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Contents

Summary

Overweight and obesity are major public health issues in Australia, associated with significant risk for chronic disease, and large costs for the health system. It is important to monitor overweight and obesity to describe existing health patterns, populations at risk, current health service use, and future demands on the health and welfare system.

This report assesses the potential for existing data sources to improve our understanding of overweight and obesity. Although many of the data sources identified were not designed primarily for monitoring overweight and obesity, they do contain relevant data.

This report acknowledges:

- Data are available for:
  - behavioural risk factors
  - prevalence of overweight and obesity.
- Data are available but require further development for:
  - prevention, treatment and management activities for overweight and obesity, particularly to fill substantial gaps in relation to early intervention and prevention activity and care provided in primary health-care settings
  - death and disability associated with overweight and obesity, noting additional information is expected in 2019 from new Australian estimates of burden of disease
  - quality of life associated with overweight and obesity
  - health expenditure associated with overweight and obesity.
- Future opportunities for improving data include:
  - data linkage to enhance the information that can be gained using existing data
  - enhancing primary health-care data
  - access to complementary novel data sources
  - surveys specific for people who are overweight or obese to; for example, to track their pathways across the health system and impacts on quality of life, and/or specific questions on overweight and obesity in existing surveys.

A 4-step process has been used to assess the utility of different data sources, including an initial stocktake, a review of in-scope data sources, an assessment of individual data sources and lastly an overall assessment. This methodological approach has been adapted from *Data sources for monitoring arthritis and other musculoskeletal conditions* (AIHW 2014).

1 Introduction

The purpose of this report is to assess the potential for existing data sources to improve our understanding of overweight and obesity in Australia through monitoring. It intends to assess the selected data sources' utility to provide relevant information across key areas for monitoring rather than make value judgements about the data sources.

Overweight and obesity are currently areas of great interest in Australian public health. In order to support public health interventions, such as the upcoming Department of Health Obesity Strategy (COAG HC 2018), it is important to assess the quality of the data available to monitor overweight and obesity. Many data sources exist that could potentially be used to improve understanding of overweight and obesity. However, as many of these data sources were not designed primarily for overweight and obesity monitoring, this report examines their utility in providing relevant information on key areas of interest, such as risk factors, prevalence, prevention, management and treatment, impact (including quality of life, death and disability) and cost. Additionally, in the context of the assessment of available data sources, this report will explore opportunities for future data development.

1.1 Why monitoring overweight and obesity is important

Monitoring chronic conditions and risk factors to health is important for understanding the health of the population and the quality of health services. Data collected through surveys, registries and administrative sources can be used to monitor existing and emerging health patterns, population groups at risk of ill health, current health service use and future demand on the health system.

Monitoring assists with allocating resources, planning preventative and treatment services and with targeting priority population groups. It also assists with tracking the impact of risk factors, trends in health issues over time, improvements in diagnosis, health promotion, informing development of new policies and programs and evaluating their impact.

More regular and extensive monitoring of overweight and obesity, and of contributing risk factors (both behavioural, genetic and environmental), are required to add to a greater understanding of the impact that overweight and obesity is having on individuals and society.

Monitoring overweight and obesity is important because of the:

- high prevalence in the population
- role that overweight and obesity plays in contributing to chronic disease
- impact on the health and quality of life of people affected by overweight and obesity
- cost burden on the health system.

Prevalence

National data from the Australian Bureau of Statistics 2014–15 National Health Survey—based on measured height and weight—show that nearly two-thirds (63%) of Australian adults and one quarter (27%) of children and adolescents are overweight or obese. The average waist circumference is 97.5 cm for men and 87.5 cm for women (ABS 2015), both of which are considerably higher than the World Health Organization (WHO) cut-points for increased chronic disease risk of 94 cm for men and 80 cm for women (WHO 2011).

The prevalence of overweight and obesity has increased from the mid-1990s, from 56% in 1995 to 63% in 2014–15 for adults, and 21% to 27% for children. Overweight and obesity are more common in adults, but can occur throughout the life course, with 1 in 5 (20%) children aged 2–4 overweight or obese in 2015. Between 1995 and 2014–15 the age-standardised prevalence of severe obesity (body mass index (BMI) of 35 kg/m^2 or above) has almost doubled (AIHW 2018).

The prevalence of overweight and obesity varies across population groups. After adjusting for differences in age structure between populations:

- Aboriginal and Torres Strait Islander people aged 15 and over are 1.2 times as likely as non-Indigenous Australians to be overweight or obese and 1.6 times as likely to be obese (ABS 2014).
- Among adults aged 18 or over, compared with people in *Major cities,* people in *Outer regional* and *Remote* areas have a higher prevalence of overweight and obesity (61% and 68%, respectively) (AIHW 2018).
- Among the population aged 2 and over, compared with people living in the highest socioeconomic areas, people living in lowest socioeconomic areas have higher rates of overweight and obesity (58% and 66%, respectively) (AIHW 2016a).

According to the Organisation for Economic Co-operation and Development (OECD), Australia ranks fifth highest among all OECD countries for obesity behind the United States, Mexico, New Zealand and Hungary (OECD 2017b). The prevalence of obesity in Australia is well above the average for all OECD countries (OECD 2017a).

Quality of life, physical functioning and disability

Over the long term, overweight and obesity have a substantial impact on health and quality of life. The impact of high BMI on quality of life start early in the life course. Children who are affected by overweight or obesity are at risk of a range of health conditions, including breathing difficulties, fracture and numerous chronic conditions, and are more likely to remain overweight or obese into adulthood (Sahoo et al. 2015; WHO 2016). Psychosocial functioning and mental health have also been found to be adversely affected by overweight and obesity in children, who may experience weight biases, bullying and distress associated with their body weight (Russell-Mayhew et al. 2012). Being overweight or obese as an adult further increases the likelihood of developing a number of chronic conditions that impact physical functioning and quality of life, including cardiovascular disease, asthma, back pain and other back problems, chronic kidney disease, dementia, diabetes, gallbladder disease and gout. People who are overweight or obese are also more likely to experience social isolation, stigma, and mental and behavioural problems than are people of normal weight (ABS 2015; AIHW 2018; Rogge et al. 2004; Strauss & Pollack 2003).

Overweight and obesity can also contribute to the development of disabilities. There is a higher incidence of musculoskeletal disorders in people who are overweight or obese and they also experience impairments in spine flexibility, range of movement limitations, reduced muscle strength and impaired respiratory capacity (Capodaglio et al. 2010). In addition, people experience increased difficulty with performing everyday tasks with increasing BMI, including bathing, dressing, walking 200–300 metres and other self-care activities (VicHealth 2014).

Cost to the health system

Overweight and obesity are conditions that can be experienced throughout the life-course and can lead to the development of complex chronic conditions that require ongoing treatment and

management. This, in turn, places a large cost burden on the health-care system, the individual, families and carers.

Direct financial costs to the health system can include higher health-care costs, and higher demand on health-care services, such as those provided by general practitioners (GPs), specialists, and allied health professionals, and pharmaceuticals. Indirect costs can include productivity losses, carer costs, government payments for people living with an illness, injury or disability and forgone taxation revenue.

In 2014–15, more than 124,000 procedures related to weight-loss surgery were billed to Medicare—in public and private hospitals, and in non-hospital settings. The total costs for these Medicare-billed procedures were about $62.8 million, with about $25.7 million in benefits paid by Medicare, and about $37.1 million paid in out-of-pocket costs by patients and/or private health insurers (AIHW 2017b). This doesn't include a small amount of procedures undertaken on public patients in public hospitals, which were funded by the health service budget, or other hospital or public authorities (AIHW 2017b; MeTEOR 2018), but these constitute less than 2% of procedures.

The estimated cost of obesity on the Australian economy in 2011–12 was $8.6 billion, which included $3.8 billion in direct costs and $4.8 billion in indirect costs—including absences from work, forgone tax and government subsidies. It has been estimated that, if no preventative action is taken to slow the growth of obesity, up to $87.7 billion in additional direct and indirect costs due to obesity may be incurred by 2025 (PwC Australia 2015). Data from the 45 and Up Study from 2014 show that, among the population aged 45 and over in Australia, overweight and obesity was responsible for:

- around 1 in every 8 admissions to hospital
- 1 in every 6 days in hospital
- 1 in every 6 dollars spent on hospitalisations (Korda et al. 2015).

1.2 What are the priority information areas?

For accurate monitoring, information is required to describe various dimensions of overweight and obesity, including risk factors, prevalence, how effectively the health system is responding to the matter through prevention and treatment, the impact (measured in quality of life, death, and disability) and health expenditure. Information is needed to describe the situation at a particular point in time and track changes over time. These priority areas translate into the following 6 key questions, which are used to guide the remainder of this report (Box 1.1).

This framework is used broadly by the AIHW for monitoring chronic conditions and has received support for its application specifically from the AIHW Obesity Expert Group for monitoring overweight and obesity.

Box 1.1: Key questions for monitoring overweight and obesity

Risk factors: What proportion of the population experience risk factors associated with overweight and obesity?

Prevalence: What is the prevalence of (that is, how common is) overweight and obesity?

Prevention, management and treatment: What prevention, management and treatment services do people affected by overweight and obesity receive?

Quality of life: How does overweight and obesity affect an individual's quality of life?

Death and disability: How much death and disability is associated with overweight and obesity?

Health expenditure: What is known about expenditure on overweight and obesity?

Wherever possible, these questions are examined in relation to overweight and obesity, but the outcomes may also be useful for other purposes. For example, data on weight status often provide information about underweight, as well as overweight and obesity. The approach taken in this report is to establish the extent to which information is available to answer the key questions in Box 1.1 and refer to examples of more complex follow-up questions in the discussion (Chapter 4).

1.3 How do we assess how well we can currently answer key questions?

This report describes and assesses data sources for monitoring overweight and obesity in Australia, and identifies gaps and limitations in the current information base for regular monitoring. Given the population health monitoring focus of this report, data sources that are nationally representative are considered advantageous. The data sources selected for inclusion in this report are not necessarily superior to other collections in general. The authors acknowledge that each data set was established for a particular purpose, not necessarily with monitoring overweight and obesity as its primary aim.

Depending on the user's information needs, it is possible that many regional or other data collections reviewed will provide some answers to specific questions about overweight and obesity. The AIHW used a 4-step process to assess the suitability of current data collections in Australia to answer the key questions for monitoring overweight and obesity.

Assessment framework (4 steps) for determining the suitability of current data collections for monitoring overweight and obesity

Step 1: A stocktake of national and local data sources to identify 'in-scope' collections (see Chapter 2)

Data sources included were not meant to be exhaustive; rather, the focus was on those that:

- contain some information on overweight and/or obesity in relation to one or more of the 6 priority information areas; **and**
- data are, or could be, available for analysis; **and**
- are representative of the Australian population, **or** are smaller regional/localised studies (with at least 1,000 participants).

Step 2: Detailed review of in-scope collections (see Chapter 2 and Appendix A)

The review captured:

- data source characteristics—title, type (administrative, survey, etc.), description, purpose, collection management, where to go for further information
- methodology—scope, geographical coverage, frequency/timing
- information on which priority information areas are included in the data source (for example, risk factors, prevalence (whether self-reported or measured), prevention, management or treatment, quality of life, death and disability, health expenditure; refer to Box 1.1).

Step 3: Determining data source relevance to each priority information area and assessing their representativeness and completeness for this purpose (see Chapter 3)

The following 5 categories were assigned to the selected data sources to determine their usefulness for informing the relevant priority areas:

- Representative national data that provides comprehensive information
- Representative state/territory/regional data that provides comprehensive information, or Representative national data that provides partial information
- Non-representative national data, or Representative state/territory/regional data that provides partial information
- Non-representative state/territory/regional data
- Other—there are limitations with the use or interpretability of the data; however, it may have some benefit to monitoring.

Note: Also considered in the category rating were issues such as the currency of the data and whether the collections are ongoing.

Step 4: Comparative assessment of the overall strength of data for each priority information area (see Chapter 4)

Finally, a comparative assessment was undertaken, based on the number of relevant data sources, their individual category ratings, and an overall assessment of the relative depth and breadth of data available in each priority information area (spanning both nationally representative information and complementary information). To some extent, this is an 'on-balance' assessment that takes into consideration the relative strength of information available across all of the priority information areas.

1.4 Structure of this report

This chapter outlines the purpose and scope of the report, the key questions relevant for monitoring overweight and obesity, and the assessment approach.

Chapter 2 provides an overview of the types of data sources available for population health monitoring and identifies those data relevant for monitoring overweight and obesity (including a reference table).

Chapter 3 outlines the key questions for monitoring and how current available data can support monitoring activities.

Chapter 4 discusses and summarises the overall findings and suggests future opportunities for data development.

The template used to record the information collected in each data source can be found in Appendix A, followed by an index of all assessed data sources in Appendix B and entries on all assessed data sources in Appendix C.

A guide to assessment criteria can be found in the supplementary material for this report and an assessment of the equity focused monitoring capabilities of each data source can be in found in Appendix D.

2 Description of the data sources

A number of data sources provide public health information in Australia. Based on the mechanism of data collection, the data sources can be categorised as administrative, survey, registry, derived and longitudinal. The information in these data sources is obtained from individuals, government agencies, private and community organisations, and health professionals. A public health monitoring system can include one or more of these data sources to inform the population health issue in question.

Information from these sources may be collected continuously over many years, allowing in-depth analysis of health service use for a given month or year or over time. Surveys may be conducted periodically or 'one-off' and can provide a snapshot at one point in time, including possible comparison with similar cross-sectional data collected at an earlier or later time.

Data may be collected and reported at a national, state/territory or local level:

- **National** data sources are beneficial because they provide information at a population level and are often representative; that is, participants closely match the characteristics of the population, which enables the result to be generalised to the whole population.
- Public health information obtained at the **state and territory** level can provide data that complements, or can be used as a substitute for, national data, depending on the collection methods and representativeness.
- **Regional and local data** can be very useful, particularly in understanding the needs of local communities and the extent to which available services meet these needs. Regional and local data can also be used to identify areas that perform substantially better or worse than average, which can be used as a basis for exploring what factors may contribute to this difference.

In many data sources, weighting techniques are used to provide representative estimates. While recognising the need for information at all of the above levels, the 'representativeness' assessment of data sources undertaken in this review (Step 3) focuses on the national representativeness of each data source.

2.1 Types of data sources

Administrative data sources

Administrative data are collected as a by-product of the delivery of health or other services. For example, data are recorded during a hospital admission, or through other processes, such as registrations of births, deaths or marriages.

Administrative data sources can capture information on the majority of, if not all, people receiving a particular service or program. These data sets generally:

- have good coverage of person and service characteristics
- are collected on an ongoing basis and reported frequently
- have sufficient coverage for use at the national, state and territory or regional level.

In addition, where scope, coverage and data quality are consistent over time, administrative data sets provide a valuable source of time series information. There are, however, limitations associated with administrative data sources, because they are:

- by their nature, the by-product information from existing health or other activities (such as admission to hospital); therefore, limited to specific scope, coverage and data elements available as a cost-effective by-product of that activity
- collected for a particular purpose and then possibly used for a secondary purpose (including aggregate reporting); therefore, these sources cannot usually tell us about people who do not use a given program or service, may not include the depth of information to inform all questions of interest, and may not produce reliable estimates for all regions (depending on coverage)
- potentially non-representative of the population of interest
- limited by the quality and completeness of information provided for each data element.

Survey-based data sources

Survey-based data sources collect health-related information, often using a population sample. Survey data include details about the experience of the respondent across a range of health services and conditions and can provide a greater depth of information than administrative data. Where question design, sampling and data quality are consistent over time, population health surveys provide a valuable source of time series comparisons.

There are also inherent limitations to this methodology. Respondents may misreport information, either intentionally or unintentionally, which reduces the accuracy of the result. For example, respondents may be unable to remember health events, food intake, medications or medical advice, particularly if they are asked to reflect over a long time period. Additionally, the sampling method for most population surveys is not designed to produce reliable estimates at regional levels, nor for small, but important, subpopulations. Finally, low response rates are a common issue with surveys and may compromise the representativeness of the data.

Registry data sources

Registries aim to systematically collect detailed information on persons with a certain disease or condition or receiving a particular type of treatment and/or care. The data can be used to determine the incidence of an event or disease, and the nature of an intervention, procedure or service. However, the data are specific to these events and usually do not include information from the general population.

It is difficult to generalise the results for registries to the population as a whole. Further, findings derived from registry data may be limited in instances where full coverage of the relevant disease of treatment population is not obtained. For example, unless registries are supported by business processes, audits, mandatory data entry or by-product information from other technology, their complete coverage cannot be guaranteed.

Derived data sources

Derived data sources use information from other data sources to produce new measures. Some examples are to derive summary measures or monetary costs of a disease or condition. The accuracy and validity of the data are dependent on the quality of the underlying data, the methods used to calculate the derived data and any assumptions made. Derived data can be a powerful way of summarising information from a range of sources and can allow

comparisons across variables or factors (for example, disease types, risk factors and type of health service).

Longitudinal data sources

Longitudinal studies involve following a cohort of individuals over time with continuous monitoring of risk factors and/or health outcomes. The length of the study may vary, with some longitudinal studies running for decades. Longitudinal studies are useful because they provide important data about changes experienced by individuals over time and allow for flexibility in the data collected at each time point. However, these studies are time-consuming (which affects participant retention), potentially costly (in order to maintain a committed research team) and not always representative of the general population.

Additionally, complete follow up of initial participants is not guaranteed, and attrition can affect the representativeness of the sample over time (Caruana et al. 2015; Gustavson et al. 2012).

2.2 Key data sources for monitoring overweight and obesity in Australia

The first step in assessing the suitability of data sources for monitoring overweight and obesity is to identify 'in-scope' data collections (Assessment framework: Step 1). These are listed in Table 2.1, which is not an exhaustive list but focuses on those that:

- contain some information about overweight and obesity in relation to one or more of the six areas of interest; **and**
- the data are, or could be, available for analysis; **and**
- are representative of the population of interest; **or** are smaller regional/localised studies (with at least 1,000 participants) with an overweight and obesity focus.

A detailed review of each source, which captures the type of data they provide with respect to the priority information areas, is provided at Appendix A (Assessment framework: Step 2). Key data sources for overweight and obesity in Australia include the:

- National Health Survey (NHS)
- National Nutrition and Physical Activity Survey (NNPAS)
- National Aboriginal and Torres Strait Islander Health Survey (NATSIHS)
- National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey (NATSINPAS)
- Australian Longitudinal Study on Women's Health (ALSWH).

These data sources provide key information in relation to monitoring overweight and obesity because: they capture data on a national/representative level; data collection is regular or ongoing; and in some areas, they include information specific to these conditions.

Other important data sources include the:

- Longitudinal Surveys of Australian Youth (LSAY)
- Australian Longitudinal Study of Ageing (ALSA)
- Longitudinal Study of Australia Children (LSAC)
- Household Income and Labour Dynamics Australia (HILDA) Survey
- 45 and Up Study
- representative state and territory health surveys.

Table 2.1: In-scope data sources for monitoring overweight and obesity

Type of data source	National	State, territory or regional
Administrative	National Hospital Morbidity Database (NHMD) National Mortality Database (NMD) Medicare Benefits Scheme (MBS) Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS) National Perinatal Data Collection (NPDC)	National Prescribing Service (NPS) MedicineInsight Population Level Analysis and Reporting (POLAR) System
Survey	National Health Survey (NHS) and National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) Bettering the Evaluation and Care of Health Survey in General Practice (BEACH) Jean Hailes for Women's Health Survey National Nutrition and Physical Activity Survey (NNPAS) National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey (NATSINPAS) National Secondary Students' Diet and Activity (NaSSDA) Survey	ACT General Health Survey (ACTGHS) ACT Kindergarten Health Check collection ACT Year 6 Physical Activity and Nutrition Survey (ACTPANS) Busselton Health Study Great South Coast Childhood Obesity Monitoring Study NSW Population Health survey NSW Secondary School Students Health Behaviours Survey NSW School Physical Activity and Nutrition Survey (SPANS) Queensland Preventative Health Survey (QPHS) South Australian Population Health Survey (SAPHS) Tasmanian Population Health Survey (TPHS) Victorian Population Health Survey (VPHS) Western Australia Nutrition Monitoring Survey Series (WA NMSS) Western Australia Health and Wellbeing Surveillance System (WA HWSS)
Longitudinal Survey	Australian Longitudinal Study on Women's Health (ALSWH) Australian Longitudinal Study of Ageing (ALSA) Longitudinal Study of Australian Children (LSAC) The Longitudinal Study of Indigenous Children (LSIC) Longitudinal Surveys of Australian Youth (LSAY) The Household, Income and Labour Dynamics in Australia Survey (HILDA) Childhood Determinants of Adult Health study (CDAH) Ten to Men: the Australian Longitudinal Study on Male Health	45 and up Study North West Adelaide Health Study (NWAHS) AusDiab Study The Study of Environment on Aboriginal Resilience and Child Health (SEARCH) The Raine Study
Registry	Bariatric Surgery Registry (BSR)	
Derived	Burden of Disease Studies National Key Performance Indicators for Aboriginal and Torres Strait Island Primary Health Care (nKPI)	

3 To what extent can in-scope data sources answer key questions?

The chapter explains Step 3 of the Assessment framework (Section 1.3). It identifies the in-scope data sources of most relevance to each priority area (outlined in Box 1.1) and assesses their representativeness and completeness for this purpose. For each key question, we explore the following questions:

- Why collect information in this area?
- What information is available?
- What information is missing?

Although there is considerable background information to help set the scene for each information area, this report provides a summary only and directs readers to other information resources as required.

3.1 Key question 1—Risk factors

What proportion of the population experience the risk factors associated with overweight and obesity?

Why collect information about risk factors?

Many factors, known as determinants of health, influence our health and wellbeing. Factors affecting health in a negative way are commonly referred to as risk factors; for example, high blood pressure can increase the likelihood of developing cardiovascular illness. Those affecting health in a positive way are known as protective factors; for example, good nutrition and exercise can help prevent many chronic conditions (AIHW 2012b).

The determinants of overweight and obesity can be divided into 4 major groups. The conceptual framework presented in Figure 3.1 shows that the first main group—the broad features of society and environmental factors—can determine the features of another main group (that is, people's socioeconomic characteristics such as their level of education and employment). Both of these main groups also influence people's health behaviours and their psychological state.

At all stages along the path, the various factors interact with an individual's physical and psychological make-up. In addition, the factors within a box often interact and are closely related to each other, such as a person's psychological state having an influence on their health behaviours.

This framework demonstrates the complex interplay between these factors and the challenges in reducing the prevalence of overweight and obesity.

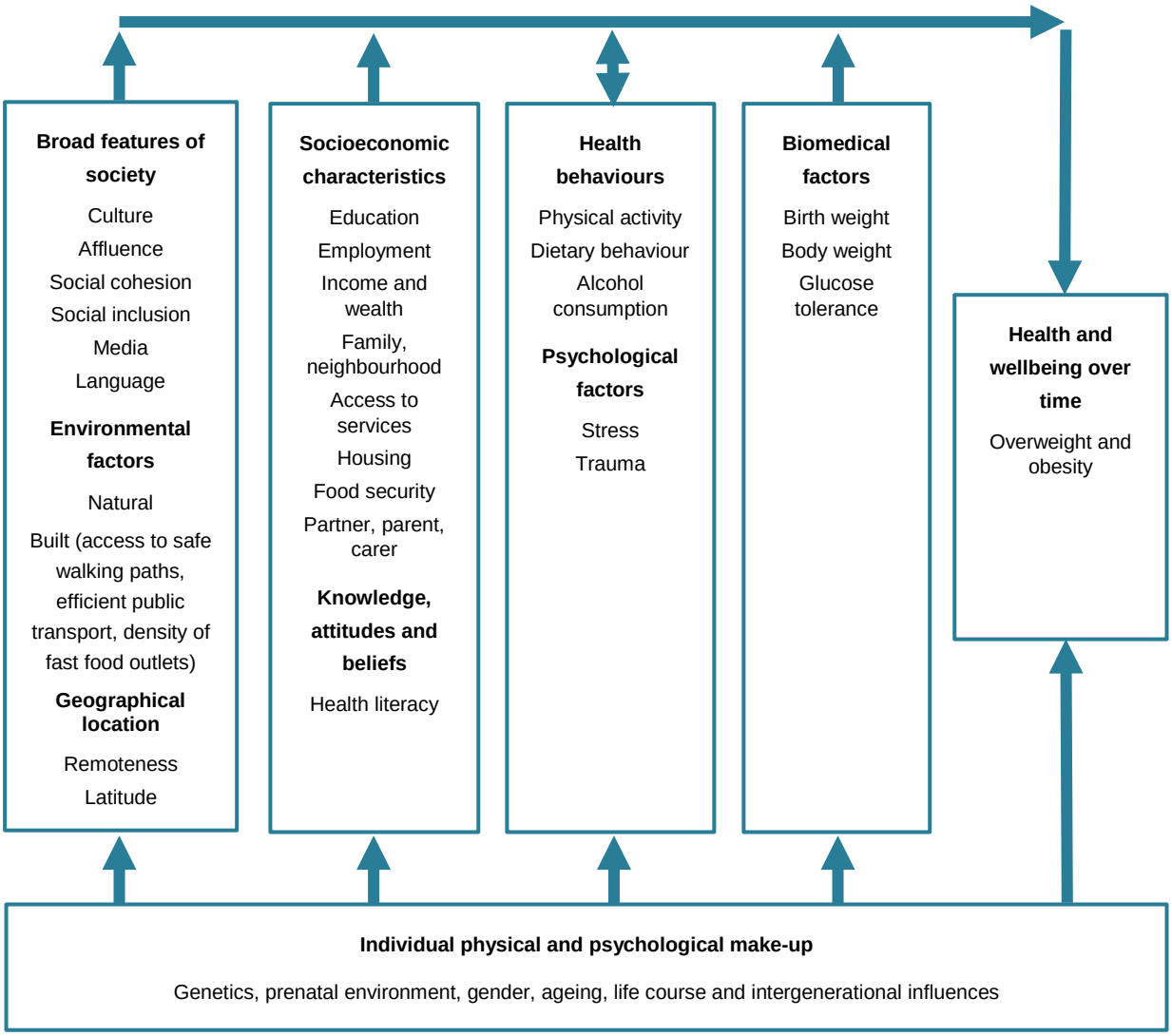
Included in the framework are risk factors that are modifiable and those that are not. Non-modifiable risk factors include age, sex and family history (which run along the bottom of the framework). Although these risk factors cannot be modified, information about them can help identify people at high risk of developing a disease or condition so that prevention strategies and relevant medical services can be devised and located to best effect.

In contrast, risk factors that individuals have the power to change are described as modifiable, such as the health behaviours of diet and physical activity. Biomedical risk factors can be

influenced by health behaviours and are therefore potentially modifiable through self-management, health promotion and other health interventions (AIHW 2012b). For example, high blood pressure can be modified through diet and physical activity.

While our health behaviours have a substantial impact on the risk of becoming overweight and obese, it is clear that a person's environment can also have an impact on this risk. In 1997, the term *obesogenic* environment was coined to describe an environment that promotes food intake and discourages physical activity (Egger & Swinburn 1997). An obesogenic environment is made up of a complex interplay of factors, including infrastructure—including access to safe walking paths and efficient public transport—and food economies—including the density of fast food outlets in a given area or access to fresh healthy foods (Brehm & D'Alessio 2014; Cooksey-Stowers et al. 2017). Other factors that may impact the obesogenic environment include advertising, working arrangements and out-of-home food environments such as school canteens or workplace cafeterias (Carter & Swinburn 2004; NFOS 2018; Resich et al. 2013). The interest in the obesogenic environment and its impact on the risk of an individual becoming overweight and obese has been growing in the past decade (Townshend & Lake 2017), and these factors are an important consideration in the overall picture of obesity in Australia.

Figure 3.1: A conceptual framework for the determinants of overweight and obesity



Source: Adapted from AIHW 2012b.

Because modifiable risk factors are amenable to change in the population, these were selected as the focus area for this report. This report focuses on three key individual health behaviours that are important for preventing and managing overweight and obesity and their related conditions (CDC 2017):

- dietary behaviour
- physical activity (including sedentary activity and screen time)
- alcohol intake.

Environmental influences are acknowledged here, but were not considered when rating the overall strength of the data. In general, there are limited population health monitoring focused data sources that collect information on environmental risk factors on a routine basis. It has been noted in the assessment table and individual data source entries (Appendix C) where this information is collected, though it is recognised that this is an emerging data area in population health monitoring and information is not regularly collected at present. For information on non-population health monitoring focused data sources that may be used to assess environmental risk for overweight and obesity, see Section 4.2.

What information is available?

The most relevant data sources for monitoring risk factors are presented in Table 3.1. Our assessment is that the available data sources in this area are 'Very well developed', consisting of several representative, ongoing data collections spanning both cross-sectional collections and longitudinal studies.

There are six main data sources that provide detailed individual lifestyle and environmental risk factor data particularly relevant for monitoring overweight and obesity:

- National Nutrition and Physical Activity Survey (NNPAS)
- National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey (NATSINPAS)
- Australian Longitudinal Study on Women's Health (ALSWH)
- Longitudinal Study of Australian Children (LSAC)
- Raine Study
- National Secondary Students' Diet and Activity (NaSSDA) survey.

The NNPAS, undertaken in 2011–12, provides food and nutrition data of a detail not seen since the National Nutrition Survey in 1995. Detailed self-reported information is available on food intake from two 24-hour dietary recalls, with nutrient intakes derived from these data. This includes detailed information on alcohol intake. Also available from the NNPAS is pedometer data to complement self-reported levels of physical activity. A future NNPAS is planned.

The ALSWH collects self-reported information on intake of fruit and vegetables and soft drinks, while food frequency questionnaire data and 24-hour dietary recall is available for some cohorts on some occasions. The ALSWH collects self-reported information on physical activity (including intensity) and alcohol intake at each wave of data collection. The ongoing nature of this cohort study, which dates back to 1996, enables a robust assessment of changes over time and analysis of the data within the context of the transition of participants in and out of being overweight or obese.

The LSAC collects self- or parent-reported information on children's intake of breast-milk or other milks, fruit juice, vegetables, fruits and other food groups. A food diary is undertaken by children aged 10 and over. A time use diary contains information on physical activity.

For the Aboriginal and Torres Strait Islander population, detailed self-reported information is available from the NATSINPAS, undertaken in 2012–13, on food intake from a 24-hour dietary recall, with nutrient intakes derived from these data. This includes information on alcohol intake. Also available is pedometer data to complement self-reported levels of physical activity from respondents in non-remote areas. A future NATSINPAS is planned.

The Raine Study is a longitudinal study of over 2,000 participants followed from birth until age 27 that collects a wide range of individual and environmental risk factor information. The NaSSDA is a national cross-sectional survey that collects information on the individual and environmental risk factors of adolescents in Australian secondary schools. These two sources are considered key due to extensive environmental risk data collection and their focus on early life, which is an area of interest in overweight and obesity research.

A number of other national and state or territory-based data sources, some of which are ongoing data collections, complements these, including the:

- WA Nutrition Monitoring Survey Series (WA NMSS)
- WA Health and Wellbeing Surveillance System (WA HWSS)
- ACT General Health Survey (ACTGHS)
- NSW Population Health Survey
- NSW School Students Health Behaviours Survey
- Tasmanian Population Health Survey (TPHS)
- Victorian Population Health Survey (VPHS)
- Queensland Preventative Health Survey (QPHS)
- South Australian Population Health Survey (SAPHS)
- Childhood Determinants of Adult Health (CDAH)
- Busselton Health Study
- National Health Survey (NHS)
- Household, Income and Labour Dynamics in Australia (HILDA).

For the purposes of monitoring the modifiable risk factors for overweight and obesity, these complementary data sources are limited in the type of risk factor data provided and/or their representativeness of the Australian population. Each of these sources is representative only for its respective populations and some have limited information on risk factors. For example, the various state and territory population health surveys collect representative information for their jurisdiction, but the data on nutrition is largely limited to intake of types of food. The 24-hour dietary recall undertaken in the NNPAS, NATSINPAS, ALSWH and LSAC enable a more detailed assessment of food and nutrient intakes.

A number of these data sources collect information regarding the physical activity and food environments of young people in schools and at home, which is an area of particular interest in overweight and obesity research.

Table 3.1: Assessment of data sources for monitoring risk factors for overweight and obesity

Data source	Notes	Monitoring relevance
National Nutrition and Physical Activity Survey	Collects a range of self-reported risk factor data 1995 and 2011–12 collection. Future collections to be confirmed. Ongoing collection.	Representative national data providing comprehensive information.
National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey	Collects a range of self-reported and measured risk factor data. Future collections to be confirmed.	Representative national data for the Indigenous population providing comprehensive information.
Australian Longitudinal Study on Women's Health	Collects a range of self-reported individual and environmental risk factor data. Ongoing/regular collection.	Representative national data for women providing comprehensive information.
Longitudinal Study of Australian Children	Collects a range of self or parent-reported risk factor data. Ongoing/regular collection.	Representative national data providing comprehensive information.
National Health Survey	Collects a range of self-reported risk factor data. Ongoing collection.	Representative national data providing partial information.
Ten to Men	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative national data providing partial information.
Household, Income and Labour Dynamics in Australia	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative national data providing partial information.
Longitudinal Surveys of Australian Youth	Collects a limited range of self-reported risk factor data. Ongoing/regular collection.	Representative national data providing partial information.
Childhood Determinants of Adult Health study	Collects a range of measured and self-reported risk factor data. Ongoing collection.	Representative national data providing partial information.
National Secondary Students' Diet and Activity survey	Collects a range of self-reported individual and environmental risk factor data. Ongoing/regular collection.	Representative national data for year 8 to 11 secondary school students providing comprehensive information.
Raine Study	Collects a range of measured and self-reported individual and environmental risk factor data. Ongoing/regular collection.	Representative state data providing comprehensive information.
Busselton Health Study	Collects a range of detailed self-reported risk factor data, including family history of obesity. Ongoing/regular collection.	Representative state data providing comprehensive information.
Tasmanian Population Health Survey	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative state data providing comprehensive information.

Table 3.1 (continued): Assessment of data sources for monitoring risk factors for overweight and obesity

Data source	Notes	Monitoring relevance
WA Nutrition Monitoring Survey Series	Collects detailed nutrition risk factor information. Ongoing/regular collection.	Representative state data providing partial information.
ACT General Health Survey	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
45 and Up Study	Collects a range of risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
NSW Population Health Survey	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
Victorian Population Health Survey	Collects a range of self-reported risk factor data and limited environmental risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
WA Health and Wellbeing Surveillance System	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
Queensland Preventative Health Survey	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
South Australian Population Health Survey	Collects a range of risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
NSW Health School Students Health Behaviours Survey	Collects a range of self-reported individual and environmental risk factor data. Ongoing/regular collection.	Representative state data providing partial information.
AusDiab	Collects a range of measured and self-reported risk factor data and limited environmental risk factor data. No future collections.	Non-representative national data providing partial information.
Jean Hailes for Women's Health Survey	Collects a limited range of self-reported risk factor data. Ongoing collection.	Non-representative national data providing partial information.
Australian Longitudinal Study of Ageing	Collects a range of risk factor data. No future collections.	Non-representative state data providing comprehensive information.
Year 6 ACT Physical Activity and Nutrition Survey	Collects a range of self-reported risk factor data. Ongoing/regular collection.	Non-representative state data providing partial information.

Table 3.1 (continued): Assessment of data sources for monitoring risk factors for overweight and obesity

Data source	Notes	Monitoring relevance
Longitudinal Study of Indigenous Children	Collects data on a range of self-reported risk factors. Ongoing/regular collection.	Non-representative data for Indigenous population providing partial information.
Study of Environment on Aboriginal Resilience and Child Health Study	Collects self and parent reported individual risk factors and limited environmental risk factors. Ongoing collection.	Non-representative data for Indigenous population providing partial information.
Overall assessment of all available data sources		**Very well developed**

Data gaps and limitations

Reliance on self-reporting

The majority of assessed data sources for monitoring risk factors for overweight and obesity are based on the self-reported activities of respondents. There is evidence to suggest that, self-reports of physical activity, alcohol intake and nutrition measures—such as fruit and vegetable intake—can be unreliable (Dal Grande et al. 2012; Davy & Estabrooks 2015; Neuhouser et al. 2013; Prince et al. 2008). For example, research has found that public health survey results can underestimate the consumption of alcohol by up to 30% (Livingston & Callinan 2017).

The reliability of self-reported risk factor information can vary between population groups, and research has found that people with a higher BMI are more likely to provide an inaccurate estimation of certain risk factors, such as physical activity and energy intake (Davy & Estabrooks 2015; Elliott et al. 2014). These issues with self-reported data can be due to social desirability biases—for example, over-reporting 'good behaviour' such as eating vegetables, and under-reporting 'bad behaviour' such as eating fast food (Herbert et al. 2008; Miller et al. 2008)—an inability to remember intake over an extended period, or variations in the tools used to collect risk factor data (King et al. 2018; Subar et al. 2015).

Data collections where secondary forms of measurement can be used to verify self-reported behaviours—such as a pedometer for physical activity—may provide a more accurate picture of the risk factors to becoming overweight or obese. However, due to resource or time restraints, this is not always possible, particularly for large-scale population health surveys. Additionally, secondary data sources have their own limitations, such as measurement error or incorrect use by the respondent.

Environmental risk factors

As noted, information on environmental risk factors is not routinely collected in population health monitoring surveys or other data collections. This information is gathered on an ad-hoc basis through smaller targeted studies or through data held by the private sector, which is out of scope for this report. Given the importance of understanding and monitoring environmental risk factors, future work could include a specific focus on environmental risk factors using a range of standard and novel data sources. Further details are provided in Section 4.2.

Coverage

The NHS and the NNPAS do not cover *Very remote* areas or non-private dwellings such as hotels, motels, hostels, hospitals, nursing homes and short-stay caravan parks. They are therefore likely to under-represent some groups and their exposure to the risk factors associated with overweight and obesity.

3.2 Key question 2—Prevalence

What is the prevalence of overweight and obesity in the population?

Why collect information about prevalence?

Prevalence is a measure of the level of a disease or characteristic in a population at a specific point in time. It is distinct from incidence, which refers to the number of new cases diagnosed in a given time period. Prevalence is a direct product of incidence and survival; for example, health conditions with high incidence and high survival tend to have high prevalence, as is the case with overweight and obesity.

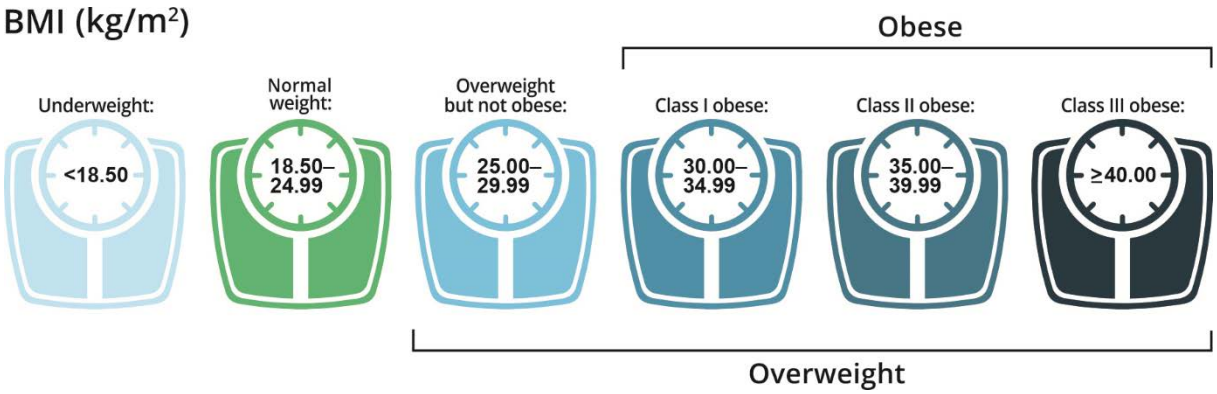
It is important to measure the incidence and prevalence of health conditions because knowing how often and how much a condition occurs in the population, and in particular population groups, plays an important role in preventing and treating illness. The different measures can inform aspects of health services planning and delivery (AIHW 2012b). For diseases that are mandatorily reported in Australia, incidence statistics can be readily obtained, such as health practitioners' reporting to state health authorities on cases of HIV, tuberculosis and swine flu. In addition, comprehensive and reliable figures can be obtained for diseases that have a nationally coordinated and comprehensive register. However, for overweight and obesity, incidence data are not readily available, and so for this report, incidence is not discussed.

The most common and practical methods of measuring overweight and obesity in the population are calculating a person's BMI, and/or measuring their waist circumference. However, BMI may be less appropriate for certain individuals (discussed later in this report).

BMI is calculated by dividing a person's weight in kilograms by the square of their height in metres (kg/m^2). BMI is internationally used as a proxy for body fat at a population level for both children and adults (WHO Europe 2018). BMI classifications for adults have been defined by the World Health Organization (WHO). Obesity is divided into 3 classes, according to severity, with more-severe obesity associated with a higher risk of comorbidities (Figure 3.2). For children and adolescents, age- and sex-specific cut-offs or standard deviation scores are used (WHO 2016).

It is important to note that differences in body composition—BMI cannot distinguish lean body mass from fat mass—mean that these classifications may not be suitable for all ethnic groups, as well as older adults. For example, an optimal BMI for life expectancy in older people is said to be in the range of 27–30 kg/m^2 (ANZSGM 2011; Winter et al. 2014).

Figure 3.2: Body mass index categories for adults



Source: WHO 2016.

Abdominal obesity is measured using a waist circumference and waist to hip ratio. These measures are used to indicate an accumulation of abdominal fat, which can lead to an increased risk of chronic disease. Guidelines for risk assessment using waist circumference are produced by WHO, and vary by sex, reproductive status, age and ethnicity (WHO 2011). Measures of prevalence using height and weight are strengthened when a measure of waist circumference is also collected.

What information is available?

The most relevant data sources for monitoring the prevalence of overweight and obesity are presented in Table 3.2. Our assessment is that the available data sources for this are 'Very well developed', consisting of several representative, ongoing data collection, spanning both point-in-time collections and longitudinal studies.

Three data sources—the ABS National Health Survey (NHS), the National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) and the Longitudinal Study of Australian Children (LSAC)—collect measured data on height, weight and waist circumference. Measured height and weight data contribute to an accurate calculation of BMI, giving a more correct estimation of prevalence than self-reported data only. These data sources collect nationally representative data and are untaken on a regular basis.

A selection of other state and territory-based data sources, which are ongoing collections, provide complementary data, including the:

- ACT General Health Survey (ACTGHS)
- ACT Year 6 Physical Activity and Nutrition Survey (ACTPANS)
- ACT Kindergarten Health Check
- NSW School Students Physical Activity and Nutrition Survey.

These sources provide data on measured height and weight and/or waist circumference that are representative of their jurisdiction. Other data sources listed in Table 3.2 provide a mix of representative and non-representative data on measured and self-reported height and weight.

Table 3.2: Assessment of data sources for monitoring prevalence of overweight and obesity

Data source	Notes	Monitoring relevance
National Health Survey	Measured height and weight and waist circumference (except in 2001 and 2004–05 where height and weight were self-reported only). Ongoing/regular collection.	Representative national data providing comprehensive information.
National Aboriginal and Torres Strait Islander Health Survey	Collects measured height and weight and waist circumference. Ongoing/regular collection.	Representative national data providing comprehensive information.
Longitudinal Study of Australian Children	Collects measured height and weight and waist circumference. Ongoing/regular collection.	Representative national data providing comprehensive information.
Childhood Determinants of Adult Health	Collects measured height and weight and waist circumference. Ongoing collection.	Representative national data providing comprehensive information.
Ten to Men	Self-reported height, weight and waist circumference. Ongoing/regular collection.	Representative national data providing partial information.
Australian Longitudinal Study on Women's Health	Collects self-reported height and weight. Ongoing/regular collection.	Representative national data providing partial information.
Longitudinal Surveys of Australian Youth	Collects self-reported height and weight. Ongoing/regular collection.	Representative national data providing partial information.
ACT Year 6 Physical Activity and Nutrition Survey	Collects measured height and weight. Ongoing/regular collection.	Representative state data providing comprehensive information.
NSW Schools Physical Activity and Nutrition Survey	Collects measured height and weight and waist circumference. Ongoing/regular collection.	Representative state data providing comprehensive information.
Busselton Health Study	Collects measured height, weight and waist circumference. Ongoing/regular collection.	Representative state data proving comprehensive information.
NSW Population Health Survey	Collects self-reported height, weight and waist circumference. Ongoing/regular collection.	Representative state data providing comprehensive information.
WA Nutrition Monitoring Survey Series	Collects self-reported height, weight and waist circumference. Ongoing/regular collection.	Representative state data providing comprehensive information.
ACT General Health Survey	Collects self-reported height and weight. Ongoing/regular collection.	Representative state data providing partial information.
ACT Kindergarten Health Check	Collects measured height and weight. Ongoing/regular collection.	Representative state data providing partial information.

Table 3.2 (continued): Assessment of data sources for monitoring prevalence of overweight and obesity

Data source	Notes	Monitoring relevance
Queensland Preventative Health Survey	Collects self-reported height and weight. Ongoing/regular collection.	Representative state data providing partial information.
South Australia Population Health Survey	Collects self-reported height and weight. Ongoing/regular collection.	Representative state data providing partial information.
Victorian Population Health Survey	Collects self-reported height and weight. Ongoing/regular collection.	Representative state data providing partial information.
Tasmanian Population Health Survey	Collects self-reported height and weight. Ongoing/regular collection.	Representative state data providing partial information.
WA Health and Wellbeing Surveillance System	Collects self-reported height and weight. Ongoing/regular collection	Representative state data providing partial information.
45 and Up Study	Collects self-reported height and weight. Ongoing/regular collection.	Representative state data providing partial information.
Great South Coast Childhood Obesity Monitoring Study	Collects measured height and weight. Ongoing/regular collection.	Non-representative state data providing comprehensive information.
Population Level Analysis and Reporting System	Collects measured height, weight and waist circumference. Ongoing/regular collection.	Non-representative state data providing comprehensive information.
The Study of Environment on Aboriginal Resilience and Child Health	Collects measured height and weight and waist circumference. Ongoing collection.	Non-representative regional data providing comprehensive information.
Australian Longitudinal Study of Ageing	Collects measured height, weight and waist circumference. No future collections.	Non-representative state data providing comprehensive information.
NSW High School Students Health Behaviours Survey	Collects self-reported height and weight. Ongoing/regular collection.	Non-representative state data providing partial information.
North West Adelaide Health Study	Collects measured height and weight and waist circumference. No future collections.	Non-representative regional data providing comprehensive information.
Overall assessment of all available data sources		**Very well developed**

Data gaps and limitations

Reliance on self-reported height and weight

Some of the continuing population health surveys identified here as complementary data sources rely on self-reported data regarding the height and weight of respondents—especially those using telephone interview and written questionnaire methods. Resource constraints and inaccessibility of participants limit the feasibility of carrying out measured collections.

Research has suggested that asking direct questions about height and weight, especially in face-to-face interviews, may cause offence and discomfort in the respondent and discourage their current or future participation in the survey (Wooden et al. 2008). Self-reported measures of height and weight can also be affected by 'social desirability' biases (Burke & Carman 2017). This often results in people overstating their height and understating their weight. For example, in the collection of the 1995 NHS and National Nutrition Survey (NNS), ABS researchers compared the self-reported height and weight of respondents (provided in the NHS) to measurements taken in the course of the NNS. The data showed that 64% of males and 51% of females had overstated their height by 2.1 cm on average for males and 1.2 cm for women, and 22% of males and 28% females understated their weight by 1.8 kg on average for males and 2.5 kg for females (ABS 1995, 2003; Wooden et al. 2008). However, adjustment techniques are often used to substantially improve estimates of prevalence from self-reported data using simple models for corrected height and weight based on analysis from the 1995 NHS and NNS (Hayes et al. 2008).

Misreporting of height and weight can also be unintentional. If a person is not in the habit of regularly weighing and measuring themselves, they will tend to round their height and weight, which can also affect measures of prevalence. Finally, in the case of household surveys, parents may be asked to report the height and weight of children or adolescents living in the house, often without consulting the child or teenager. This can also impact the accuracy of prevalence measures collected by surveys.

Non-response rates for measured height and weight data in national surveys

Some participants choose to opt-out of having their height and weight measured in surveys (non-response). For example, in the 2017–18 NHS, 34% of respondents aged 18 and over did not have their height, weight or both measured, and 35% did not have their waist circumference measured. Because survey data have weighting applied to be representative of the population, the missing data would affect the accuracy of the weighted data. Imputation was used to obtain values for respondents for whom physical measurements were not taken.

For the 2017–18 NHS, a record with a missing response (the 'recipient') received the response of another similar record (the 'donor'). A number of characteristics with which to match recipients to donors was used, such as:

- age group
- sex
- part of state (capital city and balance of state)
- self-perceived body mass (underweight, acceptable or overweight)
- level of exercise (sedentary, low, moderate or high)
- whether or not has high blood cholesterol (as a long-term health condition) (ABS 2015).

Although imputation is an accepted statistical method for producing suitable quality data for time trend analyses, the proportion of missing values for height, weight and waist circumference should be considered when evaluating the quality and accuracy of prevalence data in a collection.

Opt-in biases

Another consideration when evaluating the accuracy of measured height and weight data is the manner in which respondents were recruited to have these measurements taken. For example, recent Australian studies have found that people who opt in to have these measurements taken (an active process of volunteering) are generally healthier than people who do not (GLOBE 2018; Strugnell et al. 2018), whereas a more passive opt-out process encourages more people to have their measurements taken and helps reduce this bias. Several significant national data sets—including the NHS—use the opt-in method when measuring height, weight and waist circumference, and this may lead to the underestimation of prevalence of overweight and obesity in the population.

Coverage

The NHS does not cover *Very remote* areas or non-private dwellings such as hotels, motels, hostels, hospitals, nursing homes and short-stay caravan parks. It is therefore likely to under-represent some groups, although it is unclear what impact this has on overall estimates of prevalence of overweight and obesity.

3.3 Key question 3—Prevention, management and treatment

What prevention, management and treatment services do the population with overweight and obesity receive?

Why collect information about prevention, management and treatment?

Prevention

Prevention (of disease or ill health) is described as action to reduce or eliminate the onset, causes, complication or recurrence of disease or ill health (AIHW 2018). Prevention is a key policy focus in most health systems, including in Australia, in light of the growing burden of chronic conditions and the potential to reduce costs.

A useful framework for understanding prevention was first published by the AIHW in 2009 (AIHW 2009). According to the framework, there are 3 main components of prevention—prevention of risk factors (causes), prevention of disease (onset) and prevention of progression, complications and recurrence in people with the disease or condition—noting that, for each of these 3 components, it is important to monitor the outcomes that are to be prevented and the prevention service being provided.

Prevention activities can occur at national, state, community and individual levels. National health promotion campaigns aim to encourage behaviour change, such as increased physical exercise or consumption of healthy foods. These campaigns can be aimed at specific populations, such as the Girls Make Your Move Campaign aimed at encouraging young women and girls to participate in sports. Examples of state and community level prevention activities include healthy eating and physical activity programs in schools or free after school activities (Millar et al. 2015). Whether at national or state level, prevention can also involve population-wide strategies, such as partnerships for food reformulation, urban planning to encourage physical activity, or policies to reduce children's exposure to advertising of

unhealthy foods, or fiscal policies, such as a tax on sugary drinks. At the individual level, prevention activities relating to overweight and obesity can include:

- weight management consultations with a GP
- attendance at selected allied health services, including nutritionists, dietitians and exercise physiologists
- regular exercise including cardiovascular and strength-based activities
- eating a balanced diet including recommended daily serves of fruit and vegetables and limiting intake of discretionary foods
- participating in commercial weight-loss and management programs, such as Weight Watchers or gym programs.

However, prevention activities do not always take place in a health-care setting, so it can be difficult to collect accurate and consistent data on these activities. Obesity prevention activities in particular are multi-sectoral and, although there are a few data sources that collect information on the participation of respondents in particular weight loss and weight gain prevention activities, there is a dearth of nationally representative population health data sets that integrate prevention activities into survey variables.

Treatment and management

Treatment and management generally occurs **after** a person has become overweight or obese.

Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia specify that care should be centred on the needs of the affected individual and be culturally appropriate, non-judgemental and enable people to participate in informed decision making (NHMRC 2013).

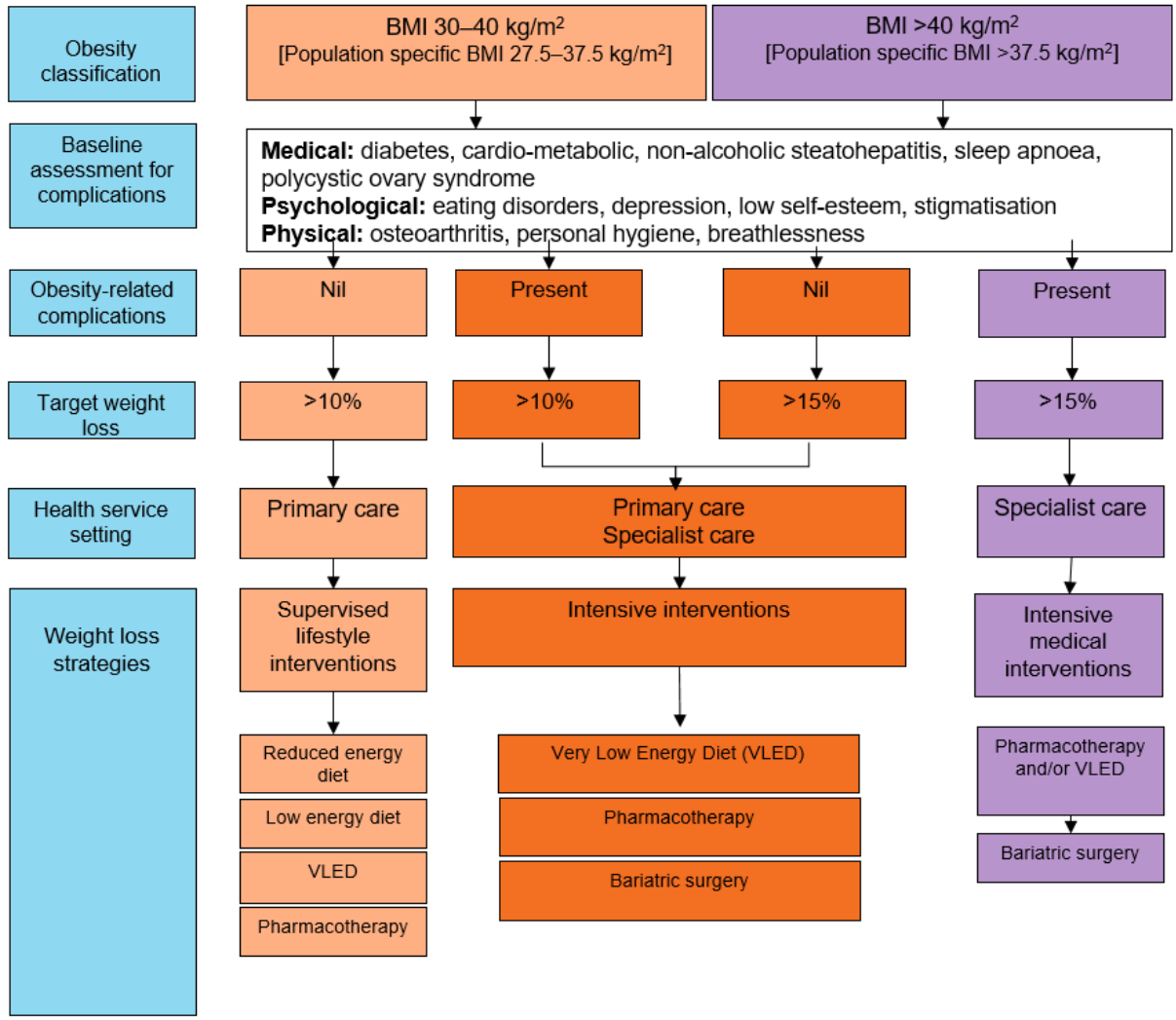
For adults, clinical goals focus on behaviour change and improved health in conjunction with weight loss. The first recommended approach to weight loss is multicomponent lifestyle intervention (healthy eating plan, increased physical activity and support for behaviour change). More intensive interventions, such as very low energy diets and medication, are recommended to help some people reduce weight further. The guidelines acknowledge that bariatric surgery is currently the most effective intervention for severe obesity.

The guidelines recognise that long-term weight management is difficult, due to strong physiological responses that increase hunger and encourage weight gain. It is advised that the clinician should provide regular support over the long term (NHMRC 2013).

For most children and many adolescents, the clinical focus is on weight maintenance, as opposed to weight loss, through lifestyle interventions such as reduced energy intake, increased physical activity and less screen time. These strategies should aim to engage the parents, carers and family.

As an extension of these clinical practice guidelines, Figure 3.3 shows the algorithm developed by the Australian and New Zealand Obesity Society (ANZOS) for the medical management of obese patients. This algorithm was developed specifically for the management of Caucasian persons with a BMI greater than 30 or, as indicated by the population-specific BMI label, Asian persons with a BMI greater than 27.5. ANZOS has also suggested that population specific cut-points may be used for Indigenous Australians (ANZOS 2018). However, no formal algorithm for the management of patients who fall into the overweight category (BMI between 25.00 and 29.99 kg/m^2 for the Caucasian population and a BMI between 23.00 and 27.49 kg/m^2 for the Asian population) has been published. As such, there is a gap in formal clinical guidelines for early intervention for overweight and obesity.

Figure 3.3: Algorithm for the management of obesity in Australia



Source: ANZOS 2018.

What information is available?

Data on the possible impact of prevention activities at the population level—through looking at the nutrition and physical activity risk factors, and overweight and obesity prevalence—are available through the components on modifiable risk factors (Section 3.1) and prevalence (Section 3.2). There are some data sources that provide general information on prevention activities such as intention to lose weight, availability of healthy food choices and barriers to healthy eating (Table 3.3), but they are not robust enough to provide useful information in this area and are therefore rated as 'very underdeveloped'.

Much of the data available on the management and treatment of overweight and obesity is specific to late stage interventions. Although counselling on eating a healthy diet and exercising may be given by a primary care provider in the earlier stages of overweight and obesity (NHMRC 2013), data is more readily available for treatments for severe and recurring cases.

These include:

- weight-loss medications
- weight management via shared-care arrangements between GPs and allied health professionals
- bariatric surgery.

The most relevant data sources for monitoring the management and treatment of overweight and obesity are presented in Table 3.4. All data sources in this table include the measurement of BMI (through either measured or self-assessed height and weight), with the exception of the National Hospital Morbidity Database (NHMD), where data up to 2016–17 captured obesity only as a diagnoses in hospital separations. Data from 2017–18 captures obesity in patients over the age of 18 with specific BMI ranges. Patients aged under 18 do not have their BMI collected.

The available data sources for management and treatment have been assessed to be 'underdeveloped' because few sources collect information on management and treatment activities directly related to overweight and obesity at a national level. This rating largely reflects the lack of data to describe comprehensively the full range of services currently being accessed by people who are affected by overweight or obesity—including commercial weight loss services—or to understand the level of unmet demand for such services.

The main data source that can be used to assess management and treatment for people who are overweight or obese is the NHMD, which provides data on weight-loss procedures from essentially all public and private hospitals. The NHMD also provides information on non-surgical interventions received in hospital such as assessments by dietitians, education and non-invasive procedures such as adjustment of gastric bands. It should be noted that the NHMD captures information only on admitted patients with a health intervention specifically performed to treat or tackle overweight and obesity and cannot be used to determine comprehensively the treatments and management activities undertaken by overweight and obese patients. For example, an overweight or obese patient could be admitted for another condition and not treated for obesity during that episode of care, and would therefore would not be assigned a code for 'obesity'. As such, although the NHMD is a national data set, data on treatments sought or performed on persons who are obese or overweight, but not directly related to overweight or obesity, cannot be considered representative or comprehensive.

The remaining data sources, such as the nationally representative NHS and NATSIHS, provide information on medication use for control of chronic conditions and health services use, but this information is not available in direct relation to overweight and obesity. Various state and territory surveys collect information on service use, which can be assessed according to those who are overweight or obese, but cannot be directly linked to these conditions.

The list of data sources reviewed does not include localised management and treatment programs throughout Australia, because they are not readily visible in national information. Although these programs may be a valuable resource to people who are overweight or obese, routine data collection for monitoring may not be undertaken and/or may be difficult to access. An example of a localised management and treatment program is the Nepean Blue Mountains Family Obesity Service, established as a family-centred, multidisciplinary clinic to help parents and their children tackle obesity and achieve a healthy weight (Box 3.1).

Box 3.1: Case study: The Nepean Family Obesity Service (NFOS)

The NFOS is Australia's first public, whole-of-lifespan, multidisciplinary, tertiary obesity service. Established in late 2016, the service is located at Nepean Hospital in western Sydney. The hospital services the Nepean Blue Mountains Local Health District, which includes the suburbs of Penrith and Lithgow. These two suburbs have some of the highest rates of overweight and obesity in New South Wales: 64.1% compared with 53.5% state-wide. Penrith and Lithgow also have a high concentration of fast food outlets, and high levels of socioeconomic disadvantage. The region has some of the highest rates of childhood overweight and obesity in Australia.

(continued)

Box 3.1 (continued): Case study: The Nepean Family Obesity Service (NFOS)

A Primary Health Network needs assessment of the population serviced by the NFOS found that:

- 5.7% of the population were one parent families
- 9.4% of the population had a weekly income of less than $500
- 31.9% had year 10 as their highest school education level
- 5.7% consumed the recommended fruit and vegetable servings
- 9.7% of adults had expressed very high levels of psychological distress.

The NFOS runs 4 clinics: paediatric, preconception, adult and pregnancy. Patients are referred to the clinic by their GP, and family members of the patient are encouraged to obtain a co-referral to attend the clinic. The NFOS primarily treats patients with severe obesity. The referral criteria for each of the clinics is as follows:

- Paediatric clinic: Children aged 2–16 with obesity defined as a weight greater than the 99th percentile (CDC BMI chart)
- Pregnancy clinic: BMI greater than 40 or a BMI greater than 35 with an obesity-related comorbidity
- Adult clinic: BMI greater than 45 or a BMI greater than 40 with an obesity-related comorbidity
- Preconception clinic: Women with a BMI or greater than 35 and who would like to plan for pregnancy within the next 12 months. Referrals to this clinic are prioritised for women who have a history of menstrual dysfunction, infertility, pre-diabetes/diabetes, hypertension or adverse obstetric outcomes related to their weight.

The clinic team includes endocrinologists, nurses, diabetes educators, midwives, dietitians, clinical psychologists and physiotherapists. The clinic takes a multi-disciplinary approach to treating and managing obesity and obesity-related comorbidities and has encouraged local policy makers to take steps to complement medical obesity services, such as:

- regulating the number of fast food and takeaway venues
- increasing the number of venues selling health food options
- diversifying urban planning and encouraging the construction of green spaces and safe walking paths
- supporting workplace agreements that promote flexible working arrangements to allow more time to shop and prepare meals at home and provide time for family-oriented physical activity
- improving public transport to minimise time spent in cars
- implementing education programs for children from a young age, including mandatory classes in shopping, menu planning, food budgeting and cooking
- ensuring school canteens in all schools abide by the Nutrition in Schools Policy
- improving funding for tertiary obesity services.

In a submission to the Senate Select Committee into the Obesity Epidemic in Australia, the NFOS team emphasised that severe social and economic disadvantage contribute to an obesogenic environment producing higher rates of overweight and obesity, with implications for health and the local economy. The NFOS is an example of community and regional level prevention, management and treatment activities that considers determinants outside individual action.

Source: NFOS 2018.

Table 3.3: Assessment of data sources for monitoring prevention of overweight and obesity

Data source	Notes	Monitoring relevance
Australian Longitudinal Study of Women's Health	Weight-loss products used, etc. in at least 1 survey for each cohort. Ongoing/regular collection.	Representative national data providing comprehensive information.
Household Income and Labour Dynamics in Australia Survey	Variables in Waves 7, 9, 13 and 17 for current intention to lose weight and frequency of weight loss diets in the previous 12 months. Ongoing/regular collection.	Representative national data providing partial information.
WA Nutrition Monitoring Survey Series	Availability of healthy and unhealthy food choices in local area, main source of nutrition information, perceived importance of government intervention in nutrition monitoring and education, and importance of promotion of health eating. Ongoing/regular collection	Representative state data providing comprehensive information.
Raine Study	Perceived barriers to physical activity and participation in school sports/physical education, perception of importance of being physically active, frequency of parents/teachers/friends encouraging or helping facilitate physical activity and school facilities. Ongoing/regular collection	Non-representative state data providing partial information.
Jean Hailes Women's Health Survey	Barriers to healthy eating, whether wanted more information on weight management and healthy eating. Ongoing collection.	Limitations with the use or interpretability of the data.
Overall assessment		**Very underdeveloped**

Table 3.4: Assessment of data sources for monitoring management and treatment of overweight and obesity

Data source	Notes	Monitoring relevance
National Hospital Morbidity Database	Collects data on bariatric surgeries and other weight-loss procedures and data for overweight or obesity as a diagnosis for hospital separations. Ongoing/regular collection.	Representative national data providing comprehensive information.
AusDiab	Collects data on medications, advice received from medical professionals regarding weight management, and health and allied service use. No future collections.	Representative national data providing comprehensive information.
Medicare Benefits Schedule (MBS) data	Collects data on weight-loss procedures for clinically severely obese patients (BMI ≥40 or BMI ≥35 with a major medical comorbidity). Ongoing/regular collection.	Representative national data providing partial information.
National Health Survey	Collects data on self-reported medication use for control of chronic conditions, not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
National Aboriginal and Torres Strait Islander Health Survey	Collects data on health services use, hospital visits, hospital admissions and prescription medication use; however, not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
Australian Longitudinal Study on Women's Heath	Collects data on GP, specialist and hospital use; however, not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS) data	Collects data on all PBS and RPBS prescriptions supplied to patients. Only 1 of the 4 approved medications for weight management is included on the RPBS (available only to DVA card holders) and this drug is also available at pharmacies over the counter without a prescription. Ongoing/regular collection.	Representative national data providing partial information.
Bariatric Surgery Registry	Collects data on all bariatric procedures from participating hospitals and specialists. Ongoing/regular collection.	Non-representative national data providing comprehensive information.

Table 3.4 (continued): Assessment of data sources for monitoring management and treatment of overweight and obesity

Data source	Notes	Monitoring relevance
Bettering the Evaluation and Care of Health Survey	Collected data on frequency of counselling/advice on nutrition/weight by GPs, medications, treatments provided for each recorded problem, referrals to specialists and investigations ordered. No future collections.	Non-representative national data providing partial information.
NPS MedicineInsight	Collects data on prescribed medications, GP-managed conditions, pathology test results and referrals. Ongoing/regular collection.	Non-representative national data providing partial information.
NSW Population Health Surveys	Collects data on health service use, current management of diabetes and medication use; however, not directly related to overweight and obesity. Ongoing/regular collection.	Representative state data providing partial information.
45 and Up Study	Data collected on health service use, medications and hospitalisations; however, not directly related to overweight and obesity. Ongoing/regular collection.	Representative state data providing partial information.
Population Level Analysis and Reporting System	Collects data on medications, pathology and diagnostic imaging ordered and diabetes cycle of care records. Ongoing/regular collection.	Non-representative state data providing partial information.
ACT General Health Survey	Collects data on health service access and diabetes management activities; however, not directly related to overweight and obesity. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
South Australia Population Health Survey	Collects data on medications for high blood cholesterol, diabetes and hypertension and medical and mental health service use. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
WA Health and Wellbeing Surveillance System	Data collected on medication use and preventative screening participation for selected health conditions; however, not directly related to overweight and obesity. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
Overall assessment		**Underdeveloped**

Data gaps and limitations

Prevention

Prevention activities are generally carried out outside the health-care system, such as through laws and regulations, taxation, industry action, promotion of health literacy, population health programs, community initiatives and urban planning. Monitoring and evaluation is important to assess the performance of these health promotion initiatives; however, traditional data sources for monitoring population health do no typically collect information on broader prevention activities. There is also very limited information on primary health care activity—such as GP consultations on weight management—of relevance to early detection and ongoing effective management of overweight and obesity and commercial and non-medical prevention activities undertaken by individuals. The limited data available on consumption of commercial weight-loss products and other non-medical prevention strategies (excluding physical activity and nutrition) are more readily available for women than for men, and 3 of the 5 data sources collecting information on these activities do not collect Indigenous status. More data on the commercial weight loss and weight gain prevention activities among men is needed, as are data on the strategies employed be specific population groups of interest.

Clinical management and treatment

There are a limited number of data sources available to provide an overview of the management and treatment services received by people who are affected by overweight or obesity. Gaps and limitations include:

- Data collected as part of Medicare and the PBS provide key national administrative data collections for primary and specialist health care in the community. While being national data sets that are routinely updated, these sources focus on GP, selected allied health care and medical specialist services reimbursed under Medicare and supplied under the PBS/RPBS. This also includes under co-payment data not subsidised. These data sources do not cover the whole primary health care sector (for example, not all allied health services are covered), nor all pharmaceuticals (for example, over-the-counter medications and supplements commonly used for overweight and obesity are not covered). In addition to lack of coverage, these data sources are limited because it is generally not possible to use Medicare or PBS information to link medical interventions undertaken or medications with the problem or condition being treated (that is, there is no information about health conditions, diagnoses or physical measurements attached to Medicare and PBS information).
- Although the BEACH Survey of General Practice collected information about reasons for GP visits, problems managed and medications prescribed by GPs, the survey had limitations due to its methodology, quality assurance processes and coverage, which mean its findings with respect to overweight and obesity need to be interpreted with caution. In addition, the BEACH Survey captured information about GP activity only and not the broader range of health interventions recommended for treating overweight and obesity (for example, physical exercise, nutrition education services and specialist diet services). The BEACH Survey ceased in 2016.

The limitations about primary health care information for overweight and obesity are part of a broader issue with the relative lack of primary health care information in Australia. Despite the primary health-care sector providing the vast majority of health care in Australia, this setting has not experienced the same national focus on data capture, collation and reporting as other parts of the health system. As a result, there are:

- little or only poor quality data collected about a particular service type

- many pieces of data collected at various levels of government are often overlapping, non-standardised and not centrally collated
- substantial volumes of data collected and stored within the private sector—by individual GPs or allied health practices or private health insurers—that have historically not been accessed at a national level
- there are limited comprehensive collections now available on primary health care activities—such as NPS MedicineInsight—but monitoring is not primary purpose of these data sources.

This has meant that, in most cases in relation to primary health care, we have little information about:

- why someone went to a health professional (for example, for weight management advice related to overweight or obesity, or a condition related to overweight and obesity)
- which type(s) of health professional they visited (for example, information is limited to general practice activity under the BEACH Survey, Medicare-reimbursed consultations with specialists and a subset of Medicare-reimbursed services delivered by allied health professionals)
- what occurred during their consultation
- what interventions or management actions were recommended (for example, referral to a weight loss surgeon or allied health professional)
- what outcomes were experienced
- what are the full costs.

These limitations mean that it is not possible to describe accurately the full range of primary health care services currently being accessed by people who are affected by overweight or obesity, nor to understand the level of unmet demand for such services. Additionally, data on interventions undertaken before or in addition to clinical management, such as commercial weight-loss programs or attendance at non-Medicare weight management services (such as naturopaths) is not readily available for monitoring purposes. This particular data gap is discussed further in Section 4.2.

Bariatric surgery

Although the NHMD, MBS and Bariatric Surgery Registry (BSR) can provide data on bariatric surgery, it should be noted that this surgery is considered an intensive intervention and there is a lack of consistency across clinical guidelines for bariatric surgery in Australia (RACS 2015). It is unlikely; for example, that bariatric surgery would be undertaken on people with a BMI less than 30 kg/m^2 (AIHW 2017b; Lee & Dixon 2017a; NHMRC 2013). As such, there is a lack of data on the treatment, prevention and management activities being undertaken by persons who fall into the ‘overweight but not obese’ category, representing a significant gap in our ability to monitor these activities as a whole. The NHMRC clinical guidelines recommend consultation on lifestyle interventions by GPs in the first instance. However, this is difficult to monitor because there is no specific MBS item for weight management plans made by GPs, nor are reasons for referral to allied health professionals who may assist in weight management—such as dietitians or exercise, physiologists—routinely recorded in existing data sources. Improved primary care data may support improved monitoring of treatment, management and prevention activities for persons experiencing less-severe obesity.

Pharmacotherapy

Pharmacotherapy is a recognised intensive intervention for persons affected by overweight and obesity (Lee & Dixon 2017b). However, there are limited data sources collecting information on the prescribing and consumption of these products. For example, of the 4

approved weight-loss medications in Australia, only 1—Orlistat (Xenical)—is listed on the RPBS. Orlistat can be prescribed (to DVA card holders only) with authority to persons with a BMI greater than or equal to 30 kg/m^2 or a BMI equal to or greater than 27 kg/m^2 with at least one obesity-related comorbidity. However, Orlistat is also available over the counter after consultation with a pharmacist so the RPBS data captures only part of the total consumption of the drug (Bray 2016).

The other 3 weight-loss medications, Phentermine (Duromine), Contrave and Liraglutide (Saxenda), are not currently PBS listed and are only available on private prescription. Contrave was only recently (21 August 2018) added to the Australian Register of Therapeutic Goods (ARTG) and it is not yet clear as to whether an application for this drug to be listed on the PBS has been made (TGA 2018).

NPS MedicineInsight collects data about medicines prescribed in participating general practices, but it is not possible to determine whether the patient subsequently filled the prescription after it was prescribed.

Previously, an additional weight loss drug—Sibutramine (Reductil)—was also available in Australia, but was withdrawn from the market in 2010. However, the drug was never listed on the PBS, after 3 unsuccessful Pharmaceutical Benefits Advisory Committee (PBAC) applications in 2006, 2007 and 2008 (PBS 2006, 2007, 2008).

3.4 Key question 4—Health-related quality of life

How do overweight and obesity affect an individual's quality of life?

Why collect information about quality of life?

A person's health can be viewed as not merely the absence of disease, but as a combination of factors related to physical, mental and social wellbeing. As such, quality of life is an important aspect of the health equation. Perceptions of quality of life are subjective and there is no universally agreed definition of what constitutes a 'good' quality of life. Factors that can have an influence include physical health, psychological wellbeing, levels of independence and functioning, social support networks, material resources and personal beliefs. Broader policies, social inequalities and economic factors can also contribute (AIHW 2012a).

Understanding the quality of life of people who are overweight or obese is particularly relevant given the often long-term and relapsing nature of overweight and obesity. Existing literature suggests that the consequences of overweight and obesity for health-related quality of life can include reduced mobility, depression, joint pain and withdrawal from social activities (AIHW 2017a; Hassan et al. 2003; Rotenberg et al. 2017). The literature also suggests that overweight and obesity may impact the overall sense of wellbeing in an individual and can lead to high frequency of sick leave and even early retirement (Wirth et al. 2014).

There are many ways to measure quality of life, with one being to ask individuals how they feel in general. Although such a question is based on personal opinion, the answer generally reflects a combination of physical, psychological and cultural factors. For example, in the ABS 2007 National Survey of Mental Health and Wellbeing, respondents were asked how they felt about their life as a whole, taking into account what had happened in the past year and what was expected to happen in the future (AIHW 2012a).

Data sources for measuring quality of life in Australia include the National Survey of Mental Health and Wellbeing, Measures of Australia's Progress, OECD Better Life Index, the Human

Development Index and the National Health Survey. Difficulties when measuring and analysing quality of life include that there is no agreed definition and no internationally agreed measures. International studies on the nature of quality-of-life measures have suggested that the major challenge lies in the uniqueness of the concept to individuals (Carr & Higginson 2001). Further details on these measures and their complexities are available in the AIHW publication *Australia's Health 2012* (AIHW 2012a).

What information is available?

The most relevant data sources for monitoring quality of life in relation to overweight and obesity are presented in Table 3.5. All data sources include the measurement of BMI (through either measured or self-assessed height and weight) and aspects of quality of life. Our assessment is that the available data sources for this are 'Very underdeveloped'. There are 2 identified data sources that directly ask respondents to evaluate how their body weight impacts their daily functioning, makes them feel, or whether they have experienced social isolation as a direct result of being affected by overweight or obesity. The LSAC and ACT Year 6 Physical Activity and Nutrition Survey provide an insight into bullying related to body weight.

There are numerous other data sources that measure health-related quality of life in general, which can be analysed according to respondents reporting high body mass. In these data sources, participant responses are not necessarily specific to overweight and obesity and there are numerous factors that can have an impact on an individual's quality of life. For example, some respondents—particularly those in the older age groups—may also have other long-term chronic conditions that would contribute to their assessment.

Table 3.5: Assessment of data sources for monitoring quality of life associated with overweight and obesity

Data source	Notes	Monitoring relevance
Longitudinal Study of Australian Children	Collects data on experiencing bullying related to body weight. Ongoing/regular collection.	Representative national data providing partial information.
Household Income and Labour Dynamics in Australia Survey	Data on body weight tested against physical functioning, general health, vitality, social functioning and mental health in Waves 7, 9, 13 and 17. Ongoing/regular collection.	Representative national data providing partial information.
National Health Survey	Collects data on self-assessed health status, bodily pain and disability status. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
Australian Longitudinal Study of Women's Health	Collects a range of quality of life data using several reliable instruments including the SF36 and DSSI. Ongoing/regular collection.	Representative national data providing partial information.
Childhood Determinants of Adults Health Study	Collects data on HRQoL using SF36 tool and self-assessed emotional wellbeing and social support. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.

Table 3.5 (continued): Assessment of data sources for monitoring quality of life associated with overweight and obesity

Data source	Notes	Monitoring relevance
ACT Year 6 Physical Activity and Nutrition Survey	Collects data on self-assessed health status and whether child had experienced bullying related to body weight. Ongoing/regular collection.	Representative state data providing partial information.
Victorian Population Health Survey	Collects data on psychological distress measures, self-assessed health status, social and emotional status and life satisfaction. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative state data providing partial information.
WA Health and Wellbeing Surveillance System	Collects data on self-assessed health, psychological distress, suicidal ideation, mental health service use and psychosocial functioning. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative state data providing partial information.
NSW Population Health Surveys	Collects data on self-assessed health status, life satisfaction and self-rated mental health. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative state data providing partial information.
South Australia Population Health Survey	Collects data on self-assessed health status (using SF-1 tool), psychological distress, suicidal ideation and mental health service use. Ongoing/regular collection.	Representative state data providing partial information.
Australian Longitudinal Study of Ageing	Collects data on psychological and emotional health, self-assessed health status, social support, general life satisfaction, chronic conditions and personal growth. No further collections.	Non-representative state data providing partial information.
ACT General Health Survey	Collects data on psychological distress and self-assessed health status. Not directly related to overweight and obesity. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
NSW School Students Health Behaviours Survey	Collects data on stress, mental health and trouble at school, not directly related to overweight and obesity. Ongoing/regular collection	Limitations with the use or interpretability of the data.

Table 3.5 (continued): Assessment of data sources for monitoring quality of life associated with overweight and obesity

Data source	Notes	Monitoring relevance
Tasmanian Population Health Survey	Collects data on psychological distress, self-reported experiences of mental health problems and self-assessed health status. Not directly related to overweight and obesity. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
45 and Up Study	Collects data on self-rated quality of life, functional capacity and levels of psychological distress. Not directly related to overweight and obesity. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
Overall assessment		**Very underdeveloped**

Data gaps and limitations

Quality of life measures are captured in a range of data sources, but a large gap exists when trying to assess quality of life specifically in relation to overweight and obesity.

3.5 Key question 5—Death and disability

How much death and disability is associated with overweight and obesity.

Why collect information about death and disability?

Information about how much death and disability is associated with overweight and obesity can help guide and monitor targets related to prevention activities. Monitoring death and disability associated with overweight and obesity can also help determine which groups in the population suffer the greatest burden, so health interventions can be effectively targeted and planned.

Disability denotes the negative aspect of an individual's interaction between their health condition and environmental and personal factors. Functioning encompasses all body functions, activities and participation, and refers to the positive aspects of an individual's interaction between their health condition and environmental and personal factors (WHO 2001).

There is no consistent way of measuring disability. For example, the NHS asks participants to comment on the impact of a condition on everyday activities and/or employment. More detailed measures are through questions on the extent in which a long-term illness or pain places a burden on themselves or their family.

Burden of disease studies measure the impact of living with illness and injury (non-fatal burden) and dying prematurely (fatal burden). Burden of disease analysis assesses and compares the health impact of different diseases, conditions, injuries and contribution from risk factors on a population.

Due to their association with a range of chronic conditions, overweight and obesity as a risk factor contributed 7.0% of the total burden of disease in Australia in 2011 (AIHW 2017a).

High body mass ranked second only to tobacco use for contribution total disease burden (AIHW 2016a). High body mass contributed to a higher proportion of disease burden in men than in women (7.3% and 6.6%, respectively) (AIHW 2017a).

Around 63% of the burden contributed by overweight and obesity was fatal burden, as opposed to non-fatal burden, indicating that overweight and obesity contributes to premature death (AIHW 2017a). Other studies have shown that a greater number of years lived with obesity is also associated with increased risk of mortality, and being affected by overweight or obesity is associated with an increased death rate when looking at all causes (Abdullah et al. 2011; Di Angelantonio et al. 2016).

Information about the disabling impact of overweight and obesity is therefore of great interest. It is, however, difficult to separate the disabling effect of overweight and obesity from conditions that occur with, or because of, these conditions. It should be noted that, although high body mass is a recognised contributor to the development of disease that may result in death or disability, it is not common for overweight or obesity to be recorded as the main cause of death or disability in data collections.

What information is available?

The most relevant data sources for monitoring death and disability in relation to overweight and obesity are presented in tables 3.6 and 3.7.

All data sources listed include the measurement of BMI (through either measured or self-assessed height and weight) and aspects of disability and/or death. Our assessment is that the available data sources for death are 'Developed' (Table 3.6) and the data sources for disability are 'Underdeveloped' (Table 3.7).

Linking data sets provides additional opportunities to analyse death and disability associated with overweight and obesity. For example, the ALSWH has permission to link to various data sets such as the National Death Index, MBS, PBS, Admitted Patients Hospitals Collections (currently NSW, QLD, WA and SA), Cancer Registries (currently NSW, QLD, WA, VIC and SA), and aged care data sets. As such, the ALSWH can provide national data on death and disability associated with overweight and obesity for women. Linkage capability has been considered is the assessment of the available sources.

Death

Mortality data are collected on an ongoing basis by state/territory registrars of births, deaths and marriages and coronial services, coded to the International Classification of Diseases by the ABS, and made available to selected users by the Australian Coordinating Registrar under strict privacy restrictions. These data are ongoing, comprehensive and high quality. Data on overweight and obesity as a cause of death are, however, lacking. Although there is a code for obesity as an underlying cause of death, it is rarely (if ever) used. It may arise in the associated cause of deaths, but associated causes (should) reflect conditions that contributed to the death. Comorbidities, such as overweight and obesity, are not mandated on the death certificate if they were not involved in causing death.

The Australian Burden of Disease Study undertaken by the AIHW provides information on the burden of disease for the Australian population, including the Aboriginal and Torres Strait Islander population. The study builds on the AIHW's previous burden of disease studies and disease monitoring work and provides Australian-specific estimates for 200 diseases and injuries, grouped into 17 disease groups, for 2003 and 2011. It also provides estimates of how much of the burden and how many deaths can be attributed to 29 different risk factors.

The most recent AIHW burden of disease study, using 2011 data, included 'high body mass' as a risk factor to disease burden, with the 'attributable burden' representing the reduction in

burden that would have occurred if exposure to the risk factor have been avoided or reduced to the lowest possible exposure. This report included an estimate of the portion of the health burden from overweight and obesity that is attributable to fatal versus non-fatal burden (AIHW 2016b). Updates to this study were released in 2017 (AIHW 2017a) and the AIHW is currently in the process of updating the 2011 disease burden estimates using 2015 data.

Disability

There are numerous data sources that measure 'disability and impairment' in general terms, which can be analysed according to respondents reporting of high body mass, though reports of disability in these sources are unlikely to be reported in direct relation to overweight and obesity.

Table 3.6: Assessment of data sources for monitoring death associated with overweight and obesity

Data source	Notes	Monitoring relevance
Australian Burden of Disease Studies	Data collected on the burden of death and disease directly related to high body mass and related conditions. Ongoing/regular collection.	Representative national data providing partial information.
Australian Longitudinal Study on Women's Health	Participants linked to the National Death Index (NDI) to collect data on deaths and to the Admitted Patients Data Collections and cancer registries. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
Household Income and Labour Dynamics in Australia Survey	Data collected on year of death. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
Childhood Determinants of Adult Health	Participants linked to NDI to collect data on deaths. Not directly related to overweight and obesity. Ongoing collection.	Representative national data providing partial information.
National Mortality Database	Collects data on all deaths with a cause of death or associated cause of death. Data on overweight and obesity are lacking. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
Overall assessment		**Developed**

Table 3.7: Assessment of data sources for monitoring disability associated with overweight and obesity

Data source	Notes	Monitoring relevance
Australian Burden of Disease Studies	Data collected on the burden of disease directly related to high body mass and related conditions. Ongoing/regular collection.	Representative national data providing partial information.
Australian Longitudinal Study on Women's Health	Data collected about disability status and limitations/help needed with daily tasks for each cohort. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
Household Income and Labour Dynamics in Australia Survey	Data collected about long-term health conditions, disability and impairments. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
National Aboriginal and Torres Strait Islander Health Survey	Data collected of self-reported disability status, type of disability and type of restrictions. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
National Health Survey	Data collected on self-reported disability. Not directly related to overweight and obesity. Ongoing/regular collection.	Representative national data providing partial information.
WA Health and Wellbeing Surveillance System	Data collected on self-reported disability and health conditions requiring mobility equipment. Not directly related to overweight and obesity. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
Overall assessment		**Underdeveloped**

Data gaps and limitations

The key limitation with national burden of disease information is that the data are not updated annually; however, the next edition is expected to be published in 2019 (based on 2015 data). In addition, limitations exist in other sources collecting data on death and disability, due to the potential inability of participants to identify high body mass as a source of disability. Also, although disability measures are captured in a range of data sources, a large gap exists when trying to assess disability specifically in relation to overweight and obesity because there are many other potential influencers. This could, however, be accommodated through statistical analysis.

3.6 Key question 6—Health expenditure

The key question that requires answering is:

What is known about expenditure on overweight and obesity?

Why collect information about health expenditure?

Health expenditure data can be used to answer many important questions, such as:

- Who finances the health system and where the funds are directed?
- How much, on average, is spent on health for each Australian?
- At what rate is Australia's health bill growing each year?
- How fast are health prices rising and how does this compare with general inflation?
- How much investment is there in health facilities and equipment?
- How fast are health-care costs rising and how does this compare with general inflation?

Health expenditure for people with overweight or obesity is of particular interest because overweight and obesity are largely preventable, can reoccur throughout the life-course, and can be a significant cause of ill health.

Direct health expenditure on overweight and obesity relate to the costs incurred for prevention and treatment of these weight conditions specifically, such as weight-loss surgery. Funding for these services comes from government and non-government services, including from private health insurance and individuals. In 2014–15, more than 124,000 procedures related to weight-loss surgery were billed to Medicare, the total costs (that is, Medicare paid benefits and out-of-pocket costs combined) for which were around $62.8 million. Of these costs, around $25.7 million were Medicare paid benefits and around $37.1 million were paid by out-of-pocket costs by patient and/or health insurers (AIHW 2017b).

This cost doesn't include a small number of procedures undertaken on public patients in public hospitals, which were funded by the health service budget, or, other hospital or public authority (AIHW 2017b; METeOR 2018) but these constitute less than 2% of procedures.

There are other non-health-care costs and indirect costs that accrue to patients, such as travel costs when accessing health care, social and economic burden on carers and family, and lost wages. For example, for 2017–18 it was estimated that Australians would spend $641.4 million on weight loss counselling services and related low-energy foods and dietary supplements (IBIS World Industry Market Research 2017). However, ongoing and comprehensive data on these costs are not readily available. As such, these costs are not assessed in this report.

Another area of expenditure related to overweight and obesity is funding for research. For example, the National Health and Medical Research Council (NHRMC) granted over $420 million dollars in funds for overweight and obesity research between 2000 and 2017, with the amount of money granted for research in the area increasing each year (NHMRC 2018). In 2017, the NHMRC granted over $26 million to various academic institutions to research overweight and obesity.

What information is available?

The suitability of available data sources for monitoring expenditure associated with overweight and obesity is assessed as 'Very underdeveloped' (Table 3.8), due to the limited information

on the full amount spent on preventing, managing and treating overweight and obesity. There are data in the RPBS (available only to DVA card holders) on 1 of the 3 approved weight-loss medications in Australia—Orlistat—but these data are limited. Orlistat is listed on the PBS/RPBS but can also be purchased over the counter from a pharmacist. According to clinical guidelines, Orlistat should only be prescribed to patients with a BMI equal to or greater than 30 kg/m^2 or patients with a BMI or equal to or greater than 27 kg/m^2 with one or more obesity-related comorbidities (PBS reference). However, investigations by *Choice* magazine in 2016 suggested that Orlistat was being routinely dispensed to persons who did not meet the eligibility criteria (Bray 2016). As such, it is difficult to monitor the consumption of weight-loss medications and the associated expenditure. Information on expenditure directly related to the management and treatment of overweight and obesity comes from data on weight-loss medications from NPS MedicineInsight and the PBS/RPBS, and weight-loss surgery data from the National Hospital Morbidity Database (NHMD), MBS, and the Bariatric Surgery Registry.

Table 3.8: Assessment of data sources for monitoring direct expenditure for overweight and obesity

Data source	Notes	Monitoring relevance
Medicare Benefits Schedule (MBS) data	Collects data on weight-loss procedures for clinically severely obese patients (BMI ≥40 or BMI ≥35 with a major medical comorbidity). Ongoing/regular collection.	Representative national data providing partial information.
National Hospital Morbidity Database	Data collected on funding sources and insurance status of patients who have weight-loss procedures. Ongoing/regular collection.	Representative national data providing partial information.
Australian Longitudinal Study on Women's Health	Participants linked with MBS, PBS and hospital databases, providing approximate health-care costs but cannot be traced to specific conditions. Ongoing/regular collection.	Representative national data providing partial information.
Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS) data	Collects data on all PBS and RPBS prescriptions supplied to patients. Only 1 of the 3 approved medications for weight management is included on the RPBS (available only to DVA card holders) and this drug is also available at pharmacies over the counter without a prescription. Ongoing/regular collection.	Representative national data providing partial information.
Bariatric Surgery Registry	Collects data on all weight-loss surgeries performed at participating hospitals and specialist sites. Ongoing/regular collection.	Non-representative national data providing partial information.
Population Level Analysis and Reporting System	Data collected on MBS items charged for each patient, but cannot be traced to specific conditions. Ongoing/regular collection.	Non-representative state data providing partial information.
NPS MedicineInsight	Data collected on prescribed medications, GP-managed conditions, pathology tests and referrals. Ongoing/regular collection.	Non-representative national data providing partial information.

Table 3.8 (continued): Assessment of data sources for monitoring direct expenditure for overweight and obesity

Data source	Notes	Monitoring relevance
North West Adelaide Health Study	Participants linked with MBS and PBS databases, providing approximate health-care costs, but cannot be traced to specific conditions. No future collections.	Non-representative regional data providing partial information.
45 and Up Study	Participants linked with MBS and PBS databases, providing approximate health-care costs, but cannot be traced to specific conditions. Ongoing/regular collection.	Limitations with the use or interpretability of the data.
Overall assessment		**Underdeveloped**

Data gaps and limitations

The vast majority of obesity-related health expenditure is hidden in several large health service expenditure components, including GP consultations and hospital admissions for conditions associated with obesity. It is, however, difficult to identify what proportion of them are associated with obesity.

It is worth noting that the forthcoming Australian Burden of Disease Study (which will use 2015 data) will include a product on 'health expenditure by disease'. This could be combined with previous work by the AIHW on the proportion of each disease that is due to overweight and obesity to calculate the proportion of health spending due to overweight and obesity.

Allied health services

Although a report by Price Waterhouse Coopers estimated that adults spent approximately $125 million on allied health services for managing overweight and obesity in 2011–12 (PwC Australia 2015), there is currently limited data on individual and government expenditure related to allied health service management of overweight and obesity.

MBS data are available on allied health items claimed for services that may be related to the management and treatment of overweight and obesity—such as dietetics, exercise physiology and diabetes education—but it is not possible to identify from these data the condition for which the treatment has been undertaken.

Early stage prevention, management and treatment activities

Two of the key data sources identified by this assessment—the MBS and Bariatric Surgery Registry—capture only those patients who meet certain requirements (see Section 3.3).

As such, although these data sources provide good data for a portion of the population affected by more-severe levels of obesity, there is comparatively less-reliable data on the costs associated with treatment and management activities of patients experiencing less-severe levels of overweight and obesity.

Additionally, as noted elsewhere in this report, there is a significant lack of data on expenditure associated with prevention activities such as weight-loss products and fitness programs.

Costs to the individual

There are survey-based limited data sources that ask respondents if they experienced cost barriers to eating a healthier diet or losing weight, but there are no known data sources that ask specifically how much the respondent spent on weight loss. This includes health services, gyms and weight-loss products, and whether cost was a barrier to previous weight loss efforts.

4 Discussion

This discussion summarises the outcomes of a comparative assessment (Step 4, Section 1.3) in terms of the relative strength of available data in each of the six areas and outlines several future opportunities for data development.

The comparative assessment process is based on the number of relevant data sources, their individual category ratings, and an overall assessment of the relative depth and breadth of data available in each priority information area (spanning both nationally representative information and complementary information). To some extent, this is an 'on-balance' assessment, which takes into consideration the relative strength of information available across all of the priority information areas.

4.1 Comparative assessment

Priority information areas with well-developed data

Risk factors

Based on assessment of the identified in-scope data collections, Australia has very well-developed data on most modifiable risk factors, particularly the broad lifestyle risk factors implicated for overweight and obesity: nutrition, physical activity and alcohol intake. However, few national representative data sources follow populations over time to support examination of the link between risk factors and health. Most data sources rely of self-reported information, which is prone to under- or over-reporting.

Overall, these limitations do not lessen the collective value of the data available on risk factors, which is considered 'very well developed'. The component on risk factors only considers those that are modifiable at the individual level. Non-modifiable risk factors, such as family history, age and sex, can help identify people at high risk of developing conditions such as overweight and obesity so that prevention strategies and relevant medical services can be targeted and located to best effect. However, because modifiable risk factors are amenable to change in the population, these were selected as the focus area for this report.

Overall rating: Very well developed for risk factor data

Prevalence

There is also well-developed data to monitor the prevalence of overweight and obesity. As with information about risk factors, there are some limitations in that many data sources rely on self-reported information.

Many other questions related to prevalence may be answered through access to high-quality data. These include how the prevalence of overweight and obesity varies according to the demographic factors of the population (for example, socioeconomic position or geographic remoteness), Indigenous status or country of birth, as well as how the prevalence is changing over time. Although not considered in detail here, the Appendix tables indicate for each data source if information is collected to make analyses by these factors possible. However, the available data does not allow for systematic analysis at local levels.

Overall assessment: Very well developed for prevalence data

Priority information areas with developed data

Death and disability

Data are underdeveloped in terms of producing information about disability associated with overweight and obesity. The main limitation in relation to disability for traditional data sources is the difficulty in accurately quantifying disability related specifically to overweight and obesity or where people have multiple chronic conditions.

Methodology and data are developed about the contribution to disease burden and death of overweight and obesity, but they are infrequently updated and often based on older data at time of release. Modelling is used to produce more recent and/or future estimates, partially offsetting this issue. Although Australian deaths data are comprehensive, they are of limited relevance to understanding overweight and obesity because these conditions alone are rarely fatal, and those conditions for which high body mass is an accepted risk factor and **are** fatal (for example, cardiovascular heart disease) cannot be definitively linked to high body mass.

Overall rating: Developed for death data and underdeveloped for disability data

Priority information areas where data requires development

Prevention, management and treatment

Data sources to describe management and treatment activities for overweight and obesity are considered to be underdeveloped, particularly in relation to prevention activity, and the use and appropriateness of care in primary health care settings, particularly in the less-severe stages of overweight and obesity.

Data on prevention is considered to be very underdeveloped, with very few representative data sources collecting information on commercial preventative programs conducted outside the health-care system.

More information is available on the type of care provided to admitted hospital patients, especially those undertaking bariatric surgery. However, most prevention and management activities for overweight and obesity are developed in GP, community and other primary health care settings for which limited systematic data is available.

Information on who received care is part of a broader set of questions about who needs, benefits from and demands care versus those who received it. In asking questions about what services a population group receives with respect to overweight and obesity, we are interested in what services they need, what services they pursue (demand) and the gap between these factors and what they received. These questions cannot be adequately answered using available data, particularly with regard to early intervention strategies—such as supervised lifestyle interventions undertaken with the assistance of allied health professionals or GPs. Data are better developed in the area of intensive interventions at the more-severe stages of overweight and obesity, such as pharmacotherapy and surgical intervention.

Overall rating: Underdeveloped for treatment and management data and very underdeveloped for prevention

Health expenditure

The data relating to expenditure related to overweight and obesity are underdeveloped.

Although there are some data on weight-loss surgery, and there are broad estimates as to total health system expenditure due to overweight and obesity, there is a paucity of data on the financial costs borne by people affected by overweight and obesity—as well as a lack of data on the expenditures associated with less-severe stages of overweight and obesity.

Information about health expenditure is one component of a broader set of questions about direct and indirect costs, costs to individuals versus costs to government, health costs versus broader social costs. These aspects have not been investigated in this report.

Overall rating: Underdeveloped for health expenditure data

Priority information areas where data is lacking

Quality of life

The data sources relating to the impact of overweight and obesity on quality of life are very underdeveloped. Although many sources collect information on quality of life in general, they are not specific about the impact of overweight and obesity.

Overall assessment: Very underdeveloped for quality of life data

Equity-focused monitoring capabilities

A key function of population heath monitoring is to explore how health outcomes differ across population groups. According to the WHO, regular collection of data on health inequalities and the influences of social determinants of health are critical to inform evidence-based programs and policies aimed at closing health gaps. A person's socioeconomic position may determine how often they access health and screening services, their exposure to specific risk factors and determine the health problems they have across the life stages. To monitor how social determinants of health are affecting vulnerable and disadvantaged populations, it is important that data can be analysed according to key indicators such as:

- Indigenous status
- socioeconomic position
- remoteness.

It has been noted in the individual data sources tables where data sources have collected information on these indicators, and a full assessment of each data source's capability to be disaggregated by each of these key indicators is available in Appendix D.

The Australian Bureau of Statistics (ABS) has a specific measure of socioeconomic position called the Socio-Economic Indexes for Areas (SEIFA) that ranks areas in Australia according to relative socioeconomic advantage as disadvantage. There are other indicators that can be used to determine socioeconomic position—such as education or employment—and it has been noted in individual data source entries whether these other measures of socioeconomic position are collected, but they have not been included in the assessment in Appendix D to increase ease of comparison across data sources.

Remoteness refers to the remoteness area under the ABS Australian Statistical Geography Standard (ASGS) Remoteness structure. Access to services can also be measured using the Accessibility and Remoteness Index of Australia (ARIA+) produced by the Hugo Centre for Migration and Population Research at the University of Adelaide. If a data source has collected either or both of these measures, it is considered to have collected a measure of remoteness. However, some data sources may collect more informal measures of remoteness, such as grouping respondents by 'urban' or 'rural' area of residence. For the purposes of the assessment in Appendix D, these informal measures of remoteness have been listed in the 'other geographic information' section because they may require additional analyses to translate them to the ABS measures of remoteness.

Additional geographic information, such as postcode or Primary Health Network can also provide information on sociodemographic factors affecting health for different population groups and depending on completeness can sometime be mapped to SEIFA and ASGS. For example, access to health services and the built environment vary between small geographic areas (such as local government areas) and monitoring health outcomes across these areas can support planning and program implementation that is specific to local population needs. As such, where this information is collected, has been noted in both individual data source entries and in the assessment table.

Overall, a majority of the data sources listed in this report collect Indigenous status, and about half collect a measure of remoteness, where far fewer collect specific measures of socioeconomic position (SEIFA). Almost all sources collect some information that can be used for local area analysis—such as postcode or local government area—but there is a lack of consistency across data sources. For example, some data sources collect suburb or 'area' of residence, rather than postcode, which makes comparisons across data sources difficult.

Overall summary of findings

In summary, this report has identified that the data for monitoring overweight and obesity in Australia are strongest in the areas of modifiable risk factors and prevalence. Data are available but require development in the areas of prevention, management and treatment, and death and disability, and there is a lack of data on quality of life and health expenditure (Table 4.1).

Table 4.1: Assessed data sources—overall rating with respect to each priority information area

Information area	Rating
Risk factors	Very well developed
Prevalence	Very well developed
Death	Developed
Management and treatment	Underdeveloped
Health expenditure	Underdeveloped
Disability	Underdeveloped
Prevention	Very underdeveloped
Quality of life	Very underdeveloped

4.2 Future opportunities for data development

Effective monitoring of overweight and obesity can contribute to efforts to relieve some of the burden from individuals and the health-care system. In view of the limitations in information about overweight and obesity identified in this report, the following section provides suggested opportunities to improve national overweight and obesity monitoring in Australia.

Data integration and linkage

By integrating existing data sources, such as through data linkage, it may be possible to provide a more complete picture of overweight and obesity. Well-developed methods exist, with appropriate protections that help maximise the utility of existing data collected once to be used multiple times.

The AIHW is one of only three accredited Commonwealth Integrating Authorities. This allows the AIHW and other accredited agencies to undertake data linkage work involving Commonwealth data under enhanced security processes and protocols. Examples of such linkage include the National Data Linkage Demonstration Project, the Multi-Agency Data Integration Project (MADIP), and the National Integrated Health Services Information (NIHSI) Analysis Asset.

National Integrated Health Services Information Analysis Asset

The NIHSI intends to link all state and territory hospital, emergency department, MBS, PBS, RPBS, NDI and Residential Aged Care data for 2010–11 onward. The de-identified data from these linked data sets will be available in the near future for analysis by approved analysts—including the AIHW—and can be used to analyse patterns of health service use, chronic condition management, patient journeys and accessibility.

The NIHSI would enable research to be conducted on the journeys through the health system of patients who are overweight or obese and further understand the role of primary care in treating and managing overweight and obesity and their related conditions. Additionally, this data set may provide more detailed information on the characteristics of persons using weight-loss medications, an area in which there is currently a knowledge gap (see sections 3.3 and 3.6).

Multi-Agency Data Integration Project

The MADIP is a cross-portfolio Australian Government partnership that combines longitudinal data on health care, education, government payments and personal income tax with demographic information. As of July 1 2018, the MADIP has been fully operational, with data contributions from the ABS, Australian Taxation Office, Department of Education and Training, Department of Health (including MBS and PBS data), Department of Human Services and the Department of Social Services (Galexia 2018).

The MADIP could be used to investigate the sociodemographic and non-health elements affecting overweight and obesity. If persons who are affected by overweight and obesity are able to be linked to this comprehensive data source, it would provide insight into their income, training and social circumstances. In turn, this information could be interpreted into more-effective and targeted intervention programs.

Primary health care data development

Substantial limitations have been identified in this report in relation to primary health care data and information. Improvements in this area are part of a broader need for information on primary health care utilisation and outcomes—for example, see *Australia's Health 2018* (AIHW 2018).

In the May 2018 Federal Budget, the AIHW received appropriation funding for primary health care data development and the Primary Health Care Data Unit was established to develop a National Primary Health Care Data Asset. This Data Asset will support a more comprehensive understanding of patient outcomes, from diagnosis, treatment and experiences within the primary health care system.

The proposed Data Asset will enable better population health planning, help identify gaps in the provision of primary health care services, and enable reporting of indicators. In the medium term, data from GP electronic health records, the MBS, PBS and immunisation data will be considered for inclusion. In the long term, additional sources may include pathology data and diagnostic imaging data. New and developing data sources, such as patient report experiences measures and patient report outcomes measures, will also be considered.

Preservation of routine collections

The high rating of data availability achieved for some priority information areas (for example, risk factors and prevalence) is due to the comprehensive information available from large, nationally representative surveys such as the NHS and Australian Longitudinal Study on Women's Health. It is important that these data continue to be regularly collected in a comparable way to assess change over time. Additionally, the Ten to Men longitudinal study on the health of men and boys is potentially a substantial ongoing resource to the monitoring of overweight and obesity.

However, there is currently not an ongoing expenditure collection on the costs of overweight and obesity, nor are there substantial longitudinal data to monitor prevention and management activities.

Enhancements to existing data sources

Modifications and enhancements could be undertaken on existing data sources to cover overweight and obesity in more detail. For example, although many data sources collect information on prevalence and quality of life, it is not possible to link the two; that is, the questions on quality of life are general and do not particularly relate to a person's BMI. Although this can provide information on quality of life for people with and without these conditions, it cannot tell us how they directly affect quality of life.

It would also be beneficial to harmonise of state and national data collections, which would allowing data to be pooled and provide larger sample sizes using existing resources.

Emerging and novel data sources

Supermarket, health and wellness technology, commercial and purchasing data

Supermarket data can potentially provide a novel data source to supplement existing food and nutrition data sources. Supermarket data can be collected from several sources, including point-of-sale scanner data (obtained from checkouts) and loyalty program data. The collection of supermarket data is unobtrusive and provides an opportunity for the collection of continuous, objective monitoring of purchasing patterns.

Supermarket data have been used to report on trends in tobacco and soft-drink consumption (Hawthorne 2014, 2017), to compare purchasing patterns between different population groups (Buckeridge et al. 2014), and purchasing practices for 12 months after the introduction of a supermarket in an area previously classified as a 'food desert' (Fuller et al. 2015).

However, there are limitations to using supermarket data in monitoring risk factors to overweight and obesity, because the data measure purchasing behaviour rather than food intake. Additionally, there are potential privacy issues associated with accessing supermarket data, particularly data accessed through loyalty programs.

Another potential novel source of data for monitoring overweight and obesity is data from wearable technology devices and free health and wellness smart phone applications (apps), such as the Fitbit or the MyFitnessPal app. Wearable technology devices objectively capture data such as daily steps, calories burned, heart rate, sleep and sedentary behaviour. These devices are linked to smart phone applications that collect these data, which is then held by the device's manufacturer. For example, it has been estimated that the Fitbit corporation currently hold over 150 billion hours of heart rate data stored (Pogue 2018). Health and wellness applications collect a variety of risk factor data including self-reported height, weight, and detailed nutrition and physical activity data.

The obesity research community has expressed interest in accessing and analysing data collected from these technologies (internal consultation) to complement traditional risk factor data. However, there are limitations to obtaining and using this data. For example, data from wearable devices can be collected only from people who are affluent and health conscious enough to purchase and consistently use the device, and self-reported data recorded in free apps may be inconsistent or incorrect. Additionally, privacy concerns are inevitable in attempting to access app data and—given that the data is primarily held by private companies—may be expensive to obtain.

There is some possibility of analysing purchasing data collected by major financial institutions to monitor purchasing patterns. For example, in 2017 the Commonwealth Bank released a short report detailing the average amount spent per customer in fast food outlets and restaurants per month (CBA 2017). The main finding from the analysis was that Australians were spending 20% more per month in 2017 than in 2015. The report also conducted analyses by state and suburbs. The analyses of bank data such as that used in this type of reporting could be complementary to traditional data sources in monitoring purchasing patterns associated with foods and activities associated with overweight and obesity. However, there are a number of limitations associated with the analyses of purchasing data collected by financial institutions. For example, the amount spent per customer may not be reflective of the amount consumed per customer—a person may purchase fast food for an entire family, but only consume a proportion of the total bought. Additionally, purchasing data from a location does not represent the home location of the customer—suburbs or towns that are popular tourist destinations may appear to have a population purchasing a higher amount of fast foods due to tourist traffic, rather than purchases by the local community. Finally, obtaining purchasing data from financial institutions could be problematic due to privacy concerns and legal constraints.

There has been some successful use of commercial weight management service data—for example, data from Weight Watchers or Jenny Craig—in epidemiological studies to investigate weight outcomes and sociodemographic characteristics of overweight and obese persons using these services (Ahern et al. 2011; Fagg et al. 2015; Finley et al. 2007; Johnson & Wardle 2011). Analysis of these data could provide valuable insight into management activities of those persons who are overweight or obese but choose not to undertake medical management, or undertake extra-clinical management activities concurrent with clinical management—an area in which there is currently a knowledge gap. However, these data are unlikely to be representative and privacy concerns may cause issues with accessing the data (Timmins et al. 2018).

Internet browsing data

An emerging source of complementary monitoring information is internet browsing data. For example, in May 2018 an analysis of Google trends data was presented at the European Congress on Obesity (Pawar 2018). The research showed that, over time, searches using the term 'weight loss' have increased, while those using the word obesity have decreased. The research also showed that a peak in searches for 'weight loss' and related terms occurred in January of every year. The researchers have stated that this information could be used to better target public health promotions around weight loss for when public interest is highest. Another study conducted in the United States analysed bookmarks on the popular recipe site AllRecipes.com over a 9-year period (Trattner et al. 2017). The study used this data to help explain the variance in obesity incidence recorded across the United States, and found that the average fat and sugar content of bookmarked recipes were useful predictors for obesity rates.

Using internet browsing data as a complementary data source for monitoring overweight and obesity is still in its infancy, and there are a number of limitations to using this type of 'big data'. For example, in the Allrecipes.com study, the authors listed user demographics as a key limitation, because the users of the website are skewed towards more wealthy and densely populated areas. This is a general limitation for internet based data, as it may not capture key population groups, such as older people or people without access to a computer or the internet. Additionally, internet browsing data is unlikely to be systematically collected and analyses may therefore be labour intense (Connelly et al. 2016).

Digital health records

An emerging source of health-care data is digital health records. Digital health record systems are currently used in various forms internationally, including in Canada, the USA and the UK. In Australia, digital health record systems can be health-setting, state or federally based—for example, Medical Director software in general practice, Queensland Health's Integrated electronic Medical Record system or the federal government's My Health Record (MHR) program. The MHR is a component of the Australian Government's overarching Digital Health Strategy, which was developed in 2016 and is administered by the Australian Digital Health Agency.

These digital health record systems provide electronic summaries of a patient's encounters with health practitioners, discharges from hospitals and other key health information such as medications, allergies and medical conditions. Digital health information can be collected at point of care using clinical computer software in medical practices, hospitals, pharmacies, pathology collection centres and radiology clinics. Patient health information can also be uploaded by patients into a shared record in some cases, as is the case with the MHR program. Any medical history before the creation of a MHR can be uploaded by clinical practice staff on patient request.

Use of primary health care data obtained from digital health records systems for research and public health can potentially fill significant data gaps in monitoring chronic health conditions such as overweight and obesity, including monitoring prevention and treatment activities for patients who are overweight or obese. The access and use of these data for research and public health purposes from the MHR are governed by the Department of Health's 'Framework to guide the secondary use of My Health Record system data' (DoH 2018).

Limitations on the use of MHR data include coverage issues (because eligible patients may choose to opt-out or withdraw consent for their health information being loaded to their digital health record) and accuracy of data, because patients with a MHR are entitled to hide or remove specific health information from their digital health record. Patients with a MHR are also able to withdraw their consent for use of their health data for research and public health at any time.

In-school monitoring

There is currently a number of in-school health monitoring programs in Australian states and territories. For example, in the ACT, registered nurses from ACT Health attend all primary schools to conduct Kindergarten Health Checks at the beginning of each school year to offer health checks for children. The Kindergarten Health Check includes measurement of height and weight. If parents choose to opt in for this program and provide details of their family GP, measurements are taken at school and the results are sent home to parents and a summary report is sent to the child's GP. De-identified data are held by ACT Health for research purposes (ACT Health 2018). Similar programs exist in other states and territories, with variations in the measurements taken, methods of data collection and use of data by state and territory health departments. However, there is currently no national system in place to collect and collate data from in-school health programs.

Over the past decade, researchers from Deakin University WHO Collaborating Centre for Obesity Prevention (GLOBE) have called for the introduction of a national opt-out childhood obesity-monitoring program in Australian schools (Swinburn et al. 2008). In the most recently proposed program, trained clinicians would attend schools bi-annually to collect BMI measurements (Oaten 2018). Measurements would be collected in private and would not be disclosed to the child or child's teachers and parents. Parents may choose to opt-out of the monitoring program, and no measurement could be made without the verbal consent of the child (Olds 2018). GLOBE researchers have proposed that data obtained from such a surveillance program may fill data gaps in current school monitoring program data, such as data at small local levels.

A study is currently being conducted by researchers from Deakin University in regional Victoria (see entry 11 in Appendix C). However, it should be considered that the current school screening policies in states and territories may place limitations on the use of an opt-out consent model.

Environmental risk and market monitoring

The impact of both global and local environmental risk factors on overweight and obesity has been well documented (Hinde & Dixon 2005; Swinburn et al. 2011; Townshend & Lake 2017), as has the influence of food markets and food advertising (Boyland & Halford 2013; Cairns et al. 2013; Jolly 2011; Kelly et al. 2013; Nutrition Australia 2009; Obesity Policy Coalition 2017). Currently, it is uncommon for population health surveys to collect routine data on these risk factors and exposures. This data gap has a significant impact on our understanding of how environment and market forces contribute to the risk of becoming overweight and obese at a population level.

However, there are number of non-population health-based data sources that are well placed to fill some of these gaps. These data may be used in conjunction with other population health data to measure the impact of these environmental and market forces. For example, geospatial mapping data—where maps showing population density, location of services and infrastructure are produced by geographic area—may be used in conjunction with population health surveys to measure the prevalence of obesity in a community before and after safe walking paths or other urban planning measures that encourage physical activity are introduced.

Some other examples of these data include, but are not limited to:

- Euromonitor
- Neilson data (market research)
- George Institute Global Food Monitoring Initiative (food composition monitoring)
- GIS mapping (food outlet density and public transport availability)
- State and territory government travel and transport data
- ABS Personal Safety Survey (feelings of safety using public transport).

These data can be used to produce general trends over time to compare with changes in prevalence of overweight and obesity. These data, however, are often privately held and the costs associated with obtaining data can be prohibitive.

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Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ACTGHS	ACT General Health Survey
ACTPANS	ACT Year 6 Physical Activity and Nutrition Survey
ALSA	Australian Longitudinal Study of Ageing
ALSWH	Australian Longitudinal Study on Women's Health
ANZOS	the Australian and New Zealand Obesity Society
ANZSCTS	the Australian and New Zealand Society of Cardiac and Thoracic Surgeons
ANZSGM	the Australian and New Zealand Society for Geriatric Medicine
AIHW	Australian Institute of Health and Welfare
ASGS	Australian Statistical Geography Standard
BEACH	Bettering the Evaluation and Care of Health (Survey of General Practice)
BMI	body mass index
BSR	Bariatric Surgery Registry
CATI	Computer-assisted telephone interview
CDAH	Childhood Determinants of Adult Health Study
CDC	Centers for Disease Control and Prevention
DHS	Department of Human Services
DSS	Department of Social Services
GLOBE	the Global Obesity Centre
GP	general practitioner
HILDA	Household, Income and Labour Dynamics in Australia Survey
HRQoL	Health related quality of life
LSAC	Growing up in Australia: The Longitudinal Study of Australian Children
LSIC	Footprints in Time: The Longitudinal Study of Indigenous Children
LSAY	Longitudinal Study of Australian Youth
MADIP	Multi-Agency Data Integration Project
MBS	Medical Benefits Schedule
NaSSDA	National Secondary Students' Diet and Activity survey
NATSIHS	National Aboriginal and Torres Strait Islander Health Survey

NATSINPAS	National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey
NCSD	National Cardiac Surgery Database
NDI	National Death Index
NHS	National Health Survey
NHMD	National Hospital Morbidity Database
NHMRC	National Health and Medical Research Council
NIHSI	National Integrated Health Service Information Analysis Asset
nKPI	National Key Performance Indicators
NNPAS	National Nutrition and Physical Activity Survey
NNS	National Nutrition Survey
NMD	National Mortality Database
NPDC	National Perinatal Data Collection
NSW	New South Wales
NWAHS	North West Adelaide Health Study
OECD	Organisation for Economic Co-operation and Development
PBS	Pharmaceutical Benefits Scheme
RPBS	Repatriation Pharmaceutical Benefits Scheme
POLAR	Population Level Analysis and Reporting System
QPHS	Queensland Preventative Health Survey
SA	South Australia
SAPHS	South Australian Population Health Survey
SEIFA	Socio-Economic Indexes for Areas
SEARCH	The Study of Environment on Aboriginal Resilience and Child Health
SPANS	NSW Schools Physical Activity and Nutrition Survey
TPHS	Tasmanian Population Health Study
VPHS	Victorian Population Health Study
WA HWSS	Western Australia Health and Wellbeing Surveillance System
WA NMSS	Western Australia Nutrition Monitoring Survey Series
WHO	World Health Organization

Glossary

Aboriginal or Torres Strait Islander: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander.

allied health professional: A health professional who is not a doctor, nurse or dentist. Allied health professionals include (but are not limited to) Aboriginal and Torres Strait Islander health practitioners, chiropractors, occupational therapists, optometrists, osteopaths, pharmacists, physiotherapists, podiatrists, psychologists, sonographers and speech pathologists.

asthma: A common, chronic inflammatory disease of the air passages that presents as episodes of wheezing, breathlessness and chest tightness due to widespread narrowing of the airways and obstruction of airflow.

attrition: The loss of participants in a longitudinal study over time.

back pain and problems: Range of conditions related to the bones, joints, connective tissue, muscles and nerves of the back. Back problems are a substantial cause of disability and lost productivity.

blood cholesterol: Fatty substance produced by the liver and carried by the blood to supply the rest of the body. Its natural function is to supply material for cell walls and for steroid hormones, but if levels in the blood become too high this can lead to atherosclerosis (a disease in which plaque builds up inside the arteries) and heart disease.

blood pressure: The force exerted by the blood on the walls of the arteries as it is pumped around the body by the heart. It is written, for example, as 134/70 mmHg, where the upper number is the systolic pressure (the maximum force against the arteries as the heart muscle contracts to pump the blood out) and the lower number is the diastolic pressure (the minimum force against the arteries as the heart relaxes and fills again with blood). Levels of blood pressure can vary greatly from person to person and from moment to moment in the same person. See also **high blood pressure/hypertension**.

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, $kg \div m^2$. For both men and women, underweight is a BMI below 18.5, acceptable weight is from 18.5 to less than 25, overweight but not obese is from 25 to less than 30, and obese is 30 and over. Sometimes overweight and obese are combined—defined as a BMI of 25 and over.

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

burden of disease: A term referring to the quantified impact of a disease or an individual or population, using the **disability-adjusted life year (DALY)** measure.

cardiovascular disease: Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular).

cause(s) of death: All diseases, morbid conditions or injuries that either resulted in or contributed to death—and the circumstances of the accident or violence that produced any such injuries—that are entered on the Medical Certificate of Cause of Death.

chronic diseases/conditions: A diverse group of diseases/conditions, such as heart disease, cancer and arthritis, which tend to be long lasting and persistent in their symptoms or development. Although these features also apply to some communicable diseases (infectious diseases), the term is usually confined to non-communicable diseases.

chronic kidney disease: A term that refers to all conditions to the kidney, lasting at least 3 months, where a person has had evidence of kidney damage and/or reduced kidney function, regardless of the specific cause.

cohort: A group of people who share a similar characteristic (for example, age).

comorbidity: A situation where a person has two or more health problems at the same time.

condition (health condition): A broad term that can be applied to any health problem, including symptoms, diseases and various risk factors (such as high blood cholesterol, and obesity).

data linkage: The bringing together (linking) of information from two or more different data sources that are believed to relate to the same entity (for example, the same individual or the same institution). This linkage can yield more information about the entity and, in certain cases, provide a time sequence—helping to 'tell a story', show 'pathways' and perhaps unravel cause and effect. The term is used synonymously with 'record linkage' and 'data integration'.

dementia: A general term for disorders characterised by worsening mental processes (such as Alzheimer disease or vascular dementia). Symptoms include impaired memory, understanding, reasoning and physical functioning.

depression: A mood disorder with prolonged feelings of being sad, hopeless, low and inadequate, with a loss of interest or pleasure in activities and often with suicidal thoughts or self-blame.

determinant: Any factor that can increase the chances of ill health (risk factors) or good health (protective factors) in a population or individual. By convention, services or other programs that aim to improve health are usually not included in this definition.

diabetes (diabetes mellitus): A chronic condition where the body cannot properly use its main energy source—the sugar glucose. This is due to a relative or absolute deficiency in insulin, a hormone produced by the pancreas that helps glucose enter the body's cells from the bloodstream and be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood; it can have serious short- and long-term effects.

diagnostic imaging: The production of diagnostic images, such as computed tomography, magnetic resonance imaging, X-rays, ultrasound and nuclear medicine scans.

digital health: The electronic management of health information. This includes using technology to collect and share a person's health information. It can be as simple as a person wearing a device to record how much exercise they do each day, to health-care providers sharing clinical notes about an individual.

disability: An umbrella term for any or all of the following: an impairment of body structure or function, a limitation in activities, or a restriction in participation. Disability is a multidimensional concept and is considered as an interaction between health conditions and personal and environmental factors.

disability-adjusted life year (DALY): A year (1 year) of healthy life lost, either through premature death or equivalently through living with disability due to illness or injury. It is the basic unit used in burden of disease and injury estimates.

disease: A physical or mental disturbance involving symptoms (such as pain or feeling unwell), dysfunction or tissue damage, especially if these symptoms and signs form a recognisable clinical pattern.

gallbladder disease: Conditions affect the gallbladder, a small organ that helps digestion.

general practitioner (GP): A medical practitioner who provides primary comprehensive and continuing care to patients and their families in the community.

gout: A disease brought on by excess uric acid in the blood, causing attacks of joint pain (most often in the big toe) and other problems.

health promotion: A broad term to describe activities that help communities and individuals increase control over their health behaviours. Health promotion focuses on determining and preventing the root causes of ill health, rather than on treatment and cure.

high blood cholesterol: Total cholesterol levels above 5.5 mmol/L.

high blood pressure/hypertension: Definitions can vary, but a well-accepted definition is from the World Health Organization: a systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or if [the person is] receiving medication for high blood pressure. See also **blood pressure**.

Index of Relative Socio-Economic Disadvantage (IRSD): One of the set of **Socio-Economic Indexes for Areas** for ranking the average socioeconomic conditions of the population in an area. It summarises attributes of the population such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations.

Indigenous: A person of Aboriginal and/or Torres Strait Islander descent who identified as an Aboriginal and/or Torres Strait Islander. See also **Aboriginal or Torres Strait Islander**.

insulin: A hormone produced by the pancreas, which regulates the body's energy sources, most notably the sugar glucose. It is an injectable agent that helps lower blood glucose levels by moving glucose into cells to be used as energy.

intervention (for health): Any action taken by society or an individual that 'steps in' (intervenes) to improve health, such as medical treatment and preventive campaigns.

life course: A series of life stages that people are normally expected to pass through as they progress from birth to death. For example, stages often included are: birth and infancy, childhood, youth, working age and older age.

life expectancy: An indication of how long a person can expect to live, depending on the age they have already reached. Technically, it is the number of years of life left to a person at a particular age if death rates do not change. The most commonly used measure is life expectancy at birth.

medical specialist: A doctor who has completed advanced education and clinical training in a specific area of medicine.

Medicare: A national, government-funded scheme that subsidises the cost of personal medical services for all Australians and aims to help them afford medical care. The Medicare Benefits Schedule (MBS) is the listing of the Medicare services subsidised by the Australian Government. The schedule is part of the wider Medicare Benefits Scheme (Medicare).

medications: Benefit-paid pharmaceuticals and other medications.

monitoring (of health): A process of keeping a regular and close watch over important aspects of the public's health and health services through various measurements, and then regularly reporting on the situation, so that the health system and society more generally can plan and respond accordingly. The term is often used interchangeably with surveillance, although surveillance may imply more urgent watching and reporting, such as the surveillance of infectious diseases and their epidemics. Monitoring can also be applied to individuals, such as hospital care where a person's condition is closely assessed over time.

morbidity: The ill health of an individual and levels of ill health in a population or group.

mortality: Number or rate of deaths in a population during a given time period.

My Health Record: An online platform for storing a person's health information, including their Medicare claims history, hospital discharge information, diagnostic imaging reports, and details of allergies and medications.

non-fatal burden: The quantified impact on a population of ill health due to disease or injury. Measured as years lived with disability (YLD), which is also sometimes referred to as years of healthy life lost due to disability (YLL).

non-Indigenous: People who have declared that they are not of Aboriginal or Torres Strait Islander descent.

nutrition: The intake of food, considered in relation to the body's dietary needs.

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.

Organisation for Economic Co-operation and Development (OECD): An organisation of 35 countries, including Australia, that are mostly developed but with some emerging (such as Mexico, Chile and Turkey); the organisation's aim is to promote policies that will improve the economic and social wellbeing of people around the world.

over-the-counter medicines: Medicine that can be bought without a prescription from a pharmacy or retail outlet.

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

overweight but not obese: Defined for the purpose of population studies as a **body mass index** between 25 and less than 30.

pathology: A general term for the study of disease, but often used more specifically to describe diagnostic services that examine specimens, such as samples of blood or tissue.

Pharmaceutical Benefits Scheme (PBS): National, government-funded scheme that subsidises the cost of a wide range of pharmaceutical drugs for all Australians to help them afford standard medications. The Schedule of Pharmaceutical Benefits (schedule) lists all the medicinal products available under the PBS and explains the uses for which they can be subsidised.

pharmacotherapy: The treatment of disease and illnesses using pharmaceutical drugs.

population health: Typically, the organised response by society to protect and promote health, and to prevent illness, injury and disability. Population health activities generally focus on:

- prevention, promotion and protection rather than treatment
- populations rather than on individuals
- the factors and behaviours that cause illness.

In this sense, the term is often used synonymously with public health. It can also refer to the health of particular subpopulations, and comparisons of the health of different populations.

prescription pharmaceuticals: Pharmaceutical drugs available only on the prescription of a registered medical or dental practitioner and available only from pharmacies.

prevalence: The number or proportion (of cases, instances, and so forth) in a population at a given time. For example, in relation to cancer, refers to the number of people alive who had been diagnosed with cancer in a prescribed period (usually 1, 5, 10 or 26 years).

prevention (of ill health or injury): Action to reduce or eliminate the onset, causes, complications or recurrence of ill health or injury.

primary health care: Services delivered in many settings, such as general practices, community health centres, Aboriginal health services and allied health practices (for example, physiotherapy, dietetic and chiropractic practices) and come under numerous funding arrangements. Expenditure on primary health care includes recurrent expenditure on health goods and services, such as on medical services, dental services, other health practitioner services, pharmaceuticals and community and public health services.

private hospital: A privately owned and operated institution, catering for patients who are treated by a doctor of their own choice. Patients are charged fees for accommodation and other services provided by the hospital and by relevant medical and allied health practitioners. The term includes acute care and psychiatric hospitals as well as private free-standing day hospital facilities.

procedure: A clinical intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, and requires specialist training and/or special facilities or equipment available only in the acute-care setting.

public health: Activities aimed at benefiting a population, with an emphasis on prevention, protection and health promotion as distinct from treatment tailored to individuals with symptoms. Examples include the conduct of anti-smoking education campaigns, and screening for diseases such as cancer of the breast and cervix. See also **population health**.

public hospital: A hospital controlled by a state or territory health authority. In Australia, public hospitals offer free diagnostic services, treatment, care and accommodation to all eligible patients.

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 (ASGC) (before 2011) or the Australian Statistical Geographical Standard (ASGS) (from 2011 onwards) in each Census year. The five Remoteness Areas are *Major cities*, *Inner regional*, *Outer regional*, *Remote* and *Very remote*.

Repatriation Pharmaceutical Benefits Scheme (RPBS): An Australian Government scheme that provides a range of pharmaceuticals and wound dressings at a concessional rate for the treatment of eligible veterans, war widows/widowers and their dependants.

risk factor: Any factor that represents a greater risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease; others are not necessarily so. Along with their opposites (protective factors), risk factors are known as **determinants**.

Screening (for health): A systematic method of detecting **risk factors** or suspicious abnormalities among people who are symptom free, so that health problems can be either prevented or followed up, diagnosed and treated as early as possible. Screening is usually done through special programs aimed at higher risk groups in the population. A variant of screening, often known as case-finding, is where clinicians opportunistically look for risk factors or abnormalities in people when seeing them for other reasons; for example, when many doctors routinely measure blood pressure in all patients consulting them.

screen time: Activities done in front of a screen, such as watching television, working on a computer, or playing video games.

social determinants of health: The circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies and politics.

Socio-Economic Indexes for Areas (SEIFA): 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 five groups (quintiles)—from the most disadvantaged (worst off or lowest socioeconomic area) to the least disadvantaged (best off or highest socioeconomic area).

underweight: A category defined for population studies as a body mass index less than 18.5.

References

Abdullah A, Wolfe R, Stoelwinder JU, de Courtern M, Stevenson C, Walls HL et al. 2011. The number of years lived with obesity and the risk of all-cause and cause-specific mortality. International Journal of Epidemiology 40(4):985–96.

ABS (Australian Bureau of Statistics) 1995. How Australians measure up. ABS cat. no. 4359.0. Canberra: ABS.

ABS 2003. National Health Survey: user's guide, 2001. ABS cat. no. 4363.0.55.001. Canberra: ABS.

ABS 2014. Australian Aboriginal and Torres Strait Islander Health Survey: updated results, 2012–13. ABS cat. no. 4727.055.006. Canberra: ABS.

ABS 2015. National Health Survey: first results, 2014–15. ABS cat. no. 4364.0.55.001. Canberra: ABS.

ACT Health 2018. School Health. Canberra: ACT Government. Viewed 29 November 2018, https://www.health.act.gov.au/services-and-programs/women-youth-and-children/children-and-youth/school-health.

Ahern AL, Olson AD, Aston LM & Jebb SA 2011. Weight Watchers on prescription: an observational study of weight change among adults referred to Weight Watchers by the NHS. BioMed Central Public Health 11(1):434.

AIHW (Australian Institute of Health and Welfare) 2009. Prevention of cardiovascular disease, diabetes and chronic kidney disease: targeting risk factors. Cat. no. PHE 118. Canberra: AIHW.

AIHW 2012a. Australia's health. Cat. no. AUS 156. Canberra: AIHW.

AIHW 2012b. Risk factors contributing to chronic disease. Cat. no. PHE 157. Canberra: AIHW.

AIHW 2014. Data sources for monitoring arthritis and other musculoskeletal conditions. Arthritis series no. 19. Cat. no. PHE 175. Canberra: AIHW.

AIHW 2016a. Australia's health. Cat. no. AUS 199. Canberra: AIHW.

AIHW 2016b. Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2011. Australian Burden of Disease Study series no. 3. Cat. no. BOD 4. Canberra: AIHW.

AIHW 2017a. Impact of overweight and obesity as a risk factor for chronic conditions. Australian Burden of Disease Study series no. 11. Cat. no. BOD 12. Canberra: AIHW.

AIHW 2017b. Weight loss surgery in Australia 2014–15: Australian hospital statistics. Cat. no. HSE 186. Canberra: AIHW.

AIHW 2018. Australia's health. Cat. no. AUS 221. Canberra: AIHW.

ANZOS (Australian and New Zealand Obesity Society) 2018. Australian Obesity Management Algorithm. Viewed 18 July 2018.

ANZSGM (Australian and New Zealand Society of Geriatric Medicine) 2011. Position statement no. 19: obesity and the older persons. Sydney: ANZGSM. Viewed 12 August 2018.

Boyland EJ & Halford JC 2013. Television advertising and branding. Effects on eating behaviour and food preferences in children. Appetite 62:236–241.

Bray K 2016. Is Xenical right for you? Choice. Viewed 18 September 2018, https://www.choice.com.au/health-and-body/diet-and-fitness/weight-loss/articles/xenical.

Brehm B & D'Alessio DA 2014. Environmental factors influencing obesity. In: De Groot LJ, Chrousos G & Dungan K (eds.) Endotext. South Dartmouth MA USA: MDtext.

Buckeridge DL, Chaland K, Labban A & Ma Y 2014. A method for neighbourhood-level surveillance of food purchasing. Annals of the New York Academy of Sciences 1331(1):270–277.

Burke MA & Carman KG 2017. You can be too thin (but not too tall): social desirability bias in self-reports of weight and height. Economics and Human Biology 27(Pt A):198–222. doi:10.1016/j.ehb.2017.06.002.

Cairns G, Angus K, Hastings G & Caraher M 2013. Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. Appetite 62:209–215.

Capodaglio P, Castelnuovo G, Brunani A, Vismara L, Villa V, Capodaglio EM 2010. Functional limitations and occupational issues in obesity: a review. International Journal of Occupational Safety and Erognomics 16(4):507–23.

Carr A & Higginson IJ 2001. Are quality of life measures patient centred? British Medical Journal 322(7298):1357–1360.

Caruana EJ, Roman M, Hernandez-Sanchez J, Piergiorgio S 2015. Longitudinal studies. Journal of Thoracic Disease 7(11):E537–E540.

Carter M & Swinburn B 2004. Measuring the 'obesogenic' food environment in New Zealand primary schools. Health Promotion International 19(1):15–20.

CBA (Commonwealth Bank of Australia) 2017. Aussies splurge on fast food and restaurants. Media release by CBA, 13 November. Viewed 18 September 2018, https://www.commbank.com.au/guidance/newsroom/Aussies-splurge-on-dining-out-201711.html.

CDC (Centres for Disease Control and Prevention) 2017. Adult obesity causes and consequences. Atlanta GA: CDC. Viewed 14 August 2018, https://www.cdc.gov/obesity/adult/causes.html.

Connelly R, Playford CJ, Gayle V & Dibben C 2016. The role of administrative data in the big data revolution in social science research. Social Science Research 59. doi:10.1016/j.ssresearch.2016.04.015.

Cooksey-Stowers K, Schwartz MB & Brownell KD 2017. Food swamps predict obesity rates better than food deserts in the United States. International Journal of Environmental Research and Public Health 14(11):1366.

COAG HC (Council of Australian Governments Health Council) 2018. Communiqué. 12 October. Canberra: CHC.

Dal Grande E, Fullerton S & Taylor AW 2012. Reliability of self-reported health risk factors and chronic conditions questions collected using the telephone in South Australia, Australia. BMC Medical Research Methodology 12(108):1471–2288. doi:10.1186/1471-2288-12-108.

Davy BM & Estabrooks PA 2015. The validity of self-reported dietary intake data: focus on the 'What WE Eat in America' component of the National Health and Nutrition Examination Survey Research Initiative. Mayo Clinic Proceedings 90(7):845–847.

DoH (Department of Health) 2018. Framework to guide the secondary use of My Health Record system data. Canberra: DoH.

Di Angelantonio E, Bhupathiraju ShN, Wormser D, Gao P, Kaptoge S & Berrington de Gonzalez A 2016. Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. The Lancet 388(10046):776–86.

Egger G & Swinburn B 1997. An ecological approach to the obesity pandemic. British Medical Journal 315(7106):477–480.

Elliott SA, Baxter KA, Davies PSW & Truby, H 2014. Accuracy of self-reported physical activity levels in obese adolescents. Journal of Nutrition and Metabolism 2014:808659. doi:10.1155/2014/808659.

Fagg J, Cole TJ, Cummins S, Goldstein H, Morris S, Radley D et al. 2015. After the RCT: who comes to a family-based intervention for childhood overweight or obesity when it is implemented at scale in the community? Journal of Epidemiology and Community Health 69(2):142–48.

Finley CE, Barlow CE, Greenway FL, Rock CL, Rolls BJ & Blair SN 2007. Retention rates and weight loss in a commercial weight loss program. International Journal of Obesity 31(2):292–8.

Fuller D, Engler-Stringer R & Muhajarine N 2015. Examining food purchasing patterns from sales data at a full-service grocery store intervention in a former food desert. Preventative Medicine Reports 2(2):164–9.

Galexia 2018. ABS NHS Linkage Independent Privacy Impact Assessment (PIA). Sydney: Galexia. Viewed 5 September.

GLOBE (Global Obesity Centre) 2018. Submission to the Select Committee into the obesity epidemic in Australia. Deakin University, Geelong: GLOBE.

Gustavson K, von Soest T, Karevold E & Roysamb E 2012. Attrition and generalizability in longitudinal studies: findings from a 15-year population-based study and a Monte Carlo simulation study. BMC Public Health 12(198). doi:10.1186/1471-2458-12-918.

Hassan MK, Joshi AV, Madhavan SS & Amonkar MM 2003. Obesity and health-related quality of life: a cross-sectional analysis of the US population. International Journal of Obesity 27(10):1227–32.

Hawthorne M 2014. Cigarettes and junk food dominate supermarket sales growth. The Sydney Morning Herald, 21 November.

Hawthorne M 2017. Coles and Woolworths' soft drink sales slump amid health fears. The Sydney Morning Herald, 27 January.

Hayes AJ, Kortt MA, Clarke PM & Brandrup JD 2008. Estimating equations to correct self-reported height and weight: implications for prevalence of overweight and obesity in Australia. Australian and New Zealand Journal of Public Health 32(6):542–545.

Herbert JR, Hurley TG, Peterson KE, Resnicow K, Thompson FE, Yaroch AL et al. 2008. Social desirability trait influences on self-reported dietary measures among diverse participants in a multicentre multiple risk factor trial. The Journal of Nutrition 138(1):226S–234S.

Hinde S & Dixon J 2005. Changing the obesogenic environment: insights from a cultural economic of car reliance. Transportation Research Part D: Transport and Environment 10(1):31–53.

IBIS World Industry Market Research 2017. Weight loss services—Australia Market Research Report. Melbourne: IBIS. Viewed 15 August 2018, https://www.ibisworld.com.au/industry-trends/market-research-reports/personal-services/weight-loss-services.html.

Johnson F & Wardle J 2011. The association between weight loss and engagement with a web-based food and exercise diary in a commercial weight loss programme: a retrospective analysis. International Journal of Behavioral Nutrition and Physical Activity 8(83). doi:10.1186/1479-5868-8-83.

Jolly R 2011. Marketing obesity? Junk food, advertising and kids. Research paper no. 9 2010–11. 12 January. Canberra: Parliament of Australia. Viewed 8 November 2018, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1011/11rp09#_Toc282609524.

Kelly B, King L, Baur L, Rayner M, Lobstein T, Monterio C et al. 2013 Monitoring food and non-alcoholic beverage promotions to children. Obesity Reviews 14(Supplement 1):59–69. doi:10.1111/obr.12076.

King BM, Cespedes VM, Burden GK, Brady SK, Clement LR, Abbott EM et al. 2018. Extreme under-reporting of body weight by young adults with obesity: relation to social desirability. Obesity Science and Practice 4(2):129–133.

Korda RJ, Joshy G, Paige E, Butler JRG, Jorm LR, Liu B et al. 2015. The relationships between body mass index and hospitalisation rates, days in hospital and costs: findings from a large prospective linked data study. PLoS One 10(3):e0118599.

Lee PC & Dixon J 2017a. Bariatric–metabolic surgery: a guide for the primary care physician. Australian Family Physician 46(7):465–71.

Lee PC & Dixon J 2017b. Pharmacotherapy for obesity. Australian Family Physician 46(7):472–477 Viewed 19 September 2018, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1011/11rp09#_Toc282609524 .

Livingston M & Callinan S 2015. Under-reporting in alcohol survey: whose drinking is under-estimated? Journal of Studies on Alcohol and Drugs 76(1):158–164.

METeOR (Metadata Online Registry) 2018. Episode of care—source of funding, patient funding source code NN. 25 January. Canberra: AIHW. Viewed 13 November 2018, http://meteor.aihw.gov.au/content/index.phtml/itemId/679815.

Millar L, Malakellis M, Hoare E, Sanigorski A, Nichols M, Swinburn B et al. 2015. Systems approach to reducing unhealthy weight in Australia adolescents: ACT 'It's Your Move!' Melbourne: Deakin University, GLOBE.

Miller TM, Abdel-Maksoud MF, Crane LA, Marcus AC & Byers TE 2008. Effects of social approval bias on self-reported fruit and vegetable consumption: a randomized controlled trial. Nutrition Journal 7(18). doi:10.1186/1475-2891-7-18.

NHMRC (National Health and Medical Research Council) 2013. Clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia. Melbourne: NHMRC.

NHMRC 2013. Clinical practice guidelines for the management of overweight and obesity and in adults, adolescents and children in Australia. Melbourne: NHMRC.

NHMRC 2018. Obesity research expenditure funding and grants database. Canberra: NHRMC.

Neuhouser ML, Di C, Tinker LF, Thomson C, Sternfeld B, Mossavar-Rahmani Y et al. 2013. Physical activity assessment: biomarkers and self-report of activity-related energy expenditure in the Women's Health Initiative. American Journal of Epidemiology 177(6):576–85. doi:10.1093/aje/kws269.

NFOS (Nepean Family Obesity Service) 2018. Submission to the Senate Select Committee into the obesity epidemic is Australia. Sydney: NFOS.

Nutrition Australia 2009. Position statement: food advertising directed at children. Canberra: Nutrition Australia.

Oaten J 2018. Children to be weighed and measured at school every two years in proposal to tackle obesity. ABC News, 21 July. Viewed 5 September 2018, http://www.abc.net.au/news/2018-07-21/obesity-plan-to-weigh-and-measure-children-at-school/10021260.

Obesity Policy Coalition 2017. Policies for tackling obesity and creating healthier food environments: scorecard and priority recommendations for Australian governments. Melbourne: Obesity Policy Coalition.

OECD (the Organisation for Economic Co-operation and Development) 2017a. Health at a Glance 2017: OECD Indicators. Paris: OECD Publishing. Viewed 9 August 2018, https://doi.org/10.1787/health_glance-2017-en.

OECD 2017b. Obesity update. Paris: OECD Publishing. Viewed 8 August 2018.

Olds T 2018. Weighing kids at school has more pros than cons but the reasons may surprise you. The Conversation, 25 July. Viewed 5 September 2018, http://theconversation.com/weighing-kids-at-school-has-more-pros-than-cons-but-the-reasons-may-surprise-you-100387.

Pawar AS 2018. Google search data shows weight loss searches have increased over time while those on obesity have decreased. Press release for EurekAlert, 25 May. Viewed 18 September 2018, https://www.eurekalert.org/pub_releases/2018-05/eaft-gsd052418.php.

PBS (Pharmaceutical Benefits Schedule) 2006. PBAC Meeting on Sibutramine hydrochloride, capsules, 10 mg and 15 mg, Reductil/Ectiva® March 2006. Canberra: DoH. Viewed 22 October 2018, http://www.pbs.gov.au/info/industry/listing/elements/pbac-meetings/psd/2006-03/sibutramine.

PBS 2007. PBAC Meeting on Sibutramine hydrochloride, capsules, 10 mg and 15 mg, Reductil/Ectiva® March 2006. Canberra: DoH. Viewed 22 October 2018, http://www.pbs.gov.au/info/industry/listing/elements/pbac-meetings/psd/2006-11/pbac-psd-sibutramine-nov06.

PBS 2008. PBAC Meeting on Sibutramine hydrochloride, capsules, 10 mg and 15 mg, Reductil/Ectiva® March 2006. Canberra: DoH. Viewed 22 October 2018, http://www.pbs.gov.au/info/industry/listing/elements/pbac-meetings/psd/2008-03/pbac-psd-sibutramine-hydrochloride-mar08.

Pogue D 2018. Exclusive: Fitbit's 150 billion hours of heart data reveal secrets about health. Yahoo Finance, 27 August. Viewed 5 September 2018, https://finance.yahoo.com/news/exclusive-fitbits-150-billion-hours-heart-data-reveals-secrets-human-health-133124215.html.

Prince S, Adamo KB, Hamel ME, Hardt J, Connor-Gorber S & Tremblay M 2008. A comparison of direct versus self-report measures for assessing physical activity in adults: a systematic review. International Journal of Behavioral Nutrition and Physical Activity 5(56):1479–5868.

PwC (Price Waterhouse Coopers) Australia 2015. Weighing the cost of obesity: case for action. Australia: PwC Australia.

RACS (Royal Australasian College of Surgeons) 2015. Bariatric surgery guidelines in Australia lack consistency. Media release, 16 October. Hobart: RACS.

Reisch LA, Gwordz W, Barba G, De Heanuw S, Lascorz N & Pigeot I 2013. Experimental evidence of the impact of food advertising on children's knowledge about and preferences for healthful food. Journal of Obesity 2013(2013):408582. doi:10.1155/2013/408582.

Rogge MM, Greenwald M & Golden A 2004. Obesity, stigma and civilized oppression. Advances in Nursing Sciences 27(4):301–15.

Rotenberg KJ, Bharathi C, Davies H & Finch T 2017. Obesity and social withdrawal syndrome. Eating Behaviours August (16):167–170. doi:10.1016/j.eatbeh.2017.03.006.

Russel-Mayhew S, McVey G, Bardick A & Ireland A 2012. Mental health, wellness, and childhood overweight/obesity. Journal of Obesity 2012:281801.

Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R & Bhadoria AS 2015. Childhood obesity: causes and consequences. Journal of Family Medicine and Primary Care 4:187–192.

Strauss R & Pollack HA 2003. Social marginalization of overweight children. Journal of the American Medical Association: Paediatrics 157(8):746–752.

Strugnell C, Orellana L, Hayward J, Millar L, Swinburn B & Allender S 2018. Active (opt-in) consent underestimates mean BMI-z and the prevalence of overweight and obesity compared to passive (opt-out) consent: evidence from the Healthy Together Victoria and Childhood Obesity Study. International Journal of Environmental Research and Public Health 15(4):E747. doi:10.3390/ijerph15040747.

Subar AF, Freedman LS, Tooze JA, Kirkpatrick SI, Boushey C, Neuhouser ML et al. 2015. Addressing current criticism regarding the value of self-report dietary data. The Journal of Nutrition 145(12):2639–2645.

Swinburn B, Shill J, Sacks G, Snowdon W, Strugnell C, Herbert J et al. 2008. Frameworks for the major population-based policies to prevent childhood obesity: a report prepared for the World Health Organization Forum and Technical Meeting on Population-based Prevention Strategies for Childhood Obesity Geneva, December 2009. Sydney: WHO Collaborating Centre for Obesity Prevention.

Swinburn B, Sacks G, Hall KD, McPherson K, Finegood DT, Moodie ML et. al. 2011. The global obesity pandemic: shaped by global drivers and local environments. The Lancet 2011(378):804–814.

TGA (Therapeutic Goods Administration) 2018. Registration of new or extended uses of registered medicines. Viewed 13 November 2018, https://www.tga.gov.au/prescription-medicines-new-or-extended-uses-registered-medicines.

Timmins KA, Green MA, Radley D, Morris MA & Pearce J 2018. How has big data contributed to obesity research? A review of the literature. International Journal of Obesity. doi:10.1038/s41366-018-0153-7.

Townshend T & Lake A 2017. Obesogenic environments: current evidence of the built and food environments. Perspectives in Public Health 137(1):38–44. doi:10.1177/1757913916679860.

Trattner C, Parra D & Elsweiler D 2017. Monitoring obesity prevalence in the United States through bookmarking activities in online food portals. PLoS One 12(6):e0179144.

VicHealth 2014. The nature and impact of Australia's obesity problem. Melbourne: Victorian Health Promotion Foundation.

WHO (World Health Organization) 2001. International classification of functioning disability and health. Geneva: WHO.

WHO 2011. Waist circumference and waist-hip ration: report of a WHO expert consultation. 8–11 December 2008. Geneva: WHO

WHO 2016. Obesity and overweight. Geneva: WHO. Viewed 14 August 2018, www.who.int/mediacentre/factsheets/fs311/en.

WHO Europe 2018. Body mass index. Copenhagen: WHO. Viewed 18 July 2018, http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi.

Winter JE, MacInnis RJ, Wattanapenpaiboon N & Nowson CA 2014. BMI and all-cause mortality in older adults: a meta-analysis. The American Journal of Clinical Nutrition 99(4):875–890.

Wirth A, Wabitsch M & Hauner H 2014. The prevention and treatment of obesity. Deutsches Arzteblatt International 111(42):705–713.

Wooden M, Watson N, Agius P & Frieden S 2008. Assessing the quality of the height and weight data in the HILDA survey. Melbourne Institute of Applied Economic and Society Research. Melbourne: University of Melbourne.

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Related publications

AIHW 2017. A picture of overweight and obesity in Australia 2017. Cat. no. PHE 216. Canberra: AIHW.

AIHW 2017. Overweight and obesity in Australia: a birth cohort analysis. Cat. no. PHE 215. Canberra: AIHW.

AIHW 2017. Weight loss surgery in Australia 2014–15: Australian hospital statistics. Cat. no. HSE 186. Canberra: AIHW.

AIHW 2017. Impact of overweight and obesity as a risk factor for chronic conditions: Australian Burden of Disease Study. Australian Burden of Disease Study series no. 11. Cat. no. BOD 12. Canberra: AIHW.

AIHW 2013. Obesity and injury in the National Hospital Morbidity Database. Injury research and statistics series no. 82. Cat. no. INJCAT 158. Canberra: AIHW.

AIHW 2011. Obesity and injury: a review of the literature. Injury research and statistics series no. 60. Cat. no. INJCAT 136. Canberra: AIHW.

AIHW 2005. Obesity and workplace absenteeism among older Australians. Bulletin no. 31. Cat. no. AUS 67. Canberra: AIHW.

This report assesses the potential for existing data source to improve monitoring overweight and obesity in Australia, and highlights future opportunities for improve monitoring these conditions. A 4-step process is used to assess the utility of different data sources to provide relevant information on the 6 priority information areas required for monitoring these conditions.

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