawrence D, Sawyer MG & Zubrick SR 2017. Validation of the adolescent self-esteem questionnaire: technical report. Perth: University of Western Australia.
- Haire-Joshu D & Tabak R. 2016. Preventing obesity across generations: evidence for early life intervention. *Annual Review of Public Health* 37:253–71.
- Halford JC, Boyland EJ, Hughes GM, Stacey L, McKean S & Dovey TM 2008. Beyond-brand effect of television food advertisements on food choice in children: the effects of weight status. *Public Health Nutrition* 11(9):897–904.
- Halliday JA Palma CL, Mellor D, Green J & Renzaho AMN 2014. The relationship between family functioning and child and adolescent overweight and obesity: a systematic review. *International Journal of Obesity* 38(4):480–93.
- Hammons AJ & Fiese BH 2011. Is frequency of shared family meals related to the nutritional health of children and adolescents? *Pediatrics* 127(6):e1565–74.
- Hardy LL, Foley B, Partridge SR, Kite J, Bauman A, Chau J et al. 2018. Frequent lunch purchases from NSW school canteens: a potential marker for children's eating habits? *Australian and New Zealand Journal of Public Health* 42(4):410–1.
- Harriger JA & Thompson JK 2012. Psychological consequences of obesity: weight bias and body image in overweight and obese youth. *International Review of Psychiatry* 24(3):247–53.
- Harris JL, Thompson JM, Schwartz MB & Brownell KD 2011. Nutrition-related claims on children's cereals: what do they mean to parents and do they influence willingness to buy? *Public Health Nutrition* 14(12):2207–12.
- Harter S 2012. *The construction of the self: developmental and sociocultural foundations*. New York: Guilford Publications.
- Hebden L, King L, Kelly B, Chapman K & Innes-Hughes C 2011. A menagerie of promotional characters: promoting food to children through food packaging. *Journal of Nutrition Education and Behavior* 43(5):349–55.
- Hendrie GA, Coveney H & Cox DN 2011. Defining the complexity of childhood obesity and related behaviours within the family environment using structural equation modelling. *Public Health Nutrition* 15(1):48–57.
- Hnatiuk JA, Hesketh KR & van Sluijs EM 2016. Correlates of home and neighbourhood-based physical activity in UK 3–4-year-old children. *The European Journal of Public Health* 26(6):947–53.

- Hogan, L 2018. Food demand in Australia: trends and issues 2018. Canberra: Australian Bureau of Agricultural and Resource Economics and Sciences.
- Jago R, Davison KK, Thompson JL, Page AS, Brockman R & Fox KR 2011. Parental sedentary restriction, maternal parenting style, and television viewing among 10- to 11 year olds. *Pediatrics* 128(3):e572–8.
- Jansen E, Mulkens S, Emond Y & Jansen A 2008. From the Garden of Eden to the land of plenty: restriction of fruit and sweets intake leads to increased fruit and sweets consumption in children. *Appetite* 51(3):570–5.
- Jia P, Xue H, Cheng X, Wang Y & Wang Y 2019. Association of neighborhood built environments with childhood obesity: evidence from a 9-year longitudinal, nationally representative survey in the US. *Environment international* 128:158–64.
- Johnson SL, Hughes SO, Cui X, Li X, Allison DB, Liu Y et al. 2014. Portion sizes for children are predicted by parental characteristics and the amounts parents serve themselves. *The American Journal of Clinical Nutrition* 99(4):763–70.
- Kelly B, Hardy LL, Howlett S, King L, Farrell L & Hattersley L 2010. Opening up Australian preschoolers' lunchboxes. *Australian and New Zealand Journal of Public Health* 34(3):288–92.
- Langer SL, Crain AL, Senso MM, Levy RL & Sherwood NE 2014. Predicting child physical activity and screen time: parental support for physical activity and general parenting styles. *Journal of Pediatric Psychology* 39(6):633–42.
- Larqué E, Labayen I, Flodmark C, Lissau I, Czernin S, Moreno LA et al. 2019. From conception to infancy - early risk factors for childhood obesity. *Nature Reviews Endocrinology* 15(8):456–78.
- Lauricella AR, Wartella E & Rideout VJ 2015. Young children's screen time: The complex role of parent and child factors. *Journal of Applied Developmental Psychology* 36:11–7.
- Lawrence D, Johnson S, Hafekost J, Boterhoven De Haan K, Sawyer M et al. 2015. The mental health of children and adolescents: report on the second Australian Child and Adolescent Survey of Mental Health and Wellbeing. Canberra: Australian Government Department of Health.
- Lee AJ, Kane S, Ramsey R, Good E & Dick M 2016. Testing the price and affordability of healthy and current (unhealthy) diets and the potential impacts of policy change in Australia. *BioMed Central Public Health* 16(1):315.
- Lee EY, Hesketh KD, Rhodes RE, Rinaldi CM, Spence JC & Carson V 2018. Role of parental and environmental characteristics in toddlers' physical activity and screen time: Bayesian analysis of structural equation models. *International Journal of Behavioral Nutrition and Physical Activity* 15(1):17.
- Leidy HJ 2013. The benefits of breakfast consumption to combat obesity and diabetes in young people. *American Journal of Lifestyle Medicine* 7(2):99–103.
- Lewis M & Lee A 2016. Costing 'healthy' food baskets in Australia – a systematic review of food price and affordability monitoring tools, protocols and methods. *Public Health Nutrition* 19(16):2872–86.
- Li L, Zhang S, Huang Y & Chen K 2017. Sleep duration and obesity in children: a systematic review and meta-analysis of prospective cohort studies. *Journal of Paediatrics and Child Health* 53(4):378–85.
- Litterbach EV, Campbell KJ & Spence AC 2017. Family meals with young children: an online study of family mealtime characteristics, among Australian families with children aged six months to six years. *BioMed Central Public Health* 17(1):111.
- Lockeridge A, Innes-Hughes C, O'Hara BJ, McGill B & Rissel C 2015. Munch and Move: evidence and evaluation summary. Sydney: NSW Ministry of Health.
- Lundqvist M, Vogel NE & Levin LÅ 2019. Effects of eating breakfast on children and adolescents: a systematic review of potentially relevant outcomes in economic evaluations. *Food & Nutrition Research* 63:1618.
- Mackay S, Vandevijvere S, Xie P, Lee A & Swinburn B 2017. Paying for convenience: comparing the cost of takeaway meals with their healthier home-cooked counterparts in New Zealand. *Public Health Nutrition* 20(13):2269–76.
- Mah SK, Nettlefold L, Macdonald HM, Winters M, Race D, Voss C et al. 2017. Does parental support influence children's active school travel? *Preventive Medicine Reports* 6:346–51.
- Maher C, Olds TS, Eisenmann JC & Dollman J 2012. Screen time is more strongly associated than physical activity with overweight and obesity in 9-to 16-year-old Australians. *Acta Paediatrica* 101(11):1170–4.
- Marchant G, Chevance G & Boiche J 2016. Intention and automaticity toward physical and sedentary screen-based leisure activities in adolescents: a profile perspective. *Journal of Sport and Health Science* 7(4):481–8.

- Martin LT, Ruder T, Escarce JJ, Ghosh-Dastidar B, Sherman D, Elliott M et al. 2009. Developing predictive models of health literacy. *Journal of General Internal Medicine* 24(11):1211–16.
- Matricciani L, Paquet C, Galland B, Short M & Olds T 2019. Children’s sleep and health: a meta review. *Sleep Medicine Reviews* 46:136–50.
- McGale LS, Halford JCG, Harrold JA & Boyland EJ 2016. The influence of brand equity characters on children’s food preferences and choices. *The Journal of Pediatrics* 177:33–8.
- McMinn AM, Griffin SJ, Jones AP & van Sluijs EM 2013. Family and home influences on children’s after-school and weekend physical activity. *The European Journal of Public Health* 23(5):805–10.
- Mehta K, Phillips C, Ward P, Coveney J, Handsley E & Carter P 2012. Marketing foods to children through product packaging: prolific, unhealthy and misleading. *Public Health Nutrition* 15(9):1763–70.
- Metcalfe JJ, Fiese BH & the STRONG Kids 1 Research Team 2018. Family food involvement is related to healthier dietary intake in preschool-aged children. *Appetite* 126:195–200.
- Miguel-Berges ML, Santaliestra-Pasias AM, Mouratidou T, Miguel-Etayo D, Androutsos O, De Craemer M et al. 2019. Combined longitudinal effect of physical activity and screen time on food and beverage consumption in European preschool children: the ToyBox Study. *Nutrients* 11(5):1048.
- Mihrshahi S, Drayton BA, Bauman AE & Hardy LL 2018a. Associations between childhood overweight, obesity, abdominal obesity and obesogenic behaviors and practices in Australian homes. *BioMed Central Public Health* 18(1):44.
- Mihrshahi S, Gow M & Baur L 2018b. Contemporary approaches to the prevention and management of paediatric obesity: an Australian focus. *Medical Journal of Australia* 209(6):267–74.
- Miller AL, Dawson L & Welker E 2017. *Stress in early life and childhood obesity risk*. Durham: Healthy Eating Research.
- Miller SA, Taveras EM, Rifas-Shiman SL & Gillman MW 2008. Association between television viewing and poor diet quality in young children. *International Journal of Pediatric Obesity* 3(3):168–76.
- Min J, Xue H & Wang Y 2018. Association between household poverty dynamics and childhood overweight risk and health behaviours in the United States: a 8-year nationally representative longitudinal study of 16,800 children. *Pediatric Obesity* 13(10):590–97.
- Mindell JA, Li AM, Sadeh A, Kwon R & Goh DY 2015. Bedtime routines for young children: a dose-dependent association with sleep outcomes. *Sleep* 38(5):717–22.
- Mindlin M, Jenkins R & Law C 2009. Maternal employment and indicators of child health: a systematic review in pre-school children in OECD countries. *Journal of Epidemiology & Community Health* 63(5):340–50.
- Monteiro CA, Moubarac JC, Cannon G, Ng SW & Popkin B 2013. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews* 14(S2):21–8.
- Moore TG, Arefadib N, Deery A, Keyes M & West S 2017. *The first thousand days: an evidence paper: summary*. Parkville: Murdoch Children’s Research Institute.
- Moss KM, Dobson AJ, Edwards KL, Hesketh KD, Chang YT & Mishra GD 2019. Not all play equipment is created equal: associations between equipment at home and children’s physical activity. *Journal of Physical Activity and Health* 16(11):945–51.
- Neal DT, Wood W & Quinn JM 2006. Habits—a repeat performance. *Current Directions in Psychological Science* 15(4):198–202.
- NHMRC (National Health and Medical Research Council) 2012. *Infant feeding guidelines information for health workers*. Canberra: NHMRC.
- NHMRC 2013. *Australian Dietary Guidelines*. Canberra: NHMRC.
- Nicholls L, Lewis AJ, Petersen S, Swinburn B, Moodie M & Millar L 2014. Parental encouragement of healthy behaviors: adolescent weight status and health-related quality of life. *BioMed Central Public Health* 14(1):369.
- Norman J, Kelly B, McMahon AT, Boyland E, Baur LA, Chapman K et al. 2018. Sustained impact of energy-dense TV and online food advertising on children’s dietary intake: a within subject, randomised, crossover, counter-balanced trial. *International Journal of Behavioral Nutrition and Physical Activity* 15(1):37.

- NSW Ministry of Health 2017. What NSW children eat and drink. Report of the Chief Health Officer 2017. Sydney: NSW Ministry of Health.
- Nwankwo F, Shin HD, Al-Habaibeh A & Massoud H 2019. Evaluation of children's screen viewing time and parental role in household context. *Global Pediatric Health* 6:1–11.
- O'Connor TM, Hughes SO, Watson KB, Baranowski T, Nicklas TA, Fisher JO et al. 2010. Parenting practices are associated with fruit and vegetable consumption in pre-school children. *Public Health Nutrition* 13(1):91–101.
- OECD (Organisation for Economic Co-operation and Development) 2019. The heavy burden of overweight and obesity: the economics of prevention. Paris: OECD Health Policy Studies.
- Okely A, Olds T, Jones R, Cliff D, Parrish AM, Loughran S et al. 2019. Australian 24-hour Movement Guidelines for Children (5–12 years) and Young People (13–17 years): an integration of physical activity, sedentary behaviour, and sleep. Canberra: Australian Government Department of Health.
- Olds T, Blunden S, Dollman J & Maher CA 2010. Day type and the relationship between weight status and sleep duration in children and adolescents. *Australian and New Zealand Journal of Public Health* 34(2):165–71.
- Orth U 2018. The family environment in early childhood has a long-term effect on self esteem: a longitudinal study from birth to age 27 years. *Journal of Personality and Social Psychology* 114(4):637.
- Østbye T, Malhotra R, Stroo M, Lovelady C, Brouwer R, Zucker N et al. 2013. The effect of the home environment on physical activity and dietary intake in preschool children. *International Journal of Obesity* 37(10):1314–21.
- Palfreyman Z, Haycraft E & Meyer C 2014. Development of the Parental Modelling of Eating Behaviours Scale (PARM): links with food intake among children and their mothers. *Maternal & Child Nutrition* 10(4): 617–29.
- Parliament of Australia 2018. Final report of the Senate Select Committee into the Obesity Epidemic in Australia. Canberra: Commonwealth of Australia.
- Pearson N & Biddle SJ 2011. Sedentary behavior and dietary intake in children, adolescents, and adults: a systematic review. *American Journal of Preventive Medicine* 41(2):178–88.
- Pearson N, Biddle SJ, Williams L, Worsley A, Crawford D & Ball K 2014. Adolescent television viewing and unhealthy snack food consumption: the mediating role of home availability of unhealthy snack foods. *Public Health Nutrition* 17(2):317–23.
- Pesch MH, Appugliese DP, Kaciroti N, Rosenblum KL, Miller AL & Lumeng JC 2016. Maternal encouragement and discouragement: differences by food type and child weight status. *Appetite* 101:15–22.
- Plachta-Danielzik S, Landsberg B, Bösy-Westphal A, Johannsen M, Lange D & Müller MJ 2008. Energy gain and energy gap in normal-weight children: Longitudinal data of the KOPS. *Obesity* 16(4):777–83.
- Powell LM & Nguyen BT 2013. Fast-food and full-service restaurant consumption among children and adolescents: effect on energy, beverage, and nutrient intake. *JAMA Pediatrics* 167(1):14–20.
- PwC Australia 2015. Weighing the cost of obesity: a case for action. Sydney: PwC Australia.
- Pyper E, Harrington D & Manson H 2017. Do parents' support behaviours predict whether or not their children get sufficient sleep? A cross-sectional study. *BMC Public Health* 17(1):432.
- Queensland Health and Queensland Treasury 2012. The 2010 Healthy Food Access Basket (HFAB) Survey. Brisbane: Queensland Government.
- Reale S, Marr C, Cecil JE, Hetherington MM & Caton SJ 2019a. Maternal decisions on portion size and portion control strategies for snacks in preschool children. *Nutrients* 11(12):3009.
- Reale S, Simpson RM, Marr C, Carstairs SA, Cecil JE, Hetherington MM et al. 2019b. Snack portion sizes for preschool children are predicted by caregiver portion size, caregiver feeding practices and children's eating traits. *Nutrients* 11(12):3020.
- Reicks M, Banna J, Cluskey M, Gunther C, Hongu N, Richards R et al. 2015. Influence of parenting practices on eating behaviors of early adolescents during independent eating occasions: implications for obesity prevention. *Nutrients* 7(10):8783–801.
- Rhodes A 2015. What the public thinks: top ten child health problems. Melbourne: The Royal Children's Hospital. Viewed 1 September 2020, www.rchpoll.org.au/wp-content/uploads/2015/12/ACHP_Detailed-report_Dec2015-poll-1.pdf.
- Rodgers RF, Paxton SJ, Massey R, Campbell KJ, Wertheim EH, Skouteris H et al. 2013. Maternal feeding practices predict weight gain and obesogenic eating behaviors in young children: a prospective study. *International Journal of Behavioral Nutrition and Physical Activity* 10(1):24.

- Rollins BY, Loken E, Savage JS & Birch LL 2014. Maternal controlling feeding practices and girls' inhibitory control interact to predict changes in BMI and eating in the absence of hunger from 5 to 7 years. *The American Journal of Clinical Nutrition* 99(2):249–57.
- Rose D, Bodor JN, Swalm CM, Rice JC, Farley TA & Hutchinson PL 2009. *Deserts in New Orleans? Illustrations of urban food access and implications for policy*. Louisiana: School of Public Health and Tropical Medicine.
- Russell CG, Burke PF, Waller DS & Wei E 2017. The impact of front-of-pack marketing attributes versus nutrition and health information on parents' food choices. *Appetite* 116:323–38.
- Russell CG, Haszard JJ, Taylor RW, Heath ALM, Taylor B & Campbell KJ 2018. Parental feeding practices associated with children's eating and weight: What are parents of toddlers and preschool children doing?. *Appetite* 128:120–8.
- Russell SJ, Croker H & Viner RM 2019. The effect of screen advertising on children's dietary intake: a systematic review and meta-analysis. *Obesity Reviews* 20(4):554–68.
- Russell-Mayhew S, McVey G, Bardick A & Ireland A 2012. Mental health, wellness, and childhood overweight/obesity. *Journal of Obesity* 2012: 281801.
- Sacks G, Looi E, Cameron A, Backholer K, Strugnell C, Tran et al. 2019. Population-level strategies to support healthy weight: an evidence check rapid review. Sydney: Sax Institute.
- Salmon J, Tremblay MS, Marshall SJ & Hume C 2011. Health risks, correlates, and interventions to reduce sedentary behavior in young people. *American Journal of Preventive Medicine* 41(2):197–206.
- Sanders W, Parent J, Forehand R & Breslend NL 2016. The roles of general and technology-related parenting in managing youth screen time. *Journal of Family Psychology* 30(5):641–6.
- Sanigorski AM, Bell AC, Kremer PJ & Swinburn BA 2005. Lunchbox contents of Australian school children: room for improvement. *European Journal of Clinical Nutrition* 59(11):1310–6.
- Sarmiento OL, Lemoine P, Gonzalez SA, Broyles ST, Denstel KD, Larouche R et al. 2015. Relationships between active school transport and adiposity indicators in school-age children from low-, middle-and high-income countries. *International Journal of Obesity Supplements* 5(2):S107–14.
- Scaglioni S, De Cosm V, Ciappolino V, Parazzini F, Brambilla P & Agostoni C 2018. Factors influencing children's eating behaviours. *Nutrients* 10(6):706.
- Schalkwijk AA, van der Zwaard BC, Nijpels G, Elders PJ & Platt L 2018. The impact of greenspace and condition of the neighbourhood on child overweight. *The European Journal of Public Health* 28(1):88–94.
- Schranz N, Glennon V, Evans J, Gomersall S, Hardy L, Hesketh KD et al. 2018. Results from Australia's 2018 report card on physical activity for children and youth. *Journal of Physical Activity and Health* 15(s2):S315–7.
- Scully M, Wakefield M, Niven P, Chapman K, Crawford D, Pratt IS et al. 2012. Association between food marketing exposure and adolescents' food choices and eating behaviors. *Appetite* 58(1):1–5.
- Shakir RN, Coates AM, Olds T, Rowlands A & Tsiros MD 2018. Not all sedentary behaviour is equal: Children's adiposity and sedentary behaviour volumes, patterns and types. *Obesity Research & Clinical Practice* 12(6):506–12.
- Shang L, Wang J, O'Loughlin J, Tremblay A, Mathieu MÈ, Henderson M et al. 2015. Screen time is associated with dietary intake in overweight Canadian children. *Preventive Medicine Reports* 2:265–9.
- Sikorski C, Luppá M, Luck, T & Riedel-Heller SG 2015. Weight stigma 'gets under the skin'—Evidence for an adapted psychological mediation framework: a systematic review. *Obesity* 23:266–76.
- Silventoinen K, Rokholm B, Kaprio J & Sørensen TIA 2010. The genetic and environmental influences on childhood obesity: a systematic review of twin and adoption studies. *International Journal of Obesity* 34:29–40.
- Smith BJ, Grunseit A, Hardy LL, King L, Wolfenden L & Milat A 2010. Parental influences on child physical activity and screen viewing time: a population based study. *BioMed Central Public Health* 10(1):593.
- Smithers LG, Haag DG, Agnew B, Lynch J & Sorell M 2018. Food advertising on Australian television: Frequency, duration and monthly pattern of advertising from a commercial network (four channels) for the entire 2016. *Journal of Paediatrics and Child Health* 54(9):962–7.

- Swinburn B, Egger G & Raza F 1999. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine* 29(6):563–70.
- Syrad H, Llewellyn CH, Johnson L, Boniface D, Jebb SA, Van Jaarsveld et al. 2016. Meal size is a critical driver of weight gain in early childhood. *Scientific Reports* 6(1):1–7.
- Tambalis KD, Panagiotakos DB, Psarra G & Sidossis LS 2018. Insufficient sleep duration is associated with dietary habits, screen time, and obesity in children. *Journal of Clinical Sleep Medicine* 14(10):1689–96.
- Tan CC & Holub SC 2011. Children's self-regulation in eating: associations with inhibitory control and parents' feeding behavior. *Journal of Pediatric Psychology* 36(3):340–5.
- Tate EB, Wood W, Liao Y & Dunton GF 2015. Do stressed mothers have heavier children? A meta-analysis on the relationship between maternal stress and child body mass index. *Obesity Reviews* 16(5):351–61.
- Ternouth A, Collier D & Maughan, B 2009. Childhood emotional problems and self perceptions predict weight gain in a longitudinal regression model. *BMC medicine* 7(1):46.
- The George Institute for Global Health 2019. Salt levels in children's meal from four major fast food retailers, 2019. Camperdown: The George Institute for Global Health.
- The Obesity Policy Coalition 2017. Tipping the scales: Australian obesity prevention consensus: Melbourne: The Obesity Policy Coalition.
- The Sax Institute 2019. Evidence brief: how can Australia tackle the obesity epidemic? Sydney: The Sax Institute.
- Thornton LE, Lamb KE & Ball K 2016. Fast food restaurant locations according to socioeconomic disadvantage, urban–regional locality, and schools within Victoria, Australia. *SSM-Population Health* 2:1–9.
- Timlin MT, Pereira MA, Story M & Neumark-Sztainer D 2008. Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project EAT (Eating Among Teens). *Pediatrics* 121(3):6338–45.
- Timperio A, Jeffery RW, Crawford D, Roberts R, Giles-Corti B & Ball K 2010. Neighbourhood physical activity environments and adiposity in children and mothers: a three-year longitudinal study. *International Journal of Behavioral Nutrition and Physical Activity* 7(1):18.
- Tong T, Rangan A & Gemming L 2018. Evaluating the nutritional content of children's breakfast cereals in Australia. *Children* 5(7):84.
- Vaughn AE, Martin CL & Ward DS 2018. What matters most—what parents model or what parents eat? *Appetite* 126:102–7.
- Verplanken B & Wood W 2006. Interventions to break and create consumer habits. *American Marketing Association* 25(1):90–103.
- Victoria CG, Bahl R, Barros AJ, França GV, Horton S, Krusevec J et al. 2016. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet* 387(10017):475–90.
- Viner R, Davie M & Firth A 2019. The health impacts of screen time: a guide for clinicians and parents. Scotland: Royal College of Paediatrics and Child Health.
- Vollmer RL 2014. The forgotten parent: exploring paternal influences on young children's eating behaviors, diet quality, physical activity, and body weight. Doctoral dissertations 349. Viewed 1 September 2020, <https://opencommons.uconn.edu/dissertations/349/>.
- Wall MM, Mason SM, Liu J, Olfson M, Neumark-Sztainer D & Blanco C 2019. Childhood psychosocial challenges and risk for obesity in US men and women. *Translational Psychiatry* 9(1):1–12.
- Ward PR, Verity F, Carter P, Tsourtos G, Coveney J & Wong KC 2013. Food stress in Adelaide: the relationship between low income and the affordability of healthy food. *Journal of Environmental and Public Health* 2013: 968078.
- Webb HJ, Zimmer-Gembeck MJ, Scuffham PA, Scott R & Barber B 2018. Family stress predicts poorer dietary quality in children: examining the role of the parent–child relationship. *Infant and Child Development* 27(4):e2088.
- Webster JL, Dunford EK & Neal BC 2010. A systematic survey of the sodium contents of processed foods. *The American Journal of Clinical Nutrition* 91(2):413–20.
- Whelan J, Millar L, Bell C, Russell C, Grainger F, Allender S et al. 2018. You can't find healthy food in the bush: poor accessibility, availability and adequacy of food in rural Australia. *International Journal of Environmental Research and Public Health* 15(10):2316.

- WHO (World Health Organization) 2013. Global action plan for the prevention and control of noncommunicable diseases 2013–2020. Geneva: WHO.
- WHO 2016. Report of the commission on ending childhood obesity. Geneva: WHO.
- WHO 2018. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: WHO.
- Wilcox BL, Kunkel D, Cantor J, Palmer E, Linn S & Dowrick P 2004. Report of the APA task force on advertising and children. *American Psychological Association* 30:60.
- Woo Baidal JA, Locks LM, Cheng ER, Blake-Lamb TL, Perkins ME & Taveras EM 2016. Risk factors for childhood obesity in the first 1,000 days: a systematic review. *American Journal of Preventive Medicine* 50(6): 761–79.
- Wood M & Shukla P 2019. Resilience, parenting style, and children’s eating behavior. *Social Marketing Quarterly* 25(2):123–36.
- Wu S, Ding Y, Wu F, Li R, Hu Y, Hou J et al. 2015. Socio-economic position as an intervention against overweight and obesity in children: a systematic review and meta analysis. *Scientific Reports* 5:11354.
- Wu X, Kirk SF, Ohinmaa A & Veugelers P 2016. Health behaviours, body weight and self esteem among grade five students in Canada. *SpringerPlus* 5(1):1099.
- Yan J, Liu L, Zhu Y, Huang G & Wang PP 2014. The association between breastfeeding and childhood obesity: a meta-analysis. *BioMed Central Public Health* 14(1):1267.
- Yang J, Bakshi A, Zhu Z, Hemani G, Vinkhuyzen AA, Lee SH et al. 2015. Genetic variance estimation with imputed variants finds negligible missing heritability for human height and body mass index. *Nature Genetics* 47:1114–20.
- Yao CA & Rhodes RE 2015. Parental correlates in child and adolescent physical activity: a meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity* 12(1):10.
- Yu M & Baxter 2016. Australian children’s screen time and participation in extracurricular activities. In: *Growing Up In Australia—The Longitudinal Study of Australian Children annual statistical report 2015*. Melbourne: Australian Institute of Family Studies. 99–125.
- Zecevic CA, Tremblay L, Lovsin T & Michel L 2010. Parental influence on young children’s physical activity. *International Journal of Pediatrics* 2010:1–9.
- Zhang G, Wu L, Zhou L, Lu W & Mao C 2016. Television watching and risk of childhood obesity: a meta-analysis. *The European Journal of Public Health* 26(1):13–18.
- Zlatevska N, Dubelaar C & Holen SS 2014. Sizing up the effect of portion size on consumption: a meta-analytic review. *Journal of Marketing* 78(3):140–54.


List of boxes

Box 1:	How many mothers are affected by risk factors for childhood overweight and obesity during pregnancy?	7
Box 2:	How many children are breastfed in Australia?.....	7
Box 3:	Are children meeting the physical activity component of the guidelines?	11
Box 4:	Are children meeting the sedentary screen-based behaviours guidelines?	13
Box 5:	How many children are getting inadequate sleep?	13
Box 6:	How many children in Australia have a disability?	14
Box 7:	How many Australian children report indicators of low self-esteem and mental health conditions?	15
Box 8:	How many Australian families eat meals together?	17
Box 9:	How often do Australian families eat convenience or discretionary foods?	18
Box 10:	How much does the average Australian family with children spend weekly on groceries? ...	19
Box 11:	How often are children exposed to food advertising?	21
Box 12:	How many children are overweight or obese in low socioeconomic areas or rural and remote areas?	22
Box 13:	How many children live in areas that support physical activity?.....	22
Box 14:	What stressors do some families experience?.....	24

Related publications

The following AIHW publications relating to overweight and obesity might also be of interest:

- AIHW 2020. A framework for monitoring overweight and obesity in Australia. Cat. no. PHE 272. Canberra: AIHW.
- AIHW 2020. Overweight and obesity among Australian children and adolescents. Cat. no. PHE 274. Canberra: AIHW.
- AIHW 2020. Overweight and obesity in Australia: an updated birth cohort analysis. Cat. no. PHE 268. Canberra: AIHW.
- AIHW 2020. Overweight and obesity: an interactive insight. Cat. no. PHE 251. Canberra: AIHW.
- AIHW 2019. Data sources for monitoring overweight and obesity in Australia. Cat. no. PHE 244. Canberra: AIHW.
- AIHW 2017. A picture of overweight and obesity in Australia 2017. Cat. no. PHE 216. Canberra: AIHW.



Many factors influence childhood overweight and obesity. They include individual and family factors in the home environment—where a child lives and grows—as well as the broader community and society. Parenting practices, styles and modelling of behaviour influence their children’s dietary intake, movement and health behaviours. This report looks at how nutrition, movement, psychological health, surrounding environmental factors and socioeconomic factors influence childhood overweight and obesity within the home environment.

aihw.gov.au



Stronger evidence,
better decisions,
improved health and welfare

