2018

Overview of Aboriginal and Torres Strait Islander health status, 2017

Neil Drew
Edith Cowan University, n.drew@ecu.edu.au

Anomie
Edith Cowan University, anomie@ecu.edu.au

Jane Burns
Edith Cowan University, j.burns@ecu.edu.au

Samantha Burrow
Edith Cowan University, s.burrow@ecu.edu.au

Michelle Elwell
Edith Cowan University, m.elwell@ecu.edu.au

See next page for additional authors

Australian Indigenous HealthInfoNet. (2018). *Overview of Aboriginal and Torres Strait Islander health status, 2017*. Perth: Australian Indigenous HealthInfoNet.
Available here.
This Report is posted at Research Online.
https://ro.ecu.edu.au/ecuworkspost2013/5407

Authors

Neil Drew, Anomie, Jane Burns, Samantha Burrow, Michelle Elwell, Jesse John Fleay, Caitlin Gray, Millie Harford-Mills, Joanne Hoareau, Andrea Macrae, Christine Potter, Miranda Poynton, Kathy Ride, and Avinna Trzesinski

Australian Indigenous
Health*InfoNet*

Overview of Aboriginal and Torres Strait Islander health status 2017

Core funding
is provided by the
Australian Government
Department of Health

AUSTRALIA
ECU
EDITH COWAN
UNIVERSITY

The Australian Indigenous Health*InfoNet*

The Australian Indigenous Health*InfoNet's* mission is to contribute to improvements in Aboriginal and Torres Strait Islander health by making relevant, high quality knowledge and information easily accessible to policy makers, health service providers, program managers, clinicians and other health professionals (including Aboriginal and Torres Strait Islander health workers) and researchers. The Health*InfoNet* also provides easy-to-read and summarised material for students and the general community.

The Health*InfoNet* achieves its mission by undertaking research into various aspects of Aboriginal and Torres Strait Islander health and disseminating the results (and other relevant knowledge and information) mainly via the Australian Indigenous Health*InfoNet* websites (healthinfonet.ecu.edu.au), the Alcohol and Other Drugs Knowledge Centre (aodknowledgecentre.ecu.edu.au) and Tackling Indigenous Smoking (tacklingsmoking.org.au). The research involves analysis and synthesis of data and information obtained from academic, professional, government and other sources. The Health*InfoNet's* work in knowledge exchange aims to facilitate the transfer of pure and applied research into policy and practice to address the needs of a wide range of users.

Recognition statement

The Australian Indigenous Health*InfoNet* recognises and acknowledges the sovereignty of Aboriginal and Torres Strait Islander people as the original custodians of the country. Aboriginal and Torres Strait cultures are persistent and enduring, continuing unbroken from the past to the present, characterised by resilience and a strong sense of purpose and identity despite the undeniably negative impacts of colonisation and dispossession. Aboriginal and Torres Strait Islander people throughout the country represent a diverse range of people, communities and groups each with unique identity, cultural practices and spiritualties. We recognise that the current health status of Aboriginal and Torres Strait Islander people has been significantly impacted by past and present practices and policies.

We acknowledge and pay our deepest respects to Elders past and present throughout the country. In particular, we pay our respects to the Whadjuk Noongar people of Western Australia on whose country our offices are located.

Contact details

Director: Professor Neil Drew

Address: Australian Indigenous Health*InfoNet*
Edith Cowan University
2 Bradford Street
Mount Lawley
Western Australia 6050

Telephone: (08) 9370 6336

Facsimile: (08) 9370 6022

Email: healthinfonet@ecu.edu.au

Web: healthinfonet.ecu.edu.au

ISBN 978-0-6482316-6-0

Overview of Aboriginal and Torres Strait Islander health status, 2017

Publication team

Production Editor

Jane Burns

Production Coordinator

Christine Potter

Executive Editor

Professor Neil Drew

Contributing Authors 2018

Anomie

Jane Burns

Samantha Burrow

Neil Drew

Michelle Elwell

Jesse John Fleay

Caitlin Gray

Millie Harford-Mills

Joanne Hoareau

Andrea MacRae

Christine Potter

Miranda Poynton

Kathy Ride

Avinna Trzesinski

2018

Australian Indigenous Health*InfoNet*

Perth, Western Australia

Suggested citation:

Australian Indigenous Health*InfoNet* (2018) *Overview of Aboriginal and Torres Strait Islander health status, 2017*. Perth, WA: Australian Indigenous Health*InfoNet*

Contents

Preface

The main purpose of the *Overview of Aboriginal and Torres Strait Islander health status* (Overview) is to provide a comprehensive summary of the most recent indicators of the health and current health status of Australia's Aboriginal and Torres Strait Islander people. It has been prepared by Australian Indigenous Health*InfoNet* staff as part of our contribution to supporting those who work in the Aboriginal and Torres Strait Islander health sector. The *Overview* is a key element of the Health*InfoNet's* commitment to authentic and engaged knowledge development and exchange.

The initial sections of this *Overview* provide information about the context of Aboriginal and Torres Strait Islander health, population, and various measures of population health status. Most of the subsequent sections about specific health conditions comprise an introduction about the condition and evidence of the current burden of the condition among Aboriginal and Torres Strait Islander people. Information is provided for state and territories and for demographics such as sex and age when it is available and appropriate.

While it provides a comprehensive review of key indicators across a range of health topics, it is beyond the scope of this *Overview* to provide detailed information on other aspects, such as the availability and use of services (including barriers to their use) and strategies and policies related to specific health topics. Interested readers should refer to the topic-specific reviews that are available on the Health*InfoNet's* website (healthinfonet.ecu.edu.au/learn/health-facts/reviews-knowledge-exchange-products). Additional, more in depth, information about the topics summarised in this *Overview* is included in the corresponding sections of the Health*InfoNet's* website (healthinfonet.ecu.edu.au). For more information on accessing and using the HealthInfoNet resource, please view our instructional videos accessible from the web resource and also located on You Tube at www.youtube.com/channel/UCftVbk_1fVQz2i_9TyQ1E2Q.

The key to successful knowledge exchange and transfer is authentic partnership in the development of materials so we welcome your comments and feedback about the *Overview of Aboriginal and Torres Strait Islander health status 2017.*

Neil Drew, Director on behalf of the Health*InfoNet* team

Acknowledgements

Particular thanks are extended to:

- staff of the Australian Indigenous Health*InfoNet* for their assistance, support and encouragement in the preparation of this *Overview.*
- previous staff members of the Australian Indigenous Health*InfoNet* who have contributed to earlier editions of the *Overview.*
- the Australian and New Zealand Dialysis and Transplant Registry (ANZDATA) for the provision of the notification data on end-stage renal disease (ESRD).
- the Department of Health and other funding partners for their ongoing support of the work of the Health*InfoNet.*
- members of the Health*InfoNet* Advisory Board and Health*InfoNet* Consultants.
- users of the Health*InfoNet* resource for their ongoing support and feedback.

Tell us what you think!

We value your opinion as part of our peer review process, please let us know if you have any suggestions for improving this Overview or future editions. (See healthinfonet.ecu.edu.au/contact-us)

Bibdjool

Donna Lei Rioli - a Western Australian Indigenous artist - was commissioned by the Health*InfoNet* to create a logo incorporating a gecko, chosen as it is one of a few animals that are found across the great diversity of Australia.

Donna is a Tiwi/Nyoongar woman who is dedicated to the heritage and culture of the Tiwi people on her father's side, Maurice Rioli, and the Nyoongar people on her mother's side, Robyn Collard. Donna enjoys painting because it enables her to express her Tiwi and Nyoongar heritage and she combines the two in a unique way.

Donna interpreted the brief with great awareness and conveyed an integrated work that focuses symbolically on the pathway through life. This is very relevant to the work and focus of the Australian Indigenous Health*InfoNet* in contributing to improving the health and wellbeing of Aboriginal and Torres Strait Islander Australians.

Key facts

Population

- In 2016, the estimated Australian Aboriginal and Torres Strait Islander population was 649,171.
- In 2016, it was estimated that NSW had the highest number of Aboriginal and Torres Strait Islander people (216,176 people, 33% of the total Aboriginal and Torres Strait Islander population).
- In 2016, it was estimated that the NT had the highest proportion of Aboriginal and Torres Strait Islander people in its population, with 26% of the NT population identifying as Aboriginal and/or Torres Strait Islander.
- In 2016, around 35% of Aboriginal and Torres Strait Islander people lived in a capital city.
- The Aboriginal and Torres Strait Islander population is much younger than the non-Indigenous population..

Births and pregnancy outcomes

- In 2016, there were 18,560 births registered in Australia with one or both parents identified as Aboriginal and/or Torres Strait Islander (6.0% of all births registered).
- In 2016, Aboriginal and Torres Strait Islander mothers were generally younger than non-Indigenous mothers; the median age was 25.5 years for Aboriginal and Torres Strait Islander mothers and 31.2 years for all mothers.
- In 2016, total fertility rates were 2,115 births per 1,000 for Aboriginal and Torres Strait Islander women and 1,789 per 1,000 for all women.
- In 2015, the average birthweight of babies born to Aboriginal and Torres Strait Islander mothers was 3,213 grams compared with 3,348 grams for babies born to non-Indigenous mothers.
- In 2015, the proportion of low birthweight (LBW) babies born to Aboriginal and Torres Strait Islander women was twice that of non-Indigenous women (12% compared with 6.2%).
- For 2005 to 2015 there was a slight decrease in the proportion of LBW babies born to Aboriginal and Torres Strait Islander mothers.

Mortality

- For 2016, the age-standardised death rate for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT was 1.7 times the rate for non-Indigenous people.
- Between 1998 and 2015, there was a 15% reduction in the death rates for Aboriginal and Torres Strait Islander people in NSW, Qld, WA, SA and the NT.
- For Aboriginal and Torres Strait Islander people born 2010-2012, life expectancy was estimated to be 69.1 years for males and 73.7 years for females, around 10-11 years less than the estimates for non-Indigenous males and females.
- For 2014-2016, age-specific death rates were higher for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT than for non-Indigenous people across all age-groups, and were much higher in the young and middle-adult years.
- For 2014-2016, the infant mortality rate was higher for Aboriginal and Torres Strait Islander infants than for non-Indigenous infants living in NSW, Qld, WA, SA and the NT; in 2016, the rate for Aboriginal and Torres Strait Islander infants was highest in the NT.
- In 2016, the leading causes of death among Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT were coronary heart disease, diabetes and chronic lower respiratory diseases.
- For 2008-2012, for direct maternal deaths, the rate ratio was 2.2 times higher for Aboriginal and Torres Strait Islander women than for non-Indigenous women.
- For 1998-2015, in NSW, Qld, WA, SA and the NT there was a 32% decline in the death rate from avoidable causes for Aboriginal and Torres Strait Islander people aged 0-74 years.

Hospitalisation

- In 2015-16, 4.6% of all hospital separations were for Aboriginal and Torres Strait Islander people.
- In 2015-16, the age-adjusted separation rate for Aboriginal and Torres Strait Islander people was 2.5 times higher than for non-Indigenous people.

- In 2015-16, the main cause of hospitalisation for Aboriginal and Torres Strait Islander people was for ‘factors influencing health status and contact with health services’ (mostly for care involving dialysis), responsible for 50% of all Aboriginal and Torres Strait Islander separations.
- In 2015-16, the rate of overall potentially preventable hospitalisations was around three times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.

Selected health conditions

Cardiovascular disease

- In 2012-2013, 13% of Aboriginal and Torres Strait Islander people reported having a long-term heart or related condition; after age-adjustment, these conditions were reported as being 1.2 times more common for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- In 2015-16, after age-adjustment, Aboriginal and Torres Strait Islander people were hospitalised for CVD at 1.7 times the rate of non-Indigenous people.
- In 2016, ischaemic heart disease was the leading cause of death of Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT; the age-adjusted death rate due to ischaemic heart disease for Aboriginal and Torres Strait Islander people was just over one and a half times the rate for non-Indigenous people.
- For 1998 to 2015, the gap in CVD mortality rates between Aboriginal and Torres Strait Islander and non-Indigenous people narrowed.
- In 2011, cardiovascular disease (CVD) was the third largest contributor (12%) to total disease burden among Aboriginal and Torres Strait Islander people.

Cancer

- For 2009-2013, age-adjusted cancer incidence rates were slightly higher for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA and the NT than for non-Indigenous people.
- For 2009-2013, the most common cancers diagnosed among Aboriginal and Torres Strait Islander people living in NSW, Qld, WA and the NT were lung and breast (females) cancers.
- In 2015-16, age-adjusted hospitalisation rates for cancer were lower for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA and the NT than for non-Indigenous people.
- For 2010-2014, the age-adjusted death rate for cancer for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT was 1.3 times higher than for non-Indigenous people.
- In 2011, cancer and other neoplasms (cancerous and non-cancerous tumours) were responsible for 9.4% of the total burden of disease among Aboriginal and Torres Strait Islander people.

Diabetes

- In 2012-2013, 13% of Aboriginal and Torres Strait Islander people reported having diabetes; after age-adjustment, Aboriginal and Torres Strait Islander people were more than three and a half times more likely to report having some form of diabetes than non-Indigenous people.
- In 2013-14, Aboriginal and Torres Strait Islander people were more likely to have diabetes recorded as the principal cause of hospital admission compared with non-Indigenous people.
- In 2016, Aboriginal and Torres Strait Islander people living in NSW, Qld, SA, WA and the NT died from diabetes at almost five times the rate of non-Indigenous people.
- In 2011, diabetes accounted for 4% of the burden of disease among Aboriginal and Torres Strait Islander people.

Social and emotional wellbeing

- In 2012-2013, after age-adjustment, Aboriginal and Torres Strait Islander people were 2.7 times as likely as non-Indigenous people to feel high or very high levels of psychological distress.
- In 2014-2015, 68% of Aboriginal and Torres Strait Islander people aged 15 years and over experienced at least one significant stressor in the previous 12 months.
- In 2012-2013, 91% of Aboriginal and Torres Strait Islander people reported on feelings of calmness and peacefulness, happiness, fullness of life and energy either some, most, or all of the time.

- In 2014-2015, more than half of Aboriginal and Torres Strait Islander people aged 15 years and over reported an overall life satisfaction rating of at least 8 out of 10.
- In 2015-16, there were 19,801 hospital separations with a principal diagnosis of ICD 'mental and behavioural disorders' identified as Aboriginal and/or Torres Strait Islander.
- In 2016, the death rate for ICD 'intentional self-harm' for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT was twice the rate reported for non-Indigenous people.

Kidney health

- For 2011-2015, after age-adjustment, the notification rate of end-stage renal disease was 6.8 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- In 2015-16, 'care involving dialysis' was the most common reason for hospitalisation among Aboriginal and Torres Strait Islander people.
- For 2011-2015, the age-adjusted death rate from kidney disease was 2.6 times higher for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and NT than for non-Indigenous people.
- In 2011, kidney and urinary diseases accounted for 2.5% of the total burden of disease among Aboriginal and Torres Strait Islander people.

Injury, including family violence

- In 2012-2013, 2.5% of Aboriginal and Torres Strait Islander people reported having a long-term condition caused by injury; after age-adjustment the level of injury was 1.2 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- In 2015-16, after age-adjustment, Aboriginal and Torres Strait Islander people were hospitalised for injury at almost twice the rate for non-Indigenous people.
- In 2015-16, 20% of injury-related hospitalisations among Aboriginal and Torres Strait Islander people were for falls and 19% for assaults.
- In 2016, age-adjusted death rates from intentional self-harm were twice as high for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT than for non-Indigenous people and land transport accidents two and a half times higher.
- In 2011, injury was responsible for 15% of the total burden of disease among Aboriginal and Torres Strait Islander people.

Respiratory disease

- In 2012-2013, 31% of Aboriginal and Torres Strait Islander people reported having a long-term respiratory condition. After age-adjustment, the level of respiratory disease was 1.2 times higher for Aboriginal and Torres Strait Islander than for non-Indigenous people.
- In 2012-2013, 18% of Aboriginal and Torres Strait Islander people reported having asthma.
- In 2014-15, age-adjusted hospitalisation rates for Aboriginal and Torres Strait Islander people were 5.0 times higher for chronic obstructive pulmonary disease, 3.1 times higher for influenza and pneumonia, 2.1 times higher for whooping cough and 1.8 times higher for asthma and acute upper respiratory infections, than for non-Indigenous people.
- In 2016, chronic lower respiratory disease was the leading cause of death from respiratory disease and the third highest cause of death overall for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT.
- For 1998 to 2012, age-adjusted death rates for respiratory disease in NSW, Qld, WA, SA and NT declined by 26% for Aboriginal and Torres Strait Islander people.
- In 2011, respiratory diseases were responsible for 7.9% of the total burden of disease among Aboriginal and Torres Strait Islander people.

Eye health

- In 2015-2016, after age-adjustment, vision impairment and blindness among Indigenous adults were both three times higher than in non-Indigenous adults.
- In 2014-2015, 13% of Aboriginal and Torres Strait Islander children, aged 4-14 years, were reported to have eye or sight problems.
- In 2012-2013, eye and sight problems were reported by 33% of Aboriginal people and 34% of Torres Strait Islander people.
- In 2012-2013, myopia, hyperopia, cataracts and blindness for Aboriginal and Torres Strait Islander people were reported at 0.8, 1.1, 1.4 and 7.4 times the proportions for non-Indigenous people.

- In 2016, 175 cases of trachoma were detected among Aboriginal and Torres Strait Islander children aged 5-9 years living in at-risk communities in WA (16), SA (29) and the NT (130).
- For 2013-2015, after age-adjustment, Aboriginal and Torres Strait Islander people were less likely to be hospitalised for diseases of the eye and adnexa than non-Indigenous people.

Ear health and hearing

- In 2014-2015, ear and hearing problems were reported for 8.4% of Aboriginal and Torres Strait Islander children aged 0-14 years.
- In 2012-2013, ear disease/hearing problems were reported by 12% of Aboriginal and Torres Strait Islander people.
- In 2015-16, the hospitalisation rate for ear disease for Aboriginal and Torres Strait Islander people was 1.2 times higher than the rate for non-Indigenous people.
- In 2011, hearing and vision disorders were responsible for 1.2% of the total burden of disease among Aboriginal and Torres Strait Islander people, with hearing disorders comprising 79% of this burden.

Oral health

- In 2014-15, the proportion of Aboriginal and Torres Strait Islander children aged 4-14 years with reported tooth or gum problems was 34%, a decrease from 39% in 2008.
- In 2012-2014, 61% of Aboriginal and Torres Strait Islander children aged 5-10 years had experienced tooth decay in their deciduous teeth compared with 41% of non-Indigenous children, and 36% of Aboriginal and Torres Strait Islander children aged 6-14 years had experienced tooth decay in their permanent teeth compared with 23% of non-Indigenous children.
- In 2012-2013, around 49% of adults reported no tooth loss; around 47% had lost one or more teeth; and around 5% reported complete tooth loss.
- In 2014-15, age-adjusted national potentially preventable hospitalisation rates for dental conditions were 1.3 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.

Disability

- In 2016, 6.7% of Aboriginal and Torres Strait Islander people with a profound or severe disability reported a need for assistance.
- In 2015, 24% of Aboriginal and Torres Strait Islander people living in non-remote areas reported living with a disability, compared with 18% of non- Indigenous people; after age-adjustment, the rate of disability for Aboriginal and Torres Strait Islander was 1.8 times the rate for non-Indigenous people.
- In 2015-16, 6% of disability service users were Aboriginal and Torres Strait Islander people, with most aged under 50 years (84%).

Communicable diseases

- For 2010-2014, after age-adjustment, the notification rate for tuberculosis was 9.0 times higher for Aboriginal and Torres Strait Islander people than for Australian born non-Indigenous people.
- In 2016, the age-adjusted notification rate for hepatitis B was 1.4 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- For 2012-2016, there was a 50% decline in the hepatitis B notification rates for Aboriginal and Torres Strait Islander people.
- In 2016, the age-adjusted notification rate for hepatitis C was 3.8 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- For 2012-2014, the average notification rate for *Haemophilus influenzae* type b among Aboriginal and Torres Strait Islander people was 5.3 times the rate in the total population.
- For 2013-2015, the age-standardised notification rate of invasive pneumococcal disease for Aboriginal and Torres Strait Islander people was 6.4 times higher compared with non-Indigenous people.
- For 2006-2015, the incidence of meningococcal serogroup B was 3.8 times higher among Aboriginal and Torres Strait islander people compared with non-Indigenous people.
- In 2016, Aboriginal and Torres Strait Islander people had higher crude notification rates for gonorrhoea, syphilis and chlamydia than non-Indigenous people.
- Since 2012, notification rates for gonorrhoea among Aboriginal and Torres Strait Islander people declined by 17%.

- In 2016, age-adjusted notification rates of human immunodeficiency virus (HIV) diagnosis were 2.2 times higher for Aboriginal and Torres Strait Islander people than non-Indigenous people.
- For 2009-2012, in remote NT communities, scabies was detected in almost 17% of Aboriginal and Torres Strait Islander children who had impetigo (skin sores, pyoderma).

Factors contributing to Aboriginal and Torres Strait Islander health

Environmental health

- In 2016, 16% of Aboriginal and Torres Islander people were reported living in overcrowded households.
- In 2016, 72% of Aboriginal and Torres Strait Islander households reported living in houses of an acceptable standard.
- In 2014-15, 26% of Aboriginal and Torres Strait Islander households reported structural issues within their dwelling, a reduction from 2012-2013 when the reported level was 35%.
- In 2014-15, over 90% of Aboriginal and Torres Strait Islander households reported that they had access to working facilities for: washing people, clothes and bedding; preparing food; and sewerage facilities.
- In 2014-15, after age adjustment, Aboriginal and Torres Strait Islander people were hospitalised for diseases related to environmental health at 2.3 times the rate of non-Indigenous people.
- For 2010-2014, Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT died as a result of diseases associated with poor environmental health at 1.7 times the rate of non-Indigenous people.

Nutrition and breastfeeding

- In 2012-2013, 54% of Aboriginal and Torres Strait Islander people reported eating an adequate amount of fruit per day but only 8% of Aboriginal and Torres Strait Islander people reported eating an adequate amount of vegetables per day.
- In 2012-2013, on average, Aboriginal and Torres Strait Islander people consumed 41% of their total daily energy in the form of discretionary foods (i.e. confectionary, snack foods, soft drinks and alcohol).
- In 2012-2013, 83% of Aboriginal and Torres Strait Islander people reported consuming dairy foods daily.
- In 2012-2013, on average, Aboriginal and Torres Strait Islander people reported consuming 111 grams of sugar daily.
- In 2012-2013, the average daily sodium intake was similar for Aboriginal and Torres Strait Islander people and non-Indigenous people.
- In 2012-2013, Aboriginal and Torres Strait Islander people living in remote areas were more likely to eat bush food compared with non-Indigenous people.
- In 2012-2013, Aboriginal and Torres Strait Islander people were found to be iodine sufficient, 27% had a vitamin D deficiency and 7% were at risk of anaemia.
- In 2012-2013, 22% of Aboriginal and Torres Strait Islander people reported running out of food or unable to buy food.
- In 2014-2015, 80% of Aboriginal and Torres Strait Islander children aged 0-3 years had been breastfed.
- In 2011, the joint effect of all dietary risks combined (13 identified) contributed 9.7% to the burden of disease for Aboriginal and Torres Strait Islander people.

Physical activity

- In 2012-2013, 47% of Aboriginal and Torres Strait Islander adults in non-remote areas, and 55% in remote areas, met the target of 30 minutes of moderate intensity physical activity on most days.
- In 2012-2013, 48% of Aboriginal and Torres Strait children in non-remote areas, aged 5-17 years, met the recommended amount of physical activity compared with 35% of non-Indigenous children.

Bodyweight

- In 2012-2013, 69% of Aboriginal and Torres Strait Islander adults were classified as overweight or obese; after age-adjustment, the level of obesity/overweight was 1.2 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- In 2012-2013, around 30% of Aboriginal and Torres Strait Islander children aged 2-14 years were overweight or obese; after age-adjustment, the level of obesity/overweight was 1.2 times higher for Aboriginal and Torres Strait Islander children than for non-Indigenous children.

Immunisation

- In 2016-2017, 96% of Aboriginal and Torres Strait Islander children were fully immunised against the recommended vaccine-preventable diseases.

Tobacco use

- In 2014-2015, 39% of Aboriginal and Torres Strait Islander people aged 15 years and over reported they were current smokers; after age-adjustment, this proportion was 2.8 times higher than the proportion among non-Indigenous people.
- In 2015, 45% of Aboriginal and Torres Strait Islander mothers reported smoking during pregnancy, compared with 12% of non-Indigenous mothers.
- Between 2008 and 2014-2015, the highest reduction in daily smoking was in younger age groups 15-24 years (39% to 31%) and 25-34 years (53% to 45%).
- In 2011, tobacco use was the leading cause of the burden of disease among Aboriginal and Torres Strait Islander people, responsible for 12% of the total burden of disease.

Alcohol use

- In 2014-2015, 40% of Aboriginal and Torres Strait Islander adults reported abstaining from alcohol.
- For 2010 to 2016, there was a decline (32% to 20%) in the proportion of Aboriginal and Torres Strait Islander people aged 12 years and over who exceeded the 2009 guidelines for lifetime risk (two standard drink/day).
- For 2014-15, after age-adjustment, for a principal diagnosis related to alcohol use, Aboriginal and Torres Strait Islander males were hospitalised at 4.0 times and females at 3.4 times the rates of non-Indigenous males and females.
- For 2010-2014, the age-adjusted death rates for alcohol-related deaths for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT was 4.9 times higher than for non-Indigenous people.
- In 2011, alcohol use was responsible for 8.3% of the total burden of disease among Aboriginal and Torres Strait Islander people.

Illicit drug use

- In 2014-2015, 73% of Aboriginal and Torres Strait Islander people aged 15 years and older reported they had never used illicit substances in the last 12 months.
- In 2014-2015, 30% of Aboriginal and Torres Strait Islander people aged 15 years and over reported that they had used an illicit substance in the previous 12 months.
- In 2014-2015, hospitalisation for mental/behavioural disorders from use of amphetamines had the highest rate of separations due to drug use and was 3.7 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.
- In 2010-2014, the rate of drug-induced deaths was 1.9 times higher for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT than for non-Indigenous people.
- In 2011, illicit substance use was responsible for 3.7% of the total burden of disease for Aboriginal and Torres Strait Islander people.

Volatile substance use

- In 2014-15, hospitalisation rates for poisoning and accidental poisoning from the toxic effects of organic solvents (e.g. petrol) were between 3.9 and 5.1 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.

Introduction

This *Overview of Aboriginal and Torres Strait Islander health status* (Overview) provides a comprehensive summary of the most recent indicators of the health of Aboriginal and Torres Strait Islander people[1] in Australia. Where possible, information is detailed for individual states and territories: New South Wales (NSW), Victoria (Vic), Queensland (Qld), Western Australia (WA), South Australia (SA), Tasmania (Tas), the Australian Capital Territory (ACT) and the Northern Territory (NT). The *Overview* draws largely on previously published information, some of which has been re-analysed to provide clearer comparisons between Aboriginal and Torres Strait Islander people and non-Indigenous people (for more details of statistics and methods, readers should refer to the original sources). We continue our strong commitment to developing strengths based approaches to assessing and reporting the health of Aboriginal and Torres Strait Islander people and communities.

Sources of information

Research for the *Overview* involves the collection, collation, and analysis of a wide range of relevant information, including both published and unpublished material. Sources include government reports, particularly those produced by the Australian Bureau of Statistics (ABS), the Australian Institute of Health and Welfare (AIHW), the Australian Health Ministers' Advisory Council (AHMAC), and the Steering Committee for the Review of Government Service Provision (SCRGSP). Important additions to the regular ABS and AIHW publications are four series of special reports that bring together key information about Aboriginal and Torres Strait Islander health and related areas:

- The *Overcoming Indigenous disadvantage* reports, produced by the SCRGSP and published by the Productivity Commission; the report has been published biennially since 2003.
- Reports in the *Aboriginal and Torres Strait Islander health performance framework* series with substantial detailed analyses, prepared by AHMAC since 2006.
- *Reports on government services,* produced by the SCRGSP and published annually by the Productivity Commission since 2003.
- *The health and welfare of Australia's Aboriginal and Torres Strait Islander people* series, produced by the ABS and the AIHW since 1997. The AIHW produced an updated version in 2015 [1].

This *Overview* also draws on information from the main administrative data collections (such as the birth and death registration systems and the hospital inpatient collections) and national surveys, for example, the Australian Aboriginal and Torres Strait Islander health surveys. Information from these sources has been published mainly in government reports, particularly those produced by the ABS, the AIHW, and the SCRGSP. It also relies on a wide variety of other information sources including: registers for specific diseases and other conditions; regional and local surveys; and epidemiological and other studies examining particular diseases, conditions, and health determinants. Information from these sources is disseminated mainly through journals and similar periodicals, or in special reports (such as the annual reports of the Kirby Institute and the ANZDATA).

A number of sections include the results of our own analyses of data obtained from a variety of sources. For example, estimates of the age-adjusted incidence of end-stage renal disease were made using notification data provided by ANZDATA. Similarly, information about a number of communicable diseases was derived from data published by the Kirby Institute.

Social and cultural concepts

Aboriginal people have lived in Australia for at least 45,000 years [2] and possibly up to 120,000 years [3]. They have lived through droughts and floods for thousands of years, demonstrating the resilience of their culture [4]Torres Strait Islander people have occupied 270 or so islands in the Torres Straits and now live across mainland Australia and the Straits [3].

There are distinctive ethnic and cultural differences within Aboriginal and Torres Strait Islander societies, each having their own language and traditions [5]. However, both Aboriginal people and Torres Strait Islander people enjoyed a semi-nomadic lifestyle in family and community groups, moving across a defined area following seasonal changes [3].

Aboriginal and Torres Strait Islander people experience persistent challenges to their health and wellbeing [6]. Past policy decisions have impacted negatively on their quality of life and their health [7]. Racism, discrimination, the forced removal of children, and loss of identity, language, culture and land, are some of the negative impacts that Aboriginal and Torres Strait Islander people continue to face [8].

However, there have been a number of positive changes in Aboriginal and Torres Strait Islander self-governance. Aboriginal and Torres Strait Islander members of the House of Representatives, senators and other senior political leaders work daily to improve the health and wellbeing outcomes of their people [9]. These developments come after years of leadership from Aboriginal Community Controlled Health Organisations (ACCHOs). As Megan Davis, Professor of Law, University of NSW, said of ACCHOs, 'It is apparent when we look to the Aboriginal community controlled health services sector, we can see that for decades and decades they have been leading the way already in the realisation of the most fundamental aspect of the right to self-determination: making decisions about one's health. Community control is intuitive to communities' [10].

---

[1] Very little information is available separately for Aboriginal people and Torres Strait Islander people.

In June 2016, 25 years after former Prime Minister, Paul Keating, delivered the Redfern Statement, the National Congress of Australia's First Peoples gathered to deliver a new statement, noting some key observations:

- First People continue to experience disadvantage, which is unacceptable
- challenges to the health of Aboriginal and Torres Strait Islander people continue to be marginalised in national debate
- Federal Government policies are often made for Aboriginal and Torres Strait Islander people and delivered to them, rather than being made with them, and delivered by them [11].

There has been a marked and burgeoning shift away from the deficit narratives that have infused (and confused) much of the debate about the health and wellbeing of Aboriginal and Torres Strait Islander people towards strengths based approaches that more accurately reflect the aspirations and resilience of the First Peoples of Australia [8, 12].

Social indicators

Key national measures linked to the social determinants of health for Aboriginal and Torres Strait Islander people include education, employment and income.

Education

The 2016 Australian *Census* [13] indicated that the number of Aboriginal and Torres Strait Islander people completing year 12 has increased with 47% of those aged 20 to 24 years reporting that they had completed year 12, compared with 32% in 2006.

In addition for 20-24 year olds in the 2016 *Census:*

- women were more likely to have completed year 12 than men (51% compared with 43%)
- Aboriginal and Torres Strait Islander people living in urban areas were more likely to have completed year 12 compared with those living in rural areas (50% compared with 34%)
- the highest proportions of Aboriginal and Torres Strait Islander people completing year 12 were in the ACT (66%) and Qld (55%). The NT had the lowest proportion (25%).

In 2016, 37% of Aboriginal and Torres Strait Islander people aged 15 years and over had completed vocational or tertiary studies (a non-school qualification) [13]. The highest proportions of Aboriginal and Torres Strait Islander people with vocational or tertiary qualifications were in the ACT (52%), Vic (45%), NSW (40%) and Tas (40%). The NT had the lowest proportion (22%).

The number of Aboriginal and Torres Strait Islander people studying at university has increased [13]. A total of 15,395 Aboriginal and Torres Strait Islander students were attending university in 2016 compared with 7,000 students in 2006.

An ABS school report [14] showed that in 2016:

- there were 207,852 school students who identified as Aboriginal and/or Torres Strait Islander, an increase of 3.6% from 2015.[2] The retention rate for Aboriginal and Torres Strait Islander students who started secondary school in year 7/8 and continued through to year 12, rose slightly from 59.4% in 2015 to 59.8% in 2016.

A national report on schooling in Australia [15] showed that in 2017:

- 82% of year 3 Aboriginal and Torres Strait Islander students and 76% of year 5 Aboriginal and Torres Strait Islander students were at or above the national minimum standard for reading, compared with 96% of year 3 non-Indigenous students and 95% of year 5 non-Indigenous students
- 83% of year 3 Aboriginal and Torres Strait Islander students and 69% of year 5 Aboriginal and Torres Strait Islander students were at or above the national minimum standard for writing, compared with 96% of year 3 non-Indigenous students and 93% of year 5 non-Indigenous students
- 77% of year 3 Aboriginal and Torres Strait Islander students and 78% of year 5 Aboriginal and Torres Strait Islander students were at or above the national minimum standard for spelling, compared with 95% of year 3 non-Indigenous students and 95% of year 5 non-Indigenous students
- 78% of year 3 Aboriginal and Torres Strait Islander students and 70% of year 5 Aboriginal and Torres Strait Islander students were at or above the national minimum standard for grammar and punctuation, compared with 96% of year 3 non-Indigenous students and 94% of year 5 non-Indigenous students
- 82% of year 3 Aboriginal and Torres Strait Islander students and 80% of year 5 Aboriginal and Torres Strait Islander students were at or above the national minimum standard for numeracy, compared with 96% of year 3 non-Indigenous students and 96% of year 5 non-Indigenous students.

---

[2] Increases in recent years are partly due to the success of programs to improve identification and collection of data.

Employment

According to the 2016 Australian *Census* [13]:

- almost half (47%) of Aboriginal and Torres Strait Islander people between the ages of 15 years and 64 years were employed
- 70% of Aboriginal and Torres Strait Islander people aged 15 to 24 years were either fully or partly engaged in employment, education and training
- the top three industries in which Aboriginal and Torres Strait Islander people worked were; health care and social assistance (15%), followed by public administration and safety (12%) and education and training (10%). Aboriginal and Torres Strait Islander men were most likely to be employed in construction (17%) and women were most likely to be employed in health care and social assistance (24%).

Income

In the 2016 *Census* [13]:

- 20% of Aboriginal and Torres Strait Islander people reported an equivalised[3] weekly income of $1,000 or more compared to 13% in 2011 [13, 16].
- over half (53%) of Aboriginal and Torres Strait Islander people reported an equivalised weekly household income of between $150 and $799. In comparison, 51% of non-Indigenous people reported an equivalised weekly household income of between $400 and $1,249 [13].

Aboriginal and Torres Strait Islander population

Based on information from the 2016 Australian *Census*, the ABS has estimated the Aboriginal and Torres Strait Islander population at 649,171 people in 2016 (Table 1) [17]. The Aboriginal and Torres Strait Islander population accounted for 2.8% of Australia's total population of 23 million. The Aboriginal and Torres Strait Islander population is highest in NSW (216,176 people), followed by Qld (186,482). The NT has the highest proportion of Aboriginal and Torres Strait Islander people among its population (26%) and Vic the lowest (0.8%).

Table 1. Estimated Aboriginal and Torres Strait Islander (Indigenous) population, by jurisdiction, Australia, 2016

Jurisdiction	Indigenous population (number)	Proportion of Australian Indigenous population (%)	Proportion of jurisdiction population (%)
NSW	216,176	33	2.9
Vic	47,788	7.4	0.8
Qld	186,482	29	4.0
WA	75,978	12	3.1
SA	34,184	5.3	2.0
Tas	23,572	3.6	4.6
ACT	6,508	1.0	1.6
NT	58,248	9.0	26
Australia	649,171	100	2.8

Note: The Australian population includes Jervis Bay Territory, the Cocos (Keeling) Islands, Christmas Island and Norfolk.

Source: Derived from ABS, 2017 [17]

According to the 2016 *Census*, more than one-third (35%) of Aboriginal and Torres Strait Islander people lived in capital cities [17]. In terms of specific geographical areas, more than one-half (59%) of all Aboriginal and Torres Strait Islander people counted in the 2016 *Census* lived in 10 of the 58 Indigenous regions.[4] The largest populations were in three regions in eastern Australia (Brisbane, NSW Central and North Coast, and Sydney-Wollongong), which accounted for 32% of the total Aboriginal and Torres Strait Islander population.

In the 2016 *Census*, 91% of Indigenous people were identified as Aboriginal, 5% as Torres Strait Islanders and 4% as of both Aboriginal and Torres Strait Islander descent [17]. Around 65% of Torres Strait Islander people[5] lived in Qld; NSW was the only other state with a large number of Torres Strait Islander people.

Population estimates are released regularly by the ABS and provide a more accurate measure of the actual size of a population [18]. They are assessments of what would happen to the population if components of population change (births, deaths and migration were to hold in the future).

The Aboriginal and Torres Strait Islander population is much younger overall than the non-Indigenous population (Figure 1) (Derived from [19, 20]).

---

[3] Equivalised household income adjusts the actual incomes of households to make households of different sizes and compositions comparable.

[4] Indigenous regions are large geographical units loosely based on the former Aboriginal and Torres Strait Islander Commission boundaries.

[5] Includes people who identified as Torres Strait Islanders and those who identified as being of both Aboriginal and Torres Strait Islander descent.

According to estimates from the 2016 *Census*, about 34% of Aboriginal and Torres Strait Islander people were aged less than 15 years, compared with 18% of non-Indigenous people [17, 21]. About 4.8% of Aboriginal and Torres Strait Islander people were aged 65 years or over, compared with 16% of non-Indigenous people.

Figure 1. Population pyramid of Aboriginal and Torres Strait Islander and non-Indigenous populations, 30 June 2016

Note: Excludes 90 years and older age-group.

Source: Derived from ABS, 2014 [19], ABS, 2013 [20]

Births and pregnancy outcomes

There have been some improvements in birth and pregnancy outcomes for Aboriginal and Torres Strait Islander mothers and babies in recent years, with an increase in the proportion of mothers attending antenatal care in the first trimester, a decrease in the rate of mothers smoking during pregnancy, and a slight decrease in the proportion of low birthweight babies [22]. However, significant gaps remain between outcomes for Indigenous and non-Indigenous mothers and babies.

In 2016, there were 18,560 births registered in Australia with one or both parents identified as Aboriginal and/or Torres Strait Islander (6.0% of all births registered) [23]. (This probably underestimates the true number slightly as Indigenous status is not always identified, and there may be a lag in birth registrations.) See Appendix 1 for a discussion of data limitations. For births registered as Indigenous: 27% recorded both parents as Aboriginal and/or Torres Strait Islander; 44% recorded only the mother as Aboriginal and/or Torres Strait Islander (including births where paternity was not acknowledged and those where the father's Indigenous status was unknown); and in 29% of registrations only the father was recorded as Aboriginal and/or Torres Strait Islander (including births where the mother's Indigenous status was unknown).

About births and fertility

In Australia, all births are required by law to be registered with the Registrar of Births, Deaths and Marriages in the jurisdiction in which the birth occurred. The registration information is limited from a health perspective so health authorities have established parallel maternal/perinatal collections. These collections are based on data recorded by staff attending births and include information about the nature, duration, and complications of the pregnancy, labour, and postnatal periods, and details about the baby (including weight, length, condition at birth, and complications). Information is collated and reported nationally by the ABS (for registration information) and the AIHW's National Perinatal Statistics Unit (for maternal/perinatal information).

The actual numbers of births are of limited use for public health purposes. To be useful, the actual numbers of births must be related to the population in which they occur. There are a number of general measures of births and fertility, but detailed analysis involves the use of age-specific rates.[6] These rates are the annual number of live births per 1,000 women in five-year age-groups from 15 to 49 years. (The relatively small numbers of births to women aged less than 15 years are included in the 15-19 years age-group, similarly births to women aged over 49 are included in the 45 to 49 years age-group.) The summary measure of fertility is the total fertility rate, which is the sum of age-specific fertility rates multiplied by five (since five-year age-groups are involved). It estimates the number of children that would be born to 1,000 women if each woman experienced current age-specific fertility rates at each age of her reproductive life.

---

[6] The study of birth information is known as fertility analysis, where 'fertility' refers to the number of babies born alive. This meaning is different to the lay use of the word, which means the capacity to bear children.

Age of mothers

In 2016, Aboriginal and Torres Strait Islander women had more babies and had them at younger ages than non-Indigenous women; teenagers had 15% of the babies born to Aboriginal and Torres Strait Islander women, compared with 2.4% of those born to all mothers [23]. The median age of Aboriginal and Torres Strait Islander mothers was 25.5 years, compared with 31.2 years for all mothers. The highest fertility rate among Aboriginal and Torres Strait Islander women was among the 20-24 years age-group. In comparison, the fertility rate for all women was highest in the 30-34 years age-group (Table 2). The fertility rate of teenage Aboriginal and Torres Strait Islander women (48 babies per 1,000 women) was more than four times that of all teenage women (11 babies per 1,000).

Table 2. Age-specific fertility rates, by Indigenous status of mother, selected jurisdictions, Australia, 2016

Age-group of mother (years)	Jurisdiction						
	NSW	Vic	Qld	WA	SA	NT	Australia
Aboriginal and Torres Strait Islander mothers							
15-19	39	39	48	85	49	57	48
20-24	103	114	128	161	107	119	119
25-29	107	101	122	137	116	107	114
30-34	86	98	92	97	77	69	87
35-39	45	48	45	50	59	31	44
40-44	8.1	15	11	14	9.1	7.7	10
All mothers							
15-19	9.9	6.7	14	13	9.5	32	11
20-24	41	35	56	52	43	82	45
25-29	88	87	100	98	98	95	92
30-34	121	131	118	126	122	102	123
35-39	72	82	63	72	67	59	72
40-44	16	18	13	14	13	14	15

Notes: 1 Rates per 1,000 women in each age-group; the 15-19 years age-group includes births by girls aged 14 years or younger. Figures are not provided for the 45-49 years age-group because of the small numbers involved.

2 Figures are not provided for Tas and the ACT because of the small numbers involved and doubts about the level of identification of Indigenous births, but numbers for these jurisdictions are included in figures for Australia.

Source: ABS, 2017 [23]

Total fertility rates

In 2016, total fertility rates were 2,115 births per 1,000 Aboriginal and Torres Strait Islander women and 1,789 per 1,000 for all women (Table 3) [23]. The highest total fertility rate for Aboriginal and Torres Strait Islander women was in WA (2,729 babies per 1,000 women), followed by Qld (2,230 per 1,000) and SA (2,094 per 1,000).

Table 3. Total fertility rates, by Indigenous status of mother, selected jurisdictions, Australia, 2016

Status of mother	Jurisdiction						
	NSW	Vic	Qld	WA	SA	NT	Australia
Aboriginal and Torres Strait Islander mothers	1,942	2,007	2,230	2,729	2,094	1,955	2,115
All mothers	1,740	1,800	1,822	1,874	1,756	1,917	1,789

Notes: 1 Total fertility rate is the number of children born to 1,000 women at the current level and age pattern of fertility.

2 Figures are not provided for Tas and the ACT because of the small numbers involved and doubts about the level of identification of Indigenous births. Numbers for those jurisdictions are included in figures for Australia.

Source: ABS, 2017 [23]

Antenatal care

Antenatal care from health professionals helps pregnant women by monitoring their health, screening and providing information and support [24]. It can help with the early identification of potentially preventable risk factors that adversely affect maternal and child health outcomes, especially when care is provided during the first trimester of pregnancy [25].

In 2015, pregnant Aboriginal and Torres Strait Islander women attended an average of nine antenatal visits [22].[7] (The Department of Health recommends 10 visits for first-time pregnancy without complications and seven visits for subsequent uncomplicated pregnancies [24].) Over half (57%) of these women attended the first antenatal visit during the first trimester of pregnancy [22]. The proportion of expectant Aboriginal and Torres Strait Islander mothers attending antenatal care in the first trimester increased from 41% in 2010 to 57% in 2015.

---

[7] This excludes very pre-term births and data from Vic.

Birthweight

The average birthweight of babies born to Aboriginal and Torres Strait Islander mothers in 2015 was 3,213 grams, 135 grams less than the average for babies born to non-Indigenous mothers (3,348 grams) [22]. Around 12% of babies born to Aboriginal and Torres Strait Islander mothers were of low birthweight (LBW), compared with 6.2% of babies of non-Indigenous mothers (Table 4). (LBW, defined as a birthweight of less than 2,500 grams, increases the risk of health problems and death in infancy [26].) There has been a slight decrease in the proportion of LBW babies born to Aboriginal and Torres Strait Islander mothers between 2005 and 2015 (13% to 12%).

Table 4. Proportion (%) of low birthweight babies, by sub-categories and Indigenous status, Australia, 2015

	Babies born to Aboriginal and Torres Strait Islander mothers	Babies born to non-Indigenous mothers
Low birthweight (1,500-2,499 grams)	10	5.3
Very low birthweight (less than 1,500 grams)	1.9	0.9
Extremely low birthweight (less than 1,000 grams)	*1.5*	*0.8*

Source: AIHW, 2017 [22]

In 2015, LBW for babies of Aboriginal and Torres Strait Islander mothers varied by remoteness from 11% of babies in major cities to 15% in very remote areas [22].

Factors impacting on LBW include pre-term birth, socioeconomic disadvantage, the age of the mother, and antenatal care [26]. A mother's alcohol consumption and use of tobacco and other drugs during pregnancy also impact on the birthweight of her baby. Tobacco, in particular, has a major impact on birthweight. After age-adjustment, 45% of Aboriginal and Torres Strait Islander mothers and 12% of non-Indigenous mothers reported smoking during pregnancy in 2015 [22]. The proportion of Aboriginal and Torres Strait Islander mothers who smoked during pregnancy has decreased from 50% in 2009 to 45% in 2015.

The impact of tobacco smoking during pregnancy can be seen in the proportions of LBW babies [27]. For 2012-2014, excluding pre-term and multiple births, 51% of LBW births to Aboriginal and Torres Strait Islander mothers were attributable to smoking during pregnancy, compared with 16% for other mothers. It has been estimated that if the smoking rate for Aboriginal and Torres Strait Islander pregnant women was the same as it was for other mothers, the proportion of LBW babies could be reduced by up to 40%.

Mortality

There were 3,168 deaths in Australia in 2016 where the deceased person was identified as Aboriginal and/or Torres Strait Islander [28] (see Table 5 for details for jurisdictions).

Table 5. Numbers and proportions (%) of Aboriginal and Torres Strait Islander deaths, Australia, 2016

Jurisdiction	Number of deaths	Proportion of deaths %
NSW	857	1.6
Vic	175	0.4
Qld	884	3.0
WA	565	3.8
SA	170	1.3
Tas	54	1.2
NT	443	42
ACT	19	1.0
Australia	3,168	2.0

Source: ABS, 2017 [28]

Data quality

The ABS Death Registration collection collects information on Indigenous status from the 'death registration form'; some states and territories also collect this information from medical certificates [28]. While, according to the ABS, most deaths of Aboriginal and Torres Strait Islander people are registered, the Indigenous status of some deaths is not registered, raising concerns about the accuracy of this information [28, 29]. Aboriginal and Torres Strait Islander deaths may be underestimated because of:

- inaccurate data
- lag in registration (the interval between when a death occurs and when it is registered).

This lag in registration is often longer for the Aboriginal and Torres Strait Islander population than the non-Indigenous population [29]. However, there is normally only a slight difference between registered and occurring deaths because, for each year, the number of deaths not registered balances out the deaths that occurred in the previous year but were registered late.

In 2016, there were 901 deaths for which no Indigenous status was reported, representing 0.6% of registered deaths; it is very likely that some of these deaths were among Aboriginal and Torres Strait Islander people [28]. The number of deaths with no Indigenous status reported has decreased over time [29].

Age-standardised death rates

Age-standardised death rates for Aboriginal and Torres Strait Islander people are generally calculated only for NSW, Qld, WA, SA and the NT as they are the jurisdictions with adequate data quality [28]. In 2016, the age-standardised death rate for Aboriginal and Torres Strait Islander people (9.6 per 1,000) was 1.7 times the rate for non-Indigenous people (5.7 per 1,000) (Table 6) [28]. Rates for Aboriginal and Torres Strait Islander people varied by jurisdiction, with the highest rate occurring in the NT (15 per 1,000) and the lowest in NSW (7.5 per 1,000).

Table 6. Age-standardised death rates, by Indigenous status, and Indigenous:non-Indigenous rate ratios, NSW, Qld, WA, SA and the NT, 2016

Jurisdiction	Indigenous rate	Non-Indigenous rate	Rate ratio
NSW	7.5	5.8	1.3
Qld	9.6	5.6	1.7
WA	12	5.4	2.2
SA	8.8	6.0	1.5
NT	15	5.8	2.5
Total NSW, Qld, WA, SA & NT	9.6	5.7	1.7

Notes: 1 Rates are per 1,000 population.
2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate.
3 Due to the incomplete identification of Indigenous status, these figures probably underestimate the true difference between Indigenous and non-Indigenous rates.
4 Rates are based on three year averages; for Aboriginal and Torres Strait Islander data, rates are calculated for each calendar year and then averaged to reduce variability in annual rates.

Source: ABS, 2017 [28]

For 2014-2016 in NSW, Qld, WA, SA and the NT, the age-standardised death rate for Aboriginal and Torres Strait Islander people was 9.6 per 1,000 population compared with 10.0 per 1,000 population in 2004-2006 [28]. Between 2004-2006 and 2014-2016, age-standardised death rates decreased for Aboriginal and Torres Strait Islander males (from 11.5 per 1,000 to 10.6 per 1,000) and remained steady for females (8.7 per 1,000).

Between 1998 and 2015, there was a 15% reduction in the age-standardised death rates for Aboriginal and Torres Strait Islander people in NSW, Qld, WA, SA and the NT; there was, however, no significant change in the gap in death rates between Aboriginal and Torres Strait Islander and non-Indigenous people [27].

Adjusting for age-structures of populations

Comparison of Aboriginal and Torres Strait Islander and non-Indigenous mortality needs to take account of differences in the age structures of the populations using a process known as standardisation. The process is also referred to as age-adjustment or age-standardise.

Direct standardisation, the preferred method, applies detailed information about Aboriginal and Torres Strait Islander deaths, including sex and age, to a 'standard' population [30]. In Australia, currently the 2001 Australian estimated resident population (ERP) is generally used as the standard population. Direct standardisation enables accurate comparisons of Indigenous and non-Indigenous rates, and time-series analyses.

If detailed information is not available, it is still possible to use indirect standardisation to estimate standardised mortality ratios (SMRs) [30]. The SMR is the ratio of the numbers of deaths (or of other health measures) registered/observed to the number expected. SMRs allow for the comparison of numbers of registered Indigenous deaths with the numbers expected from the corresponding age-sex-specific death rates for the total population or, preferably, the non-Indigenous population.

Expectation of life

In 2013, the ABS published revised estimates for expectation of life at birth for Indigenous people [29]. After adjustment for the underestimate of the number of deaths identified as Indigenous, the ABS estimated that Aboriginal and Torres Strait Islander males born in Australia in 2010-2012 could expect to live to 69.1 years, 10.6 years less than the 79.7 years expected for non-Indigenous males. The expectation of life at birth of 73.7 years for Aboriginal and Torres Strait Islander females born in Australia in 2010-2012 was 9.5 years less than the expectation of 83.1 years for non-Indigenous females. Revised estimates were also published for Indigenous people living in NSW, Qld, WA and the NT (Table 7).

Table 7. Expectation of life at birth in years, by Indigenous status and sex, selected jurisdictions, Australia, 2010-2012

Jurisdiction	Indigenous status/sex		
	Indigenous	Non-Indigenous	Difference
	Males		
NSW	70.5	79.8	9.3
Qld	68.7	79.4	10.8
WA	65.0	80.1	15.1
NT	63.4	77.8	14.4
Australia (unadjusted)	67.4	79.8	12.4
Australia (headline)	69.1	79.7	10.6
	Females		
NSW	74.6	83.1	8.5
Qld	74.4	83.0	8.6
WA	70.2	83.7	13.5
NT	68.7	83.1	14.4
Australia (unadjusted)	72.3	83.2	10.9
Australia (headline)	73.7	83.1	9.5

Notes: 1 This table includes two estimates for Australia. The 'headline' estimate includes adjustments based on Australia-wide census-related information; these estimates should be used in all situations except those requiring comparisons with the estimates for the states and territories, for which Australia-wide census-related information could not be applied. The unadjusted Australian estimate should be used in situations requiring such a comparison.

2 Australian estimates are based on deaths in all states and territories.

3 Differences are based on unrounded estimates.

Source: ABS, 2013 [29]

At a national level, the life expectancy gap between Aboriginal and Torres Strait Islander people and non-Indigenous people has narrowed slightly between 2005-2007 and 2010-2012 (by 0.8 years for males and 0.1 for females) [27, 29].

Data quality

Estimates of Aboriginal and Torres Strait Islander life expectancy used to measure population health and disadvantage are compiled every five years using census data [29].

In 2013, the ABS changed the methodology used to calculate Aboriginal and Torres Strait Islander life expectancy; it began using a 'direct' method that linked census records with deaths registrations, adjusting results to correct undercounts [29, 31]. The levels of under-identification, which differed by age-group, jurisdiction and remoteness of residence, were taken into account for the new estimates of Indigenous life expectancy. Estimates for 2005-2007 life expectancy have also been revised, allowing for comparison and estimation of the change in the life expectancy gap between Aboriginal and Torres Strait Islander people and non-Indigenous people [27, 29]. The ABS and others note, however, that caution should be exercised in the interpretation of estimates throughout time [29, 31].

Age at death

In 2016, the median age at death[8] for Aboriginal and Torres Strait Islander males ranged from 51.3 years in WA to 58.4 years in NSW (Table 8) [28]. For Aboriginal and Torres Strait Islander females, it ranged from 58.7 years in the NT to 65.0 years for those living in NSW.

Table 8. Median age at death, by Indigenous status and sex, NSW, Qld, WA, SA and the NT, 2016

Jurisdiction	Indigenous		Non-Indigenous	
	Males	Females	Males	Females
NSW	58.4	65.0	79.3	85.4
Qld	57.8	63.2	77.8	84.4
WA	51.3	58.9	78.3	84.7
SA	56.0	61.5	80.2	85.9
NT	53.9	58.7	68.7	72.3
All jurisdictions	55.9	61.9	78.8	85.1

Notes: 1 Information is not available for the other jurisdictions because of the relatively small numbers of deaths recorded.
2 Median age of death is the age below which 50% of deaths occur.

Source: ABS, 2017 [28]

During 2014-2016, the median age at death for Aboriginal and Torres Strait Islander people in NSW, Qld, WA, SA and the NT was 58.8 years, an increase from 54.4 years in 2004-2006 [28]. The median age at death for Aboriginal and Torres Strait Islander males, 55.9 years in 2014-2016, increased from 51.3 years in 2004-2006; there was also an increase for females to 61.9 years from 59.0 years for the same period. In comparison, for 2014-2016 the non-Indigenous median age at death was substantially higher at 82.0 years.

In 2014-2016, in NSW, Qld, WA, SA, and the NT, age-specific death rates (ASDRs) were higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people across all age-groups [28]. The rate ratios were highest in the young and middle-adult years. ASDRs for Aboriginal and Torres Strait Islander people have decreased since 2004-2006 in most age-groups except for the 5-14, 45-54, and 75+ years age-groups.

Infant mortality

The infant mortality rate (IMR) is the number of deaths of children aged less than one year in a calendar year per 1,000 live births in the same calendar year. In NSW, Qld, WA, SA and the NT in 2014-2016, the Aboriginal and Torres Strait Islander IMR was 6.2 per 1,000; this was almost twice as high as the non-Indigenous IMR, 3.2 per 1,000 [28]. In 2016, the IMR for Aboriginal and Torres Strait Islander infants was highest in the NT (13.9 per 1,000), 13.7 for males and 14.0 for females (Table 9).

Table 9. Infant mortality rates, by Indigenous status and sex, and Indigenous: non-Indigenous rate ratios, NSW, Qld, WA, SA and the NT, 2016

Jurisdiction	Indigenous		Non-Indigenous		Rate ratio	
	Males	Females	Males	Females	Males	Females
NSW	5.0	4.1	3.2	2.9	1.6	1.4
Qld	6.1	6.4	4.2	3.6	1.5	1.8
WA	7.7	5.0	2.3	2.0	3.3	2.5
SA	6.0	1.4	3.1	2.6	1.9	0.5
NT	13.7	14.0	2.0	2.4	6.9	5.8
All jurisdictions	6.6	5.8	3.4	2.9	1.9	2.0

Notes: 1 Infant mortality rate is the number of infant deaths per 1,000 live births.
2 Rates are based on three year averages; for Aboriginal and Torres Strait Islander data, rates are calculated for each calendar year and then averaged to reduce variability in annual rates.
3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate.
4 The Indigenous rates are likely to be underestimated, due to the incomplete identification of Indigenous status on births and deaths records.
5 Due to the small number of deaths registered in Vic, Tas and the ACT, these jurisdictions have been excluded.

Source: ABS, 2017 [28]

Between 1998 and 2015, the Aboriginal and Torres Strait Islander IMR has more than halved (from 13.5 to 6.3 per 1,000) [27]. The gap between Aboriginal and Torres Strait Islander and non-Indigenous IMR has narrowed significantly (by 84%).

In the five-year period 2011-2015, Aboriginal and Torres Strait Islander infants most commonly died from the International Classification of Diseases (ICD) 'Certain conditions originating in the perinatal period', including birth trauma, disorders relating to fetal growth, and complications from pregnancy, labour and delivery, and respiratory and cardiovascular disorders specific to the perinatal period [27]. This accounted for half (51%) of all Aboriginal and Torres Strait Islander infant deaths.

The second major cause was ICD 'Symptoms, signs and ill-defined conditions, which included sudden infant death syndrome (SIDS), and accounted for 21% of Aboriginal and Torres Strait Islander infant deaths.

---

[8] The median age at death is the age below which 50% of people die. Because the measure partly reflects the age structures of the respective populations, it is a less precise measure than age-specific death rates, which are summarised below.

Causes of death

Coronary heart disease (CHD; also known as ischaemic heart disease) was the leading cause of death of Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT in 2016 [32]. For Aboriginal and Torres Strait Islander people, the mortality rate for CHD was 1.7 times the rate for non-Indigenous people. The other leading specific causes of death of Aboriginal and Torres Strait Islander people were diabetes (rate ratio: 4.9), chronic lower respiratory disease (rate ratio: 2.7) and lung and related cancers (rate ratio: 2.1). For non-Indigenous people, the leading cause of death was CHD, followed by dementia, cerebrovascular diseases and lung and related cancers. The leading cause of death for both Aboriginal and Torres Strait Islander males and females living in NSW, Qld, WA, SA and the NT was CHD [32]. The next leading causes of death for males were suicide and diabetes whereas for females they were diabetes and chronic lower respiratory disease.

For 2011-2015, cardiovascular disease was the leading cause of death of Aboriginal and Torres Strait Islander people, being responsible for 24% of the deaths of those living in NSW, Qld, WA, SA and the NT [27]. The next most common causes of death were ICD 'Neoplasms' (mainly cancers) which were responsible for 21% of deaths, followed by ICD 'External causes' (injury) (15%) (Table 10).

Table 10. Proportions and rates of the leading causes of Aboriginal and Torres Strait Islander deaths and Indigenous:non-Indigenous rate ratios, NSW, Qld, WA, SA and the NT, 2011-2015

Cause of death	Proportions	Rate	Rate ratio
Cardiovascular diseases	24	271	1.6
Neoplasms	21	232	1.4
External causes	15	81	2.1
Endocrine, metabolic and nutritional disorders	8.8	101	4.5
Diabetes	*7.6*	*87*	*5.6*
Respiratory diseases	8.3	101	2.0
Digestive disorders	5.5	46	2.3
Nervous system diseases	2.5	26	0.9
Infectious and parasitic diseases	2.5	21	2.0
Kidney diseases	2.0	24	2.6
Conditions in the perinatal period	2.0	4.7	2.0

Notes: 1 Rates are deaths per 100,000.

2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate (not shown).

Source: Australian Health Ministers' Advisory Council, 2017 [27]

Between 1998 and 2015, mortality rates for Aboriginal and Torres Strait Islander people have declined for cardiovascular diseases and respiratory diseases; there was also a decline in the mortality rate for kidney disease between 2006 and 2015 [27].

Maternal mortality

Maternal deaths

Maternal deaths refer to pregnancy-related deaths occurring to women during pregnancy or up to 42 days after delivery [33]. Direct maternal deaths refer to those resulting from obstetric complications (including in pregnancy, labour, and in the first few weeks after delivery) from interventions, omissions, and incorrect treatment. Indirect maternal deaths refer to those resulting from a previously existing disease, or a disease that developed during pregnancy, that were not a direct result of obstetrics but aggravated by pregnancy.

Maternal mortality ratios (MMRs) are calculated by dividing the number of maternal deaths (direct and indirect) by the number of women who gave birth to babies weighing at least 400 grams or who reached at least 20 weeks gestation; this result is then multiplied by 100,000.

In Australia between 2008-2012, eight of the 102 maternal deaths reported were of Aboriginal and Torres Strait Islander women (Indigenous status was not reported in 23 of the deaths) [33]. The leading contributors to causes of maternal death among Aboriginal and Torres Strait Islander women were cardiovascular conditions, sepsis, and psychosocial conditions.

The MMR for Aboriginal and Torres Strait Islander women between 2008-2012 was 14 deaths per 100,000 confinements, around 2.1 times higher than the ratio of 6.6 per 100,000 for non-Indigenous women [33] (Table 11). For direct maternal deaths, the ratio of 6.9 per 100,000 for Aboriginal and Torres Strait Islander women was 2.2 times the ratio of 3.2 per 100,000 for non-Indigenous women (Derived from [33-38]).

Table 11. Numbers of women who gave birth and maternal deaths, and maternal mortality ratios, by Indigenous status, Australia, 2008-2012

Indigenous status	Women who gave birth	Maternal deaths	Maternal mortality ratio
Indigenous	57,979		
Direct and indirect maternal deaths		8	13.8
Direct maternal deaths		4	6.9
Non-Indigenous	1,428,131		
Direct and indirect maternal deaths		94	6.6
Direct maternal deaths		45	3.2

Notes:
1 Maternal mortality ratio is the number of maternal deaths divided by the number of women who gave birth (in 100,000s).
2 Due to the small number of deaths and some uncertainty about the numbers of Indigenous deaths and confinements, some caution must be exercised in the interpretation of the ratios.
3 The non-Indigenous numbers and ratios include deaths for which Indigenous status was not known. This probably results in a slight, unknown overestimate of non-Indigenous numbers and ratios, and a resultant underestimate of the differences between Indigenous and non-Indigenous women.

Sources: Derived from Laws, Li, Sullivan, 2010 [34], Li, McNally, Hilder, Sullivan, 2011 [35], Li, Zeki, Hilder, Sullivan, 2012 [36], Zeki, Hilder, Sullivan, 2013 [37], Hilder, Zhichao, Parker, Jahan, Chambers, 2014 [38], Humphrey, Bonello, Chughtai, Macaldowie, Harris, Chambers, 2015 [33]

Avoidable mortality

Avoidable mortality refers to deaths that could have been prevented with timely and effective health care, including early detection and effective treatment, as well as appropriate modifications of lifestyle behaviours (such as quitting smoking) [39].

In the five-year period 2011-2015, there were 6,427 deaths from avoidable causes among Aboriginal and Torres Strait Islander people aged 0-74 years living in NSW, Qld, WA, SA and the NT [27]. Age-adjusted rates for avoidable deaths were highest in the NT (629 per 100,000) and lowest in NSW (244 per 100,000). Aboriginal and Torres Strait Islander people died from avoidable causes at 3.3 times the rate of non-Indigenous people.

In 2011-2015, the most common conditions contributing to avoidable deaths among Aboriginal and Torres Strait Islander people aged 0-74 years living in NSW, Qld, WA, SA and the NT were CHD (22%), diabetes (12%), suicide (11%), and COPD (7.3%) [27]. After age-adjustment, the conditions most responsible for the avoidable mortality gap between Aboriginal and Torres Strait Islander and non-Indigenous people were CHD (26% of the gap), diabetes (19% of the gap), and COPD (11% of the gap).

Between 1998 and 2015, there was a 32% decline in the death rate from avoidable causes for Aboriginal and Torres Strait Islander people aged 0-74 years living in NSW, Qld, WA, SA and the NT [27].

Hospitalisation

Statistics on hospitalisation provide some insights into ill health in the population [40]. They are, however, a fairly poor reflection of the extent and patterns of treatable illness in the community because they only represent illness that is serious enough to require hospitalisation and are influenced to some degree by the geographic accessibility of hospitals and variations in admission policies.

Another limitation of the available hospital statistics as an indicator of the health of the population, is that they relate to episodes of hospitalisation rather than to individual patients [40]. Multiple admissions by a relatively small number of patients – as occurs for kidney dialysis, for example – limit the inferences that can be drawn about overall health patterns from aggregated statistics. These statistics are, of course, useful in assessing the need for health services, but of far less use in assessing health.

As is the case with other major health-related data collections (such as births and deaths), the identification of Indigenous status in hospital data collections is incomplete (See Appendix 1).

Separation rates

Of the more than 10 million hospital separations in Australia[9] during 2015-16, there were 482,787 (4.6%) identified as Aboriginal and Torres Strait Islander (Table 12) [41]. Around 93% of these hospital separations were for Aboriginal people, 3.8% were for Torres Strait Islander people, and 3.7% were for people who identified as being of both Aboriginal and Torres Strait Islander descent.

In 2015-16, the overall age-standardised separation rate of 1,003 separations per 1,000 population for Aboriginal and Torres Strait Islander people was 2.5 times that for non-Indigenous people (Table 12) [41]. The vast majority (83%) of the difference in hospitalisation rates between these two populations is due to the markedly higher separation rates for dialysis among Aboriginal and Torres Strait Islander people. The highest age-standardised separation rate was for Aboriginal and Torres Strait Islander people living in the NT (2,187 per 1,000), more than six times the rate for non-Indigenous people.

---

[9] All hospitalisation data for the NT include only public hospitals.

Table 12. Numbers of hospital separations and age-standardised separation rates, by Indigenous status and jurisdiction, and Aboriginal and Torres Strait Islander: non-Indigenous rate ratios, 2015-16

Jurisdiction	Aboriginal and Torres Strait Islander		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
NSW	98,384	622	3,023,949	369	1.7
Vic	24,990	726	2,666,485	418	1.7
Qld	117,866	878	2,247,816	457	1.9
WA	102,000	1,719	1,026,237	393	4.4
SA	25,016	885	735,563	384	2.3
NT	104,720	2,187	148,416	356	6.1
Australia	482,787	1,003	10,116,981	402	2.5

Notes:
1 Rates per 1,000 population.
2 Non-Indigenous rates and numbers include separations for which Indigenous status was not stated.
3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate.
4 Numbers and rates for the NT are for public hospitals only; separate numbers and rates are not included for Tas or the ACT, but included in totals where applicable.
5 The incomplete identification of Indigenous status means that these figures probably underestimate the true difference between Indigenous and non-Indigenous rates.

Source: Burgess, Christian, McIntyre, and Mole, 2017 [41]

Age-specific separation rates

In 2013-15 after age-adjustment, hospital separation rates (excluding dialysis) were higher for Aboriginal and Torres Strait Islander people than those for non-Indigenous people in all age-groups except for the 65 years and over age-group (Table 13) [27].

Table 13. Age-specific hospital separation rates (excluding dialysis), by sex and Indigenous status, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, Australia, 2013-15

Age-group (years)	Males			Females		
	Indigenous	Non-Indigenous	Rate ratio	Indigenous	Non-Indigenous	Rate ratio
0-4	343	268	1.3	269	204	1.3
5-14	105	97	1.1	95	81	1.2
15-24	140	130	1.1	356	228	1.6
25-34	222	138	1.6	486	360	1.3
35-44	357	195	1.8	460	339	1.4
45-54	478	285	1.7	492	339	1.4
55-64	578	477	1.2	599	461	1.3
65+	852	1002	0.9	832	864	1.0

Notes:
1 Rates per 1,000 population.
2 Non-Indigenous includes separations for which Indigenous status was not stated.
3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate.

Source: Australian Health Ministers' Advisory Council, 2017 [27]

The Council of Australian Governments (COAG) has set targets to improve wellbeing and reduce disadvantage among Aboriginal and Torres Strait Islander people; one strategic area for action is early childhood development, which uses early childhood hospitalisations as an indicator [8]. In 2014-15, Aboriginal and Torres Strait Islander children aged 0-4 years were hospitalised at a rate of 310 per 1,000, 1.3 times higher than the non-Indigenous rate. Hospitalisation rates for Aboriginal and Torres Strait children 0-4 years were similar in major cities and regional areas (271 and 276 per 1,000 respectively) but were almost twice as high in remote areas (468 per 1,000). In comparison, rates for non-Indigenous children decreased slightly as remoteness increased (from 240 per 1,000 to 208 per 1,000).

Causes of hospitalisation

In 2015-16, the most common reason for the hospitalisation of Aboriginal and Torres Strait Islander people in Australia was for ICD 'Factors influencing health status and contact with health services' (mostly for care involving dialysis), being responsible for 50% of Aboriginal and Torres Strait Islander separations (240,118 separations) [41]. Many of these separations involved repeat admissions for the same people. ICD 'Injury, poisoning and certain other consequences of external causes' (including motor vehicle accidents, assaults, self-inflicted harm and falls) was the next most common cause of hospitalisation for Aboriginal and Torres Strait Islander people, responsible for 32,694 separations (6.8% of all separations). After ICD 'Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified' and separations for pregnancy-related conditions (most of which involved normal deliveries), the next leading cause of hospitalisation for Aboriginal and Torres Strait Islander people were respiratory conditions (responsible for 24,199 separations) (Table 14).

Table 14. Numbers, proportions (%), and age-standardised hospitalisation rates for leading causes of hospital separations among Aboriginal and Torres Strait Islander people, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, Australia, 2015-16

Principal diagnosis (ICD)	Number of separations	Proportion of separations (%)	Age-standardised separation rate	Rate ratio
Injury, poisoning and certain other consequences of external causes	32,694	6.8	52	1.8
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	24,922	5.2	47	1.4
Pregnancy, childbirth and the puerperium	24,293	5.0	30	1.4
Diseases of the respiratory system	24,199	5.0	42	2.3
Diseases of the digestive system	23,172	4.8	41	1.0
Mental and behavioural disorders	19,801	4.1	32	1.8
Diseases of the circulatory system	13,940	2.9	35	1.7
Diseases of the genitourinary system	12,924	2.7	25	1.3
Diseases of the musculoskeletal system and connective tissue	10,500	2.2	22	0.8
Diseases of the skin and subcutaneous tissue	10,362	2.1	16	2.4
Endocrine, nutritional and metabolic diseases	7,865	1.6	16	2.4
Certain infectious and parasitic diseases	7,570	1.6	12	1.8
Neoplasms	7,201	1.5	18	0.7
Diseases of the nervous system	6,524	1.4	12	0.9
Factors including health status and contact with health services	240,118	50	574	6.6
All causes	482,787	100	1,000	2.5

Notes: 1 Hospitalisation data for the NT include only public hospitals.
2 Some principal diagnoses have been excluded.
3 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.

Source: Burgess, Christian, McIntyre, and Mole, 2017 [41]

Potentially preventable hospitalisations

Potentially preventable hospitalisations are admissions which 'could have been avoided with access to quality primary care and preventive care' [42]. Rates for potentially preventable hospitalisations, including those for chronic conditions and vaccine-preventable conditions, may be used as an indirect measure of problems with access to care and effective primary care [41].

In 2015-16, the age-standardised rate of overall potentially preventable hospitalisations for Aboriginal and Torres Strait Islander people was 74 per 1,000, about three times higher than that for non-Indigenous people (Table 15) [41]. The highest rates for potentially preventable hospitalisations of Aboriginal and Torres Strait Islander people were for chronic conditions (36 per 1,000). The rate for vaccine-preventable conditions was 5.4 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people.

Table 15. Age-standardised separation rates for potentially preventable hospitalisations, by Indigenous status, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, Australia, 2015-16

	Aboriginal and Torres Strait Islander rate	Non-Indigenous rate	Rate ratio
Vaccine-preventable conditions	9.8	1.8	5.4
Acute conditions	30	12	2.5
Total chronic conditions	36	12	3.1
Diabetes complications	*6.8*	*1.7*	*4.0*
Chronic conditions (excluding diabetes)	*29*	*9.9*	*2.9*
Total	74	25	2.9

Note: Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.

Source: Burgess, Christian, McIntyre, and Mole, 2017 [41]

In 2014-15, the national rate of hospitalisation of Aboriginal and Torres Strait Islander children aged 0-4 years for potentially preventable diseases and injuries was 161 per 1,000, 1.6 times higher than the rate for non-Indigenous children [8]. The rate of hospitalisation of Aboriginal and Torres Strait Islander children was 2.5 times as high in remote areas (306 per 1,000) as it was in major cities (124 per 1,000).

Selected health conditions

Cardiovascular disease

Cardiovascular disease (CVD) is the term for all diseases and conditions that affect the heart and blood vessels [43]. Specific types of CVD include CHD (or ischaemic heart disease), cerebrovascular disease (including stroke), hypertension (high blood pressure), and rheumatic heart disease (RHD) [44]. CVD presents a significant burden for Aboriginal and Torres Strait Islander people in terms of prevalence, hospitalisation, and mortality [45].

Most types of CVD (excluding RHD) are subject to the same set of modifiable or non-modifiable risk factors [46]. Modifiable behavioural factors for CVD include tobacco use, physical inactivity, poor dietary behaviour and excessive alcohol consumption [46, 47]. Modifiable biomedical factors include hypertension, high blood cholesterol, overweight and obesity. Certain related health conditions, particularly diabetes and chronic kidney disease, can also increase the risk of developing CVD [47]. Non-modifiable risk factors that can influence the risk of CVD include, age, sex, family history of CVD, and ethnicity [46]. Researchers are currently considering additional risk factors for CVD for Aboriginal and Torres Strait Islander people, including sleep quality and the presence of particular types of blood fats (lipids) [48].

Unlike other types of CVD, RHD occurs when acute rheumatic fever (ARF), an illness that affects the heart, joints, brain and skin, leads to permanent damage to the heart valves [49, 50]. ARF, which is rare among non-Indigenous Australians, is caused by an untreated bacterial (group A streptococci or GAS) infection of the throat, and possibly of the skin. Reducing ARF and RHD in Aboriginal and Torres Strait Islander communities requires initiatives that address poverty, overcrowded housing and poor sanitation, all of which contribute to the spread of GAS infection [49-51].

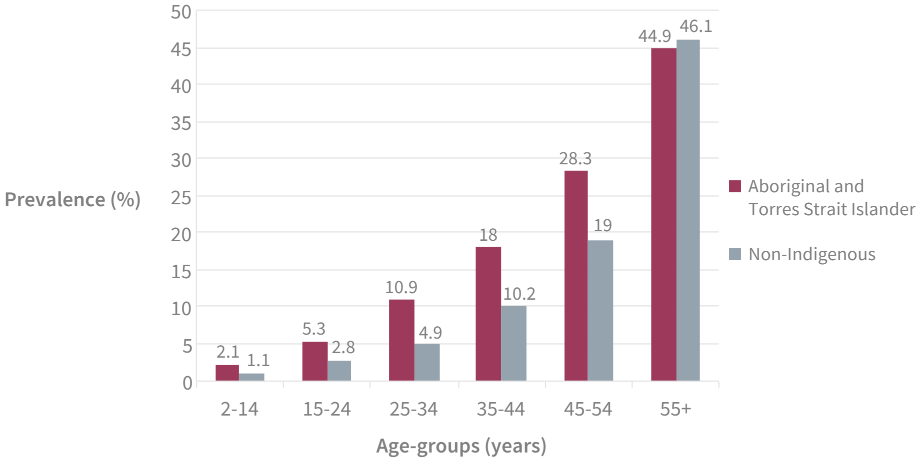
Extent of cardiovascular disease among Aboriginal and Torres Strait Islander people

Prevalence of cardiovascular disease

It was reported in the 2012-13 *Aboriginal and Torres Strait Islander Health Survey* (AATSIHS) that around 13% of Aboriginal and Torres Strait Islander people aged 2 years and over had CVD[10] [52]. The levels of CVD for Aboriginal people[11] and for Torres Strait Islander people[12] were similar (13% and 12% respectively) [53].

CVD was reported more frequently by Aboriginal and Torres Strait Islander females (14%) than by Aboriginal and Torres Strait Islander males (11%) [54]. After age-adjustment, CVD was reported 1.2 times more frequently by Aboriginal and Torres Strait Islander people than by non-Indigenous people. CVD increased with age for both Aboriginal and Torres Strait Islander and non-Indigenous people; the prevalence was higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people in all age-groups except those aged 55 years or older (Figure 2) [55]. Aboriginal and Torres Strait Islander people living in remote areas were more likely to report having heart disease than those living in non-remote areas (18% and 11% respectively) [56].

Figure 2. Prevalence (%) of people reporting cardiovascular disease as a long-term health condition, by Indigenous status and age-group, Australia, 2012-2013



Note: Prevalence expressed as percentages

Source: ABS, 2014 [55]

Hypertensive heart disease was the form of CVD most commonly reported by Aboriginal and Torres Strait Islander people (5.8%) in 2012-2013 [54]. After age-adjustment, the prevalence of hypertensive heart disease among Aboriginal and Torres Strait Islander people was similar to that among non-Indigenous people (Table 16). The greatest disparities in prevalence between Aboriginal and Torres Strait Islander and non-Indigenous males and females were for 'Heart, stroke and vascular diseases'[13] (age-adjusted rate ratios of 1.5 for males and 1.7 for females).

---

[10] Includes hypertensive disease; ischaemic heart diseases; other heart diseases; tachycardia; cerebrovascular diseases; oedema; diseases of the arteries; arterioles and capillaries; diseases of the veins, lymphatic vessels, etc; other diseases of the circulatory system; and symptoms and signs involving the circulatory system. People of Aboriginal origin only.

[11] People of Aboriginal origin only.

[12] People of Torres Strait Islander origin only, or both Aboriginal and Torres Strait Islander origin.

[13] Which include ischaemic heart disease, stroke and other cerebrovascular disease, odema, heart failure, and disease of the arteries, arterioles and capillaries.

Table 16. Prevalence (%) of cardiovascular disease among Aboriginal and Torres Strait Islander people, by sex and disease type, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, Australia, 2012-2013

Cardiovascular disease type	Males		Females	
	Prevalence	Rate ratio	Prevalence	Rate ratio
Hypertensive heart disease	5.6	1.0	6.0	1.1
Heart, stroke and vascular diseases	4.0	1.5	3.8	1.7
All cardiovascular disease	11	1.2	14	1.3

Note: 1 Prevalence expressed as percentages

2 Rate ratios are age-standardised, and are the rates for Indigenous people divided by the rates for non-Indigenous people

Source: ABS, 2014 [54]

Around 4% of Aboriginal and Torres Strait Islander people reported that they had 'Heart, stroke and/or vascular diseases' in 2012-2013 [52]. Heart disease, stroke and/or vascular diseases were reported in similar proportions by Aboriginal and Torres Strait Islander males and females (4.0% and 3.8% respectively) [54]. These diseases were prevalent from about 35 years of age onwards; 4.2% of Aboriginal and Torres Strait Islander people aged 35-44 years reported heart, stroke and/or vascular disease, compared with 10% of those aged 45-54 years and 20% of those aged 55 years and over [55].

Around 6% of Aboriginal and Torres Strait Islander people (5.8% of Aboriginal people and 5.3% of Torres Strait Islander people) reported that they had hypertensive heart disease [53]. Hypertensive heart disease was reported in almost the same proportions by Aboriginal and Torres Strait Islander males and females (5.6% and 6.0% respectively) [54]. Hypertensive disease became prevalent from about 25 years of age onwards; 12% of Aboriginal and Torres Strait Islander people aged 25 years and over reported hypertensive heart disease with proportions ranging from 4.1% of those aged 25-34 years to 25% of those aged 55 years and over [52, 55].

The 2012-13 AATSIHS also provided data for selected risk factors for CVD [52]. These self-reported results were supplemented, for the first time, by biomedical results obtained from a subset of Aboriginal and Torres Strait Islander adults (18 years and over) who provided blood and urine samples [57]. The self-reported [52] and biomedical results [57] show that some CVD risk factors are more prevalent among Aboriginal and Torres Strait Islander people than among non-Indigenous people, including: daily smoking (rate ratio: 2.6[14]); obesity (rate ratio: 1.6[14]); inadequate daily fruit and vegetable intake (rate ratios: 0.9[14] and 0.8[14] respectively for meeting the guidelines); high clinically-measured blood pressure (rate ratio: 1.2[15]); abnormal high density lipoprotein (HDL) cholesterol (rate ratio 1.8[15]); high triglycerides (rate ratio: 1.9[15]); and dyslipidaemia[16] (rate ratio: 1.1[15]).

Information on strokes as self-reported by non-Indigenous and Indigenous people is available from the 2016 National Eye Health Survey (NEHS)[17] [58, 59]. It was found that the crude prevalence of stroke among Indigenous people aged 40 years and over was 8.8%. After age-adjustment, the prevalence was 13%, indicating Indigenous people were 3 times more likely to have reported stroke than non-Indigenous people [59].

Prevalence of RHD and incidence of ARF

Jurisdictional data for the prevalence of RHD and the incidence of ARF are currently only available from RHD registers for Qld, WA, SA and the NT [60]. It is not possible to directly compare data from these registers[18] but, despite low rates of RHD and ARF in Australia, it is clear that these diseases are disproportionately represented in the Aboriginal and Torres Strait Islander population.

There were 1,204 new or recurrent episodes of ARF in Qld, WA, SA[19] and the NT combined in the period 2011-2015, of which 1,132 episodes (94%) occurred in Aboriginal and Torres Strait Islander people [61]. The crude rate of ARF for Aboriginal and Torres Strait Islander people was 0.6 per 1,000 population. Among Aboriginal and Torres Strait Islander ARF cases in Qld, WA and the NT, 45% occurred in males and 55% in females. The majority of ARF cases (55%) occurred in children aged 0-14 years, and 26% occurred in young people aged 15-24 years.

There were 3,392 people recorded as having RHD in Qld, WA, SA and the NT combined as at 31 December 2015, of which 3,129 (92%) identified as being Aboriginal and Torres Strait Islander [61]. The rate of RHD for Aboriginal and Torres Strait Islander people was 7.4 per 1,000 population. Of Aboriginal and Torres Strait Islander people with RHD in Qld and the NT, about two-thirds were female. Of Aboriginal and Torres Strait Islander people with RHD in Qld, WA and the NT, rates were lowest for those aged 0-14 years (2.4 per 1,000 population), and highest for those aged 35-44 and 25-34 years (13 per 1,000 population).

In NSW, ARF in people of any age and RHD in people aged <35 years were added to the list of notifiable conditions in 2015, and a register for people with ARF/RHD has been established [62]. Preliminary data show that, while ARF and RHD still disproportionately affect Aboriginal and Torres Strait Islander people, a high proportion of cases in NSW are also for non-Aboriginal and non-Torres Strait Islander people [63].

---

[14] For Aboriginal and Torres Strait Islander people aged 15 years and over.

[15] For Aboriginal and Torres Strait Islander people aged 18 years and over.

[16] A number of different lipid disorders that may contribute to hardening or narrowing of the arteries taking blood to the heart.

[17] The NEHS was a cross-sectional population-based study that included a representative sample of Indigenous people aged 40 years and older (n= 1,738 Indigenous people)

[18] It is not possible to directly compare data from Qld, WA SA and the NT as the registers are at different stages of establishment and coverage. The NHMRC-funded End Rheumatic Heart Disease Centre of Research Excellence is currently working on a comprehensive data linkage strategy to establish a replicable overview of national ARF and RHD burden.

[19] SA data are for 2013-2015 only.

A study that aimed to compare regional differences in the prevalence of RHD detected by echocardiographic screening in high-risk Aboriginal and Torres Strait Islander children (n=3,946) was conducted in four regions of northern and central Australia [64]. It found that the prevalence of definite RHD among Aboriginal and Torres Strait Islander children aged 5-15 years differed between regions, from 4.7 per 1,000 in Far North Qld to 15.0 per 1,000 in the Top End of the NT. The study uncovered a substantial level of previously undetected disease.

Hospitalisation

There were 13,940 hospital separations for CVD among Aboriginal and Torres Strait Islander people in 2015-16 [41], representing 5.7% of all Aboriginal and Torres Strait Islander hospital separations (excluding dialysis) (Derived from [41]). After age-adjustment, Aboriginal and Torres Strait Islander people were hospitalised with a primary diagnosis of CVD at 1.7 times the rate of non-Indigenous people: 35 per 1,000 compared with 20 per 1,000 population [41]. In 2013-15, the gap was highest in the 35-44 years and 45-54 years age-groups, with Aboriginal and Torres Strait Islander people hospitalised at over three times the rate of non-Indigenous people after age-standardisation [61].

Hospitalisation rates for CVD for Aboriginal and Torres Strait Islander people in 2014-15 were highest in remote and very remote areas (27 per 1,000 population), 2.2 times higher than in major cities (12 per 1,000 population) (Derived from [8]).

In 2013-15, of specific CVDs, CHD was responsible for the highest number of hospitalisations of Aboriginal and Torres Strait Islander people (39% of CVD hospitalisations), followed by pulmonary 'and other forms of heart disease' (33%) and cerebrovascular disease (7.7%) [61]. Although ARF/RHD accounted for only 4.4% of CVD hospitalisations, it was responsible for the biggest disparity in hospitalisation rates between Aboriginal and Torres Strait Islander and non-Indigenous people of all specific CVD diagnoses (rate ratio: 7.2).

Mortality

Of all specific causes of death, CHD was the leading cause of both Aboriginal and Torres Strait Islander and non-Indigenous deaths in 2016 [32]. After age-adjustment, the death rate due to ischaemic heart disease for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT was 1.7 times the rate for non-Indigenous people (113 per 100,000 and 68 per 100,000 population respectively). Deaths from cerebrovascular diseases occurred at similar rates for both populations (42 per 100,000 and 38 per 100,000 population respectively).

In 2011-2015, about a quarter (24%) of all deaths of Aboriginal and Torres Strait Islander people in NSW, Qld, WA, SA and the NT combined were caused by CVD, making this the leading cause of death [61]. After age-adjustment, the death rate due to CVD for Aboriginal and Torres Strait Islander people was 1.6 times the rate for non-Indigenous people (271 per 100,000 and 173 per 100,000 population respectively). Of all specific CVDs, RHD accounted for the biggest difference in death rates between Aboriginal and Torres Strait Islander and non-Indigenous people (rate ratio: 4.7), while CHD caused the most deaths (55% of deaths of Aboriginal and Torres Strait Islander people from CVD) (Table 17). CHD caused the death of nearly twice as many Aboriginal and Torres Strait Islander men as women (1,135 and 607 deaths respectively).

Table 17. Deaths from CVD, by Indigenous status and sex, NSW, Qld, WA, SA and NT, 2011–2015

CVD type	Indigenous		Non-Indigenous	Rate ratio
	% of total CVD deaths	Age-standardised rate (per 100,000)	Age-standardised rate (per 100,000	
Ischaemic heart disease	55	138	79	1.8
Acute myocardial infarction	*22*	*58*	*35*	*1.6*
Cerebrovascular disease	17	58	43	1.3
Stroke	*14*	*46*	*33*	*1.4*
Other heart disease (I26–I52)	17	45	34	1.3
Rheumatic heart disease	3.4	6.4	1.4	4.7
Hypertension disease	4.6	15	8.1	1.8
Other diseases of the circulatory system (I70–I99)	3.3	9.3	8.4	1.1
Total CVD	100.0	271	173	1.6

Notes:
1. Directly age-standardised using the 2001 standard population.
2. Data presented for acute myocardial infarcation are a subset of data presented for all ischaemic heart disease, and data presented for stroke are a subset of data presented for all cerebrovascular disease.
3. Rate ratio is the mortality rate for Indigenous people divided by the mortality rate for non-Indigenous people.
4. Rounding may result in inconsistencies in calculated ratios.

Source: AIHW, 2017 [61]

The striking difference between Aboriginal and Torres Strait Islander people and non-Indigenous people in CVD mortality is the much greater impact among young and middle-aged Aboriginal and Torres Strait Islander adults. In 2012-2016 in NSW, Qld, WA, SA and the NT, the death rate for CHD was 13.5 times higher for Aboriginal and Torres Strait Islander men and women in the 25-35 years age-group, and 10.0 times higher for Aboriginal and Torres Strait Islander people in the 35-44 years age-group than for non-Indigenous people of the same ages [32].

Between 1998 and 2015, there was a 43% decrease in the mortality rate for CVD for Aboriginal and Torres Strait Islander people, and a narrowing of the gap between Indigenous and non-Indigenous Australians for this indicator [27].

Burden of disease

'Burden of disease' analysis quantifies the impact of a disease or injury on a population, using the disability-adjusted life years (DALY) measure. In 2011, CVD was the third biggest contributor to total disease burden among Aboriginal and Torres Strait Islander people, causing 12% of total burden [45]. CHD contributed the highest total burden of all specific diseases (7% of total burden). Based on age-standardised DALY rate differences, CVD contributed most to the gap in total burden between Aboriginal and Torres Strait Islander and non-Indigenous people (19% of the gap). Aboriginal and Torres Strait Islander people experienced total rates of burden due to CVD at 2.8 times the rate for non-Indigenous people. Although RHD contributed only 5% of DALY for the CVD group overall, it represented the largest relative difference in DALY rates for CVD between Aboriginal and Torres Strait Islander and non-Indigenous people, with a rate ratio of 6.6. Between 2003 and 2011, there was a significant reduction in the age-standardised rate of total burden due to CVD for Aboriginal and Torres Strait Islander people (from 91 to 72 DALY per 1,000 people), driven by a decrease in fatal burden from CHD and stroke.

Cancer

Cancer is the term given to a number of related diseases [65]. It is a genetic disease, arising from changes to the genes (DNA) that control the way cells behave. In all cancers, some of the cells of the body divide in an uncontrolled manner (cells normally grow and divide as the body needs them). When cancer cells spread into surrounding tissues, or to different parts of the body (metastasise) they are known as malignant [66]. Cancer can start almost anywhere in the body [65].

There is limited evidence or data available on cancer to inform initiatives to improve outcomes for Aboriginal and Torres Strait Islander people [67]. Inconsistent Indigenous identification in cancer notifications in several jurisdictions is an issue [68]. The National Aboriginal and Torres Strait Islander Cancer Framework highlights the need for improved Indigenous identification, including on pathology requests and reports [67]. It also expresses a need for routine national data collection, access and linkage to allow national monitoring and reporting, and inform strategies to improve cancer care and outcomes.

Extent of cancer among Aboriginal and Torres Strait Islander people

Incidence

For 2009-2013, there were 6,397 new cases of cancer diagnosed in Aboriginal and Torres Strait Islander people living in NSW, Vic, Qld, WA and the NT (an average of 1,279 new cases per year) [69]. Aboriginal and Torres Strait Islander people were 1.1 times more likely to be diagnosed with cancer as non-Indigenous people. The most commonly diagnosed cancer among Aboriginal and Torres Strait Islander people was lung cancer followed by breast cancer (in females), colorectal cancer and prostate cancer.

For 2008-2012, 5,946 Aboriginal and Torres Strait Islander people living in NSW, Vic, Qld, WA and the NT were diagnosed with cancer [70]. After age-adjustment, the cancer incidence rate for all cancers combined was higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (484 per 100,000 and 439 per 100,000 respectively). Age-adjusted cancer incidence rates were higher for Aboriginal and Torres Strait Islander people than non-Indigenous people for: liver cancer (rate ratio: 2.8); head and neck cancer (rate ratio: 2.0); lung cancer (rate ratio: 2.0); cancers of unknown primary site (rate ratio: 1.9); and cancer of the uterus (rate ratio: 1.7) (Table 18). Cancer incidence rates were the same or lower for: leukaemia (rate ratio: 1.0); colorectal (bowel) cancer (rate ratio: 0.9); breast cancer (rate ratio: 0.9); lymphoma (rate ratio: 0.8); and prostate cancer (rate ratio: 0.7).

Table 18. Age-standardised incidence rates for the 10 most common cancers, by Indigenous status, and Indigenous:non-Indigenous rate ratios, NSW, Qld, Vic, WA and the NT, 2008-2012

Primary site	Aboriginal and Torres Strait Islander age-standardised rates	Non-Indigenous age-standardised rates	Rate ratio
Lung	82	41	2.0
Breast (females)	94	110	0.9
Colorectal (bowel)	52	57	0.9
Prostate (males)	106	157	0.7
Head and neck	29	15	2.0
Liver	17	6.0	2.8
Lymphoma	16	20	0.8
Uterus (females)	28	16	1.7
Luekaemia	12	12	1.0
Unknown primary site	18	9.4	1.9
All cancers	484	439	1.1

Notes:
1 Rates per 100,000 population, age-standardised to the Australian population at 30 June 2001.
2 Cancers are ordered by numbers among Aboriginal and Torres Strait Islander people (not shown in table).
3 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.
4 Due to the incomplete identification of Aboriginal and Torres Strait Islander status, these figures probably underestimate the true difference between Aboriginal and Torres Strait Islander and non-Indigenous rates.
5 Rounding may result in inconsistencies in calculated ratios.

Source: AIHW, 2017 [70]

For 2008-2012, detailed information[20] is available for the incidence of cervical and breast cancers for Aboriginal and Torres Strait Islander females. After age-adjustment, the rate for cervical cancer for Aboriginal and Torres Strait Islander females aged 20-69 living in NSW, Vic, Qld, WA and NT was 2.2 times higher than for non-Indigenous females of the same age (19 per 100,000 and 8.6 per 100,000 respectively) [71]. For breast cancer, the age-adjusted rate was lower than for non-Indigenous females aged 50-74 living in Vic, Qld, WA and NT (227 per 100,000 and 283 per 100,000 respectively) [72].

For 2008-2012, detailed information for cancer incidence is available for Aboriginal and Torres Strait Islander males and females living in NSW, Vic, Qld, WA and the NT. For all cancers combined, the number of new cases were higher for females (3,047 new cases) than for males (2,899 new cases) [73]. After age-adjustment, the rates for both Aboriginal and Torres Strait Islander males and females were higher than those for non-Indigenous males and females; males: 547 per 100,000 and 525 per 100,000 respectively, and females: 439 per 100,000 and 368 per 100,000 respectively.

Hospitalisation

There were 7,201 hospital separations with a principal diagnosis of neoplasms[21] among Aboriginal and Torres Strait Islander people in 2015-16 [41], representing 3.0% of all separations (excluding dialysis) among Aboriginal and Torres Strait Islander people (Derived from [41]). After age-adjustment, Aboriginal and Torres Strait Islander people were less likely to be hospitalised for neoplasms than non-Indigenous people (18 per 1,000 and 25 per 1,000 respectively) [41].

In terms of specific cancers, the age-standardised hospitalisation rates for lung and cervical cancers for Aboriginal and Torres Strait Islander people in 2014-15 were 2.0 and 3.0 times higher respectively than for non-Indigenous people [8]. Hospitalisation rates for lung cancer were slightly higher for Aboriginal and Torres Strait Islander males than females (1.4 per 1,000 and 1.3 per 1,000 respectively), and also higher for non-Indigenous males than females (0.8 per 1,000 and 0.5 per 1,000 respectively).

Mortality

In 2016, cancers of the trachea, bronchus and lung combined were the fourth leading cause of death for Aboriginal and Torres Strait Islander people (184 deaths: 107 males and 77 females) living in NSW, Qld, WA, SA and the NT, with the overall age-adjusted death rate 2.1 times higher than for non-Indigenous people [32].

For 2011-2016, cancer was responsible for the deaths of 2,754 Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT (an average of 551 deaths per year) [69]. Lung cancer was the leading cause of cancer death for Aboriginal and Torres Strait Islander people and non-Indigenous people.

For 2010-2014, cancer was responsible for the deaths of 2,558 Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT [73]. After age-adjustment, the mortality rate for all cancers combined for Aboriginal and Torres Strait Islander people was 1.3 times higher than for non-Indigenous people (221 per 100,000 and 171 deaths per 100,000 respectively). The mortality rates were higher for Aboriginal and Torres Strait Islander people than non-Indigenous people for cancers of the head and neck (rate ratio: 3.5); liver cancer (rate ratio: 2.5); cancer of the lung (rate ratio: 1.8); cancer of the oesophagus (rate ratio: 1.8); cancer of the unknown primary site (rate ratio: 1.6); and stomach (rate ratio: 1.6); pancreas (rate ratio: 1.3) and breast (rate ratio: 1.1) (Table 19). Rates were lower for prostate cancer (rate ratio: 0.8 times) and bowel cancer (rate ratio: 0.7).

Table 19. Age-standardised death rates for the 10 most common cancers, by Indigenous status, and Indigenous: non-Indigenous rate ratios, NSW, Qld, WA, SA and the NT, 2010-2014

Primary cancer	Aboriginal and Torres Strait Islander age-standardised rates	Non-Indigenous standardised rates	Rate ratio
Lung	58	32	1.8
Head and neck	14	4.0	3.5
Liver	15	5.9	2.5
Unknown primary site	17	11	1.6
Breast (females)	22	21	1.1
Pancreas	12	9.6	1.3
Bowel (colorectal)	12	16	0.7
Oesophagus	8.3	4.7	1.8
Prostate (males)	23	29	0.8
Stomach	6.7	4.3	1.6
All cancers	221	171	1.3

Notes:
1 Rates per 100,000 population, age-standardised to the Australian population at 30 June 2001.
2 Cancers are ordered by numbers among Aboriginal and Torres Strait Islander people (not shown in table).
3 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.
4 Due to the incomplete identification of Aboriginal and Torres Strait Islander status, these figures probably underestimate the true difference between Aboriginal and Torres Strait Islander and non-Indigenous rates.
5 Rounding may result in inconsistencies in calculated ratios.
6 Rate ratios less than one indicate that non-Indigenous people experience higher rates of the disease.

Source: AIHW, 2016 [73]

---

[20] This information is from the national screening programs for cervical and breast cancer and presents data for specific age groups.
[21] Neoplasms may be either malignant (cancerous) or benign (non-cancerous) and are also called tumours [45].

In 2010-2014, the age-standardised Aboriginal and Torres Strait Islander cancer mortality rates: non-Indigenous cancer mortality rates were 1.4 times higher for females (197 per 100,000 and 137 per 100,000 respectively) and 1.2 higher for males (253 per 100,000 and 213 per 100,000 respectively) [73].

The age-specific mortality rates were higher for Aboriginal and Torres Strait Islander people in all age-groups 20-29 years and 35-74 years compared with non-Indigenous people. The biggest disparity in the mortality rates between the populations occurred in the 50-59 years age-group (rate ratio: 1.9) followed by the 40-49 years age-group (rate ratio: 1.8). Aboriginal and Torres Strait Islander children and adolescents 0-19 years had age-specific mortality rates the same or lower than those for non-Indigenous people with rate ratios ranging from 0.2 (10-14 years) to 1.0 (0-4 years).

The patterns of Aboriginal and Torres Strait Islander cancer incidence and mortality can be partly explained by the higher level of risk factors, most notably tobacco use [74]. High rates of smoking are the likely cause of a high incidence of cancer of the lung. High incidence rates of liver cancer are consistent with risky levels of alcohol consumption and a higher prevalence of Hepatitis B infection. Other contributing factors include:

- Aboriginal and Torres Strait Islander people being more likely to have cancers that have a poor prognosis
- being diagnosed with cancer at a later stage
- being more likely to present with co-morbidities (that may lead to poorer outcomes)
- being less likely to receive any treatment or adequate treatment [75-77].

Burden of disease

Cancer and other neoplasms[22] were responsible for 9.4% of the total burden of disease among Aboriginal and Torres Strait Islander people in 2011, comprising 17% of all fatal burden and 0.5% of all non-fatal burden [45]. Cancer burden was almost entirely due to premature death. It was the fourth leading disease group causing burden for Aboriginal and Torres Strait Islander people (cancer was the leading disease for the total population) [78]. Lung (24%), bowel (8%), liver (7%), breast (7%) and mouth and pharyngeal (throat) (6%) cancers contributed to over half (51%) of this cancer burden [45].

Diabetes

Diabetes is a chronic disease marked by high levels of glucose in the blood and is caused by the pancreas not producing enough insulin[23] or not being able to use the insulin effectively, or both [79].

There are several types of diabetes, of which the most frequently occurring are type 1, type 2 and gestational diabetes mellitus (GDM) [79]. Type 1 diabetes is the most common form of diabetes in children and young people but can occur at any age [80]. Type 2 diabetes is the most common form [81] and is largely preventable by maintaining a healthy lifestyle [79]. GDM develops in some women during pregnancy [81] and is more common among Aboriginal and Torres Strait Islander women than among non-Indigenous women [82].

Diabetes is recognised as one of the most important health problems currently facing Aboriginal and Torres Strait Islander people and can lead to life-threatening health complications [80]. The most common form is type 2 diabetes which occurs at earlier ages for Aboriginal and Torres Strait Islander people and is often undetected and untreated. Complications from diabetes may occur within months of diagnosis while others may develop over several years [83]. Aboriginal and Torres Strait Islander people with diabetes tend to have higher levels of risk factors such as smoking [80] and may show signs of other chronic conditions, including chronic kidney disease, cardiovascular disease, liver disease and anaemia [84].

Extent of diabetes among Aboriginal and Torres Strait Islander people

Incidence and prevalence

Results from the 2012-13 *National Aboriginal and Torres Strait Islander Health Measures Survey* (NATSIHMS) indicated that 13% (46,200 people) of Aboriginal and Torres Strait Islander adults had diabetes, based on self-report and measured results [80]. About 2% of these adults did not self-report that they had diabetes, which may indicate that they were unaware they had the condition. Of those with diabetes, there was a larger proportion of females (56%) than males (44%). Overall Aboriginal and Torres Strait Islander adults were 3.5 times more likely to have diabetes than non-Indigenous adults. There was an increase with age for the prevalence of diabetes among Aboriginal and Torres Strait Islander adults, from 2% aged 18-34 years to 46% aged 65 years and over.

For type 2 diabetes, in the initial stages, known as pre-diabetes, blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes [80]. Impaired glucose regulation can be measured by impaired fasting glycemia (IFG) testing. In 2011-13, an estimated 5.3% of Aboriginal and Torres Strait Islander adults had IFG compared with 2.9% of non-Indigenous adults. Aboriginal and Torres Strait Islander adults in the 18-44 years age-group had a higher prevalence of IFG (4.2%) compared with non-Indigenous adults in the same age-group (1%).

---

[22] Cancer and other neoplasms include malignant neoplasms (cancer) and benign and uncertain neoplasms [45].
[23] Insulin is necessary to convert glucose to energy [79].

In 2012-2013 in remote areas, Aboriginal and Torres Strait Islander adults were twice as likely to have diabetes compared with those living in non-remote areas (28% and 15% respectively) [80]. The disparity in diabetes prevalence between Aboriginal and Torres Strait Islander adults (18 years and over) and non-Indigenous adults was greater in remote areas (six times greater) than in non-remote areas (three times greater).

In 2016, according to the National (insulin treated) Diabetes Register (NDR), the incidence rate of type 1 diabetes was lower for Aboriginal and Torres Strait Islander people than for non-Indigenous people (9.3 per 100,000 compared with 11 per 100,000 respectively after age-adjustment) [85]. The incidence rates among Aboriginal and Torres Strait Islander people in the 0-30 year age-groups were lower than for non-Indigenous people, the same for 30-39 years and slightly higher for 40-49 years (6.2 per 100,000 compared with 5.7 per 100,000 respectively). Details are not available for older Aboriginal and Torres Strait Islander people. Incidence rates were relatively similar for Aboriginal and Torres Strait Islander people and non-Indigenous people across all socioeconomic groups and remoteness areas.

In 2016 for insulin treated type 2 diabetes, after age-adjustment the incidence rate was 103 cases per 100,000 for Aboriginal and Torres Strait Islander people, 2.6 times higher than for non-Indigenous people (39 cases per 100,000) [85]. The rates of new cases for Aboriginal and Torres Strait Islander people ranged from 7 per 100,000 for the 10-19 years age group to 251 per 100,000 for the 50-59 years age-group.

Between 2006 and 2011, 252 new cases of diabetes were reported among Aboriginal and Torres Strait Islander youth aged 10-19 years at diagnosis[24] [86]. Of these, 55% were type 2 and 43% were type 1 diabetes. The age-specific rates of type 2 diabetes for young Aboriginal and Torres Strait Islander people were much higher than for their non-Indigenous counterparts (8.3 times higher among 10-14 year-olds and 3.6 times higher for 15-19 year-olds) [86].

In 2011 after age-adjustment, incidence rates for insulin treated GDM were similar for Aboriginal and Torres Strait Islander and non-Indigenous women (60 per 100,000 and 59 per 100,000 respectively) [87]. The most recent national estimates of the prevalence of GDM are for 2005-2007 when almost 6.6% of Aboriginal and Torres Strait Islander women who gave birth in NSW, Vic, Qld, WA, SA and the NT had diabetes during pregnancy: 1.5% had pre-existing diabetes and 5.1% had GDM [82]. Aboriginal and Torres Strait Islander women who gave birth were 3.2 times more likely than their non-Indigenous counterparts to have pre-existing diabetes and 1.6 times more likely to have GDM.

General practice attendances and hospitalisation

Survey results from April 2010 - March 2015 found that, among Aboriginal and Torres Strait Islander patients, diabetes accounted for 5.5% of all problems managed by GPs [88]. Type 2 diabetes accounted for 92% of all diabetes problems managed for Aboriginal and Torres Strait Islander patients [27]. After age-adjustment, diabetes was managed around 2.9 times more frequently among Aboriginal and Torres Strait Islander patients than among other patients. This was due mainly to type 2 diabetes, 82 per 1,000 encounters, a rate three times higher than for non-Indigenous patient encounters [88]. For type 1 diabetes encounters, the rate was 5.4 per 1,000 encounters, after age-adjustment the Aboriginal and Torres Strait Islander rate was 2.3 higher than for non-Indigenous patient encounters.

Hospital services are typically required to treat the advanced stages of complications of diabetes or acute episodes of poor glycaemic control [80]. In 2013-14, there were 52,048 Aboriginal and Torres Strait Islander hospitalisations where the principal or additional diagnosis was diabetes. Of these, 90% were for type 2 diabetes, 4% for type 1 diabetes, 4%, for GDM and 2% for other unspecified diabetes related hospitalisations.

For type 2 diabetes as a principal or additional diagnosis, there were 46,975 Aboriginal and Torres Strait Islander hospitalisations in 2013-14 [80]. Rates were four times higher than for non-Indigenous people (124 per 1,000 and 29 per 1,000 respectively). For Aboriginal and Torres Strait Islander hospitalisations, there were more for females (27,607) than for males (19,368). Aboriginal and Torres Strait Islander females were almost six times more likely than non-Indigenous females to be hospitalised (136 per 1,000 and 24 per 1,000 respectively) and Aboriginal and Torres Strait Islander males were three times more likely than non-Indigenous males to be hospitalised (113 per 1,000 and 35 per 1,000 respectively).

In 2013-14, rates of hospitalisations for type 2 diabetes increased with age for Aboriginal and Torres Strait Islanders; for all age-groups, they were hospitalised at higher rates than non-Indigenous people [80]. The gap between the hospitalisation rates for the two populations was larger at younger ages, 14 times higher for 25-34 years (24 per 1,000 and 1.7 per 1,000 respectively) and for 35-44 years (87 per 1,000 and 6.3 per 1,000 respectively), this declined to twice as high for age 75 years and over (398 per 1,000 compared with 202 per 1,000).

In 2013-14, the rate of hospitalisation for type 2 diabetes as a principal or additional diagnosis in remote areas and very remote areas was more than twice as high (220 per 1,000) as the rates in major cities and inner and outer regional areas (both around 100 per 1,000) [80]. In both major cities and in inner and outer regional areas, the rates of hospitalisation were three times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people. In remote and very remote areas, the rate was eight times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (220 per 1,000 and 26 per 1,000 respectively).

---

[24] Based on combined data from the National Diabetes Services Scheme (NDSS) and the Australasian Paediatric Endocrine Group (APEG) [86].

For type 1 diabetes as a principal or additional diagnosis in 2013-14, Aboriginal and Torres Strait Islander people were hospitalised at twice the rate of non-Indigenous people (4.0 per 1,000 and 2.2 per 1,000 respectively) [80]. Aboriginal and Torre Strait Islander people were hospitalised at higher rates than non-Indigenous people across most ages, the rate was three times higher in the 55-64 years age-group (9.5 per 1,000 compared with 3.0 per 1,000 respectively). Rates were similar in the under 25 years and 75 years and over age-groups.

In both major cities and in the inner and outer regional areas, hospitalisation rates for type 1 diabetes as a principal or additional diagnosis for Aboriginal and Torres Strait Islander people were similar (4.5 per 1,000 and 4.9 per 1,000) [80]. The rate in remote and very remote areas (1.7 per 1,000) was less than half the rate in major cities and in outer regional areas. When compared with the non-Indigenous population, in major cities and in inner and outer regional areas, Aboriginal and Torres Strait Islander people were more likely to be hospitalised for type 1 diabetes than non-Indigenous people (2.2 times higher in major cities and 1.9 times higher in inner and outer regional areas). Type 1 diabetes hospitalisation rates were similar for Aboriginal and Torres Strait Islander people living in remote and very remote areas compared with non-Indigenous people.

Hospitalisations for various chronic conditions, including complications of diabetes, are considered potentially preventable [8]. In 2014-15, diabetes complications accounted for 19% of potentially preventable hospitalisations for Aboriginal and Torres Strait Islander people, with an age-adjusted rate four times greater than the rate for non-Indigenous people.

Mortality

Diabetes was the second leading cause of death among Aboriginal and Torres Strait Islander people in 2016 [32]. Deaths due to diabetes occurred among Aboriginal and Torres Strait Islander people at a rate of 4.9 times that of non-Indigenous people[25]. Diabetes was responsible for 7.8% of deaths (228 deaths) among Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA, and the NT. There were more deaths due to diabetes among Aboriginal and Torres Strait Islander females (127 deaths) than among males (101 deaths).

For 2012-2016, diabetes was the underlying cause of death for 1,041 Aboriginal and Torres Strait Islander people in NSW, Qld, WA, SA and NT [32]. Aboriginal and Torres Strait Islander people died from diabetes at a rate 1.8 times higher than for non-Indigenous people (33 per 100,000 compared with 18 per 100,000). The age-specific death rates for diabetes for the 45-54 years age-group for Aboriginal and Torres Strait Islander people were 62 per 100,000 for males and 54 per 100,000 for females with rate ratios of 11.4 for males and 21.1 for females when compared with non-Indigenous males and females.

Burden of disease

Diabetes accounted for 4% of the total burden of disease among Aboriginal and Torres Strait Islander people in 2011 [45]. Diabetes was among the top five specific diseases which included CHD (ranked highest), suicide/self-inflicted injuries, anxiety disorders and alcohol use disorders.

Social and emotional wellbeing (including mental health)

Social and emotional wellbeing (SEWB) is a complex and multifaceted concept that has particular resonance and meaning for Aboriginal and Torres Strait Islander people [7, 89]. While the term SEWB has been used interchangeably with 'mental health' and 'mental illness', Gee et al. argue that these latter terms should be positioned 'within' a broader understanding of SEWB rather than 'equated with SEWB' [7]. SEWB for Aboriginal and Torres Strait Islander people then, may be defined as 'a multidimensional concept of health that includes mental health, but which also encompasses domains of health and wellbeing such as connection to land or 'country', culture, spirituality, ancestry, family and community' [7]. Understanding SEWB and mental health as cultural constructions enhances the capacity for culturally responsive, strengths based approaches to managing emerging issues for individuals and communities. Colonisation has had a systematically profound impact on Aboriginal and Torres Strait Islander peoples' traditional cultural practices and by implication on their SEWB [6, 90]. A number of factors have been linked to SEWB concerns for Aboriginal and Torres Strait Islander people such as discrimination and racism, grief and loss, child removals and unresolved trauma, life stress, social exclusion, economic and social disadvantage, incarceration, child removal by care and protection orders, violence, family violence, substance use and physical health problems [6]. Gee et al. also identify a number of important factors that enhance SEWB such as connection to country, spirituality and ancestry; kinship; and self-determination, community governance and cultural continuity [91].

The World Health Organization (WHO) defines mental health as a state of social and emotional wellbeing in which individuals can cope with the normal stresses of life and realise their potential [92]. Like SEWB, mental health is influenced by individual attributes, social circumstances in which they find themselves and the environment they live in [93].

Some individuals experience compromised mental health due to mental health problems or mental illness. Mental health problems are characterised by reduced cognitive, emotional, or social functioning, but not to the extent that the criteria for a mental illness are met [94, 95]. Mental illness is a psychological disorder that significantly interferes with an individual's cognitive, emotional, or social abilities, and is generally determined according to the classification system of the *Diagnostic and statistical manual of mental disorders* (DSM) or the ICD. Severe mental illness, while evident in the anthropological or ethnographic records, was relatively rare in traditional Aboriginal societies [91].

---

[25] Data presented here excludes Victoria, ACT and the NT as per national reporting guidelines [32].

For Aboriginal people broadly speaking, the structure and cultural practices of traditional society buffered the impacts experienced since colonisation. Similarly, for Torres Strait Islander people, traditional cultural practices enhanced the likelihood of better health outcomes, including SEWB [91].

Extent of social and emotional wellbeing, mental illness and mental health problems among Aboriginal and Torres Strait Islander people

Prevalence

The 2012-13 AATSIHS found that the SEWB of many Aboriginal and Torres Strait Islander people was compromised: 30% of respondents aged 18 years and over reported high or very high levels of psychological distress in the four weeks prior to the interview [96]. After age-adjustment, the proportion of Aboriginal and Torres Strait Islander people reporting high or very high distress levels in 2012-2013 was more than 2.7 times that of non-Indigenous people reported in 2011-2012 [96].

The 2012-13 AATSIHS found a relationship between education level and employment status, and the level of psychological distress for Aboriginal and Torres Strait Islander people [97]. The proportion of 34% of Aboriginal and Torres Strait Islander people who were educated to year 9 level experienced high/very high levels of psychological distress, whereas for those who were educated to year 12, the figure was 26%. Similarly, 42% of unemployed Aboriginal and Torres Strait Islander people experienced high/very high levels of psychological distress, compared with 22% of those employed.

The higher overall levels of psychological distress reported by Aboriginal and Torres Strait Islander people than by non-Indigenous people are consistent with the relative frequencies with which the two populations experienced specific stressors in the previous 12 months [98]. According to the 2014-15 NATSISS, 68% of Aboriginal and Torres Strait Islander people aged 15 years and over experienced one or more selected personal stressors in the 12 months prior to the survey. The most prevalent stressors for Aboriginal and Torres Strait Islander people were death of a family member or close friend (28% of people surveyed), followed by; unable to get a job (19%); serious illness (12%); other work-related stressors (11%) and mental illness (10%). Among Aboriginal and Torres Strait Islander people, commonly reported personal stressors were fairly consistent for males and females; however a greater proportion of females than males reported experiencing one or more specific stressors (70% and 66% respectively). Aboriginal and Torres Strait Islander people with a mental health condition were more likely to experience personal stressors than those with no long-term health condition: 84% and 60% respectively [99].

Psychological distress and the contributing life stressors are just one aspect of SEWB. Also providing an indication of a person's state of SEWB is the degree to which they experience positive feelings. In the 2012-13 AATSIHS respondents reported on feelings of calmness and peacefulness, happiness, fullness of life, and energy and 91% of Aboriginal and Torres Strait Islander people reported feeling happy either some, most, or all of the time [100]. However, concerning proportions responded 'a little/none of the time' to questions relating to having 'lots of energy' (21%), a sense of calmness and peacefulness (18%) and fullness of life (19%). The absence of comparable data precludes definitive statements about the relative positive wellbeing of Aboriginal and Torres Strait Islander and non-Indigenous people, but the greater frequency of psychological distress in the Aboriginal and Torres Strait Islander population, together with the types and numbers of stressors reported, suggests Aboriginal and Torres Strait Islander people experience lower levels of SEWB than non-Indigenous people.

The 2014-15 NATSISS found that more than half of Aboriginal and Torres Strait Islander people aged 15 years and over reported an overall life satisfaction rating of at least 8 out of 10 (54% of females and 52% of males), where 0 is completely unsatisfied and 10 is completely satisfied. (Derived from [101]). Of those that experienced low range (0-4 out of 10) satisfaction ratings, a clear association was found with relative disadvantage. In particular, low scores were associated with unemployment and those who had not finished year 12.

In 2014-2015, 23% of Aboriginal and Torres Strait Islander people with a mental health condition reported excellent or very good self-assessed health, this compared with 58% of those with no long-term health condition. Those with a mental health condition were 2.6 times more likely to have experienced high or very high levels of psychological distress (60%) as those with no long-term health condition (23%) [99].

SEWB is influenced by the support a person receives from their social networks [102]. Information collected in the 2013-14 NATSISS showed that 92% of Aboriginal and Torres Strait Islander people aged 15 years and over were able to obtain emotional, physical, or financial help from someone else during a time of crisis (Derived from [101]). For the general population, people experience similar levels of social support: in the 2014 General Social Survey (GSS) it was found that 95% were able to access support at a time of crisis [103].

Removal from one's natural family also has significant implications for a person's mental health. The 2014-15 NATSISS found that Aboriginal and Torres Strait Islander people with a mental health condition were more likely to have been removed, or had relatives removed, from their natural family (50%) than those with no long-term health condition (34%). Additionally, those with a mental health condition were more likely to have had an unfair experience because they were an Aboriginal and /or Torres Strait Islander person (44%) than those with no long-term health condition (28%) [99].

The *Footprints in time: longitudinal study of Indigenous children* found that there was a significant association with self-reported parenting efficacy and children's social and emotional difficulties [104]. An increase in self-reported parenting efficacy scores is associated with a decrease in children's social and emotional difficulties scores. Additionally, children's abilities to interact socially were also significantly associated with self-reported parenting efficacy; an increase in self-reported parenting efficacy is associated with an increase in prosocial skills.

Hospitalisation

Reflecting the continuing high levels of distress experienced by many Aboriginal and Torres Strait Islander people, 19,801 of the hospital separations in 2015-16 with a principal diagnosis of ICD 'Mental and behavioural disorders' were identified as Aboriginal and Torres Strait Islander (Derived from [41]).[26] This number of separations accounted for 4.1% of all hospital separations for Aboriginal and Torres Strait Islander people; and occurred at 1.8 times higher than the rate for non-Indigenous people (32 per 1,000 and 17 per 1,000 respectively).

Information about hospitalisation for the specific sub-categories within the ICD 'Mental and behavioural disorders' are not available for 2015-16, but data from 2013-15 show hospitalisation rates for each sub-category were generally higher for Aboriginal and Torres Strait Islander people than for other Australians [61]. For this period, the age-adjusted separation rates for mental and behavioural disorders due to ICD 'Psychoactive substance use disorders' were 3.6 times higher for Aboriginal and Torres Strait Islander people than those for non-Indigenous people. Similarly, the rate for Aboriginal and Torres Strait Islander people for ICD 'Schizophrenia, schizotypal, and delusional disorders' was 3.0 times higher than the rate for non-Indigenous people.

Intentional self-harm categorised as a principal diagnosis, was responsible for 2,701 (0.6%) of all hospital separations for Aboriginal and Torres Strait Islander people in 2015-16 (Derived from [41]). In 2013-15, Aboriginal and Torres Strait Islander people were 2.7 times more likely to be admitted for intentional self-harm than non-Indigenous people [61]. After age-adjustment, separation rates for self-harm were 3.1 and 2.5 times higher for Aboriginal and Torres Strait Islander males and females respectively, than those for non-Indigenous males and females.

Mortality

The most recent detailed information about Aboriginal and Torres Strait Islander mortality as a result of mental health related conditions is for those living in NSW, Qld, WA, SA and the NT in 2011-2015, there were 385 deaths of Aboriginal and Torres Strait Islander people, 167 males and 218 females (Table 20) [61][27]. After age-adjustment, death rates were 1.3 and 1.2 times higher for Aboriginal and Torres Strait Islander males and females respectively, than for non-Indigenous males and females.

Table 20. Numbers and rates of deaths from mental health related conditions (excluding intentional self-harm), by sex and cause of death, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, NSW, Qld, WA, SA, and the NT, 2011-2015

Cause of death	Males			Females		
	Number	Rate	Rate ratio	Number	Rate	Rate ratio
Mental disorders due to substance use	70	9.4	5.0	19	n.p.	n.p.
Organic mental disorders	86	32	1.3	160	44	1.2
Other mental disorders	11	n.p.	n.p.	39	10	0.6
All mental disorders	167	44	1.2	218	56	1.1

Notes: 1 Rates are deaths per 100,000, rounded to the nearest whole number, standardised using the Australian 2001 ERP.

2 Details of death from intentional self-harm are not included in this table; see Tables 21 and 22.

3 'Mental disorders due to substance use' comprises ICD codes F10-F19, 'Organic mental disorders' ICD codes F00-F09, and 'Other mental disorders' ICD codes F20–F99, G30, G47.0, G47.1, G47.2, G47.8, G47.9, O99.3, R44, R45.0, R45.1, R45.4, R48.

4 n.p.: not published

Source: AIHW, 2017 [61]

In 2016, the death rate for ICD 'Intentional self-harm' for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA, and the NT was 2.1 times the rate reported for non-Indigenous people [32]. It was the fifth leading specific cause of death among Aboriginal and Torres Strait Islander people.

For 2012-2016, death rates from intentional self-harm were much higher for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT than for non-Indigenous people, with age-standardised death rates ranging from 16 per 100,000 (NSW) to 41 per 100,000 (WA) [32]. Death rates were higher for Aboriginal and Torres Strait Islander males than females (in those jurisdictions for which details were available) (Table 21).

---

[26] The ICD chapter 'Mental and behavioural disorders', used for the classification of both hospitalisation and mortality, is very broad. As well as mental illness and mental health problems, it includes mental retardation and a broad sub-category for disorders relating to the use of psychoactive substances (including alcohol, tobacco, other drugs and volatile substances). The chapter doesn't include, however, the results of intentional self-harm, which are classified within the ICD chapter 'External causes of morbidity and mortality'.

[27] Under the ICD, intentional self-harm is classified under 'External causes of morbidity and mortality' (codes X60-X84); details are provided separately.

Table 21. Age-standardised death rates for intentional self-harm among Aboriginal and Torres Strait Islander people, by sex and jurisdiction, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, NSW, Qld, WA, SA and the NT, 2012-2016

Jurisdiction	Aboriginal and Torres Strait Islander people			Rate ratios		
	Persons	Males	Females	Persons	Males	Females
NSW	16	26	n.p.	1.6	1.7	n.p.
Qld	23	37	10	1.7	1.8	1.6
WA	41	59	22	3.3	3.3	3.5
SA	21	27	16	1.7	1.4	2.5
NT	26	32	21	1.8	1.4	4.0

Notes: 1 Rate per 100,000 population, rounded to the nearest whole number, standardised to the Australian 2011 and 2016 ERP

2 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate

3 n.p.: not published

4 These figures probably underestimate the differences between Aboriginal and Torres Strait Islander and non-Indigenous people due to the incomplete identification of Indigenous status

Source: ABS, 2017 [32]

These overall death rates conceal the very high rates of suicide among young Aboriginal and Torres Strait Islander people who die from suicide at much younger ages than non-Indigenous people [32]. Combined data for NSW, Qld, WA, SA and the NT in 2012-2016 show that for Aboriginal and Torres Strait Islander people in the 15-24 years and 25-34 years age groups, intentional self-harm was the leading cause of death; with death rates as high as 39 per 100,000 and 46 per 100,000 respectively (Table 22). The median age of death among Aboriginal and Torres Strait Islander people was 29 years. The burden of death by intentional self-harm was highest among Aboriginal and Torres Strait Islander males aged 25-34 years and 35-44 years (rates of 70 per 100,000 and 61 per 100,000 respectively), but was also very high among young Aboriginal and Torres Strait Islander females. The suicide rates for Aboriginal and Torres Strait Islander females in the 1-14 years to 15-24 years age-groups were 7.1 and 4.6 times higher respectively, than for non-Indigenous females.

Table 22. Age-standardised death rates for intentional self-harm among Aboriginal and Torres Strait Islander people, by sex and age-group, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, NSW, Qld, WA, SA and the NT, 2012-2016

Age-group (years)	Aboriginal and Torres Strait Islander people			Rate ratios		
	Persons	Males	Females	Persons	Males	Females
1-14	2.7	2.9	2.4	8.5	9.9	7.1
15-24	39	51	27	3.7	3.3	4.6
25-34	46	70	23	3.3	3.3	3.5
35-44	40	61	20	2.3	2.3	2.4
45+	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
All ages	23	33	n.p.	1.9	1.8	n.p.

Notes: 1 Rate per 100,000 population, rounded to the nearest whole number, standardised to the Australian 2011 and 2016 ERP.

2 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.

3 n.p.: not published.

4 Due to the incomplete identification of Aboriginal and Torres Strait Islander status, these figures probably underestimate the true differences between Aboriginal and Torres Strait Islander and non-Indigenous people.

Source: ABS, 2017 [32]

In 2016, among 5-17 year olds, suicide was the leading cause of death for both the Aboriginal and Torres Strait Islander population and the non-Indigenous population. For 2012-2016, of all suicide deaths in this age group, more than one-quarter (27%) were Aboriginal and Torres Strait Islander children and young people, with a rate of 9.8 per 100,000 this was 5.2 times the rate for non-Indigenous children and young people, 1.9 per 100,000 [32].

Research in NSW, Qld, WA, SA and the NT has highlighted the increasing impact of suicide among young Aboriginal and Torres Strait Islander people, and a trend among young Indigenous males [8]. Research in the Kimberley region of WA between 2005-2014 found the age-adjusted rate of suicide per year in this region to be 74 per 100,000, and of these, 68% of people were less than 30 years old and 71% were male [105]. The level of intentional self-harm has been recognised as a key indicator of Indigenous disadvantage [8].

Data sovereignty in Aboriginal and Torres Strait Islander health

There is increasing recognition of the importance of local level data in terms of data governance and sovereignty [106]. In recent years, it has become increasingly apparent that data pertaining to Indigenous people globally and Aboriginal and Torres Strait Islander people in Australia have promulgated a racialised narrative of Indigenous deficit. Walter in particular, has named the five 'D's; disparity, deprivation, disadvantage, dysfunction and difference that have infused much of the debate about Aboriginal and Torres Strait Islander people [107]. She also lamented the 'data desert' surrounding more positive strength based assessments of Aboriginal and Torres Strait Islander health [108]. There are a number of emerging data sources that gather local, culturally safe data such as the work of Eunice Yu and colleagues in the Kimberley Region [109]. In their research, they have conceptualised the social and emotional wellbeing using the local understandings of the word 'Liyan'. As Patrick Dodson, Paul Lane and Alan Duncan state in their forward to a Yap and Yu (2016) report, 'many of the indicators commonly used to capture Indigenous peoples' wellbeing are drawn from western concepts that fail to reflect the essential elements of a good life that resonate with Yawuru people' p. 8 [110]. Another striking example of local level data, is the study of Aboriginal suicide in the Kimberley [105]. As reported in this section, the local level data revealed suicide rates significantly, and worryingly, higher than reported in the national statistics. These local level statistics reenergised and recalibrated the debate and imperative towards urgent action in the region. These two case studies are exemplars of the importance of data sovereignty for the development of future policy and practice in Aboriginal and Torres Strait Islander health.

Kidney health (renal disease)

Kidney disease, renal and urologic disease, and renal disorder are terms that refer to a variety of different disease processes involving damage to the filtering units of the kidneys (nephrons) which affect the kidneys ability to eliminate wastes and excess fluids [111]. Of particular importance to Aboriginal and Torres Strait Islander people is chronic kidney disease (CKD), which is defined as kidney damage or reduced kidney function that lasts for three months or more [112]. CKD is inclusive of different conditions, including diabetic nephropathy, hypertensive renal disease, glomerular disease, chronic renal failure, and end-stage renal disease (ESRD) [113]. If CKD is left untreated, kidney function can decrease to the point where kidney replacement therapy, in the form of dialysis (mechanical filtering of the blood to help maintain functions normally performed by the kidneys) or transplantation (implantation of a kidney from either a living or recently deceased donor) is necessary to survive [114]. ESRD, where the kidneys are operating at less than 15% of capacity and dialysis or transplant are required [111], is expensive to treat [115] and has a marked impact on the quality of life of those who suffer from the disease as well as those who care for them [116, 117].

Risk factors associated with kidney disease, including obesity, hypertension, diabetes mellitus, tobacco use, established cardiovascular disease, age, family history, socioeconomic disadvantage [118] and LBW [119, 120]. These factors are particularly common among Aboriginal and Torres Strait Islander people and contribute to high rates of CKD [45, 114].

Extent of kidney disease among Aboriginal and Torres Strait Islander people

Prevalence/incidence

Around 1.8% of Aboriginal and Torres Strait Islander people reported kidney disease as a long-term health condition in the 2012-13 AATSIHS [52]. After age-adjustment, the prevalence of kidney disease was 3.7 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people. The proportions of Aboriginal and Torres Strait Islander people reporting kidney disease were similar for males and females, but the age-adjusted Aboriginal and Torres Strait Islander: non-Indigenous rate ratio was slightly higher for males (3.9) than for females (3.6). The reported prevalence of kidney disease among Aboriginal and Torres Strait Islander people was less than 2% for all age-groups under 45 years, increasing to 4.0% for people aged 45-54 years and 7.7% for people aged 55 years and over.

With most information on CKD limited to self-reported data, the primary focus in the literature has been on ESRD. The overall incidence rate of ESRD for Aboriginal and Torres Strait Islander people is consistently reported as being considerably higher than for non-Indigenous people [121]. Rates fluctuate from year to year but in recent years Aboriginal and Torres Strait Islander rates have stabilised.

Data from the ANZDATA for the five-year period 2011-2015 reveal that the age-standardised notification rate of ESRD for Aboriginal and Torres Strait Islander people was 629 per 1,000,000 population, 6.8 times the rate for non-Indigenous people (Derived from [19, 122-124]).

Notification rates of ESRD were higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people in all states and territories, with the highest rates recorded for Aboriginal and Torres Strait Islander people living in the NT (1,828 per 1,000,000), WA (1,090 per 1,000,000), and SA (588 per 1,000,000) (Table 23) (Derived from [19, 122-124]).

Table 23. Numbers of notifications and age-standardised notification rates for ESRD, by Indigenous status, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, selected jurisdictions, Australia, 2011-2015

Jurisdiction	Aboriginal and Torres Strait Islander		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
NSW	186	293	3,755	92	3.2
Vic	51	368	3,139	100	3.7
Qld	293	503	2,112	88	5.7
WA	311	1,090	1,075	86	12.7
SA	70	588	834	87	6.8
NT	433	1,828	75	98	18.6
Australia	1,354	629	11,512	93	6.8

Notes: 1 Rates per 1,000,000 population have been standardised using the ERP from 30 June 2001.
2 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.
3 Notification rates for Tas, ACT and the NT have not been shown separately because of the small numbers of notifications, but are included in the figures for Australia.
4 Rounding may result in inconsistencies in calculated ratios.

Sources: Derived from ABS, 2014 [19], ABS, 2003 [122], ABS, 2014 [123], ANZDATA, 2017, [124]

Of people newly registered with the ANZDATA in 2011-2015, 58% of Aboriginal and Torres Strait Islander people were aged less than 55 years, compared with 30% of non-Indigenous people. Notification rates were higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people across all age-groups (except for the 0-14 years age-group) (Table 24) (Derived from [19, 122-124]). Rate ratios were particularly high for people aged 45-54 years (12.2).

Table 24. Numbers of notifications and notification rates of ESRD, by Indigenous status and age-group, and Aboriginal and Torres Strait Islander:non-Indigenous rate ratios, Australia, 2011-2015

Age-group (years)	Aboriginal and Torres Strait Islander		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
0-14	6	4.9	168	8.1	0.6
15-24	27	38	259	18	2.2
25-34	88	180	532	32	5.6
35-44	231	566	905	58	9.8
45-54	437	1,310	1,612	107	12.2
55-64	393	1,912	2,506	193	9.9
65-74	147	1,604	2,965	321	5.0
75+	25	700	2,565	350	2.0
All ages	1,354	629	11,512	93	6.8

Notes: 1 Rates per 1,000,000 population
2 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate
3 Rates for 'All ages' are age-standardised
4 Rounding may result in inconsistencies in calculated ratios

Sources: Derived from ABS, 2014 [19], ABS, 2003, [122], ABS, 2014 [123], ANZDATA, 2017 [124]

Hospitalisation, dialysis and transplantation

In 2015-16, there were 1,003 per 1,000 hospital separations[28] for Aboriginal and Torres Strait Islander people, 2.5 times the rate for non-Indigenous people (402 per 1,000) [41]. However, 83% of the difference between these rates was due to higher separations for Aboriginal and Torres Strait Islander people admitted for dialysis.

Detailed information from ANZDATA is available for 2015 when a total of 277 Aboriginal and Torres Strait Islander people commenced dialysis, this is a decrease from 2014 (283 people) [121]. In 2015, there were 36 new transplant operations for Aboriginal and Torres Strait Islander recipients, compared with 880 performed for non-Indigenous recipients. At 31 December 2015, 31 (3%) of the 1,061[29] patients on the waiting list for a transplantation were Aboriginal and/or Torres Strait Islander people.

Haemodialysis (HD), conducted in urban or regional clinics and hospitals, is the most common form of dialysis treatment for Aboriginal and Torres Strait Islander people with ESRD [114, 121, 125]. In 2015, HD accounted for the majority of treatment; 92%, with only 8% of Aboriginal and Torres Strait Islander dialysis patients receiving peritoneal dialysis (PD) (Derived from [121]). The majority (78%) of non-Indigenous dialysis patients also received HD, but 22% of non-Indigenous dialysis patients received PD. In 2015, there were 1,647 prevalent dialysis patients in Australia (PD and HD treatments) identified as Aboriginal and Torres Strait Islander.

For 2013-15, hospitalisation rates for CKD (excluding dialysis) were 3.6 times higher after age-adjustment among Aboriginal and Torres Strait Islander people (5.6 per 1,000) than non-Indigenous people (1.6 per 1,000) [61]. For Aboriginal and Torres Strait Islander males,

---

[28] Only includes public hospital data for Tas, ACT and NT.
[29] Included 18 patients with an unreported Indigenous status.

rates were 2.5times higher than for non-Indigenous males (4.0 per 1,000 and 1.6 per 1,000 respectively). For Aboriginal and Torres Strait Islander females, rates were 4.6 times higher than for non-Indigenous females (7.1 per 1,000 and 1.5 per 1,000 respectively).

For 2013-15, Aboriginal and Torres Strait Islander people were hospitalised for CKD (excluding dialysis) at higher rates than non-Indigenous people in all age-groups, in particular the 45-54 years (rate ratio: 6.6) and 55-64 years (rate ratio: 5.8) age groups [61]. Hospitalisation rates for CKD (excluding dialysis) were highest for Aboriginal and Torres Strait Islander people living in very remote areas (10 per 1,000), followed by remote areas (9.6 per 1,000), outer regional areas (5.6 per 1,000), major cities (4.1 per 1,000) and inner regional areas (3.3 per 1,000).

There were 207,605 hospital separations for ESRD among Aboriginal and Torres Strait Islander people in 2014-15 [8]. After age-adjustment, the hospitalisation rate for ESRD was 11.2 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people. Aboriginal and Torres Strait Islander females had the highest rate of hospitalisation for ESRD, 17.4 times that of other females; Aboriginal and Torres Strait Islander males were hospitalised for ESRD at 7.3 times the rate of other males.[30]

In 2014-15 after age-adjustment, hospitalisation rates for ESRD for Aboriginal and Torres Strait Islander people increased with remoteness [8]. In remote and very remote areas the hospitalisation rate for Aboriginal and Torres Strait Islander people was almost 70 times higher than for non-Indigenous people. For Aboriginal and Torres Strait Islander people living in remote and very remote areas, the hospitalisation rate was 2.9 times the rate of Aboriginal and Torres Strait Islander people living in major cities.

In 2013-14, hospitalisation rates for regular dialysis as the principal diagnosis were 10.3 times higher for Aboriginal and Torres Strait Islander people (451 per 1,000) than for non-Indigenous people (44 per 1,000) [80]. For Aboriginal and Torres Strait Islander males, hospitalisation rates were 6.9 times higher than for non-Indigenous males (390 and 57 per 1,000 respectively). For females, hospitalisation rates were 15.6 times higher than for non-Indigenous females (509 per 1,000 and 33 per 1,000 respectively).

Mortality

There were 58 deaths from disease of the urinary system among Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT in 2016 [32]. [31] After age-adjustment, the death rate for Aboriginal and Torres Strait Islander people was 2.0 times that for non-Indigenous people.

For 2011-2015, after age-adjustment, the death rate for kidney disease for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and NT (24 per 100,000) was 2.6 times the rate for non-Indigenous people (9.2 per 100,000) [126].

More detailed information is available for people living in NSW, Qld, WA, SA and the NT for 2010-2012. During this period, CKD was the underlying cause of death of 260 Aboriginal and Torres Strait Islander people and the underlying or associated cause of death of 1,166 Aboriginal and Torres Strait Islander people [80]. After age-adjustment, the death rate for CKD as an underlying or associated cause of death for Aboriginal and Torres Strait Islander people was 3.2 times higher than the rate for non-Indigenous people. The Aboriginal and Torres Strait Islander: non-Indigenous rate ratios were higher for females (3.9) than for males (2.6).

Burden of disease

Kidney and urinary diseases accounted for 2.5% of the total burden of disease among Aboriginal and Torres Strait Islander people in 2011 [45]. CKD (79%) and other kidney and urinary diseases (20%) were the largest contributors to this total burden.

Injury, including family violence

Injury includes both physical harm to a person's body and non-physical harm, including grief, loss and suffering [127], but in public health practice attention is almost entirely confined to physical harm [128]. Even restricted to physical harm, assessing the total impact of injury is difficult because many injuries do not result in hospitalisation or death and there are few systematic data [129].

The classification of injury has generally followed the WHO's ICD, which includes particular attention to the external cause of the injury [44].[32] When looking at injury in Aboriginal and Torres Strait Islander contexts, there are a number of factors which must be taken into consideration. These include low socioeconomic contexts (which have a higher risk of injury because of unsafe environments) [129, 131], alcohol and other drug use, intimate partner violence [132], disruption to culture [127], as well as less access to prevention efforts and high-quality treatment and rehabilitation services.

Extent of injury among Aboriginal and Torres Strait Islander people

Prevalence

The 2012-13 AATSIHS reported that 2.5% of Aboriginal and Torres Strait Islander people had a long-term condition caused by injury with the highest reported levels in the 35-44 years and 45-54 years age-groups [133]. Long-term conditions caused by injury were reported more frequently by Aboriginal and Torres Strait Islander people than by non-Indigenous people across all age-groups except for the

---

[30] Data presented in this report refer to episodes of admitted care, meaning the same patient can potentially have multiple hospitalisations within the same period. Consequently, data represent health service usage by those with CKD rather than representing the number or proportion of people in Australia with CKD admitted to hospital.

[31] Disease of the urinary system includes disorders of the bladder and urethra, as well as those specifically of the kidneys and ureters.

[32] This system is followed in this section, but it has its limitations (for more details, see [130]).

55 years and over age-group. After age-adjustment, Aboriginal and Torres Strait Islander people were 1.2 times more likely than non-Indigenous people to report a long-term condition as a result of an injury; the rate ratio for females (1.3) was slightly higher than for males (1.1) [134].

In relation to violence, in the 2014-15 NATSISS, 22% of Aboriginal and Torres Strait Islander people aged 15 years and over had experienced physical or threatened violence in the last 12 months [135]. For males, victimisation was highest in the 15-24 years age-group (27%), while for females, it was highest in the 25-34 years age-group (27%). Males experienced physical or threatened violence at a slightly higher rate than females (23% and 22% respectively). In terms of remoteness, victimisation levels were slightly higher in remote areas (23%) than they were in non-remote areas (22%).

According to the 2014-15 NATSISS, 69% of Aboriginal and Torres Strait Islander people aged 15 years or over reported awareness of problems in their neighbourhood or community, with 25% reporting awareness of family violence and 21% reporting awareness of assault [135]. For remote areas, 47% of Aboriginal and Torres Strait Islander people reported awareness of family violence, compared with 19% for non-remote areas. The figures are similar for assault, with 45% of Aboriginal and Torres Strait Islander people in remote areas reporting awareness of assault, compared with 14% in non-remote areas.

Hospitalisation

There were 32,694 hospital separations for injuries for Aboriginal and Torres Strait Islander people in 2015-16, representing 14% of all Aboriginal and Torres Strait Islander separations (excluding those for dialysis) (Derived from [41]). The leading external causes of injury-related hospitalisations were falls (20%), assault (19%), exposure to mechanical forces (17%) and complications of medical and surgical care (13%). After age-adjustment, the separation rate for injury was almost twice as high for Aboriginal and Torres Strait Islander people than for other Australians (52 per 1,000 and 29 per 1,000 respectively).

More detailed information for 2013-15 shows that in terms of age, the greatest disparity between Aboriginal and Torres Strait Islander and non-Indigenous people was in the 35-44 years age-group, where the rate of hospitalised injury was three times higher for Aboriginal and Torres Strait Islander people [61]. The number of Aboriginal and Torres Strait Islander men hospitalised for injury was highest in the 35-44 years age group (64 per 1,000), however the number of Aboriginal and Torres Strait Islander women hospitalised for injury was the highest in the 65+ age group (58 per 1,000). Rates of hospitalised injury are consistently higher for Aboriginal and Torres Strait Islander people than non-Indigenous people in the middle years, however from about 65 years of age, the rates are high for both populations.

In terms of remoteness, hospitalisation rates for injury for Aboriginal and Torres Strait Islander people increased with remoteness in 2014-15 [8]. The rate increased from 38 per 1,000 in major cities to 74 per 1,000 in remote and very remote areas. Hospitalisation rate ratios (Aboriginal and Torres Strait Islander/non-Indigenous) were higher in remote areas than major cities for a number of principal diagnoses, notably so for assaults, where the rate ratio for remote and very remote areas (19.0) was more than twice that of major cities (7.6).

Assaults account for a higher proportion of injury-related hospitalisations among Aboriginal and Torres Strait Islander people than among non-Indigenous people; in 2015-16, 19% of injury-related hospitalisations among Aboriginal and Torres Strait Islander people were for assaults compared with 2% among non-Indigenous people [41].

Rates of hospitalisations due to family violence-related assaults among Aboriginal and Torres Strait Islander people were higher than for non-Indigenous people in 2014-15 [8]. After age-adjustment, Aboriginal and Torres Strait Islander people were hospitalised for assaults relating to family violence at 29 times the rate of non-Indigenous people. The hospitalisation rates for family violence-related assaults for Aboriginal and Torres Strait Islander females were highest for those aged 25-34 years (13 per 1,000). For Aboriginal and Torres Strait Islander males, rates were highest for those aged 35-44 years (4.3 per 1,000). The hospitalisation rates from family violence-related assaults for Aboriginal and Torres Strait Islander people increased with remoteness, from 4.0 per 1,000 in major cities to 15 per 1,000 in remote and very remote areas (rate ratios: 13.8 and 41.7 respectively when compared with the age-standardised rates for non-Indigenous people).

Mortality

Important specific causes of injury deaths for NSW, Qld, SA, WA and the NT in 2016 were:

- intentional self-harm (162 deaths, 5.5% of all Aboriginal and Torres Strait Islander deaths)
- land transport accidents (80 deaths, 2.7% of all Aboriginal and Torres Strait Islander deaths)
- accidental poisoning (75 deaths, 2.6% of all Aboriginal and Torres Strait Islander deaths) [32].

After age-adjustment, deaths from intentional self-harm were 2.1 times as common for Aboriginal and Torres Strait Islander people than for non-Indigenous people, those from land transport accidents 2.5 times as common, and deaths from accidental poisoning 2.4 times as common [32].

More detailed information for death from injury is available for 2011-2015. In this period, there were 1,995 Aboriginal and Torres Strait Islander deaths from injury in NSW, Qld, WA, SA and the NT, representing 15% of all Aboriginal and Torres Strait Islander deaths [61]. After age-adjustment, Aboriginal and Torres Strait Islander people died from injury at 2.1 times the rate of non-Indigenous people.

Death rates for injury were particularly high among Aboriginal and Torres Strait Islander people aged 25-34 years (104 per 100,000), 35-44 years (111 per 100,000) and 75 years and above (205 per 100,000 respectively).

Leading causes of injury-related death of Aboriginal and Torres Strait Islander people for 2011-2015 in NSW, Qld, WA, SA and the NT, as a percentage of total deaths were intentional self-harm (6.8% for males and 3.4% for females), land transport accidents (4.1% for males and 2.4% for females), accidental poisoning by and exposure to noxious substances (2.3% for males and 1.8% for females) and assault (1.6% for males and 1.4% for females) [61].

Burden of disease

In 2011, injury was the second highest contributor to the total burden of disease for Aboriginal and Torres Strait Islander people, responsible for 15% of this burden [45]. The burden of disease for injury was higher in Aboriginal and Torres Strait Islander males (19%) compared with females (10%). Looking specifically at the injury burden, suicide accounted for 30% of this burden, with transport accidents accounting for 17%, and homicide and violence accounting for 12%.

Respiratory disease

Respiratory disease refers to a number of conditions that affect the airways and other structures of the lung [136] and impair the process of breathing and oxygen delivery [137]. These diseases range from acute respiratory infections to chronic respiratory conditions [45].

Respiratory disease is associated with a number of contributing factors, including: risky behaviours (particularly tobacco use); environmental conditions; occupational exposures and hazards [45, 138]; family history and other health conditions (obesity, infectious diseases) [138]. Infants and children are particularly susceptible to developing respiratory diseases due to risk factors including: exposure to tobacco smoke; poor living conditions; poor nutrition; and limited access to medical care [139, 140].

Extent of respiratory disease among Aboriginal and Torres Strait Islander people

Prevalence

Long-term diseases of the respiratory system[33] were reported by 31% of Aboriginal and Torres Strait Islander people who participated in the 2012-13 AATSIHS[34] [134]. After age-adjustment, the overall level of respiratory disease among Aboriginal and Torres Strait Islander people was 1.2 times higher than for non-Indigenous people. Respiratory diseases were more frequently reported by Aboriginal and Torres Strait Islander females (34%) than males (28%). The proportion of Aboriginal and Torres Strait Islander people reporting respiratory diseases increased with age, from 21% in the 0-14 year age-group to 43% in the 45-54 years age-group, before decreasing to 41% for the 55 years and over age-group.

Asthma was reported by 18% of Aboriginal and Torres Strait Islander people in the 2012-13 AATSIHS; it was the most commonly reported long-term respiratory disease and the second most commonly reported long-term disease overall [134]. After age-adjustment, the rate of asthma was 1.9 times higher among Aboriginal and Torres Strait Islander people than non-Indigenous people. Asthma was reported more commonly by females (20%) than by males (15%) [134] and by people living in non-remote areas (20%) than those in remote areas (10%) [141].

Other long-term respiratory diseases reported in the 2012-13 AATSIHS were chronic sinusitis (8.3%) and chronic obstructive pulmonary disease (COPD)[35] (4.1%) [134].

Hospitalisation

There were 24,199 hospital separations with a principal diagnosis of respiratory disease among Aboriginal and Torres Strait Islander people in 2015-16 [41], representing 10% of all separations (excluding dialysis) identified as Aboriginal and Torres Strait Islander (Derived from [41]). After age-adjustment, the hospitalisation rate for respiratory disease was 2.3 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people [41]. In 2014-15, age-standardised hospitalisation rates for selected respiratory diseases were higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people, particularly in the middle adult years (Table 25) [8].

---

[33] Individuals who reported a current respiratory condition that had lasted, or was expected to last, for six months or more [134].

[34] The 2014-15 NATSISS provides the most current information on the prevalence of long-term diseases of the respiratory system, however the ABS proposes wherever possible the 2012-2013 AATSIHS should be used for more detailed reporting of this data [135].

[35] COPD relates to a progressive lung disease for which the symptoms are not fully reversible, and includes chronic bronchitis and emphysema [142].

Table 25. Indigenous:non-Indigenous hospitalisation rate ratios, by selected condition and age-group, all jurisdictions, 2014-15

	Age-group (years)					
	0-14	15-24	25-44	45-64	65+	All ages
COPD	n/a	n/a	n/a	n/a	n/a	5.0
Influenza and pneumonia	1.9	2.7	5.4	5.7	2.0	3.1
Whooping cough	1.3	n/a	n/a	n/a	3.8	2.1
Asthma	1.0	1.6	3.2	3.4	2.9	1.8
Acute upper respiratory infections	1.6	1.3	2.4	3.1	1.8	1.8

Source: Derived from Steering Committee for the Review of Government Service Provision, 2016 [8]

In 2014-15, hospitalisation rates for COPD, influenza and pneumonia, acute upper respiratory infections, and asthma all increased with remoteness [8]. The rate for influenza and pneumonia was particularly high for Aboriginal and Torres Strait Islander people living in remote/very remote areas (22 per 1,000) compared with the rate for those living in major cities areas (6.8 per 1,000).

Mortality

In 2016, chronic lower respiratory disease (which includes asthma, bronchitis, bronchiectasis, emphysema, and other COPD) was the leading cause of death from respiratory disease and the third highest cause of death overall for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT (responsible for 200 deaths) [32]. After age-adjustment, the death rate for chronic lower respiratory disease among Aboriginal and Torres Strait Islander people was 2.7 times higher than among non-Indigenous people. Influenza and pneumonia were responsible for 46 Aboriginal and Torres Strait Islander deaths, with an age-adjusted death rate 1.3 times higher than for non-Indigenous people.

For the period 2011-2015, more detailed information is available for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT [61]. The overall age-standardised proportion of total deaths from respiratory diseases was higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (Table 26). COPD accounted for the highest age-standardised percentage difference between the two populations.

Table 26. Underlying causes of death, by Indigenous status, respiratory diseases, NSW, Qld, WA, SA and NT, 2011-2015

Respiratory disease type	Indigenous		Non-Indigenous	
	Deaths	Age-standardised % of total deaths	Deaths	Age-standardised % of total deaths
Chronic lower respiratory diseases	757	7.2	24,531	4.7
COPD	*648*	*6.5*	*21,993*	*4.2*
Asthma	*42*	*0.3*	*1,341*	*0.3*
Pneumonia and influenza	187	1.5	8,796	1.7
Other respiratory diseases	148	1.4	12,060	2.3
Total respiratory diseases	1,092	10	45,387	8.7

Notes: 1 Directly age-standardised using the 2001 standard population.

2 Data presented for COPD and asthma are a subset of data presented for all chronic lower respiratory diseases.

Sources: AIHW, 2017 [61]

Age-specific information is available for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and the NT for the period 2012-2016 [32]. The highest rate ratio for deaths from chronic lower respiratory diseases was in the 45-54 years age-group where the death rate was 9.0 times higher for Aboriginal and Torres Strait people (37 per 100,000) than for non-Indigenous people. 'Pneumonia and influenza' was a leading cause of respiratory related deaths for Aboriginal and Torres Strait Islander infants under one year of age (13 per 100,000) at a rate 8.2 times higher than for non-Indigenous infants.

While death rates from respiratory disease continue to be higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people, the disparity has closed over recent decades because of a decrease in rates among Aboriginal and Torres Strait Islander people since 1998 [1]. Age-standardised death rates for respiratory disease for Aboriginal and Torres Strait Islander people living in NSW, Qld, WA, SA and NT declined by 26% over the 1998-2012 period.

Burden of disease

Respiratory diseases[36] were responsible for 7.9% of the total burden of disease among Aboriginal and Torres Strait Islander people in 2011 [45]. Most of the burden from respiratory disease was attributed to asthma (particularly affecting people aged 10-24 years) and COPD (peaking in the 60-64 years age-group).

---

[36] Includes chronic conditions such as COPD, upper respiratory diseases and bronchiectasis.

Eye health

Eye health can be affected by a number of factors, including genetics, ageing, premature birth, diseases (such as diabetes), infections, injuries, ultraviolet (UV) exposure, nutrition and tobacco use [135, 143]. Poor vision can limit opportunities in education, employment and social engagement; it can also increase the risk of injury and be a reason for dependence on services and other people [27, 144, 145]. Even partial loss of vision can reduce an individual's ability to live independently and increase the risk of mortality [27, 146, 147].

Aboriginal and Torres Strait Islander people are at particular risk of developing some eye conditions [58]. There is however, evidence that Aboriginal and Torres Strait Islander children, especially those living in remote areas, generally experience better vision than non-Indigenous children [8, 148]. In addition, eye health initiatives appear to be closing the vision gap. It is estimated that 90% of vision impairment (VI) and blindness[37] among both Indigenous and non-Indigenous people is preventable or treatable [58].

Extent of eye health problems among Aboriginal and Torres Strait Islander people

Estimates of the prevalence of eye health problems among Aboriginal and Torres Strait Islander people have been obtained from surveys[38] and surveillance activities that rely on eye examinations or self-report[39].

Prevalence estimates of eye health problems based on data from eye examinations

The National Eye Health Survey (NEHS) was conducted between March 2015 and April 2016 [58]. It provides the latest evidence about the prevalence, causes and treatment of VI[40] and blindness[41] among Indigenous adults in Australia. The NEHS examined the eyes of 1,738 Indigenous people (aged 40-92 years) and 3,098 non-Indigenous people (aged 50-98 years) living in 30 randomly selected urban, rural and remote sites across Australia [150]. According to the NEHS, bilateral VI and bilateral blindness occurred among 11% and 0.3% of Indigenous Australians respectively [58]. After age-adjustment, the NEHS found that the prevalence of bilateral VI and bilateral blindness were both three times higher among Indigenous participants than among non-Indigenous participants. Of note, is the apparent reduction in the prevalence of blindness in Indigenous adults, from six times higher than that experienced by non-Indigenous adults in 2008 [148] to three times higher in 2016[42] [58].

VI increased with age among Indigenous adults participating in the NEHS, ranging from 5.7% for those in the 40-49 years age-group to 46% for those aged 80 years and over [58]. There was no significant difference in the prevalence of VI or blindness between Indigenous males and females. The prevalence of VI among Indigenous adults in outer regional and very remote areas (17% and 15% respectively) was double that in other areas (8.2% in major cities, 8.4% in inner regional areas and 8.3%, in remote areas). In 2016, it was estimated that up to 18,300 Indigenous people aged 40 years or older were living with VI or blindness.

According to the NEHS, the main causes of VI in Indigenous and non-Indigenous adults were uncorrected refractive error (63% and 62% respectively) and cataract (20% and 14% respectively) [58]. Diabetic retinopathy (DR) was the third most common cause of VI in Indigenous adults, but it contributed to a smaller proportion of cases among non-Indigenous adults (5.5% and 1.5% respectively). Among those with self-reported diabetes, a greater proportion of Indigenous adults had DR and vision-threatening DR (39% and 9.5% respectively) than non-Indigenous adults (29% and 4.5% respectively) [152]. While not among the main causes of VI, the prevalence of vision loss due to ocular trauma (eye injury) was also higher among Indigenous adults (0.8%) than among non-Indigenous adults (0.2%) [150]. Participants who were male, or living in a very remote area were also more likely to have vision loss from ocular trauma.

The NEHS identified five Indigenous participants with bilateral blindness, the main causes of which were cataract (two people), DR (one person), optic atrophy (one person) and a combination of mechanisms (one person) [58]. In comparison, the main cause of bilateral blindness in non-Indigenous people was age-related macular degeneration (5 out of 7 people).

Prevalence estimates of eye health problems based on self-reported data

Although self-report is considered an unreliable population-based research tool for identifying eye disease in those with vision loss [153], self-reported data is the only recent data available for some aspects of eye health. The most recent self-reported data on eye health problems for children comes from the 2014-15 NATSISS [27, 135]. In 2014-15, 13% of Aboriginal and Torres Strait Islander children aged 4-14 years were reported to have eye or sight problems (including treated/corrected eye or sight problems) [135]. Eye problems were less likely to be reported for children in remote areas (6%) than for those in non-remote areas (14%). For Aboriginal and Torres Strait Islander children aged 0-14 years, 9.7% had a long-term eye problem, with long sightedness (4.7%) and short sightedness (2.8%) being the most common problems [8]. In comparison, 12% of non-Indigenous children had a long-term eye problem.

Eye and sight problems[43] were reported in the 2012-13 AATSIHS by one-third (33%) of Aboriginal and Torres Strait Islander people (33% of Aboriginal people and 34% of Torres Strait Islander people), making it the most commonly reported long-term health condition [154].

---

[37] This calculation is based on figures for age-related macular degeneration, cataract, diabetic retinopathy, glaucoma and uncorrected refractive error [58].

[38] Survey findings may not be directly comparable due to differing ways of defining and assessing vision loss [149].

[39] Self-reported survey data may underestimate the prevalence of health conditions because participants: may not have been diagnosed yet, may not be willing to disclose a diagnosis, may have forgotten the diagnosis or misinterpreted the survey question [1].

[40] The NEHS defines vision impairment as 'presenting distance visual acuity <6/12 in the better eye' [58].

[41] The NEHS defines blindness as 'presenting distance visual acuity <6/60 in the better eye' [58].

[42] It has been noted however, that the observed reduction is based on small numbers of people with bilateral blindness [151].

[43] Eye and sight problems include: cataract; glaucoma; disorders of the choroid and retina; disorders of the ocular muscles, binocular movement, accommodation and refraction; visual disturbances and blindness; and other diseases of the eye and adnexa [154]. Unlike the 2016 NEHS data, measures of myopia and hyperopia have been reported separately and include both corrected and uncorrected cases.

Eye and sight problems were reported by 29% of males and by 38% of females [134]. The proportion of Aboriginal and Torres Strait Islander people reporting eye or sight problems was similar in non-remote areas[44] and remote areas (both 35%), but lower among those living in very remote areas (25%) [141]. The most common eye conditions reported by Aboriginal and Torres Strait Islander people in the 2012-13 AATSIHS were: hyperopia (long sightedness: 19%), myopia (short sightedness: 13%), other diseases of the eye and adnexa[45] (5.6%), blindness (3.0%), and cataract (1.1%) [134].

After age-adjustment, Aboriginal and Torres Strait Islander people were slightly less likely to report eye and sight problems than non-Indigenous people (ratios of 0.9 for: males; females; and total persons) [134]. They were more likely to report hyperopia, cataract and blindness than non-Indigenous people (ratios of 1.1, 1.4 and 7.4 respectively), but were less likely to report myopia (ratio: 0.8) and other diseases of the eye and adnexa (ratio: 0.5).

Prevalence estimates of trachoma and trichiasis based on surveillance

The National Trachoma Surveillance and Reporting Unit provides prevalence data for trachoma which shows there have been substantial improvements in trachoma control in Indigenous communities in Australia [155]. The estimated prevalence of active trachoma among Indigenous children aged 5-9 years in selected remote communities has decreased from 14% in 2009 to 4.7% in 2016, however persistently high levels of trachoma continue to be found in some regions. In 2016, screening was undertaken in at-risk communities in WA, SA, the NT and Qld. Among the 175 cases that were detected, 16 were in WA, 29 in SA, and 130 in the NT.

If left untreated, trachoma can cause scarring of the eyelid and in-turned eyelashes that lead to blindness (trichiasis) [148, 155]. In 2016, screening in at risk communities in WA, SA and the NT detected trichiasis in 0.6% of Indigenous adults aged 15 years and over and 1.1% of those aged 40 years and over [155]. A total of 65 cases of trichiasis were detected (18 in WA, 7 in SA, and 40 in the NT).

General practice attendances and hospitalisation

Among Aboriginal and Torres Strait Islander patients, 1.1% of all problems that were managed by GPs in the period April 2010 to March 2015 were related to eye health [151]. After age-adjustment, eye health problems among Indigenous patients were managed by GPs at a similar rate as for other patients (rate ratio: 1.0). However they were 3.5 times more likely than other patients to see GPs for the management of cataracts.

In 2015-16, there were 3,994 hospital separations for diseases of the eye and adnexa among Aboriginal and Torres Strait Islander people in Australia, accounting for 1.6% of separations (excluding dialysis) (derived from [41]). A more detailed analysis of hospitalisation data is available for the period July 2013 to June 2015 [61]. In this period, there were 6,523 hospitalisations for diseases of the eye and adnexa among Aboriginal and Torres Strait Islander people, the majority of which (60%) were for cataracts. There were more hospitalisations for females (55%) than males (45%).

After age-adjustment, Aboriginal and Torres Strait Islander males and females were less likely to be hospitalised for diseases of the eye and adnexa than non-Indigenous males and females (rate ratios of 0.8 for both) [61]. Aboriginal and Torres Strait Islander people in remote and very remote areas were more likely to be hospitalised than those in non-remote areas (rate ratios: 1.5 and 1.6 respectively). When compared with non-Indigenous people Indigenous people were less likely to be hospitalised for eye conditions in non-remote areas (rate ratio: 0.7), but they were more likely to be hospitalised for them in remote and very remote areas (rate ratios: 1.1 and 1.3 respectively).

Between July 2013 and June 2015, there were also 1,658 hospitalisations for eye injury among Aboriginal and Torres Strait Islander people in Australia [61]. After age-adjustment, hospitalisation rates for eye injury were higher among Aboriginal and Torres Strait Islander men than women, but Aboriginal and Torres Strait Islander: non-Indigenous rate ratios were higher among women (4.2) than men (2.7). Overall, Aboriginal and Torres Strait Islander people were 3.2 times more likely to be hospitalised for eye injury than non-Indigenous people.

Burden of disease

In 2011, hearing and vision disorders together contributed to 1.2% of the total burden of disease experienced by Aboriginal and Torres Strait Islander people [45]. The burden of vision loss[46] was estimated to be three times greater for Aboriginal and Torres Strait Islander people than for non-Indigenous people.

Ear health and hearing

There are three main parts of the ear (external, middle and inner ear) and diseases of the ear are classified according to the part where the disorder occurs [156]. Inflammation and infection of the middle ear, which are nearly always associated with fluid in the middle ear space, are referred to as otitis media (OM) [157].

OM can be caused by viruses or bacteria or both, and often occurs as a result of another illness, such as a cold [156]. It can cause intermittent or persistent hearing impairment and the risk of permanent hearing loss increases if OM becomes chronic and is not

---

[44] Non-remote areas include major cities and inner and outer regional areas [141].

[45] Other diseases of the eye and adnexa include: glaucoma, macular degeneration, astigmatism and presbyopia [134].

[46] Vision loss refers specifically to loss due to refractive error, cataract, glaucoma and age-related macular degeneration [45]. It does not include vision loss due to trachoma or diabetes.

adequately treated and followed up. Persistent ear discharge through a perforation (hole) in the tympanic membrane (eardrum) is referred to as chronic suppurative otitis media (CSOM) [157].

The association of OM, particularly in suppurative forms, with impairment of hearing has major implications for language development, learning, behaviour and social skills and possibly contributes to poor education outcomes and unemployment [158-164]. OM can affect Aboriginal and Torres Strait Islander babies within weeks of birth and a high proportion of children living in remote communities will continue to suffer from CSOM throughout their developmental years [159].

As with many other areas of Aboriginal and Torres Strait Islander health, high rates of recurring ear infections are associated with poverty, crowded housing conditions, inadequate access to clean water and functional sewerage systems, nutritional problems, and poor access to health care [8]. A reduced risk of OM is associated with breastfeeding [8, 165].

Extent of ear disease among Aboriginal and Torres Strait Islander people

Prevalence

High levels of ear disease and hearing loss have been reported for many years in Aboriginal and Torres Strait Islander communities, particularly in remote areas [156] [158, 162, 166-168]. The levels of CSOM described among children living in some remote communities in northern and central Australia have been such that they would be classified by the WHO as being 'a massive public health problem' requiring 'urgent attention' [169, p.2].

Between 2001 and 2013, 90% of children under three years of age living in remote communities in the Top End region of Australia had some form of OM [168, 170, 171]; however, changes in vaccination schedules in the NT have been associated with a sustained improvement in the severity of OM seen in these children [171].

Ear or hearing problems were reported for 8.4% of Aboriginal and Torres Strait Islander children aged 0-14 who participated in the 2014-15 NATSISS [135]. Ear or hearing problems were 2.9 times more prevalent among Aboriginal and Torres Strait Islander children aged 0-14 than non-Indigenous children [61].

Diseases of the ear and mastoid and/or hearing problems were reported as a long-term health condition by 12% of Aboriginal and Torres Strait Islander people who participated in the 2012-13 AATSIHS [172]. Ear/hearing problems were reported by the same proportion of those in non-remote areas and remote areas (both 12%). Ear/hearing problems were reported by 13% of males and by 12% of females. After age-adjustment, the rate for ear and mastoid and/or hearing problems for Aboriginal and Torres Strait Islander people was 1.3 times higher than for non-Indigenous people (1.2 times higher for males and 1.5 times higher for females).

The proportion of Aboriginal and Torres Strait Islander people with ear/hearing problems increased with age, ranging from 7% of children aged 0-14 years, to 28% of those aged 55 years and over [172]. The same proportions of Aboriginal and Torres Strait Islander children aged 0-14 years were reported to have hearing loss (3%) and OM (3%). Hearing loss was the most commonly reported ear/hearing problem in all other age-groups, affecting between 7% of Aboriginal and Torres Strait Islander people aged 15-24 years and 26% of those aged 55 years and over.

Hearing health services funded by the Australian Government and implemented by the NT Government provided information for 2015-16 on audiology outreach services to 1,981 children and young people and 1,011 ear, nose and throat (ENT) services to 936 children and young people [173]. Of 2,010 children and young people aged 20 years and under who received an audiology or ENT service, 1,330 (66%) were diagnosed with at least one type of ear condition, the most common being otitis media with effusion (OME) (23%) followed by eustachian tube dysfunction[47] (16%) and foreign body (16%). The prevalence of ear conditions ranged from 78% of those aged 3-5 years to 50% of those aged 16-20 years. Of those diagnosed with at least one ear condition, 66% experienced hearing loss. Rates of hearing loss were highest among those with CSOM with discharge (87%), OME (78%) and CSOM without discharge (77%). It was found that levels of hearing loss have recently improved slightly: in 2015-16, 49% of Aboriginal and Torres Strait Islander children had some type of hearing loss, compared with 52% in 2012-2013, and 32% had a hearing impairment, compared with 37% in 2012-2013.

GP attendances and hospitalisation

According to the Bettering the Evaluation of Care and Health (BEACH) survey data, the rates of GP attendance for the period from April 2010 to March 2015 were about the same for Aboriginal and Torres Strait Islander and non-Indigenous children aged 0-14 years for OM (67 per 1,000 encounters compared with 64 per 1,000 encounters), and similar for total diseases of the ear (105 per 1,000 encounters compared with 98 per 1,000 encounters) [27].

There were 2,994 hospital separations with principal diagnosis of diseases of the ear and mastoid process among Aboriginal and Torres Strait people in 2015-16 [41], representing 1.2% of all separations (excluding dialysis) among Aboriginal and Torres Strait Islander people (Derived from [41]). After age-adjustment, the hospitalisation rate for middle ear and mastoid conditions was 1.2 times higher for Aboriginal and Torres Strait Islander people than that for non-Indigenous people [41].

---

[47] Eustachian tube dysfunction can be caused when the eustachian tubes (which help regulate ear pressure) become plugged or infected.

In 2014-15, the hospitalisation rate for middle ear and mastoid conditions as the principal diagnosis for Aboriginal and Torres Strait Islander children aged 0-3 years (9.5 per 1,000) was 0.7 times the rate for non-Indigenous children (12.7 per 1,000) [8]. Rates for Aboriginal and Torres Strait Islander children aged 4-14 years (6.8 per 1,000) were 1.4 times higher than for non-Indigenous children (4.9 per 1,000).

In major cities, the hospitalisation rate for Aboriginal and Torres Strait Islander children aged 0-14 years (6.3 per 1,000) was lower than for non-Indigenous children (7.2 per 1,000) whereas in remote and very remote area it was over twice as high (13.6 per 1,000 and 6.2 per 1,000 respectively) [8].

Burden of hearing disorders

Hearing and vision disorders, (which includes all possible conditions leading to long-term hearing loss, auditory system disorders, otitis externa and diseases of the inner ear), were responsible for 1.2% of the total burden of disease among Aboriginal and Torres Strait Islander people in 2011, with hearing disorders comprising 79% of the total burden for hearing and vision disorders [45].

Oral health

Oral health is defined as the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex [174]. The two most common oral diseases are dental caries (tooth decay) and periodontal disease (gum disease) [175].

Caries is caused when bacteria in the mouth interact with sugars in foods to produce acids that degrade tooth enamel [175]. Caries is reversible in its early stages, but, if untreated, can cause pain, abscesses and eventually lead to tooth loss.

Periodontal disease is caused by bacterial infection associated with poor oral hygiene, infrequent dental visits, age, and smoking, and is related to health conditions including diabetes and CVD [175]. Gingivitis, an inflammation of the gums, is an early reversible form of periodontal disease. Untreated gingivitis may lead to serious gum infection.

Extent of oral health problems among Aboriginal and Torres Strait Islander people

Prevalence of child oral health problems

The 2012-2014 National Child Oral Health Study (NCOHS) provided estimates of clinically-measured oral health problems among Aboriginal and Torres Strait Islander children [176]. The study had 24,664 participants aged 5 to 14 years, and included a nationally representative sample of Aboriginal and Torres Strait Islander children.

The 2012-14 NCOHS found that:

- The proportion of Aboriginal and Torres Strait Islander children aged 5-10 years who had experienced any tooth decay in their deciduous teeth (61%) was 1.5 times the proportion of non-Indigenous children (41%) [176]. The average number of decayed, missing or filled deciduous tooth surfaces for Aboriginal and Torres Strait Islander children aged 5-10 years was 6.3, compared with 2.9 for non-Indigenous children.
- The proportion of Aboriginal and Torres Strait Islander children aged 6-14 years who had experienced any tooth decay in their permanent teeth (36%) was 1.6 times the proportion of non-Indigenous children (23%) (Derived from [176]). The average number of decayed, missing or filled permanent tooth surfaces for Aboriginal and Torres Strait Islander children aged 6-14 years was 1.3, compared with 0.7 for non-Indigenous children [176].
- Among children aged 5-14 years, the prevalence of visible dental plaque was higher among Aboriginal and Torres Strait Islander children than non-Indigenous children (60% versus 42%), as was the prevalence of gingivitis (34% versus 21%) [176]. Both are indicators of oral hygiene status.

The 2014-15 NATSISS collected data about the self-reported tooth or gum problems of Aboriginal and Torres Strait Islander children. In 2014-2015, the proportion of 4-14 year-old children with reported tooth or gum problems was 34%, a decrease from 39% in 2008 [135].

Dental services in the NT have been provided to Aboriginal and Torres Strait Islander children under the age of 16 years through a succession of programs funded by the Australian Government and delivered by the NT Government, most recently through the Northern Territory Remote Aboriginal Investment Oral Health Program [177]. In 2016, among the 2,557 children (derived from [177]) for whom complete data is available, tooth decay prevalence was highest among children aged 6 years (90%) and aged 9 years (88%), and lowest among children aged 1-3 years (45%) and aged 12 years (72%)[48] [177]. There has been some improvement in tooth decay prevalence for young children; between 2013 and 2016, the average amount of tooth decay in children aged 1–3 years decreased by 19%, and in children aged 8 years decreased by 11%.

Prevalence of adult oral health problems

Reliable national estimates of the prevalence of caries and periodontal disease among Aboriginal and Torres Strait Islander adults, based on clinically-obtained data, do not currently exist [27, 178, 179].

---

[48] Children who receive services through this program are not a random sample of the population and, as such, the data may not be representative of the general population of Aboriginal and Torres Strait Islander children in the NT.

The 2012-2013 AATSIHS collected information about the self-reported tooth loss of Aboriginal and Torres Strait Islander adults aged 15 years and over, excluding wisdom tooth loss [61]. In 2012-2013, 49% of adults reported no tooth loss; 47% had lost one or more teeth; and 4.7% reported complete tooth loss.

Dentist visits and hospitalisation

A number of surveys collected self-reported data about dental visits made by Aboriginal and Torres Strait Islander people.

- In the 2012-13 AATSIHS, around 4.8% of all Aboriginal and Torres Strait Islander people and 4.6% of children aged 2-14 years were reported as visiting a dental professional in the two weeks[49] prior to the survey [172].
- In the 2014-15 NATSISS, 49% of Aboriginal and Torres Strait Islander children aged less than 15 years were reported as having a dental consultation in the 12 months prior to the survey [27].
- In the 2012-14 NCOHS, 75% of Indigenous children aged 5-14 years were reported as visiting a dental provider in the 12 months prior to the survey, compared with 82% of non-Indigenous children [176].

In 2014-15, the hospitalisation rates were higher for Aboriginal and Torres Strait Islander children aged 0-4 and 5-9 years than for non-Indigenous children, but the reverse was true for those aged 10-14 years (Table 27) [8].

Table 27. Age-specific hospital separation rates for potentially preventable dental conditions among children aged 0-14 years, by Indigenous status, and Indigenous:non-Indigenous rate ratios, Australia, 2014-15

Age-group (years)	Indigenous	Non-Indigenous	Rate ratio
0-4	8.0	5.0	1.6
5-9	12	9.9	1.2
10-14	3.3	6.0	0.5
Total 0-14 years	7.9	7.0	1.1

Notes: 1 Rates per 1,000 population

2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate.

Source: Steering Committee for the Review of Government Service Provision, 2016 [8]

In 2014-15, after age-adjustment, hospitalisation rates for acute dental conditions were 1.3 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (3.5 per 1,000 and 2.8 per 1,000 respectively) (Derived from [126]).

The hospitalisation rate for Aboriginal and Torres Strait Islander people living in remote/very remote areas was more than twice as high as for those in major cities.

Aboriginal and Torres Strait Islander people undergo more intensive hospital dental treatments at younger ages than the general population [180]. In 2013-15 for all Australians, dental procedures requiring a general anaesthetic were most common in people aged 15-24 years (17 per 1,000 persons); for Aboriginal and Torres Strait Islander people, the procedure rate was highest among 5-9 year-olds (12 per 1,000 people) [27].

National potentially preventable hospitalisation rates for dental conditions in 2014-15 were 1.3 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people after age-adjustment [8].

Disability

Disability can be defined as a limitation, restriction or impairment which has lasted, or is likely to last, for at least six months and restricts everyday activities [181]. It can be considered in terms of the nature of the impairment in body structure or function, a limitation in activities (such as mobility and communication), a restriction in participation (involvement in life situations, such as work, education and social interaction), and the interaction between an individual and their personal and environmental context [79, 182]. A profound or severe core-activity limitation refers to a specified condition for which the person requires help or supervision in one or more core activities (e.g. self-care, mobility or communication) [135].

Aboriginal and Torres Strait Islander people may perceive the concept of disability differently to non-Indigenous people [183]. For Aboriginal and Torres Strait Islander people, the concept of disability is often viewed within the context of their beliefs, attitudes and experiences of disability.

The main source of information about the level of disability at a population level in Australia is the ABS periodic Survey of Disability, Ageing and Carers (SDAC)[50], which collects information about the prevalence of disability and also data about people's needs for assistance with core activities [181]. Information about disability, at a population level, is also collected in Australia's five-yearly censuses [21], and among Aboriginal and Torres Strait Islander people in surveys such as the NATSISS [135].

The greater burden of disability experienced by Aboriginal and Torres Strait Islander people is associated with poorer physical and mental health, increased exposure to risk factors, and higher levels of socio-economic disadvantage [79, 135].

---

[49] This data cannot be used to reliably calculate annual aggregates of service usage [172].

[50] The SDAC does not include people living in discrete Indigenous communities and very remote areas [181].

Extent of disability among Aboriginal and Torres Strait Islander people

Prevalence

The 2016 *Census* only provided information on assistance for Australians with a profound or severe disability. In 2016, 6.7% of Aboriginal and Torres Strait Islander people reported a need for assistance with either self-care, mobility or communication (for an additional 6.1% of respondents, a need for assistance was not stated) [21]. Of those who needed assistance, more males (53%) needed assistance than females (47%).

In the 2015 SDAC, 24% of Aboriginal and Torres Strait Islander people living in households in Australia reported living with a disability, compared with 18% of non-Indigenous people [181]. Disability prevalence rates for Aboriginal and Torres Strait Islander males and females were similar, 23% and 25% respectively. Of all Aboriginal and Torres Strait Islander people, 7.3% had a profound or severe limitation with similar rates for males and females (7.1% and 7.0% respectively). Of those with a disability, 60% needed assistance with at least one activity such as self-care, mobility and communication. After age-adjustment, Aboriginal and Torres Strait Islander people were 1.8 times more likely than non-Indigenous people to be living with a disability.

In the 2014-2015 NATSISS, 45% of Aboriginal and Torres Strait Islander people aged 15 years and over reported having a disability or restrictive long-term health condition (43% males and 47% females); 8% of Aboriginal and Torres Strait Islander people reported having a profound or severe core activity restriction [135]. The most common type of disability reported was physical disability (29%), followed by disability relating to sight, hearing or speech (21%) and psychological (9%) and intellectual (8%) impairments. Aboriginal and Torres Strait Islander females were more likely than males to have a physical disability (31% compared with 27%), or psychological disability (10% compared with 7%) [135].

Services

The disability services field has experienced many changes in recent years, including the approval of the National Disability Strategy 2010-2020 (NDS), revisions of the National Disability Agreement (NDA) and the introduction of the National Disability Insurance Scheme (NDIS) [184].

The NDS, at a national level, aims to improve the lives of people living with a disability [185]. The second implementation plan for the NDS acknowledges the specific needs of Aboriginal and Torres Strait Islander people with disability [184]. As part of the NDS, the Government developed the plan - Australian Government Plan To Improve Outcomes For Aboriginal and Torres Strait Islander People With Disability to address these often complex and multi-faceted needs [186]. The plan will cover areas for future attention and includes activities relating to education, employment, health and the NDIS [61].

The NDA previously identified increasing access to disability services for Aboriginal and Torres Strait Islander people, as a priority area for all Australian governments (COAG) [187, 188]. The *National Indigenous access framework* forms part of the NDA and aims to ensure that the needs of Aboriginal and Torres Strait Islander people with disability are addressed through accessible and appropriate service delivery [188]. NDA services[51] include accommodation support, community support, community access, respite and employment services [189].

The NDIS aims to assist people with marked and permanent disabilities who require assistance with everyday activities [190]. Access is determined according to a set of criteria. If eligible, individuals are provided with funding to purchase the support they require. The NDIS is being introduced across Australia in stages and over time most NDA recipients will be expected to transition to the NDIS. Not all NDA users will be eligible for the NDIS, however, the government has guaranteed 'continuity of support services' so they are not disadvantaged [191].

Not all people who could benefit from the use of disability support services access them. To assess the level of use of disability services by Aboriginal and Torres Strait Islander people, attention is directed to the 'potential population' of users: 'the number of people with the potential to require disability support services, including individuals who meet the service eligibility criteria but who do not demand these services' [192]. In 2014-15, the proportion of the 'potential population' of Aboriginal and Torres Strait Islander people who used NDA services was lower for accommodation support and community access services compared with the proportion for non-Indigenous people and higher for community support services and respite services [192].

For disability services provided under the NDA for 2015-16, 6% of service users were identified as Aboriginal and Torres Strait Islanders (Table 28) [189].

---

[51] Additional services include advocacy and 'other' support, however, data are not collected for these service groups [189]

Table 28. Numbers and proportions (%) of disability services users, by Indigenous status, Australia, 2011-12 to 2015-16

	Indigenous		Non-Indigenous		Not stated	Total	
Year	**Number**	**Proportion**	**Number**	**Proportion**	**Number**	**Number**	**Proportion**
2015-16	19,290	6.0	300,097	94	12,430	331,817	100
2014-15	19,031	5.9	302,736	94	12,028	333,795	100
2013-14	18,021	5.8	291,631	94	11,879	321,531	100
2012-13	17,406	5.8	283,306	94	11,827	312,539	100
2011-12	16,937	5.7	282,128	94	18,551	317,616	100

Notes: 1 Service user data are estimates to account for individuals who received services from more than one service type outlet during the 12-month period

2 Service user data were not collected for all NDA service types

3 Percentages are of the total excluding service users for whom Indigenous status was 'not stated/not collected'

4 The ACT did not collect data in 2015-16

5 Includes service users who only accessed recreational/holiday programs. This service type was not required to complete this data item

Source: AIHW, 2017 [189]

In 2015-16, 84% of Aboriginal and Torres Strait Islander service users were aged under 50 years [189]. The proportion of Aboriginal and Torres Strait Islander service users who lived in major cities was 38%, compared with 67% of non-Indigenous service users. A further 28% lived in an inner regional area, 20% lived in an outer regional area, and 11% lived in a remote or very remote area, these were higher proportions than for non-Indigenous service users (23%, 8.9% and 0.8% respectively).

In 2015-16, 258 Aboriginal and Torres Strait Islander NDA service users transitioned to the NDIS, this included 227 people who identified as Aboriginal, five who identified as a Torres Strait Islander and 26 who identified as both an Aboriginal and Torres Strait Islander [189].

Communicable diseases

Communicable (infectious) diseases can be caused by bacteria (e.g. pertussis (whooping cough) and tuberculosis), viruses (e.g. influenza and human immunodeficiency virus (HIV)), fungi (e.g. tinea (e.g. athlete's foot)), protozoan parasites (e.g. giardia) and larger parasites (e.g. head lice) [193]. Risk factors vary according to the type of disease. Improvements to sanitation and the increased use of vaccination and antibiotics have markedly reduced some infectious diseases in Australia [79, 194].

Communicable diseases covered in this report include: tuberculosis, hepatitis (B and C), *Haemophilus influenzae type b* (Hib), pneumococcal disease, meningococcal disease, sexually transmissible infections (STIs), HIV and skin infections.

Information for specific communicable diseases comes from a variety of sources, including individual studies and the state and territory notifiable disease collections [195]. Data from state and territory collections are collected and published by the National Notifiable Disease Surveillance System (NNDSS) [195], but Indigenous status is often not reported for large proportions of notifications [196]. Information about some communicable diseases of particular importance to Aboriginal and Torres Strait Islander people, is analysed and published by specialised external agencies, including the Kirby Institute for STIs, hepatitis and HIV [197] and the National Centre for Immunisation Research & Surveillance (NCIRS) for vaccine-preventable diseases [198].

Tuberculosis

Tuberculosis (TB) is primarily a lung infection caused by the inhalation of *Mycobacterium tuberculosis bacteria* [199]. The main risk factors for TB are: physical contact with another person with TB; overcrowding; malnutrition; tobacco use and alcohol use [200, 201]. People who are immune-compromised by disease (e.g. diabetes, renal failure and HIV infection) are more at risk.

Incidence

The most recent information available about TB among Indigenous people is for 2010-2014, when 172 (22%) of the 789 notifications of TB among Australian-born people in Australia were identified as Indigenous [202-205]. Around one-third (34%) of the new cases among Indigenous people were reported in the NT (59 cases), and another one-third (33%) in Qld (57 cases) (Table 29).

Table 29. Numbers of new cases and crude notification rates of tuberculosis among Indigenous people, by jurisdiction, Australia, 2010-2014

Jurisdiction	Number	Rate
NSW	36	3.4
Vic	3	1.2
Qld	57	5.9
WA	9	2.0
SA	7	3.7
Tas	1	0.8
ACT	0	0.0
NT	59	17
Australia	172	5.0

Notes: 1 Rates are crude incidence rates per 100,000 population.
2 Population figures are for 30 June 2012 (the mid-point of the five-year period, 2010-2014).

Source: Derived from Bareja, 2014 [202], Bareja, 2014 [203], Toms, 2015 [204], ABS, 2014, [19] Toms, 2017 [205]

Australia-wide, the notification rate for TB in 2010-2014 was 5.0 cases per 100,000 population for Indigenous people; the crude notification rate was highest for the NT (17 cases per 100,000 population) (Derived from [19, 202-205]). After age-adjustment, the notification rate for TB for Indigenous people was 9.0 times higher than for Australian-born non-Indigenous people.[52]

The notification rate of TB was higher for Indigenous people than for Australian-born non-Indigenous people across all age-groups, with rate ratios being highest for the 45-54 years and 55-64 years age-groups (Table 30) (Derived from [19, 202-206]).

Table 30. Numbers of new cases and notification rates of tuberculosis, by Indigenous status and age-group, and Indigenous:non-Indigenous rate ratios, Australia, 2010-2014

Age-group (years)	Indigenous		Non-Indigenous		Rate ratio
	Number	Rate	Number	Rate	
0-4	7	1.7	76	1.1	1.6
5-14	8	1.0	32	0.2	4.1
15-24	16	2.3	81	0.6	4.2
25-34	18	3.8	68	0.4	8.9
35-44	26	6.4	60	0.4	16.5
45-54	52	16	69	0.5	34.9
55-64	30	15	69	0.5	28.6
65+	15	13	162	1.0	12.3
All ages	172	5.0	617	0.6	9.0

Notes: 1 Rates are per 100,000 population
2 Any discrepancy between the figures shown for 'All ages' and the sum of the number for the specific age-groups is due to age not being stated in the notification
3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate
4 The rate ratio for 'All ages' is the standardised notification ratio, which is the number of Indigenous cases reported divided by the number expected if the Indigenous population had the same age-specific rates as the non-Indigenous population
5 Rounding may result in inconsistencies in calculated rates

Source: Derived from Bareja, 2014 [202], Bareja, 2014 [203], Toms, 2015 [204], ABS, 2014 [19], ABS, 2012 [206], Toms, 2017 [205]

Hospitalisation

In 2014-15, Aboriginal and Torres Strait Islander people were hospitalised for TB at a rate of 0.2 per 1,000, after age-adjustment [8]. This rate was 4.1[53] times the hospitalisation rate for TB for non-Indigenous Australians (0.06 per 1,000). Hospitalisation rates were higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people across all age-groups, with a rate ratio of 11.0 for the 45-64 years age-group being the highest (rates of 0.6 per 1,000 and 0.06 per 1,000 respectively).

Hepatitis

Hepatitis is an inflammation of the liver, most commonly caused by a viral infection [207].

Hepatitis B

Transmission of hepatitis B virus (HBV) is from contact with blood and other body fluids (semen, vaginal fluids and a low risk from saliva) from an infected individual, commonly through sexual contact or use of contaminated injecting equipment [208]. A mother may also transmit HBV to the fetus during pregnancy or to the infant during birth.

---

[52] Reflecting the fact that the vast majority of new cases of TB in Australia are among people born overseas, particularly relatively recent arrivals from India, Vietnam, the Philippines and China, the analysis here compares the notification rates of Indigenous people with those of Australian-born non-Indigenous people.

[53] Rounding may result in inconsistencies in calculated rate ratios

In 2016, of the 6,555 people with newly acquired HBV in Australia, 173 (3%) were identified as Aboriginal and Torres Strait Islander [197]. After age-adjustment, the notification rate for Aboriginal and Torres Strait Islander people was 1.4 times[54] higher than for non-Indigenous people (31 per 100,000 and 23 per 100,000 respectively). Over the five year period 2012-2016, there was a 50% decline in the notification rates for Aboriginal and Torres Strait Islander people from 62 per 100,000 in 2012 to 31 per 100,000 in 2016 (Derived from [197]). It is suggested that this reduction is due to immunisation programs for HBV [197].

In 2016, the rates of newly diagnosed HBV among Aboriginal and Torres Strait Islander people were higher for males than females across most age-groups, particularly among males 30-39 years and 40-49 years [197]. Rates among Aboriginal and Torres Strait Islander males were higher than for non-Indigenous males (37 per 100,000 and 25 per 100,000 respectively). Rates for Aboriginal and Torres Strait Islander females were also higher than for non-Indigenous females (25 per 100,000 and 21 per 100,000 respectively).

Hepatitis C

Transmission of hepatitis C virus (HCV) typically occurs via blood-to-blood contact. Injecting drug use and sharing unsterile injecting equipment are the most common reasons for contracting the virus [209]. The likelihood of transmission of HCV via sexual contact is generally very low [210]. New treatment for HCV, direct-acting antiviral therapies have been found to be highly effective [209]. There is no vaccine to protect people against HCV [210].

In 2016, of the 11,949 people diagnosed with HCV in Australia, 1,122 (9%) were identified as Aboriginal and Torres Strait Islander[55] [197]. After age-adjustment, the notification rate for HCV was 3.8 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (173 per 100,000 and 45 per 100,000 respectively) (Derived from [197]).

In 2016, the greatest disparities in age-specific rates of newly acquired HCV between Aboriginal and Torres Strait Islander males and non-Indigenous males were in the 15-19 and 20-29 years age-groups, eight and six times higher respectively for Aboriginal and Torres Strait Islander males [197]. For females, differences in rates were greatest in the 15-19, 20-29 years and 30-39 years age-groups, five to seven times higher respectively for Aboriginal and Torres Strait Islander females compared with non-Indigenous females.

The rates of newly diagnosed HCV infection for Aboriginal and Torres Strait Islander people in 2016 were highest for those living in major cities and inner regional areas, eight and four times higher respectively, than the rates reported for non-Indigenous people [197].

Haemophilus influenzae type b

Haemophilus influenzae type b (Hib) is a bacterium that can cause meningitis, epiglottitis, pneumonia, bacteraemia, cellulitis, osteomyelitis, pericarditis, and septic arthritis [198, 208]. Infants and children are particularly susceptible to Hib, which is serious in its invasive form [211-213]. High rates of Hib carriage in the upper respiratory tract have been noted prior to cases of invasive disease [212]. Higher rates in Indigenous populations worldwide suggest socioeconomic disadvantage, high rates of tobacco use and crowded living conditions, as probable causes [198].

Notifications of invasive Hib disease in Australia decreased by more than 95% following the commencement of nationally funded infant vaccination in 1993 [208]. The decline has been markedly evident in Aboriginal and Torres Strait Islander children, but they continue to be at higher risk of contracting Hib than non-Indigenous children [214].

In the period 2012-2014, nine (17%) of the 54 cases of invasive Hib disease notified in all jurisdictions were identified as Aboriginal and Torres Strait Islander (Derived from [215-217]). In this period, the average notification rate for the Aboriginal and Torres Strait Islander population was 5.3 times the rate in the total population (0.5 per 100,000 and 0.09 per 100,000 respectively).

In the period 2012-2014, infants (Indigenous and non-Indigenous) aged less than 12 months accounted for 16 (30%) of all cases (Derived from [215-217]). The highest notification rate for Hib was consistently in the 0-4 years age-group, which had an average rate of 0.5 per 100,000 during 2012-2014.

There were four deaths associated with Hib reported between 2012 and 2014 [215-217]. Two deaths were of adults over 60 years of age and two were of infants. Of these, one death was an Aboriginal and Torres Strait Islander infant who was unvaccinated.

Pneumococcal disease

Pneumococcal disease results from an infection by the bacterium *Streptococcus pneumoniae* (also known as pneumococcus), which may cause pneumonia, OM or sinusitis when in the respiratory tract [218]. Invasive pneumococcal disease (IPD) occurs when the bacterium infects other normally sterile sites, such as blood and cerebrospinal fluid, causing bacteraemia and meningitis [208, 218]. Rates of IPD are highest in infants and older people [208]. Recognised risk factors for pneumococcal disease include: diabetes; chronic respiratory and cardiac diseases; other immune-compromised conditions; tobacco use; and high levels of alcohol consumption [198, 219-221]. In children, asthma, previous pneumonia, exposure to smoke and attendance at childcare increases susceptibility to IPD [220].

Nationally-funded vaccination for pneumococcal disease is available for Aboriginal and Torres Strait Islander infants, adults aged 50 years and older and those aged 15-49 years at high risk [208]

---

[54] There were 3,661 (56%) notifications for which Indigenous status was not reported [197].

[55] HCV notification rates were based on data from Vic, Qld, WA, SA, Tas, the ACT and the NT where Aboriginal and Torres Strait Islander status was ≥50% complete for 2016 [197].

Extent of pneumococcal disease among Aboriginal and Torres Strait Islander people

Incidence

For the period 2013-2015, the age-standardised notification rate for IPD was 6.4 times higher for Aboriginal and Torres Strait Islander people compared with non-Indigenous people [61]. Age-standardised notification rates were higher for Aboriginal and Torres Strait Islander people than non-Indigenous people across all age groups, particularly in the middle-aged years (Table 31).

Table 31. Age-standardised notification rates for invasive pneumococcal disease, by Indigenous status, age group and Indigenous: non-Indigenous rate ratios, Australia, 2013-2015

Age group	Aboriginal and Torres Strait Islander rate	Non-Indigenous rate	Rate ratio
0-4	39	12	3.3
5-14	9.7	2.0	4.8
15-24	9.4	1.1	8.7
25-34	21	1.9	11.0
35-44	44	4.0	10.9
45-54	59	5.1	11.7
55-64	54	8.2	6.5
65+	57	15	3.7
Total	35	5.5	6.4

Notes: 1 Rates per 100,000 population, age-standardised to the Australian population at 30 June 2001.
2 Rate ratio is the Aboriginal and Torres Strait Islander rate divided by the non-Indigenous rate.
3 Rounding may result in inconsistencies in calculated ratios.

Sources: AIHW, 2017 [61]

Hospitalisation

The latest hospitalisation data for IPD is for children aged 0-4 years living in NSW, Vic, Qld, WA, SA and the NT. In 2014-15, Aboriginal and Torres Strait Islander children were hospitalised at 4.6 times the rate of non-Indigenous children (0.4 per 1,000 and 0.1 per 1,000 respectively) [61].

Mortality

For 2011 and 2012 there were 14 and 9 deaths respectively, attributed to IPD among Aboriginal and Torres Strait Islander people [220].

Meningococcal disease

Meningococcal disease is caused by the bacterium *Neisseria meningitidis* (also known as meningococcus) [208]. The most common clinical presentation of meningococcal disease is acute bacterial meningitis [198]. Meningococcal infections can progress quickly, resulting in serious disease or deaths in otherwise healthy people [208].

Meningococcal disease is more common in infants, young children, adolescents and adults aged over 45 years [222]. Possible risk factors for the disease include: immuno-compromising diseases, living in crowded housing conditions, exposure to smokers, a recent respiratory illness and multiple kissing partners [208].

The most common groups of meningococcus found in Australia are serogroups[56] B, C, W and Y [222], with B responsible for most confirmed cases [222, 223]. In 2015, an increase in serogroup W and Y infections were observed. The introduction of a nationally funded vaccine in 2003 for serogroup C has seen a reduction in the number of cases of this serogroup [222]. A vaccine for serogroup B is only available by private purchase and is not listed on the National Immunisation Program schedule (NIP) [222]. From July 2017, five states (NSW, Qld, Vic, WA and Tas) have introduced state-funded 4vMenCV (A, C, W and Y) vaccination programs for older adolescents via school-based immunisation and/or primary care providers [224, 225].

In 2015, there were 174 cases of invasive meningococcal disease notified in Australia (Indigenous status not specified) [222]. In 2014, there were 170 cases of invasive meningococcal disease notified in Australia with 21 cases (12%) identified as Aboriginal [215]; an increase from 2013 where 13 cases (8.7%) were identified as Aboriginal and one identified as Torres Strait Islander (0.7%) [216].

More detailed information is available for meningococcal serogroup B (MenB) for the period 2006-2015. The incidence of MenB among Aboriginal and Torres Strait Islander people was 3.8 times higher compared with non-Indigenous people (2.8 and 0.7 per 100,000 respectively) [223]. Rate ratios were higher among Aboriginal and Torres Strait Islander people than non-Indigenous people for all age groups under 15 years of age with the highest difference in the 5-9 years age group (rate ratio: 6.3), followed by the 1-4 years age group (rate ratio: 3.8) and less than 12 months of age (rate ratio: 3.4).

---

[56] A serogroup is a group of bacteria containing a common antigen.

Sexually transmitted infections

Sexually transmissible infections (STIs) are spread primarily by heterosexual or homosexual contact with an infected person [226]. STIs are caused by microorganisms that are transmitted from one person to another through semen, fluid from the vagina, anal or throat secretions, and blood [227]. Some STIs can also be transmitted under some circumstances via skin to skin contact, or from mother to baby during pregnancy and/or birth. Young people under the age of 30 are particularly vulnerable to STI infections [228]. The use of condoms is regarded as fundamental in preventing STI transmission.

Many STIs are asymptomatic and at-risk individuals may not be diagnosed and treated unless they are tested frequently [229]. Early detection of STIs can ensure appropriate management to limit further transmission and prevent the development of complications. Contact tracing and partner notification enable diagnosis and treatment for people who may not realise that they have an STI and have the potential of reducing re-infection rates.

Variations in STI notification rates over time may reflect real changes in incidence, but can also be due to the introduction of easier and more sensitive testing procedures, changes in screening programs and public awareness campaigns [215]. The high level of screening in some Aboriginal and Torres Strait Islander communities probably contributes to the higher STI rates reported for Aboriginal and Torres Strait Islander people than for non-Indigenous people.

Gonorrhoea

Gonorrhoea is an infection caused by the bacterium *Neisseria gonorrhoea* [197]. In 2016, there were 3,779 gonorrhoea notifications for Aboriginal and Torres Strait Islander people accounting for 16% of the notifications in Australia (Indigenous status was not reported for 35% of notifications). The notification rate[57] was seven times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (582 per 100,000 and 84 per 100,000 respectively).

In 2016, one-third (32%) of gonorrhoea notifications for the Aboriginal and Torres Strait Islander population occurred in the 15-29 years age-group, compared with 7% in the same age-group in the non-Indigenous population [197]. Since 2012, notification rates for gonorrhoea among Aboriginal and Torres Strait Islander people declined by 17%, whereas the rates among non-Indigenous people increased by 125% during the same period.

Aboriginal and Torres Strait Islander females were more likely to be diagnosed with gonorrhoea than Aboriginal and Torres Strait Islander males, with a male to female ratio of 0.9:1, whereas in the non-Indigenous population, the number of diagnoses for males was three times the number reported for females [197]. This suggests the transmission of gonorrhoea occurs largely through heterosexual contact in the Aboriginal and Torres Strait Islander population, whereas sex between males is the predominate mode of transmission among non-Indigenous people.

Syphilis

Syphilis is an infection caused by the bacterium *Treponema pallidum* [197]. In 2016, there were 530 syphilis notifications for Aboriginal and Torres Strait Islander people accounting for 16% of the notifications in Australia (Indigenous status was not reported for 10% of notifications). The syphilis notification rate[58] for Aboriginal and Torres Strait Islander people was over five times higher than for non-Indigenous people (67 per 100,000 and 12 per 100,000 respectively).

In 2016, the syphilis notification rate for males (both Aboriginal and Torres Strait Islander males and non-Indigenous males) was highest in the 30-39 years age-group (155 per 100,000 and 49 per 100,000 respectively) [197]. For females, it was highest in the 15-19 years age-group for Aboriginal and Torres Strait Islander females (173 per 100,000), and in the 20-29 years age-group for non-Indigenous females (4.2 per 100,000).

In 2016, the proportion of infectious syphilis notifications for Aboriginal and Torres Strait Islander people was slightly higher for males (54%) than for females (46%) [197]. For non-Indigenous people, 94% of diagnoses were for males. This indicates that transmission of infectious syphilis is mainly through heterosexual contact in the Aboriginal and Torres Strait Islander population and through sex between males in the non-Indigenous population.

Chlamydia

Chlamydia is an infection caused by the bacterium *Chlamydia trachomatis* and is asymptomatic in about 80% of cases [230]. In 2016, there were 6,925 notifications of chlamydia for Aboriginal and Torres Strait Islander people accounting for 10% of the notifications in Australia (Indigenous status was not reported for 50% of notifications) [197]. For STIs, chlamydia was the most frequently diagnosed infection in Australia in 2016. The notification rate[59] for chlamydia was almost three times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (1,194 per 100,000 compared with 419 per 100,000).

---

[57] Gonorrhoea notification rates were based on data from Vic, Qld, WA, SA, Tas, the ACT and the NT where Aboriginal and Torres Strait Islander status was ≥50% complete for 2016 [197].
[58] Syphilis notifications notification rates were based on data from all jurisdictions in Australia with Aboriginal and Torres Strait Islander status being ≥50% complete for 2016 [197].
[59] Chlamydia notifications were based on data from Qld, WA, SA and the NT where Aboriginal and Torres Strait Islander status was ≥50% complete per year for 2016 [197].

Chlamydia is typically diagnosed among young people in both the Aboriginal and Torres Strait Islander and non-Indigenous populations [197]. In 2016, people aged 15-29 years accounted for 81% of chlamydia notifications in the Aboriginal and Torres Strait Islander population and 77% in the non-Indigenous population. For both the Aboriginal and Torres Strait Islander population and non-Indigenous population, females accounted for a greater proportion of chlamydia diagnoses than males. The rate of chlamydia notifications in Aboriginal and Torres Strait Islander females aged 15-19 and 20-29 years was four and three times higher respectively than in the non-Indigenous population. Higher notification rates for Aboriginal and Torres Strait Islander females aged 15-19 years may be due to greater health care attendance and subsequent testing.

HIV

The human immunodeficiency virus (HIV) is a retrovirus that infects cells in the body's immune system [231]. The immune system becomes severely compromised if HIV is left untreated. Anti-retroviral therapy is a significant prevention approach to prevent the transmission of HIV. The late stage of HIV is referred to as acquired immune deficiency syndrome (AIDS) and is life-threatening. AIDS is no longer a notifiable disease [27] so recent information about the occurrence of AIDS among Aboriginal and Torres Strait Islander people is not available.

HIV can be transmitted in three ways: sexual and blood contact with an infected person; and an infected mother can pass HIV on to her child [197]. Aboriginal and Torres Strait Islander people are regarded as being at particular risk of HIV infection due to their higher rates of STIs in many remote and very remote communities, sharing of injecting equipment and over-representation in prisons and juvenile detention [232].

In 2016, there were 1,013 cases of newly diagnosed HIV infection in Australia of which 46 (5%) were among Aboriginal and Torres Strait Islander people [197]. Age-standardised rates of HIV diagnosis were 2.2 times higher for Aboriginal and Torres Strait Islander people than non-Indigenous people (6.4 per 100,000 and 2.9 per 100,000 respectively). Recent changes in the notification rates, after age-adjustment, of newly diagnosed HIV infection in the Aboriginal and Torres Strait Islander population show that in 2007 the rate was 3.6 per 100,000, then rates mostly remained stable until 2011, increasing afterwards to reach 6.4 per 100,000 in 2016. In the same period, the rate remained relatively stable for the non-Indigenous population at 3.8 per 100,000 in 2007 and 2.9 per 100,000 in 2016.

In 2016, the median age of diagnosis among Aboriginal and Torres Strait Islander people was 30 years, and males accounted for 89% of new HIV cases (Derived from [197]). Rates among Aboriginal and Torres Strait Islander males were 12 per 100,000, and among non-Indigenous males 5.6 per 100,000. Rates among Aboriginal and Torres Strait Islander and non-Indigenous females (1.1 and 0.3 per 100,000 respectively) were lower than for Aboriginal and Torres Strait Islander and non-Indigenous males.

Almost two-thirds of all new HIV infections among the Aboriginal and Torres Strait Islander population in 2016 were reported in Qld (43%) and NSW (22%) (Derived from [197]). In the total population, of all new HIV infections, 31% were reported in both NSW and Vic (Derived from [233]).

The highest rates of new HIV diagnoses in 2016 for Aboriginal and Torres Strait Islander people were among those living in urban areas (14 per 100,000) [197]. The lowest rates among Aboriginal and Torres Strait Islander people were found in remote areas (4.2 per 100,000) [230].

In terms of exposure to HIV, men who have sex with men accounted for 59% of new HIV cases among Aboriginal and Torres Strait Islander people in 2016 [197]. Heterosexual contact was also identified as a common form of exposure to HIV among Aboriginal and Torres Strait Islander people (20%). For the total population, 70% of all new HIV cases were attributed to the categories 'men who have sex with men' and 21% were attributed to 'heterosexual contact' [233].

The proportion of new HIV cases attributed to injecting drug use excluding 'men who have sex with men' among Aboriginal and Torres Strait Islander people increased from 6% in 2012 to 27% in 2014 followed by a drop to 4% in 2016 [197]. For the total population in 2016, the HIV exposure category, illicit drug use excluding 'men who have sex with men', was responsible for 1.4% of new cases (Derived from [233]).

Of importance, are the trends in HIV notifications over the past five years. The non-Indigenous population continues to experience an overall decline in rates whereas the trend in the Aboriginal and Torres Strait Islander population is a steady increase; highlighting the need to continue to resource this area including continued access to prevention and health promotion strategies [233].

Skin health

Skin infections affecting Aboriginal and Torres Strait Islander children include scabies and impetigo [234, 235]. Scabies is a skin disease caused by the mite *Sarcoptes scabiei* that produces skin inflammation and itching [236]. Scratching in response to a scabies infestation can result in impetigo[60], a bacterial infection of the skin [236-238] and recent research suggests that scabies mites could also spread bacterial infection and promote bacterial growth [234, 239]. Impetigo in Aboriginal and Torres Strait Islander communities commonly involves GAS, which brings a risk of severe effects, kidney disease and, probably, ARF and heart disease [234, 239-243].

---

[60] Impetigo is also referred to as skin sores, or the broader term, pyoderma, and these terms are commonly used interchangeably.

While resource-poor environments are associated with an increased burden of skin infections and infestations [234, 237, 243-245], preventative, focused and collaborative programs based within remote Aboriginal communities have had positive outcomes [240, 246-248].

Risk factors for impetigo include poverty, overcrowding, lack of water, poor hygiene, tropical climate, scabies and other conditions affecting skin integrity [238, 240, 243, 244, 249].

Prevalence

Scabies is endemic in some remote central and northern Aboriginal and Torres Strait Islander communities, affecting both adults and children. Most prevalence information is available about children [250, 251] and research indicates that the significant public health problem posed by skin infections afflicts infants within a few months of birth [238, 251, 252]. Aboriginal and Torres Strait Islander people, particularly those living in the high-rainfall, humid areas of northern Australia, are also vulnerable to a variety of fungal and related organisms [240].

Aboriginal and Torres Strait Islander children under 15 years of age were screened between September 2004 and August 2007 in five remote NT communities for the East Arnhem Healthy Skin Project (EAHSP) and it was found that the average monthly prevalence for pyoderma was 35% and for scabies 13% [247]. For children under three years of age, scabies prevalence was 23%, representing double that of children aged 3-14 years (11%). Nearly all children (92%) had presented with pyoderma and 35% with scabies at least once. A study of medical records for children born between 2001-2006 participating in the EAHSP found that 69% of children had presented with scabies and 82% had presented with skin sores during their first year of life [252]. Skin sores were seven times more likely to be present if scabies was also diagnosed than if scabies was not evident. In the Skin Sore Trial, conducted in seven remote NT communities between November 2009 and November 2012, scabies was detected in almost 17% of Aboriginal and Torres Strait Islander children who had impetigo [234, 243].

Hospitalisation

There were 10,362 hospital separations with a principal diagnosis of 'diseases of the skin and subcutaneous tissue' among Aboriginal and Torres Strait Islander people in 2015-16 [41], representing 4.3% of all separations (excluding dialysis) among Aboriginal and Torres Strait Islander people (Derived from [41]). After age-adjustment, the hospitalisation rate was 2.4 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people [41].

In 2014-15, the age specific hospitalisation rates of 'diseases of the skin and subcutaneous tissue' as principal diagnosis among Aboriginal and Torres Strait Islander children aged four years and under in Australia was 1.8 times higher in major cities than for non-Indigenous children; 3 times higher in regional areas; and 7.1 times higher in remote and very remote areas [8]. In WA between 1996 and 2012, the age specific hospital admission rates for skin infections as principal and/or additional diagnoses were 15 times higher for Aboriginal and Torres Strait Islander children under 16 years of age than for non-Indigenous children [253]. The rate for Aboriginal and Torres Strait Islander infants under one year of age was highest (79 per 1,000); 22.5 times higher than for non-Indigenous infants. The rate for skin infections classified as scabies as a principal and/or additional diagnoses, for Aboriginal and Torres Strait Islander infants under one year of age was 417 times higher than for non-Indigenous infants.

Between October 2015 and January 2016, 49% of children under 16 years of age, 74% of whom were Aboriginal, who were admitted to two regional hospitals in WA, were diagnosed with impetigo and 8.2% with scabies [254].

For 2006-2010, 10% of medical admissions to Mt Isa Hospital (Qld) for children aged under five years, were due to scabies or pyoderma, and all were Aboriginal and Torres Strait Islander children [255]. Between May 2011 and May 2013 in the NT, the annual incidence of invasive GAS disease was nearly eight times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (70 per 100,000 compared with 8.8 per 100,000) with 96% of cases overall resulting in hospital admissions [256]. The site of first infection was most commonly the skin.

For 2005-2009, 67% of GAS bacteraemia admissions at Royal Darwin Hospital were for Aboriginal and Torres Strait Islander people, with recent or current scabies a risk factor in 30% of cases, and recent or current pyoderma in 66% of cases [257].

Burden of disease

Skin disorders, which includes chronic and acute conditions, skin infections and scabies, were responsible for 1.3% of the total burden of disease among Aboriginal and Torres Strait Islander people in 2011, with the fatal burden comprising 7.7% of the total burden due to skin disorders, and skin infections making up 70% of this fatal burden [45].

Factors contributing to Aboriginal and Torres Strait Islander health

Selected health risk and protective factors

The factors contributing to the health status of Aboriginal and Torres Strait Islander people should be seen within the broad context of the social determinants of health [79, 258-260]. The WHO describes the social determinants of health as the conditions in which people are born, grow, live, work and age [261]. A life course approach to ill health, known as life course epidemiology, integrates theories about the social determinants of health, fetal and developmental origins of disease and the impact of lifestyle and individual behaviour

[262]. The determinants of health, some of which are discussed in the *Social and cultural concepts* section, are shaped by a wider set of forces and systems, including policies, political systems and social norms [258, 261].

For the health of Aboriginal and Torres Strait Islander people, social disadvantage needs to be considered together with 'health risk and protective factors'. These are the behaviours, characteristics, or exposures that may increase or decrease the likelihood of developing a particular health condition [263]. Health risk and protective factors can be divided into non-modifiable factors, often biomedical (e.g. age, sex, genetics), and modifiable factors which are environmental or behavioural and which, in theory, can be changed [79]. It is important to note that risk is based on probability, or likelihood [264]. Not everyone who is exposed to a known risk factor will have an adverse outcome, and people may develop a health condition without ever having been exposed to an associated risk factor.

The selected health risk and protective factors summarised in the following sections are generally related to individual behaviour. However, these behavioural factors should be considered within the context of the social determinants of health and structural influences that could be shaping behaviour and ability to make changes [79, 265]. Research undertaken in WA emphasised the importance of having a strong cultural identity in enabling Aboriginal people to make healthy choices [266].

Environmental health

Environmental health refers to the physical, chemical and biological factors that may affect people in particular surroundings or settings [267]. Environmental factors can be associated with ill health conditions including intestinal and skin infections and some chronic diseases, for example, acute rheumatic fever, respiratory issues (such as asthma) and some cancers [268]. Aboriginal and Torres Strait Islander people are disproportionately affected by the diseases associated with environmental health due to a number of factors, including: the remoteness of some communities; poor infrastructure; lack of access to tradespeople and repairs; and the cost of maintenance [268, 269].

This section will primarily cover information relevant to housing and infrastructure. For more detailed information about some of the health conditions associated with environmental health, see the *Cardiovascular health* section for information on acute rheumatic fever, the *Eye health* section for information on trachoma, the *Respiratory health* section for information on asthma and other related conditions, as well as the *Skin health* section for information about scabies and other skin health issues.

Housing

Housing issues such as overcrowding and poor infrastructure contribute significantly to the ill health of some Aboriginal and Torres Strait Islander people [135].

Overcrowding

Cultural aspects need to be considered in relation to housing conditions and overcrowding for Aboriginal and Torres Strait Islander people. Contributions to overcrowding include: visits to other households (to see relatives, for funerals or because of ties to neighbourhoods or towns and to be closer to 'country') and the high importance placed on demand sharing[61] [270].

In the 2016 National Social Housing Survey (NSHS), it was reported that 16% of Aboriginal and Torres Strait Islander people were living in overcrowded households compared with 6% of non-Indigenous people [271]. This figure was particularly high for Aboriginal and Torres Strait Islander people living in state owned and managed Indigenous housing, with 23% of people living in an overcrowded household.

There have been some small decreases in overcrowding in Aboriginal and Torres Strait Islander households in recent years. In the 2014-15 NATSISS, the proportion of Aboriginal and Torres Islander people living in overcrowded households was 21%, this compares with 23% in 2012-13 and 28% in 2008 [8]. Overcrowding was significantly higher in remote and very remote areas, in 2014-15, 41% of Aboriginal and Torres Strait Islander people were living in overcrowded households, compared with 15% for non-remote areas. However, over time there has been a decrease in overcrowding in very remote areas. In 2004-05, 63% of Aboriginal and Torres Strait Islander people were living in an overcrowded household, decreasing to 49% in 2014-2015. Aboriginal and Torres Strait Islander people were more than three times as likely to live in a household that required an additional bedroom compared with non-Indigenous people in 2014-2015 (18% and 5% respectively) [135].

The proportion of Aboriginal and Torres Strait Islander people reporting overcrowding as a stressor has also decreased over time. In the 2014-15 NATSISS, 6.5% of Aboriginal and Torres Strait Islander people reported overcrowding as a stressor in the last year, which was a decrease from 21% in 2002 [8]. This decrease was consistent across both remote and non-remote areas, but particularly so for remote areas, which dropped from 42% in 2002, to 9.2% in 2014-2015.

Infrastructure

An important contributor to the health and wellbeing of Aboriginal and Torres Strait Islander people is access to working infrastructure in housing and communities, including sewerage, water supply and electricity [272].

---

[61] Demand sharing is mainly where resources and money are shared within an extended family group [270].

In the 2016 NSHS, 72% of Aboriginal and Torres Strait Islander respondents reported living in a house of an 'acceptable' standard [271]. In addition, 24% of Aboriginal and Torres Strait Islanders reported that their household facilities were of an acceptable standard, but the structure of the dwelling was not.

More detailed information on household infrastructure is available for 2014-2015, when 82% of Aboriginal and Torres Strait Islander households were living in houses of an acceptable standard[62] [8]. This proportion has remained relatively stable, with 78% of households living in houses of an acceptable standard in 2012-2013, and 83% in 2008. In 2014-2015, 26% of households reported major structural issues within their dwelling. However this proportion has declined, since 2012-2013 when 35% of Aboriginal and Torres Strait Islander people reported living in a house with major structural issues. Dwellings with major structural problems increased with remoteness. In 2014-2015 for Aboriginal and Torres Strait Islander households living in very remote areas, 37% reported living in a house with major structural problem, compared with 25% for non-remote areas. Nationally, the most significant issues for Aboriginal and Torres Strait Islander dwellings were major cracks in the walls/floors (11%), walls or windows not straight (6.1%), and major plumbing problems (5.7%).

In terms of access to household facilities, the majority of Aboriginal and Torres Strait Islander households across Australia in 2014-2015 had access to working facilities, with over nine in ten households reporting functioning facilities [8]. This included access to working facilities for: washing people (97%); washing clothes and bedding (91%); preparing food (92%) and sewerage facilities (97%). Access to working facilities in remote and very remote areas was lower than in non-remote areas. Overall, access to household facilities has remained relatively stable since 2008.

For Aboriginal and Torres Strait Islander people living in remote communities, a 2017 report, *Water, sanitation and hygiene in remote Indigenous communities: a scan of priorities*, provides an overview of the current status of water, sanitation and hygiene services and challenges however, the information provided is more qualitative than quantitative [273].

Remote housing review

A 2017 review which assessed the outcomes of two Australian Government key strategies, the National Partnership Agreement For Remote Indigenous Housing (NPARIH) and its replacement, the Remote Housing Strategy, found that there has been some progress in the provision of remote housing. However, there was also a range of ongoing issues that need to be addressed to reduce the levels of overcrowding, and to sustain the quality of housing achieved as a result of these strategies [274]. Some key recommendations from the report include:

- the addition of 5,500 homes to address overcrowding in remote areas
- greater emphasis on planned cyclic maintenance (focusing on health hardware and functioning)
- improvements to property and tenancy management
- engaging local community members to undertake repairs and maintenance
- address the misconception that Aboriginal and Torres Strait Islander families are the cause of the majority of damage to remote Indigenous households
- encourage better engagement between public housing authorities and communities to foster good practice in tenancy management.

There were also some issues around the implementation and development of the Remote Housing Strategy, which hampered the effectiveness of this program [274]. These included:

- complications because of the Commonwealth being the only funder of the program, which did not ensure that the states and territories were adequately motivated to provide strong outcomes
- obstacles relating to objectives and shifting policy settings
- opportunities for local workers to be engaged in the program were not always available
- a lack of long-term employment and business growth because of the two-year capital work cycles.

Hospitalisation

In 2014-15, after age-adjustment, Aboriginal and Torres Strait Islander people were hospitalised for selected diseases related to environmental health at 2.3 times the rate of non-Indigenous people [8]. In remote and very remote areas, the rate was 4.0 times the rate of non-Indigenous people. Hospitalisation for scabies and acute rheumatic fever are particularly high, with Aboriginal and Torres Strait Islander people nationally hospitalised at 51.3 and 43.2 times the rate of non-Indigenous people respectively. There has been little change in the hospitalisation rates for selected diseases related to environmental health in recent years, with the rate for Aboriginal and Torres Strait Islander people 2.2 times higher than for non-Indigenous people in 2012-2013.

---

[62] Housing of an acceptable standard includes two components: working household facilities; and major structural components [8].

Mortality

For 2010-2014 in NSW, Qld, WA, SA and the NT, after age-adjustment, Aboriginal and Torres Strait Islander people died as a result of diseases associated with poor environmental health at 1.7 times the rate of non-Indigenous people [8]. This is a small decrease compared with 2003-2007, where Aboriginal and Torres Strait Islander people died at 1.8 times the rate of non-Indigenous people.

Nutrition

The nutritional status of Aboriginal and Torres Strait Islander people is influenced by many factors such as socioeconomic disadvantage, and geographical, environmental, and social factors [275, 276]. Poor nutrition is an important factor contributing to overweight and obesity, malnutrition, CVD, type 2 diabetes, and tooth decay [275, 277]. The Australian Dietary Guidelines recommend that adults eat fruit and plenty of vegetables every day, selected from a wide variety of types and colours [277]. The guidelines also recommend including reduced fat varieties of milk, yoghurts and cheeses, and limiting the intake of added sugar and salt and the consumption of 'discretionary'[63] foods and drinks.

Fruit consumption

According to the 2012-13 *National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey* (NATSINPAS), Aboriginal and Torres Strait Islander children (2-18 years) averaged 1.6 serves of fruit a day and adults (aged 19 years and over) averaged one serve per day [279]. Based on self-reported usual serves of fruit eaten per day, 54% of Aboriginal and Torres Strait Islander people met the recommendations for usual serves [280]. Females were more likely than males to have eaten an adequate amount of fruit (57% and 51% respectively). After age-adjustment, Aboriginal and Torres Strait Islander people aged 15 years or older were less likely than non-Indigenous people to be eating adequate amounts of fruit (ratio 0.9) [52]. Aboriginal and Torres Strait Islander people living in non-remote areas were more likely than those in remote areas to have consumed fruit in the 24 hours prior to the survey (49% and 35% respectively) [281]; however, similar proportions of Aboriginal and Torres Strait Islander people living in remote and non-remote areas usually met the guidelines for daily serves of fruit [280].

Vegetable consumption

According to the 2012-13 NATSINPAS, Aboriginal and Torres Strait Islander children (2-18 years) averaged 1.4 serves of vegetables a day and adults (aged 19 years and over) averaged 2.1 serves per day [279]. Based on self-reported usual serves of vegetables eaten per day, only 8% of Aboriginal and Torres Strait Islander people met the recommendations for usual serves [280]. Females aged 15 years and over were more likely than their male counterparts to have eaten an adequate amount of vegetables (7% and 3% respectively) [282]. After age-adjustment, Aboriginal and Torres Strait Islander people aged 15 years or older were less likely than non-Indigenous people to be eating adequate amounts of vegetables (ratio 0.8) [52]. Aboriginal and Torres Strait Islander people living in non-remote areas were more likely than those in remote areas to have consumed some vegetables in the 24 hours prior to the survey (67% and 56% respectively) [281].

Fruit and vegetable dietary behaviour and labour force

The 2012-13 AATSIHS examined associations between dietary behaviour and labour force status and educational attainment [52]. After age-adjustment, unemployed Aboriginal and Torres Strait Islander people were more likely to have an inadequate daily fruit intake (63%) and inadequate vegetable intake (98%) than those who were employed (54% and 94% respectively), or not in the labour force (60% and 95% respectively). When considering educational levels, Aboriginal and Torres Strait Islander people who had completed year 10 or below were more likely to consume inadequate amounts of fruit (59%) and vegetables (95%) than those who had completed year 12 or equivalent (54% and 93% respectively).

Dairy food consumption

According to the 2012-13 NATSINPAS, Aboriginal and Torres Strait Islander people averaged 1.2 serves per day of milk, yoghurt, cheese and alternatives [279]. Dairy milk was the most frequently consumed product (65%) followed by cheese (30%). Milk products and dishes (dairy foods) were consumed by 83% of Aboriginal and Torres Strait Islander people, which was similar to the proportion of non-Indigenous people who consumed dairy foods (85%) [281]. Similar proportions of males and females consumed dairy foods (84% and 82% respectively), and people in remote areas were just as likely as those in non-remote areas to have consumed these products (83%). Adults were about as likely to consume these products as children (81% and 84% respectively).

Discretionary foods

According to the 2012-13 NATSINPAS, discretionary foods were consumed by a large proportion of Aboriginal and Torres Strait Islander people in the 24 hours prior to the survey, including confectionary (25%), snack foods (20%) and alcoholic beverages (11%) [281]. On average, Aboriginal and Torres Strait Islander people consumed 41% of their total daily energy in the form of discretionary foods; including 8.8% of daily energy as cereal-based products (such as cakes, biscuits and pastries), and 6.9% of daily energy as non-alcoholic beverages (such as soft drinks) [280]. Similar proportions of females and males consumed all discretionary foods except for alcoholic

---

[63] Foods that are energy dense but do not provide many/any nutrients and that typically contain high levels of sugar, salt and fat [277, 278].

beverages for which twice as many males as females reported consuming (15% and 7.7% respectively) [281]. People in non-remote areas were more likely to consume all discretionary foods types than those in remote areas, except for non-alcoholic beverages (both 99%).

Sugar consumption

The WHO recommends that both adults and children consume less than 10% of daily dietary energy from free sugars [283]. According to the 2012-13 NATSINPAS, Aboriginal and Torres Strait Islander people consumed 111 grams (g) of total sugars per day on average [278]. Around two-thirds of this (75 g or 18 teaspoons of white sugar) was free sugars[64], which equated to an average of 14% of daily dietary energy from free sugars. Ninety-one percent (91%) of the free sugars were added[65] sugars (Derived from [278]). Males consumed more total sugars on average than females (121 g compared with 101 g) especially in the 14-18 years age-group (147 g compared with 102 g). The variation in sugar consumption across age and sex was mostly due to the consumption of free sugars as the amount of intrinsic and milk sugars consumed remained relatively constant across all age and sex groups. The majority of free sugars consumed were from discretionary foods and beverages.

Sodium (salt) consumption

According to the 2012-13 NATSINPAS, the average daily amount of sodium consumed from food by Aboriginal and Torres Strait Islander people was 2,379 mg (approximately one teaspoon of salt) [280]. This excludes salt added by consumers in household cooking or when preparing food. Sodium consumption was higher among males than females (2,638 mg and 2,122 mg respectively). Males in all age-groups, except for those 51 years and older, had average intakes that exceeded the upper level of sodium intake recommended by the NHMRC.

Almost half of Aboriginal and Torres Strait Islander people did not use salt in household cooking or preparing food (47%) [284]. This proportion was slightly higher for females than males (50% and 45% respectively), and higher for people living in non-remote areas compared with those in remote areas (48% and 44% respectively) and for children aged 2-18 years compared with people aged 19 years or older (51% and 44% respectively). For those who used salt in household cooking or preparing food, fewer people used iodised salt than non-iodised salt (21% and 24% respectively).

The average daily sodium intake was similar for Aboriginal and Torres Strait Islander people and non-Indigenous people (2,379 mg and 2,408 mg respectively) [280]. Males recorded a higher consumption of sodium than females in both populations.

Bush foods

As a proxy measure of bush food consumption, participants in the 2012-13 NATSINPAS were asked about their consumption of foods that were naturally harvested or wild-caught, such as fish and seafood, wild harvested fruit and vegetables, reptiles and insects [281]. Aboriginal and Torres Strait Islander people in remote areas were more likely than their non-remote counterparts to eat non-commercially caught fin fish (7.8% and 1.8% respectively), crustacea and molluscs (1.2% and 0.3% respectively), wild harvested meat (7.7% and 0% respectively) and reptiles (3.9% and 0.1% respectively).

Biomarkers of nutrition

The 2012-13 National Aboriginal and Torres Strait Islander Health Measures Survey collected information on biomarkers of nutrition, including vitamin D, anaemia and iodine [57]. It was found that:

- More than a quarter of Aboriginal and Torres Strait Islander adults (27%) had a vitamin D deficiency. After age-adjustment, Aboriginal and Torres Strait Islander people were only slightly more likely to have a vitamin D deficiency than non-Indigenous people (ratio 1.1). The levels of vitamin D deficiency were similar for both Aboriginal and Torres Strait Islander males and females, and across all age-groups (ranging from 25% to 29%). Vitamin D deficiency was more common among Aboriginal and Torres Strait Islander people living in remote areas (39%) than those in non-remote areas (23%).
- The proportion of Aboriginal and Torres Strait Islander adults who were at risk of anaemia was 7.6%. Aboriginal and Torres Strait Islander adults were at higher risk of anaemia than their non-Indigenous counterparts in most age-groups (ratio 1.9 after age-adjustment). Females were more likely to be at risk of anaemia than males (10% compared with 4.8%). The risk of anaemia was higher for those living in remote areas compared with those living in non-remote areas (10% compared with 6.9%).
- The Aboriginal and Torres Strait Islander adult population was found to be iodine-sufficient. They had higher iodine levels than non-Indigenous adults (median levels of 135 ug/L compared with 124 ug/L) and those living in remote areas had higher median levels than those living in non-remote areas [57].

Food security

The 2012-13 NATSINPAS addressed the issue of food security by asking respondents if they had run out of food and couldn’t afford to buy more in the last 12 months [285]. This had been a problem for 22% of respondents; 7% of respondents had run out and gone without food, while 15% had run out but not gone without food. People in remote areas were more likely to run out of food than people in non-remote areas (31% and 20% respectively) and slightly more likely to go without (9.2% and 6.4% respectively).

---

[64] Free sugars are added sugars plus those naturally occurring in honey, fruit juice and fruit concentrate [278].

[65] Added sugars are added to foods during manufacture or by the consumer during food preparation or consumption [278].

Burden of disease

The 2011 Australian Burden of Disease study considered the contribution of 29 selected risk factors to the burden of disease, of which 13 risk factors were dietary [45]. When combined, the joint effect of all dietary risks contributed 9.7% to the total burden of disease for Aboriginal and Torres Strait Islander people. The contribution of dietary risk factors to the burden of disease was particularly notable in the 65 years and over age-group, with a diet low in fruit contributing 4% to the burden for Aboriginal and Torres Strait Islander males and 3% for Aboriginal and Torres Strait islander females.

Breastfeeding

Breast milk is the natural and optimum food for babies and provides all the energy and nutrients that an infant needs for the first six months of life [277, 286]. Breastfeeding promotes sensory and cognitive development and protects the infant against SIDS, asthma, infectious diseases and chronic diseases later in life. Exclusive breastfeeding aids a quicker recovery from illness and reduces infant deaths from common childhood illnesses such as diarrhoea or pneumonia. The Australian Dietary Guidelines recommendation is to 'encourage, support and promote breastfeeding' [277]. The WHO recommends exclusive breastfeeding for six months followed by complementary feeding with continued breastfeeding for up to two years or beyond [286]. Breastfeeding contributes to the health of the mother by reducing the risk of ovarian and breast cancers.

In the 2014-15 NATSISS, it was reported that 80% of Aboriginal and Torres Strait Islander children aged 0-3 years had been breastfed [135]. This is similar to the proportion measured in the 2012-13 AATSIHS, where 83% of Aboriginal and Torres Strait Islander children aged 0-3 years had been breastfed [27]. The NATSISS found that Aboriginal and Torres Strait Islander children aged 0-2 years were 1.2 times more likely than non-Indigenous infants to have never been breastfed (18% compared with 14% respectively). Of those who had been breastfed, Aboriginal and Torres Strait Islander infants were more likely than non-Indigenous infants to have been breastfed for less than 1 month (15% compared with 10% respectively). Aboriginal and Torres Strait Islander infants were less likely than non-Indigenous infants to have been breastfed for 12 months or more (4% compared with 12% respectively).

The proportion of Aboriginal and Torres Strait Islander infants aged 0-2 years who had been breastfed ranged from 98% in the NT to 75% in Victoria (87% in ACT, 86% in Qld, 83% in SA, 79% in NSW, 78% in Tas and 77% in WA) [27]. Of these, higher proportions of Aboriginal and Torres Strait Islander children than non-Indigenous children were breastfed in Qld, Tas and NT. Breastfeeding proportions for Aboriginal and Torres Strait Islander children were higher in very remote areas (91%) compared with major cities (73%).

According to the 2010 Australian National Infant Feeding Survey, breastfeeding initiation levels were similar among Indigenous and non-Indigenous mothers (87% and 90% respectively), but levels of exclusive breastfeeding declined more rapidly among Indigenous mothers (Derived from [287]). At five months of age, only 11% of Indigenous babies were exclusively breastfed, compared with 27% of non-Indigenous babies.

A study of infant feeding behaviour among Aboriginal women in rural Australia concluded that lack of intergenerational support, unsupportive social factors and the pervasive presence of infant formula produced strong barriers to breastfeeding [288].

Commencing in 2008, the Footprints In Time: The Longitudinal Study of Indigenous Children collects data annually from 11 sites (rural, remote and urban) and from up to 1,700 Aboriginal and Torres Strait Islander children and their families around Australia [289]. Data on breastfeeding from this study showed that 80% of Aboriginal and Torres Strait Islander children had been breastfed at some time during their early years, and 22% of infants had been breastfed for at least 12 months. This study found that children living in more remote areas had been breastfed for a slightly longer period of time than those living in other areas [290].

Physical activity

Physical activity is important for maintaining good overall health and wellbeing [291]. Low levels of activity, including high levels of sedentary behaviour are risk factors for a range of health conditions as well as being a strong contributor to obesity. Australia's Physical Activity and Sedentary Behaviour Guidelines for adults recommend a combination of moderate and vigorous physical activity on most, preferably all, days of the week to improve health and reduce the risk of chronic disease and other conditions [292]. However, doing some physical activity is better than doing none and the health benefits of being physically active are continuous, starting with any activity above zero [293]. Regular physical activity reduces the risk of many health problems, such as cardiovascular disease, type 2 diabetes, depression and certain cancers [292].

According to the 2012-13 AATSIHS, 47% of Aboriginal and Torres Strait Islander people aged 18 years and over living in non-remote areas had met the target of 30 minutes of moderate intensity physical activity on most days (or a total of 150 minutes per week) [172]. A smaller proportion (41%) of Aboriginal and Torres Strait Islander adults had exercised for at least 150 minutes over five sessions in the previous week. Over one-quarter (29%) of Aboriginal and Torres Strait Islander adults had exercised at a moderate level and 10% at a high level; these levels of physical activity were 0.9 and 0.6 times those of non-Indigenous people. Those who participated in the survey's pedometer study recorded an average of 6,963 steps per day; 17% met the recommended threshold of 10,000 steps or more [291].

Among Aboriginal and Torres Strait Islander adults living in non-remote areas, more males than females met the target of 150 minutes of moderate intensity exercise per week (52% compared with 42%) and had exercised for at least 150 minutes over five sessions in the previous week (45% compared with 38%) [172]. Aboriginal and Torres Strait Islander males in non-remote areas were significantly more likely than Aboriginal and Torres Strait Islander females to have exercised at moderate intensity (32% compared with 25%) and were twice as likely to have exercised at high intensity (14% compared with 7%) in the previous week [172, 291]. In remote areas, 55% of Aboriginal and Torres Strait Islander adults exceeded the recommended 30 minutes of physical activity and 21% did not participate in any physical activity on the day prior to the interview [291]. The most common type of physical activity for adults was 'walking to places' (71%). Around one-in-ten (11%) participated in cultural activities, including hunting and gathering bush foods or going fishing.

Among Aboriginal and Torres Strait Islander adults living in non-remote areas, 61% reported that they were physically inactive (sedentary or had exercised at a low level) in the week prior to the survey [172]. A higher proportion of Aboriginal and Torres Strait Islander females than Aboriginal and Torres Strait Islander males were physically inactive (68% compared with 53%). Aboriginal and Torres Strait Islander adults spent an average of 5.3 hours per day on sedentary activities, including 2.3 hours of watching television (TV), DVDs and videos [291].

On average, Aboriginal and Torres Strait Islander adults engaged in around one third the amount of physical activity as children aged 5-17 years (39 minutes per day including 21 minutes on walking for transport) [291].

Aboriginal and Torres Strait Islander children aged 5-17 years living in non-remote areas spent an average of two hours per day participating in physical activity (exceeding the recommendation of one hour per day); this was 25 minutes more than non-Indigenous children [291]. Around half (48%) of Aboriginal and Torres Strait Islander children met the recommended amount of physical activity, compared with 35% of non-Indigenous children. The most common physical activities performed by Aboriginal and Torres Strait Islander children were active play and children's games (57%) and swimming (18%). Those who participated in the survey's pedometer study, recorded an average of 9,593 steps per day, with a quarter of the children (25%) meeting the recommended 12,000 steps per day. For Aboriginal and Torres Strait Islander children aged five years and over in remote areas, 82% did more than 60 minutes of physical activity on the day prior to the interview. Other than walking (82%), the two most common activities were running (53%) and playing football or soccer (33%) [291].

Aboriginal and Torres Strait Islander children spent less time than non-Indigenous children using the internet or computer for homework; four minutes compared with eight minutes per day for 12-14 year-olds and eight minutes compared with 20 minutes per day for 15-17 year-olds [291]. Aboriginal and Torres Strait Islander children aged 15-17 years spent more time on screen-based activities than those aged 5-8 years (3.3 hours compared with 1.9 hours).

Aboriginal and Torres Strait Islander children aged 2-4 years living in non-remote areas spent an average of 6.6 hours per day participating in physical activity and spent more time outdoors than non-Indigenous children in the same age group (3.5 hours compared with 2.8 hours) [291]. Aboriginal and Torres Strait Islander children aged 2-4 years spent an average of 1.5 hours per day on sedentary screen-based activities such as watching TV, DVDs or playing electronic games.

Bodyweight

The standard measure for classifying a person's weight status is body mass index (BMI) (BMI: weight in kilograms divided by height in metres squared) [294]. Being overweight (BMI 25 to 29) or obese (BMI of 30 or more) increases a person's risk for CVD, type 2 diabetes, certain cancers, chronic kidney disease and some musculoskeletal conditions [276, 295]. A high BMI can be a result of many factors, alone or in combination, such as poor nutrition, physical inactivity, socioeconomic disadvantage, genetic predisposition, increased age, and alcohol use [79, 277, 296, 297]. Being underweight (BMI less than 18.5) [79] can also have adverse health consequences, including lower immunity (leading to increased susceptibility to some infectious diseases) and osteoporosis (bone loss) [277].

Abdominal obesity, a risk factor for the development of metabolic syndrome, can be measured by waist circumference (WC) alone (greater than 94 cm for males and greater than 80 cm for females), or waist-hip ratio (WHR) (greater than or equal to 0.90 for males and 0.85 for females) [298].

Obesity and abdominal obesity, as measured by BMI and WC, have been shown to be risk factors for hypertension [299] and type 2 diabetes in Aboriginal and Torres Strait Islander people [300]. However, optimal BMI and WC cut-offs are still uncertain for Aboriginal and Torres Strait Islander people (due to differences in body shape and other physiological factors) when calculating diabetes type 2 and cardiovascular risk [301-303]. It has been suggested that a BMI of 22 might be more appropriate than 25 as a measure of acceptable BMI for Aboriginal people [303]. There is also evidence that measuring the WHR in Aboriginal people is more accurate and easier to measure than BMI. An equation has been developed for calculating fat free mass in Aboriginal and Torres Strait Islander adults using the easily acquired variables of resistance[66], height, weight, age and sex for use in the clinical assessment and management of obesity [304].

Nationally in 2012-13, 69% of Aboriginal and Torres Strait Islander people aged over 18 years were considered to be overweight (29%) or obese (40%) [8]. A further 28% were normal weight and 3% were underweight. More Aboriginal and Torres Strait Islander males than females were overweight (32% and 27% respectively); however, females were more likely to be obese than males (43% and 36% respectively). The rates of overweight remained relatively stable as age increased, however the obesity rates increased with age,

---

[66] When an electrical current is passed through the body, fatty tissue offers more resistance than lean tissue. The resistance to the flow of electricity is used to calculate the proportion of body fat in the individual.

from 28% for those aged 18-24 years to 49% for those aged 55 years and over. This was similar for both males and females. After age-adjustment, the combined overweight/obesity levels were slightly higher for Aboriginal and Torres Strait Islander people aged 18 years or older than for their non-Indigenous counterparts (rate ratio: 1.2). Aboriginal and Torres Strait Islander people were 1.6 times as likely as non-Indigenous people to be obese (rate ratios: 1.4 for males and 1.7 for females) [305].

In 2012-2013, 3.1% of Aboriginal and Torres Strait Islander people aged 18 years or older were underweight, with 2.4% of Aboriginal and Torres Strait Islander males and 3.8% of Aboriginal and Torres Strait Islander females having a BMI of less than 18.5 [305]. After age-adjustment, Aboriginal and Torres Strait Islander people were 1.6 times more likely to be underweight than non-Indigenous people (rate ratios: for males 1.8 and females 1.5) but less likely to be of normal weight (rate ratio: 0.7).

Measurements of WC and WHR were taken in the 2012-13 AATSIHS to help determine levels of risk for developing certain chronic diseases [306]. Based on WC, a higher proportion of Aboriginal and Torres Strait Islander females (81%) than Aboriginal and Torres Strait Islander males (62%) aged 18 years or older were found to be at increased risk of developing chronic diseases. Based on WHR, 81% of males and 73% of females aged 18 years or older were at increased risk of developing chronic diseases. The proportion of Aboriginal and Torres Strait Islander males and females who were at increased risk of developing chronic diseases based on both measures of WC and WHR increased with age.

According to the 2012-13 AATSIHS, based on BMI information, around 30% of Aboriginal and Torres Strait Islander children aged 2-14 years were overweight (20%) or obese (10%), 62% were in the normal weight range, and 8% were underweight [52]. Similar proportions of Aboriginal and Torres Strait Islander boys and girls aged 2-14 years were overweight or obese (28% and 32% respectively). After age-adjustment, the combined overweight/obesity levels were slightly higher for Aboriginal and Torres Strait Islander children aged 2-14 years than for non-Indigenous children (rate ratio: 1.2) mainly due to higher obesity rates in both boys and girls (boys: 10% compared with 6% respectively; and girls: 11% compared with 7% respectively).

Immunisation

In recent decades, vaccination has been very successful in contributing to improvements in Aboriginal and Torres Strait Islander health and child survival [208]. National immunisation coverage rates for Aboriginal and Torres Strait Islander children have improved steadily since 2008, reducing the gap between Indigenous and non-Indigenous children [307]. The National Immunisation Program (NIP) schedule for the Australian population recommends vaccinations at different stages of life and additional recommendations for specific high risk populations, these include: hepatitis A; hepatitis B; diphtheria; tetanus; whooping cough; Haemophilus influenzae type b (Hib); polio; pneumococcal conjugate; rotavirus; meningococcal C; measles; mumps and rubella (MMR); varicella (chickenpox); HPV and influenza [208]. Due to some vaccine-preventable diseases still being experienced at higher rates among Aboriginal and Torres Strait Islander people, other supplementary vaccines[67] are also specifically prescribed depending on age, location and health risk factors.

Childhood vaccination

Nationally, in late 2014 it was agreed by the Australian Chief Medical Officer and other chief health officers to set a goal of having 95% of children fully immunised in line with the schedule's recommendations relevant to their age [308]. The NIP for all children includes vaccines for hepatitis B, whooping cough, Hib, MMR, pneumococcal disease, meningococcal C, varicella (chickenpox), rotavirus, HPV, and influenza [309]. Across primary health networks in 2016-17, percentages for fully immunised Aboriginal and Torres Strait Islander children varied for all three age-groups [310].

These ranges were:

- 1 year-olds - 96% in Murrumbidgee, NSW to 85% in Perth North, WA
- 2 year-olds - 94% in Eastern Melbourne, Vic to 81% in Perth South, WA
- 5 year-olds - 100%[68] in Northern Sydney, NSW to 90% in Western Vic.

In 2016-17, there were 22 out of 31 PHN areas with vaccination proportions above 95% compared with 2 out of 31 in 2012-2013.

According to data from more than 80 Statistical Areas Level 4 (SA4s), the proportion of Aboriginal and Torres Strait Islander children who were fully immunised in 2016-17 varied by age, ranging from [310]:

- 98% in Moreton Bay South Qld to 85% in Adelaide West, SA for 1 year-olds
- 97%[69] in Mandurah, WA to 78% in North West, Vic for 2 year-olds
- 99%[70] Melbourne North East, Vic to 86% in Geelong[71], Vic for 5 year-olds.

In 2016-17, the national rate of fully immunised Aboriginal and Torres Strait Islander children was 96% [311].

---

[67] These include vaccinations for Bacille Calmette-Guérin (BCG) for newly born babies living in areas of high TB incidence, hepatitis A for children living in Qld, WA, SA and the NT, hepatitis B for adults not previously vaccinated against hepatitis B, influenza for all persons aged 6 months or over, pneumococcal conjugate for children living in Qld, WA, SA and the NT and pneumococcal polysaccaride for persons aged 15-49 years old with underlying conditions increasing the risk of invasive pneumococcal disease (IPD) and all persons aged 50 years and older [208].

[68] Interpret with caution due to low numbers of eligible children.

[69] Interpret with caution due to low numbers of eligible children

[70] Interpret with caution due to low numbers of eligible children

[71] Interpret with caution due to low numbers of eligible children

According to the Australian Immunisation Register (AIR), national immunisation rates for fully immunised Aboriginal and Torres Strait Islander children at December 2017 were lower than the rates for all children: 92% compared with 94% for 1 year-olds, and 88% compared with 90% for 2 year-olds [312]. The national immunisation rate for Aboriginal and Torres Strait Islander 5 years-olds was higher than the rate for all children (96% compared with 94%, respectively).

Adult vaccination

Vaccinations for hepatitis B, influenza, pneumococcal disease, Japanese encephalitis and rubella are recommended for Aboriginal and Torres Strait Islander adults [208]. Due to the high rates of mortality and morbidity associated with hepatitis B in the Aboriginal and Torres Strait Islander population, it is important that people are tested for hepatitis B infection, and offered vaccination if they are not immune. As reported in the *National Key Performance Framework for Aboriginal and Torres Strait Islander primary health care centres*, as of June 2016, 33% of Aboriginal and Torres Strait Islanders regular clients[72] aged over 50 years were immunised against influenza [313]. There was no difference in the proportion of Aboriginal and Torres Strait Islander males and females who were immunised against influenza. Of those clients with type 2 diabetes, 35% were immunised against influenza; of those clients with COPD, 37% were immunised against influenza.

The 2012-2013 AATSIHS found that among Aboriginal and Torres Strait Islander adults aged 50 years and older, influenza vaccination in the previous 12 months was reported by: 51% of adults aged 50-64 years, 74% of adults aged 65 years and above, and overall 57% of adults aged 50 years and older [100]. Vaccination for pneumococcus in the previous five years was reported by: 23% of 50-64 year-olds, 44% of 65 year-olds and older, and 29% overall of 50 years and older.

Tobacco use

Tobacco use has a number of health impacts, including increasing the risk of chronic disease, such as CVD, many forms of cancer, and lung diseases, as well as a variety of other health conditions [27]. Tobacco use is also a risk factor for complications during pregnancy and is associated with preterm birth, LBW, and perinatal death. Environmental tobacco smoke (passive smoking) is of concern to health, with children particularly susceptible to resultant problems that include exacerbation of middle ear infections, asthma, and increased risk of SIDS.

Extent of tobacco use among Aboriginal and Torres Strait Islander people

The 2014-15 NATSISS is currently the most reliable source of information on the prevalence of tobacco smoking among Aboriginal and Torres Strait Islander people. While the more recent report, the *National drug strategy household survey 2016: detailed findings* has data from 2016, there are issues with the sample size of Aboriginal and Torres Strait Islander people, as well as some other limitations. Because of this, comparisons against non-Indigenous people must be interpreted with caution [314]. The 2014-15 NATSISS also has more comprehensive data in terms of remoteness, sex, and age.

The 2014-15 NATSISS found that 39% of Aboriginal and Torres Strait Islander people aged 15 years and over reported that they were current daily smokers [135]. This represents a significant reduction from levels reported in the 2008 NATSISS (45%) and 2002 (49%). Findings from the *National drug strategy household survey 2016: detailed findings,* which reported on Aboriginal and Torres Strait Islander people aged 14 years and over, also showed a significant decrease in smoking levels, but with smaller numbers of Aboriginal and Torres Strait Islander people, declining from 35% in 2010, to 32% in 2013 and 27% in 2016 [314].

In 2014-2015, the proportion of Aboriginal and Torres Strait Islander males who were current daily smokers (42%) was higher than the proportion of Aboriginal and Torres Strait Islander females (36%) [135]. Aboriginal and Torres Strait Islander males had the highest proportion of current daily smokers across all age-groups, most notably in the 45-54 years age-group (51% compared with 41% of females). For Aboriginal and Torres Strait Islander people, the age-group with the highest proportion of current daily smokers was 35-44 years (47%). After age-adjustment, Aboriginal and Torres Strait Islander people were 2.8 times more likely to smoke than non-Indigenous people (39% compared with 14% respectively).

In 2014-2015, Aboriginal and Torres Strait Islander people living in remote areas reported a higher proportion of current daily smokers (47%) than those living in non-remote areas (37%) [135]. The overall proportion of current smokers in remote areas in 2014-2015 has only seen a minor decrease since 2002 (47% and 50% respectively).

When comparing smoking prevalence over the six years between the 2014-15 NATSISS, and the 2008 NATSISS, the highest reductions in daily smoking have been found in the younger age-groups [135]. In 2008, the proportion of 15-24 year-olds who smoked daily was 39%, compared with 31% in 2014-2015. The proportion for the 25-34 years age-group was 53% in 2008 compared with 45% in 2014-2015.

High rates of smoking have been reported for Aboriginal and Torres Strait Islander mothers [22]. In 2015, almost half of Aboriginal and Torres Strait Islander mothers (45%) reported smoking during pregnancy, compared with 12% of non-Indigenous mothers. The proportion of smoking cessation for Aboriginal and Torres Strait Islander women during the second 20 weeks of pregnancy was 14%, compared with 25% among non-Indigenous women.

---

[72] A regular client is a person who has an active medical record – that is, a client who attended the primary health care organisation at least three time in the last two years [313].

In 2014-2015, 57% of Aboriginal and Torres Strait Islander children aged 0-14 years lived in households with a daily smoker (a decline from 63% in 2008) [135]. For those children living with a daily smoker, 13% were living in households where people smoked indoors.

Burden of disease

In 2011, tobacco use remained the leading cause of the burden of disease and injury among Aboriginal and Torres Strait Islander people, responsible for 12% of the total burden of disease [45]. It contributed around 40% of the disease burden to CVD, cancer and respiratory diseases. Tobacco use was also the risk factor contributing the most (23%) to the health gap between Aboriginal and Torres Strait Islander and non-Indigenous people.

Alcohol use

Drinking too much alcohol, both on single drinking occasions (binge drinking) and over a person's lifetime can lead to health and social harms including chronic diseases, injury and transport accidents, mental health disorders, intergenerational trauma and violence. This not only affects the individual, but families and the wider community [314, 315]. Many common factors influence why people drink too much alcohol, for example, socioeconomic disadvantage, stress, and early life experience [316]. With regard to Aboriginal and Torres Strait Islander people, it is important to understand the historical and social contexts of colonisation, the effects of dispossession of land and culture, and economic exclusion [315, 317, 318].

Aboriginal and Torres Strait Islander people are less likely to drink alcohol than non-Indigenous people, but those who do drink are more likely to at levels that cause harm [97, 314]. Evidence suggests that Aboriginal and Torres Strait Islander people have better health outcomes when there are adequately resourced and culturally safe services provided by community controlled organisations [318, 319].

Extent of alcohol use among Aboriginal and Torres Strait Islander people

Assessing risks from use of alcohol

In 2009, the NHMRC introduced revised guidelines that depart from specifying 'risky' and 'high risk' levels of drinking [320]. The revised guidelines seek to estimate the overall risk of alcohol-related harm over a person's lifetime. For males and females:

- Guideline 1 states that to reduce the risk of alcohol-related harm over a lifetime, no more than two standard drinks should be consumed on any day
- Guideline 2 states that to reduce the risk of injury on a single occasion of drinking, no more than four standard drinks should be consumed
- Guideline 3 recommends that the safest option is not drinking alcohol for those aged under 15 years and delaying alcohol use for as long as possible for those aged 15 to 17 years
- Guideline 4 recommends that the safest option for pregnant and breastfeeding women is not to drink alcohol.

Abstinence or no consumption of alcohol in the last 12 months

Aboriginal and Torres Strait Islander people are more likely to not drink alcohol than non-Indigenous people. In the 2014-15 NATSISS, 40% of Aboriginal and Torres Strait Islander people aged 15 years and over reported not drinking alcohol in the previous 12 months [8]. In the 2012-13 AATSIHS, 23% of Aboriginal and Torres Strait Islander people aged 18 years or older (17% of males and 28% of females) had never drank alcohol or had not done so for more than 12 months [321]. After age-adjustment, abstinence was 1.6 times more common among Aboriginal and Torres Strait Islander people than among non-Indigenous people. Similar proportions of Aboriginal and Torres Strait Islander and non-Indigenous people have never drank alcohol (10% and 8.9% respectively).

Short-term and single occasion risk

The 2012-13 AATSIHS reported that 18% of Aboriginal and Torres Strait Islander people aged 18 years and over did not exceed the 2009 guidelines (four or less standard drinks on a single day for both males and females) [321]. Similar proportions of Aboriginal and Torres Strait Islander and non-Indigenous people exceeded the 2009 guidelines for drinking at short-term/single occasion risk (52% and 45% respectively after age-adjustment) [321]. Aboriginal and Torres Strait Islander males were 1.5 times more likely than Aboriginal and Torres Strait Islander females to exceed the 2009 guidelines for drinking at risk on a single occasion (68% compared with 46% respectively). In the 2014-15 NATSISS, the proportion of Aboriginal and Torres Strait people exceeding the guidelines for single occasion risk was lower in very remote areas compared with inner and outer regional and very remote areas [8].

Lifetime risk

The 2016 NDSHS reported that between 2010 and 2016 there was a significant decline (from 32% to 20%) in the proportion of Indigenous people aged 12 years and older exceeding the 2009 guidelines for lifetime risk (no more than two standard drinks on any single day) [314]. The 2012-13 AATSIHS reported that among Aboriginal and Torres Strait Islander people aged 18 years and over who drank alcohol, 20% drank at levels exceeding the 2009 guidelines for long-term/lifetime drinking risk [322]. After age-adjustment, lifetime drinking risk was similar for both Aboriginal and Torres Strait Islander people and non-Indigenous people (ratio 1.0). Aboriginal and Torres Strait Islander males were 2.7 times more likely than Aboriginal and Torres Strait Islander females to exceed the guidelines for risk of long-term harm (29% compared with 11% respectively).

A lower proportion of Aboriginal and Torres Strait Islander people aged 15 years and older in very remote areas (14%) has been found to exceed the guidelines for lifetime risk when compared with proportions in other areas, specifically inner regional (19%) and remote areas (23%) [141].

Alcohol and pregnancy

Drinking alcohol in pregnancy can affect the unborn baby leading to fetal alcohol spectrum disorder (FASD), a diagnostic term that describes a range of conditions including central nervous system dysfunction, poor growth, characteristic facial features and developmental delay [323, 324]. The 2014-15 NATSISS reported that there was a significant reduction of mothers of Aboriginal and Torres Strait Islander children that drank through pregnancy, from 19.6% in 2008 to 9.8% in 2014-2015 [135]. In the 2008 NATSISS, 80% of mothers of Indigenous children aged 0-3 years did not drink during pregnancy, 16% drank less alcohol than usual, and 3.3% drank the same or more alcohol during pregnancy [325]. The proportion of mothers who drank the same or more alcohol during pregnancy was greatest in Tas/ACT (6.0%), followed by Vic (5.4%), and WA (5.0%).

Hospitalisation

For 2014-2015, the alcohol-related hospitalisation rate for Aboriginal and Torres Strait Islander people after age adjustment was 7.3 per 1,000 [8]. Aboriginal and Torres Islander males were hospitalised at 4.0 times the rate for non-Indigenous males and Aboriginal and Torres Islander females were hospitalised at 3.4 times the rate for non-Indigenous females.

Among Aboriginal and Torres Strait Islander people living in NSW, Vic, Qld, WA, SA and the NT, between 2004-2005 and 2014-2015, age-adjusted hospital separations due to acute intoxication increased from 2.1 per 1,000 to 5.8 per 1,000 [8]. This was an increase from 5.7 to 11.4 times the rates for non-Indigenous people. In 2014-15, the highest rate of hospital separations related to alcohol use for Aboriginal and Torres Strait Islander people was for mental/behavioural disorders (7.8 per 1,000) which was 3.7 times the rate of non-Indigenous people.

Hospital separation rates related to alcohol use due to acute intoxication for Aboriginal and Torres Strait Islander people in 2014-15 varied by level of remoteness [8]. Aboriginal and Torres Strait Islander people living in remote and very remote areas had the highest rate of hospitalisation due to acute intoxication (11 per 1,000) while Aboriginal and Torres Strait Islander people in urban areas had the lowest (3.4 per 1,000). In remote and very remote areas, Aboriginal and Torres Islander people were hospitalised for alcohol-related diagnoses at 7.1 times the rate for non-Indigenous people [8].

Mortality

From 2010-2014 in NSW, Qld, WA, SA and NT the Aboriginal and Torres Strait Islander death rate due to alcohol was 4.9 times greater after age-adjustment than for non-Indigenous people (22 per 100,000 compared with 4.5 per 100,000 respectively) [8] The main cause of alcohol-related deaths was from alcoholic liver disease; the death rate for Aboriginal and Torres Strait Islander females was 7.0 times that of non-Indigenous females, and 4.1 times for Aboriginal and Torres Strait Islander males compared with non-Indigenous males. Aboriginal and Torres Strait Islander males were 2.6 times more likely to die due to alcohol use compared with Aboriginal and Torres Strait Islander females.

Burden of disease

In 2011, alcohol use was responsible for 8.3% of the total burden of disease among Aboriginal and Torres Strait Islander people [45]. The highest levels of disease burden from alcohol use among Aboriginal and Torres Strait Islander people were for mental and substance use disorders (22%), injury (19%), and gastrointestinal diseases (15%).

Illicit substance use

Illicit drug use describes the use of drugs that are illegal to possess (e.g. cannabis, heroin, ecstasy, and methamphetamine), and the non-medical use of prescribed drugs such as painkillers [8, 326]. Illicit drug use is associated with an increased risk of; mental illness, poisoning, self-harm, infection with blood borne viruses from unsafe injection practices, chronic disease, and death [8, 45, 197, 327].

Extent of illicit substance use among Aboriginal and Torres Strait Islander people

Surveys consistently show that most Aboriginal and Torres Strait Islander people do not use illicit drugs [135, 314, 328]. The two most recent national surveys to collect this data, the 2016 NDSHS (which contained a small sample of Aboriginal and Torres Strait Islander respondents)[73] and the 2014-15 NATSISS found that 73% of Aboriginal and Torres Strait Islander people aged 14 years and over (NDSHS) and 69% of Aboriginal and Torres Strait Islander people aged 15 years and over (NATSISS) reported either never using illicit drugs or had not used illicit drugs in the last 12 months (Derived from [135, 314].

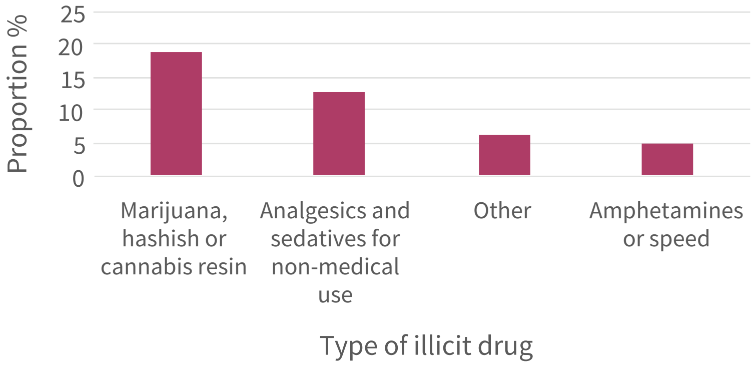
---

[73] Because of the small sample size (n= 568 Aboriginal and Torres Strait Islander respondents), comparison of data between Aboriginal and Torres Strait Islander people and non-Indigenous people should be viewed with caution.

The 2014-2015 NATSISS found that 30% of Aboriginal and Torres Strait Islander people aged 15 years and over reported using illicit drugs in the last 12 months [135]. Similar proportions were recorded in the 2016 NDSHS which found 27% of Aboriginal and Torres Strait people aged 14 years and over reported using illicit drugs in the last 12 months [314]. The NDSHS allows some comparison with the non-Indigenous population; Aboriginal and Torres Strait Islander people were around 1.8 times more likely to have used illicit drugs in the past 12 months when compared with non-Indigenous people (derived from [314]).

The 2014-2015 NATSISS and the 2016 NDSHS found that cannabis (marijuana, hashish or cannabis resin) was the most commonly used illicit drug, used by 19% of Aboriginal and Torres Strait Islander in the previous 12 months [135, 314]. The NATSISS reported that after cannabis, the most commonly used illicit drugs were analgesics and sedatives for non-medical use (13%), 'other' drugs (heroin, cocaine, petrol, LSD/synthetic hallucinogens, naturally occurring hallucinogens, ecstasy/designer drugs, methadone and kava) (6.4%) and amphetamines (4.8%) (Figure 3) [135].

Figure 3. Proportion of Aboriginal and Torres Strait Islander people who reported illicit drug use in the last 12 months, 2014-2015



Note: 'Other' includes heroin, cocaine, petrol, LSD/synthetic hallucinogens, naturally occurring hallucinogens, ecstasy/designer drugs, methadone and kava.

Source: ABS, 2016 [135]

In 2014-2015, Aboriginal and Torres Strait Islander males were more likely than females to have used an illicit drug in the previous 12 months (34% and 27% respectively) [135]. The higher proportions of use by males were found for all drug types, except analgesics and sedatives where the proportions for females were higher (15% and 11% respectively). Almost twice as many Aboriginal and Torres Strait Islander males as females had used cannabis (25% compared with 14%), amphetamines (6.3% compared with 3.2%), and 'other' drugs (8.5% compared with 4.5%). Use of illicit drugs in the previous 12 months was greater among Aboriginal and Torres Strait people aged 15 years or over living in non-remote areas than among those living in remote areas in 2014-2015 (33% compared with 21%).

In 2015-16, of the Aboriginal and Torres Strait Islander organisations providing primary health care services to Aboriginal and Torres Strait Islander people, 68% included programs to address substance use [329]. The most common illicit substance use issues people sought help for from primary health care services were cannabis (79%), amphetamines (58%) and multiple drug use (45%).

Hospitalisation

In 2014-2015, the most common drug-related conditions resulting in hospitalisation for Aboriginal and Torres Strait Islander people were for 'poisoning' and 'mental and behavioural disorders' [8]. The hospitalisation rate for Aboriginal and Torres Islander people from poisoning due to drug use (2.9 per 1,000) was 2.3 times the rate for non-Indigenous people (1.3 per 1,000). The hospitalisation rate for mental and behavioural disorders due to drug use for Aboriginal and Torres Strait Islander people (3.5 per 1,000) was 3.1 times the rate for non-Indigenous people (1.1 per 1,000). Hospitalisation for mental/behavioural disorders from use of amphetamines[74] had the highest rate of separations due to drug use and was 3.7 times higher for Aboriginal and Torres Strait Islander people (1.5 per 1,000) than non-Indigenous people (0.4 per 1,000). Cannabis use was the second highest cause of hospitalisation for mental and behavioural disorders due to drug use, with Aboriginal and Torres Strait islander people 3.9 times more likely to be hospitalised (0.8 per 1,000) than non-Indigenous people (0.2 per 1,000).

Hospitalisation rates due to drug use were higher for Aboriginal and Torres Strait Islander people in major cities (9.1 per 1,000) than in inner and outer regional areas (6.2 per 1,000) and remote areas (3.9 per 1,000) [8].

Mortality

For the period 2010-2014, SA recorded the highest rate of drug-induced deaths for Aboriginal and Torres Strait Islander people (24 per 100,000), followed by NSW (17 per 100, 000), and WA (9 per 100,000) [8]. Rates of drug induced deaths were higher for Aboriginal and Torres Strait Islander males (14 per 100,000) than for females (10 per 100,000). The rate of drug-induced deaths was around 1.9 times higher for Aboriginal and Torres Strait Islander people than for non-Indigenous people (Table 32) (derived from [8]).

---

[74] ICD code F15 hospitalisation from use of other stimulants includes amphetamine-related disorders and caffeine but not cocaine.

Table 32. Rate of drug induced deaths, by Indigenous status, and Indigenous:non-Indigenous rate ratios, NSW, Qld, WA, SA, and the NT, 2010-2014

Jurisdiction	Indigenous rate	Non-Indigenous rate	Rate ratio
NSW	17	6.4	2.6
Qld	9.1	6.7	1.4
WA	9.4	7.1	1.3
SA	24	6.5	3.8
NT	6.1	4.1	1.5
NSW, Qld, WA, SA and the NT	12	6.5	1.9

Notes: 1 Rates are per 100,000 (age-standardised)
2 Deaths where Indigenous status was not stated are excluded from the analysis

Source: Derived from Steering Committee for the Review of Government Service Provision, 2016 [8]

Burden of disease

In 2011, illicit drug use made a greater contribution to the burden of disease for Aboriginal and Torres Strait Islander people than for the total population with an overall burden of 3.7% compared with 1.8% respectively [45, 132]. The highest level of disease burden attributable to illicit drug use for Aboriginal and Torres Strait Islander people was for gastrointestinal disorders including chronic liver disease (31% compared with 17% for the total population) followed by injury (7.4% compared with 1.7 % for the total population). Illicit drug use contributed 5.9% to the burden of disease for mental health for both Aboriginal and Torres Strait Islander and the total population.

Volatile substance use

Volatile substance use (VSU) involves sniffing substances that give off fumes at room temperature such as petrol, paint, glue or deodorants. [330]. They are also called 'inhalants' because of the way people use them by inhaling the fumes through the nose or mouth. Most volatile substances are central nervous system depressants which slow down brain activity. Short term effects include; slurred speech, lack of coordination, dizziness, and euphoria [331, 332]. With short lasting effects, users continue to inhale for hours to extend the feelings of intoxication and this long-term use increases the risk of losing consciousness or suffocation [333].

VSU can cause hangover headaches and drowsiness which can last for hours or days. Using volatile substances can also damage the kidneys, liver, heart and lungs, and can cause hearing loss and bone marrow damage [330, 332, 333]. There is also growing acknowledgement that excessive harmful inhalant use can lead to permanent acquired brain injury [334]. Petrol is one of most dangerous volatile substances to sniff, especially when it contains tetraethyl lead (found in leaded petrol and no longer sold in Australia) which can result in long-term health consequences [335]. However, long term abstinence from inhalants may allow recovery of normal brain function [336]. The availability of low aromatic unleaded fuel has reduced petrol sniffing in some communities [337]. The Indigenous Advancement Strategy has provided for the continuation of the rollout of low aromatic fuel and in 2015, legislation changes prohibited the supply and sale of regular unleaded fuel in Katherine and Tennant Creek in the NT and Palm Island in Qld [61].

Extent of VSU use among Aboriginal and Torres Strait Islander people

There are limited data about VSU in Australia as it is not a criminal offence and the data collected do not always include Indigenous status [338]. It is known that VSU is an issue of concern to Aboriginal and Torres Strait Islander people as well as to non-Indigenous people [339]. Although there has there has been significant progress, particularly in remote Aboriginal communities, in recent years (based on reviews, reports and inquiries conducted over the past three decades which highlight VSU as a critical issue), there is still much to be done [337, 340-345].

A study of petrol sniffing in 41 Aboriginal and Torres Strait Islander communities found that the number of people sniffing petrol decreased by 29% from 298 in 2011-12 to 204 in 2013-14 [337]. Since 2005, an overall decline in reported use for 17 of these communities for which there are comparable data, shows that the total number of people sniffing petrol has fallen, from 647 in 2005-06 to 78 in 2013-14, a reduction of 88%. This decrease in prevalence of sniffing has been associated with the replacement of regular unleaded petrol with low aromatic fuel (LAF).

The 2012-2013 AATSIHS reported that 6.6% of males and 4.2% of females had ever used petrol or other inhalants [88].

Hospitalisation

In 2014-15 the rate of hospital separations for Aboriginal and Torres Strait Islander people from poisoning and accidental poisoning due to the toxic effect of organic solvents (eg petrol) was 0.04 per 1,000 for both. Aboriginal and Torres Strait Islander people were hospitalised due to the toxic effect of organic solvents at rates 3.9 to 5.1 times the rates for non-Indigenous people [8].

The rate of hospital separations due to mental/behavioural disorders from use of volatile substances was 0.05 per 1,000 which was which was 9.2 times the rate for non-Indigenous people (0.5 per 100,000) [8].

Mortality

The systematic collection of VSU associated mortality data is very limited due to the practice of listing the medical explanation for death rather than the use of volatile substances as a cause [346]. For example, the death of a chronic petrol sniffer may be recorded as 'end stage renal failure', not 'petrol sniffing'. This practice has most likely resulted in VSU mortality and morbidity rates being underestimated.

Early research using a combination of coronial and government reports, community death registers and personal communication identified 37 petrol sniffing deaths between 1998 and 2003 in Australia with the main reported causes of death being respiratory failure/asphyxia and suicide [338, 347, 348].

Concluding comments

Since the publication of our previous Overview (2017), the momentum for continued change in the way we tackle the health issues facing Aboriginal and Torres Strait Islander people has mounted. The Uluru Statement from the Heart reinforced the critical importance Aboriginal and Torres Strait Islander stewardship and participation in framing the political agenda that guides health policy and practice [349]. The data sovereignty movement too has emphasised the centrality of local data guiding local solutions [350]. The narrative has irrevocably changed from deficit to strengths based. The strengths lie in culture, kinship, country, leadership and governance. The light now shines more brightly on exemplars of best practice in health service delivery and less on the 5 Ds of disparity, deprivation, disadvantage, dysfunction and difference [107]. However, none of the leading commentators suggest for a moment that we should ignore the self-evident truths of the many disadvantageous comparisons of Aboriginal and Torres Start Islander people to non-Indigenous people. Rather they argue for greater balance in reportage, leading to a more positive and productive pathway forward. In this edition of our Overview, we have continued our development towards a better understanding and appreciation of strengths based approaches to reporting the health and wellbeing of Aboriginal and Torres Strait islander people and communities. As part of this, we have heard the voices of key Aboriginal and Torres Strait Islander leaders and their determination to honour the principles of data sovereignty and governance [106]. While there have been significant and important improvements in the quality of data pertaining to Aboriginal people, we still have some way to go [350]. We included a box in this Overview showcasing the work of Yap and Yu [109] and exploring the Yawuru concept of social and emotional wellbeing. We have also established a data sovereignty page on our web resource (healthinfonet.ecu.edu.au/learn/cultural-ways/data-sovereignty/). As the section develops, we will present emerging best practice examples in data sovereignty and governance. We are determined to play an active, indeed proactive, role supporting data sovereignty initiatives in pursuit of local level data to support local level solutions [350].

While the political debate continues there is considerable bipartisan support from the major political parties to change the conversation to embrace and act in support of the aspirations of Aboriginal and Torres Strait Islander people throughout Australia. The Uluru Statement speaks evocatively, eloquently and passionately on behalf of Aboriginal and Torres Strait Islander people to this crucial national imperative [109].

> *'This is the torment of our powerlessness. We seek constitutional reform to empower our people and take a rightful place in our own country.*
>
> *When we have power over our destiny our children will flourish. They will walk in two worlds and their culture will be a gift to their country.'*

Appendix 1

Limitations of the sources of Aboriginal and Torres Strait Islander health information

The assessment of Aboriginal and Torres Strait Islander people's health status requires accurate information about the size of the population and the numbers of specific health conditions/occurrences. This information is required at national, regional, and local levels.

There have been improvements in recent years - both in estimates of the Indigenous population (the denominator for calculation of rates) and in the availability of data for a number of health conditions/occurrences (the numerators for calculating rates) - but there is still some uncertainty in most areas.

In relation to population estimates, the ABS has made considerable efforts to achieve accurate counts of the Aboriginal and Torres Strait Islander population in the five-yearly Australian censuses [351]. Despite these efforts, there are impacts on data quality such as non-responses for identification.

The ABS has also worked for many years with the AIHW and state and territory authorities to improve the accuracy of Indigenous status in a number of health-related collections, including birth and death registrations, hospital administrative data, and the maternal/perinatal collection. Some attention has also been directed to the data collections related to communicable diseases, cancer, and to a number of other disease-specific collections.

A persistent problem, however, is the extent to which Aboriginal and Torres Strait Islander people are correctly identified in the various health-related data collections. In death registrations, for example, not all Aboriginal and Torres Strait Islander deaths are correctly identified as such [352]. Due to concerns about the mortality rates of Aboriginal and Torres Strait Islander people relative to the total population, there has been ongoing data integration to investigate the quality of the data using health and death records by several state and territory government departments.

Estimating the proportions of deaths identified correctly is not simple, so it is difficult to estimate the actual number of Indigenous deaths occurring and the corresponding rates. The ABS uses estimates of the proportions of registered deaths correctly identified as Indigenous in preparing its life tables, the source of life expectancy figures.

The Indigenous Mortality Project involved linking death registrations with 2011 Census records with the aim to assess the consistency of Indigenous status across the two datasets [353]. It was estimated that the Australia-wide rate of Indigenous identification in deaths notifications was 62%. For the jurisdictions for which results could be reported, the NT had the highest rate of consistent reporting (95%) and Vic had the lowest rate (29%). In relation to age-groups, the lowest rate of consistent identification was for people over the age of 70 years (50%). Consistent identification of Indigenous status for both the Census and death registrations was lowest in major cities (44%) and highest in remote areas (92%). The ABS has estimated that the proportion of Indigenous births identified correctly was 96% in 2002-2006, a significant improvement over the level for previous years [354]. Completeness of identification varied across the country, with only Vic, Qld, WA, SA and the NT having levels above 90%.

The National Perinatal Data Collection provides data on pregnancy and childbirth; prior to 2011, the Indigenous status of the baby was based on the Indigenous status of the mother, since then, the Indigenous status of the baby has been based on the mother and/or father identifying as being of Aboriginal and/or Torres Strait Islander origin [8]. This means that previously there was an underestimation of Aboriginal and/or Torres Strait Islander births. Indigenous status for around 6% of births is unknown, due to unknown status of the father.

The level of identification in hospital admissions is variable, but overall it has been estimated that 88% of Aboriginal and Torres Strait Islander patients were correctly identified in Australian public hospital admission records in 2011-12 [355]. The accuracy of the identification of Indigenous people varied between states and territories, from 98% in the NT to 58% in the ACT. The accuracy of identification also varied with remoteness level, from 99% in very remote areas to 77% in major cities. Another limitation is that all hospitalisation data for the NT include only public hospitals [41].

The levels of Aboriginal and Torres Strait Islander people's identification in many of the other health-related data collections are generally so incomplete as to preclude reasonably accurate estimates. With these uncertainties, there must be some doubt about the precision of the various estimates of health status. The differences between Aboriginal and Torres Strait Islander people and non-Indigenous people in the levels of most of these estimates are so great, however, that the slight imprecision in some estimates is of little practical importance.

Despite the important advances that have been made in recent years in both the extent and quality of information about the health of Aboriginal and Torres Strait Islander people, there is substantial scope for further improvement. For example:

- There are deficiencies in the information available for some important areas. Probably the best example is cancer, the second most common cause of death among Aboriginal and Torres Strait Islander people. The AIHW's *Cancer in Australia: an overview 2014* acknowledges that national data on cancer incidence and mortality among Aboriginal and Torres Strait Islander people are not available and Indigenous-specific information about screening is only collected for breast cancer and not for cervical and bowel cancer [356].
- Special reports related to Aboriginal and Torres Strait Islander health (see the *Sources of information* section) tend to be selective rather than comprehensive in their coverage of the various health topics.
- The time periods for which detailed information is available tend to vary substantially; this means that documents like this *Overview* need to draw on information from various time periods in attempting to compile a comprehensive picture.
- Important data sources, particularly major national surveys, are generally only conducted around every five years; this is inevitable, but it means that relevant information is often quite dated.
- Changes in aspects like methodology and levels of reporting in publications pose difficulties in the analysis and synthesis of information for periods of time and for comparisons.

Glossary

Aboriginal and Torres Strait Islander
people who identify themselves as being of Aboriginal and/or Torres Strait Islander origin. See also **Indigenous**

age-adjustment or age-adjusted
see **age-standardisation**

age-specific rate
an estimate of the number of people experiencing a particular event in a specified age-group relative to the total number of people 'at risk' of that event in that age-group

age-specific death rate
the number of deaths of persons of a specific age-group in a calendar year per 1,000 persons of the same age-group. For the purposes of this report the age-specific death rate is calculated per 100,000 persons of the same age-group so the rate can be expressed as a whole number

age-specific fertility rate
the number of live births to women in a specified age-group in one year per 1,000 women in the same age-group

age-standardisation
a method of removing the influence of age when comparing populations with different age structures. This is necessary because the rates of many diseases increase with age. The age structures of the different populations are converted to the same 'standard' structure; then the disease rates that would have occurred with that structure are calculated and compared. See **direct standardisation** and **indirect standardisation**

avoidable mortality
a death that, theoretically, could have been avoided given an understanding of causation, the adoption of available disease prevention initiatives and the use of available health care

biomedical data
data collected from the results of blood and urine testing

body mass index (BMI)
a measure calculated by dividing weight in kilograms by height in metres squared, and which categorises a person as ranging from underweight to obese: underweight (BMI: <18.5); normal (BMI: 18.5-24.9); overweight (BMI: 25.0-29.9); obese (BMI: 30.0+)

burden of disease (and injury)
the quantified impact of a disease or injury on a population using the **disability-adjusted life year** measure

cause of death
as entered on the medical certificate of cause of death – refers to all diseases, morbid conditions or injuries that either resulted in or contributed to death

crude rate
the number of new cases (crude incidence rate) or deaths (crude death rate) due to a disease in the total population that could be affected, without considering age or other factors

disability-adjusted life year
a year of healthy life lost, either through premature death or living with disability due to illness or injury

direct standardisation
the procedure for adjusting rates in which the specific rates for a study population are averaged using as weights the distribution of a standard population. This form of standardisation is used when the populations under study are large and the age-specific rates are reliable

excess deaths
the difference between the actual number of deaths occurring and the number expected from rates for the comparable population (the population used for comparison is most often the total Australian population or the total for the specific jurisdictions being considered)

expectation of life
predicted number of years of life remaining to a person if the present pattern of mortality does not change. It is a statistical abstraction based on current age-specific death rates

fatal burden
the burden of dying prematurely from a disease or injury as measured by **years of life lost**. It offers a way to compare the impact of different diseases, conditions or injuries on a population. See **non-fatal burden**

fertility rate
see **age-specific fertility rate** and **total fertility rate**

hospitalisation
an episode of admitted patient care, which can be either a patient's total stay in hospital (from admission to discharge, transfer or death), or part of a patient's stay in hospital that results in a change to the type of care (for example, from acute care to rehabilitation)

hospital separation
see **hospitalisation**. Also, the formal process by which a hospital records the completion of treatment and/or care for an admitted patient

hospital separation rate
the total number of episodes of care for admitted patients divided by the total number of persons in the population under study. Often presented as a rate per 1,000 or 100,000 members of a population. Rates may be crude or standardised

incidence
the number of instances of illness commencing, or of persons falling ill, during a given period in a specified population

incidence rate
the number of instances of illness commencing, or of persons falling ill, during a given period in a specified population divided by the population at risk

Indigenous
term used to refer collectively to the two Indigenous sub-populations within Australia – Australian Aboriginal and Torres Strait Islander people

indirect standardisation
the procedure for adjusting rates in which the specific rates in a standard population are averaged using as weights the distribution of the study population. This form of standardisation is used when the populations under study are small and the age-specific rates are unreliable or not known

infant mortality
the death of a live-born child who dies before reaching his/her first birthday

infant mortality rate
the number of deaths of children under one year of age in a specified period per 1,000 live births in the same period

International Classification of Disease
World Health Organization's internationally accepted classification of death and disease. The ICD-10-AM (Australian modification) was introduced in hospitals and other healthcare agencies in 1999 to report morbidity data

life expectancy
see **expectation of life**

maternal mortality
pregnancy-related deaths occurring to women during pregnancy or up to 42 days after delivery

maternal mortality ratio
number of maternal deaths divided by the number of confinements (expressed in 100,000s)

median age at death
the age above and below which 50% of deaths occurred

morbidity
state of being diseased or otherwise unwell

mortality
death

mortality gap
calculated as the difference between two or more populations in potential years of life lost due to premature death

non-fatal burden
the burden from living with ill health, as measured by **years lived with disability**

non-Indigenous
a person who does not identify as Aboriginal and/or Torres Strait Islander

other Australians
includes people who did not identify as being of Aboriginal and/or Torres Strait Islander origin, and people for whom information on their Indigenous status is not available

potentially preventable hospitalisations
hospital separations from a specified range of conditions where hospitalisation is considered to be largely preventable if timely and adequate care had been provided through population health services, primary care and outpatient services

prevalence
the number of instances of a given disease or other condition in a given population at a designated time

rate
one number (the numerator) divided by another number (the denominator). The numerator is commonly the number of events in a specified time. The denominator is the population at risk of the event. Rates (crude, age-specific and age-standardised) are generally multiplied by a number such as 100,000 to create whole numbers

rate ratio
the rate for one population (example, Aboriginal and Torres Strait Islander) divided by the rate for another population (example, non-Indigenous population)

risk factor
an attribute or exposure that is associated with an increased probability of a specified outcome, such as the occurrence of a disease. A risk factor is not necessarily a causal factor

self-reported data
data based on how an individual perceives their own health. It relies on survey participants being aware, and accurately reporting, their health status and health conditions, which is not as accurate as data based on clinical records or measured data

standardised mortality ratio
the ratio of the observed number of deaths in a study population to the number expected if the study population had the same age-specific rates as a standard population. The standardised mortality ratio is expressed sometimes as the ratio multiplied by 100.
See **age-standardisation**

standardised rate
the number of new cases (standardised incidence rate) or deaths (standardised death rate) due to a disease for a particular population after adjustment has been made for differences in the age structures of this population and a reference population.
See **age-standardisation**

total fertility rate
the number of live births a woman would have if, throughout her reproductive years, she had children at the rates prevailing in the reference calendar year. It is the sum of the **age-specific fertility** rates for that calendar year

years lived with disability
measures the years of what could have been a healthy life that were instead spent in states of less than full health. Years lived with disability represent **non-fatal burden**

years of life lost
measures years of life lost due to premature death, defined as dying before the ideal lifespan (based on the lowest observed death rates from multiple countries). Years of life lost represent **fatal burden**

Abbreviations

AATSIHS - Australian Aboriginal and Torres Strait Islander Health Survey

ABS - Australian Bureau of Statistics

ACIR - Australian Childhood Immunisation Register

ACT - Australian Capital Territory

AHMAC - Australian Health Ministers' Advisory Council

AIDS - Acquired immune deficiency syndrome

AIHW - Australian Institute of Health and Welfare

ANZDATA - Australia and New Zealand Dialysis and Transplant Registry

AOM - Acute otitis media

APEG - Australasian Paediatric Endocrine Group

ARF - Acute rheumatic fever

AR-DRG - Australian Refined Diagnosis Related Group

BCG - Bacille Chalmette-Guerin

BEACH - Bettering the Evaluation and Care of Health

BMI - Body mass index

CHD - Coronary heart disease

CKD - Chronic kidney disease

COAG - Council of Australian Governments

COPD - Chronic obstructive pulmonary disease

CSOM - Chronic suppurative otitis media

CVD - Cardiovascular disease

DALY - Disability-adjusted life year

DMFT/dmft - Decayed missing and filled teeth

DNA - Deoxyribonucleic acid

DSM - Diagnostic and statistical manual of mental disorders

DTP - Diphtheria, tetanus, and pertussis

ENT - Ear, nose, throat

ERP - Estimated resident population

ESRD - End-stage renal disease

FASD - Fetal alcohol spectrum disorder

GAS - Group A streptococcus

GDM - Gestational diabetes mellitus

GP - General practitioner

GSS - General Social Survey

HAV - Hepatitis A virus

HBV - Hepatitis B virus

HCV - Hepatitis C virus

HD - Haemodialysis

HDL - High density lipoprotein

Hib - *Haemophilus influenzae* type b

HILDA - Household Income and Labour Dynamics in Australia

HIV - Human immunodeficiency virus

HPV - Human papilloma virus

ICD - International Classification of Diseases - the World Health Organization›s internationally accepted classification of death and disease

IFG - Impaired fasting glycemia

IMR - Infant mortality rate

IPD - Invasive pneumococcal disease

LBW - Low birthweight

MMR - Maternal mortality ratio

MMR - Measles, mumps, rubella

NAGATSIHID - National Advisory Group on Aboriginal and Torres Strait Islander Health Information and Data

NCIRS - National Centre for Immunisation Research & Surveillance

NATSIHMS - National Aboriginal and Torres Strait Islander Health Measures Survey

NATSIHS - National Aboriginal and Torres Strait Islander Health Survey

NATSINPAS - National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey

NATSISS - National Aboriginal and Torres Strait Islander Social Survey

NDA - National Disability Agreement

NDR - National (insulin-treated) Diabetes Register

NDSS - National diabetes services scheme

NDSHS - National Drug Strategy Household Survey

NEHS - National Eye Health Survey

NHMRC - National Health and Medical Research Council

NIP - National Immunisation Program

NNDSS - National Notifiable Diseases Surveillance System

NSAOH - National Survey of Adult Oral Health

NSW - New South Wales

NT - Northern Territory

OM - Otitis media

OME - Otitis media with effusion

PD - Peritoneal dialysis

Qld - Queensland

RHD - Rheumatic heart disease

SA - South Australia

SCRGSP - Steering Committee for the Review of Government Service Provision

SDAC - Survey of Disability, Ageing and Carers

SEWB - Social and emotional wellbeing

SIDS - Sudden infant death syndrome

SMR - Standardised mortality ratio

STI - Sexually transmitted infection

Tas - Tasmania

TB - Tuberculosis

UV - Ultraviolet

VI - Visual Impairment

Vic - Victoria

VSU - Volatile substance use

WA - Western Australia

WAACHS - Western Australian Aboriginal Child Health Survey

WC - Waist circumference

WHO - World Health Organization

WHR - Waist to hip ratio

References

1. Australian Institute of Health and Welfare (2015) *The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2015.* (AIHW Catalogue no IHW 147) Canberra: Australian Institute of Health and Welfare
2. Malaspinas A, Westaway MC, Muller C, Sousa VC, Lao O, Alves I, Bergström A, Athanasiadis G, Cheng JY, Crawford JE, Heupink TH, Macholdt E, Peischl S, Rasmussen S, Schiffels S, Subramanian S, Wright JL, Albrechtsen A, Barbieri C, Dupanloup I, Eriksson A, Margaryan A, Moltke I, Pugach I, Korneliussen TS, Levkivskyi IP, Moreno-Mayar JV, Ni S, Racimo F, Sikora M, Xue Y, Aghakhanian FA, Brucato N, Brunak S, Campos PF, Clark W, Ellingvåg S, Fourmile G, Gerbault P, Injie D, Koki G, Leavesley M, Logan B, Lynch A, Matisoo-Smith EA, McAllister PJ, Mentzer AJ, Metspalu M, Migliano AB, Murgha L, Phipps ME, Pomat W, Reynolds D, Ricaut F, Siba P, Thomas MG, Wales T, Wall CM, Oppenheimer SJ, Tyler-Smith C, Durbin R, Dortch J, Manica A, Schierup MH, Foley RA, Lahr MM, Bowern C, Wall JD, Mailund T, Stoneking M, Nielsen R, Sandhu MS, Excoffier L, Lambert DM, Willerslev E (2016) A genomic history of Aboriginal Australia. *Nature*;538(7624):207-214
3. Dudgeon P, Wright M, Paradies Y, Garvey D, Walker I (2014) Aboriginal social, cultural and historical contexts. In: Dudgeon P, Milroy H, Walker R, eds. *Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice.* 2nd ed. Canberra: Department of The Prime Minister and Cabinet:3-24
4. Hamm G, Mitchell P, Arnold L, Prideaux GJ, Questiaux D, Spooner NA, Levchenko VA, Foley EC, Worthy TH, Stephenson B, Coulthard V, Coulthard C, Wilton S, Johnston D (2016) Cultural innovation and megafauna interaction in the early settlement of arid Australia. *Nature*;539(7628):280-283
5. NSW Department of Health (2004) *Communicating positively: a guide to appropriate Aboriginal terminology.* Sydney: NSW Department of Health
6. Zubrick SR, Shepherd CCJ, Dudgeon P, Gee G, Paradies Y, Scrine C, Walker R (2014) Social determinants of social and emotional wellbeing. In: Dudgeon P, Milroy H, Walker R, eds. *Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice*. 2nd edition ed. Canberra: Department of The Prime Minister and Cabinet:93-112 (chapter 6)
7. Gee G, Dudgeon P, Schultz C, Hart A, Kelly K (2014) Aboriginal and Torres Strait Islander social and emotional wellbeing. In: Dudgeon P, Milroy H, Walker R, eds. *Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice.* 2nd ed. Canberra: Department of The Prime Minister and Cabinet:55-68
8. Steering Committee for the Review of Government Service Provision (2016) *Overcoming Indigenous disadvantage: key indicators 2016 report*. Canberra: Productivity Commission
9. Parliament of Australia (2016) *Indigenous parliamentarians, federal and state: a quick guide.* Retrieved 19 October 2016 from https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1718/Quick_Guides/IndigenousParliamentarians
10. Davis M (2013) Community control and the work of the National Aboriginal Community Controlled Health Organisation: putting meat on the bones of the 'UNDRIP'. *Indigenous Law Bulletin*;8(7):11-14
11. National Congress of Australia's First Peoples (2016) *The Redfern statement: Aboriginal and Torres Strait Islander peak organisations unite*. Sydney: National Congress of Australia's First Peoples
12. Australian Department of Health and Ageing (2013) *National Aboriginal and Torres Strait Islander Health Plan 2013-2023*. Canberra: Australian Department of Health and Ageing
13. Australian Bureau of Statistics (2017) *Census of population and housing: reflecting Australia - stories from the Census, 2016: Aboriginal and Torres Strait Islander population*. Retrieved 28 June 2017 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2071.02016?OpenDocument
14. Australian Bureau of Statistics (2017) *Schools, Australia, 2016.* (ABS Catalogue no. 4221.0) Canberra: Australian Bureau of Statistics
15. Australian Curriculum Assessment and Reporting Authority (2017) *National Assessment Program - Literacy and Numeracy: achievement in reading, writing, language conventions and numeracy: national report for 2017.* Sydney: Australian Curriculum Assessment and Reporting Authority
16. Australian Bureau of Statistics (2012) *Census of population and housing: characteristics of Aboriginal and Torres Strait Islander Australians, 2011.* (ABS Catalogue no 2076.0) Canberra: Australian Bureau of Statistics
17. Australian Bureau of Statistics (2017) *Census of population and housing - counts of Aboriginal and Torres Strait Islander Australians, 2016.* Canberra: Australian Bureau of Statistics
18. Australian Bureau of Statistics (2017) *Australian demographic statistics, September quarter 2017.* (3101.0) Canberra: Australian Bureau of Statistics

19. Australian Bureau of Statistics (2014) *Estimates and projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026.* (ABS Catalogue no.3238.0) Canberra: Australian Bureau of Statistics

20. Australian Bureau of Statistics (2013) *Population projections, Australia, 2012 (base) to 2101.* (ABS Catalogue no 3222.0) Canberra: Australian Bureau of Statistics

21. Australian Bureau of Statistics (2017) *2016 Census community profiles: Aboriginal and Torres Strait Islander peoples profile.* Retrieved 23 October 2017 from http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument

22. Eldridge D, Sedgwick K, Cotter D (2017) *Australia's mothers and babies 2015: in brief.* Canberra: Australian Institute of Health and Welfare

23. Australian Bureau of Satistics (2017) *Births, Australia, 2016.* Retrieved 13 December 2017 from http://www.abs.gov.au/ausstats/abs@.nsf/mf/3301.0

24. Australian Department of Health (2012) *Clinical Practice Guidelines: Antenatal Care - Module I.* Canberra: Australian Department of Health

25. Brown S, Glover K, Weetra D, Ah Kit J, Stuart-Butler D, Leane C, Turner M, Gartland D, Yelland J (2016) Improving access to antenatal care for Aboriginal women in South Australia: evidence from a population-based study. *Birth*;43(2):134-143

26. Australian Institute of Health and Welfare (2014) *Birthweight of babies born to Indigenous mothers.* (AIHW Catalogue no IHW 138) Canberra: Australian Institute of Health and Welfare

27. Australian Health Ministers' Advisory Council (2017) *Aboriginal and Torres Strait Islander Health Performance Framework 2017 report.* Canberra: Department of the Prime Minster and Cabinet

28. Australian Bureau of Statistics (2017) *Deaths, Australia, 2016*. Retrieved 27 September 2017 from http://www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0?OpenDocument

29. Australian Bureau of Statistics (2013) *Life tables for Aboriginal and Torres Strait Islander Australians, 2010-2012.* (ABS Cat. no. 3302.0.55.003) Canberra: Australian Bureau of Statistics

30. Australian Institute of Health and Welfare (2011) *Principles on the use of direct age-standardisation in administrative data collections: for measuring the gap between Indigenous and non-Indigenous Australians.* (AIHW Catalogue no CSI 12) Canberra: Australian Institute of Health and Welfare

31. Coleman C, Fortune N, Lee V, Griffiths K, Madden R (2015) *Aboriginal and Torres Strait Islander life expectancy and mortality trend reporting.* Sydney: Sydney Centre for Aboriginal and Torres Strait Islander Statistics

32. Australian Bureau of Statistics (2017) *Causes of death, Australia, 2016.* Retrieved 27 September 2017 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/47E19CA15036B04BCA2577570014668B?opendocument

33. Humphrey MD, Bonello MR, Chughtai A, Macaldowie A, Harris K, Chambers GM (2015) *Maternal deaths in Australia 2008-2012.* (AIHW Catalogue no PER 70, maternal deaths series no 5) Canberra: Australian Institute of Health and Welfare

34. Laws PJ, Li Z, Sullivan EA (2010) *Australia's mothers and babies 2008.* (Perinatal statistics series no. 24. Cat. no. PER 50) Canberra: Australian Institute of Health and Welfare

35. Li Z, McNally L, Hilder L, Sullivan EA (2011) *Australia's mothers and babies 2009.* (AIHW Catalogue no PER 52) Canberra: Australian Institute of Health and Welfare

36. Li Z, Zeki R, Hilder L, Sullivan EA (2012) *Australia's mothers and babies 2010.* (AIHW Catalogue no PER 57, perinatal statistics series no 27) Canberra: Australian Institute of Health and Welfare

37. Li Z, Zeki R, Hilder L, Sullivan EA (2013) *Australia's mothers and babies 2011.* (AIHW Catalogue no PER 59, perinatal statistics series no 28) Canberra: Australian Institute of Health and Welfare

38. Hilder L, Zhichao Z, Parker M, Jahan S, Chambers GM (2014) *Australia's mothers and babies 2012.* (AIHW Catalogue no PER 69, perinatal statistics series no 30) Canberra: Australian Institute of Health and Welfare

39. Page A, Tobias M, Glover J, Wright C, Hetzel D, Fisher E (2006) *Australian and New Zealand atlas of avoidable mortality.* Adelaide: Public Health Information Development Unit, University of Adelaide

40. Thomson N, Ali M (2003) Births, deaths, and hospitalisation. In: Thomson N, ed. *The health of Indigenous Australians.* South Melbourne: Oxford University Press:44-74

41. Burgess K, Christian L, McIntyre J, Mole T (2017) *Admitted patient care 2015-16: Australian hospital statistics.* Canberra: Australian Institute of Health and Welfare

42. Clinical Epidemiology and Health Service Evaluation Unit (2009) *Potentially preventable hospitalisations: a review of the literature and Australian policies: final report.* Sydney: Australian Commission on Safety and Quality in Health Care

43. Baker IDI (2012) *Cardiovascular disease.* Retrieved 2012 from https://www.baker.edu.au/health-hub/fact-sheets/cardiovascular-disease

44. World Health Organization (2016) *International Statistical Classification of Diseases and Related Health Problems 10th Revision.* Retrieved 2016 from http://apps.who.int/classifications/icd10/browse/2016/en#/XIX

45. Australian Institute of Health and Welfare (2016) *Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011.* (Australian Burden of Disease Study series no. 6, Cat no. BOD 7) Canberra: Australian Institute of Health and Welfare

46. World Heart Federation (2012) *Cardiovascular disease risk factors.* Retrieved 2012 from http://www.world-heart-federation.org/cardiovascular-health/cardiovascular-disease-risk-factors/

47. Australian Institute of Health and Welfare (2015) *Cardiovascular disease, diabetes and chronic kidney disease - Australian facts: risk factors.* (AIHW Catalogue no CDK 004, cardiovascular, diabetes and chronic kidney disease series no 4) Canberra: Australian Institute of Health and Welfare

48. Rémond MGW, Stewart S, Carrington MJ, Marwick TH, Kingwell BA, Meikle P, O'Brien D, Marshall NS, Maguire GP (2017) Better Indigenous Risk stratification for Cardiac Health study (BIRCH) protocol: rationale and design of a cross-sectional and prospective cohort study to identify novel cardiovascular risk indicators in Aboriginal Australian and Torres Strait Islander adults. *BMC Cardiovascular Disorders* 17.

49. Australian Institute of Health and Welfare (2013) *Rheumatic heart disease and acute rheumatic fever in Australia: 1996-2012.* (AIHW Catalogue no CVD 60, cardiovascular disease series no 36) Canberra: Australian Institute of Health and Welfare

50. Rheumatic Heart Disease Australia, National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand (2012) *The Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease: 2nd edition.* Darwin: Menzies School of Health Research

51. Maguire GP, Carapetis JR, Walsh WF, Brown ADH (2012) The future of acute rheumatic fever and rheumatic heart disease in Australia [editorial]. *Medical Journal of Australia*;197(3):133-134

52. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012–13.* (ABS Catalogue no. 4727.0.55.006) Canberra: Australian Bureau of Statistics

53. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13 - Australia: table 21.3 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500621.xls&4727.0.55.006&Data%20Cubes&166861F2585F8D85CA257CEE0010DAE7&0&2012%9613&06.06.2014&Latest

54. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13 - Australia: table 5.3 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500605.xls&4727.0.55.006&Data%20Cubes&A95A701E3429A625CA257CEE0010D780&0&2012%9613&06.06.2014&Latest

55. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13 - Australia: table 6.3 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500606.xls&4727.0.55.006&Data%20Cubes&7F2DBD07A515E7A2CA257CEE0010D7BF&0&2012%9613&06.06.2014&Latest

56. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13 - Australia: table 2.3 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500602.xls&4727.0.55.006&Data%20Cubes&A0A5C6AE5F15C5DECA257CEE0010D6DC&0&2012%9613&06.06.2014&Latest

57. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: biomedical results, 2012-13.* (ABS Catalogue no 4727.0.55.003) Canberra: Australian Bureau of Statistics

58. Foreman J, Keel S, Xie J, van Wijngaarden P, Crowston J, Taylor HR, Dirani M (2016) *The National Eye Health Survey 2016 report.* Melbourne: Vision 2020 Australia

59. Keel S, Foreman J, Xie J, Taylor HR, Dirani M (2017) The prevalence of self-reported stroke in the Australian National Eye Health Survey. *Journal of Stroke and Cerebrovascular Diseases*;26(7):1433-1439

60. Australian Institute of Health and Welfare (2016) *Better Cardiac Care measures for Aboriginal and Torres Strait Islander people: second national report 2016.* Canberra: Australian Institute of Health and Welfare

61. Australian Institute of Health and Welfare (2017) *Aboriginal and Torres Strait Islander Health Performance Framework.* Retrieved 30 May 2017 from https://www.aihw.gov.au/reports/indigenous-health-welfare/health-performance-framework/contents/summary

62. Chronic Care for Aboriginal People (2017) *Acute rheumatic fever and rheumatic heart disease in NSW: framework.* Sydney: Agency for Clinical Innovation

63. Public Health Association of Australia (2017) *Communicable Diseases Control Conference 2017: infectious diseases: a global challenge: abstract book.* Melbourne: Public Health Association of Australia

64. Roberts KV, Maguire GP, Brown A, Atkinson DN, Remenyi B, Wheaton G, Ilton M, Carapetis J (2015) Rheumatic heart disease in Indigenous children in northern Australia: differences in prevalence and the challenges of screening. *Medical Journal of Australia*;203(5):221e1-221e7

65. National Cancer Institute (2015) *What is cancer?* Retrieved 2017 from https://www.cancer.gov/about-cancer/understanding/what-is-cancer

66. Cancer Council Australia (2014) *What is cancer?* Retrieved 1 December 2014 from http://www.cancer.org.au/about-cancer/what-is-cancer/

67. Cancer Australia (2015) *National Aboriginal and Torres Strait Islander cancer framework.* Sydney: Cancer Australia

68. Australian Institute of Health and Welfare (2013) *Towards better Indigenous health data.* (AIHW Cat. no. IHW 93) Canberra: Australian Institute of Health and Welfare

69. Australian Institute of Health and Welfare (2018) *Cancer in Aboriginal and Torres Strait Islander people of Australia.* Retrieved 15 March 2018 from https://www.aihw.gov.au/reports/cancer/cancer-in-indigenous-australians/contents/table-of-contents

70. Australian Institute of Health and Welfare (2017) *Cancer in Aboriginal and Torres Strait Islander people of Australia.* Retrieved 29 April 2017 from http://webarchive.nla.gov.au/gov/20170421064119/https://www.aihw.gov.au/cancer/indigenous-australians/

71. Budd A, Tanevska B, Rompotis C, Harvey J (2017) *Cervical screening in Australia 2014-2015.* Canberra: Australian Institute of Health and Welfare

72. Tanevska B, Budd A, Rompotis C, Harvey J (2017) *BreastScreen Australia monitoring report 2014-2015.* Canberra: Australian Institute of Health and Welfare

73. Australian Institute of Health and Welfare (2016) *Cancer in Aboriginal and Torres Strait Islander people of Australia.* Retrieved 15 June 2016 from http://webarchive.nla.gov.au/gov/20160615061103/https://www.aihw.gov.au/cancer/indigenous-australians/

74. Australian Institute of Health and Welfare, Cancer Australia (2013) *Cancer in Aboriginal and Torres Strait Islander peoples of Australia: an overview.* (AIHW Catalogue no CAN 75, cancer series no78) Canberra: Australian Institute of Health and Welfare

75. Cunningham J, Rumbold AR, Zhang X, Condon JR (2008) Incidence, aetiology, and outcomes of cancer in Indigenous peoples in Australia. *The Lancet Oncology*;9(6):585-595

76. Valery PC, Coory M, Stirling J, Green AC (2006) Cancer diagnosis, treatment, and survival in Indigenous and non-Indigenous Australians: a matched cohort study. *The Lancet*;367(9525):1842-1848

77. Moore SP, Green AC, Bray F, Garvey G, Coory M, Martin J, Valery PC (2014) Survival disparities in Australia: an analysis of patterns of care and comorbidities among Indigenous and non-Indigenous cancer patients. *BMC Cancer* 14.

78. Goodwin M (2017) *Burden of cancer in Australia: Australian Burden of Disease Study 2011.* Canberra: Australian Institute of Health and Welfare

79. Australian Institute of Health and Welfare (2016) *Australia's health 2016.* Canberra: Australian Institute of Health and Welfare

80. Australian Institute of Health and Welfare (2015) *Cardiovascular disease, diabetes and chronic kidney disease - Australian facts: Aboriginal and Torres Strait Islander people.* Canberra: Australian Institute of Health and Welfare

81. Australian Institute of Health and Welfare (2009) *Insulin-treated diabetes in Australia 2000–2007.* (AIHW Catalogue no. CVD 45) Canberra: Australian Institute of Health and Welfare

82. Australian Institute of Health and Welfare (2010) *Diabetes in pregnancy: its impact on Australian women and their babies.* (AIHW Catalogue no CVD 52, diabetes series no. 14) Canberra: Australian Institute of Health and Welfare

83. Australian Institute of Health and Welfare (2011) *Prevalence of Type 1 diabetes in Australian children, 2008.* (AIHW Catalogue no CVD 54, Diabetes series no.15) Canberra: Australian Institute of Health and Welfare

84. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: biomedical results, 2012-13 - Australia: table 6.3 [data cube].* Retrieved 10 September 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&4727.0.55.003_6.xls&4727.0.55.003&Data%20Cubes&F653985C855EA253CA257D4E00170316&0&2012-13&10.09.2014&Latest

85. Australian Institute of Health and Welfare (2018) *Incidence of insulin-treated diabetes in Australia.* Retrieved 29 January 2018 from https://www.aihw.gov.au/reports/diabetes/incidence-insulin-treated-diabetes-australia-2016/contents/introduction

86. Australian Institute of Health and Welfare (2014) *Type 2 diabetes in Australia's children and young people: a working paper.* (AIHW Catalogue no CVD 64, diabetes series no 21) Canberra: Australian Institute of Health and Welfare

87. Australian Institute of Health and Welfare (2014) *Incidence of insulin-treated diabetes in Australia 2000-2011.* (AIHW Catalogue no CVD 66, diabetes series no 22) Canberra: Australian Institute of Health and Welfare

88. Australian Institute of Health and Welfare (2015) *Aboriginal and Torres Strait Islander health performance framework 2014 report: detailed analyses.* (AIHW Cat. no. IHW 167) Canberra: Australian Institute of Health and Welfare

89. Dudgeon P, Walker R, Scrine C, Shepherd C, Calma T, Ring I (2014) *Effective strategies to strengthen the mental health and wellbeing of Aboriginal and Torres Strait Islander people.* (Issues paper no 12) Canberra: Closing the Gap Clearinghouse

90. Sherwood J (2013) Colonisation - it's bad for your health: the context of Aboriginal health. *Contemporary Nurse*;46(1):28-40

91. Parker R, Milroy H (2014) Aboriginal and Torres Strait Islander mental health: an overview. In: Dudgeon P, Milroy H, Walker R, eds. *Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice.* 2nd ed. Canberra: Department of The Prime Minister and Cabinet:25-38

92. World Health Organization (2013) *Mental health action plan 2013 - 2020.* Geneva: World Health Organization

93. World Health Organization (2012) *Risks to mental health: an overview of vulnerabilities and risk factors. Background paper by WHO secretariat for the development of a comprehensive mental health action plan.* Geneva: World Health Organization

94. Department of Health and Ageing (2009) *National mental health policy 2008.* Canberra: Commonwealth of Australia

95. Australian Health Ministers (2003) *National Mental Health Plan 2003-2008.* Canberra: Australian Government

96. Australian Bureau of Statistics (2013) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 7 [data cube].* Canberra: Australian Bureau of Statistics

97. Australian Health Ministers' Advisory Council (2015) *Aboriginal and Torres Strait Islander health performance framework 2014 report.* Canberra: Department of the Prime Minister and Cabinet

98. Australian Bureau of Statistics (2016) *National Aboriginal and Torres Strait Islander Social Survey, 2014-15: Table 14. Stressors, by sex and remoteness [data cube].* Retrieved 28 April 2016 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4714.02014-15?OpenDocument

99. Australian Bureau of Statistics (2016) *National Aboriginal and Torres Strait Islander Social Survey, 2014-15: Table 19. Selected wellbeing indicators, by long-term health conditions [data cube].* Retrieved 28 April 2016 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4714.02014-15?OpenDocument

100. Steering Committee for the Review of Government Service Provision (2014) *Overcoming Indigenous disadvantage: key indicators 2014.* Canberra: Productivity Commission

101. Australian Bureau of Statistics (2016) *National Aboriginal and Torres Strait Islander Social Survey, 2014-15: Table 17. Overall life satisfaction, by selected characteristics [data cube].* Retrieved 28 April 2016 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4714.02014-15?OpenDocument

102. Australian Bureau of Statistics (2009) *National Aboriginal and Torres Strait Islander social survey, 2008.* Retrieved 11 April 2011 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/357509A09C098E90CA257FA200272E0B?opendocument

103. Australian Bureau of Statistics (2015) *General social survey: summary results, Australia, 2014.* Retrieved 29 June 2015 from http://www.abs.gov.au/ausstats/abs@.nsf/mf/4159.0

104. Footprints in Time (2015) *Footprints in Time: the longitudinal study of Indigenous children: report from Wave 5: Part A - wave 5 update: family life.* Canberra: Department of Social Services

105. McHugh C, Campbell A, Chapman M, Balaratnasingam S (2016) Increasing Indigenous self-harm and suicide in the Kimberley: an audit of the 2005–2014 data. *Medical Journal of Australia;*205(1):33

106. Kukutai T, Taylor J, eds. (2016) *Indigenous data sovereignty: toward an agenda.* Canberra: ANU Press

107. Walter M (2016) Data politics and Indigenous representation in Australian statistics. In: Kukutai T, Taylor J, eds. *Indigenous data sovereignty: toward an agenda.* Canberra: ANU Press:79-97

108. Walter M (2017) *Indigenous Data Sovereignty: our data, our priorities, our way.* Presented at Indigenous Data Sovereignty Symposium 11-12 October 2017, Melbourne

109. Yap M, Yu E (2016) Operationalising the capability approach: developing culturally relevant indicators of Indigenous wellbeing - an Australian example. *Oxford Development Studies*;44(3):315-331

110. Yap M, Yu E (2016) *Community wellbeing from the ground up: a Yawuru example.* (BCEC research report no. 3/16) Perth: Bankwest Curtin Economics Centre

111. Kidney Foundation of Canada (2015) *What is kidney disease?* Retrieved 2015 from http://www.kidney.ca/page.aspx?pid=320

112. Kidney Health Australia (2015) *Chronic kidney disease (CKD) management in general practice*. 3rd ed. Melbourne: Kidney Health Australia

113. Australian Bureau of Statistics, Australian Institute of Health and Welfare (2008) *The health and welfare of Australia's Aboriginal and Torres Strait Islander Peoples 2008.* (ABS Catalogue no. 4704.0 and AIHW Catalogue no. IHW 21) Canberra: Australian Bureau of Statistics and Australian Institute of Health and Welfare

114. Australian Institute of Health and Welfare (2011) *Chronic kidney disease in Aboriginal and Torres Strait Islander people 2011.* (AIHW Catalogue no PHE 151) Canberra: Australian Institute of Health and Welfare

115. Kidney Health Australia (2010) *The economic impact of end-stage kidney disease in Australia - projections to 2020.* Melbourne: Kidney Health Australia

116. Hughes JT, Dembski L, Kerrigan V, Majoni SW, Lawton PD, Cass A (2017) *Indigenous patient voices: gathering perspectives - finding solutions for chronic and end stage kidney disease: 2017 symposium report.* Darwin: Menzies School of Health Research

117. Devitt J, Anderson K, Cunningham J, Preece C, Snelling P, Cass A (2017) Difficult conversations: Australian Indigenous patients' views on kidney transplantation. *BMC Nephrology 18.*

118. Johnson D (2013) *Risk factors for early chronic kidney disease.* Melbourne: Kidney Health Australia

119. Hoy WE, White AV, Tipiloura B, Singh G, Sharma SK, Bloomfield H, Swanson CE, Dowling A, McCredie DA (2015) The multideterminant model of renal disease in a remote Australian Aboriginal population in the context of early life risk factors: lower birth weight, childhood post-streptococcal glomerulonephritis, and current body mass index influence levels of albumi. *Clinical Nephrology*;83(7(Supplement 1)):S75-S81

120. Das SK, Mannan M, Faruque ASG, Ahmed T, McIntyre HD, Al Mamun A (2016) Effect of birth weight on adulthood renal function: a bias-adjusted meta-analytic approach. *Nephrology;*21(7):547-565

121. Australia and New Zealand Dialysis and Transplant Registry, ed. (2017) *The thirty ninth annual Australia and New Zealand Dialysis and Transplant Registry Report 2016.* Adelaide: Australia and New Zealand Dialysis and Transplant Registry

122. Australian Bureau of Statistics (2003) *Australian demographic statistics quarterly: September quarter 2002.* (ABS catalogue no. 3101.0) Canberra: Australian Bureau of Statistics

123. Australian Bureau of Statistics (2014) *Australian demographic statistics, Dec 2013.* Retrieved 19 June 2014 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3101.0Main+Features1Dec%202013?OpenDocument

124. Australian and New Zealand Dialysis and Transplant Registry (2017) *End stage renal disease notifications, by Indigenous status, age, jurisdiction and year [2011 to 2015, unpublished].* Adelaide: Australian and New Zealand Dialysis and Transplant Registry

125. Agar JWM, Hawley CM, George CRP, Mathew TH, McDonald SP, Kerr PG (2010) Home haemodialysis in Australia — is the wheel turning full circle? *Medical Journal of Australia*;192(7):403-406

126. Steering Committee for the Review of Government Service Provision (2017) *Report on government services 2017, volume E: Health.* Canberra: Productivity Commission

127. National Public Health Partnership (2005) *The national Aboriginal and Torres Strait Islander safety promotion strategy.* Canberra: National Public Health Partnership

128. National Public Health Partnership (2005) *The national injury prevention and safety promotion plan: 2004-2014.* Canberra: National Public Health Partnership

129. Clapham K, O'Dea K, Chenhall R (2007) Interventions and sustainable programs. In: Carson B, Dunbar T, Chenhall RD, Bailie R, eds. *Social determinants of Indigenous health.* Crows Nest, NSW: Allen and Unwin:271-295

130. Moller J (1996) Understanding national injury data regarding Aboriginal and Torres Strait Islander peoples. *Australian Injury Prevention Bulletin*;14(December):1-8

131. WHO (2016) *Q&As: injuries.* Retrieved 2016 from http://www.who.int/topics/injuries/qa/en/

132. Australian Institute of Health and Welfare (2016) Australian Burden of Disease Study: impact and causes of illness and death in Australia 2011. Canberra: Australian Institute of Health and Welfare

133. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 6 [data cube].* Retrieved 26 March 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&table%206%20long-term%20conditions%20by%20age%20by%20indigenous%20status,%202012-13%20-%20australia.xls&4727.0.55.001&Data%20Cubes&A9CAFB0F3F64E992CA257CA6000E32B3&0&2012-13&26.03.2014&Latest

134. Australian Bureau of Statistics (2013) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 5 [data cube].* Retrieved 27 November 2013 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&table%205%20long-term%20conditions%20by%20sex%20by%20indigenous%20status,%202012-13%20-%20australia.xls&4727.0.55.001&Data%20Cubes&5C97CE7DA7059C06CA257C2F00145D5A&0&2012-13&27.11.2013&Latest

135. Australian Bureau of Statistics (2016) *National Aboriginal and Torres Strait Islander Social Survey, 2014-15.* Canberra: Australian Bureau of Statistics

136. World Health Organization (2017) *About chronic respiratory diseases.* Retrieved 2017 from http://www.who.int/respiratory/about_topic/en/

137. Australian Institute of Health and Welfare (2005) *Chronic respiratory diseases in Australia: their prevalence, consequences and prevention.* (AIHW Catalogue no PHE 63) Canberra: Australian Institute of Health and Welfare

138. Australian Institute of Health and Welfare (2010) *Asthma, chronic obstructive pulmonary disease and other respiratory diseases in Australia.* (AIHW Catalogue no ACM 20) Canberra: Australian Institute of Health and Welfare

139. Janu EK, Annabattula BI, Kumariah S, Zajaczkowska M, Whitehall JS, Edwards MJ, Lujic S, Masters IB (2014) Paediatric hospitalisations for lower respiratory tract infections in Mount Isa. *Medical Journal of Australia*;200(10):591-594

140. Hall KK, Chang AB, Anderson J, Dunbar M, Arnold D, O'Grady KF (2017) Characteristics and respiratory risk profile of children aged less than 5 years presenting to an urban, Aboriginal-friendly, comprehensive primary health practice in Australia. *Journal of Paediatrics and Child Health*;53(7):636-643

141. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 2 [data cube].* Retrieved 26 March 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&table%202%20selected%20health%20characteristics,%20by%20remoteness%20area%202012-13%20-%20australia.xls&4727.0.55.001&Data%20Cubes&9F3D9B7052520B1BCA257CA6000E31B5&0&2012-13&26.03.2014&Latest

142. Australian Institute of Health and Welfare (2014) *Mortality from asthma and COPD in Australia.* (AIHW Catalogue no ACM 30) Canberra: Australian Institute of Health and Welfare

143. Biotext (2008) *Risk factors for eye disease and injury: literature review.* (Final report) Canberra: National Health and Medical Research Council, Australia

144. Access Economics (2004) *Clear Insight: The economic impact and cost of vision loss in Australia.* Access Economics Pty Limited

145. George Institute for Global Health (2017) *Low vision, quality of life and independence: a review of the evidence on aids and technologies.* Sydney: Macular Disease Foundation Australia

146. Taylor HR, Boudville A, Anjou M, McNeil R (2011) *The roadmap to close the gap for vision: summary report.* Melbourne: Indigenous Eye Health Unit, the University of Melbourne

147. Estevez J, Kaidonis G, Henderson T, Craig JE, Landers J (2017) Association of disease-specific causes of visual impairment and 10-year mortality among Indigenous Australians: the Central Australian Ocular Health Study. *Clinical & Experimental Ophthalmology*;Accepted Articles(https://onlinelibrary.wiley.com/doi/abs/10.1111/ceo.13009

148. Taylor HR, National Indigenous Eye Health Survey Team (2009) *National Indigenous eye health survey: minum barreng (tracking eyes): summary report.* Melbourne: Indigenous Eye Health Unit, The University of Melbourne

149. Australian Department of Health and Ageing, Victorian Department of Human Services (2005) *Eye health in Australia: a background paper to the national framework for action to promote eye health and prevent avoidable blindness and vision loss.* Canberra: Australian Government Department of Health and Ageing

150. Keel S, Xie J, Foreman J, Taylor HR, Dirani M (2017) The prevalence of vision loss due to ocular trauma in the Australian National Eye Health Survey. *Injury*;48(11):2466-2469

151. Australian Institute of Health and Welfare (2017) *Indigenous eye health measures 2016.* Canberra: Australian Institute of Health and Welfare

152. Keel S, Xie J, Foreman J, van Wijngaarden P, Taylor H, ,, Dirani M (2017) The prevalence of diabetic retinopathy in Australian adults with self-reported diabetes: The National Eye Health Survey. *Ophthalmology*;124(7):977-984

153. Foreman J, Xie J, Keel S, van Wijngaarden P, Taylor HR, Dirani M (2017) The validity of self-report of eye diseases in participants with vision loss in the National Eye Health Survey. *Scientific Reports 7.*

154. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 25 [data cube].* Retrieved 26 March 2014 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4727.0.55.0012012-13?OpenDocument

155. The Kirby Institute (2017) *Australian trachoma surveillance report 2016.* Sydney: The Kirby Institute, University of New South Wales

156. Burrow S, Thomson N (2003) Ear disease and hearing loss. In: Thomson N, ed. *The health of Indigenous Australians.* South Melbourne: Oxford University Press:247-272

157. Darwin Otitis Guidelines Group (2010) *Recommendations for clinical care guidelines on the management of otitis media in Aboriginal and Torres Strait Islander populations.* Darwin: Menzies School of Health Research

158. Couzos S, Metcalf S, Murray R (2008) Ear health. In: Couzos S, Murray R, eds. *Aboriginal primary health care: an evidence-based approach*. 3rd ed. South Melbourne: Oxford University Press:308-354

159. Burrow S, Galloway A, Weissofner N (2009) Review of educational and other approaches to hearing loss among Indigenous people. *Australian Indigenous HealthBulletin* 9.

160. Leach A (2016) *Bulging ear drums and hearing loss: Aboriginal kids have the highest otitis media rates in the world.* Retrieved 16 September 2016 from https://theconversation.com/bulging-ear-drums-and-hearing-loss-aboriginal-kids-have-the-highest-otitis-media-rates-in-the-world-64165

161. Wilson B (2014) *A share in the future: the review of Indigenous education in the Northern Territory.* Darwin: Northern Territory Department of Education

162. House of Representatives Standing Committee on Health ACaS (2017) *Still waiting to be heard... report on the Inquiry into the Hearing Health and Wellbeing of Australia.* Canberra: Parliament of Australia

163. Howard D, Barney J (2018) Minced words: the importance of widespread hearing loss as an issue in the mental health of Indigenous Australians. *Australian Indigenous HealthBulletin* 18.

164. Australian Medical Association (2017) *2017 AMA report card on Indigenous health: a national strategic approach to ending chronic otitis media and its life long impacts in Indigenous communities*. Canberra: Australian Medical Association

165. Burns J, Thomson N (2013) *Review of ear health and hearing among Indigenous Australians.* (Australian Indigenous HealthReviews no. 15) Perth, WA: Australian Indigenous HealthInfoNet

166. Senate Community Affairs References Committee (2010) *Hear us: inquiry into hearing health in Australia.* Canberra: Parliament of Australia: Senate

167. Gunasekera H, Morris PS, Daniels J, Couzos S, Craig JC (2009) Otitis media in Aboriginal children: the discordance between burden of illness and access to services in rural/remote and urban Australia. *Journal of Paediatrics and Child Health*;45(7-8):425–430

168. Morris PS, Leach AJ, Silberberg P, Mellon G, Wilson C, Hamilton E, Beissbarth J (2005) Otitis media in young Aboriginal children from remote communities in Northern and Central Australia: a cross-sectional survey. *BMC Pediatrics* 5.

169. WHO/CIBA (2000) *Prevention of hearing impairment from chronic otitis media.* (WHO/PDH/98.4) Geneva: WHO

170. Leach AJ, Wigger C, Andrews R, Chatfield M, Smith-Vaughan H, Morris PS (2014) Otitis media in children vaccinated during consecutive 7-valent or 10-valent pneumococcal conjugate vaccination schedules. *BMC Pediatrics* 14.

171. Leach AJ, Wigger C, Beissbarth J, Woltring D, Andrews R, Chatfield MD, Smith-Vaughan H, Morris PS (2016) General health, otitis media, nasopharyngeal carriage and middle ear microbiology in Northern Territory Aboriginal children vaccinated during consecutive periods of 10-valent or 13-valent pneumococcal conjugate vaccines. *International Journal of Pediatric Otorhinolaryngology*;86:224-232

172. Australian Bureau of Statistics (2013) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13.* (ABS Catalogue no. 4727.0.55.001) Canberra: Australian Bureau of Statistics

173. Tong B, Pan R, Kok B, Penm R, Watson J (2017) *Northern Territory remote Aboriginal investment: Ear and Hearing Health Program - July 2012 to June 2016*. Canberra: Australian Institute of Health and Welfare

174. FDI World Dental Federation (2016) *FDI unveils new universally applicable definition of 'oral health'.* Retrieved 6 September 2016 from http://www.fdiworldental.org/media/press-releases/latest-press-releases/06092016-fdi-unveils-new-universally-applicable-definition-of-%E2%80%98oral-health%E2%80%99.aspx

175. Northern Territory Department of Health (2011) *Healthy smiles: oral health and fluoride varnish information for health professionals.* Darwin: Northern Territory Department of Health

176. Do LG, Spencer AJ, eds. (2016) *Oral health of Australian children: The National Child Oral Health Study 2012-14.* Adelaide: University of Adelaide Press

177. Sheppard C, Tong B, Penm R (2018) *Northern Territory remote Aboriginal investment: Oral Health Program July 2012 to December 2016*. Canberra: Australian Institute of Health and Welfare

178. de Silva AM, Martin-Kerry JM, McKee K, Cole D (2016) Caries and periodontal disease in Indigenous adults in Australia: a case of limited and non-contemporary data. *Australian Health Review*;Online early(http://dx.doi.org/10.1071/AH15229)

179. Schuch HS, Haag DG, Kapellas K, Arantes R, Peres MA, Thomson WM, Jamieson LM (2017) The magnitude of Indigenous and non-Indigenous oral health inequalities in Brazil, New Zealand and Australia. *Community Dentistry and Oral Epidemiology*;45(5):434-441

180. Australian Institute of Health and Welfare (2014) *Oral health and dental care in Australia: key facts and figures trends 2014.* (AIHW Catalogue no DEN 228) Canberra: Australian Institute of Health and Welfare

181. Australian Bureau of Statistics (2017) *Disability, ageing and carers, Australia: summary of findings, 2015.* Canberra: Australian Bureau of Statistics

182. World Health Organization (2011) *World report on disability.* Geneva: World Health Organization

183. Do PL (2017) How well does the National Disability Insurance Scheme respond to the issues challenging Indigenous people with disability? *Aotearoa New Zealand Social Work*;29(4):49-60

184. Department of Social Services (2016) *National Disability Strategy 2010-2020 second implementation plan: driving action 2015-2018.* Canberra: Department of Social Services

185. Council of Australian Governments (2011) *National disability strategy 2010-2020.* Canberra: Council of Australian Governments

186. Australian Department of Social Services (2017) *Australian Government plan to improve outcomes for Aboriginal and Torres Strait Islander People with disability.* Sydney: Australian Department of Social Services

187. Council of Australian Governments (2012) *National disability agreement: intergovernmental agreement on federal financial relations.* Canberra: Council of Australian Governments

188. Disability Policy & Research Working Group (2012) *National Indigenous access framework.* Sydney: Disability Policy & Research Working Group

189. Australian Institute of Health and Welfare (2017) *Disability support services: services provided under the National Disability Agreement 2015-16.* Canberra: Australian Institute of Health and Welfare

190. Australian Government (2016) *National Disability Insurance Scheme Act 2013.* Canberra: Australian Government

191. Australian Government Department of Social Services (2016) *Disability and carers: transition of Commonwealth programs to the National Disability Insurance Scheme.* Retrieved 27 September 2016 from https://www.dss.gov.au/disability-and-carers/programs-services/for-people-with-disability/national-disability-insurance-scheme/transition-of-commonwealth-programs-to-the-national-disability-insurance-scheme-ndis

192. Steering Committee for the Review of Government Service Provision (2017) *Report on government services 2017, volume F: Community services.* Canberra: Productivity Commission

193. National Health and Medical Research Council (2012) *Staying healthy: preventing infectious diseases in early childhood education and care services (5th edition).* Canberra: National Health and Medical Research Council

194. Williams S (2014) *National framework for communicable disease control.* Canberra: Australian Department of Health

195. Australian Department of Health (2016) *Surveillance systems reported in Communicable Diseases Intelligence, 2016.* Retrieved 11 April 2016 from http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-surv_sys.htm#nndss

196. Australian Institute of Health and Welfare (2013) *The inclusion of Indigenous status on pathology request forms.* (AIHW Catalogue no IHW 103) Canberra: Australian Institute of Health and Welfare

197. The Kirby Institute (2017) *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017.* Sydney: The Kirby Institute

198. Naidu L, Chiu C, Habig A, Lowbridge C, Jayasinghe S, Wang H, McIntyre P, Menzies R (2013) Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, Australia 2006–2010. *Communicable Diseases Intelligence*;37(December 2013 supplement):S1-S92

199. National Institute of Allergy and Infectious Diseases (2009) *Tuberculosis (TB): detailed explanation of TB.* Retrieved 6 March 2009 from https://www.niaid.nih.gov/diseases-conditions/tuberculosis-tb

200. Narasimhan P, Wood J, Macintyre CR, Mathai D (2013) Risk factors for tuberculosis. *Pulmonary Medicine* 2013.

201. Communicable Disease Network Australia (2015) *Tuberculosis (TB): CDNA National Guidelines for the public health management of TB*. Canberra: Australian Department of Health

202. Bareja C, Waring J, Stapledon R, National Tuberculosis Advisory Committee (2014) Tuberculosis notifications in Australia 2010. *Communicable Diseases Intelligence*;38(1):E36-E48

203. Bareja C, Waring J, Stapledon R, Toms C, Douglas P, National Tuberculosis Advisory Committee (2014) Tuberculosis notifications in Australia, 2011. *Communicable Diseases Intelligence*;38(4):E356-E368

204. Toms C, Stapledon R, Waring J, Douglas P (2015) Tuberculosis notifications in Australia, 2012 and 2013. *Communicable Diseases Intelligence*;Submitted to CDI:E217-E235

205. Toms C, Stapledon R, Coulter C, Douglas P, National Tuberculosis Advisory Committee (2017) Tuberculosis notifications in Australia, 2014. *Communicable Diseases Intelligence*;41(3):E247-E263

206. Australian Bureau of Statistics (2012) *Australian demographic statistics, June quarter 2012.* (ABS Catalogue no 3101.0) Canberra: Australian Bureau of Statistics

207. World Health Organisation (2014) *Hepatitis*. Retrieved 2014 from http://www.who.int/topics/hepatitis/en/

208. Immunise Australia Program (2016) *The Australian immunisation handbook 10th edition (2016 update).* Canberra: Australian Department of Health

209. Hepatitis C Virus Infection Consensus Statement Working Group (2016) *Australian recommendations for the management of hepatitis C virus infection: a consensus statement 2016.* Melbourne: Gastroenterological Society of Australia

210. Australasian Society for HIV Medicine (2010) *Australasian contact tracing manual : a practical handbook for health care providers managing people with HIV, viral hepatitis, STIs and HIV-related tuberculosis.* 4th ed. Sydney: Australasian Society for HIV Medicine

211. Horby P, Gilmour R, Wang H, McIntyre P (2003) Progress towards eliminating Hib in Australia: an evaluation of Haemophilus influenzae type b prevention in Australia, 1 July 1993 to 30 June 2000. *Communicable Diseases Intelligence*;27(3):324-341

212. Jacups SP, Morris PS, Leach AJ (2011) Haemophilus influenzae type b carriage in Indigenous children and children attending childcare centers in the Northern Territory, Australia, spanning pre- and post-vaccine eras. *Vaccine*;29(16):3083-3088

213. Cleland G, Leung C, Wan Sai Cheong J, Francis J, Heney C, Nourse C (2018) Paediatric invasive Haemophilus influenzae in Queensland, Australia, 2002-2011: young Indigenous children remain at highest risk. *Journal of Paediatrics and Child Health*;54(1):36-41

214. Wang H, Deeks S, Glasswell A, McIntyre P (2008) Trends in invasive Haemophilus influenzae type b disease in Australia, 1995-2005. *Communicable Diseases Intelligence*;32(3):316-325

215. National Notifiable Diseases Surveillance System Annual Report Writing Group (2016) *Australia's notifiable disease status, 2014: annual report of the National Notifiable Diseases Surveillance System.* Canberra: National Notifiable Diseases Surveillance System

216. National Notifiable Diseases Surveillance System Annual Report Writing Group (2015) *Australia's notifiable disease status, 2013: annual report of the National Notifiable Diseases Surveillance System.* Canberra: National Notifiable Diseases Surveillance System

217. National Notifiable Diseases Surveillance System Annual Report Writing Group (2015) *Australia's notifiable disease status, 2012: annual report of the National Notifiable Diseases Surveillance System.* Canberra: National Notifiable Diseases Surveillance System

218. Dey A, Knox S, Wang H, Beard FH, McIntyre PB (2016) Summary of national surveillance data on vaccine preventable diseases in Australia, 2008-2011. *Communicable Diseases Intelligence*;40(Supplement):S1-S70

219. Jacups SP, Cheng A (2011) The epidemiology of community acquired bacteremic pneumonia, due to streptococcus pneumoniae, in the top end of the Northern Territory, Australia - over 22 years. *Vaccine*;29(33):5386-5392

220. Toms C, de Kluyver R (2016) Invasive pneumococcal disease in Australia, 2011 and 2012. *Communicable Diseases Intelligence*;40(2):E267-E284

221. Lim FJ, Lehmann D, McLoughlin A, Harrison C, Willis J, Giele C, Keil AD, Moore HC (2014) Risk factors and comorbidities for invasive pneumococcal disease in Western Australian Aboriginal and non-Aboriginal people. *Pneumonia*;4(2014):24-34

222. Lahra M, Enriquez R (2016) Australian Meningococcal Surveillance Programme annual report, 2015. *Communicable Diseases Intelligence*;40(4):E503-E511

223. Archer BN, Chiu CK, Jayasinghe SH, Richmond PC, McVernon J, Lahra MM, Andrews RM, McIntyre PB (2017) Epidemiology of invasive meningococcal B disease in Australia, 1999-2015: priority populations for vaccination. *Medical Journal of Australia*;207(9):382-387

224. National Centre for Immunisation Research & Surveillance (2017) *Meningococcal vaccines for Australians*. Sydney: National Centre for Immunisation Research & Surveillance

225. National Centre for Immunisation Research & Surveillance (2017) *Meningococcal vaccines - frequently asked questions.* Sydney: National Centre for Immunisation Research & Surveillance

226. Burns J, Burrow S, Genovese E, Pumphrey M, Sims E, Thomson N (2003) Other communicable diseases. In: Thomson N, ed. *The health of Indigenous Australians.* South Melbourne: Oxford University Press:397-441

227. Family Planning Association of WA (2010) *Sexually transmissible infections (STI) and blood-borne viruses (BBV): a guide for health professionals, educators, and general practitioners.* Northbridge, WA: Family Planning Association of WA

228. Australian Department of Health (2014) *Third national sexually transmissible infections strategy: 2014-2017.* Canberra: Australian Department of Health

229. Australian Department of Health (2014) *Fourth National Aboriginal and Torres Strait Islander Blood-Borne Viruses and Sexually Transmissible Infections Strategy 2014-2017.* Canberra: Australian Department of Health

230. The Kirby Institute (2016) *Bloodborne viral and sexually transmitted infections in Aboriginal and Torres Strait Islander people: surveillance and evaluation report 2016.* Sydney: The Kirby Institute

231. Western Australian Department of Health (2015) *WA HIV Strategy 2015-2018.* Perth: Department of Health, Western Australia

232. Australian Department of Health (2014) *Seventh National HIV Strategy 2014-2017.* Canberra: Australian Department of Health

233. The Kirby Institute (2017) *HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2017.* Sydney: The Kirby Institute

234. Tasani M, Tong SYC, Andrews R, Holt DC, Currie BJ, Carapetis JR, Bowen AC (2016) The importance of scabies coinfection in the treatment considerations for impetigo. *Pediatric Infectious Disease Journal*;35(4):374-378

235. Australian Healthy Skin Consortium (2018) *National healthy skin guideline: for the prevention, treatment and public health control of impetigo, scabies, crusted scabies and tinea for Indigenous populations and communities in Australia - 1st edition.* Perth: Telethon Kids Institute

236. Centre for Disease Control (2015) *Healthy Skin Program: guidelines for community control of scabies, skin sores, tinea and crusted scabies in the Northern Territory [3rd ed.]*. Darwin: Northern Territory Department of Health

237. Romani L, Steer AC, Whitfeld MJ, Kaldor JM (2015) Prevalence of scabies and impetigo worldwide: a systematic review. *The Lancet Infectious Diseases*;15(8):960-967

238. McMeniman E, Holden L, Kearns T, Clucas DB, Carapetis JR, Currie BJ, Connors C, Andrews RM (2011) Skin disease in the first two years of life in Aboriginal children in East Arnhem Land. *Australasian Journal of Dermatology*;52(4):270–273

239. Mofiz E, Seemann T, Bahlo M, Holt D, Currie BJ, Fischer K, Papenfuss AT (2016) Mitochondrial genome sequence of the scabies mite provides insight into the genetic diversity of individual scabies infections. *PLOS Neglected Tropical Diseases* 10.

240. Currie BJ, Carapetis JR (2000) Skin infections and infestations in Aboriginal communities in northern Australia. *Australasian Journal of Dermatology*;41(3):139-145

241. McDonald M, Currie BJ, Carapetis JR (2004) Acute rheumatic fever: a chink in the chain that links the heart to the throat? *The Lancet Infectious Diseases*;4(4):240-245

242. Bowen AC, Harris T, Holt DC, Giffard PM, Carapetis JR, Campbell PT, McVernon J, Tong SY (2016) Whole genome sequencing reveals extensive community-level transmission of group A Streptococcus in remote communities. *Epidemiology and Infection*;144(9):1991-1998

243. Bowen AC, Tong SYC, Andrews RM, O'Meara IM, McDonald MI, Chatfield MD, Currie BJ, Carapetis JR (2014) Short-course oral co-trimoxazole versus intramuscular benzathine benzylpenicillin for impetigo in a highly endemic region: an open-label, randomised, controlled, non-inferiority trial. *The Lancet*;384(9960):2132–2140

244. McDonald E, Bailie R, Brewster D, Morris P (2008) Are hygiene and public health interventions likely to improve outcomes for Australian Aboriginal children living in remote communities? A systematic review of the literature. *BMC Public Health* 8.

245. Currie B, Couzos S (2008) Skin infections. In: Couzos S, Murray R, eds. *Aboriginal primary health care: an evidence-based approach.* 3rd ed. South Melbourne: Oxford University Press:410-444

246. Lokuge B, Kopczynski A, Woltmann A, Alvoen F, Connors C, Guyula T, Mulholland E, Cran S, Foster T, Lokuge K, Burke T, Prince S (2014) Crusted scabies in remote Australia, a new way forward: lessons and outcomes from the East Arnhem Scabies Control Program. *Medical Journal of Australia;*200(11):644-648

247. Andrews RM, Kearns T, Connors C, Parker C, Carville K, Currie BJ, Carapetis JR (2009) A regional initiative to reduce skin infections amongst Aboriginal children living in remote communities of the Northern Territory, Australia. *PLOS Neglected Tropical Diseases*;3(11):1-9

248. Hendrickx D, Stephen A, Lehmann D, Silva D, Boelaert M, Carapetis J, Walker R (2016) A systematic review of the evidence that swimming pools improve health and wellbeing in remote Aboriginal communities in Australia. *Australian and New Zealand Journal of Public Health*;40(1):30-36

249. McDonald MI, Towers RJ, Andrews RM, Benger N, Currie BJ, Carapetis JR (2006) Low rates of streptococcal pharyngitis and high rates of pyoderma in Australian Aboriginal communities where acute rheumatic fever is hyperendemic. *Clinical Infectious Diseases*;43(6):683-689

250. Fischer K, Kemp DJ (2009) Scabies and bacterial skin infections at a molecular level. *Microbiology Australia*;30(5):177-180

251. Clucas DB, Carville KS, Connors C, Currie B, Carapetis J, Andrews R (2008) Disease burden and health-care clinic attendances for young children in remote Aboriginal communities of northern Australia. *Bulletin of the World Health Organization*;86(4):275-281

252. Kearns T, Clucas D, Connors C, Currie BJ, Carapetis JR, Andrews RM (2013) Clinic attendances during the first 12 months of life for Aboriginal children in five remote communities of Northern Australia. *PLOS ONE* 8.

253. Abdalla T, Hendrickx D, Fathima P, Walker R, Blyth CC, Carapetis JR, Bowen AC, Moore HC (2017) Hospital admissions for skin infections among Western Australian children and adolescents from 1996 to 2012. *PLOS ONE* 12.

254. Yeoh DK, Anderson A, Cleland G, Bowen AC (2017) Are scabies and impetigo 'normalised'? A cross-sectional comparative study of hospitalised children in northern Australia assessing clinical recognition and treatment of skin infections. *PLOS Neglected Tropical Diseases* 11.

255. Whitehall J, Kuzulugil D, Sheldrick K, Wood A (2013) Burden of paediatric pyoderma and scabies in North West Queensland. *Journal of Paediatrics and Child Health*;49(2):141–143

256. Boyd R, Patel M, Currie BJ, Holt DC, Harris T, Krause V (2016) High burden of invasive group A streptococcal disease in the Northern Territory of Australia. *Epidemiology and Infection*;144(5):1018-1027

257. Gear RJ, Carter JC, Carapetis JR, Baird R, Davis JS (2015) Changes in the clinical and epidemiological features of group A streptococcal bacteraemia in Australia's Northern Territory. *Tropical Medicine & International Health*;20(1):40–47

258. World Health Organization (2010) *A conceptual framework for action on social determinants of health: SDH discussion paper 2.* Geneva: World Health Organization

259. Marmot M (2016) *Health inequality and the causes of the causes [lecture]*. Sydney: ABC Radio National

260. Gubhaju L, McNamara BJ, Banks E, Joshy G, Raphael B, Williamson A, Eades SJ (2013) The overall health and risk factor profile of Australian Aboriginal and Torres Strait Islander participants from the 45 and up study. *BMC Public Health* 13.

261. World Health Organization (2016) *What are social determinants of health?* Retrieved 2016 from http://www.who.int/social_determinants/sdh_definition/en/

262. Detels R, Gulliford M, Abdool K.Q., Tan CC, eds. (2015) *Oxford textbook of global public health*. 6th ed. Oxford, UK: Oxford University Press

263. World Health Organization (2016) *Risk factors*. Retrieved 2016 from http://www.who.int/topics/risk_factors/en/

264. Rickwood D (2006) *Pathways of recovery: preventing further episodes of mental illness (monograph).* Canberra: Commonwealth of Australia

265. World Health Organization (2000) *The implications for training of embracing: a life course approach to health.* Geneva: World Health Organization

266. Waterworth P, Dimmock J, Pescud M, Braham R, Rosenberg M (2016) Factors affecting Indigenous West Australians' health behavior: Indigenous perspectives. *Qualitative Health Research*;26(1):55-68

267. enHealth (2016) *Preventing disease and injury through healthy environments: Environmental Health Standing Committee (enHealth) strategic plan 2016 to 2020.* Canberra: enHealth

268. Clifford HD, Pearson G, Franklin P, Walker R, Zosky GR (2015) Environmental health challenges in remote Aboriginal Australian communities: clean air, clean water and safe housing. *Australian Indigenous HealthBulletin*;15(2):1-14

269. enHealth (2010) *Environmental health practitioner manual: a resource manual for environmental health practitioners working with Aboriginal and Torres Strait Islander communities.* Canberra: Department of Health, Australia

270. Memmott P, Greenop K, Birdsall-Jones C (2014) *How is crowding in Indigenous households managed?* (Research and Policy Bulletin no. 180) Melbourne: Australian Housing and Urban Research Institute

271. Australian Institute of Health and Welfare (2017) *National Social Housing Survey: detailed results 2016.* Canberra: Australian Institute of Health and Welfare

272. Ware V-A (2013) *Housing strategies that improve Indigenous health outcomes.* (Resource sheet no 25) Canberra: Closing the Gap Clearinghouse

273. Hall N, Barbosa MC, Currie D, Dean AJ, Head B, Hill PS, Naylor S, Reid S, Selvey L, Willis J (2017) *Water, sanitation and hygiene in remote Indigenous Australian communities: a scan of priorities.* (Discussion paper: Water for equity and wellbeing series) Brisbane: Global Change Institute, The University of Queensland

274. Towart R, Griew R, Murphy S, Pascoe F (2017) *Remote housing review: a review of the National Partnership Agreement on Remote Indigenous Housing and the Remote Housing Strategy (2008-2018).* Canberra: Department of the Prime Minister and Cabinet

275. National Health and Medical Research Council (2000) *Nutrition in Aboriginal and Torres Strait Islander peoples: an information paper*. Canberra: National Health and Medical Research Council

276. Lee A, Ride K (2018) *Review of nutrition among Aboriginal and Torres Strait Islander people.* Perth, WA: Australian Indigenous HealthInfoNet

277. National Health and Medical Research Council (2013) *Australian Dietary Guidelines: providing the scientific evidence for healthier Australian diets.* Canberra: National Health and Medical Research Council

278. Australian Bureau of Statistics (ABS) (2016) *Australian Aboriginal and Torres Strait Islander Health Survey: consumption of added sugars, 2012-13.* (4727.0.55.009) Canberra: Australian Bureau of Statistics (ABS)

279. Australian Bureau of Statistics (ABS) (2016) *Australian Aboriginal and Torres Strait Islander Health Survey: consumption of food groups from the Australian Dietary Guidelines, 2012-13.* (4727.0.55.008) Canberra: Australian Bureau of Statistics (ABS)

280. Australian Bureau of Statistics (2015) *Australian Aboriginal and Torres Strait Islander health survey: nutrition results - food and nutrients, 2012-13.* (ABS cat. no. 4727.0.55.005) Canberra: Australian Bureau of Statistics

281. Australian Bureau of Statistics (2015) *Australian Aboriginal and Torres Strait Islander health survey: nutrition results - food and nutrients, 2012-13: Table 4 [data cube].* Retrieved 20 March 2015 from http://www.abs.gov.au/ausstats/subscriber.nsf/log?openagent&4727055005_201213_04.xls&4727.0.55.005&Data%20Cubes&F3E8C224BFBA2FE0CA257E0D000EC970&0&2012-13&20.03.2015&Latest

282. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13: table 13 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500613.xls&4727.0.55.006&Data%20Cubes&D751183318983C51CA257CEE0010D97D&0&2012%9613&06.06.2014&Latest

283. World Health Organization (2015) *Guideline: sugars intake for adults and children.* Geneva: World Health Organization

284. Australian Bureau of Statistics (2015) *Australian Aboriginal and Torres Strait Islander health survey: nutrition results - food and nutrients, 2012-13: Table 12.1 [data cube].* Retrieved 20 March 2015 from http://www.abs.gov.au/ausstats/subscriber.nsf/log?openagent&4727055005_201213_12.xls&4727.0.55.005&Data%20Cubes&2DC1BC4A0840357FCA257E0D000ECE96&0&2012-13&20.03.2015&Latest

285. Australian Bureau of Statistics (2015) *Australian Aboriginal and Torres Strait Islander health survey: nutrition results - food and nutrients, 2012-13: Table 14.1 [data cube].* Retrieved 20 March 2015 from http://www.abs.gov.au/ausstats/subscriber.nsf/log?openagent&4727055005_201213_14.xls&4727.0.55.005&Data%20Cubes&2ABA2FFD38663577CA257E0D000ECF19&0&2012-13&20.03.2015&Latest

286. World Health Organization (2013) *Exclusive breastfeeding*. Retrieved 2013 from http://www.who.int/nutrition/topics/exclusive_breastfeeding/en/

287. Australian Institute of Health and Welfare (2011) *2010 Australian national infant feeding survey: indicator results*. (AIHW Catalogue no PHE 156) Canberra: Australian Institute of Health and Welfare

288. Helps C, Barclay L (2015) Aboriginal women in rural Australia; a small study of infant feeding behaviour. *Women and Birth*;In press(http://dx.doi.org/10.1016/j.wombi.2014.12.004)

289. Footprints in Time (2015) *Footprints in Time: the longitudinal study of Indigenous children: report from Wave 5.* Canberra: Department of Social Services

290. Department of Families Housing Community Services and Indigenous Affairs (2009) *Footprints in time: the longitudinal study of Indigenous children - key summary report from Wave 1.* Canberra: Department of Families, Housing, Community Services and Indigenous Affairs

291. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: physical activity, 2012–13.* (ABS cat. no. 4727.0.55.004) Canberra: Australian Bureau of Statistics

292. Australian Government Department of Health (2014) *Australia's physical activity and sedentary behaviour guidelines.* Canberra: Australian Government Department of Health

293. Australian Government Department of Health (2014) *Australia's physical activity and sedentary behaviour guidelines - guidelines evidence summary.* Canberra: Australian Government Department of Health

294. Brooks R (2017) *Overweight and obesity in Australia: a birth cohort analysis.* Canberra: Australian Institute of Health and Welfare

295. Dunford M, Prescott V (2017) *Impact of physical inactivity as a risk factor for chronic conditions: Australian Burden of Disease Study.* Canberra: Australian Institute of Health and Welfare

296. World Health Organization (2013) *Obesity and overweight: fact sheet no 311.* Retrieved March 2013 from http://www.who.int/mediacentre/factsheets/fs311/en/

297. National Health and Medical Research Council (2013) *Eat for Health: Australian dietary guidelines summary.* Canberra: National Health and Medical Research Council

298. World Health Organization (2011) *Waist circumference and waist–hip ratio: report of a WHO expert consultation* Presented Geneva

299. Li M, McDermott R (2015) Obesity, albuminuria, and gamma-glutamyl transferase predict incidence of hypertension in Indigenous Australians in rural and remote communities in northern Australia. *Journal of Hypertension*;33(4):704–710

300. Adegbija O, Hoy WE, Wang Z (2015) Corresponding waist circumference and body mass index values based on 10-year absolute type 2 diabetes risk in an Australian Aboriginal community. *BMJ Open Diabetes Research & Care 3*.

301. Daniel M, Rowley K, McDermott R, O'Dea K (2002) Diabetes and impaired glucose tolerance in Aboriginal Australians: prevalence and risk. *Diabetes Research and Clinical Practice*;57:23-33

302. Li M, McDermott RA (2010) Using anthropometric indices to predict cardio-metabolic risk factors in Australian Indigenous populations. *Diabetes Research and Clinical Practice*;87(3):401-406

303. Gracey M, Burke V, Martin DD, Johnston RJ, Jones T, Davis EA (2007) Assessment of risks of "lifestyle" diseases including cardiovascular disease and type 2 diabetes by anthropometry in remote Australian Aborigines. *Asia Pacific Journal of Clinical Nutrition*;16(4):688-697

304. Hughes JT, Maple-Brown LJ, Piers LS, Meerkin J, O'Dea K, Ward LC (2015) Development of a single-frequency bioimpedance prediction equation for fat-free mass in an adult Indigenous Australian population. *European Journal of Clinical Nutrition*;69(1):28–33

305. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13: table 8 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500608.xls&4727.0.55.006&Data%20Cubes&2414D8800A3A8364CA257CEE0010D832&0&2012%9613&06.06.2014&Latest

306. Australian Bureau of Statistics (2014) *Australian Aboriginal and Torres Strait Islander health survey: updated results, 2012-13: table 14 [data cube].* Retrieved 6 June 2014 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&472705500614.xls&4727.0.55.006&Data%20Cubes&7116BB02CF341792CA257CEE0010D9AF&0&2012%9613&06.06.2014&Latest

307. Haupt I, Fisher R, Weber J, Dunn K (2014) *Review of the National Partnership Agreement on Essential Vaccines.* Canberra: Sapere Research Group and Sironis Health

308. National Health Performance Authority (2016) *Healthy communities: immunisation rates for children in 2014-15.* Sydney: National Health Performance Authority

309. Immunise Australia Program (2015) *The Australian immunisation handbook: 10th edition 2015 (updated June 2015).* Canberra: Australian Department of Health

310. Australian Institute of Health and Welfare (2018) *Immunisation interactive data table.* Retrieved 2018 from https://www.myhealthycommunities.gov.au/interactive/immunisation

311. MyHealthyCommunities (2018) *Immunisation rates for children in 2016-17: web update.* Canberra: Australian Institute of Health and Welfare, MyHealthyCommunities

312. Department of Health (2018) *Childhood immunisation coverage.* Retrieved 27 April 2018 from https://beta.health.gov.au/topics/immunisation/childhood-immunisation-coverage

313. Wright K, Miller D, Howle T, Seebus I (2017) *National Key Performance Indicators for Aboriginal and Torres Strait Islander primary health care: results from June 2016. National key performance indicators for Aboriginal and Torres Strait Islander primary health care series no. 4.* Canberra: Australian Institute of Health and Welfare

314. Claydon C, Webber K, Sweeney J (2017) *National Drug Strategy Household Survey 2016: detailed findings.* Canberra: Australian Institute of Health and Welfare

315. Australian Government Department of Health (2017) *National drug strategy 2017-2026.* Canberra: Australian Government Department of Health

316. Australian Institute of Health and Welfare (2014) *National Drug Strategy Household Survey detailed report: 2013.* (AIHW Catalogue no PHE 183, drug statistics series no 28) Canberra: Australian Institute of Health and Welfare

317. Gray D, Cartwright K, Stearne A, Saggers S, Wilkes E, Wilson M (2017) *Review of the harmful use of alcohol among Aboriginal and Torres Strait Islander people.* (19) Perth, WA: Australian Indigenous HealthInfoNet

318. Intergovernmental Committee on Drugs (2015) *National Aboriginal and Torres Strait Islander peoples' drug strategy 2014-2019.* Canberra: National Drug Strategy

319. Alford K (2014) *Economic value of Aboriginal community controlled health services.* Canberra: National Aboriginal Community Controlled Health Organisation

320. National Health and Medical Research Council (2009) *Australian guidelines to reduce health risks from drinking alcohol.* Canberra: National Health and Medical Research Council

321. Australian Bureau of Statistics (2013) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 14 Alcohol consumption - Short-term or Single occasion risk by age, Indigenous status and sex [data cube].* Retrieved 27 November 2013 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4727.0.55.001Main+Features12012-13?OpenDocument

322. Australian Bureau of Statistics (2013) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 13 Alcohol consumption - Long-term or Lifetime risk by age, Indigenous status and sex [data cube].* Retrieved 27 November 2013 from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4727.0.55.0012012-13?OpenDocument

323. Bower C, Elliott EJ (2016) *Australian guide to the diagnosis of FASD.* Perth, WA: Telethon Kids Institute

324. Watkins RE, Elliott EJ, Wilkins A, Mutch RC, Fitzpatrick JP, Payne JM, O'Leary CM, Jones HM, Latimer J, Hayes L, Halliday J, D'Antoine H, Miers S, Russell E, Burns L, McKenzie A, Peadon E, Carter M, Bower C (2013) Recommendations from a consensus development workshop on the diagnosis of fetal alcohol spectrum disorders in Australia. *BMC Pediatrics* 13.

325. Australian Institute of Health and Welfare (2013) *Aboriginal and Torres Strait Islander health performance framework 2012: detailed analyses.* (AIHW Cat. no. IHW 94) Canberra: Australian Institute of Health and Welfare

326. Stafford J, Breen C (2016) *Australian drug trends 2015: findings from the Illicit Drug Reporting System (IDRS).* (Australian Drug Trend Series no. 145) Sydney: National Drug and Alcohol Research Centre

327. Degenhardt L, Hall W (2012) Extent of illicit drug use and dependence, and their contribution to the global burden of disease. *The Lancet*;379(9810):55-70

328. Australian Bureau of Statistics (2013) *Australian Aboriginal and Torres Strait Islander health survey: first results, Australia, 2012-13: Table 15 Substance use by age, remoteness and sex [data cube].* Retrieved 27 November 2013 from http://www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&table%2015%20substance%20use%20by%20age,%20remoteness%20and%20sex,%202012-13%20-%20australia.xls&4727.0.55.001&Data%20Cubes&E6B1092ED1C8DC69CA257C2F00145F58&0&2012-13&27.11.2013&Latest

329. Rodgers R, Kovacevic C, Zhang X, Tuttle R (2017) *Aboriginal and Torres Strait Islander health organisations: online services report - key results 2015-16. Aboriginal and Torres Strait Islander health services report no. 8.* Canberra: Australian Institute of Health and Welfare

330. d'Abbs P, Maclean S (2008) *Volatile substance misuse: a review of interventions.* (Monograph Series No. 65) Barton, ACT: Australian Government Department of Health and Ageing

331. Lubman DI, Hides L, Yucel M (2006) Inhalant misuse in youth: time for a coordinated response. *Medical Journal of Australia*;185(6):327-330

332. National Institute on Drug Abuse (2012) *NIDA InfoFacts: inhalants.* Retrieved 2010 from http://drugabuse.gov/infofacts/inhalants.html

333. Brouette T, Anton R (2001) Clinical review of inhalants. *The American Journal on Addictions*;10(1):79-94

334. Wilkes E, Gray D, Casey W, Stearne A, Dadd L (2014) Harmful substance use and mental health. In: Dudgeon P, Milroy H, Walker R, eds. *Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice.* 2nd edition ed. Canberra: Department of The Prime Minister and Cabinet:125-146 (chapter 8)

335. Cairney S, Maruff P, Burns CB, Currie J, Currie BJ (2005) Neurological and cognitive recovery following abstinence from petrol sniffing. *Neuropsychopharmacology*;30(5):1019-1027

336. Cairney S, O'Connor N, Dingwall KM, Maruff P, Shafiq-Antonacci R, Currie J, Currie BJ (2013) A prospective study of neurocognitive changes 15 years after chronic inhalant abuse. *Addiction*;108(6):1107–1114

337. d'Abbs P, Shaw G (2016) *Monitoring trends in the prevalence of petrol sniffing in selected Australian Aboriginal communities 2011-2014: final report.* Darwin: Menzies School of Health Research

338. Marel C, MacLean S, Midford R (2016) *Review of volatile substance use among Aboriginal and Torres Strait Islander people.* (Australian Indigenous HealthReviews no. 15) Perth: Australian Indigenous HealthInfoNet

339. National Inhalant Abuse Taskforce (2006) *National directions on inhalant abuse: final report.* Melbourne: Victorian Department of Human Services

340. Senate Community Affairs References Committee (2010) *Combined Australian Government response to two Senate Community Affairs References Committee reports on petrol sniffing in Indigenous communities.* Canberra: Department of Families, Housing, Community Services and Indigenous Affairs

341. Senate Standing Committee on Community Affairs (2009) *Inquiry into Petrol Sniffing and Substance Abuse in Central Australia.* Retrieved 2009 from http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Completed_inquiries/2008-10/petrol_sniffing_substance_abuse08/index

342. Standing Committee on Community Affairs (2009) *Grasping the opportunity of Opal: assessing the impact of the Petrol Sniffing Strategy.* Canberra: Senate Community Affairs Committee, Parliament of Australia

343. Senate Select Committee on Regional and Remote Indigenous Communities (2010) *Select Committee on Regional and Remote Indigenous Communities: final report 2010.* Canberra: Parliament of Australia

344. Select Committee on Substance Abuse in the Community (2004) *Petrol sniffing in remote Northern Territory communities.* Darwin: Select Committee on Substance Abuse in the Community, Legislative Assembly of the Northern Territory

345. Marcus D, Shaw D (2013) *Whole of strategy evaluation of the petrol sniffing strategy: future directions for the PSS: final report.* Canberra: Department of Families, Housing, Community Services and Indigenous Affairs

346. Parliament of Victoria Drugs and Crime Prevention Committee (2002) *Inquiry into the inhalation of volatile substances: final report.* Melbourne: Parliament of Victoria

347. Shaw G, Biven A, Gray D, Mosey A, Stearne A, Perry J (2004) *An evaluation of the Comgas scheme: they sniffed it and they sniffed it but it just wasn't there.* Canberra: Department of Health and Ageing

348. South Australian Centre for Economic Studies (2010) *Cost benefit analysis of legislation to mandate the supply of opal fuel in regions of Australia: final report.* Adelaide: Australian Government Department of Health and Ageing

349. Referendum Council (2017) *Uluru statement from the heart.* Referendum Council

350. Anderson I (2017) *Democratising data/building a platform for Indigenous development [2017 Menzies Oration]*. Darwin: Menzies School of Health Research

351. Australian Bureau of Statistics (2011) *Indigenous Status.* Retrieved 2011 from http://www.abs.gov.au/websitedbs/censushome.nsf/home/statementspersoningp?opendocument&navpos=430

352. Australian Bureau of Statistics (2016) *Deaths, Australia,* 2015. Retrieved 28 September 2016 from http://www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0?OpenDocument

353. Australian Bureau of Statistics (2013) *Information paper: death registrations to census linkage project - key findings for Aboriginal and Torres Strait Islander peoples, 2011-2012.* Retrieved 15 November 2013 from http://www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0.55.005?OpenDocument

354. Australian Bureau of Statistics (2007) *Births, Australia, 2006.* (ABS Catalogue no. 3301.0) Canberra: Australian Bureau of Statistics

355. Australian Institute of Health and Welfare (2013) *Indigenous identification in hospital separations data: quality report.* (AIHW Catalogue No IHW 90) Canberra: Australian Institute of Health and Welfare

356. Australian Institute of Health and Welfare (2014) *Cancer in Australia: an overview 2014.* (AIHW Catalogue no CAN 88, cancer series no 90) Canberra: Australian Institute of Health and Welfare

Core funding
is provided by the
Australian Government
Department of Health

healthinfonet.ecu.edu.au