Australian Government
Australian Institute of
Health and Welfare

Chronic kidney disease: Australian facts

Web report | Last updated: **17 Jun 2024** | Topic: Chronic kidney disease | Media release

About

This web report is part of Australian Centre for Monitoring Population Health

Chronic kidney disease: Australian facts provides key information for monitoring chronic kidney disease (CKD) in the Australian population, focussing on CKD risk factors, treatment and impact. Incidence, prevalence, hospitalisation and mortality are described with additional analysis of priority population groups.

This report is regularly updated with data from a range of sources. There are differences in the source year and frequency of publication. See Data sources and Notes for more information.

Cat. no: CDK 20

- Australian stories about chronic kidney disease
- Data

Findings from this report:

- 2 million hospitalisations recorded CKD as a diagnosis in 2021–22 – 18% of all hospitalisations in Australia
- In 2022, 29,000 people with kidney failure received kidney replacement therapy (KRT) in Australia
- 13,500 people were living with a functioning kidney transplant – 940 of these were performed in 2022
- Chronic kidney disease contributed to around 22,000 deaths in 2022 – 11% of all deaths in Australia

In this report:

How many people are living with chronic kidney disease in Australia?

Explore CKD prevalence (existing cases) and incidence (new cases)

- How many people are living with chronic kidney disease in Australia?

Risk factors for chronic kidney disease

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Chronic kidney disease is an Australia's health topic

- Chronic conditions | 17 Jun 2024
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Chronic kidney disease (CKD) refers to all conditions of the kidney affecting the filtration and removal of waste from the blood for 3 months or more. It is identified by reduced filtration by the kidney and/or by the leakage of protein or albumin from the blood into the urine.

CKD is mostly diagnosed at more advanced stages when symptoms become more apparent. Kidney failure occurs when the kidneys can no longer function adequately, at which point people require kidney replacement therapy (KRT) – a kidney transplant or dialysis – to survive.

How common is chronic kidney disease?

In 2011–12:

- an estimated 11% of people (1.7 million Australians) aged 18 and over had biomedical signs of CKD, according to Australian Institute of Health and Welfare (AIHW) analysis of the Australian Bureau of Statistics (ABS) latest National Health Measures Survey (NHMS) (ABS 2013)
- the prevalence of CKD increased rapidly with age, affecting around 44% of people aged 75 and over (AIHW 2018)
- only 6.1 of NHMS respondents who showed biomedical signs of CKD self-reported having the disease, indicating that CKD is a largely under-diagnosed condition (ABS 2013).

For more information on the incidence and prevalence of CKD, see How many people are living with chronic kidney disease in Australia?

Change over time

Two national surveys have been conducted in Australia that provide data on biomarkers of CKD – the 1999–2000 Australian Diabetes, Obesity and Lifestyle Study - external site opens in new window (AusDiab) and the 2011–12 NHMS.

Between 1999–2000 and 2011–12:

- the age-standardised CKD prevalence rate remained stable
- the number of Australians with moderate to severe loss of kidney function nearly doubled, from 322,000 to 604,000.

This increase was mostly driven by growth in the population of older people (as people live longer) and by survival of people with kidney failure who are receiving KRT (AIHW 2018).

The ABS is currently undertaking a multi-year Intergenerational Health and Mental Health Study in 2021–2024 - external site opens in new window, which will include a new NHMS and a new National Aboriginal and Torres Strait Islander Health Measures Survey (ABS 2022).

For more information, see Trends over time.

Kidney failure

Not everyone with kidney failure chooses to receive KRT, opting instead for end-of-life care. Therefore, prevalence estimates for kidney failure need to count cases both with and without replacement therapy. The most recent data available to examine this are linked data from the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry and the National Death Index, covering the period 1997 to 2013 (AIHW 2016).

In 2013:

- there were around 5,100 new cases of kidney failure in Australia – around 14 new cases per day – of these, half (50%) were receiving KRT

- 92% of people with newly diagnosed kidney failure who were aged under 55 received KRT, compared with 19% of people newly diagnosed aged 75 and over.

Before age 75, most new cases of kidney failure are treated with KRT; however, this trend reverses after age 75, with an 11-fold increase in kidney failure without KRT compared with those aged 65–74 (145 and 13 per 100,000 population) (Figure 1) (AIHW 2016).

Figure 1: Incidence of kidney failure with and without replacement therapy, by age, 2013

The bar chart shows the incidence rate of kidney failure in 2013 by sex, age group and kidney replacement therapy (KRT) treatment status, from the AIHW analysis of the linked ANZDATA, AIHW National Mortality Database and National Death Index.

The treatment rate for new patients with kidney failure increased slightly with age from 4.8 per 100,000 population among persons aged under 55, to 35 per 100,000 population among persons aged 75 and over. In contrast, the rate of new patients with kidney failure who did not get any KRT treatment increased sharply from 0.4 per 100,000 population among those aged under 55 to 145 per 100,000 population among those aged 75 and over. These age patterns are similar for men and women, with higher kidney failure incidence rates observed for males.

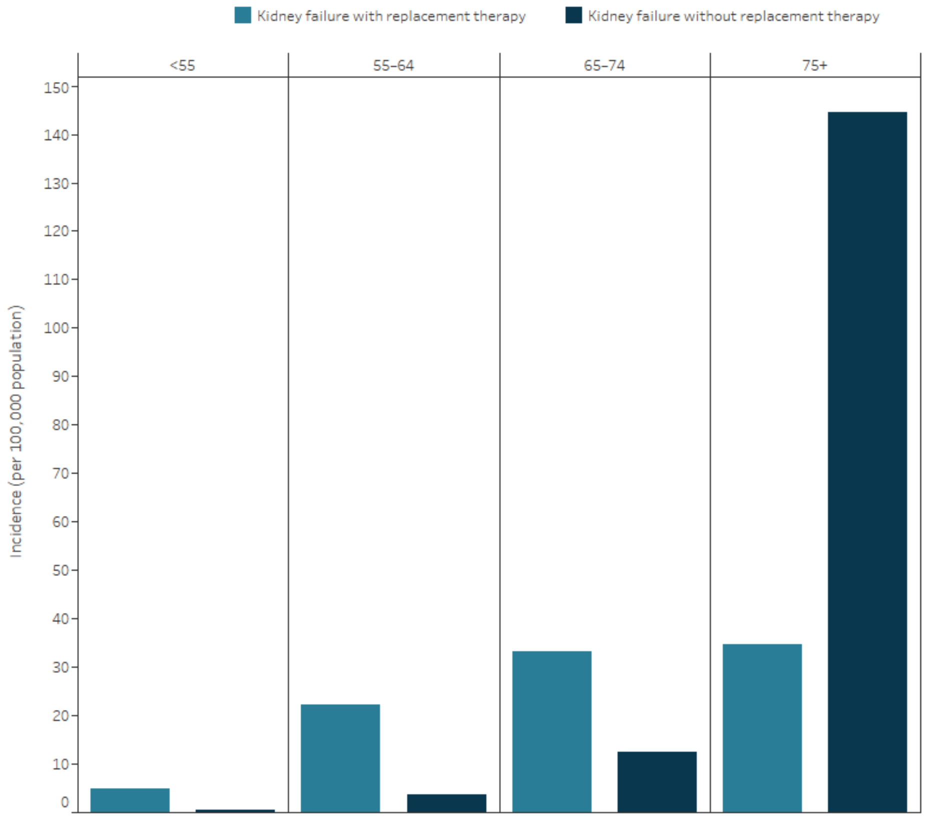


Chart: AIHW. Source: Linked data from the Australia and New Zealand Dialysis and Transplant Registry, AIHW National Mortality Database and National Death Index.
https://www.aihw.gov.au/

Download data

Impact of chronic kidney disease

Burden of chronic kidney disease

Burden of disease refers to the quantified impact of living with and dying prematurely from a disease or injury.

In 2023, CKD was:

- responsible for 1.1% of the total burden (fatal and non-fatal), compared with 0.8% in 2003
- the 14th leading cause of fatal burden across all age groups
- the sixth leading cause of fatal burden for women aged 85–89 and ninth leading cause of fatal burden for men aged 85–89 (AIHW 2023).

For more information on the burden of CKD, see Burden of chronic kidney disease.

Deaths from chronic kidney disease

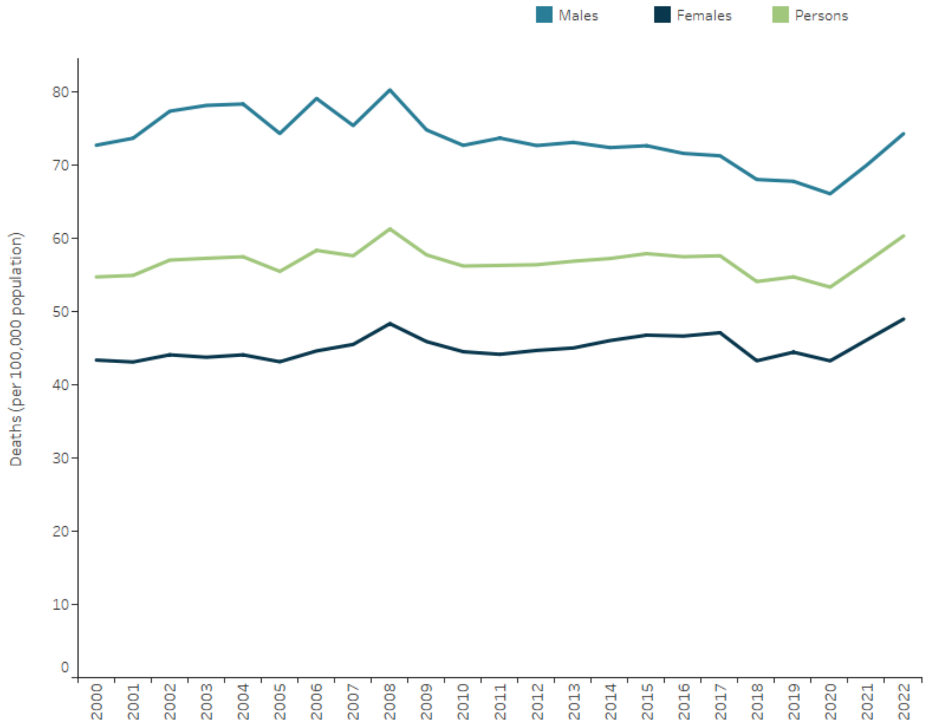
CKD contributed to around 22,000 deaths in 2022 (11% of all deaths in Australia), a rate of 84 per 100,000 population. CKD was recorded as the underlying cause of death in 22% and associated cause of death in 78% of CKD deaths. The number of CKD-related deaths has more than doubled since 2000 (when there were 10,200 deaths).

CKD mortality rates increased slightly year-on-year in both 2021 and 2022 (4.2% and 6.2%, respectively), after adjusting for age (Figure 2). These increases should be interpreted in the context of higher overall mortality in 2022, with two-thirds of excess deaths being associated with COVID-19 (ABS 2023b). People with pre-existing chronic conditions are also at higher risk of more severe outcomes from COVID-19 with chronic kidney diseases being a pre-existing condition among 13.2% of people who died from the virus (registered to 28 February 2023) (ABS 2023a).

For more information on deaths from CKD, see Mortality.

Figure 2: Trends in chronic kidney disease death rates (underlying or associated cause), by sex, 2000 to 2022

This graph shows the age-standardised rate of deaths where CKD was recorded as either an underlying or associated cause of death, from 2000 to 2021. Rates are higher in males than in females and have remained relatively stable. For persons, the rate of CKD deaths per 100,000 population was 55 in 2000, and 57 in 2021. The highest rate was in 2008, with 61 deaths per 100,000 population.



Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.
https://www.aihw.gov.au

Download data

Treatment and management of chronic kidney disease

Hospitalisations

CKD was recorded as the principal or additional diagnosis for around 2 million hospitalisations – 18% of all hospitalisations in Australia in 2021–22.

Dialysis was the most common reason for hospitalisation, accounting for 14% of all hospitalisations, and 81% of CKD hospitalisations (1.7 million).

There were 385,000 hospitalisations with a diagnosis of CKD (excluding dialysis as a principal diagnosis). Of these, 85% had CKD as an additional (rather than principal) diagnosis.

Between 2000–01 and 2021–22:

- the number of hospitalisations with CKD as the principal diagnosis (excluding dialysis) more than doubled, from 24,200 to 56,800
- the age-standardised hospitalisation rate for CKD as a principal diagnosis rose by 57%.

For more information, see Hospitalisations for chronic kidney disease.

Kidney replacement therapy

In 2022, around 29,000 people received KRT with 53% being treated with dialysis while 47% were living with a functioning kidney transplant.

The number of people receiving KRT has more than doubled since 2003, from around 13,800 to 29,000 (ANZDATA, 2023).

For more information on kidney replacement therapy, see Treatment of kidney failure.

Population groups

The impact of CKD varies between population groups.

Generally, the impact of CKD in terms of prevalence, hospitalisation, mortality and burden of disease, is greater among Aboriginal and Torres Strait Islander (First Nations) people, people living in lower socioeconomic areas, and people living in *Remote* and *very remote* areas. For example:

- An estimated 59,600 First Nations adults (18%) had biomedical signs of CKD in 2012–13 (ABS 2014). First Nations adults were 2.1 times as likely as non-Indigenous adults to have biomedical signs of CKD, after adjusting for age.
- CKD accounted for 2.5% of total disease burden among First Nations people in 2018 (6,500 DALY). The proportion attributed to fatal burden (73%) was higher than non-fatal burden (27%). The burden from CKD was 7.8 times as high among First Nations people as non-Indigenous people (AIHW 2021, 2022).
- Among people living in the lowest socioeconomic areas, there were around 16,200 deaths where CKD was the underlying or associated cause in 2020–2022 (105 per 100,000 population). The CKD death rate among this group was 1.8 times as high as for people living in the highest socioeconomic areas, after adjusting for age.
- Among people living in *Remote* and *very remote* areas, there were 17,100 CKD hospitalisations in 2021–22 (3,400 per 100,000 population). People living in these areas were 3.0 times as likely to be hospitalised for CKD as people living in *Major cities*, after adjusting for age.

Where do I go for more information?

For more information, see Chronic kidney disease: Australian facts.

References

ABS (Australian Bureau of Statistics) (2013) Australian Health Survey: biomedical results for chronic diseases - external site opens in new window, ABS, Australian Government, accessed 22 February 2022.

ABS (2014) Australian Aboriginal and Torres Strait Islander health survey: biomedical results, 2012–13- external site opens in new window - external site opens in new window, ABS, Australian Government, accessed 18 March 2022.

ABS (2022) Intergenerational Health and Mental Health Study (IHMHS) - external site opens in new window ABS, Australian Government, accessed 10 May 2022.

ABS (2023a) *COVID-19 Mortality in Australia: Deaths registered until 28 February 2023*- external site opens in new window - external site opens in new window, ABS, Australian Government, accessed 16 May 2024.

ABS (2023b) *Measuring Australia's excess mortality during the COVID-19 pandemic until August 2023*- external site opens in new window - external site opens in new window, ABS, Australian Government, accessed 16 May 2024.

AIHW (Australian Institute of Health and Welfare) (2016) *Incidence of end-stage kidney disease in Australia 1997–2013*, AIHW, Australian Government, accessed 26 March 2022.

AIHW (2018) *Chronic kidney disease prevalence among Australian adults over time*, AIHW, Australian Government, accessed 26 March 2022.

AIHW (2021) *Australian Burden of Disease Study: impact and causes of illness and death in Australia 2018*, AIHW, Australian Government, accessed 3 February 2022.

AIHW (2022) *Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2018*, AIHW, Australian Government, accessed 16 March 2022.

AIHW (2023) *Australian Burden of Disease Study 2023*, AIHW, Australian Government, accessed 14 December 2023.

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2023) ANZDATA 46th Annual Report 2023 - external site opens in new window, ANZDATA, accessed 28 February 2024.

Notes

Report summary and data tables updated 17 June 2024 with the latest available data at that time. Updates to the report's main content will be released by December 2024.

Introduction

Chronic kidney disease (CKD) refers to abnormalities of kidney structure or function, that are present for 3 months or more. It may be caused by several conditions – such as diabetes, high blood pressure or congenital conditions. Identifying the underlying cause of CKD is integral to its treatment and management.

The kidneys essentially 'clean' the blood by filtering it through millions of tiny functional units called nephrons (Lote 2012). When the kidneys are healthy, they filter about half a cup of blood each minute and produce around 1.5 litres of urine a day. Urine contains waste products and toxins, which the kidneys remove from the blood. The kidneys also help to maintain a proper balance of salts and minerals in the body, regulate blood pressure, absorb glucose and activate vitamin D.

CKD is a common and costly disease; however, it is largely preventable as a number of its key risk factors are modifiable. The number of people with CKD in Australia is increasing (AIHW 2018), and prevalence rates are likely vastly underestimated (ABS 2013).

Because the kidneys can continue to work even when they are damaged, most people do not realise they have CKD until the disease has progressed far enough for symptoms to develop.

Kidney failure describes the point at which a kidney transplant or dialysis is required for a person to survive. Clinically, it is defined by an estimated glomerular filtration rate (eGFR) of less than 15 mL/min/1.73m^2, or being on dialysis. Treatment and management of kidney failure place a significant burden on the person, their carers, families and friends and the health system.

Fortunately, simple tests performed by a general practitioner can identify most cases of CKD when the disease is in its early stages, enabling treatment to prevent or slow progression and reduce the likelihood of developing kidney failure.

In 2020, Kidney Disease: Improving Global Outcomes (KDIGO) released new guidelines for nomenclature (naming) related to kidney function and disease (Levey et al. 2020). This report uses updated terminology based on these guidelines.

What is kidney disease?

Kidney disease can be acute (lasting less than 3 months) or chronic (lasting 3 months or more).

Chronic kidney disease

Clinically, chronic kidney disease is defined as one of the following being present for 3 months or more:

- estimated or measured glomerular filtration rate (eGFR/GFR) of less than 60mL/min/1.73m^2, with or without evidence of kidney damage.
- kidney damage with or without decreased GFR, indicated by any of the following:

1. albuminuria – a condition caused when the kidneys cannot filter large protein molecules out of the blood, so they pass into the urine
2. haematuria – the presence of blood in the urine, not caused by another condition
3. structural abnormalities, for example abnormally small kidneys
4. pathological abnormalities, for example interstitial nephritis (inflammation of part of the kidneys).

Chronic kidney disease is classified into 5 stages, depending on the level of kidney function.

Stages 1 and 2
eGFR ≥ 60, with albuminuria, haematuria, or a pathological or structural abnormality

There are usually no symptoms, as the kidneys are still able to function adequately when they are slightly damaged. This makes diagnosis difficult. The eGFR is normal (≥90mL/min/m^2; stage 1) or slightly reduced (between 60 and 89 mL/min/m^2; stage 2). The risk of disease progression depends on albuminuria levels.

Stages 3 and 4
eGFR between 15 and 59, with or without albuminuria

The level of waste (urea and creatinine) in the blood rises and a person may start to feel unwell. Kidney function is reduced and blood pressure rises. This is usually when diagnosis occurs. Stage 3 is marked by a moderate reduction in eGFR (between 30 and 59 mL/min/m^2) and is divided into stage 3a and 3b. Stage 4 is marked by a severe reduction in eGFR (between 15 and 29 mL/min/m^2). In these stages, the risk of progression can depend on both GFR and albuminuria stages.

Stage 5 – kidney failure (also known as end-stage kidney disease)
eGFR < 15 or on dialysis

This is marked by substantial loss of kidney function. The kidneys are no longer able to adequately filter waste from the blood and the person requires kidney replacement therapy – either dialysis or a kidney transplant – to stay alive. The risk of progression is very high.

Acute kidney injury

Acute kidney injury (AKI) refers to a sudden decline in GFR due to a rapid increase in serum creatinine or oliguria (a decrease in urine output) or both (KDIGO AKI Work Group 2012). It has multiple causes, including illness, medications, and injuries to the kidney. Following AKI, kidney function often returns to normal within 3 months.

Source: KHA 2020a, b, c.

Purpose and structure of this report

CKD is a growing concern in Australia. This online report provides policy-makers, health professionals, researchers and the broader community with a comprehensive summary of the latest available data on CKD in the Australian population, including breakdowns by remoteness area, socioeconomic area and Aboriginal and Torres Strait Islander status.

It focuses on:

- CKD prevalence (existing cases) and incidence (new cases) of kidney failure estimates
- risk factors for CKD
- common comorbidities
- treatment and management
- morbidity and mortality estimates
- impact in terms of burden of disease, expenditure and deaths.

Need more information?

Please note: the information in this report does not contain medical advice. If you are concerned about your health, consult a qualified health care professional for guidance on your personal medical needs.

For further information on CKD education and support programs, see the Kidney Health Australia - external site opens in new window website or the Healthdirect - external site opens in new window website.

References

ABS (Australian Bureau of Statistics) (2013) *Australian Health Survey: biomedical results for chronic diseases 2011–2012* - external site opens in new window, ABS, Australian Government, accessed 22 February 2022.

AIHW (Australian Institute of Health and Welfare) (2018) *Chronic kidney disease prevalence among Australian adults over time* - external site opens in new window, AIHW, Australian Government, accessed 26 March 2022.

Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. 'KDIGO Clinical Practice Guideline for Acute Kidney Injury', Kidney inter., Suppl. 2012; 2: 1–138, doi: 10.1159/000339789 - external site opens in new window.

KHA (2020a) *Chronic kidney disease management in primary care* - external site opens in new window, 4th edn, Kidney Health Australia website, accessed 11 April 2022.

KHA (2020b) *Stages of kidney disease* - external site opens in new window, Kidney Health Australia website, accessed 11 April 2022.

KHA (2020c) *Types of kidney disease* - external site opens in new window, Kidney Health Australia website, accessed 11 April 2022.

Levey AS, Eckardt KU, Dorman NM, Christiansen SL, Hoorn EJ, Ingelfinger JR et al. (2020) ‘Nomenclature for kidney function and disease: report of a Kidney Disease: Improving Global Outcomes (KDIGO) consensus conference’, *Kidney International*, 97(6):1117–1129. doi: 10.1016/j.kint.2020.02.010 - external site opens in new window.

Lote CJ (2012) *Principles of renal physiology*, 5th edn, Springer, New York, doi:10.1007/978-1-4614-3785-7 - external site opens in new window.

Australian stories about living with chronic kidney disease

Please note: Aboriginal and Torres Strait Islander people should be aware that this page may contain images of deceased persons.

Sarah and Josh's story

Sarah was the primary carer for her brother Josh, who lives with Lupus and as a result, kidney disease. In 2020, Josh made the decision to go into palliative care, but Sarah advised him to look into organ donation first.

Ina's story

Ina is an Aboriginal woman and artist from Central Australia. After living with diabetes for 20 years, she was diagnosed with kidney failure and told she would need to have dialysis.

These case studies are based on interviews with persons living with chronic kidney disease. These personal accounts are not necessarily representative of the circumstances of others, but offer insights into the diversity of people’s experiences with CKD.

Sarah and Josh's story

Sarah was the primary carer for her brother Josh, who lives with Lupus and as a result, kidney disease. In addition to everyday responsibilities to help Josh manage his conditions, which included taking over 20 medications a day and dialysing three times a week, caring for Josh left Sarah in a constant worry about the life of someone so dear to her.

> “Watching him deteriorate and having gone through so many ups and downs, rushes to hospitals for ICU admissions and close calls, it’s crushing and incredibly sad.”

Sarah was deeply affected by Josh’s ongoing pain and suffering. When Josh’s health hit a further low point in late 2020, he made the decision to go into palliative care. Stepping in as a family member and carer, Sarah advised him to look into organ donation first. After a while waiting for a suitable donor, Sarah learned she was an organ donor match. Happily, the transplant surgery was a complete success and both brother and sister are enjoying their much-deserved good health.

Sarah found support in using Kidney Health Australia - external site opens in new window resources such as their Kidney Helpline, which was really useful to answer questions or to provide information about what she and Josh could expect in going through the transplant process.

> 'Having experienced a loved one live with a chronic and life-threatening condition, Sarah urges others to never take relationships or health for granted.'

By sharing their story, Sarah and Josh hope to raise more awareness and support for kidney disease, and encourage others to get a Kidney Health Check - external site opens in new window.

This case study is based on an interview with a person who is living with chronic kidney disease. This personal account is not necessarily representative of the circumstances of other people with chronic kidney disease or the challenges they may face, but it is our hope that it will give readers a greater awareness and understanding of the diversity of people’s experiences with CKD.

The information provided does not contain medical advice – consult a qualified healthcare professional for guidance relating to your personal medical needs.

Kidney Transplantation

Ina's story

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Ina is an Aboriginal woman and artist from Central Australia. After living with diabetes for 20 years, she was diagnosed with kidney failure and told she would need to have dialysis. The diagnosis was a surprise to her and at first, she didn’t know what dialysis was. She was nervous about the treatment and had to move to Adelaide to access it.

Leaving her country, family and community was difficult and at first Ina was homesick.

> 'When the sun went down, I was sitting outside and thinking about home. Up in the land at night-time, we always sat outside and watched the stars, beautiful stars. And I miss the stars.'

Although she was worried initially, Ina has friends in Adelaide now and is happy, but says her home is still up North. She travels back sometimes and has used mobile dialysis services to receive treatment while she visits home. Ina has also developed ways to manage her treatment and take care of herself. She makes sure to cook dinner to refrigerate before she goes to dialysis, so she doesn’t need to worry about preparing a meal when she gets home.

But she says the most difficult thing about living with kidney disease is how hard it is on Aboriginal people from remote regions to move far away from home to receive treatment.

> 'It’s very important and pretty difficult to manage. Some of us, some of our families, lose us on this machine.'

Ina enjoyed being a part of the Kidney Health Australia Yarning Kidneys Consultations - external site opens in new window. It was important to her to talk with doctors about her journey and contribute to the new guidelines for treatment and management of CKD in Aboriginal and Torres Strait Islander peoples.

To Ina, it is important to share her story so that her family and the children growing up in her community know to take care of their kidney health and to have kidney checks - external site opens in new window.

This case study is based on an interview with a person who is living with chronic kidney disease. This personal account is not necessarily representative of the circumstances of other people with chronic kidney disease or the challenges they may face, but it is our hope that it will give readers a greater awareness and understanding of the diversity of people’s experiences with CKD.

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Treatment on Country

How many people are living with chronic kidney disease in Australia?

Page highlights:

Variation by age and sex

- 1.7 million Australians aged 18 and over had biomedical signs of chronic kidney disease in 2011–12 – 11% of the adult population.
- Only 6.1% of adults with biomedical signs of chronic kidney disease self-reported having the condition.

Trends over time

- The prevalence of chronic kidney disease remained stable between 1999–2000 and 2011–12.

Variation between population groups

- An estimated 18% of Aboriginal and Torres Strait Islander adults (59,600 people) had biomedical signs of chronic kidney disease in ABS 2012–13.

Further information

Chronic kidney disease (CKD) is a growing health problem in Australia. Due to our ageing population, its prevalence – the total number of cases – is likely to continue increasing. This web page presents data on prevalence of CKD.

Due to the asymptomatic nature of CKD, and because diagnosis requires the presence of measured biomedical markers that persist for at least 3 months, people often do not realise they have the disease. As a result, numbers based on self-report are often underestimates of the true number of people living with CKD in Australia. Accurate estimates of the prevalence of CKD require large-scale surveys of biomedical markers of kidney function in the population.

The Australian Bureau of Statistics (ABS) 2011–12 National Health Measures Survey (NHMS) is the most recent national survey to date to include biomedical testing for markers of CKD (ABS 2013). The following section reports on the number of Australians who showed biomedical signs of CKD in the 2011–12 NHMS; these data should not be compared with numbers reflecting self-reported CKD.

An estimated 1.7 million Australians aged 18 and over had biomedical signs of chronic kidney disease in 2011–12, representing 11% of the adult population, according to the most recently available data (AIHW analysis of ABS 2013).

Only 6.1% of adults with biomedical markers of CKD self-reported having the condition in 2011–12, indicating that the majority of CKD in Australia is undiagnosed (ABS 2013).

Variation by age and sex

In 2011–12, the prevalence of biomedical signs of CKD among adults aged 18 and over:

- was around 11% for both men and women (AIHW analysis of ABS 2013)
- increased rapidly after age 74, with rates among those aged 75 and over being twice as high (44%) as rates for people aged 65–74 (22%) (Figure 1).

Figure 1: Prevalence of chronic kidney disease among people aged 18 and over, by age and sex, 2011–12

The bar chart shows the percentage of adults aged 18 and over who showed biomedical signs of CKD in the 2011-12 National Health Measures Survey. Males had a higher prevalence than females across all age groups except 18 to 44 year-olds, where CKD was slightly more prevalence in females (7.1%) than males (5.3%). Prevalence increased with age, and rapidly after age 65. People aged 75 and over showed the highest prevalence of biomedical signs of CKD.

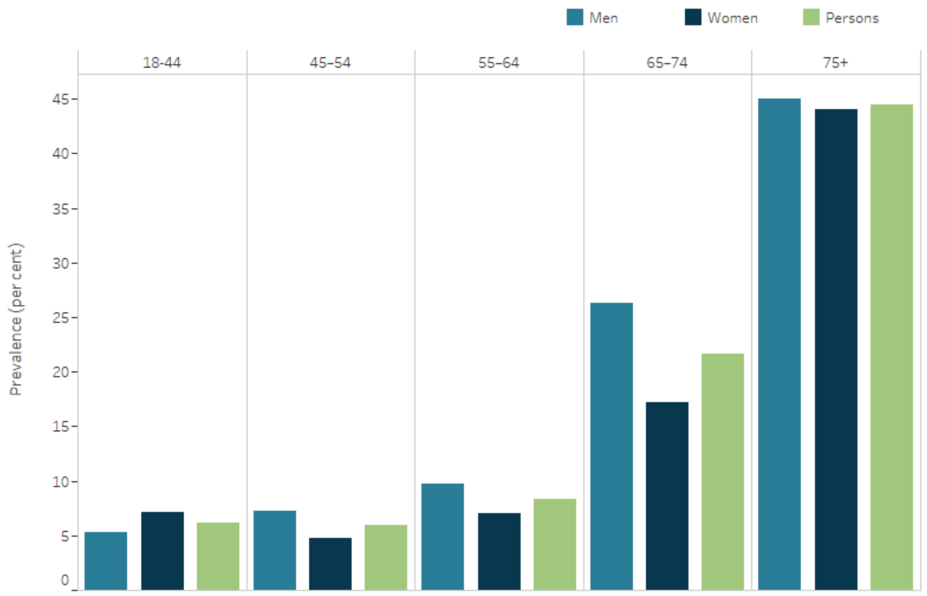


Figure 1: Prevalence of chronic kidney disease among people aged 18 and over, by age and sex, 2011-12

Notes
1. Confidence interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.
2. CKD prevalence is based on measured eGFR and ACR results of people who participated in the National Health Measures survey.
3. Participants with missing or unreliable measurement of eGFR or ACR were excluded from the denominator population.

Chart: AIHW. Source: AIHW analysis of ABS 2013.
https://www.aihw.gov.au

Download data

Stages of chronic kidney disease

Stages 1 and 2
eGFR ≥ 60, with albuminuria, haematuria, or a pathological or structural abnormality

There are usually no symptoms, as the kidneys are still able to function adequately when they are slightly damaged. This makes diagnosis difficult. The estimated glomerular filtration rate (eGFR) is normal (≥90mL/min/m^2; stage 1) or slightly reduced (between 60 and 89 mL/min/m^2; stage 2). The risk of disease progression depends on albuminuria levels (Figure 2).

Stages 3 and 4
eGFR between 15 and 59, with or without albuminuria

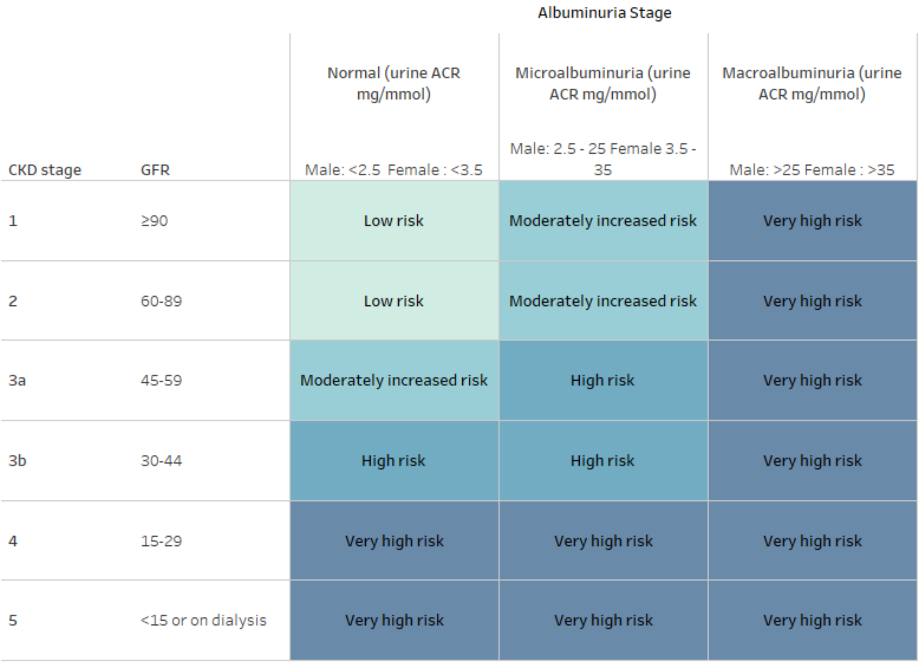
The level of waste (urea and creatinine) in the blood rises and a person may start to feel unwell. Kidney function is reduced and blood pressure rises. This is usually when diagnosis occurs. Stage 3 is marked by a moderate reduction in eGFR (between 30 and 59 mL/min/m^2) and is divided into stage 3a and 3b. Stage 4 is marked by a severe reduction in eGFR (between 15 and 29 mL/min/m^2). In these stages, the risk of progression can depend on both GFR and albuminuria.

Stage 5 – kidney failure (also known as end-stage kidney disease)
eGFR < 15 or on dialysis

This is marked by substantial loss of kidney function. The kidneys are no longer able to adequately filter waste from the blood and the person requires kidney replacement therapy – either dialysis or a kidney transplant – to stay alive. The risk of progression is very high.

Figure 2: Stages of chronic kidney disease and risk of progression, by GFR and albuminuria

The table shows the categorisation of kidney function stage according to glomerular filtration rate (GFR) and albuminuria stage. Albuminuria stage is categorised as normal, microalbuminuria and macroalbuminuria according to urine ACR (mg/mmol). Kidney function stage 1 is defined by GFR greater than or equal to 90, stage 2 is GFR 60 to 89, stage 3a is GFR 45 to 59, stage 3b is GFR 30 to 44, stage 4 is GFR 15 to 29 and stage 5 is defined by GFR less than 15 or receiving dialysis.



		Albuminuria Stage		
		Normal (urine ACR mg/mmol)	Microalbuminuria (urine ACR mg/mmol)	Macroalbuminuria (urine ACR mg/mmol)
CKD stage	GFR	Male: <2.5 Female : <3.5	Male: 2.5 - 25 Female 3.5 - 35	Male: >25 Female : >35
1	≥90	Low risk	Moderately increased risk	Very high risk
2	60-89	Low risk	Moderately increased risk	Very high risk
3a	45-59	Moderately increased risk	High risk	Very high risk
3b	30-44	High risk	High risk	Very high risk
4	15-29	Very high risk	Very high risk	Very high risk
5	<15 or on dialysis	Very high risk	Very high risk	Very high risk

Figure 2: Stages of chronic kidney disease and risk of progression, by GFR and albuminuria

Note: For 'low risk' categories, CKD is not present unless haematuria, structural or pathological abnormalities are present.

Chart: AIHW. Source: KDIGO CKD Workgroup 2013, KHA 2020.
https://www.aihw.gov.au

In 2011–12, 97% of adults with biomedical signs of CKD were in stages 1 to 3 of the disease (ABS 2013):

- 7.0% (1.1 million people) had biomedical signs indicating stage 1 or 2 CKD
- 3.0% (466,700 people) had biomedical signs indicating stage 3a CKD
- 1.0% (154,200 people) had biomedical signs indicating stage 3b and stages 4 to 5 CKD (Figure 3).

Figure 3: Prevalence of biomedical markers of chronic kidney disease among people aged 18 and over, by stage and sex, 2011–12

The bar chart shows the percentage of adults aged 18 and over who showed biomedical signs of CKD in the 2011-12 National Health Measures Survey. The proportion of people with signs of CKD decreased with the severity of the disease indicators from around 4% showing signs of Stage 1, to around 1% showing signs of Stages 3b, 4 and 5 (combined).

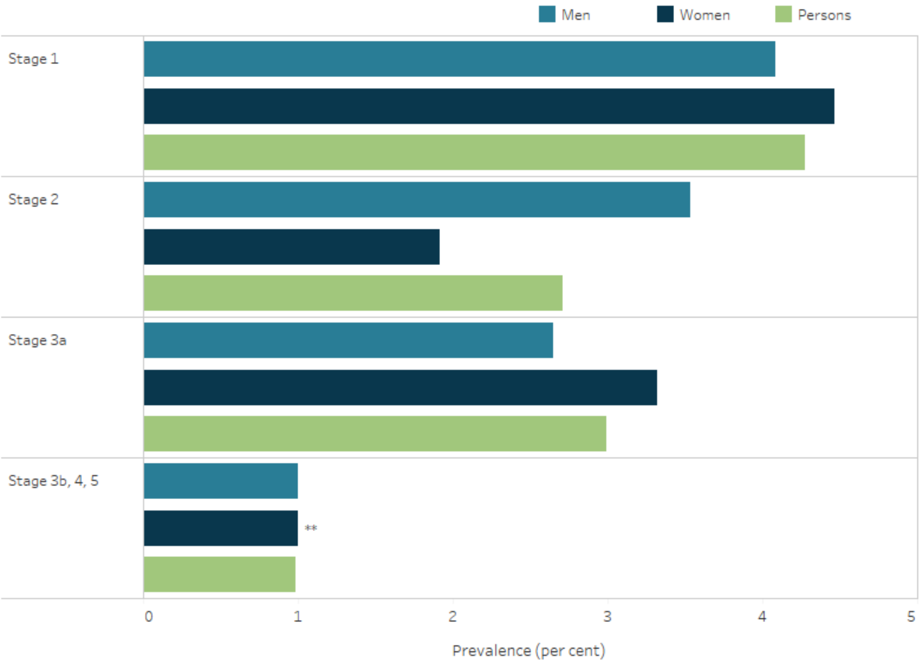


Figure 3: Prevalence of biomedical markers of chronic kidney disease among people aged 18 and over, by stage and sex, 2011–12

[Notes]

Chart: AIHW. Source: AIHW analysis of ABS 2013.
https://www.aihw.gov.au

Download data

CKD prevalence is closely related to age. In 2011–12:

- 6.6% of people aged 18–64 showed biomedical signs of CKD, compared with 31% of those aged 65 and over
- 70% of adults with CKD stages 1 and 2 were aged 18–64
- 88% of adults with CKD stages 3 to 5 were aged 65 and over.

Trends over time

Two national surveys have been conducted in Australia that provide data on biomarkers of CKD – the 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab) and the 2011–12 NHMS (ABS 2013). Because the AusDiab study included participants aged 25 and over only, comparisons over time between it and the NHMS do not include adults aged 18–24. For more information on methods for these trends see: Chronic kidney disease prevalence among Australian adults over time.

Note that the ABS is currently undertaking a multi-year Intergenerational Health and Mental Health Study in 2020–2024, which will include a new NHMS and a new National Aboriginal and Torres Strait Islander Health Measures Survey (ABS 2022).

Between 1999–2000 and 2011–12, CKD prevalence remained stable, at around 10% among adults aged 25 and over (AIHW 2018). There was no difference between men and women in the prevalence of CKD in both surveys (Figure 4).

Figure 4: Prevalence of chronic kidney disease among people aged 25 and over, by sex, 1999–2000 and 2011–12

The bar chart shows the percentage of adults aged 25 and over who showed biomedical signs of CKD in two national surveys – the AusDiab Study in 1999-2000 and the National Health Measures Survey in 2011-12, by sex. For both males and females, the proportion of the population with signs of CKD remained stable between the 2 surveys, at around 10% of the population.
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The age pattern between both surveys was similar, with CKD prevalence increasing gradually until age 64, and sharply from age 65; however, there was a significant increase in CKD prevalence in those aged 25–44 in 2011–12 compared with 1999–2000 (AIHW 2018) (Figure 5).

Figure 5: Prevalence of chronic kidney disease by age, 1999–2000 and 2011–12

The bar chart shows the percentage of adults aged 25 and over who showed biomedical signs of CKD in two national surveys – the AusDiab Study in 1999-2000 and the National Health Measures Survey in 2011-12, by age. The proportion of the population with signs of CKD remained stable between the 2 surveys, increasing with age, particularly from age 65. The highest prevalence was in people aged 75 and over (around 44.5% in 2011-12).

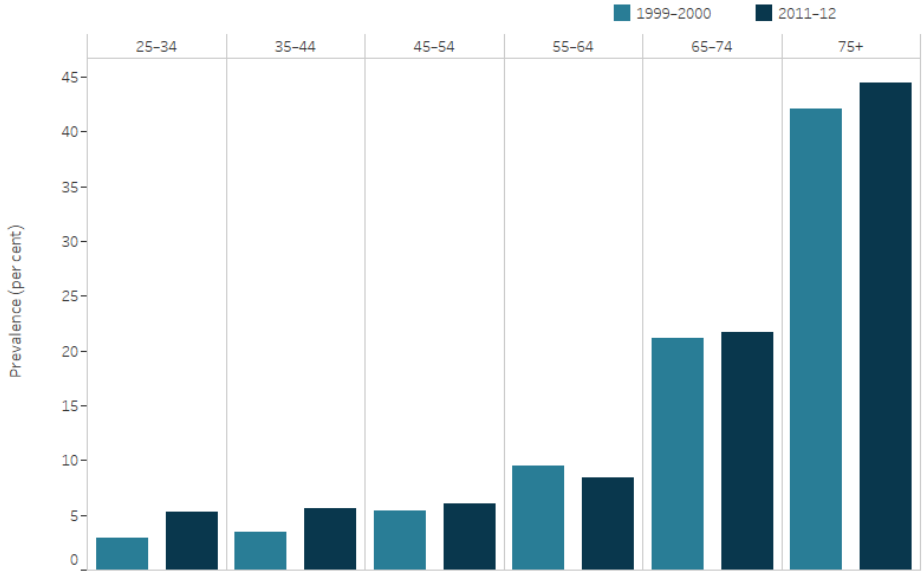

Figure 5: Prevalence of chronic kidney disease by age, 1999–2000 and 2011–12

Notes
1. CKD prevalence in 2011–12 is based on measured eGFR and ACR results of people who participated in the National Health Measures survey. Prevalence in 1999–2000 is based on calculated eGFR using standardised creatinine measures and the CKD-epi formula (AIHW 2018).
2. Participants with missing or unreliable measurement of eGFR or ACR were excluded from the denominator population.
3. Overall rates by sex have been adjusted by age and sex using the 2001 Australian standard population.

Chart: AIHW. Source: AIHW analysis of 1999–2000 Australian Diabetes and Lifestyle Study and AIHW analysis of ABS 2013.
https://www.aihw.gov.au

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The number of Australians with stages 3 to 5 CKD nearly doubled between 1999–2000 (322,000) and 2011–12 (604,000) (AIHW 2018). This increase was mostly driven by an increase in CKD stage 3, due to growth in the size of the population aged 65 and over.

Variation between population groups

Aboriginal and Torres Strait Islander people

An estimated 18% of Indigenous Australian adults (59,600 people) had biomedical signs of CKD, according to the ABS 2012–13 National Aboriginal and Torres Strait Islander Health Measures Survey (ABS 2014).

Indigenous adults were twice as likely as non-Indigenous adults to have biomedical signs of CKD, after accounting for differences in the age structure of the populations.

Remoteness and socioeconomic area

After adjusting for differences in the age structures of the population, the prevalence of biomedical signs of CKD among adults in 2011–12:

- was 1.3 times as high in *Outer regional and remote areas* as in *Major cities*
- was 1.5 times as high in the lowest socioeconomic areas as in the highest socioeconomic areas (Figure 6).

See *Geographical variation in disease: diabetes, cardiovascular and chronic kidney disease* for more information on the prevalence of CKD by state/territory, Population Health Network and Population Health Area.

Figure 6: Prevalence of chronic kidney disease among people aged 18 and over, by remoteness and socioeconomic area, 2011–12

The bar chart shows the age-standardised percentage of males, females and the total, aged 18 and over with biomedical signs of CKD in 2011-12, by remoteness and socioeconomic area. The prevalence of signs of CKD was similar across remoteness areas, but was highest in people living in the most disadvantaged socioeconomic areas.

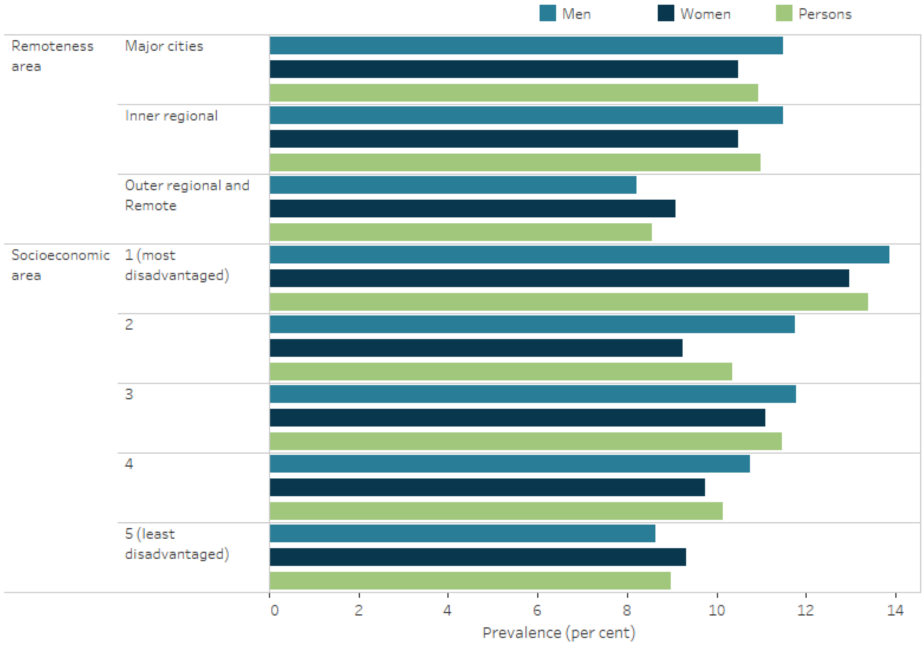

Figure 6: Prevalence of chronic kidney disease among people aged 18 and over, by remoteness and socioeconomic area, 2011–12

[Notes]

Chart: AIHW. Source: AIHW analysis of ABS 2013.
https://www.aihw.gov.au

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Further information

For more information on the prevalence of CKD, see:

- *Chronic kidney disease prevalence among Australian adults over time*
- *Indicators of socioeconomic inequalities in cardiovascular disease, diabetes and chronic kidney disease*

References

ABS (Australian Bureau of Statistics) (2013) *Australian Health Survey: biomedical results for chronic diseases* - external site opens in new window, ABS, Australian Government, accessed 22 February 2022.

ABS (2013) *Microdata: Australian Health Survey, Core Content – Risk Factors and Selected Health Conditions, 2011–12* - external site opens in new window, AIHW analysis of detailed microdata, accessed 20 October 2021.

ABS (2014) *Australian Aboriginal and Torres Strait Islander health survey: biomedical results, 2012–13* - external site opens in new window, ABS, Australian Government, accessed 18 March 2022.

ABS (2018) *Kidney disease* - external site opens in new window, ABS, Australian Government, accessed 18 March 2022.

ABS (2022) *Intergenerational Health and Mental Health Study (IHMHS),* - external site opens in new window ABS, Australian Government, accessed 10 May 2022.

AIHW (Australian Institute of Health and Welfare) 2018 *Chronic kidney disease prevalence among Australian adults over time*, AIHW, Australian Government, accessed 13 May 2022.

Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group, *KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease* - external site opens in new window, Kidney inter., Suppl. 2013; 3: 1–150.

KHA (Kidney Health Australia) (2020) *Stages of kidney disease* - external site opens in new window, Kidney Health Australia website, accessed 11 April 2022.

Risk factors for chronic kidney disease

What is a risk factor?

Risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health disorder.

Behavioural risk factors are health-related behaviours that individuals have the most ability to modify. Behavioural risk factors for chronic kidney disease (CKD) include:

- smoking
- diet
- physical activity
- alcohol consumption

Biomedical risk factors are bodily states that have an impact on a person's risk of disease. Biomedical risk factors for CKD include:

- diabetes
- high blood pressure (also known as hypertension)
- established cardiovascular disease, including heart attack, heart failure and stroke
- overweight and obesity.

Some biomedical risk factors can be influenced by health behaviours. Others, such as type 1 diabetes, occur independently of behaviours.

Fixed risk factors cannot be modified. Fixed risk factors for CKD include:

- ageing
- family history of kidney failure
- history of acute kidney injury

Other non-traditional risk factors such as use of certain medications, kidney stones, foetal and maternal factors, infections, and environmental factors are increasingly being recognised as threats to kidney health (Luyckx et al. 2017).

For most behavioural and biomedical risk factors there is no known threshold at which risk begins. The relationship between risk and disease is continuous – there is an increasing effect as exposure to the risk factor increases. Having multiple risk factors further escalates risk.

Controlling or managing risk factors can help reduce the risk of CKD. The progression of CKD can also be slowed by controlling risk factors and by appropriate disease treatment and management.

This section presents statistics on selected key risk factors that increase the risk of a person developing CKD.

View the risk factors for CKD:

- Diabetes
- High blood pressure
- Cardiovascular disease
- Overweight and obesity
- Smoking
- Multiple risk factors
- Risk factors among adults with chronic kidney disease

Further information

For more information on these and other CKD risk factors, see:

- Alcohol
- Diet

- Overweight and obesity
- Physical activity
- Smoking and e-cigarettes

Visit Risk factors for more information on this topic.

References

Luyckx VA, Tuttle KR, Garcia-Garcia G, Gharbi MB, Heerspink HJL, Johnson DW et al. (2017) 'Reducing major risk factors for chronic kidney disease - external site opens in new window', *Kidney International Supplements,* 7(2):71–87.

Diabetes

Diabetes is a chronic condition marked by high levels of glucose in the blood. It is caused by the inability of the body to produce or effectively use insulin, a hormone made by the pancreas to control blood glucose levels. Type 2 diabetes is the most common form. It involves a genetic component but is largely preventable and can be managed with changes to diet and physical activity, and with medications (Diabetes Australia 2022).

Diabetes is one of the main causes of chronic kidney disease (CKD) (AIHW 2021, ANZDATA 2021). High blood glucose levels can damage the kidney's filters (nephrons), affecting the ability to remove waste and fluid from the body. Diabetic kidney disease is also called 'diabetic nephropathy'.

Diabetes and chronic kidney disease share risk factors. Many people with diabetes develop high blood pressure, which can also damage the kidneys. People with both chronic kidney disease and diabetes are more likely to develop other complications of diabetes such as nerve damage and eye damage.

Diabetes is the most common reason that people with chronic kidney disease need to have dialysis or a kidney transplant. The mortality risk for people with kidney failure and diabetes is greater than the risk for people with kidney failure alone (Lim et al. 2018).

In 2021, based on linked data from the National Diabetes Services Scheme (NDSS) and Australasian Paediatric Endocrine Group (APEG) state-based registers:

- more than 1 in 20 (1.3 million) Australians were living with diabetes. This includes people with type 1 diabetes, type 2 diabetes and other diabetes, but excludes gestational diabetes (AIHW 2023)
- diabetes was more common in males (4.8%) than females (3.8%) after controlling for age
- almost 1 in 5 (19.5%) Australians aged 80–84 were living with diabetes, which was almost 30 times as high as those aged under 40 (0.7%)
- age-standardised prevalence rose from 2.4% in 2000 to 4.3% in 2021. The diabetes rate remained has remained relatively stable since 2011 (Figure 1).

Information based on linked NDSS and APEG data underestimates prevalence as it does not include people with undiagnosed diabetes. The ABS 2011–12 Australian Health Survey, which included both measured and self-reported data, showed that for every 4 adults with diagnosed diabetes, there was 1 who was undiagnosed (ABS 2013).

Figure 1: Prevalence of diabetes from linked NDSS and APEG data, 2000 to 2021

This chart shows the estimated age-standardised proportion of people with diabetes based on data from the linked National Diabetes Services Scheme and Australasian Paediatric Endocrine Group between 2000 and 2021. The proportion increased from 2.4% in 2000 to 4.3% in 2021 but has remained relatively stable since 2011.

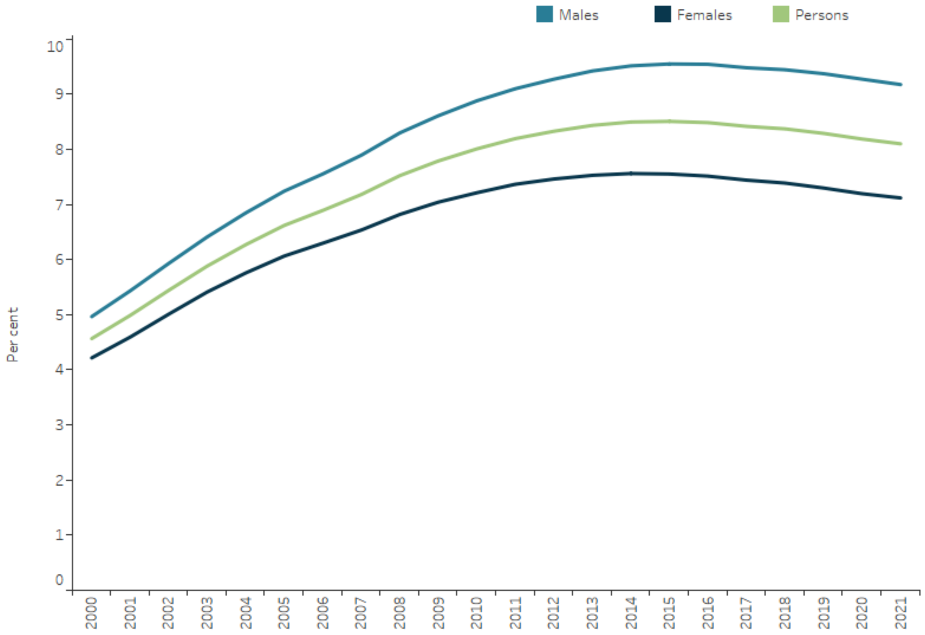

Figure 1: Prevalence of diabetes from linked NDSS and APEG data, 2000 to 2021

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW analysis of linked National Diabetes Services Scheme (NDSS) and Australasian Paediatric Endocrine Group (APEG) state-based registrars.
https://www.aihw.gov.au

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Data presented from the linked NDSS and APEG data (Figure 1) are likely to underestimate the true prevalence of diabetes in the Australian population. This is because:

- both data sources are based on people who have received a formal medical diagnosis of diabetes. However, Australian studies have shown that many people are living with undiagnosed type 2 diabetes.
- registration with the NDSS is voluntary and eligible people with type 2 diabetes are more likely to register if they access subsidised diabetes consumables to monitor their diabetes at home or require insulin. Some people may be diagnosed with diabetes and choose not to register with the scheme.
- Indigenous Australians are under-represented on the NDSS (see Using the NDSS for reporting on Indigenous Australians).

Despite these limitations, these data sources provide the best picture into the number of people living with diabetes in Australia to monitor changes in populations at risk and trends over time. Further research is required to examine whether the proportion of people with undiagnosed type 2 diabetes in Australia has changed over time and the impact of this on the prevalence of disease in Australia.

Variation between population groups

- Around 7.9% of Aboriginal and Torres Strait Islander people (64,100 people) were living with diabetes according to self-reported data from the ABS 2018–19 National Aboriginal and Torres Strait Islander Health Survey (ABS 2019). After controlling for differences in the age structures of the populations, Indigenous Australians were almost 3 times as likely to have diabetes as non-Indigenous Australians (13% compared with 4.3%).
- The age-standardised prevalence rate of diabetes in 2021 was around 1.8 times as high among those living in the lowest socioeconomic areas as among those living in the highest socioeconomic areas. The variation in prevalence rates between the lowest and highest socioeconomic areas was slightly higher among females than males (2.0 and 1.7 times as high, respectively).
- The age-standardised prevalence rate of diabetes in 2021 was highest in *Remote and very remote* areas where people were 1.3 times as likely to be living with diabetes as those in *Major cities*. The disparity in *Remote and very remote* areas was more pronounced among females than males (1.6 and 1.1 times as high, respectively) (AIHW 2023).

References

ABS (Australian Bureau of Statistics) (2013) *Australian Health Survey: biomedical results for chronic diseases, 2011–12* - external site opens in new window, ABS, Australian Government.

ABS (2019) *National Aboriginal and Torres Strait Islander Health Survey, 2018–19* - external site opens in new window, ABS, Australian Government.

AIHW (2021) *Australian Burden of Disease Study 2018: interactive data on risk factor burden*, AIHW, Australian Government, accessed 1 February 2022.

AIHW (2023) *Diabetes facts*, AIHW, Australian Government, accessed 30 June 2023.

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2021) *ANZDATA 44th Annual Report 2021* - external site opens in new window, ANZDATA, Adelaide, accessed 1 November 2021.

Diabetes Australia (2022) *What is diabetes* - external site opens in new window, Diabetes Australia, accessed 12 April 2022.

Lim WH, Johnson DW, Hawley C, Lok C, Polkinghorne KR, Roberts MA et al. (2018) Type 2 diabetes in patients with end-stage kidney disease: influence on cardiovascular disease-related mortality risk - external site opens in new window. *Medical Journal of Australia,* 209:440–446, doi: 10.5694/mja18.00195.

High blood pressure

Blood pressure is the force exerted by blood on the walls of the arteries, depending on whether the heart muscle is contracting (systolic blood pressure), or relaxing between contractions (diastolic blood pressure). High blood pressure, also known as raised blood pressure or hypertension, is where blood pressure is permanently higher than normal.

Untreated high blood pressure is a key risk factor for the development and progression of chronic kidney disease. It can damage the blood vessels in the kidneys, leading to reduced blood supply and making waste and fluid removal difficult (Webster et al. 2017). Extra fluid can, in turn, raise blood pressure and cause more damage, ultimately leading to kidney failure.

High blood pressure is also a risk factor for cardiovascular events in people with chronic kidney disease or kidney failure. Drug treatment and changes to health-related behaviours (such as weight loss, a healthy diet and physical activity) can help to control blood pressure.

In the Australian Bureau of Statistics (ABS) National Health Survey 2017–18, people aged 18 years and over could consent to having a blood pressure measurement taken at the time of the interview. ‘Uncontrolled high blood pressure’ is reported for participants with a systolic blood pressure reading 140 mmHg or more, or diastolic blood pressure of 90 mmHg or more, or receiving medication for high blood pressure (ABS 2018).

Blood pressure is considered to be uncontrolled if measured levels of systolic or diastolic blood pressure are high, regardless of the use of blood pressure medication. ‘Controlled blood pressure’ refers to those people who are taking blood pressure medication and have a normal blood pressure reading.

In 2017–18, based on measured data from the National Health Survey:

- 34% of adults had high blood pressure. This included 23% who had uncontrolled high blood pressure, and 11% whose blood pressure was controlled with medication.
- men were more likely to have uncontrolled high blood pressure than women (25% and 20%) (Figure 1).
- the proportion of adults with uncontrolled high blood pressure increased with age – from 7.5% among those aged 18–34 (10.2% men, 4.9% women) to a peak of 47% at age 85 and over (51% men, 48% women) (AIHW 2019).

The proportion of Australian adults with high blood pressure has been stable since 2011–12.

Figure 1 and 1(b): Prevalence distribution of systolic and diastolic blood pressure measurements among adults, 2017–18

The two line charts show the distribution of systolic and diastolic blood pressure levels among adults by sex in 2017–18.

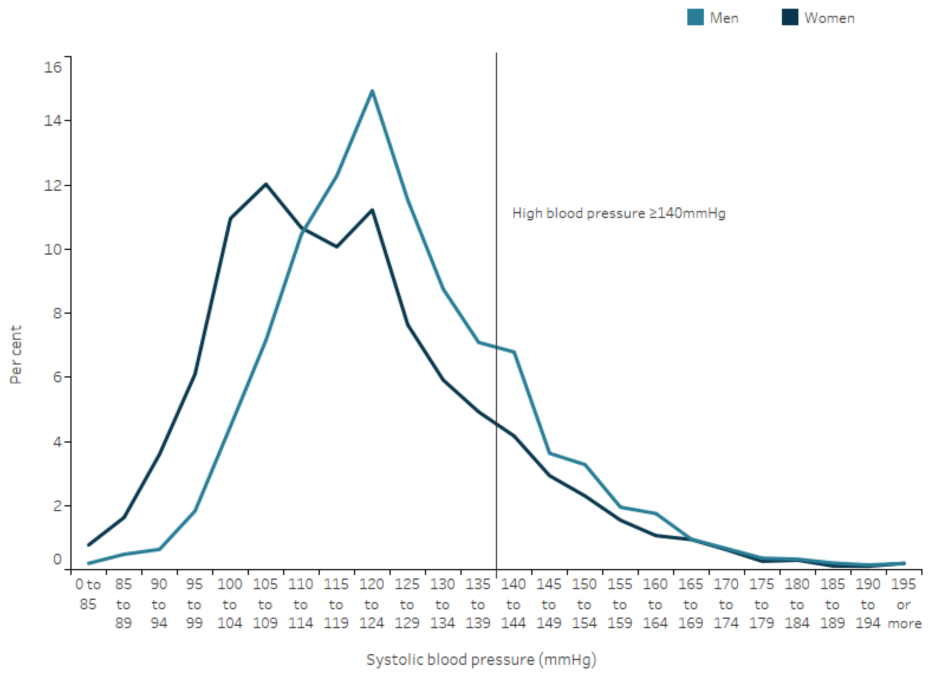

Figure 1: Prevalence distribution of systolic blood pressure measurements among adults, 2017–18

[Notes]

Chart: AIHW. Source: AIHW analysis of ABS 2019.
https://www.aihw.gov.au

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Variation between population groups

- In 2018–19, of the estimated 486,300 Indigenous adults who had their blood pressure measured, 23% (112,100) had high blood pressure. After adjusting for different population age structures, Indigenous adults were 1.2 times as likely as non-Indigenous adults to have measured high blood pressure (AIHW and NIAA 2022).
- The age-standardised prevalence rate of uncontrolled high blood pressure in 2017–18 was 1.3 times as high among those living in the lowest socioeconomic areas as among those living in the highest socioeconomic areas (AIHW 2019).
- The age-standardised prevalence rate of uncontrolled high blood pressure in 2017–18 was similar between remoteness areas in 2017–18 (AIHW 2019).

References

ABS (Australian Bureau of Statistics) 2018, *National Health Survey: first results methodology* - external site opens in new window, ABS, Australian Government, accessed 1 February 2022.

ABS (2019) *Microdata: National Health Survey, 2017–18* - external site opens in new window, AIHW analysis of detailed microdata, accessed 20 March 2019.

AIHW (Australian Institute of Health and Welfare) (2019) *High blood pressure*, AIHW, Australian Government, accessed 1 February 2022.

AIHW and NIAA (National Indigenous Australians Agency) (2022) *Aboriginal and Torres Strait Islander Health Performance Framework summary report 2020* - external site opens in new window, Measure 1.07 – High blood pressure, AIHW, Australian Government, accessed 31 May 2022.

Webster AC, Nagler EV, Morton RL and Masson P (2017) Chronic kidney disease - external site opens in new window, *Lancet,* 389:1238–1252, doi: 10.1016/S0140-6736(16)32064-5.

Australian Government
Australian Institute of
Health and Welfare

Cardiovascular disease

Cardiovascular disease – also known as heart, stroke and vascular disease – is a broad term that describes the many different diseases and conditions that affect the heart and blood vessels. Common types of cardiovascular disease in Australia include coronary heart disease, stroke and heart failure.

Cardiovascular disease and chronic kidney disease are interrelated. Both diseases share common risk factors such as smoking, obesity, high blood pressure, diabetes and dyslipidaemia. Disease of one organ can impair function in the other.

Cardiovascular disease can result in a reduced supply of blood to the kidneys, which can lead to kidney disease. People with chronic kidney disease are at greater risk of coronary artery disease, heart failure, arrhythmias, and sudden cardiac death. People with kidney failure are at much higher risk of mortality due to cardiovascular disease (Go et al. 2004, Jankowski et al. 2021). In Australia, cardiovascular disease is the most common cause of death among people who have chronic kidney disease.

An estimated 1.2 million Australians aged 18 and over (6.2% of the adult population) had 1 or more conditions related to heart, stroke or vascular disease, based on self-reported data from the ABS 2017–18 National Health Survey (AIHW 2021).

The prevalence of heart, stroke and vascular disease among adults in 2017–18:

- was higher among men (641,000, an age-standardised rate of 6.5%) than women (509,000, an age-standardised rate of 4.8%)
- increased with age – 26% of people aged 75 and over had heart, stroke and vascular disease, compared with 1.0% of adults aged 18–44 (Figure 1).

Figure 1: Prevalence of self-reported heart, stoke and vascular disease among people aged 18 and over, by age and sex, 2017–18

The bar chart shows the prevalence of self-reported heart, stroke and vascular disease by age group in 2017–18. Rates were highest among men and women aged 75 and over (32% and 20%).

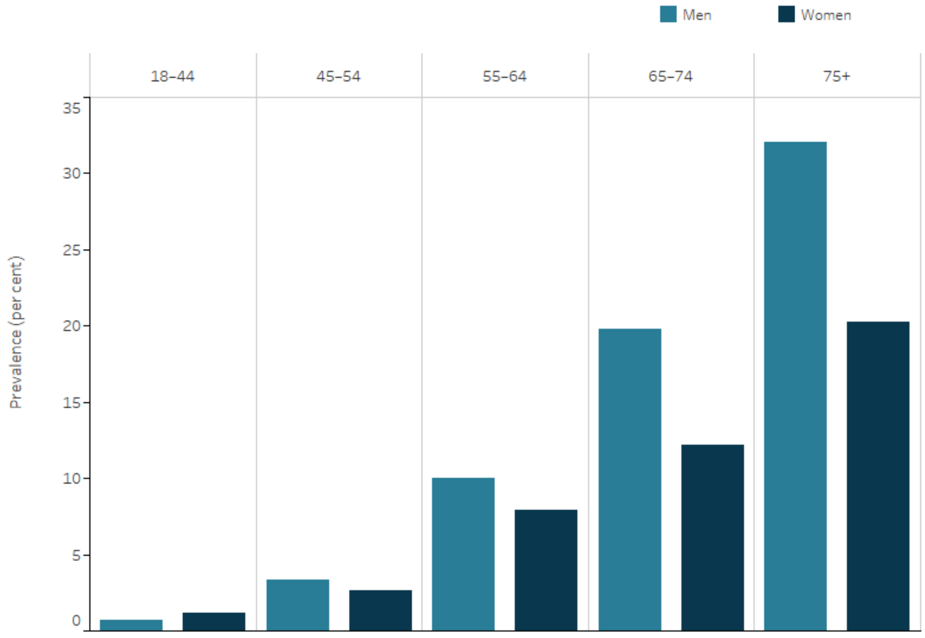

Figure 1: Prevalence of self-reported heart, stroke and vascular disease among people aged 18 and over, by age and sex, 2017-18

Note: Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

Chart: AIHW. Source: AIHW analysis of ABS 2019.
https://www.aihw.gov.au

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Variation between population groups

- In 2018–19, an estimated 42,000 Indigenous adults (8.6%) self-reported having heart, stroke and vascular disease. After adjusting for different population age structures, Indigenous adults were 2.1 times as likely as non-Indigenous adults to self-report having heart, stroke and vascular disease (AIHW 2021).
- The age-standardised prevalence rate of self-reported heart, stroke and vascular disease did not vary significantly between adults living in the most and least disadvantaged socioeconomic areas in 2017–18.
- The age-standardised prevalence rate of self-reported heart, stroke and vascular disease did not vary significantly across remoteness area in 2017–18.

References

ABS (Australian Bureau of Statistics) (2019) *Microdata: National Health Survey, 2017–18* - external site opens in new window, AIHW analysis of detailed microdata, accessed 4 March 2021.

AIHW (Australian Institute of Health and Welfare) (2021) *Heart, stroke and vascular disease: Australian facts*, AIHW, Australian Government, accessed 1 February 2022.

Go AS, Chertow GM, Fan D, McCulloch CE and Hsu C (2004) Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization - external site opens in new window, *New England Journal of Medicine*, 351:1296–1305, doi: 10.1056/NEJMoa041031.

Jankowski J, Floege J, Fliser D, Böhm M and Marx N (2021) Cardiovascular disease in chronic kidney disease: pathophysiological insights and therapeutic options - external site opens in new window. *Circulation,* 143:1157–1172, doi: 10.1161/CIRCULATIONAHA.120.050686.

Overweight and obesity

Overweight and obesity refers to excess body weight. Excess weight, especially obesity, increases a person’s risk of developing chronic kidney disease (CKD) by raising levels of blood pressure and abnormal blood abnormal blood lipids, and placing people at increased risk of cardiovascular disease and type 2 diabetes (NHMRC 2013).

Being overweight or obese can make it more difficult to control or manage chronic diseases. Overweight and obesity is also associated with higher rates of death (AIHW 2023, 2021). Evidence has shown that the risk of CKD is almost 1.5 times as high for an overweight but not obese person and almost twice as high for an obese person. Obese women have a higher risk of developing CKD than obese men (Wang et al. 2008).

In adults, overweight and obesity is defined as a body mass index (BMI) of 25–29 kg/m^2 and ≥30 kg/m^2, respectively.

This report uses BMI to define overweight and obesity. For information on waist circumference, see 'Waist circumference' in Diabetes: Australian facts.

Based on measured BMI from the Australian Bureau of Statistics (ABS) 2022 National Health Survey:

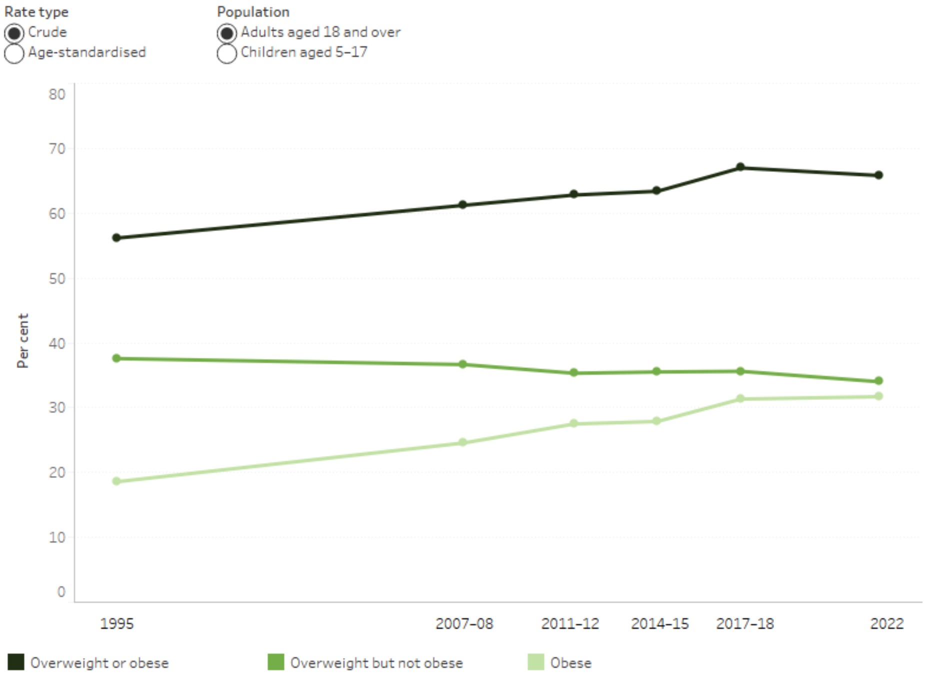
- one in 4 children and adolescents aged 2–17 (26%) were living with overweight or obesity. This is approximately 1.3 million children and adolescents. The proportion living with overweight or obesity was similar for boys and girls across most age groups, except for the youngest age group, where more girls aged 2–4 (24%) were living with overweight or obesity than boys (14%).
- 66% of adults aged 18 and over were living with overweight or obesity, with 34% living with overweight but not obesity, and 32% living with obesity.
- men had higher rates of overweight or obesity than women (71% men, 61% women), and higher rates of obesity (33% men, 31% women).
- obesity was more common among older age groups – 15% of men and 16% of women aged 18–24 years were living with obesity, compared with 41% of men and 37% of women aged 65–74 (AIHW 2024).

After adjusting for different population age structures over time, the proportion of adults aged 18 and over living with overweight or obesity increased from 57% in 1995 to 65% in 2022. Over this time, the proportion living with overweight (but not obesity) declined from 38% to 34% but the proportion of those living with obesity increased, from 19% in 1995 to 31% (Figure 1) (AIHW 2024).

See the *Overweight and obesity* report for more information.

Figure 1: Proportion of overweight or obesity in children and adolescents aged 5–17, and adults aged 18 and over, 1995 to 2022

Data show that in children and adolescents and adults the prevalence of overweight/obesity has generally increased from 1995 to 2022.



Notes:

1. Age standardised rates use the 2001 Australian population to account for differences in the age structure across population groups.

2. Age-standardised rates are only for adults aged 18 and over.

Source: Overweight and Obesity (AIHW 2024). For data and footnotes see data tables S4 and S11 in *Overweight and obesity*.

References

AIHW (Australian Institute of Health and Welfare) (2021) *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018 – Summary report*, AIHW, Australian Government, accessed 18 October 2023.

AIHW (2023) *Reducing the burden due to overweight (including obesity) and physical inactivity*, AIHW, Australian Government, accessed 18 October 2023.

AIHW (2024) *Overweight and obesity*, AIHW, Australian Government, accessed 8 May 2024.

NHMRC (National Health and Medical Research Council) (2013) *Clinical Practice Guidelines for the Management of Overweight and Obesity in Adults, Adolescents and Children in Australia* - external site opens in new window, NHMRC, Melbourne, accessed 1 February 2022.

Wang Y, Chen X, Song Y, Caballero B & Cheskin LJ (2008) 'Association between obesity and kidney disease: a systematic review and meta-analysis - external site opens in new window', *Kidney International*, 73:19–33.

Smoking

Tobacco smoking is the leading cause of preventable disease and death in Australia today. Smoking increases blood pressure, reduces blood oxygen levels and damages blood vessels, heightening the risk of plaques and clots.

People who smoke are at increased risk for the development and progression of chronic kidney disease – and that risk increases with greater lifetime exposure to smoking (Hallan and Orth 2011; Yacoub et al. 2010). Smoking contributes to negative outcomes for people with kidney transplants (Mercado and Jaimes 2007). Smoking also contributes to the development of other chronic diseases closely linked to chronic kidney disease, including cardiovascular disease and type 2 diabetes (Briganti et al. 2002).

Australia's smoking rate has fallen over the past 40 years, largely attributable to public health strategies. However, the proportion of people continuing to smoke is still concerning, particularly in some population groups such as Aboriginal and Torres Strait Islander people, and people living in low socioeconomic areas (Greenhalgh et al. 2022).

In 2022–23, based on results from the National Drug Strategy Household Survey:

- 8.3% of people aged 14 and over smoked daily (males 9.0%, females 7.7%)
- men and women aged 50–59 had the highest proportion of current daily smokers (12.1% and 11.9%, respectively).

Between 2001 and 2022–23:

- the proportion age 14 and over who smoked daily decreased by 57% for both males and females
- daily smoking rates among males and females aged 15–24 decreased by 74% and 82%, respectively (AIHW 2024).

Use of e-cigarettes

While the proportion of Australians who smoke tobacco may be declining, the use of e-cigarettes is becoming more common, particularly among young adults. Current use of e-cigarettes among people aged 14 and over nearly tripled between 2019 (2.5%) and 2022–23 (7.0%) while quadrupling among people aged 18–24 (from 5.3% to 21%) and increasing more than five-fold among people aged 14–17 (from 1.8% to 9.7%) (AIHW 2024).

See the *National Drug Strategy Household Survey 2022–23* report for more information.

References

AIHW (Australian Institute of Health and Welfare) (2024) *National Drug Strategy Household Survey 2022–2023*, AIHW, Australian Government, accessed 22 March 2024.

Briganti EM, Branley P, Chadban SJ, Shaw JE, McNeil JJ, Welborn TA and Atkins RC (2002) 'Smoking is associated with renal impairment and proteinuria in the normal population: the AusDiab kidney study - external site opens in new window', *American Journal of Kidney Diseases,* 40:704–712.

Greenhalgh EM, Scollo MM and Winstanley MH (2022) *Tobacco in Australia: facts and issues* - external site opens in new window, Cancer Council Victoria, Melbourne, accessed 8 April 2022.

Hallan SI and Orth SR (2011) 'Smoking is a risk factor in the progression to kidney failure - external site opens in new window', *Kidney International,* 80:516–523.

Mercado C and Jaimes EA (2007) 'Cigarette smoking as a risk factor for atherosclerosis and renal disease: novel pathogenic insights - external site opens in new window', *Current Hypertension Reports*, 9:66–72.

Yacoub R, Habib H, Lahdo A, Radwan AA, Varjabedian L, Atalla G, Aki NK, Aldakheel S, Alahdab S and Albitar S (2010) 'Association between smoking and chronic kidney disease: a case control study - external site opens in new window', *BMC Public Health*, 10:731.

Multiple risk factors

Risk factors for chronic kidney disease (CKD) rarely act alone or independently. Many also apply to other chronic diseases such as cardiovascular disease and diabetes, which in turn are risk factors for CKD. CKD risk factors tend to coexist and to interact in their effects (AIHW 2021, White 2020). The more risk factors a person has, the greater their risk of developing chronic disease, including CKD (Licher et al. 2019).

Based on pooled data from the ABS 2014–15 and 2017–18 National Health Surveys:

- 76% of Australian adults had at least 1 of 5 key CKD risk factors – either diabetes, uncontrolled high blood pressure, heart, stroke and vascular disease, current smoker or overweight/obese
- 25% had 2 of these risk factors in combination, while 7.4% had 3 or more of these risk factors in combination (Figure 1)
- men (37%) were more likely than women (27%) to have 2 or more of these risk factors in combination (AIHW analysis of ABS 2016 and ABS 2019).

Figure 1: Multiple risk factor prevalence, people aged 18 and over, by sex, 2014–2018

The bar chart shows the distribution of number of risk factors in 2014–18, with men (37%) more likely than women (27%) to have 2 or more of these risk factors in combination.

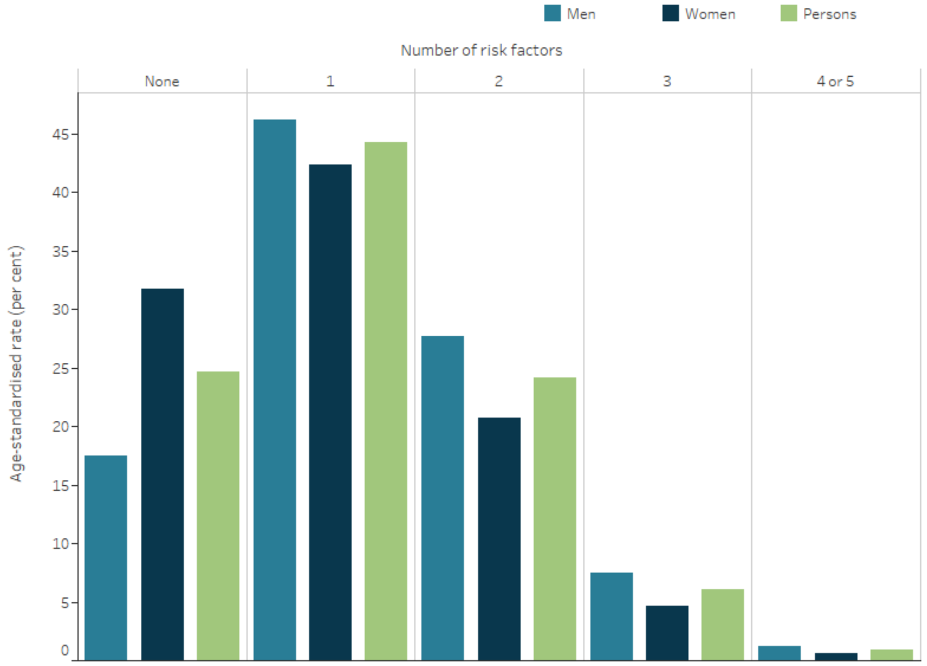


Figure 1: Multiple risk factor prevalence, people aged 18 and over, by sex, 2014 to 2018

[Notes]

Chart: AIHW. Source: AIHW analysis of ABS 2016 and ABS 2019.
https://www.aihw.gov.au

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Co-occurrence of 3 key risk factors

Many adults who are overweight or obese also have uncontrolled high blood pressure, and have diabetes, placing them at increased risk of CKD development and progression (Figure 2).

Based on pooled data from the ABS 2014–15 and 2017–18 National Health Surveys, an estimated:

- 13 million adults (71%) had at least 1 of these 3 risk factors (men 77%, women 64%)
- 2.9 million adults (16%) were overweight or obese and had uncontrolled high blood pressure (men 18%, women 14%)

- 624,000 adults (3.4%) were overweight or obese and self-reported having diabetes (men 4.0%, women 2.9%)
- 383,000 adults (2.1%) were overweight or obese, had uncontrolled high blood pressure, and self-reported having diabetes (men 2.4%, women 1.8%) (AIHW analysis of ABS 2016 and ABS 2019).

Figure 2: Prevalence of three key risk factors for chronic kidney disease, people aged 18 and over, 2014–2018

The Venn diagram shows the overlapping proportion of adults who were overweight/obese, had self-reported diabetes or had uncontrolled high blood pressure in 2014–18. An estimated 44% were overweight or obese only and only 2.1% had all 3 risk factors.

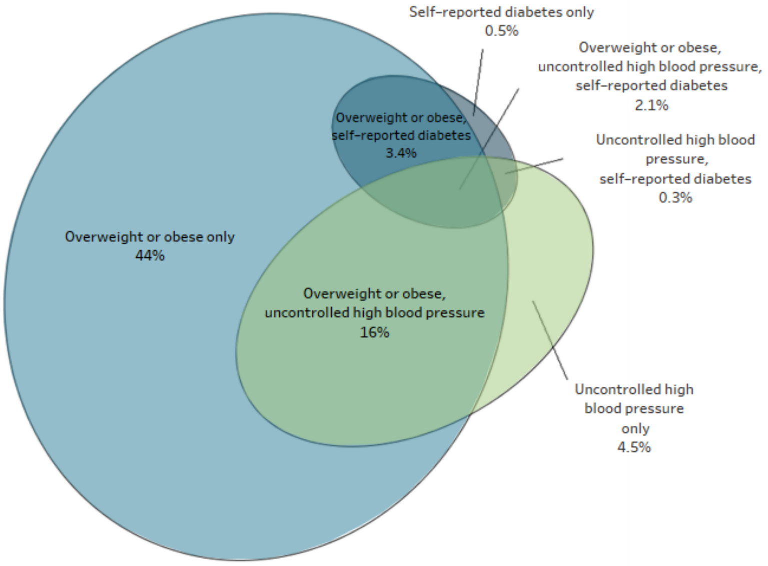

Figure 2: Prevalence of three key risk factors for chronic kidney disease, people aged 18 and over, 2014–2018

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. CI = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

Chart: AIHW. Source: AIHW analysis of ABS 2016 and 2019.
https://www.aihw.gov.au..

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References

ABS (Australian Bureau of Statistics) (2016) *Microdata: National Health Survey, 2014–15* - external site opens in new window, AIHW analysis of detailed microdata, ABS, Australian Government, accessed 20 October 2021.

ABS (2019) *Microdata: National Health Survey, 2017–18* - external site opens in new window, AIHW analysis of detailed microdata, ABS, Australian Government, accessed 20 October 2021.

AIHW (2021) *Australian Burden of Disease Study 2018: Interactive data on risk factor burden*, AIHW, Australian Government, accessed 1 February 2022.

Licher S, Heshmatollah A, van der Willik, KD, Stricker BHC, Ruiter R, de Roos EW, et al. (2019) Lifetime risk and multimorbidity of non-communicable diseases and disease-free life expectancy in the general population: a population-based cohort study - external site opens in new window, *PLOS Medicine*, 16(2), e1002741, doi: 10.1371/journal.pmed.1002741.

White SL (2020) *Chronic kidney disease, diabetes and cardiovascular disease: evidence report 2021* - external site opens in new window, Kidney Health Australia, Melbourne, accessed 1 February 2022.

Risk factors among adults with chronic kidney disease

This web page compares levels of 5 key chronic kidney disease (CKD) risk factors among adults with and without biomedical signs of CKD.

The populations with and without CKD were obtained from the 2011–12 National Health Measures Survey (NHMS) – the biomedical component of the Australian Health Survey (AHS) – which is the most recent national survey to include biomedical testing (ABS 2013).

Adults who had biomedical signs of CKD in the 2011–12 NHMS had significantly higher levels of diabetes, uncontrolled high blood pressure and self-reported heart, stroke and vascular disease, than adults who did not have biomedical signs of CKD (Figure 1).

These higher risk factor levels among adults who may have developed CKD highlight the need for secondary prevention to limit the disease's further development and increased severity. Secondary prevention focuses on the early detection and best practice management of a disease or disorder to reduce deterioration and long-term effects. This includes identifying people at risk of ill-health through screening programs, general health examinations, as well as the identification of complications and co-morbidities.

Biomedical risk factors

After adjusting for different population age structures, an estimated:

- 11% of adults who had biomedical signs of CKD in the 2011–12 NHMS had diabetes, 2.6 times as high as the 4.2% of adults without CKD who had diabetes
- 27% of adults with biomedical signs of CKD had uncontrolled high blood pressure, 1.5 times as high as the 18% of adults without CKD who had uncontrolled high blood pressure
- 10% of adults with biomedical signs of CKD reported having heart, stroke or vascular disease, 2.0 times as high as the 5.1% of adults without CKD who reported having heart, stroke or vascular disease.

Figure 1: Risk factor prevalence among adults with and without biomedical signs of chronic kidney disease, 2011–12

The chart shows the proportion of risk factors among adults with and without biomedical signs of chronic kidney disease in in 2011–12.

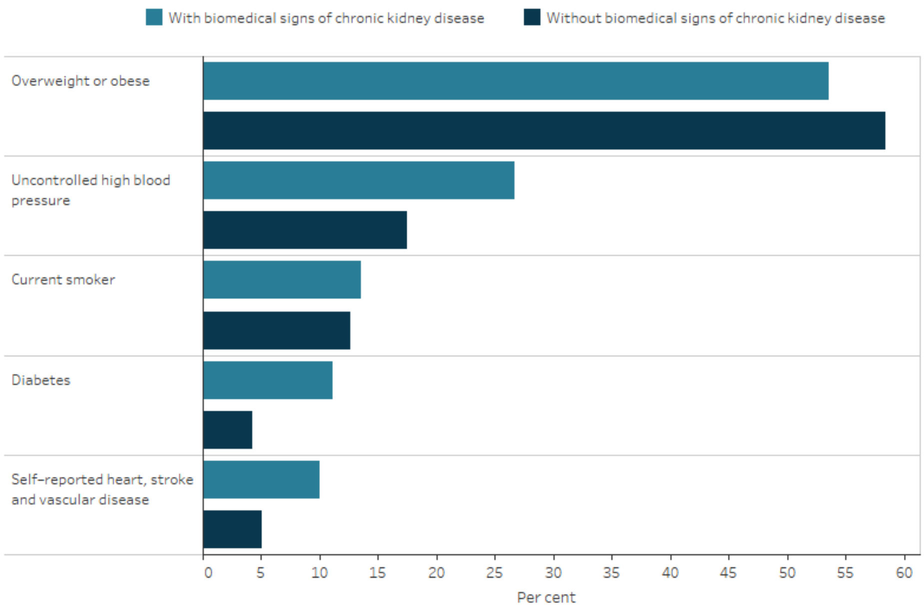

Figure 1: Risk factor prevalence among adults with and without biomedical signs of chronic kidney disease, 2011–12

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Confidence interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

Chart: AIHW. Source: AIHW analysis of ABS 2013.
https://www.aihw.gov.au

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Behavioural risk factors

After adjusting for different population age structures, an estimated:

- 14% of adults with biomedical signs of CKD in the 2011–12 NHMS were current smokers, similar to the 13% of adults without CKD who were current smokers
- 54% of adults with biomedical signs of CKD in the 2011–12 NHMS were overweight or obese, similar to the 58% of adults without CKD who were overweight or obese.

Although the differences in this survey were not statistically significant, smoking and overweight or obesity are considered risk factors for CKD, as well as diabetes and cardiovascular disease, which in turn are risk factors for CKD.

Further information

For more information on these and other CKD risk factors, see:

- Diabetes
- High blood pressure
- Heart, stroke and vascular disease
- Overweight and obesity: an interactive insight
- Smoking
- Insufficient physical activity
- Poor diet
- Alcohol
- Health risk factors among Indigenous Australians - external site opens in new window
- Australian Burden of Disease Study 2018: interactive data on risk factor burden

See Risk factors for more information on this topic.

References

ABS (Australian Bureau of Statistics) (2013) *Microdata: Australian Health Survey, 2011–12 - external site opens in new window*, AIHW analysis of detailed microdata, accessed 20 October 2021.

Comorbidity of chronic kidney disease

Page highlights:

Prevalence of chronic kidney disease, diabetes and heart, stroke and vascular disease

- In 2011–12, an estimated 2.8 million Australian adults (18%) were living with diabetes, chronic kidney disease and/or heart, stroke and vascular disease.

Hospitalisations with chronic kidney disease, diabetes and cardiovascular disease

- In 2020–21, 23% (2.2 million) non-dialysis hospitalisations of people aged 18 or over involved chronic kidney disease, diabetes or cardiovascular disease.

Comorbidities of people receiving kidney replacement therapy

- In 2021, 44% of people receiving kidney replacement therapy were living with diabetes.

Deaths from chronic kidney disease, diabetes and cardiovascular disease

- In 2021, 58% of adult deaths (99,100) involved chronic kidney disease, diabetes or cardiovascular disease.

What is multimorbidity and comorbidity?

Many people with chronic health conditions do not have a single, predominant condition. Rather, they experience multimorbidity – the presence of 2 or more chronic conditions in a person at the same time (AIHW 2021).

The health effect of multimorbidity can be greater than the combined effect of individual conditions. People with multimorbidity often have more severe illness and use more health services, including increased contact with primary health care services, with more complex hospitalisations and poorer outcomes.

The additional health conditions experienced by a person who has chronic kidney disease (CKD) is known as comorbidity. Diabetes and cardiovascular disease are common comorbidities among people with CKD (AIHW 2007, 2014). On this web page, much of the focus is on the comorbidity of CKD in combination with diabetes and/or cardiovascular disease.

An ageing population, along with unfavourable trends in some risk factors and a high prevalence of chronic disease in the community is expected to result in a rise in the number of people with CKD comorbidity, and higher rates of CKD among people with other chronic conditions.

Based on the Australian Bureau of Statistics (ABS) 2017–18 National Health Survey (NHS), an estimated 238,000 Australians had CKD as a long-term condition. Almost all (234,000 or 98%) had at least 1 of 9 other selected chronic conditions, including arthritis, mental and behavioural conditions, cardiovascular disease, back problems, diabetes, osteoporosis, chronic obstructive pulmonary disease and cancer (ABS 2018a).

CKD was present in:

- 6.6% of people with heart, stroke and vascular disease
- 5.8% of people with diabetes
- 4.4% of people with cancer
- 4.3% of people with chronic obstructive pulmonary disease (ABS 2018a).

Note that these data are based on self-report and rely on survey respondents providing accurate information – some conditions, such as CKD, are substantially under-reported in the NHS. Of the estimated 1.7 million adults who had biomedical signs of CKD in 2011–12, only 6.1% reported having kidney disease (ABS 2013a).

Prevalence of chronic kidney disease, diabetes, and heart, stroke and vascular disease

Based on the ABS 2011–12 National Health Measures Survey, an estimated 2.8 million Australian adults aged 18 and over (18%) had biomedical signs of CKD, diabetes, or heart, stroke and vascular disease (ABS 2013b). Of these, 2.2 million (14% of adults) had only 1 of CKD, diabetes, or heart, stroke and vascular disease. Another 621,000 (4.0% of adults) had at least 2 of CKD, diabetes, or heart, stroke and vascular disease:

- 241,000 adults (1.5%) had CKD as well as heart, stroke and vascular disease
- 201,000 adults (1.3%) had CKD and diabetes
- 103,000 adults (0.7%) had heart, stroke and vascular disease as well as diabetes
- 77,000 adults (0.5%) had all 3 conditions (Figure 1).

Among adults with biomedical signs of CKD in 2011–12, 44% also had diabetes and/or heart, stroke and vascular disease.

The prevalence of comorbidity of CKD with diabetes and/or heart, stroke and vascular disease rose with age, from 2.1% of adults aged 55–64 to 14% of adults aged 65 and over.

Figure 1: Prevalence of chronic kidney disease, diabetes, and heart, stroke and vascular disease (HSVD) and their comorbidity, people aged 18 and over, 2011–12

The Venn diagram shows the overlapping proportion of adults who had chronic kidney disease, diabetes or heart, stroke and vascular disease in 2011–12. Among adults with these conditions, an estimated 7.6% had CKD only and 0.5% were living with all 3 conditions.

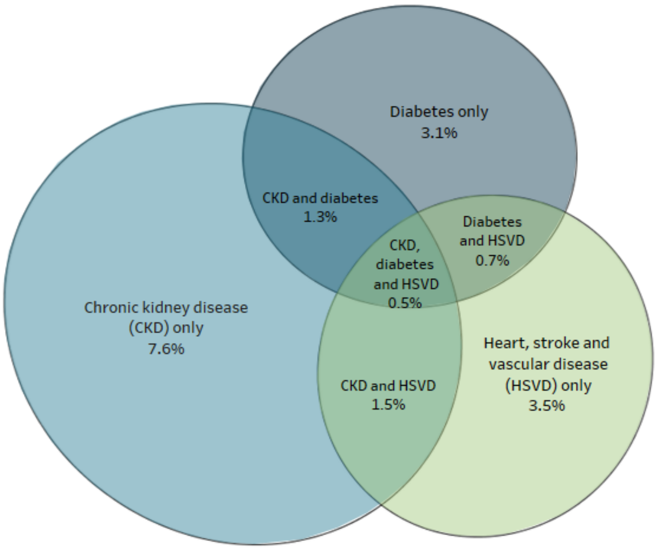

Figure 1: Prevalence of chronic kidney disease, diabetes, and heart, stroke and vascular disease (HSVD) and their comorbidity, people aged 18 and over, 2011–12

Note: CKD prevalence is based on eGFR and ACR test results, diabetes prevalence is based on HbA1c and self-reported data and HSVD prevalence is based on self-reported data of people who participated in the 2011–12 National Health Measures Survey.

Chart: AIHW. Source: AIHW analysis of ABS 2013.
https://www.aihw.gov.au

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Aboriginal and Torres Strait Islander people

Based on the ABS 2012–13 National Aboriginal and Torres Strait Islander Health Survey, an estimated 86,800 Indigenous adults aged 18 and over (26%) had biomedical signs of CKD, diabetes, or heart, stroke and vascular disease (AIHW analysis of ABS 2015).

After adjusting for differences in the age structures of the populations, 35% of Indigenous adults had CKD, diabetes, or heart, stroke and vascular disease, compared with 18% of all Australian adults.

An estimated 27,300 Indigenous adults had 2 of CKD, diabetes, or heart, stroke and vascular disease together, and 4,300 Indigenous adults had all 3 conditions together. After adjusting for age, 1.8% of Indigenous adults had all 3 conditions, compared with 0.5% of all Australian adults.

Among 59,300 Indigenous adults with biomedical signs of CKD in 2012–13, almost half (27,000) also had diabetes and/or heart, stroke and vascular disease. Among Indigenous adults with biomedical signs of CKD, 46% also had diabetes and/or heart, stroke and vascular disease, compared with 30% of all Australian adults (Figure 2).

Figure 2: Prevalence of chronic kidney disease, diabetes and heart, stroke and vascular disease (HSVD) and their comorbidity, Aboriginal and Torres Strait Islander people aged 18 and over, 2012–13

The Venn diagram shows the overlapping proportion of Aboriginal and Torres Strait Islander adults who had chronic kidney disease, diabetes or heart, stroke, and vascular disease in 2011-12. An estimated 9.7% had CKD only and 1.3% were living with all 3 conditions.

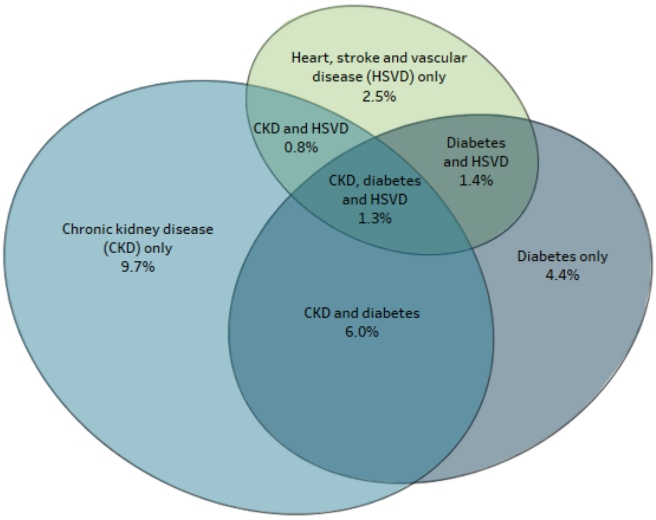

Figure 2: Prevalence of chronic kidney disease, diabetes, and heart, stroke and vascular disease (HSVD) and their comorbidity, Aboriginal and Torres Strait Islander people aged 18 and over, 2012–13

Note: CKD prevalence is based on on eGFR and ACR test results. Diabetes prevalence is based on HbA1c and self-reported data. Heart, stroke and vascular disease prevalence is based on self-reporting by people who participated in the measured component of the 2012–13 National Aboriginal and Torres Strait Islander Health Survey.

Chart: AIHW. Source: AIHW anlaysis of ABS 2015.
https://www.aihw.gov.au

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Hospitalisations with chronic kidney disease, diabetes and cardiovascular disease

Hospital comorbidity

On this web page, where a person has 2 or more of CKD, diabetes or cardiovascular disease present in the record of their episode of hospitalisation, it is referred to as comorbidity.

Dialysis (including both haemodialysis and peritoneal dialysis) hospitalisations have been excluded from this analysis, because they are often performed as routine treatments on a same-day basis and usually have no other comorbid diagnoses recorded.

In 2020–21, there were around 2.2 million non-dialysis hospitalisations of people aged 18 or over in which CKD, diabetes or cardiovascular disease was recorded as the principal and/or an additional diagnosis. This equates to 23% of all non-dialysis hospitalisations for people aged 18 and over.

Of these, 383,000 (17%) included CKD, either alone (82,700 or 3.8%), or in combination with diabetes and/or cardiovascular disease (301,000 or 14%) (Figure 3).

CKD was more commonly comorbid with diabetes (139,000 or 6.3%) than with cardiovascular disease (51,800 or 2.4%); however, it should be noted that diabetes is universally coded on a patient’s hospital record.

There were a further 110,000 hospitalisations (5.0%) where all 3 diseases were present. More than 1 in 100 hospitalisations of people aged 18 and over in 2020–21 involved all 3 diagnoses of CKD, cardiovascular disease and diabetes.

Figure 3: Hospitalisations with chronic kidney disease, diabetes and cardiovascular disease (CVD), people aged 18 and over, 2020–21

The Venn diagram shows the overlapping proportion of hospitalisations among adults in 2020–21 with chronic kidney disease, diabetes or cardiovascular disease as the principal and/or additional diagnosis. Among the hospitalisations for these conditions 3.8% were for CKD only, and 5.0% of hospitalisations were for all 3 conditions.

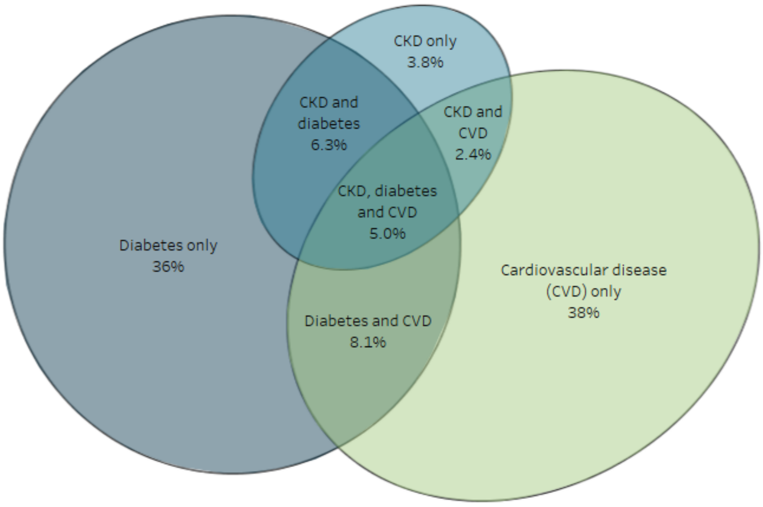

Figure 3: Hospitalisations with chronic kidney disease, diabetes and cardiovascular disease (CVD), people aged 18 and over, 2020–21

Notes
1. Due to rounding, percentages may not add up to 100.
2. Figure shows the proportion of hospitalisations due to any combination of CKD, diabetes and cardiovascular disease.
3. Hospitalisations exclude dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Variation by age and sex

The rate of hospitalisation with comorbidity of CKD, diabetes and/or cardiovascular disease increases with age.

In 2020–21, for example, people aged 65 and over were 5.0 times as likely to have a combination of CKD and diabetes recorded on their hospital record as people aged 45–64 (2,400 and 477 per 100,000 population).

Men were more likely to be hospitalised with comorbidity than women. After adjusting for age, the rate of hospitalisation where all 3 diseases were recorded was 1.7 times as high for men as for women.

Hospital comorbidity in the Aboriginal and Torres Strait Islander population

In 2020–21, there were 96,600 non-dialysis hospitalisations of Indigenous Australians aged 18 and over where CKD, diabetes or cardiovascular disease was present as a principal diagnosis and/or additional diagnosis.

Of these hospitalisations, 34,800 (36%) recorded 2 or 3 of the diseases – 15,700 (16%) recorded CKD and diabetes together, 1,800 (1.8%) recorded CKD and cardiovascular disease, 8,400 (8.7%) recorded cardiovascular disease and diabetes, and 8,900 (9.2%) recorded all 3 diseases (Figure 4).

Among people with any diagnosis of CKD, diabetes or cardiovascular disease, a higher proportion of Indigenous adults had comorbidity in their record of hospitalisation, compared with non-Indigenous adults (36% and 21%). The proportion of Indigenous hospitalisations with all 3 diseases (9.2%) was also higher than that in the non-Indigenous population (4.9%).

After adjusting for age differences in the populations, the rate of hospitalisation of Indigenous Australians recording all 3 diseases was 5.8 times as high as the rate of non-Indigenous people.

Figure 4: Hospitalisations with chronic kidney disease, diabetes and cardiovascular disease (CVD), Aboriginal and Torres Strait Islander people aged 18 and over, 2020–21

The Venn diagram shows the overlapping proportion of hospitalisations among Aboriginal and Torres Strait Islander adults in 2020–21 with chronic kidney disease, diabetes, or cardiovascular disease as the principal and/or additional diagnosis. Among the hospitalisations for these conditions, 3.8% were for CKD only and 9.2% of hospitalisations were for all 3 conditions.

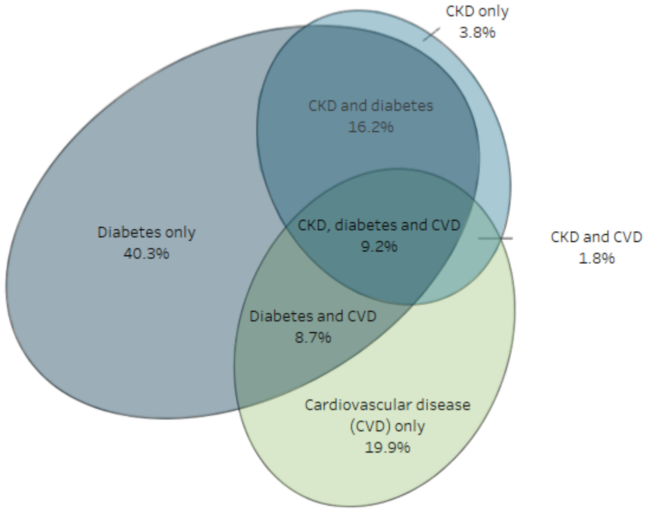

Figure 4: Hospitalisations with chronic kidney disease, diabetes and cardiovascular disease (CVD), Aboriginal and Torres Strait Islander people aged 18 and over, 2020–21

Notes
1. Due to rounding, percentages may not add up to 100.
2. Figure shows the proportion of hospitalisations due to any combination of CKD, diabetes and cardiovascular disease among Indigenous Australians.
3. Hospitalisations exclude dialysis as a principal diagnosis and persons whose Indigenous status was not stated or inadequately described.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Comorbidities of people receiving kidney replacement therapy

The Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry collects information on the comorbidities of people who receive kidney replacement therapy (KRT) for kidney failure (ANZDATA 2022).

Of the 28,500 people who received KRT for kidney failure in 2021:

- 12,500 (44%) had type 1 or type 2 diabetes
- 9,600 (33%) had known or suspected coronary heart disease
- 5,700 (20%) had known or suspected peripheral artery disease
- 4,300 (15%) had known or suspected chronic lung disease
- 3,400 (12%) had known or suspected cerebrovascular disease (mostly stroke).

Of the 3,300 people who started KRT for kidney failure in 2021:

- more than half (1,700 or 51%) had type 1 or type 2 diabetes
- 1,100 (34%) had known or suspected coronary heart disease
- 642 (20%) had known or suspected peripheral artery disease
- 457 (14%) had known or suspected chronic lung disease
- 362 (11%) had known or suspected cerebrovascular disease (mostly stroke).

The presence of comorbid diabetes on commencement of KRT has increased over the past 2 decades (Figure 5). In contrast, the presence of other comorbid conditions has declined since 2011.

Figure 5: Comorbidities of new kidney failure with replacement therapy patients, 2000 to 2021

The line chart shows the trend in comorbidities across 5 conditions for people with new cases of kidney failure with replacement therapy, from 2000 to 2021. In 2021, diabetes was the most common comorbidity for new patients receiving KRT (51%), followed by coronary heart disease (34%), peripheral arterial disease (20%), chronic lung disease (14%) and cerebrovascular disease (11%). Over time, the proportion of new cases of kidney failure with replacement therapy who had comorbid diabetes has risen, while the remaining comorbidities have been relatively stable.

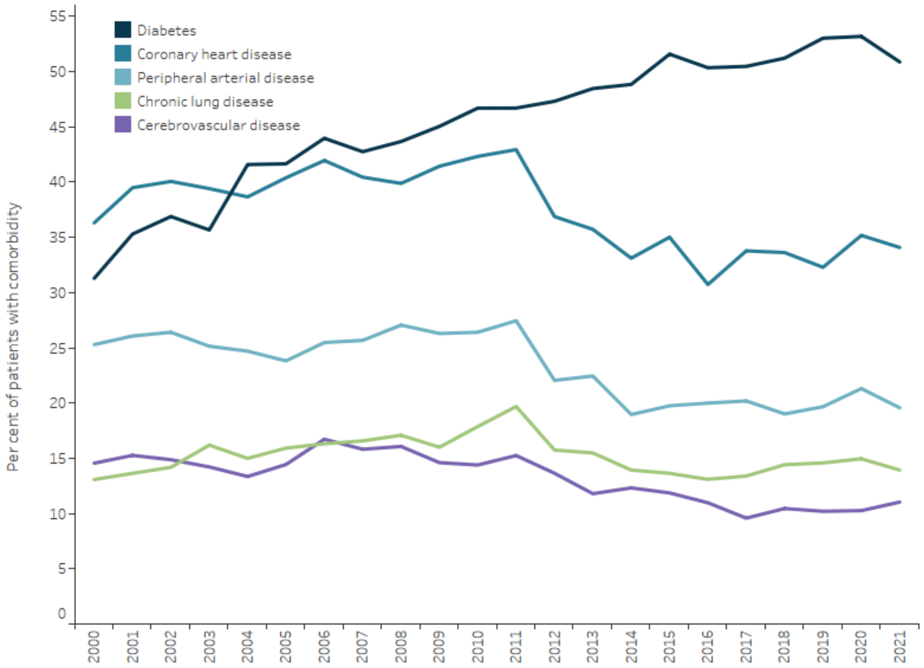

Figure 5: Comorbidities of new kidney failure with replacement therapy patients, 2000 to 2021

Note: Includes persons with confirmed and suspected comorbidity.

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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Deaths from chronic kidney disease, diabetes and cardiovascular disease

Often, more than one disease contributes to a death. Along with the underlying cause of death, a medical practitioner or coroner will also record associated causes on a death certificate. The most complete representation of cause-of-death will consider the contribution of both underlying and associated causes.

CKD and diabetes are more likely to be recorded as associated causes of death, unlike cardiovascular disease which is a common underlying cause of death. Both CKD and diabetes are known to be under-reported in national mortality statistics and might be omitted from death certificates as contributory causes of death (McEwen et al. 2011; Sypek et al. 2018).

Association of chronic kidney disease, diabetes and cardiovascular disease deaths

Of the 169,800 deaths registered among persons aged 18 and over in Australia in 2021, CKD, diabetes and cardiovascular disease were listed as underlying or associated causes in 99,100 (58%) of these.

CKD was listed as either an underlying or associated cause of death in 19,900 deaths (12% of adult deaths). Cardiovascular disease was listed with 90,900 deaths (54% of adult deaths) and diabetes with 19,300 deaths (11% of adult deaths).

Of the 19,900 adult CKD deaths registered in 2021, 79% (15,700) also involved a diagnosis of either CVD or diabetes.

Of all deaths among adults in 2021:

- 26,800 (16%) had at least 2 of CKD, CVD and diabetes
- 4,200 (2.5%) had CKD only recorded
- 890 (0.5%) had CKD and diabetes
- 10,600 (6.3%) had CKD and CVD
- 11,100 (6.5%) had CVD and diabetes
- 4,200 (2.4%) had all 3 conditions recorded (Figure 6).

Figure 6: Proportion of deaths with CKD, cardiovascular disease (CVD) and diabetes listed as any cause of death, persons aged 18 and over, 2021

The Venn diagram shows the proportion of deaths among adults in 2020 with chronic kidney disease, diabetes or cardiovascular disease as any cause of death. Among deaths from these conditions, CKD was recorded as the only cause in 4.3% of deaths, and all 3 diseases were recorded as the underlying or associated cause in 4.2% of deaths.

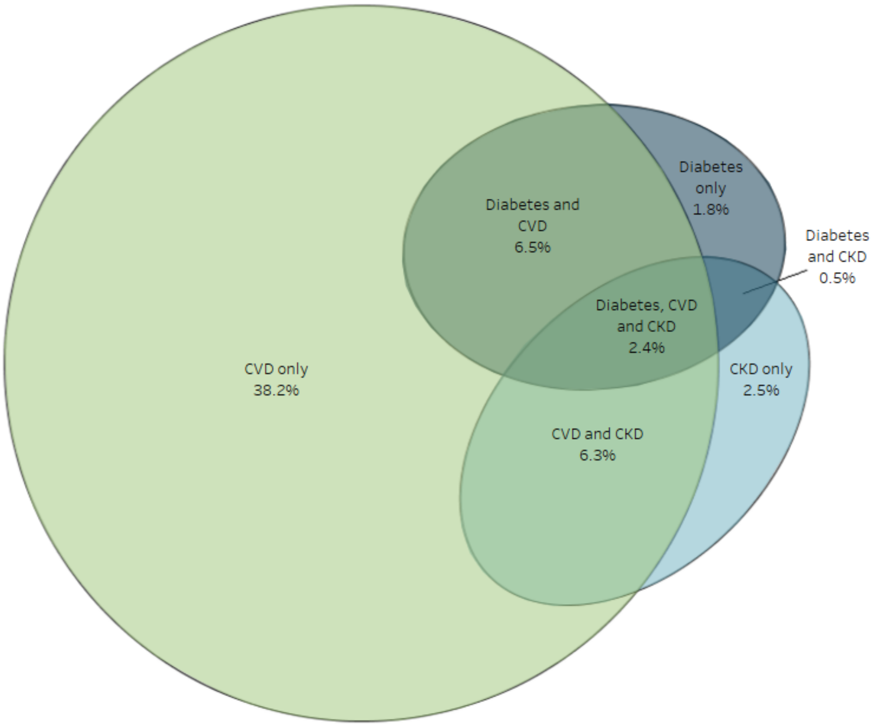

Figure 6: Proportion of deaths with CKD, CVD and diabetes listed as any cause of death, persons aged 18 and over, 2021

Chart: AIHW. Source: AIHW National Mortality Database
https://www.aihw.gov.au

Download data

Diseases commonly associated with chronic kidney disease deaths

When CKD is the underlying cause of death, cardiovascular disease and/or diabetes are often listed as associated causes of death (Table 1).

Acute kidney failure (ICD-10 N17) was also often listed as an associated cause of death when the underlying cause of death was CKD.

Other causes that were commonly associated with CKD deaths in 2021 included heart failure (ICD–10 I50), essential (primary) hypertension (I10), chronic ischaemic heart disease (I25) and type 2 diabetes mellitus (E11).

Table 1: Common associated causes with chronic kidney disease as the underlying cause of death, 2021

Associated cause	Number	Per cent of all CKD deaths as underlying cause
Diseases of the circulatory system	**4,961**	**41.4**
Heart failure (I50)	1,218	10.2
Essential (primary) hypertension (I10)	999	8.3
Chronic ischaemic heart disease (I25)	628	5.2
Endocrine, nutritional and metabolic diseases	**1,649**	**13.7**
Type 2 diabetes mellitus (E11)	679	5.7

Unspecified diabetes mellitus (E14)	463	3.9
Other disorders of fluid, electrolyte and acid-base balance (E87)	132	1.1
Diseases of the respiratory system	**961**	**8.0**
Pneumonia, organism unspecified (J18)	226	1.9
Other chronic obstructive pulmonary disease (J44)	211	1.8
Pulmonary oedema (J81)	134	1.1
Diseases of the genitourinary system	**817**	**6.8**
Acute kidney failure (N17)	621	5.2
Other disorders of urinary system (N39)	160	1.3

Note: Excludes death records where CKD was listed as an associated cause (see ICD 10 codes in Data sources).

Source: AIHW National Mortality Database.

Chronic kidney disease associated with other causes of death

CKD was listed as an associated cause of death for 9.0% of all deaths registered in 2021 (15,400 of 171,000 total deaths).

When CKD was listed as an associated cause, the most common underlying causes of death included chronic ischaemic heart disease, acute myocardial infarction, heart failure, other chronic obstructive pulmonary disease and type 2 diabetes mellitus (Table 2).

Table 2: Common underlying causes of death with chronic kidney disease as an associated cause of death, 2021

Underlying cause	Number	Per cent of all CKD deaths as associated cause
Diseases of the circulatory system	**5,136**	**33.4**
Chronic ischaemic heart disease (I25)	1,666	10.8
Acute myocardial infarction (I21)	682	4.4
Heart failure (I50)	654	4.2
Cancers	**3,104**	**20.2**
Malignant neoplasm of prostate (C61)	363	2.4
Malignant neoplasm of bronchus and lung (C34)	303	2.0
Multiple myeloma and malignant plasma cell neoplasms (C90)	220	1.4
Endocrine, nutritional and metabolic diseases	**1,449**	**9.4**
Type 2 diabetes mellitus (E11)	620	4.0
Unspecified diabetes mellitus (E14)	429	2.8
Diseases of the respiratory system	**1,235**	**8.0**
Other chronic obstructive pulmonary disease (J44)	624	4.1
Pneumonia, organism unspecified (J18)	213	1.4
Other interstitial pulmonary diseases (J84)	107	0.7

Note: Excludes death records where CKD was listed as an underlying cause (see ICD 10 codes in Data sources).

Source: AIHW National Mortality Database.

References

ABS (Australian Bureau of Statistics) (2013a) *Australian Health Survey: biomedical results for chronic diseases* - external site opens in new window*, ABS, Australian Government, accessed 1 February 2022.*

ABS (2013b) Microdata: Australian Health Survey: core content – risk factors and selected health conditions, 2011–12 - external site opens in new window, AIHW analysis of detailed microdata, ABS, Australian Government, accessed 20 October 2021.

ABS (2015) Microdata: Australian Aboriginal and Torres Strait Islander Health Survey, core content – risk factors and selected health conditions, 2012–13 - external site opens in new window, AIHW analysis of detailed microdata, ABS, Australian Government, accessed 18 May 2022.

ABS (2018a) National Health Survey: first results, 2017–18 - external site opens in new window, ABS, Australian Government, accessed 1 February 2022.

ABS (2018b) Kidney disease - external site opens in new window, ABS, Australian Government, accessed 1 February 2022.

AIHW (Australian Institute of Health and Welfare), Tong B, Stevenson C (2007) Comorbidity of cardiovascular disease, diabetes and chronic kidney disease in Australia, AIHW, Australian Government, accessed 13 July 2022.

AIHW (2014) Cardiovascular disease, diabetes and chronic kidney disease – Australian facts: prevalence and incidence, AIHW, Australian Government, accessed 1 February 2022.

AIHW (2015) Cardiovascular disease, diabetes and chronic kidney disease – Australian facts: Aboriginal and Torres Strait Islander people, AIHW, Australian Government, accessed 1 February 2022.

AIHW (2021) Chronic condition multimorbidity, AIHW, Australian Government, accessed 1 February 2022.

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2022) ANZDATA 45th Annual Report 2022 - external site opens in new window, ANZDATA, accessed 15 March 2023.

McEwen L, Karter A, Curb J, Marrero D, Crosson J and Herman W (2011) Temporal trends in recording of diabetes on death certificates: results from Translating Research into Action for Diabetes (TRIAD) - external site opens in new window. Diabetes Care, 34:1529–1533, doi: 10.2337/dc10-2312.

Sypek MP, Dansie KB, Clayton P, Webster AC and McDonald S (2018) Comparison of cause of death between Australian and New Zealand Dialysis and Transplant Registry and the Australian National Death Index - external site opens in new window. Nephrology, 24:322–329, doi: 10.1111/nep.13250.

Treatment and management of chronic kidney disease

How is chronic kidney disease treated?

There is no cure for chronic kidney disease, so management of the disease and its symptoms is the primary form of treatment. The earlier chronic kidney disease is detected, the better the outcomes for halting or slowing its progression.

Depending on the stage of chronic kidney disease a person is in, there are a variety of management options available. The best treatment option depends on the person being treated and the underlying condition that caused chronic kidney disease. Treatment options may include lifestyle modifications and medication.

Treatment and management of kidney failure may involve kidney replacement therapy (KRT) – dialysis or a kidney transplant – or comprehensive conservative care for those who choose not to undergo KRT. Supportive care can also be a part of the treatment and management of chronic kidney disease, which focuses on helping a person live the best life possible regardless of what stage of chronic kidney disease they are in or what treatments they are receiving.

General practice and primary health care

One of the main goals of primary health care for chronic kidney disease (CKD) is the preservation of kidney health. Collaboration between general practitioners (GPs), nurse practitioners, primary health care nurses and people with CKD is recognised as an important part of the ongoing treatment and management of CKD, and primary health care providers have a role in supporting individuals' self-management of this condition (Bear and Stockie 2014; Havas et al. 2017; KHA 2020a).

Diagnosis and detection of chronic kidney disease in general practice

The asymptomatic nature of CKD in stages 1–4 make GP and primary health care settings particularly important in detecting and reducing the burden of CKD.

CKD is chronically underdiagnosed in the Australian population, with only 6.1% of adults who showed biomedical markers of CKD in 2011–12 also self-reporting having the disease (ABS 2013). According to recent evidence, 88% of people with stages 1–2 CKD and 80% of people with stage 3 CKD may be undiagnosed (Khanam et al. 2019, NPS MedicineWise 2020).

Because CKD requires signs of reduced kidney function or damage to be present for at least 3 months, diagnosis involves biomedical assessments (blood and/or urine tests) to be repeated more than 3 months apart. This can make the disease more difficult to detect and diagnose.

Given the rates of under-diagnosis and the high burden of CKD, targeted screening of individuals at increased risk of developing CKD due to the presence of one or more risk factors and performing kidney health checks of those people is the clinical protocol recommended in Australia for detecting CKD (KHA 2020a).

Chronic kidney disease management in general practice

Kidney Health Australia guidelines for the clinical management of CKD in primary health care involve regular monitoring of patients with CKD (KHA 2020a). Although these guidelines are endorsed by The Royal Australian College of General Practitioners, the Australian Primary Health Care Nurses Association and the Australian and New Zealand Society of Nephrologists, complete monitoring of people with CKD in Australia is inadequate (Khanam et al. 2019, NPS MedicineWise 2020).

Clinical monitoring of chronic kidney disease

Monitoring of CKD depends on the level of kidney function, with worse function requiring more assessments.

Standard monitoring of CKD requires the following tests:

Urinary albumin:creatinine ratio (urine ACR) is a urine test to detect the presence of albumin (protein) in the urine, which would normally be filtered out by the kidneys. If kidney function is reduced, protein may pass from the blood into the urine, causing albuminuria. Albuminuria is indicative of CKD, even if other tests are normal (KHA 2017a).

Estimated glomerular filtration rate (eGFR) is a blood test that provides an indication of how well the kidneys are filtering waste from the blood. It is used to diagnose the stage of CKD and to monitor progression of the disease (KHA 2020b).

Electrolytes is a blood test that measures sodium and potassium levels in the blood, which should be properly balanced to maintain the normal function of metabolic processes.

Glycated haemoglobin (HbA1c) is the main biomarker used to assess long-term glucose control in people living with diabetes. It forms part of monitoring CKD only in people with diabetes.

Fasting lipids are used to determine cardiovascular disease risk and monitor disease progression. Dyslipidaemia, or an altered lipid profile in the blood, can accelerate the rate of kidney function decline.

Blood pressure tests are needed to identify high blood pressure, which can both cause and exacerbate CKD. Controlling high blood pressure is an important component in the treatment and management of CKD.

Additional assessments that may be required depending on kidney function include:

Full blood count can detect anaemia (deficiency in the number or quality of red blood cells) and monitor iron levels. Anaemia is a common complication of CKD, and can cause damage to other organs as well as reducing quality of life in severe cases.

Calcium and phosphate need to be maintained at healthy levels to help protect against heart disease and stroke, and to prevent bones from weakening. In more advanced stages of CKD, the kidneys do not activate Vitamin D, which is necessary for the body to absorb calcium and phosphate. Calcium and phosphate levels may need to be controlled through diet and the use of phosphate binders and Vitamin D supplements (KHA 2017b).

Parathyroid hormone (PTH) can detect hyperparathyroidism, which disrupts calcium levels and can lead to kidney failure.

According to a recent study of people with CKD in general practice, in 2018–19:

- 45% of those in Australian primary health care received complete monitoring (as defined by a record of urine ACR, eGFR, cholesterol (lipids), HbA1c (if diabetic), haemoglobin (full blood count), and blood pressure measurement).
- among those with diabetes, 68% received complete monitoring, compared with 28% of those without diabetes.
- those with stages 1–2 CKD were almost twice as likely to receive complete monitoring compared with those with stages 3–5 (81% compared with 41%), possibly due to a higher proportion of people with stages 1–2 CKD having diabetes (NPS MedicineWise 2020).

Factors associated with reduced monitoring of CKD were older age and living in a disadvantaged socioeconomic area, compared with co-existing diabetes or hypertension, and having a documented CKD diagnosis, which were positively associated with complete monitoring (Khanam et al. 2019).

Chronic kidney disease management in the Aboriginal and Torres Strait Islander population

National key performance indicators

Data on chronic disease management in Indigenous-specific primary health care are provided by organisations funded under the Australian Government's Indigenous Australians' Health Programme (AIHW 2022).

Based on data from the national Key Performance Indicator collection, as at June 2021:

- 63% of Indigenous regular clients aged 15 and over with type 2 diabetes had an eGFR and/or urine ACR or other micro albumin test recorded within the previous 12 months.
- 62% of Indigenous regular clients aged 15 and over with cardiovascular disease had an eGFR and/or urine ACR or other micro albumin test recorded within the previous 12 months.

Of those who had an eGFR test recorded:

- 80% of Indigenous regular clients with type 2 diabetes had an eGFR in the ideal range (≥60mL/min/1.73m^2), within the previous 12 months.
- 77% of Indigenous regular clients with cardiovascular disease had an eGFR in the ideal range (≥60mL/min/1.73m^2), within the previous 12 months.
- Of those who had a urine ACR test recorded:
- 43% of Indigenous regular clients with type 2 diabetes had an ACR of <2.5 (males) or <3.5 (females), within the previous 12 months.

Further information

Aboriginal and Torres Strait Islander specific primary health care: results from the nKPI and OSR collections.

References

ABS (Australian Bureau of Statistics) (2013) *Australian Health Survey: biomedical results for chronic diseases - external site opens in new window*, ABS, Australian Government, accessed 22 February 2022.

AIHW (Australian Institute of Health and Welfare) (2022) *Aboriginal and Torres Strait Islander specific primary health care: results from the nKPI and OSR collections*, AIHW, Australian Government, accessed 31 May 2022.

Bear RA and Stockie S (2014) Patient engagement and patient-centred care in the management of advanced chronic kidney disease and chronic kidney failure - external site opens in new window, *Canadian Journal of Kidney Health and Disease* 1:24, doi: 10.1186%2Fs40697-014-0024-7.

Havas K, Douglas C and Bonner A (2017) Person centred care in chronic kidney disease: a cross sectional study of patients' desires for self management support - external site opens in new window, *BMC Nephrology* 18:17, doi: 10.1186%2Fs12882-016-0416-2.

KHA (Kidney Health Australia) (2020a) *Chronic kidney disease (CKD) management in primary care - external site opens in new window*, 4th edition, KHA, Melbourne.

KHA (2020b) *Estimated glomerular filtration rate (eGFR) fact sheet* - external site opens in new window, KHA, Melbourne.

KHA (2017a) *Albuminuria fact sheet - external site opens in new window*, KHA, Melbourne.

KHA (2017b) *Calcium and phosphate balance with kidney disease fact sheet - external site opens in new window*, KHA, Melbourne.

Khanam MA, Kitsos A, Stankovich J, Castelino R, Jose M, Kinsman L et al. (2019) Chronic kidney disease monitoring in Australian general practice - external site opens in new window, *Australian Journal of General Practice*, 48(3), doi: 10.31128/ajgp-07-18-4630.

NPS MedicineInsight (2020) PDF *Clinical review, testing and management of renally cleared medicines among MedicineInsight patients with chronic kidney disease in 2018–2019 - external site opens in new window*, NPS MedicineWise, Sydney.

Medicines for chronic kidney disease

The general goal of treatment for chronic kidney disease (CKD) is to reduce the progression of the disease and reduce cardiovascular risk. Typically, this involves the use of medicines that treat comorbidities and risk factors, and can offer protection against further kidney damage in the early stages of the disease. Managing existing conditions like diabetes, high blood pressure and cardiovascular disease before kidney disease develops and in the early stages of CKD is critical in protecting the kidneys in the long-term.

The cause of CKD is important in determining the most appropriate treatment and management strategies, as these usually depend on the underlying condition.

Managing diabetes

In 2021, 37% of kidney failure cases in those who started dialysis or received a transplant were attributable to diabetes (ANZDATA 2022). Controlling blood sugar in diabetes is important to reduce the risk of CKD.

Methods of controlling blood sugar include medication and engaging in healthy lifestyle practices, including physical activity and eating a healthy diet.

Medications often prescribed for type 2 diabetes are:

- insulin
- metformin
- sodium-glucose transporter 2 (SGLT2) inhibitors
- DPP-4 inhibitors
- glucagon-like-peptide-1 receptor agonists/analogues.

Sodium-glucose transporter 2 inhibitors

SGLT2 inhibitors are a class of glucose-lowering drugs used in managing type 2 diabetes. They work by reducing the amount of glucose that is reabsorbed in the kidneys, promoting its excretion in the urine.

Multiple clinical trials have shown SGLT2 inhibitors to be effective in delaying the progression of CKD in people with and without type 2 diabetes (Heerspink et al. 2020, Li et al. 2021, Neal et al. 2017, Perkovic et al. 2019).

In September 2021, the Therapeutic Goods Administration approved dapagliflozin for treatment of CKD to reduce the risk of progressive decline in kidney function in adults with proteinuric CKD (stage 2, 3 or 4 and urine ACR≥ 30 mg/g) (TGA 2021). In September 2022, treatment of CKD was added to the Pharmaceutical Benefits Scheme listing for dapagliflozin (PBS 2022).

For more information, see Diabetes medicines.

Managing cardiovascular disease

High blood pressure

High blood pressure was the primary cause of 12% of kidney failure cases in people newly diagnosed with kidney failure in Australia in 2021 (ANZDATA 2022). High blood pressure can cause CKD; however, CKD both perpetuates and exacerbates high blood pressure.

Medications that may be prescribed to control high blood pressure, include:

- ACE inhibitors
- ARBs
- beta blockers
- diuretics.

As with all medication in people with CKD, these need to be carefully monitored and adjusted or ceased depending on a person’s individual circumstances and their level of kidney function.

High cholesterol

Statins are a first line treatment for managing high cholesterol; however, some research has indicated that the use of statins in people receiving dialysis shows limited benefits and can potentially be harmful (Kennard and Singer 2017). For people with CKD not on dialysis, combining statin therapy with ezetimibe has been shown to reduce the risk of adverse kidney events compared with statin use alone (Bae et al. 2020, CARI Living Guideline Lipid Work Group 2021).

For more information, see Medicines for cardiovascular disease.

Managing medications in chronic kidney disease

In stages 3–5 CKD, medicine use must be carefully managed. This is because medicines that are excreted through the kidneys have the potential to build up in the body and be toxic to the kidneys or other organs (Hartmann et al. 2010). To avoid this, clinical assessment and management of medication are important components of treating and managing later stages of CKD.

Management should be tailored to each individual and may involve stopping or lowering the dosage of certain medications or, when available, using alternatives that are not eliminated from the body through the kidneys (Faull and Lee 2007, Hartman et al. 2010, KHA 2020).

Because CKD is typically caused by another health condition, comorbidity and multimorbidity are common. This means that many people with CKD are prescribed complex medication regimens, which need to be monitored and adjusted to achieve the best outcomes.

Australians with CKD were prescribed an average of 8.4 medications between January 2013 and June 2016 (Castelino et al. 2020).

The use of multiple medications to manage underlying chronic conditions increases the chances of drug interactions, as well as adverse outcomes such as hospitalisation, falls, and mortality (Manski-Nankervis et al. 2021). In Australia, medication reviews are subsidised under Medicare and may be beneficial for people with CKD to simplify their medication regimen.

Potentially inappropriate medication use in clinical management of chronic kidney disease

Inappropriate prescribing in CKD involves the prescription of medications that are filtered or excreted through the kidneys and may potentially harm those taking them. As such, the types and dosages of medicines prescribed to people with CKD should be carefully monitored.

A potentially inappropriate prescription can include a contraindicated medicine, or too high a dose for a persons' level of kidney function.

In Australia, between 1.5% and 2.6% of people with CKD were potentially inappropriately prescribed the combination of an ACE inhibitor, diuretic and non-steroidal anti-inflammatory drug (NSAID) (the 'triple whammy'), according to estimates from 2016 and 2019 (Bezahbe et al. 2020, NPS MedicineWise 2020). Kidney Health Australia advises against using this combination of medicines in people with CKD, due to the increased risk of acute kidney injury.

Castelino and colleagues (2020) found that 35% of all Australians with CKD were given at least one potentially inappropriate prescription. The rate of potentially inappropriate prescribing increased with the stage of CKD, with 69% of people with stages 4–5 CKD receiving at least one potentially inappropriate prescription.

References

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2022) ANZDATA 45th Annual Report 2022 - external site opens in new window, ANZDATA, Adelaide, accessed 15 March 2023.

Bae J, Hong N, Lee B, Kang E, Cha B and Lee Y (2020) Comparison of renal effects of ezetimibe-statin combination versus statin monotherapy: a propensity-score-matched analysis - external site opens in new window, *Journal of Clinical Medicine*, 9(3):798, doi:10.3390/jcm9030798.

Bezabhe W, Kitsos A, Saunder T, Peterson G, Bereznicki L, Wimmer B et al. (2020) Medication prescribing quality in Australian primary care patients with chronic kidney disease - external site opens in new window, *Journal of Clinical Medicine*, 9(3):783, doi:10.3390/jcm9030783.

Caring for Australians and New Zealanders with Kidney Impairment (CARI) Living Guideline Lipid Work Group (2021) *Management of cholesterol-lowering therapy for people with chronic kidney disease* - external site opens in new window, CARI, Sydney, accessed 13 July 2022.

Castelino RL, Saunder T, Kitsos A, Peterson GM, Jose M, Wimmer B et al. (2020) Quality use of medicines in patients with chronic kidney disease - external site opens in new window, *BMC Nephrology*, 21:216, doi:10.1186/s12882-020-01862-1.

Faull R and Lee L (2007) Prescribing in renal disease - external site opens in new window, *Australian Prescriber*, 30(1):17–20, doi:10.18773/austprescr.2007.008.

Hartmann B, Czock D and Keller F (2010) Drug therapy in patients with chronic renal failure - external site opens in new window, *Deutsches Arzteblatt International*, 107(37):647–655, doi:10.3238/arztebl.2010.0647.

Heerspink HLJ, Stefánsson BV, Correa-Rotter R, Chertow GM, Greene T, Hou F et al. (2020) Dapagliflozin in patients with chronic kidney disease - external site opens in new window, *New England Journal of Medicine*, 383:1436–1446, doi:10.1056/NEJMoa2024816.

Kennard A and Singer R (2017) Lipid lowering in renal disease - external site opens in new window, *Australian Prescriber*, 40(4):141–146, doi: 10.18773/austprescr.2017.047.

Kidney Health Australia (KHA) (2020) *Chronic kidney disease (CKD) management in primary care* - external site opens in new window, 4th edn, KHA, Melbourne, accessed 11 April 2022.

Li N, Lv D, Wei P, Gui Y, Liu S, Zhou E et al. (2021) Effects of SGLT2 inhibitors on renal outcomes in patients with chronic kidney disease: a meta-analysis - external site opens in new window, *Frontiers in Medicine*, 8:728089, doi:10.3389/fmed.2021.728089.

Manski-Nankervis J, McMorrow R, Nelson C, Jesudason S and Sluggett J (2021) Prescribing and deprescribing in chronic kidney disease - external site opens in new window, *Australian Journal of General Practice*, 50(4), doi:10.31128/AJGP-11-20-5752.

Neal B, Perkovic V, Mahaffey KW, de Zeeuw D, Fulcher G, Erondu N et al. (2017) Canagliflozin and cardiovascular and renal events in type 2 diabetes - external site opens in new window, *New England Journal of Medicine*, 377:644–657, doi:10.1056/NEJMoa1611925.

NPS MedicineWise (2020) *Clinical review, testing and management of renally cleared medicines among MedicineInsight patients with chronic kidney disease in 2018–2019* - external site opens in new window, Sydney: NPS MedicineWise, accessed 11 April 2022.

Perkovic V, Jardine MJ, Neal B, Bompoint S, Heerspink HLJ, Charytan DM et al. (2019) Canagliflozin and renal outcomes in type 2 diabetes and nephropathy - external site opens in new window, *New England Journal of Medicine*, 380:2295–2306, doi:10.1056/NEJMoa1811744.

PBS (Pharmaceutical Benefits Scheme) (2022) *PBS Schedule: Summary of Changes (September 2022) - external site opens in new window*, Canberra: Australian Government Department of Health and Aged Care, accessed 5 October 2022.

TGA (Therapeutic Goods Administration) (2021) *Prescription medicines: new or extended uses, or new combinations of registered medicines, 2021* - external site opens in new window, TGA, Australian Government, accessed 29 June 2022.

Hospitalisations for chronic kidney disease

Page highlights:

Chronic kidney disease hospitalisations as a principal or additional diagnosis

- In 2020–21, approximately 2 million hospitalisations (17%) involved chronic kidney disease.

Variation between population groups

- In 2020–21, there were around 30,800 hospitalisations for chronic kidney disease among Aboriginal and Torres Strait Islander people – around 3,500 hospitalisations per 100,000 population.

Trends for chronic kidney disease as a principal diagnosis

- Hospitalisations for chronic kidney disease as a principal diagnosis more than doubled between 2000–01 and 2020–21, from 24,200 to 58,200 hospitalisations.

Supplementary chronic condition codes

Data presented in this section are based on single episodes of care, including multiple hospitalisations experienced by the same individual. Because people receiving dialysis are admitted for this purpose multiple times a week, hospitalisations involving dialysis as the principal diagnosis are not included in analyses of CKD hospitalisations, unless otherwise stated.

For more information, see Hospitalisations for dialysis.

In 2020–21, approximately 2 million hospitalisations (17% of all hospitalisations in Australia) recorded chronic kidney disease (CKD) (including dialysis) as a principal and/or additional diagnosis.

Dialysis accounted for 80% of CKD hospitalisations in 2020–21. After excluding all hospitalisations where dialysis was recorded as the principal diagnosis, CKD hospitalisations accounted for 3.3% of all hospitalisations in Australia in 2020–21.

In 2020–21:

- there were around 58,200 hospitalisations with CKD as a principal diagnosis – the diagnosis largely responsible for hospitalisation
- there were around 333,000 hospitalisations with CKD as an additional diagnosis – a coexisting condition with the principal diagnosis or a condition arising during hospitalisation that affects patient management
- on average, people hospitalised with a principal diagnosis of CKD (excluding dialysis as a principal diagnosis) stayed 2.8 days in hospital. For people who required hospitalisation for one night or more, the average length of stay was 4.8 days.

Chronic kidney disease is a broad term that includes multiple conditions that affect kidney function, any of which might be recorded as the principal diagnosis causing hospitalisation. The most commonly recorded principal diagnosis for CKD in 2020–21 was 'chronic kidney disease', followed by 'kidney tubulo-interstitial diseases' (Table 1).

Table 1: Major causes of hospitalisation for chronic kidney disease (as the principal diagnosis), 2020–21

Major cause of hospitalisation	Number
Chronic kidney disease	22,244
Kidney tubulo-interstitial diseases	15,251
Glomerular diseases	5,550
Other disorders of kidney and ureter	3,921
Complications related to dialysis and transplant	2,588
Hypertensive kidney disease	1,525

Diabetic nephropathy	1,235
Congenital malformations	1,200
Unspecified kidney failure	320
Dialysis (excluding preparatory care)	1,613,405
Haemodialysis	1,606,824
Peritoneal dialysis	6,581
Preparatory care for dialysis	4,318
Total	**1,671,557**

Source: AIHW National Hospital Morbidity Database.

Chronic kidney disease hospitalisations as a principal or additional diagnosis

When CKD affects patient care during hospitalisation – but is not the principal diagnosis – it is recorded as an additional diagnosis. Except where dialysis is the principal diagnosis, CKD is more often coded as an additional diagnosis.

The leading principal diagnoses in 2020–21 when CKD was listed as an additional diagnosis were:

- heart failure: 20,600 hospitalisations (6.2%)
- type 2 diabetes: 12,100 hospitalisations (3.6%)
- sepsis (blood poisoning): 11,500 hospitalisations (3.5%)
- acute kidney failure: 10,600 hospitalisations (3.2%)
- acute myocardial infarction (heart attack): 7,200 hospitalisations (2.2%).

CKD is often comorbid with cardiovascular disease and diabetes. In 2020–21, cardiovascular diseases (also known as circulatory diseases) were the most common type of principal diagnosis when CKD was an additional diagnosis, accounting for 18% (60,600) of these hospitalisations. Endocrine diseases, including type 1 and type 2 diabetes, accounted for 8.1% of hospitalisations where CKD was an additional diagnosis.

Injuries were also common principal diagnoses when CKD was an additional diagnosis (10.8% or 35,900 of these hospitalisations). Of these, complications associated with cardiac and vascular prosthetic devices, implants and grafts (6,200 hospitalisations) and fractures of the femur (5,300 hospitalisations) were the most common reasons for hospitalisation (Table 2).

CKD is associated with an increased risk of fractures, due to disturbances in mineral and bone metabolism as a result of the disease (Moe et al. 2006). Progression or development of kidney disease is also a risk associated with surgery, due to an increase in creatinine following surgery (Ishani et al. 2011).

Table 2: Leading principal diagnoses when chronic kidney disease was an additional diagnosis, by ICD-10-AM chapter and code, 2020–21

ICD-10-AM chapter	Hospitalisations	Percentage of hospitalisations where CKD was an additional diagnosis
Diseases of the circulatory system	**60,646**	**18.2**
Heart failure (I50)	20,648	6.2
Acute myocardial infarction (heart attack) (I21)	7,245	2.2
Cerebral infarction (ischemic stroke) (I63)	4,147	1.2
Injury, poisoning and certain other consequences of external causes	**35,902**	**10.8**
Complications of cardiac and vascular prosthetic devices, implants and grafts (T82)	6,197	1.9
Fracture of femur (S72)	5,327	1.6

Complications of procedures, not elsewhere classified (T81)	1,808	0.5
Diseases of the genitourinary system	**28,439**	**8.5**
Acute kidney failure (N17)	10,631	3.2
Other disorders of the urinary system (N39)	7,583	2.3
Obstructive and reflux uropathy (N13)	2,943	0.9
Endocrine, nutritional and metabolic diseases	**26,819**	**8.1**
Type 2 diabetes (E11)	12,074	3.6
Other disorders of fluid, electrolyte and acid-base balance (E87)	8,256	2.5
Type 1 diabetes (E10)	2,658	0.8
Diseases of the digestive system	**22,885**	**6.9**
Other diseases of the digestive system (K92)	2,937	0.9
Gallstones (K80)	1,982	0.6
Paralytic ileus and intestinal obstruction without hernia (K56)	1,710	0.5

Note: Excludes chronic kidney disease as a principal diagnosis and diagnoses of ‘Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified’.
Source: AIHW National Hospital Morbidity Database.

Variation by age and sex

In 2020–21, the number of CKD hospitalisations increased with age, with 70% occurring in those aged 65 and over. CKD hospitalisation rates (as a principal or additional diagnosis, excluding dialysis as a principal diagnosis):

- were between 1.2 and 2.0 times higher for females than males before the age of 45. From age 45, rates were higher for men than women
- were highest in those aged 85 and over for both males and females (19,000 and 11,200 per 100,000 population, respectively) – 1.8 and 1.7 times as high as males and females aged 75–84 (10,800 and 6,600 per 100,000, respectively) (Figure 1).

Figure 1: Chronic kidney disease hospitalisation rates, by diagnosis type, age and sex, 2020–21

The bar chart shows the rates of hospitalisation for chronic kidney disease by age groups and sex, with rates of hospitalisation increasing with age for males and females with people aged 85 and over having the highest rates (1.7 times higher than people aged 75 to 84 for principal and/or additional diagnoses of CKD).

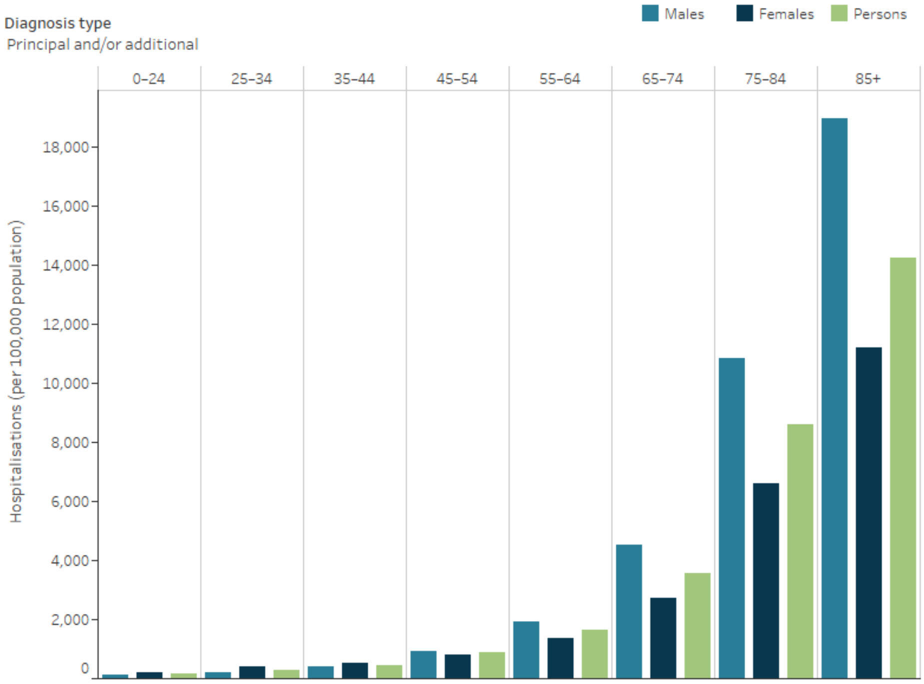

Figure 1: Chronic kidney disease hospitalisation rates, by diagnosis type, age and sex, 2020–21

Note: Hospitalisations exclude dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

Download data

Variation between population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were around 30,800 hospitalisations for CKD as a principal or additional diagnosis among Aboriginal and Torres Strait Islander people – around 3,500 hospitalisations per 100,000 population.

After adjusting for differences in the age structure between the Indigenous and non-Indigenous populations:

- The hospitalisation rate among Indigenous Australians was 5.3 times as high as the rate among non-Indigenous Australians.
- The hospitalisation rate among Indigenous females was 6.9 times as high as the rate among non-Indigenous females, while the rate among Indigenous males was 4.0 times as high as the rate among non-Indigenous males (Figure 2).

Remoteness and socioeconomic area

In 2020–21, CKD hospitalisation rates (as the principal or additional diagnosis, excluding dialysis as a principal diagnosis) increased with remoteness and socioeconomic disadvantage.

After adjusting for differences in the age structure of the population groups, CKD hospitalisation rates were:

- 3.1 times as high for people living in *Remote and very remote* areas as for people living in *Major cities*
- 4.5 times as high among females living in *Remote and very remote* areas as for females living in *Major cities*
- 2.1 times as high among males living in *Remote and very remote* areas as for males living in *Major cities*
- 2.1 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas
- 2.4 times as high among females living in the lowest socioeconomic areas as for females living in the highest socioeconomic areas
- 1.9 times as high among males living in the lowest socioeconomic areas as for males living in the highest socioeconomic areas (Figure 2).

See *Geographical variation in disease: diabetes, cardiovascular and chronic kidney disease* for more information on CKD hospitalisations by state/territory, Population Health Network and Population Health Area.

Figure 2: Chronic kidney disease hospitalisation rates as a principal or additional diagnosis, by population group, 2020–21

The bar chart shows rates of hospitalisation for chronic kidney disease by sex based on Aboriginal and Torres Strait Islander status, remoteness area and socioeconomic area. Indigenous people had rates of hospitalisation for CKD 5.3 times higher than non-Indigenous people. Hospitalisation rates for CKD across remoteness areas were similar for all areas except Remote and very remote regions, where people were hospitalised for CKD at rates 3.1 times as high as those living in Major cities. People living in the most disadvantaged socioeconomic areas were hospitalised at higher rates than all other areas, with rates decreasing with increasing socioeconomic advantage in the area which people lived. Males were hospitalised at higher rates than females across all measures except for Indigenous females and females living in Remote and very remote areas.

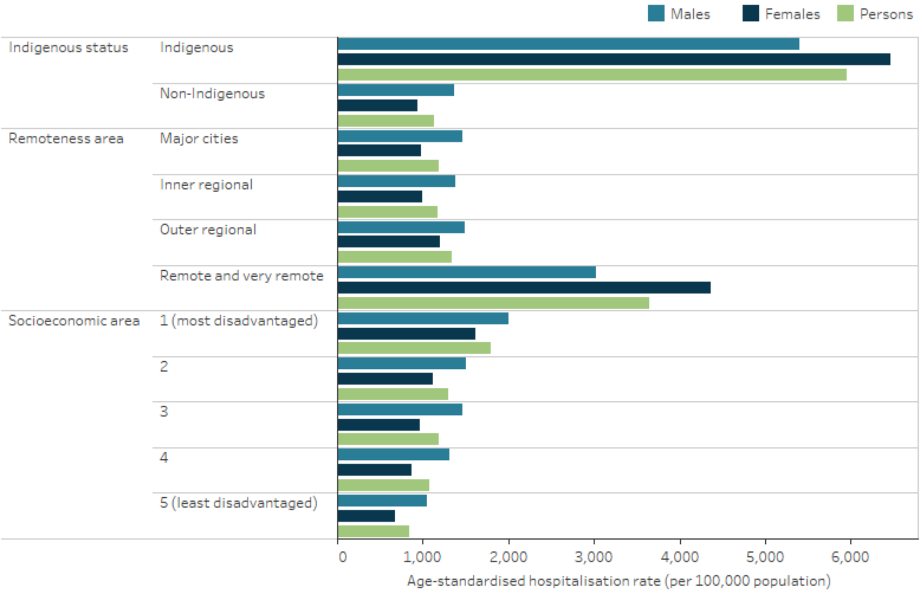

Figure 2: Chronic kidney disease hospitalisation rates as a principal or additional diagnosis, by population group, 2020–21

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons where remoteness area and/or socioeconomic area was missing and persons whose Indigenous status was not stated or inadequately described.
3. Hospitalisations exclude dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Trends for chronic kidney disease as a principal diagnosis

The number of hospitalisations for CKD as a principal diagnosis (excluding dialysis as a principal diagnosis) more than doubled between 2000–01 and 2020–21, from 24,200 to 58,200 hospitalisations. Over this period, the age-standardised rate rose by 64% (Figure 3).

Figure 3: Trends in chronic kidney disease hospitalisation rates by diagnosis type and sex, 2000–01 to 2020–21

The line chart shows an increasing trend in age-standardised CKD hospitalisation rates between 2000-01 to 2020–21, when CKD was a principal diagnosis and a principal or additional diagnosis. Over this time, when CKD was a principal diagnosis, hospitalisations increased by 64%.

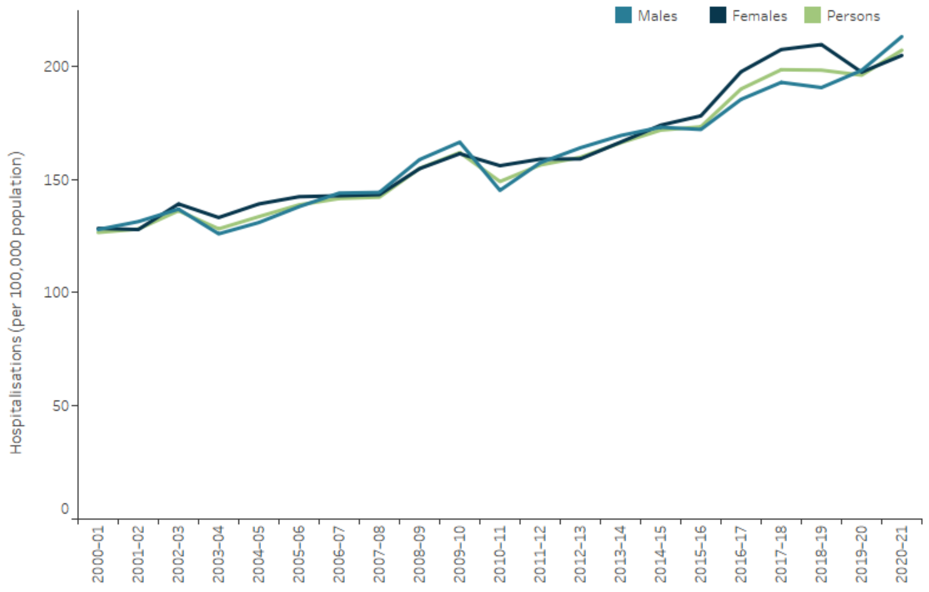

Figure 3: Trends in chronic kidney disease hospitalisation rates as a principal diagnosis, by sex, 2000–01 to 2020–21

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Hospitalisations exclude dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Supplementary chronic condition codes

CKD (stages 3 to 5) can be recorded in hospitalisation data as a supplementary code, as opposed to a principal or additional diagnosis. Supplementary codes represent a selection of clinically important chronic conditions that are part of the patient's current health status on admission which do not meet criteria for inclusion as additional diagnoses but may affect clinical care.

- CKD (stages 3 to 5) was the ninth most-assigned supplementary code for hospitalisations in 2020–21, assigned in 1.8% of hospital admissions.
- Since the supplementary code for CKD was introduced in 2015–16, the number of hospitalisations recording CKD as an additional diagnosis has fallen.

References

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2021) *ANZDATA 44th Annual Report 2021 - external site opens in new window*, ANZDATA website, accessed 30 June 2022.

Ishani A, Nelson D, Clothier B, Schult T, Nugent S, Greer N et al. (2011) The magnitude of acute serum creatinine increase after cardiac surgery and the risk of chronic kidney disease, progression of kidney disease, and death - external site opens in new window, *Archives of Internal Medicine*, 171(3):226–233, doi:10.1001/archinternmed.2010.514.

KHA (Kidney Health Australia) (2016a) *An introduction to haemodialysis - external site opens in new window*, KHA, Melbourne, accessed 22 February 2022.

KHA (2016b) *An introduction to peritoneal dialysis - external site opens in new window*, KHA, Melbourne, accessed 22 February 2022.

Moe S, Drüeke T, Cunningham J, Goodman W, Martin K, Olgaard K et al. (2006) 'Definition, evaluation, and classification of renal osteodystrophy: a position statement from Kidney Disease: Improving Global Outcomes (KDIGO), *Kidney International*, 69:1945–1953, doi:10.1038/sj.ki.5000414.

Hospitalisations for dialysis

Page highlights

- In 2020–21, 1.6 million (14%) of hospitalisations in Australia were for dialysis.
- The number of hospitalisations for dialysis nearly tripled between 2000–01 and 2020–21, from 582,000 to 1.6 million.
- In 2020–21, there were 264,000 hospitalisations for dialysis (as the principal diagnosis) among Aboriginal and Torres Strait Islander people, 30,300 per 100,000 population.

Dialysis is the most common reason for hospitalisation in Australia, accounting for 14% of all hospitalisations in 2020–21 (1.6 million hospitalisations). Although the majority of people admitted to hospital for dialysis receive haemodialysis, a small number receive peritoneal dialysis. Data on this web page includes hospitalisations for both types of dialysis.

Hospitalisation data count the number of dialysis episodes rather than the number of people who receive dialysis. Most people undergoing dialysis attend 3 sessions per week (ANZDATA 2021).

For more information about people receiving dialysis, see Dialysis.

What is dialysis?

Dialysis is an artificial way to remove waste and excess water from the blood, and regulate safe levels of circulating agents (such as potassium, calcium and phosphorous) in the body, a function usually performed by the kidneys. It is most often provided to treat chronic kidney failure, but is sometimes needed in cases of acute kidney failure, where the kidneys have been temporarily damaged due to illness or injury.

There are 2 types of dialysis: peritoneal dialysis and haemodialysis.

Peritoneal dialysis is an internal filtration process requiring the placement of a catheter (a thin, flexible plastic tube) into the abdomen, which remains in place as long as dialysis is required. Peritoneal dialysis uses the peritoneal membrane inside the abdominal cavity to filter the blood inside the body.

The process involves filling the abdomen with a sterile dialysis solution, called dialysate. Over 4–8 hours, waste is drawn out of the blood through the peritoneal membrane and into the dialysate. The used solution is then drained out of the body and replaced with a new solution. This process is called an exchange and takes around 30–45 minutes.

Between exchanges, the person is free to continue their usual activities. Peritoneal dialysis can be performed either by the person 3 or 4 times during the day (continuous ambulatory peritoneal dialysis) or automatically by a machine at night for about 8–10 hours while the person sleeps (automated peritoneal dialysis).

As the necessary equipment is portable, peritoneal dialysis can be performed almost anywhere. Individuals do not need to be in a hospital or clinic and can usually manage the procedure without assistance.

Haemodialysis is an external filtration process where the blood is diverted from the body to a machine which removes waste and excess fluid. It involves an initial procedure to join an artery and vein together with either a fistula or graft, that serves as the access point to the dialysis machine (dialyser). Once this access point is ready, haemodialysis sessions take place for an average of 4 to 5 hours 3 times per week (ANZDATA 2021). Once the blood has been filtered by the dialyser, it is returned to the body through the access point.

Haemodialysis can be done at home or in specialised dialysis centres located either in hospitals or satellite units. The process involves specialised plumbing installation for the dialyser and the person requires assistance to be connected to the machine. If performed at home, the procedure may be done more frequently for shorter periods or overnight.

Sources: KHA 2016a, 2016b.

Variation by age and sex

In 2020–21, hospitalisation rates for dialysis as the principal diagnosis:

- were 1.6 times higher in males than in females. Age-specific rates for males were higher than those for females across all age groups
- increased with age up to ages 75–84, with 76% of hospitalisations occurring in people aged 55 and over. Dialysis hospitalisation rates for males and females were highest among those aged 75–84 (39,000 and 19,200 per 100,000 population, respectively) (Figure 1).

Figure 1: Dialysis hospitalisation rates, as a principal diagnosis, by age and sex, 2020–21

The bar chart shows hospitalisations for dialysis by age and sex in 2020–21, which people aged 75-84 having the highest rates of hospitalisation. Prior to age 75, hospitalisations rates increase with age, and then decrease after age 85. The pattern was the same for males and females, with males having higher rates than females.

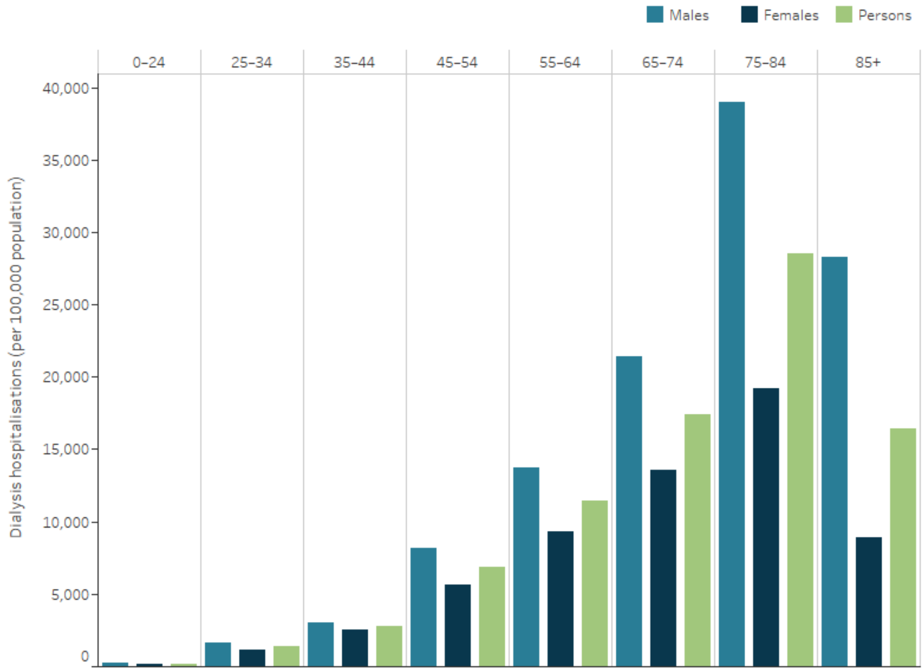

Figure 1: Dialysis hospitalisation rates, as a principal diagnosis, by age and sex, 2020–21

Note: Data include hospitalisations for haemodialysis and peritoneal dialysis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Trends over time

The number of hospitalisations for dialysis rose by 177% between 2000–01 and 2020–21, from 582,000 to over 1.6 million. After adjusting for changes in the age structure of the population over this time, this equated to an increase of 76% in the rate of dialysis hospitalisations. Note that this does not capture trends in dialysis performed outside of hospitals.

The rate of hospitalisations for dialysis among males was consistently higher than for females over the period, with both showing similar respective rates of increase (Figure 2).

Figure 2: Trends in dialysis hospitalisation rates, as a principal diagnosis, by sex, 2000–01 to 2020–21

The line chart shows the age-standardised trend in hospitalisations for dialysis from 2000-01 to 2020–21, by sex. Between 2000-01 and 2020–21, hospitalisations for dialysis increased by 76%. Males had higher rates of dialysis than females across this period.

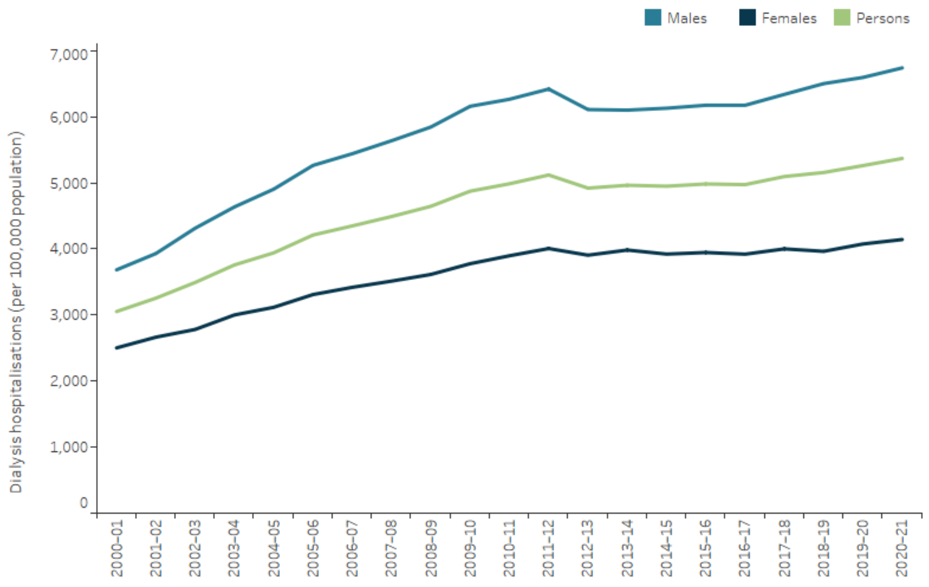

Figure 2: Trends in hospitalisations for dialysis, as a principal diagnosis, by sex, 2000–01 to 2020–21

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Data include hospitalisations for haemodialysis and peritoneal dialysis.
3. From 2012–13, data exclude hospitalisations in WA with a contracted patient status of 'Inter-hospital contracted patient to private sector hospital', to adjust for separations recorded on both sides of contractual care arrangements.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Variation between population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were 264,000 hospitalisations for dialysis (as the principal diagnosis) among Aboriginal and Torres Strait Islander people (113,000 males, 151,000 females).

Indigenous Australians were hospitalised for dialysis at a rate of 30,300 per 100,000 population. Indigenous females were hospitalised for dialysis at a rate of 34,600 per 100,000 population, and Indigenous males at a rate of 26,000 per 100,000 population.

After adjusting for differences in the age structure of these populations:

- Indigenous Australians were hospitalised for dialysis at a rate over 10 times as high as that for non-Indigenous Australians
- Indigenous females were hospitalised for dialysis at a rate that was 16 times as high as that for non-Indigenous females. Indigenous males were hospitalised at a rate 7.0 times as high as that for non-Indigenous males (Figure 3).

Remoteness and socioeconomic area

In 2020–21, hospitalisation rates for dialysis (as the principal diagnosis) varied by remoteness and socioeconomic area (Figure 3).

After adjusting for differences in the age structure of the population groups:

- dialysis hospitalisation rates were 4.7 times as high in *Remote and very remote* areas as in *Major cities*
- females living in *Remote and very remote areas* were hospitalised for dialysis at a rate 8.8 times as high as that for females living in *Major cities*. Males living in *Remote and very remote areas* were hospitalised for dialysis at a rate that was 2.6 times the rate of males living in *Major cities*
- hospitalisations for dialysis were 2.5 times as high for people living in the lowest socioeconomic areas as for those living in the highest
- females living in the lowest socioeconomic areas were hospitalised at a rate 3.7 times as high as that for females living in the highest socioeconomic areas. Males living in the lowest socioeconomic areas were hospitalised at a rate 2.0 times as high as that for males living in the highest socioeconomic areas.

See *Geographical variation in disease: diabetes, cardiovascular and chronic kidney disease* for more information on dialysis hospitalisations by state/territory, Population Health Network and Population Health Area.

Figure 3: Dialysis hospitalisation rates, as a principal diagnosis, by population group and sex, 2020–21

The bar chart shows rates of hospitalisation for dialysis by sex based on Aboriginal and Torres Strait Islander status, remoteness area and socioeconomic area. Indigenous people had rates of hospitalisation for dialysis 10.4 times higher than non-Indigenous people. Hospitalisation rates for dialysis across remoteness areas were similar for all areas except Remote and very remote regions, where people were hospitalised for dialysis at rates 4.7 times as high as those living in Major cities. Hospitalisations for dialysis increased gradually by socioeconomic area, with people living in the least disadvantaged socioeconomic areas having the lowest rates of hospitalisation for dialysis, and those living in the most disadvantaged areas having the highest. Males were hospitalised at higher rates than females across all measures except for Indigenous females and females living in Remote and very remote areas.

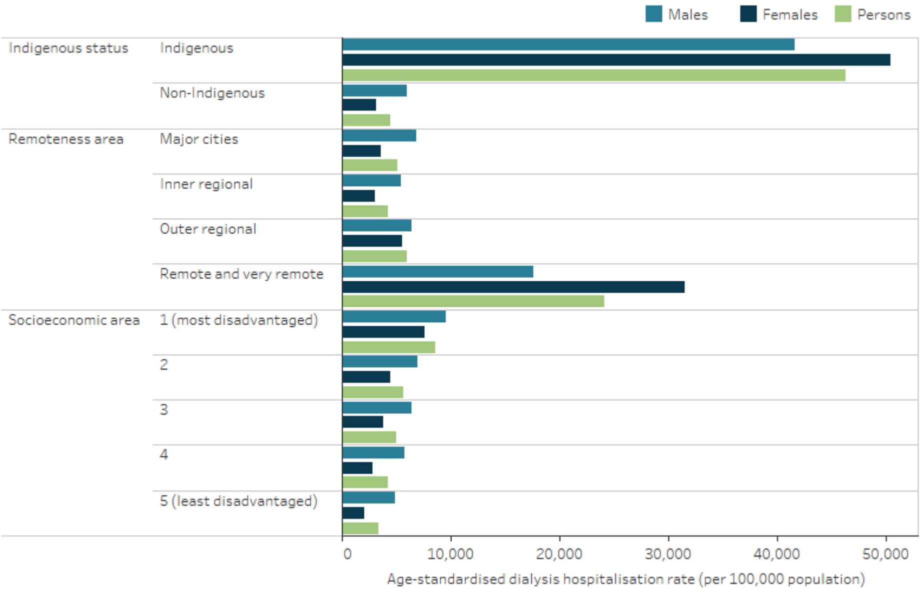

Figure 3: Dialysis hospitalisation rates, as a principal diagnosis, by population group and sex, 2020–21

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons where remoteness area and/or socioeconomic area was missing and persons whose Indigenous status was not stated or inadequately described.
3. Data include hospitalisations for haemodialysis and peritoneal dialysis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

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Further information

For more information on hospitalisation for dialysis for Indigenous people, see: Profiles of Aboriginal and Torres Strait Islander people with kidney disease

Reference

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2021) *ANZDATA 44th Annual Report 2021 - external site opens in new window*, ANZDATA website, accessed 30 June 2022.

Treatment of kidney failure

Page highlights:

Kidney failure

- In 2021, 72% of new kidney failure cases were attributable to 4 causes: diabetes (37%), glomerulonephritis (a type of kidney inflammation) (17%), hypertension (12%) and polycystic disease (the presence of multiple cysts in the kidney) (6%).

Incidence of kidney replacement therapy

- During 2021, 3,300 people with kidney failure started kidney replacement therapy in Australia, at an average of 9 people per day.

Treatment on Country

- In 2020, 26% of Indigenous Australians who received kidney replacement therapy (including kidney transplantation) did so close to home.

Prevalence of kidney replacement therapy

- In 2021, 28,500 people living with kidney failure in Australia were receiving kidney replacement therapy.

This web page presents statistics on the number of people with kidney failure receiving kidney replacement therapy (KRT), using data from the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry.

Not all people with kidney failure choose to undergo KRT. Instead, some opt to receive comprehensive conservative care, with a focus on quality of life and symptom control.

Whether a person chooses to receive KRT is a personal decision, and may depend on a variety of factors, such as the person’s age and expected quality of life receiving KRT versus comprehensive conservative care. Person-centred care emphasises that the choice of what type of treatment to receive be made collaboratively by the person with kidney failure, their families and their care team.

Kidney failure

Kidney failure is the most severe form of chronic kidney disease (CKD). It occurs when the kidneys can no longer function adequately on their own.

People with kidney failure require KRT to survive. KRT involves either dialysis or a kidney transplant.

In 2021, 72% of new kidney failure cases were attributable to 4 causes: diabetes (37%), glomerulonephritis (a type of kidney inflammation) (17%), hypertension (12%) and polycystic disease (the presence of multiple cysts in the kidney) (6%) (ANZDATA 2022).

Comprehensive conservative care and kidney supportive care

Not all people with kidney failure undertake KRT – comprehensive conservative care and management of kidney failure is a treatment choice that focusses on patient care, quality of life and symptom control rather than on efforts to prolong life.

Kidney supportive care aims to improve the quality of life of people living with CKD, regardless of whether they are undergoing therapies intended to prolong life (Davison et al. 2015).

This care includes preventing and relieving pain and takes into account other physical, psychological, social or spiritual needs, helping people to live as actively as possible until death (WHO 2022). It emphasises shared decision-making between the person with CKD, their families and their health care team.

For a person near the end of their life, comprehensive conservative care with supportive care may be a more suitable form of care. Decisions on whether to start or withdraw from KRT are made by the person living with CKD and their family. These decisions are informed by the person’s health-care team (including their general practitioner and nephrologist); they consider people’s prognoses, as well as assessments of the person’s anticipated quality of life (with or without dialysis) and treatment burdens (AIHW 2016).

For each person who started KRT in 2013, there was one person with kidney failure who chose not to receive KRT (AIHW 2016).

For more information on quality of life for people with CKD, see Quality of life of people with chronic kidney disease.

The probability of not receiving KRT increases sharply from age 75 (Sparke et al. 2013). In 2013, the incidence of people not receiving KRT increased from 13 per 100,000 population in those aged 65–74, to 145 per 100,000 in those aged 75 and over (Figure 1).

Figure 1: Incidence of kidney failure with and without replacement therapy, by age, 2013

The bar chart shows the incidence rate of kidney failure in 2013 by sex, age group and kidney replacement therapy (KRT) treatment status, from the AIHW analysis of the linked ANZDATA, AIHW National Mortality Database and National Death Index.

The treatment rate for new patients with kidney failure increased slightly with age from 4.8 per 100,000 population among persons aged under 55, to 35 per 100,000 population among persons aged 75 and over. In contrast, the rate of new patients with kidney failure who did not get any KRT treatment increased sharply from 0.4 per 100,000 population among those aged under 55 to 145 per 100,000 population among those aged 75 and over. These age patterns are similar for men and women, with higher kidney failure incidence rates observed for males.

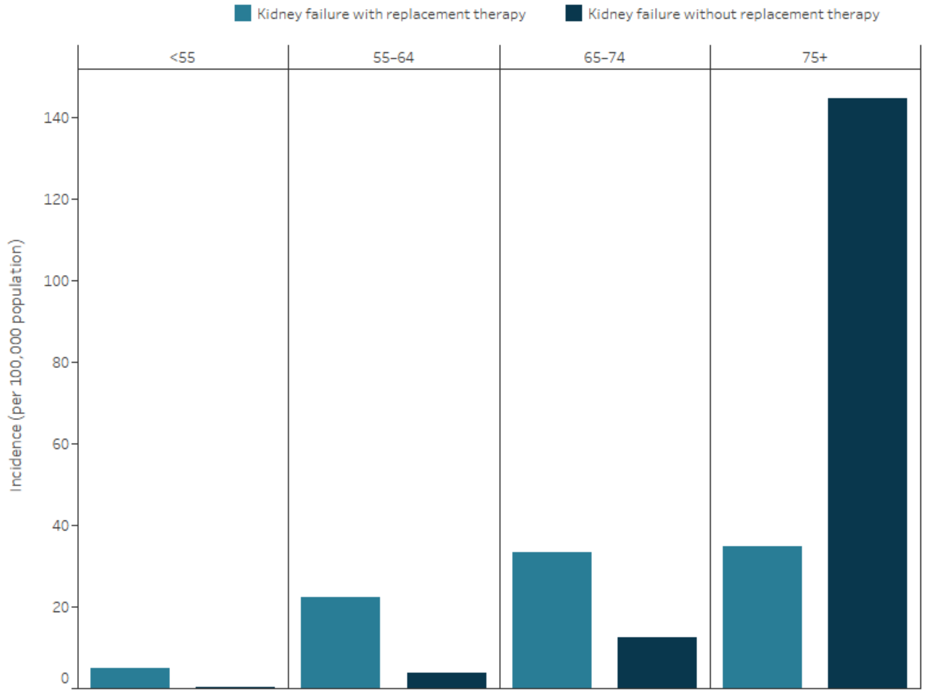

Figure 1: Incidence of kidney failure with and without replacement therapy, by age, 2013

Chart: AIHW. Source: Linked data from the Australia and New Zealand Dialysis and Transplant Registry, AIHW National Mortality Database and National Death Index.
https://www.aihw.gov.au/

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Incidence of kidney replacement therapy

An estimate of the incidence of KRT can be obtained from the ANZDATA Registry. This registry includes information on people who have had KRT in the form of dialysis or a kidney transplant. It does not contain information on people with kidney failure who do not receive KRT.

Not everyone with kidney failure chooses to receive KRT, opting instead for medical management, with a focus on quality of life and symptom control. Therefore, estimates of the total prevalence of kidney failure need to count cases of people who are receiving KRT and those who are not.

Estimating the true incidence of kidney failure in Australia requires linkage between ANZDATA and the National Death Index. This was most recently performed in 2013 and showed that of the 5,100 new cases of kidney failure in 2013, half (2,500) were not receiving treatment with KRT (AIHW 2016). Work is underway by the AIHW to update this linkage (see Data gaps and opportunities).

The total incidence of kidney failure (treated and untreated) is an indicator in the Australian Health Performance Framework (AIHW 2022).

Variation by age and sex

During 2021, 3,300 people with kidney failure started KRT in Australia, at an average of 9 people per day (ANZDATA 2022). Of these, 67% were aged under 70 and 64% were males.

In 2021, the incidence rate of KRT:

- was 1.8 times as high in males as in females
- increased with age, to be highest among men aged 75–79 and women aged 70–74 (Figure 2).

Figure 2: Incidence of kidney replacement therapy, by age and sex, 2021

The bar chart shows the number of new cases of kidney failure with replacement therapy, by age group and sex, for 2021. Males commenced KRT in 2021 at higher rates than females. For both sexes, the number of new cases of kidney failure with replacement therapy peaked in the 75-79 year age group.

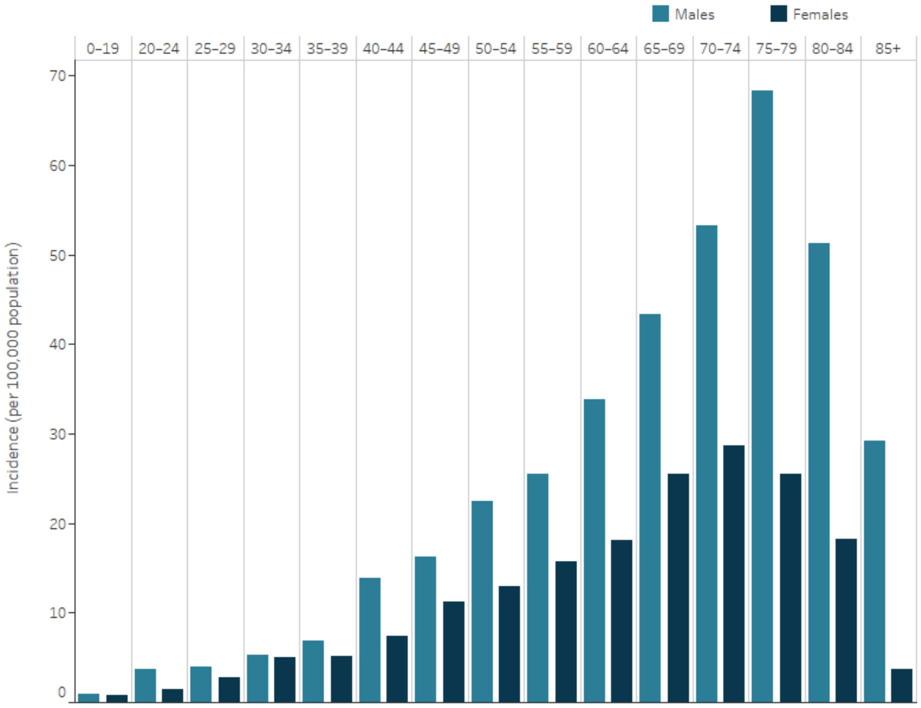

Figure 2: Incidence of kidney replacement therapy, by age and sex, 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Variation between population groups

Aboriginal and Torres Strait Islander people

Around 1,800 Aboriginal and Torres Strait Islander people living with kidney failure started KRT from 2017 to 2021, a rate of 42 per 100,000 population.

After adjusting for differences in the age structure of the populations:

- the incidence rate of KRT among Indigenous Australians was 6.2 times as high as that for non-Indigenous Australians
- Indigenous females started KRT at a rate 9.4 times as high as that for non-Indigenous females
- Indigenous males started KRT at a rate 4.4 times as high as that for non-Indigenous males (Figure 3).

Treatment on Country

Treating and managing kidney failure among Indigenous Australians can be challenging, often due to difficulties associated with providing holistic health care that meets the medical, social and cultural needs of clients (Hughes et al. 2019).

Indigenous Australians may also have to leave their home, families and Country to access in-centre haemodialysis, adding to the challenges of treatment (Anderson et al. 2012). Providing dialysis services in remote regions of Australia has enabled more people to access care close to home. Between 2009 and 2016, there was a 42% increase in dialysis treatments delivered in Central Australia (Gorham et al. 2016).

In 2020, 26% of Indigenous Australians who received KRT (including kidney transplantation) did so close to home, with a large increase in the prevalence of peritoneal dialysis in the Northern Territory (ANZDATA 2021). In Central Australia, survival rates for haemodialysis are now higher than for the rest of Australia, going from the worst to the best in the country over the last 20 years (Gorham et al. 2016; UNE 2020).

Community-led services are making it easier for people to access care in their Country. Purple House is an Indigenous owned health service, providing remote dialysis, social support, aged care and National Disability Insurance Scheme services. It operates 18 dialysis units in Central Australia (Purple House 2022).

Remoteness and socioeconomic area

Data for 2017–2021 show that the incidence rate of KRT was much higher in *Remote and very remote* areas and increased with socioeconomic disadvantage.

After adjusting for differences in the age structure of the populations, rates were:

- 3.7 times as high in *Remote and very remote* areas as in *Major cities*. Rates were 6.7 times as high among females, but only 2.2 times as high among males
- 1.8 times as high in the lowest socioeconomic areas as in the highest socioeconomic areas (Figure 3).

Figure 3: Incidence of kidney replacement therapy, by population group, 2017–2021

The bar chart shows rates of new cases of kidney failure with replacement therapy by sex based on Aboriginal and Torres Strait Islander status, remoteness area and socioeconomic area. Indigenous people had commenced replacement therapy for kidney failure at rates 6.2 times higher than non-Indigenous people. Incidence rates for commencing KRT varied across remoteness areas, with the highest rates seen in Remote and Very remote areas, followed by Outer regional. Incidence rates increased by socioeconomic area, with people living in the least disadvantaged socioeconomic areas having the lowest incidence of kidney failure with replacement therapy, and those living in the most disadvantaged areas having the highest. Males commenced KRT for kidney failure at higher rates than females across all measures except for Indigenous females and females living in Remote and Very remote areas.

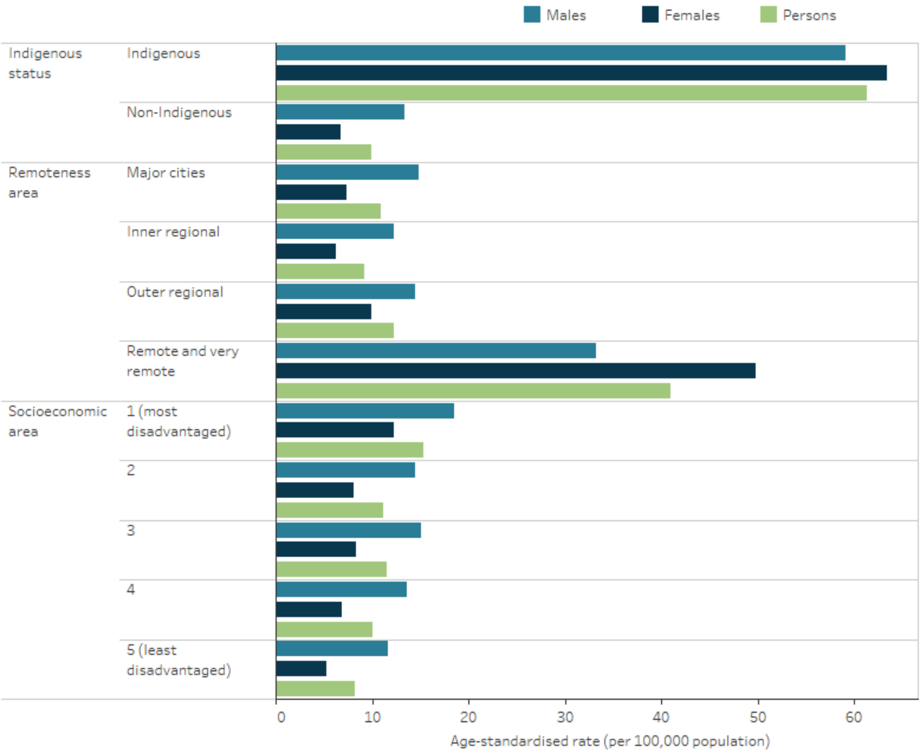

Figure 3: Incidence of kidney replacement therapy, by population group, 2017–2021

[Notes]

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

Download data

Trends over time

Between 2000 and 2021:

- the number of people with kidney failure who started KRT rose from 1,800 to 3,300
- the age-standardised incidence rate of KRT among males was 1.4 times as high as for females in 2000, increasing to 1.8 times as high in 2021 (Figure 4).

Figure 4: Trends in the incidence of kidney replacement therapy, by sex, 2000 to 2021

The line chart shows the age-standardised trend in the incidence of kidney failure with replacement therapy, from 2000 to 2021, by sex. The incidence rate has remained stable for females over this time, and has increased by one third for males, from 11 cases per 100,000 population in 2000 to 14.6 in 2021.

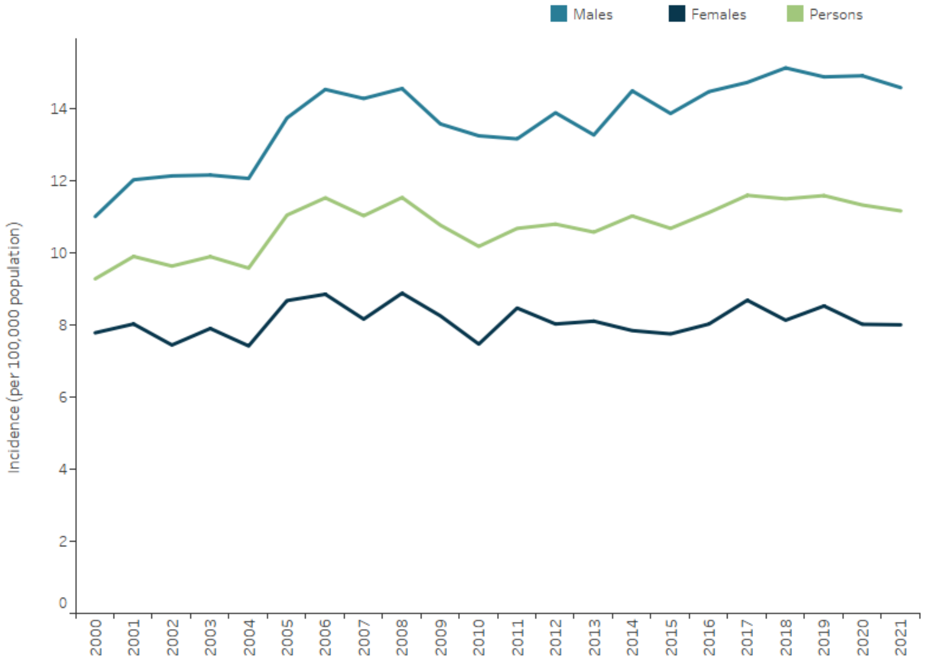

Figure 4: Trends in the incidence of kidney replacement therapy, by sex, 2000 to 2021

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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Prevalence of kidney replacement therapy

This section reports on the total number of people with kidney failure who received kidney replacement therapy (KRT) in Australia.

Variation by age and sex

At the end of 2021, 28,500 people living with kidney failure had received KRT in Australia, of whom 61% (17,500) were males, and 71% (20,200) were aged under 70 (ANZDATA 2022).

In 2021, the prevalence rate of KRT:

- was 1.7 times as high in males as in females
- increased with age, to be highest among men aged 75–79 (411 per 100,000 population) and women aged 65–69 (218 per 100,000 population) (Figure 5).

Figure 5: Prevalence of kidney replacement therapy, by age and sex, 2021

The bar chart shows the total prevalence rate of kidney failure with replacement therapy by age and sex in 2021. Across all ages, more males than females were receiving KRT. The overall prevalence increased with increasing age until age 80 to 84.

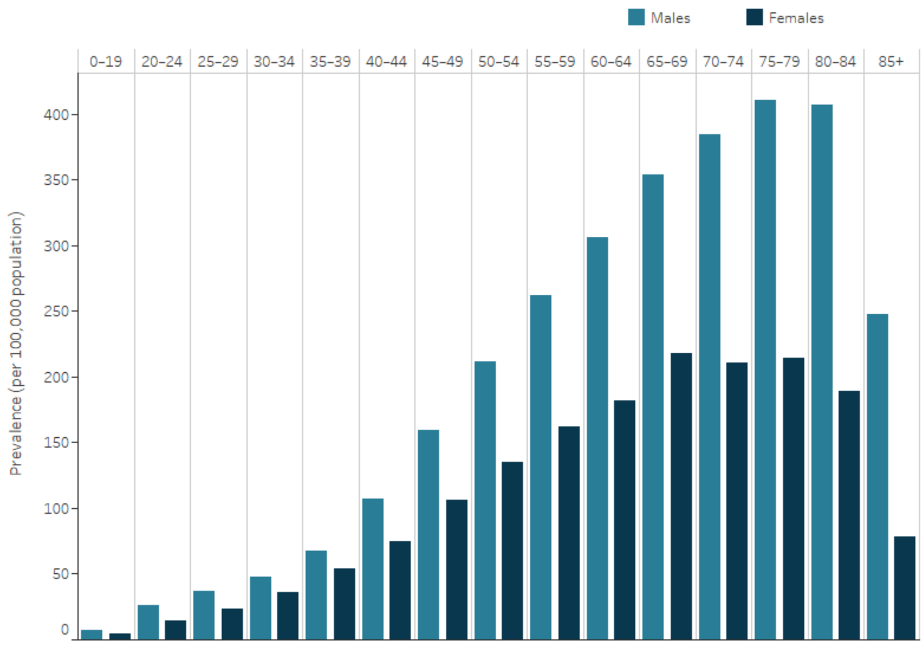

Figure 5: Prevalence of kidney replacement therapy, by age and sex, 2021

Note: The prevalent population includes people with kidney failure who were receiving KRT as at 31 December 2021.

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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Type of kidney replacement therapy

The type of KRT received varies according to age. In 2021, people with kidney failure aged under 55 were more likely to have a functioning kidney transplant than undergo dialysis (Figure 6).

Between ages 55 and 64, approximately half of the people receiving KRT had a functioning kidney transplant (52%), and half received dialysis (48%).

After age 65, people with kidney failure were more likely to receive dialysis than have a functioning kidney transplant, with the proportion of people on dialysis rising sharply from age 75.

Figure 6: Proportion of kidney replacement therapy type, by age, 2021

The bar chart shows the total prevalence of kidney failure with replacement therapy by age and type of KRT (dialysis or transplant). The general pattern shows that the percentage of people treated with a transplant decreases with age, while dialysis increases. Transplants were the most common for of KRT for those aged 0 to 64, with those aged 0 to 24 having the highest proportion of treatment with transplants (73%). Dialysis was the most common form of KRT in those aged 65 and over, increasing with age. 92% of those aged 85+ receiving KRT were treated with dialysis. For those aged 55 to 64, the prevalence of dialysis and transplants was similar (48% and 52%, respectively).

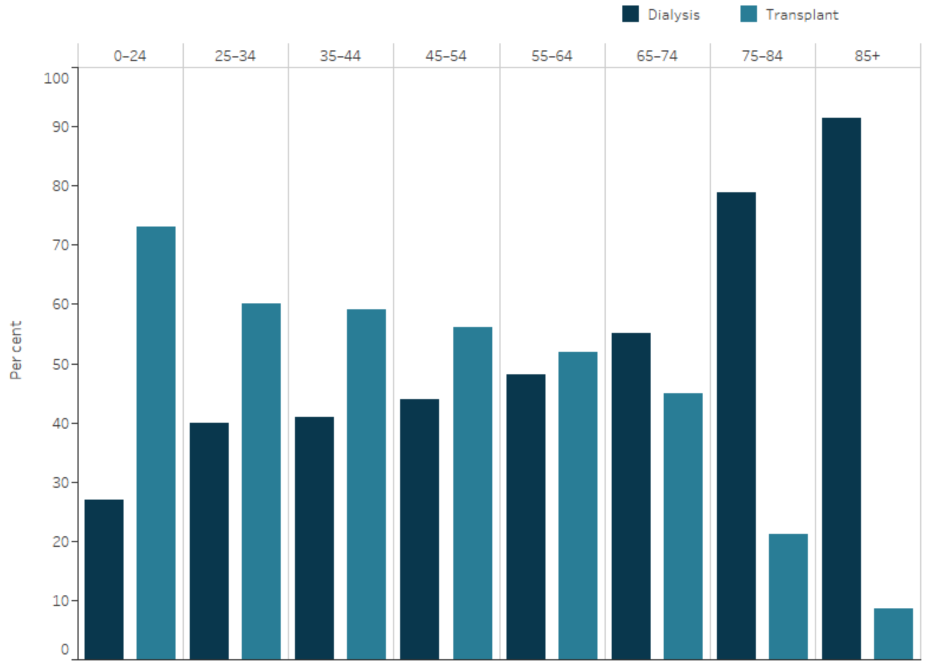

Figure 6: Proportion of kidney replacement therapy type, by age, 2021

Note: The prevalent population includes people with kidney failure who were receiving KRT as at 31 December 2021.

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Variation between population groups

Aboriginal and Torres Strait Islander people

Indigenous Australians with kidney failure are more likely to receive dialysis than a kidney transplant, while non-Indigenous Australians with kidney failure are equally likely to receive either KRT type (Figure 7).

In 2021, 2,600 Indigenous Australians with kidney failure received KRT, with 85% undergoing dialysis and 15% having a kidney transplant.

In comparison, 51% of non-Indigenous Australians with kidney failure received dialysis and 49% had a kidney transplant.

Figure 7: Proportion of kidney replacement therapy type, by Indigenous status, 2000 to 2021

The line chart shows the trend in the proportion of Indigenous and non-Indigenous people receiving kidney replacement therapy in the form of either dialysis or transplant. Trends for Indigenous people show little change over the period – in 2021, 85% of Indigenous people with kidney failure underwent dialysis and 15% had a kidney transplant. In comparison, 51% of non-Indigenous Australians with kidney failure received dialysis and 49% had a kidney transplant.

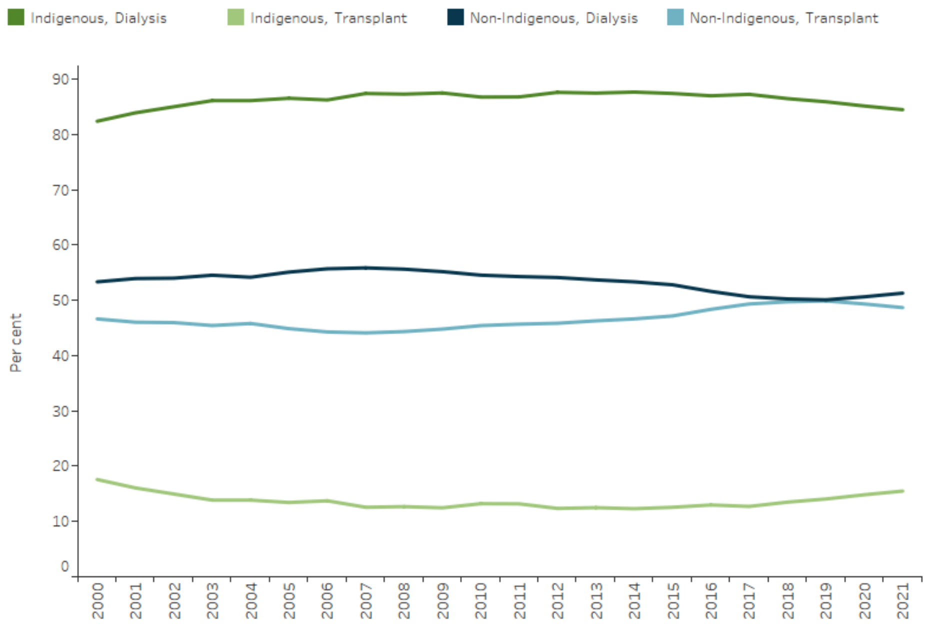

Figure 7: Proportion of kidney replacement therapy type, by Indigenous status, 2000 to 2021

Notes
1. Excludes records with no stated information on Aboriginal and Torres Strait Islander status.
2. The prevalent population includes people with kidney failure who were receiving KRT as at 31 December.

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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Around 2,600 Indigenous Australians with kidney failure received KRT in 2021, at a rate of 289 per 100,000 population.

After adjusting for differences in the age structure of the populations:

- the prevalence rate of KRT among Indigenous Australians was 5.0 times as high as that for non-Indigenous Australians
- Indigenous females received KRT at a rate that was 7.2 times as high as that for non-Indigenous females
- Indigenous males received KRT at a rate that was 3.7 times as high as that for non-Indigenous males (Figure 8).

Remoteness and socioeconomic area

Data for 2021 show that the prevalence rate of KRT was highest in *Remote and very remote* areas and increased with socioeconomic disadvantage.

After adjusting for differences in the age structure of the populations, rates were:

- 2.8 times as high in *Remote and very remote* areas as in *Major cities*. Rates were 4.6 times as high for females and 1.8 as high for males
- 1.6 times as high in the lowest socioeconomic areas as in the highest socioeconomic areas (Figure 8).

Figure 8: Prevalence of kidney replacement therapy, by population group and sex, 2021

The bar chart shows rates of kidney failure with replacement therapy by sex based on Aboriginal and Torres Strait Islander status, remoteness area and socioeconomic area. Indigenous people received replacement therapy for kidney failure at a rate 5.0 times as high as non-Indigenous people. Prevalence rates for KRT were similar across remoteness areas, with the exception of Remote and Very remote areas, which had a rate 2.8 times as high as in Major cities. Prevalence rates increased by socioeconomic area, with people living in the least disadvantaged socioeconomic areas having the lowest prevalence of kidney failure with replacement therapy, and those living in the most disadvantaged areas having the highest. Males received KRT for kidney failure at higher rates than females across all measures except for Indigenous females and females living in Remote and very remote areas.

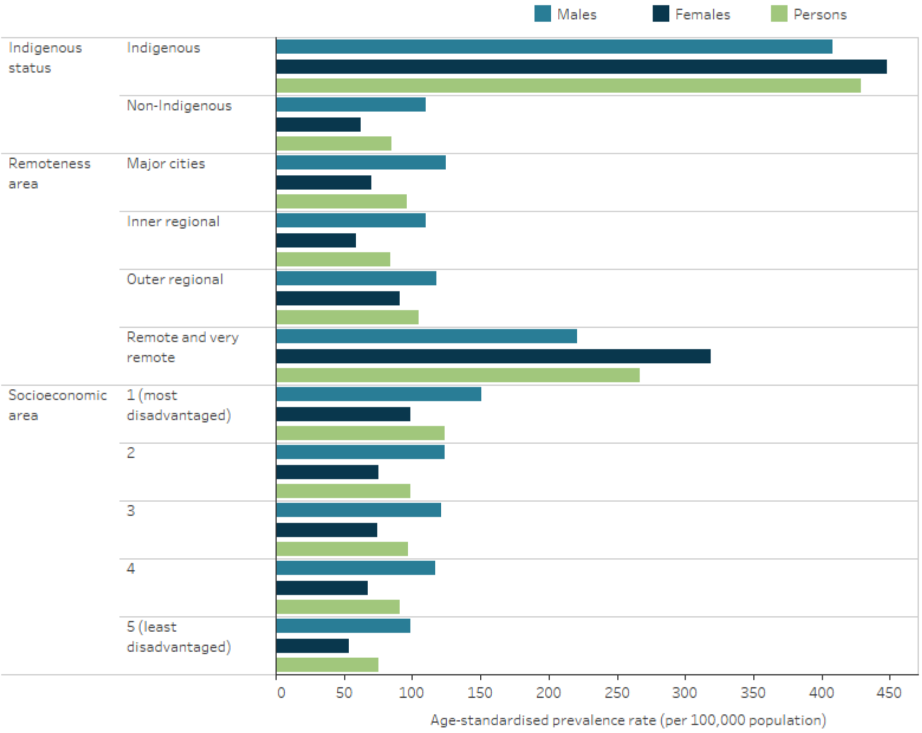

Figure 8: Prevalence of kidney replacement therapy, by population group and sex, 2021

[Notes]

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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Trends over time

Between 2000 and 2021:

- the number of people with kidney failure receiving KRT more than doubled, from 11,700 to 28,500
- the age-standardised prevalence rate of KRT increased by 57% (Figure 9)
- the age-standardised prevalence rate of KRT among males compared with females increased from 1.4 times as high to 1.7 times as high.

People with kidney failure receiving KRT are about equally likely to receive dialysis or a kidney transplant (Figure 9(b)). Dialysis was slightly more common than kidney transplantation in 2021 (53% and 47%), with the largest difference in the 2 types seen between 2005 and 2010.

Figure 9 and 9(b): Trends in prevalence of kidney replacement therapy, by sex and type, 2000 to 2021

The first line chart shows the age-standardised prevalence rate of kidney failure with replacement therapy, by sex, from 2000 to 2021. The prevalence increased for males and females, growing by 68% for males from 73 to 122 per 100,000 population, and 44% for females from 51 to 74 per 100,000 population.

The second line chart shows the proportions of kidney failure with replacement therapy, by the type of KRT, from 1989 to 2021. In 1989, transplants were the most common form of KRT (53%), in 1994 transplant and dialysis proportions were the same (50%), whereas in 2021, dialysis was the most common form of KRT (53%).

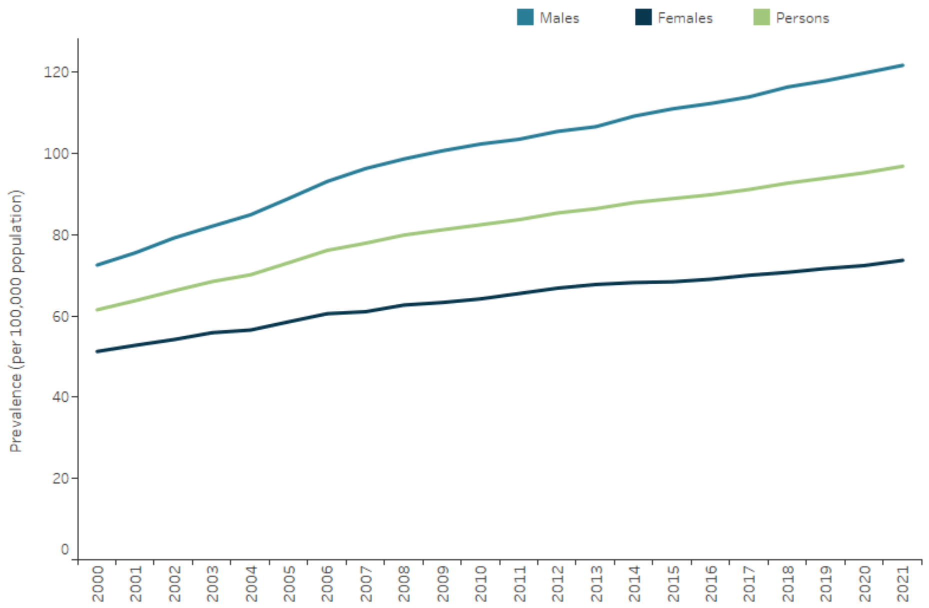

Figure 9: Trends in prevalence of kidney replacement therapy, by sex, 2000 to 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. The prevalent population includes people with kidney failure who were receiving KRT as at 31 December.

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Further information

For more information on KRT in Indigenous people, see:

- Profiles of Aboriginal and Torres Strait Islander people with kidney disease
- Aboriginal and Torres Strait Islander Health Performance Framework: kidney disease - external site opens in new window

References

AIHW (Australian Institute of Health and Welfare) (2016) *Incidence of end-stage kidney disease in Australia 1997–2013*, AIHW, Australian Government, accessed 8 March 2022.

AIHW (2022) *Australia's health performance framework*, AIHW, Australian Government, accessed 8 March 2022.

Anderson K, Cunningham J, Devitt J, Preece C and Cass A (2012) "Looking back to my family": Indigenous Australian patients' experience of hemodialysis - external site opens in new window. *BMC Nephrology*, 13:114, doi:10.1186/1471-2369-13-114.

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2022) *ANZDATA 45th Annual Report 2022 - external site opens in new window*, ANZDATA website, accessed 15 March 2023.

Gorham G, Cass A, Howard K and Evans K (2016) *Central Australia Renal Study: technical report update* - external site opens in new window, report prepared by the Menzies School of Health Research to the Department of Health, accessed 27 May 2022.

Hughes J, Freeman N, Beaton B, Puruntatemeri M, Hausin M, Tipiloura G et al. (2019) My experiences with kidney care: a qualitative study of adults in the Northern Territory of Australia living with chronic kidney disease, dialysis and transplantation - external site opens in new window, *PLOS ONE* 14(12):e0225722. doi:10.1371/journal.pone.0225722.

Purple House (2022) *Our story* - external site opens in new window, Purple House website, accessed 21 February 2022.

Sparke C, Moon L, Green F, Mathew T, Cass A, Chadban S et al. (2013) Estimating the total incidence of kidney failure in Australia including individuals who are not treated by dialysis or transplantation - external site opens in new window, *American Journal of Kidney Diseases* 61:413–9. doi: 10.1053/j.ajkd.2012.10.012.

UNE (University of New England) (2020) *Home-grown Indigenous healthcare – The Purple House* - external site opens in new window, UNE website, accessed 21 February 2022.

WHO (World Health Organization) (2022) *Palliative care* - external site opens in new window, WHO, accessed 21 February 2022.

Dialysis

Page highlights:

- In 2021, 15,200 people with kidney failure received dialysis.
- The number of people with kidney failure who received dialysis more than doubled between 2000 and 2021, from 6,400 to 15,200.
- In 2021, 82% of people with kidney failure who were receiving dialysis underwent haemodialysis, compared with 18% who used peritoneal dialysis.

Dialysis is an artificial way to remove waste and excess water from the blood, and regulate safe levels of circulating agents (such as potassium, calcium and phosphorous) in the body, a function usually performed by the kidneys. It is most often provided to treat chronic kidney failure, but is sometimes needed in cases of acute kidney failure, where the kidneys have been temporarily damaged due to illness or injury.

For more information, see What is dialysis?

Variation by age and sex

In 2021, 15,200 people with kidney failure received dialysis (9,300 males and 5,900 females).

The number of males who received dialysis was higher than the number of females in all age groups. The number was highest in the 65–74 year age group (2,300 men and 1,500 women). The number of people with kidney failure receiving dialysis reduced sharply in people aged 85 and over (Figure 1).

Figure 1: Prevalence of kidney failure with dialysis, by age and sex, 2021

The bar chart shows the number of people living with kidney failure who are being treated with dialysis in 2021, by age group and sex. More males than females were treated with dialysis across all age groups. The number of people receiving dialysis for kidney failure increased with age until peaking in the 65 to 74 year age group for males and females.

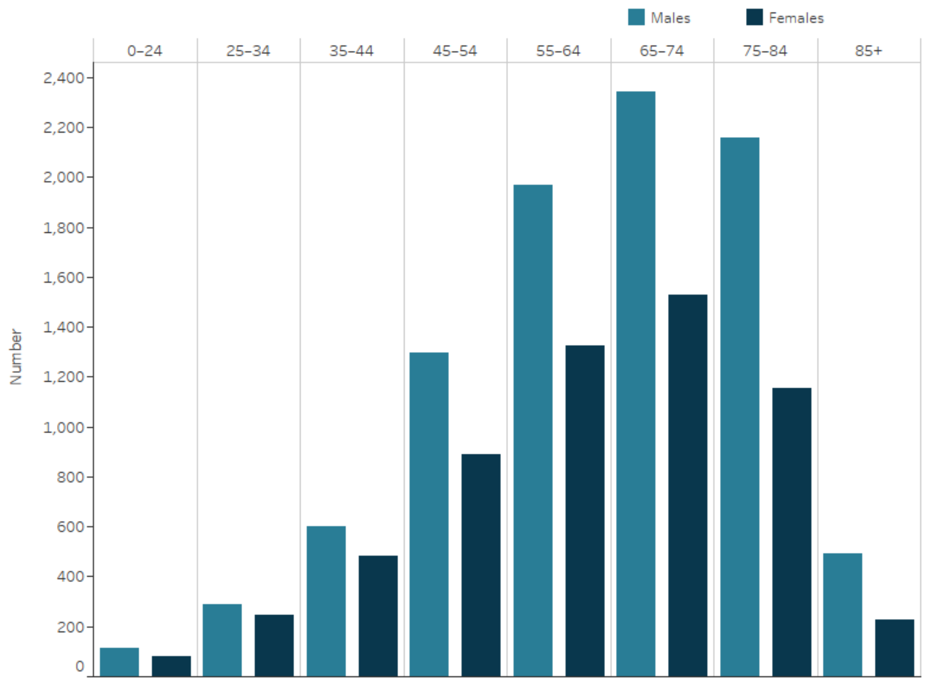

Figure 1: Prevalence of kidney failure with dialysis, by age and sex, 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Trends over time

The number of people with kidney failure who received dialysis more than doubled between 2000 and 2021, from 6,400 to 15,200.

The number of males receiving dialysis in 2021 was 2.6 times as high as in 2000 (9,300 and 3,600), while the number of females receiving dialysis was 2.1 times as high (5,900 and 2,800) (Figure 2).

Figure 2: Trends in the prevalence of kidney failure with dialysis, by sex, 2000 to 2021

The line chart shows the number of people receiving dialysis, by sex, from 2000 to 2021. Overall, there has been an increase of 137% in the number of people receiving dialysis, from 6,400 to 15,200. The increase was larger for males (156%) than females (113%).

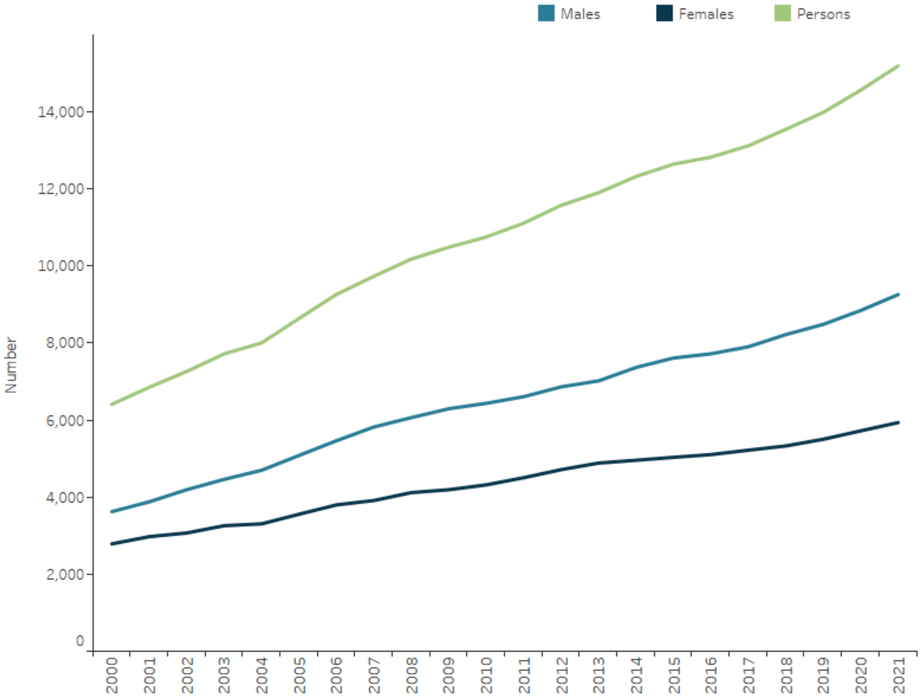

Figure 2: Trends in the prevalence of kidney failure with dialysis, by sex, 2000 to 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Dialysis type

Haemodialysis is the most common type of dialysis received by people with kidney failure.

In 2021, 82% of people with kidney failure who were receiving dialysis underwent haemodialysis, compared with 18% who used peritoneal dialysis. In 2000, the corresponding proportions were 73% using haemodialysis and 27% peritoneal dialysis (Figure 3).

Figure 3 and 3(b): Trends in prevalence of kidney failure with dialysis, by type, 2000 to 2021

The line chart shows the change in the type of dialysis people receive, from 2000 to 2021. The overall number of people receiving haemodialysis has increased from 4,700 people in 2000 to 12,500 in 2021. In contrast, around 1,700 people received peritoneal dialysis in 2000 compared to 2,700 in 2021.

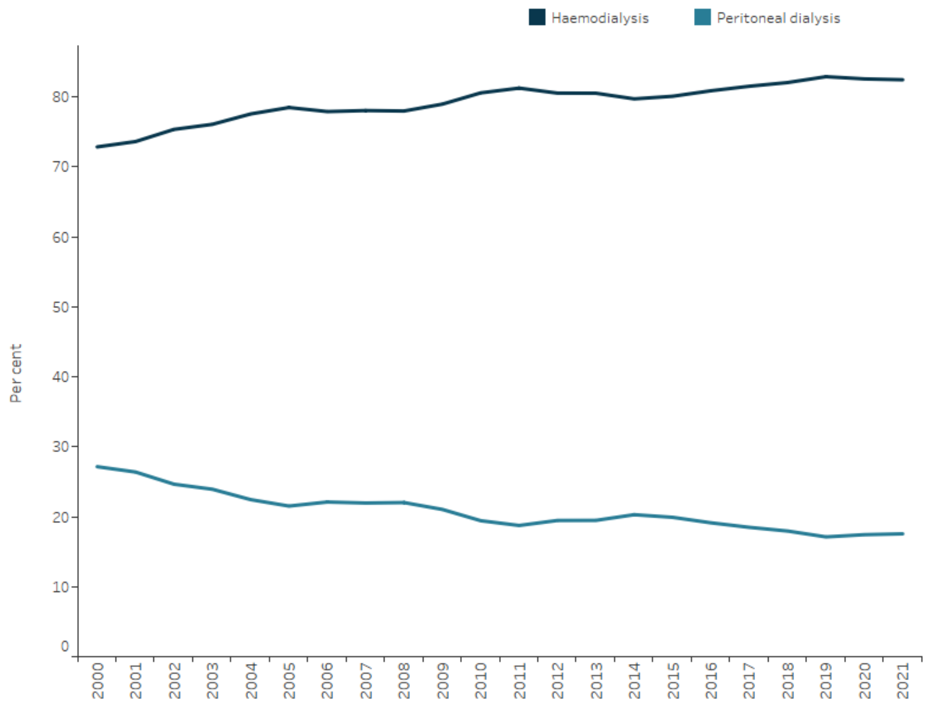

Figure 3: Proportion of kidney failure treated with dialysis, by type, 2000 to 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Haemodialysis treatment location

In 2021, 65% of people with kidney failure receiving haemodialysis were treated in satellite facilities, with 25% treated in hospital and 9% at home. A satellite facility has been the most common location to receive haemodialysis since 2000 (Figure 4).

This reflects changes in the kidney care landscape, with the expansion of satellite kidney care centres, to better meet the needs of the population with kidney failure.

The number of people with kidney failure receiving haemodialysis has risen across all dialysis locations. From 2000 to 2021, numbers increased:

- by 271% for satellite haemodialysis care, from 2,200 to 8,200
- by 85% for hospital haemodialysis, from 1,700 to 3,200
- by 51% for home haemodialysis, from 741 to 1,120.

Figure 4: Trends in prevalence of kidney failure with haemodialysis, by location, 2000 to 2021

The line chart shows the change in the number of people receiving dialysis at satellite, home, hospital and community locations, from 2000 to 2021. This number has increased across all locations, however the number of people receiving haemodialysis in satellite facilities has increased the most, from 2,200 in 2000 to 8,200 in 2021, with 65% of people receiving haemodialysis at satellite facilities in 2021.

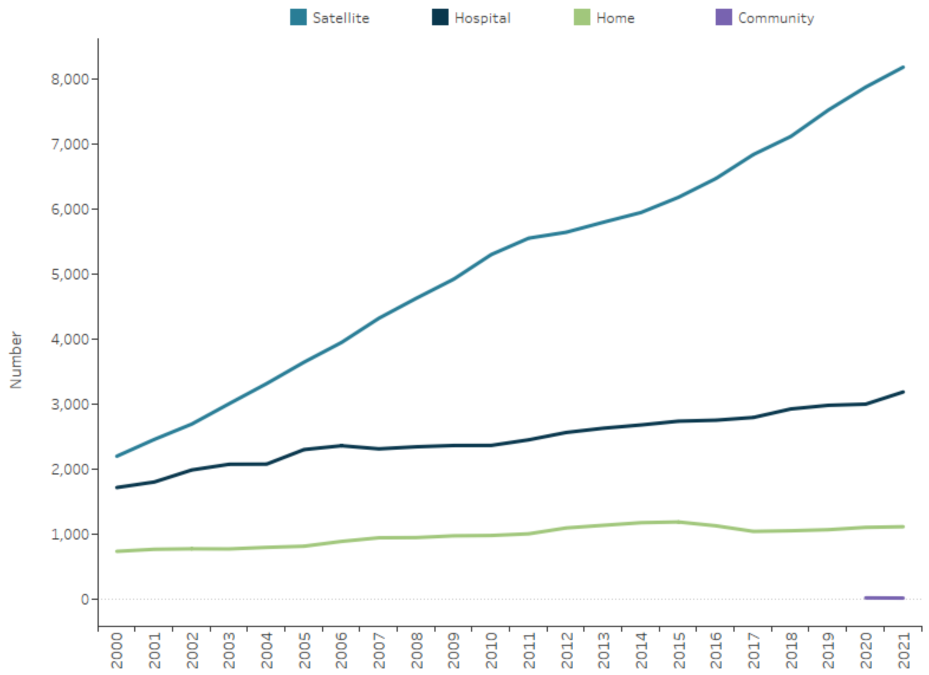

Figure 4: Trends in prevalence of kidney failure with haemodialysis, by location, 2000 to 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
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Kidney care units in Australia

Kidney transplants and dialysis are usually performed in specialised kidney units in hospitals, satellite facilities and transplant centres. Australia has more than 100 kidney care 'parent' units that are typically based in hospitals, and over 300 locations for dialysis treatment (ANZDATA 2022). It is common for parent units to be associated with one or more satellite units that provide access to dialysis and transplantation services, and to inpatient hospital care.

In 2019, an ANZDATA survey found that the size of kidney units varied considerably across Australia, with over half treating fewer than 250 patients, and the largest caring for well over 1,000 patients. Kidney transplantation was available in 40% of the units.

On average, each unit had 3 full-time consultant nephrology staff. Most units also had physician trainees, along with nurse practitioners, nurses, dietitians, social workers, pharmacists and transplant coordinators (McDonald et al. 2021).

References

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2022) *ANZDATA 45th Annual Report 2022* - external site opens in new window, ANZDATA, Adelaide, accessed 16 March 2023.

McDonald S, Hewawasam E, Hurst K, Irish G and Clayton P (2021) *ANZDATA special reports 1: unit survey 2020* - external site opens in new window, ANZDATA, Adelaide, accessed 8 April 2022.

Kidney transplantation

Page highlights:

- In 2021, 13,300 people with kidney failure had a functioning kidney transplant.
- In 2021, 857 kidney transplant operations were performed in Australia.

Kidney transplantation is the preferred type of kidney replacement therapy (KRT), as it lowers long-term mortality risk and costs, and increases quality of life (Liem et al. 2008). Following transplantation, care directed towards preventing chronic kidney disease (CKD) is required (KHA 2021).

Successful kidney transplants where recipients are still living with their transplant, regardless of how many years ago they received it, are referred to on this web page as ‘functioning kidney transplants’.

A total of 857 kidney transplant operations were performed in Australia in 2021, with 9 in 10 of these being the first kidney transplant. Of all transplanted kidneys in 2021, 655 (76%) were from deceased donors and 202 (24%) were from living donors (ANZDATA 2022).

Transplanted kidneys can be donated by either deceased or living donors. The number of donated kidneys available for transplantation is insufficient to meet demand. As at 1 May 2023, 1,450 Australians were on the kidney transplant waiting list (ANZOD 2023).

A total of 729 kidney transplants from deceased donors took place in 2022. The COVID-19 pandemic substantially affected activity to do with organ donation and transplantation – 857 kidney transplants from deceased donors took place in 2019, falling to 704 in 2020 (ANZOD 2022). For more information on the impact of COVID-19 on CKD, see Impact of COVID-19.

Variation by age and sex

In 2021, 13,300 people with kidney failure had a functioning kidney transplant (8,200 males and 5,100 females).

The highest number of people with a functioning kidney transplant were in the 55–64 year age group (2,200 men and 1,300 women) (Figure 1). This was followed by the 65–74 year age group (2,000 men and 1,200 women) and then the 45–54 year age group (1,700 men and 1,100 women).

The number of males with a functioning kidney transplant exceeded the number of females in all age groups.

Figure 1: Prevalence of people living with a kidney transplant, by age and sex, 2021

The bar chart shows the number of people living with a kidney transplant in Australia, by age and sex in 2021. Across all ages, more males than females are living with a kidney transplant. Numbers increase by age up to 55-64, followed by those aged 65-74. Around 43% of people living with a kidney transplant are aged under 55.

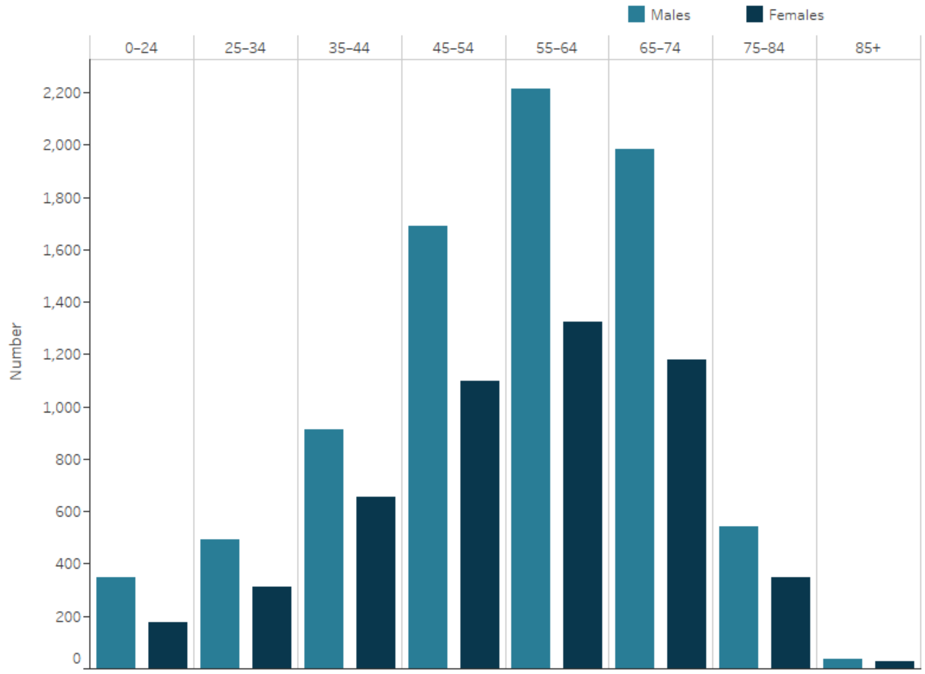

Figure 1: Prevalence of people living with a kidney transplant, by age and sex, 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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Trends over time

Over the past 2 decades, the number of people with a functioning kidney transplant has more than doubled, from 5,300 people in 2000 to 13,300 in 2021.

The number of males with a functioning kidney transplant in 2021 was 2.6 times as high as in 2000 (8,200 and 3,100), while the number of females with a functioning kidney transplant was 2.3 times as high (5,100 and 2,200) (Figure 2).

Figure 2: Trends in prevalence of people living with a kidney transplant, by sex, 2000 to 2021

The line chart shows the number of people living with a kidney transplant in Australia, from 2000 to 2021, by sex. In 2000, around 2,200 females and 3,100 males were living with a kidney transplant – in 2021 numbers has risen to 5,100 females and 8,200 males.

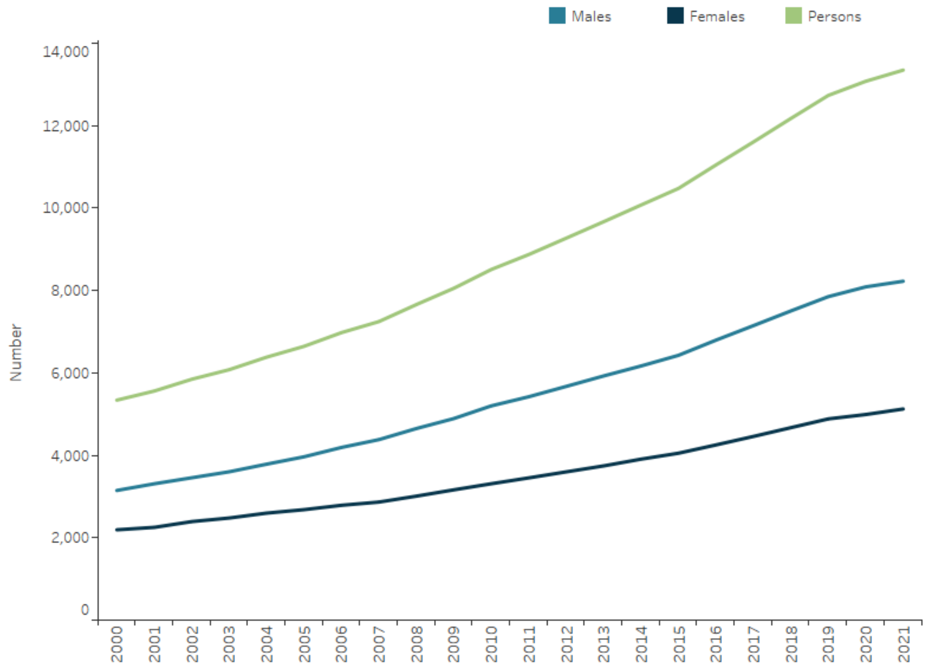

Figure 2: Trends in prevalence of people living with a kidney transplant, by sex, 2000 to 2021

Chart: AIHW. Source: AIHW analysis of the Australia and New Zealand Dialysis and Transplant Registry.
https://www.aihw.gov.au

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References

ANZDATA (Australia and New Zealand Dialysis and Transplant Registry) (2022) *ANZDATA 45th Annual Report 2022* - external site opens in new window, ANZDATA, Adelaide, accessed 16 March 2023.

ANZOD (2022) *ANZOD Monthly Report on Deceased Organ Donation in Australia – December 2022* - external site opens in new window, ANZOD, Adelaide, accessed 16 March 2023.

ANZOD (2023) *Organ waiting list* - external site opens in new window, ANZOD, Adelaide, accessed 16 March 2023.

KHA (Kidney Health Australia) (2021) *An introduction to kidney transplantation* - external site opens in new window, Kidney Health Australia website, Melbourne, accessed 22 February 2022.

Liem YS, Bosch JL and Myriam Hunink MG (2008) Preference-based quality of life of patients on renal replacement therapy: a systematic review and meta-analysis - external site opens in new window, *Value in Health* 11:733–741, doi:10.1111/j.1524-4733.2007.00308.x.

Emergency department presentations

Emergency departments (EDs) are an essential component of Australia's health care system. Many of Australia's public hospitals have purpose-built EDs, staffed 24 hours a day, providing care for patients with chronic kidney disease (CKD) who require urgent medical, surgical or other attention.

In 2020–21, there were around 42,300 emergency department presentations with a principal diagnosis of chronic kidney disease.

Variation by age and sex

In 2020–21:

- around 14,900 males and 27,400 females presented to EDs with a principal diagnosis of CKD
- the rate of presentation for females was 1.9 times as high as the male rate
- in males, the rate of presentation increased with age, and ranged between 18 and 850 presentations per 100,000 population. Beyond age 65, rates of presentation were higher in men than women (Figure 1)
- in females, there was an initial peak in presentations between the ages of 20 and 24 (363 presentations per 100,000 population). This peak mainly comprised ED presentations with a principal diagnosis of tubulo-interstitial nephritis. Following this peak, the rate of ED presentations increased with age. The rate of presentation for females ranged between 32 and 590 per 100,000 population (Figure 1).

Figure 1: Emergency department presentations with a principal diagnosis of chronic kidney disease, by age and sex, 2020–21

The bar chart shows the number of emergency department (ED) presentations with a principal diagnosis of CKD, by age group and sex in 2020-21. Among males, presentations increased with age and the highest rate of male ED presentation was in the 85+ age group (853 per 100,000 population). Among females, there were two peaks in the number of ED presentations, in the 20-24 age group (364 per 100,000 population) and the 85+ age group (590 per 100,000 population).

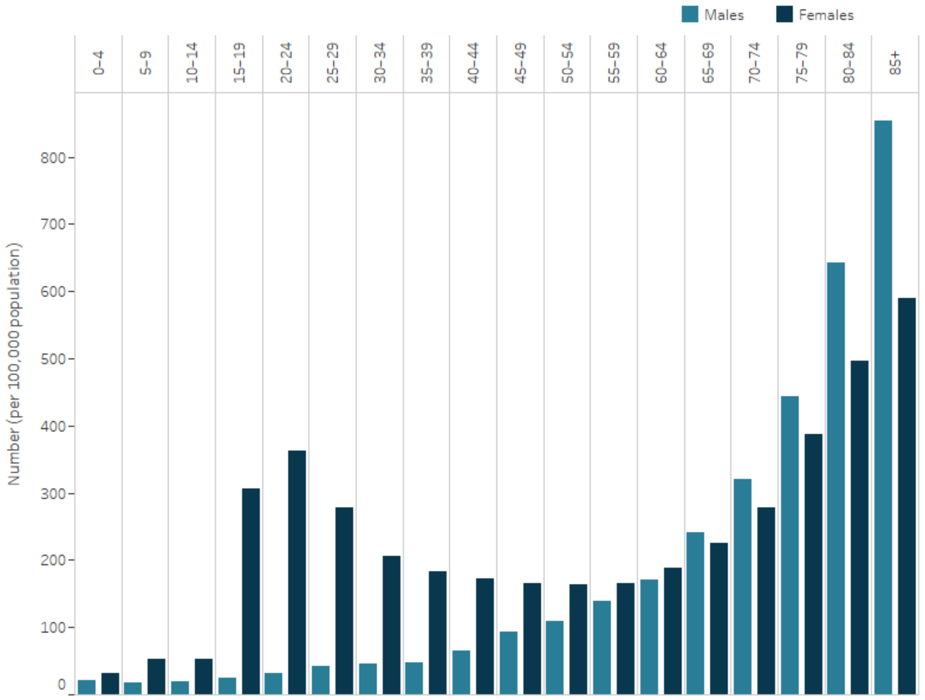

Figure 1: Emergency department presentations with a principal diagnosis of chronic kidney disease, by age and sex, 2020–21

Chart: AIHW Source: AIHW analysis of National Non-Admitted Patient Emergency Department Care Database.
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Types of chronic kidney disease

In 2020–21, there were around:

- 13,100 ED presentations with a principal diagnosis of acute kidney failure, accounting for 31% of all CKD-related ED presentations. This was the most common principal diagnosis among men (58 presentations per 100,000 population) (Figure 2).
- 18,500 presentations with a principal diagnosis of kidney tubulo-interstitial disease. After adjusting for age, women were approximately 6.7 times as likely as men to present to ED with a diagnosis of tubulo-interstitial nephritis and this was the principal diagnosis in around 58% of CKD-related female ED presentations. Tubulo-interstitial nephritis includes acute and chronic forms as well as pyelonephritis.

Figure 2: Emergency department presentations with a principal diagnosis of chronic kidney disease, by type and sex, 2020–21

The bar chart shows the number of emergency department (ED) presentations with a principal diagnosis of CKD, by CKD type and sex in 2020-21. Among females, kidney-tubulo interstitial diseases were the most common principal diagnosis (126 presentations per 100,000 population). Among males, acute kidney failure was the most common principal diagnosis (51 presentations per 100,000 population).

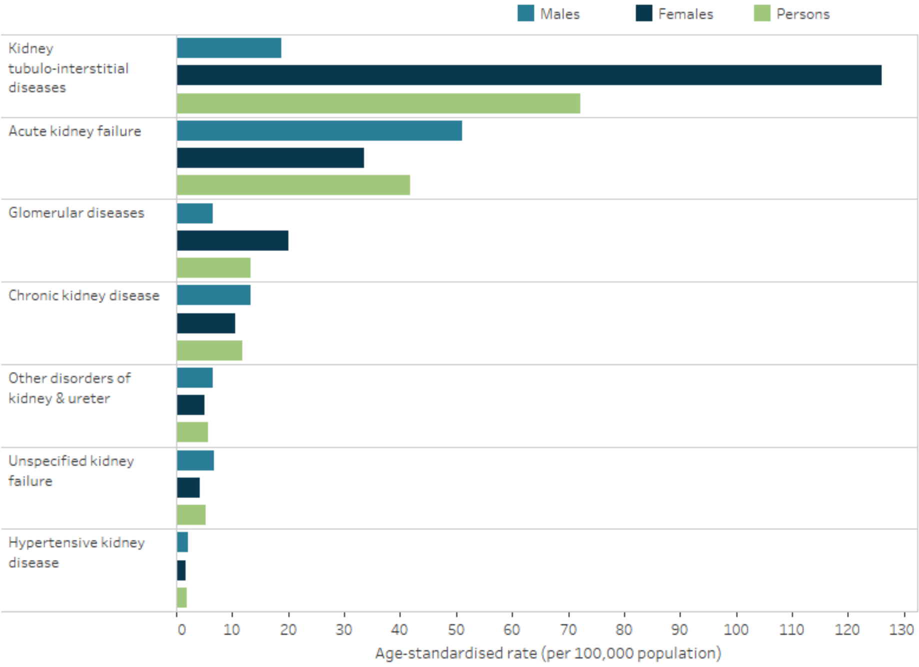

Figure 2: Emergency department presentations with a principal diagnosis of chronic kidney disease, by type and sex, 2020–21

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW Source: AIHW analysis of National Non-Admitted Patient Emergency Department Care Database.
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Variation across population groups

Aboriginal and Torres Strait Islander people

- In 2020–21, there were around 4,200 ED presentations with CKD as the principal diagnosis among Indigenous people. The rate of ED presentations in Aboriginal and Torres Strait Islander males and females was 292 and 677 per 100,000 population, respectively.
- After adjusting for age, Indigenous Australians were 4.6 times as likely as their non-Indigenous counterparts to present to an ED with a CKD-related diagnosis (Figure 3).

Remoteness and socioeconomic area

- The rate of CKD-related ED presentations increased with remoteness. People in *Remote and very remote* areas were 3.6 times as likely to present to ED with a CKD-related diagnosis as people living in *Major cities* (Figure 3).

- Presentations to ED increased with increasing socioeconomic disadvantage. Individuals in the lowest socioeconomic areas presented with CKD-related diagnoses at 2.3 times the rate of those in the highest socioeconomic areas.
- Across all levels of remoteness and socioeconomic disadvantage, females had a consistently higher rate of ED presentation than males.

Figure 3: Emergency department presentations for chronic kidney disease, by population group, 2020–21

The bar chart shows the number of emergency department (ED) presentations Indigenous status, remoteness area and socioeconomic area. Indigenous people presented to the ED at 4.6 times the rate of their non-Indigenous counterparts. Persons in Remote and very remote areas were 3.6 times as likely to present to the ED with a principal diagnosis of CKD. The rate of CKD-related ED presentations increased with increasing socioeconomic disadvantage. The most disadvantaged socioeconomic areas had a presentation rate 2.3 times that of the most advantaged socioeconomic areas.

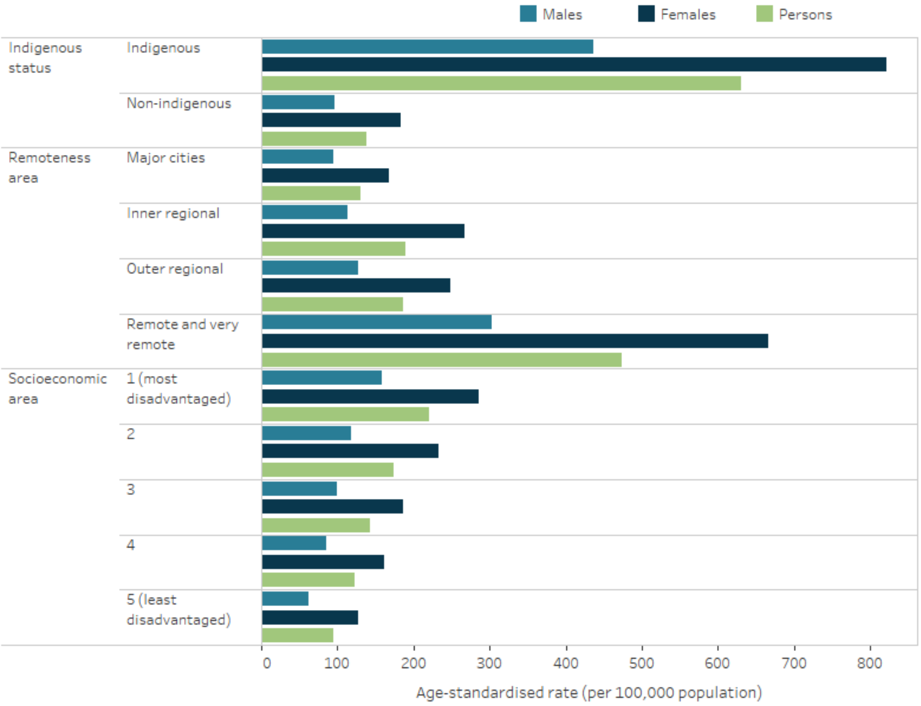

Figure 3: Emergency department presentations for chronic kidney disease, by population group, 2020–21

[Notes]

Chart: AIHW Source: AIHW analysis of National Non-Admitted Patient Emergency Department Care Database.
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Triage category

Triage category is used to indicate the level of urgency of a patient's need for care. In 2020–21, among all CKD-related ED presentations:

- 247 (0.6%) were triaged as 'resuscitation', indicating a need for immediate care
- 6,200 (14.7%) were triaged as 'emergency', requiring care within 10 minutes
- 24,800 (58.7%) were triaged as 'urgent', requiring care within 30 minutes
- 10,400 (24.6%) were triaged as 'semi-urgent', requiring care within 60 minutes
- 600 (1.4%) were triaged as 'non-urgent', requiring care within 120 minutes.

End status

In 2020–21:

- around 73% of presentations to ED with a principal diagnosis of CKD were later admitted to the hospital to which they presented
- around 23% of presentations left the ED without being admitted or referred to another hospital
- 3.3% of presentations to the ED with a principal diagnosis of CKD were referred to another hospital for admission.

Further information

For more information on acute kidney injury, see: Acute kidney injury in Australia: a first national snapshot.

Impact of COVID-19

The onset of the COVID-19 pandemic has had an impact on Australia's population and health care system in multiple ways, including on economic expenditure, mortality, disability, health workforce and disease surveillance. The next web page explores the impact of COVID-19 in Australia for people living with chronic kidney disease (CKD).

Data available on CKD across the COVID period are limited by the availability of data on the continuing pandemic period, as well as the lack of longer term data.

There will likely be long-term impacts of the COVID-19 pandemic on people with CKD, even on those who do not become infected with COVID-19, due to delays in care for chronic conditions such as CKD, diabetes and cardiovascular disease (Yende and Parikh, 2021).

Kidney transplants in Australia

Organ donation numbers and transplants have declined as a result of the COVID-19 pandemic (OTA 2021). In response to COVID-19, adult kidney transplant programs were suspended from 24 March 2020 to mid-May 2020.

Pauses in transplant surgery particularly affected those with CKD, as more than half of transplanted organs are kidneys. In 2020, there was an 18% drop in the number of kidney transplants from deceased donors compared with 2019 (704 and 857 transplants, respectively). 2021 saw a decrease of 6.8% compared with 2020 (656 transplants) (OTA 2020, 2021).

Donations from living donors are classified as elective surgery; therefore, pauses in elective surgery affected the number of transplants from living donors. There was a 24% drop in living kidney donors in 2020; in 2021, the number of living kidney donors rose by 12% compared with 2020 (202 and 182 donors) (OTA 2021).

Chronic kidney disease hospitalisations

In 2020–21, there were over 4,700 hospitalisations involving a diagnosis of COVID-19 in Australia. Of these, 394 (8.4%) had CKD recorded on their hospital admission; 64 (16%) of these required a stay in the intensive care unit, 48 (12%) required continuous ventilatory support and 113 (29%) died in hospital, the third-highest death rate for comorbid conditions after chronic obstructive pulmonary disease and dementia. This includes type 2 diabetes (19%, 188 deaths) and cardiovascular disease (20%, 189 deaths), which are often comorbid with CKD. The death rate for people with CKD and COVID-19 was also higher than for people with multiple comorbid conditions who were hospitalised with COVID-19 (26%) and people with no comorbid conditions (4.7%) (AIHW 2022).

Hospital admissions for people with CKD fell sharply between March and April 2020, when lockdown measures were introduced nationwide by the Australian Government. In April 2020, CKD hospitalisations declined by 16% among males and by 18% among females, compared with figures for April 2019 (Figure 1(b)).

Figure 1 and 1(b): Monthly trends in chronic kidney disease hospitalisations, as a principal or additional diagnosis

Figure 1: The line chart shows the number of CKD hospitalisation admissions as a principal or additional diagnosis by month, for the years 2017-18, 2018-19 and 2019-20 and 2020–21. Between March and April in 2019-20, there was a large drop in the number of CKD hospitalisations not seen to the same extent in the previous 2 years, that coincided with the onset of restrictions brought in to address the COVID-19 pandemic. The number of hospital admissions for CKD in 2020–21 were comparable to years prior to 2019–20.

Figure 1b: The line chart shows the per cent change in the number of hospital admissions for CKD from January 2019 to June 2020 for males, females and persons. Compared to the previous year, hospital admissions decreased by 17% in April 2020. This affect was greater for females (declining 18%) than males (declining by 16%).

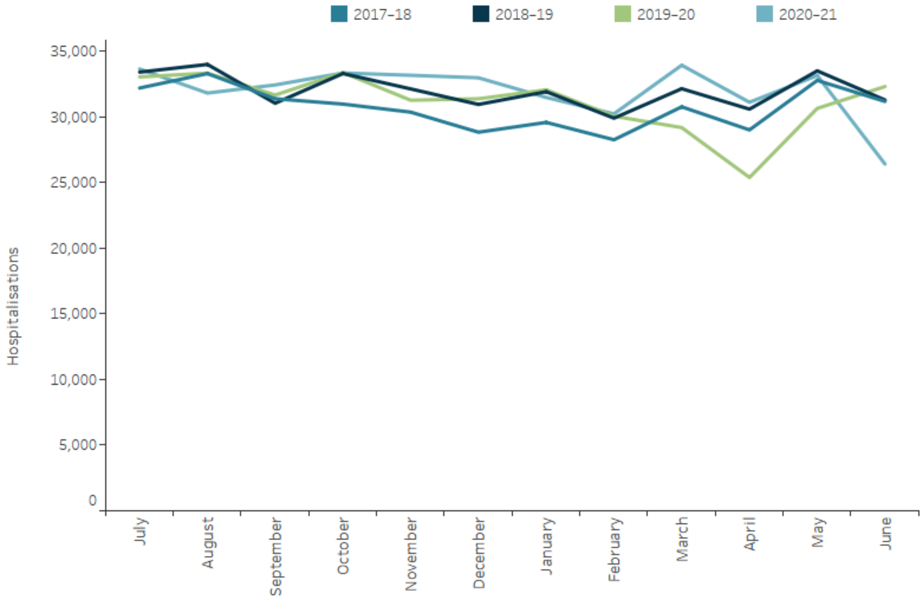

Figure 1: Monthly trends in chronic kidney disease hospitalisations, as a principal or additional diagnosis, by year, 2017–18 to 2020–21

Notes
1. Hospitalisations exclude dialysis as a principal diagnosis.
2. Hospital admission data is captured for completed hospitalisations within the data year. Hospitalisations where a person did not leave the hospital within the same data year as their admission are not included in the visualisation. This is the likely cause of the apparent decrease in admissions at the end of each data year.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.
http://www.aihw.gov.au

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Chronic kidney disease emergency department presentations

From July 2018 to June 2021, the average number of CKD-related ED presentations each month was around 3,400. The number of presentations ranged between 2,800 (April 2020) and 4,200 (January 2020) during this period.

Between January 2020 and April 2020, the rate of CKD-related ED presentations fell by about 32% (16 to 11 presentations per 100,000 population). This decline coincides with the implementation of COVID-19 restrictions in early 2020. The rate of ED presentations gradually increased between April 2020 and January 2021 (Figure 2).

Figure 2: Number of emergency department presentations with a principal diagnosis of chronic kidney disease, July 2018 to June 2021

The line chart shows the number of emergency department (ED) presentations with CKD as a principal diagnosis, by month, for the years 2018-19, 2019-20 and 2020-21. Between January and April 2019-20, there was a large drop in the number of ED presentations (from 4,200 to 2,800 presentations per month) which coincided with the implementation of restrictions associated with the COVID-19 pandemic. ED presentations gradually increased between July 2020 and December 2020.

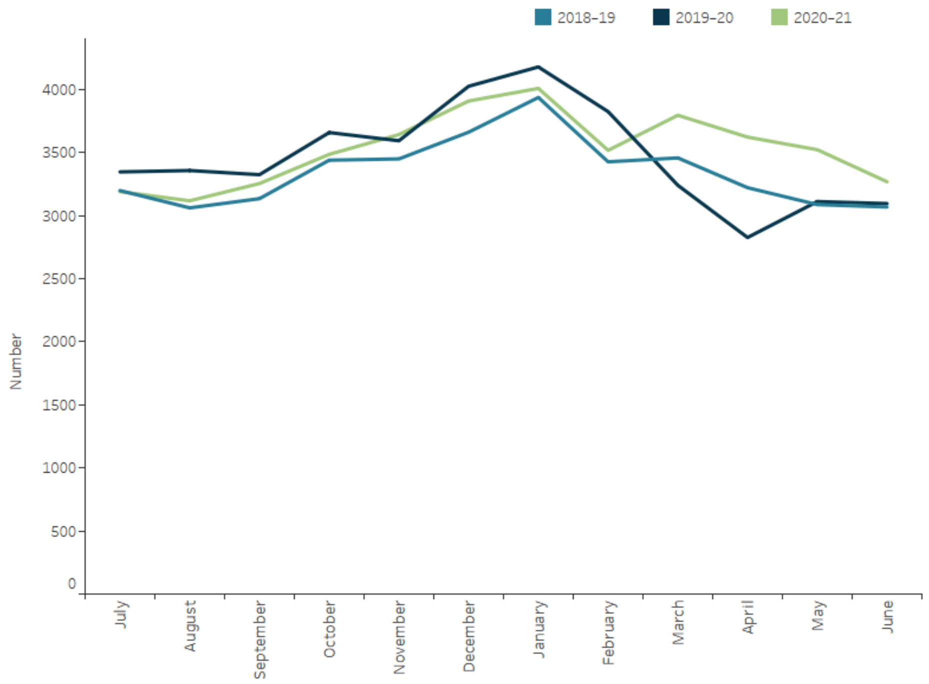

Figure 2: Number of emergency department presentations with a principal diagnosis of chronic kidney disease, July 2018 to June 2021

Chart: AIHW Source: AIHW analysis of National Non-Admitted Patient Emergency Department Care database.
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Acute kidney injury hospitalisation in Australia

International data show that COVID-19 causes acute kidney injury (AKI) in some patients. In patients hospitalised with COVID-19, rates of AKI between 6% and 28% have been reported, increasing to around 50% in patients admitted to intensive care (Huang et al 2021; Nadim et al. 2020; Silver et al 2020). Additional research suggests that cases of AKI in COVID-19 patients may be much higher than this, if an extended definition of AKI is used to capture cases where the disease occurs before hospitalisation, or early in a hospital admission (Wainstein et al. 2022).

A meta-analysis of international data published up to October 2020 showed that 19% of AKI patients with COVID-19 who were in an intensive care unit started kidney replacement therapy (Silver et al. 2020).

Early reporting suggests that 6 months post-acute COVID-19 infection, around 35% of patients have an estimated glomerular filtration rate (eGFR) of <90 mL/min/1.73m^2, including 13% who did not have AKI and had normal eGFR on discharge (Huang et al. 2021). The long-terms impacts of COVID-19 and its association with a decline in eGFR are not well understood; however, early evidence suggests that people who experienced COVID-19-associated AKI are at increased risk of developing CKD – with the severity of AKI associated with larger declines in eGFR 12 months post-acute COVID-19 infection (Gu et al. 2022; Hultström et al. 2021).

References

AIHW (2022) *Admitted patient care 2020–21 separations with a COVID-19 diagnosis*, AIHW, Australian Government, accessed 6 June 2022.

Gu X, Huang L, Cui D, Wang Y, Wang Y, Xu J et al. (2022) Association of acute kidney injury with 1-year outcome of kidney function in hospital survivors with COVID-19: a cohort study - external site opens in new window, *eBioMedicine*, 76:193817, doi:10.1016/j.ebiom.2022.103817.

Huang C, Huang L, Wang Y, Ren L, Gu X, Kang L et al. (2021) 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study - external site opens in new window, *The Lancet,* 397:220–232, doi:10.1016/S0140-6736(20)32656-8.

Hultström M, Lipcsey M, Wallin E, Larsson I, Larsson A and Fritihof R (2021) Severe acute kidney injury associated with progression of chronic kidney disease after critical COVID-19 - external site opens in new window, *Critical Care*, 25:37, doi:10.1186/s13054-021-03461-4.

Nadim MK, Forni LG, Mehta RL, Connor Jr MJ, Liu KD, Ostermann M et al. (2020) Publisher correction: COVID-19-associated acute kidney injury: consensus report of the 25th Acute Disease Quality Initiative (ADQI) Workgroup - external site opens in new window, *Nature Reviews Nephrology* 16,765 doi:10.1038/s41581-020-00372-5.

OTA (Organ and Tissue Authority) (2020) *2020 Australian donation and transplantation activity report* - external site opens in new window, OTA, Australian Government, accessed 16 March 2022.

OTA (2021) *2021 Australian donation and transplantation activity report* - external site opens in new window, OTA, Australian Government, accessed 16 March 2022.

Silver SA, Beaubien-Souligny W, Shah PS, Harel S, Blum D, Kishibe T et al. (2020) &The prevalence of acute kidney injury in patients hospitalized with COVID-19 infection: a systematic review and meta-analysis - external site opens in new window, *Kidney Medicine*, 3(1) 83–98.e1, doi:10.1016/j.xkme.2020.11.008.

Wainstein M, MacDonald S, Fryer D, Young K, Balan V, Begum H et al. (2022) Use of an extended KDIGO definition to diagnose acute kidney injury in patients with COVID-19: a multinational study using the ISARIC-WHO clinical characterisation protocol - external site opens in new window, *PLOS Medicine*, 19(4):e1003969, doi:10.1371/journal.pmed.1003969.

Yende S and Parikh CR (2021) Long COVID and kidney disease - external site opens in new window, *Nature Reviews Nephrology*, doi:10.1038/s41581-021-00487-3.

Impact of chronic kidney disease

Chronic kidney disease (CKD) is a serious disease that has a substantial impact on individuals, families and the Australian health system.

This section comments on the quality of life of people living with CKD, and presents 2 key measures of impact:

- estimates of the burden of disease of CKD
- estimates of expenditure on CKD.

Quality of life of people with chronic kidney disease

Quality of life has no agreed definition but is often described in terms of subjective well-being and life satisfaction. When applied to health, it refers to the effects of disease, injury or treatments as perceived and reported by the individuals themselves (Morton and Webster 2014).

CKD can affect a person's quality of life in many ways. Symptoms such as fatigue, fluid retention, bone pain, peripheral neuropathy or sleep disturbance as well as side effects from medication or kidney replacement therapy (KRT) can adversely affect daily living (Eranga Yapa et al. 2021). CKD diagnosis and progression may have an impact on mental health, most commonly through experiencing grief, anxiety or depression. Limitations on diet and travel for those on dialysis, satisfaction with care or unmet needs for information and support services, financial demands, and spiritual well-being can also affect quality of life.

Quality of life declines as a person's kidney damage and loss of function increases (Morton and Webster 2014). Each stage of CKD from diagnosis – through decline of kidney function, KRT with dialysis or transplantation, to end-of-life care – can have a negative impact (Bonner et al. 2018). For some people with CKD, quality of life becomes a more important consideration than length of life, and they may decide to end their dialysis treatment in favour of end-of-life care.

In 2011–12, adults with biomedical signs of CKD were more likely to rate their health as fair/poor, than adults without biomedical signs of CKD (23% and 12%) (AIHW analysis of ABS 2013). CKD has a greater impact on the quality of life of younger people than older people (Francis et al. 2019, Tong et al. 2013). The combination of CKD and diabetes also has an adverse impact – people with both diseases have substantially poorer quality of life than those with only one of these diseases (Wyld et al. 2021).

References

ABS (Australian Bureau of Statistics) (2013) *Microdata: Australian Health Survey, 2011–12* - external site opens in new window, AIHW analysis of detailed microdata, accessed 1 October 2021.

Bonner A, Chambers S, Healy H, Hoy W, Mitchell G, Kark A et al. (2018) 'Tracking patients with advanced kidney disease in the last 12 months of life', *Journal of Renal Care*, 44:115–122, doi: 10.1111/jorc.12239 - external site opens in new window.

Eranga Yapa H, Purtell L, Chambers S and Bonner A (2021) Alterations in symptoms and health-related quality of life as kidney function deteriorates: a cross-sectional study - external site opens in new window, *Journal of Clinical Nursing*, 30:1787–1796, doi: 10.1111/jocn.15738.

Francis A, Didsbury MS, van Zwieten A, Chen K, James LJ, Kim S et al. (2019) Quality of life of children and adolescents with chronic kidney disease: a cross-sectional study - external site opens in new window, *Archives of Disease in Childhood*, 104: 134–140, doi:10.1136/archdischild-2018-314934.

Morton RL and Webster AC (2014) Quality of life in chronic kidney disease - external site opens in new window, in Merici M (ed.) *Management of chronic kidney disease: a clinician's guide*, Springer, Berlin, doi: 10.1007/978-3-642-54637-2_37.

Tong A, Wong G, McTaggart S, Henning P, Mackie F, Carroll RP et al. (2013) Quality of life of young adults and adolescents with chronic kidney disease - external site opens in new window, *The Journal of Paediatrics,* 163:1179–85.e5, doi: 10.1016/j.jpeds.2013.04.066.

Wyld MLR, Morton RL, Aouad L, Magliano D, Polkinghorne KR and Chadban S (2021) The impact of comorbid chronic kidney disease and diabetes on health-related quality-of-life: a 12-year community cohort study - external site opens in new window, *Nephrology Dialysis Transplantation,* 36:1048–1056, doi: 10.1093/ndt/gfaa031.

Burden of chronic kidney disease

Page highlights:

- In 2023, chronic kidney disease accounted for 1.1% of the total burden of disease in Australia.
- In 2018, chronic kidney disease accounted for 2.5% of total burden in First Nations people.

What is burden of disease?

Burden of disease is a measure of the years of healthy life lost from living with or dying from disease and injury.

The measure used is the 'disability adjusted life year' (DALY). This measure combines health loss from living with illness and injury (non-fatal burden, or years of life lost due to disability – YLD) and dying prematurely (fatal burden, or years of life lost – YLL) to estimate total health loss (total burden, or DALY).

Burden of disease estimates seek to capture both the quantity and health-related quality of life, and to reflect the magnitude, severity and impact of disease and injury within a population. Burden of disease does not quantify the social or financial consequences of disease and injury.

The Australian Burden of Disease Study provides estimates for over 200 diseases and injuries in Australia, including chronic kidney disease (CKD), which is included as part of the Kidney and Urinary Disease group. Note that the definitions of CKD in this study are different from those used to define CKD in other sections of this report.

Further information can be found in Australian Burden of Disease Study 2023.

Note: The Australian Burden of Disease Study 2023 does not include estimates by Remoteness areas, Socioeconomic groups or risk factors. The most recent estimates are presented in the *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018* and *Australian Burden of Disease Study 2018: Interactive data on risk factor burden* reports.

In 2023, Australians lost an estimated 63,400 years of healthy life (DALY) due to CKD, equivalent to 2.4 DALY per 1,000 population (AIHW 2023).

CKD accounted for 1.1% of the total burden of disease in Australia in 2023 (1.2% males, 1.1% females) (Figure 1).

Most of the burden from CKD (72%) came from years of life lost to premature death (YLL), with the remainder (28%) from years lived with illness (YLD).

Figure 1: Total burden of chronic kidney disease compared with disease groups, 2023

The tree chart shows the burden of disease groups (such as cancer and other neoplasms, cardiovascular diseases and musculoskeletal conditions) compared with the burden of CKD. In 2023, CKD accounted for 63,448 DALY. In contrast, the largest burden of disease group – Cancer and other neoplasms – accounted for 934,551 DALY.

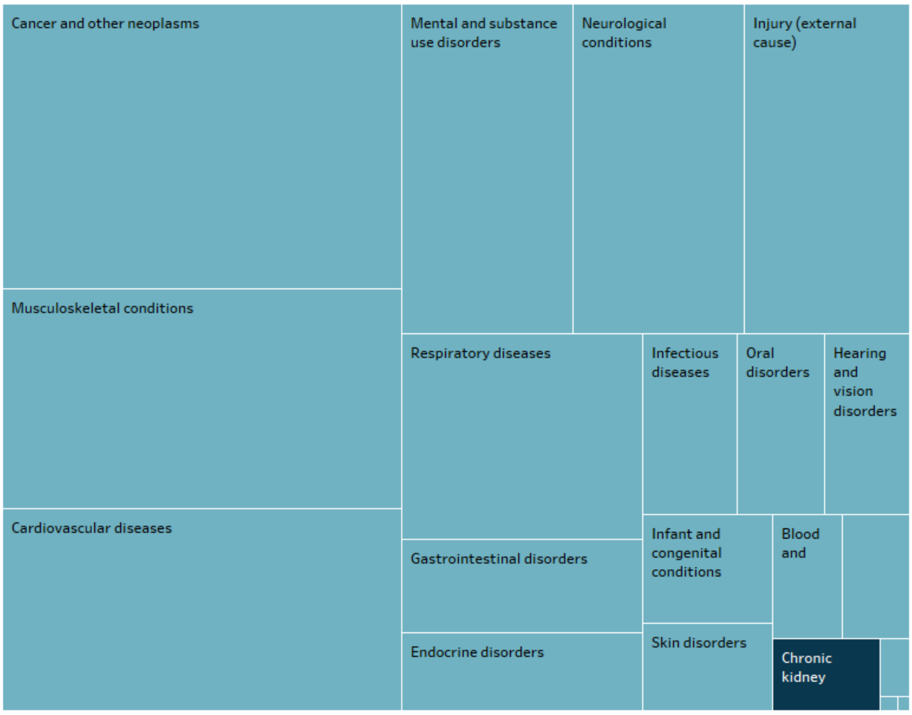

Figure 1: Total burden of chronic kidney disease compared with disease groups, 2023

Notes:
1. Total burden (DALYs) is presented. The size of each box is proportional to the magnitude of the Burden of Disease.
2. The ICD-10 codes used to define chronic kidney disease in the Australian Burden of Disease Study are different to the ICD-10 codes used to define chronic kidney disease in other sections of this report.

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.
https://www.aihw.gov.au

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Variation by age and sex

In 2023, the burden from CKD was:

- low until age 50 and increased with age (Figure 2)
- 1.3 times as high for males as females, after adjusting for age (AIHW 2023).

Figure 2: Burden of disease for chronic kidney disease, by age and sex, 2023

The bar chart shows the total burden of disease (DALY) for CKD for males and females across 22 age groups, from 0 to age 100. From age 20 burden begins to increase with increasing age, peaking at age 100 and over for both males and females.

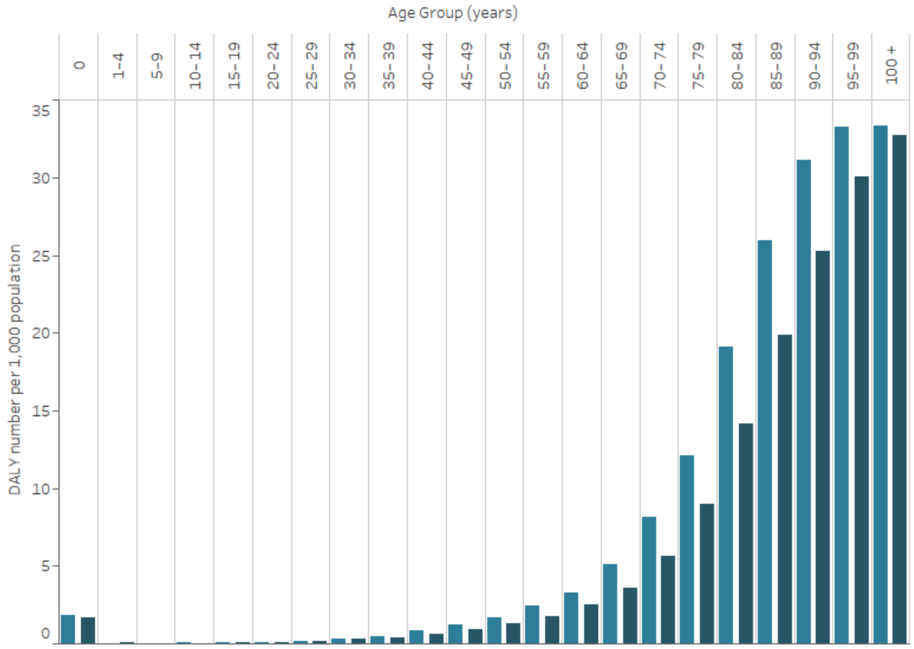

Figure 2: Burden of disease for chronic kidney disease, by age group and sex, 2023

Note: The ICD-10 codes used to define chronic kidney disease in the Australian Burden of Disease Study are different to the ICD-10 codes used to define chronic kidney disease in other sections of this report.

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.
http://www.aihw.gov.au

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Variation between population groups

In 2018, the burden from CKD for people living in:

- the lowest socioeconomic areas was 2.2 times as high as for people living in the highest socioeconomic areas (AIHW 2021a)
- *Remote and very remote* areas was 3.1 times as high as for people living in *Major cities*.

Trends over time

- The rate of burden from CKD was similar in 2003 and 2023 – age-standardised rates of 1.7 and 1.8 DALY per 1,000 population, respectively (AIHW 2023).
- The 49% increase in DALY from CKD between 2003 and 2018 (+16,200 DALY) was estimated to be driven by population growth (29% or 9,600 DALY) and population ageing (20% or 6,500 DALY) (AIHW 2021a).

First Nations people

Burden of disease estimates for First Nations people for 2018 (AIHW 2022a,b) show that:

- CKD accounted for 2.5% (6,100 DALY) of total burden in First Nations people in 2018 (2.0% males, 3.1% females)
- 73% of the burden from CKD among First Nations people was fatal, and 27% was non-fatal
- the burden from CKD was greater in females (58%, 3,500 DALY) than in males (42%, 2,600 DALY)
- the burden from CKD rose rapidly in First Nations people from age 40–44, peaking at ages 50–54. Overall, over 80% of the burden from CKD (4,900 DALY) occurred in people aged 40–74
- the rate of burden from CKD was 7.8 times as high for First Nations people as for non-Indigenous Australians
- CKD was responsible for 4.0% of the total male health gap and 6.5% of the total female health gap between First Nations and non-Indigenous Australians.

Contribution of risk factors

A portion of burden of disease is preventable, being due to modifiable health risk factors. The Australian Burden of Disease Study 2018 estimated the disease burden that can be attributed to these modifiable risk factors (AIHW 2021b).

This study provides estimates for burden due to impaired kidney function as a risk factor for other diseases, including coronary heart disease, dementia, stroke, gout and peripheral vascular disease. In 2018, 1.9% of the total disease burden in Australia was due to impaired kidney function (including CKD). Note that the study considers that impaired kidney function was responsible for the entire burden of CKD.

Of the total burden of CKD in Australia in 2018, 100% was attributable to all risk factors combined of those estimated in the study, including impaired kidney function.

The leading risk factors contributing to the total CKD burden in 2018 include impaired kidney function (100% male and female), overweight/obesity (43% male, 40% female), high blood pressure (38% male, 36% female), high blood plasma glucose (20% male and female), and a diet high in sodium (8% male, 5% female) (Figure 3).

Note that as each risk factor was analysed separately, percentages cannot be added together, and do not add up to the joint effect of all risk factors.

Figure 3: Proportion of chronic kidney disease DALY attributed to selected risk factors, 2018

The bar chart shows the proportion of CKD attributable to the following risk factors – impaired kidney function (100%), overweight (including obesity) (42%), high blood pressure (37%), high blood plasma glucose (19.8%) and diet high in sodium (6.6%).

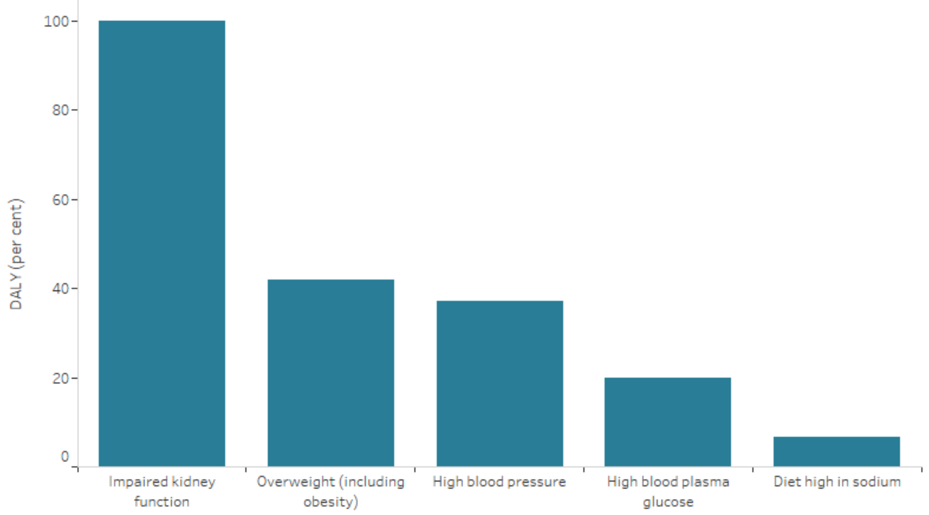

Figure 3: Proportion of chronic kidney disease DALY attributed to selected risk factors, 2018

Notes
1. Attributable burden is expressed as a % of total CKD burden (DALY).
2. All forms of diabetes and chronic kidney disease are considered entirely attributable to the risk factors high blood plasma glucose and impaired kidney function, respectively.
3. The ICD-10 codes used to define chronic kidney disease in the Australian Burden of Disease Study are different to the ICD-10 codes used to define chronic kidney disease in other sections of this report.
4. As each risk factor was analysed separately, percentages cannot be added together, and do not add up to the joint effect of all risk factors.

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.
https://www.aihw.gov.au

Download data

References

AIHW (Australian Institute of Health and Welfare) (2021a) *Australian Burden of Disease Study 2018: interactive data on disease burden*, AIHW, Australian Government, accessed 1 February 2022.

AIHW (2021b) *Australian Burden of Disease Study 2018: interactive data on risk factor burden.* AIHW, Australian Government, accessed 1 February 2022.

AIHW (2022a) *Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2018*, AIHW, Australian Government, accessed 10 March 2022.

AIHW (2022b) *Australian Burden of Disease Study 2018: interactive data on disease burden among Aboriginal and Torres Strait Islander people*, AIHW, Australian Government, accessed 10 March 2022.

AIHW (2023) *Australian Burden of Disease Study 2023*, AIHW, Australian Government, accessed 14 December 2023.

Expenditure on chronic kidney disease

Page highlight:

In 2020–21, $1.9 billion (1.2% of total allocated health expenditure) was attributed to chronic kidney disease.

How much is spent on chronic kidney disease?

In 2020–21, an estimated 1.2% of total allocated expenditure in the Australian health system ($1.9 billion) was attributed to chronic kidney disease (AIHW 2023).

The average health system spending per case of CKD in 2018–19 was $2,326 (males $3,012, females $1,727) (AIHW 2022).

What is expenditure on chronic kidney disease?

This web page provides recent data on health care expenditure on chronic kidney disease (CKD), with details by type of condition, health care service, age group, and sex.

It includes expenditure by the Australian Government; state, territory, and local governments; and the non-government sector (including private health insurance and individual contributions).

These estimates report direct, allocated and recurrent expenditure only. They do not account for the total amount spent on kidney health.

Note: Estimates are not directly comparable to previous disease expenditure estimates due to changes to data and methods. Further information on how the estimates were derived is available from the Disease expenditure in Australia web report.

Where is the money spent?

In 2020–21, most allocated CKD expenditure (89% or $1.7 billion) was spent on hospital services. This included expenditure on public hospital admitted patients ($1.2 billion), private hospital services ($261.6 million), public hospital outpatients ($158.1 million) and public hospital emergency departments ($7.8 million).

Another 4% ($76.6 million) related to non-hospital medical services (primary care and referred medical services), comprising general practitioner services ($36.0 million), specialist services ($21.7 million), medical imaging ($3.2 million), pathology ($15.1 million) and allied health and other services ($0.6 million).

A small amount of CKD expenditure (0.4% or $7.6 million) was for dental services.

The remaining 6.3% ($116.2 million) was spent on prescription pharmaceuticals subsidised under the Pharmaceutical Benefits Scheme (PBS) (Figure 1).

Figure 1: Health system expenditure on chronic kidney disease, by area of expenditure, 2020–21

The bar chart shows areas of expenditure on chronic kidney disease in 2020–21. The largest area of expenditure was ‘public hospital admitted patient’ ($1.2 billion), followed by private hospital services, public hospital outpatient services, Pharmaceutical Benefits Scheme services, general practitioner services and specialist services.

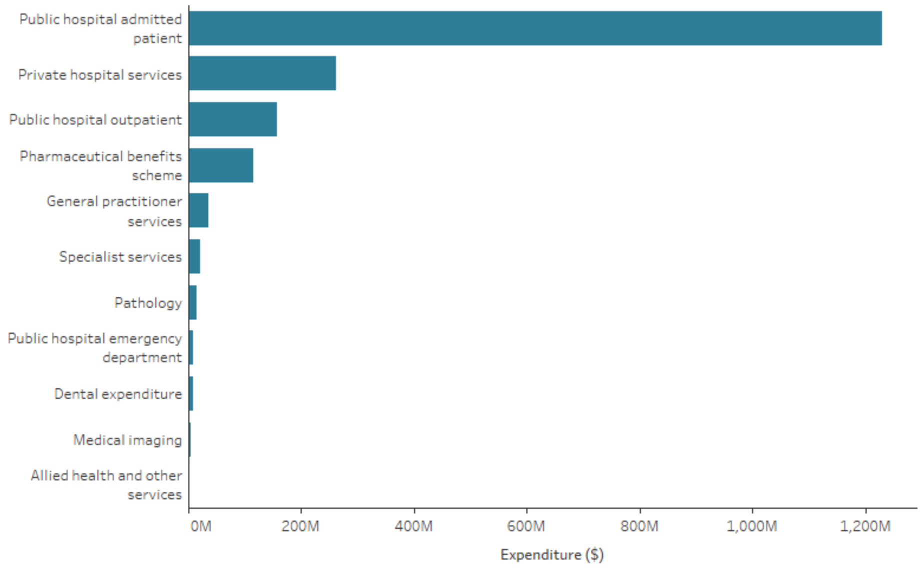

Figure 1: Health system expenditure on chronic kidney disease, by area of expenditure, 2020–21

Notes:
1. The ICD-10 codes used to define chronic kidney disease in the AIHW Disease Expenditure Database are different to the ICD-10 codes used to define chronic kidney disease in other sections of this report.
2. Pharmaceutical benefit expenditure includes over and under copayment prescriptions.
3. Dental expenditure does not contain age or demographic disaggregation.

Chart: AIHW. Source: AIHW Disease Expenditure Database.
https://www.aihw.gov.au

Download data

Who is the money spent on?

Expenditure on CKD in 2020–21 was low among young people but rose sharply from ages 45–49, to be highest among men aged 75–79 and women aged 70–74 (Figure 2).

Expenditure on CKD was higher among males than females at all ages. From ages 70–74 to age 85 and over, expenditure for men was at least 1.5 times as high as that for women.

Most of this difference related to expenditure on hospital services, where a total of $993.4 million was spent on males, compared with $662.9 million on females.

Expenditure on non-hospital medical services (primary care and referred medical services) was similar among males and females ($38.4 million and $38.1 million, respectively).

Expenditure on prescription pharmaceuticals under the Pharmaceutical Benefits Scheme was higher among males ($65.9 million) than females ($49.7 million).

Figure 2: Health system expenditure on chronic kidney disease, by age and sex, 2020–21

The bar chart shows expenditure on chronic kidney disease in 2020–21 by age and sex. The overall expense of CKD increased with age to 75–79 years ($250 million). Expenditure was higher for males than females across all age groups.

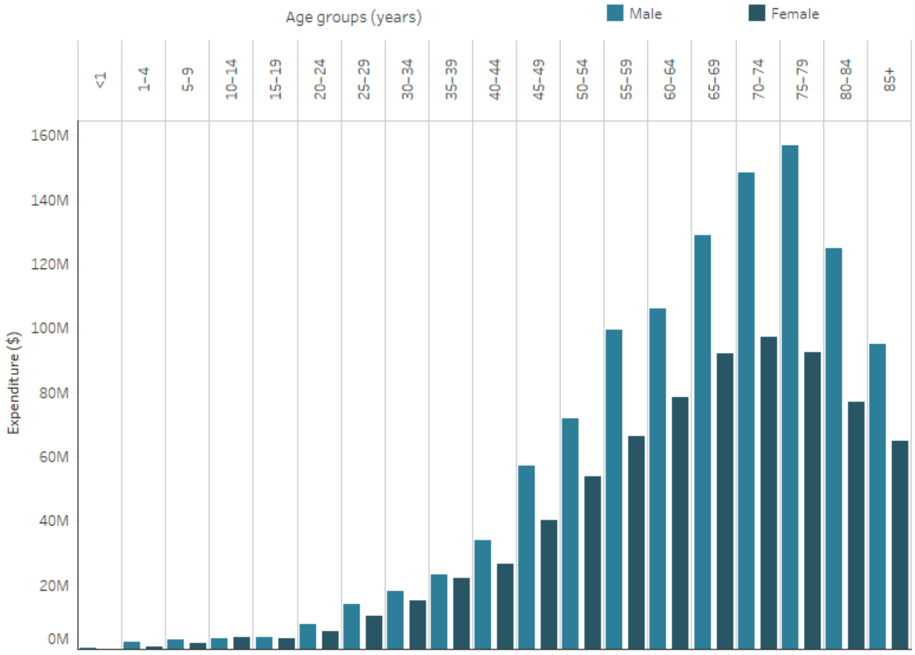

Figure 2: Health system expenditure on chronic kidney disease, by age and sex, 2020–21

Note: The ICD-10 codes used to define chronic kidney disease in the AIHW Disease Expenditure Database are different to the ICD-10 codes used to define chronic kidney disease in other sections of this report.

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.
https://www.aihw.gov.au

Download data

References

Australian Institute of Health and Welfare (2022) *Health system spending per case of disease and for certain risk factors*, AIHW, Australian Government, accessed 7 April 2022.

AIHW (2023) *Health system spending on disease and injury in Australia, 2020-21*, AIHW, Australian Government, accessed 29 November 2023.

Mortality

Page highlights:

- In 2021, chronic kidney disease contributed to around 20,000 deaths in Australia – 12% of all deaths.
- In 2021, Aboriginal and Torres Strait Islander Australians were 4 times as likely to die from chronic kidney disease as non-Indigenous Australians.

Chronic kidney disease (CKD) may be listed as the underlying cause of death – or, more commonly, as an associated cause – on a death certificate where another condition is listed as the underlying cause.

In 2021, chronic kidney disease contributed to around 20,000 deaths in Australia – 12% of all deaths.

Of these, CKD was listed as an underlying cause of death in around 4,600 cases (23% of all CKD deaths). It was recorded as an associated cause in a further 15,400 deaths (around 77% of CKD deaths). Deaths with CKD as an underlying or associated cause accounted for 12% of all deaths in Australia in 2021.

Linked data from the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry and National Death Index has shown that CKD, particularly kidney failure, is often an under-reported cause of death (AIHW 2016).

Diseases commonly listed as underlying causes of death where chronic kidney disease is an associated cause

In cases where CKD was an associated cause of death, the most common groups of underlying causes were:

- diseases of the circulatory system (33%)
- cancers (20%)
- endocrine, nutritional and metabolic diseases (9.4%)
- diseases of the respiratory system (8.0%).

More specifically, the most common underlying causes of death, by 3-digit International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) code, were:

- chronic ischaemic heart disease (10.8%)
- acute myocardial infarction (4.4%)
- heart failure (4.2%)
- other chronic obstructive pulmonary disease (4.1%).
- type 2 diabetes mellitus (4.0%)
- unspecified dementia (4.0%)

In about a third of cases where CKD was listed as an associated cause of death, the underlying cause was a disease of the circulatory system. This reflects the common comorbidity of CKD and cardiovascular diseases (see Comorbidity of chronic kidney disease for more information).

Epidemiological data also suggest that individuals with CKD are at increased risk of experiencing cognitive impairment and of developing dementia (Bugnicourt et al. 2013). This may explain why CKD is commonly listed as an associated cause of death in deaths due to unspecified dementia.

In cases where CKD was the underlying cause of death, the most common groups of associated causes included:

- diseases of the circulatory system (41%) – such as heart failure (10%), primary hypertension (8.3%) and chronic ischaemic heart disease (5.2%)
- endocrine, nutritional and metabolic diseases (14%) – such as type 2 and unspecified diabetes mellitus (5.7% and 3.9%, respectively)
- diseases of the respiratory system (8.0%) – such as pneumonia, organism unspecified (1.9%) and other chronic obstructive pulmonary disease (1.8%)
- diseases of the genitourinary system (6.8%) – such as acute kidney failure with tubular necrosis (5.2%).

Trends over time

The number of deaths with CKD as an underlying or associated cause rose by 97% between 2000 and 2021 (10,200 and 20,000 deaths). After accounting for changes in the age structure of the population over this time, the rate of CKD deaths remained relatively stable between 2000 and 2021.

Between 2000 and 2021:

- the death rates for males ranged between 66 and 80 deaths per 100,000 population, after adjusting for age (Figure 1)
- the death rate for females was consistently lower than for males, ranging between 43 and 48 deaths per 100,000 population, after adjusting for age (Figure 1).

Figure 1: Trends in chronic kidney disease death rates (underlying or associated cause), by sex, 2000 to 2021

The chart shows the age-standardised trend in chronic kidney disease death rates (as an underlying or associated cause) between 2000 and 2021. Chronic kidney disease death rates peaked in 2008 to be 80 and 48 per 100,000 among males and females respectivelyand have declined since then to be 70 and 46 per 100,000.

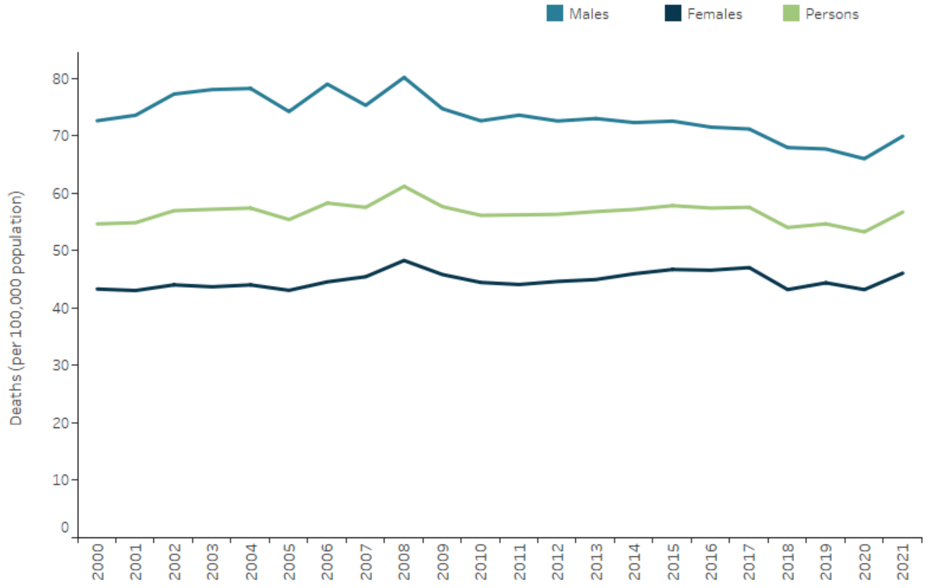

Figure 1: Trends in chronic kidney disease death rates (underlying or associated cause), by sex, 2000 to 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.
https://www.aihw.gov.au

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Variation by age and sex

In 2021, death rates for CKD as an underlying or associated cause:

- were 1.5 times as high in males as in females
- were higher in males than females across all age groups
- increased with age and were much higher in the 85 and over age group. This age group accounted for 52% of all deaths due to CKD in 2021 and had an age-specific death rate that was 4.7 times as high as for people aged 75–84 (1,900 and 414 deaths per 100,000 population) (Figure 2).

Figure 2: Chronic kidney disease death rates (underlying or associated cause), by age and sex, 2021

The chart shows the chronic kidney disease death rates (underlying or associated cause) by age and sex in 2021. Chronic kidney disease death rates were highest among males and females aged 85 and over (2,300 and 1,700 per 100,000 population).

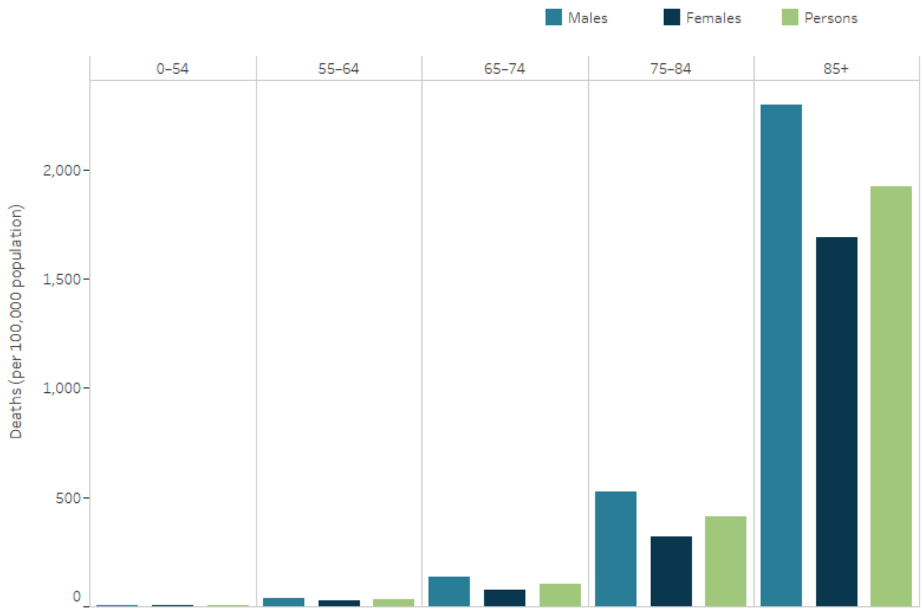

Figure 2: Chronic kidney disease death rates (underlying or associated cause), by age and sex, 2021

Notes
1. Deaths are counted according to year of registration of death.
2. Deaths registered in 2021 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database.
https://www.aihw.gov.au

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Variation between population groups

Aboriginal and Torres Strait Islander people

In 2019–2021, CKD contributed to around 1,900 deaths (as an underlying or associated cause) among Indigenous Australians in jurisdictions with adequate Indigenous identification, a rate of 85 per 100,000 population. These deaths accounted for around 3.8% of all deaths due to CKD during this period.

Indigenous females had higher numbers of deaths than Indigenous males (1,041 and 890, respectively).

Indigenous Australians were 4 times as likely to die from CKD as non-Indigenous Australians, after adjusting for age.

This difference was greater in females than in males. CKD death rates for Indigenous females and males were 4.9 and 3.3 times as high, respectively, compared with their non-Indigenous counterparts (Figure 3).

Remoteness and socioeconomic area

In 2021, the age-standardised death rate for CKD (as an underlying or associated cause of death) was higher in *Remote and very remote* areas and in areas with increased socioeconomic disadvantage.

- Death rates in *Remote and very remote areas* were twice as high as in *Major cities*. This difference was greater for females than males (2.5 times as high for females and 1.7 times as high for males).
- The mortality rate was higher in males than females across all remoteness areas.
- The difference between male and female death rates was greatest in *Major cities* and lowest in *Remote and very remote* areas.
- Death rates were 1.8 times as high in the lowest socioeconomic area than in the highest socioeconomic area.
- Males had a higher death rate than females across all socioeconomic areas (Figure 3).

Figure 3: Chronic kidney disease deaths (underlying or associated cause), by population group, 2019–2021

The chart shows the age-standardised chronic kidney disease death rates as the underlying and/or associated cause by selected population group and sex in 2019–2021. Overall, chronic kidney disease death rates increased with increasing levels of socioeconomic disadvantage being 1.8 times as higher among those living in the most disadvantaged areas as those living in the least disadvantaged areas. Chronic kidney disease death rates also increase with the level of remoteness being 2.0 times as high among those living in Remote and very remote areas as Major cities.

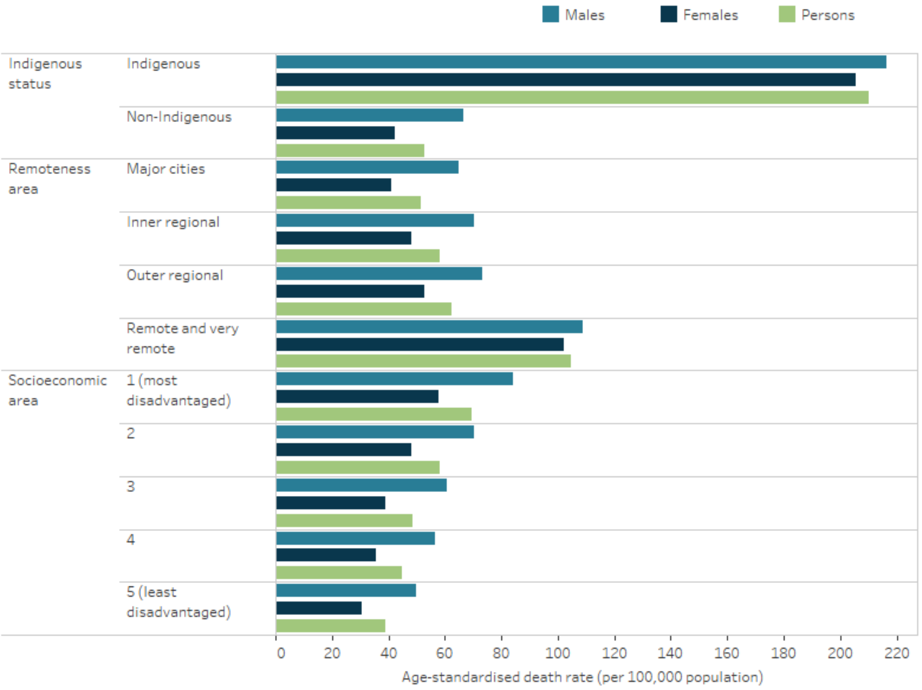

Figure 3: Chronic kidney disease deaths (underlying or associated cause), by population group 2019–2021

[Notes]

Chart: AIHW. Source: AIHW National Mortality Database.
https://www.aihw.gov.au

Download data

References

AIHW (Australian Institute of Health and Welfare) (2016) *Incidence of end-stage kidney disease in Australia 1997–2013*, catalogue number PHE 211, AIHW, Australian Government, accessed 7 February 2021.

Bugnicourt JM, Godefroy O, Chillon JM, Choukroun G and Massy ZA (2013) Cognitive disorders and dementia in CKD: the neglected kidney–brain axis - external site opens in new window, *Journal of the American Society of Nephrology*, 24(3):353–363, doi:10.1681/ASN.2012050536.

Data gaps and opportunities

Comprehensive, accurate and timely data are necessary for effective population health monitoring of chronic kidney disease (CKD). Although national health information collections continue to develop and improve, there are still gaps and the information collected may not always be brought together efficiently for analysis (AIHW 2022a).

Increasing digitisation of health information means more detailed data are being collected, expanding the possibilities for analysing and reporting. There is greater demand for information that:

- is easily accessible, flexible and interactive
- is comparable at national, subnational and at smaller geographic levels
- maintains privacy and confidentiality.

The *National Strategic Action Plan for Kidney Disease* identifies several data priorities that can drive improvements in the effectiveness and efficiency of kidney disease prevention, treatment and support (Department of Health 2019). Key priorities include expanding the collecting of person-centred data, and increasing data linkage and integration.

Comprehensive person-centred data

Following individuals from a diagnosis of CKD through their interactions with the health system improves our ability to analyse not only the development and trajectory of disease but also the interplay of determinants and interventions and the role and performance of the health system in preventing, treating and managing CKD.

Current opportunities to improve consumer-led and person-centred CKD data includes:

- collecting comprehensive data at all points of primary health care activity, particularly at diagnosis and early treatment of early and mid-stage CKD. This can provide a fuller picture of CKD management, including associated comorbidities, early interventions and long-term outcomes as well as improving estimates of incidence, prevalence and early treatment. A National Primary Health Care Data Collection is currently under development (AIHW 2022b).
- conducting regular health surveys that measure markers of CKD and other markers of chronic disease and nutrition status. This will allow population health trends in the Australian population to be better determined. The Australian Bureau of Statistics is undertaking a multi-year Intergenerational Health and Mental Health Study in 2020–2024, which will include a biomedical component (ABS 2022).
- detailed information for priority population groups, including Aboriginal and Torres Strait Islander people, people from lower socio-economic areas, people with disability, and culturally and linguistically diverse populations. These groups may experience substantial disadvantages in relation to kidney health and in accessing health services.
- data for smaller geographical areas to identify variations in health status and care by location. The AIHW has published several dynamic dashboards to show the distribution of the impact of CKD by geographic levels (AIHW 2021).

Commonwealth investment in chronic kidney disease research

Between 2000 and 2022, the National Health and Medical Research Council (NHMRC) has expended $469 million towards research relevant to kidney disease.

From its inception in 2015 to 31 March 2023, the Medical Research Future Fund has invested $37.40 million in 22 grants with a focus on kidney disease research (including chronic kidney disease research).

This includes:

- $2.00 million to Monash University for the PROPHECY CKD study to reduce the burden of chronic kidney disease in Indigenous Australians.
- $2.23 million to University of New South Wales for the project, Dapagliflozin in advanced chronic kidney disease and kidney failure: The RENAL LIFECYCLE trial.

Data linkage and integration

Data on the Australian health system are largely organised around occasions of service. Data linkage, also known as data integration, brings together information from more than one source. Matching disparate pieces of information can fill gaps in knowledge on not only specific diseases and the effectiveness and quality of health services and population groups but also across the health and welfare sectors.

Linking these data, together with other data such as from surveys, allows for a richer understanding of how people and population groups interact with health services, and their health outcomes.

Two examples of recently linked data sets include the National Integrated Health Services Information Analysis Asset, developed by the AIHW, and the Multi-Agency Data Integration Project developed by the Australian Bureau of Statistics (AIHW 2022a).

Current opportunities presented by health data linkage include:

- linking primary care data with the existing Australia and New Zealand Dialysis and Transplant Registry (ANZDATA) and Australia and New Zealand Organ Donation Registry databases. This linkage will assist in building a comprehensive picture of clinical measures of CKD and long-term outcomes; it will also facilitate research and the monitoring and evaluation of policies and programs (Department of Health 2019).
- linking ANZDATA and the National Death Index, to ascertain the true incidence of kidney failure by also counting people with non-KRT-treated kidney failure. The AIHW is currently working to develop the Kidney and Diabetes Data Integration project for this purpose. This dataset will provide information on individuals with diabetes and kidney disease, their treatment, their health service usage, and their diabetes-related complications and comorbidity over time. The AIHW and researchers will use this dataset to develop new methodologies to refine the national monitoring of CKD.

References

ABS (Australian Bureau of Statistics) (2022) *Intergenerational Health and Mental Health Study (IHMHS), - external site opens in new window*ABS, Australian Government, accessed 10 May 2022.

AIHW (Australian Institute of Health and Welfare) (2021) *Geographical variation in disease: diabetes, cardiovascular and chronic kidney disease*, AIHW, Australian Government, accessed 10 May 2022.

AIHW (2022a) *Australia's health 2022: data insights*, AIHW, Australian Government, accessed 12 July 2022.

AIHW (2022b) *Primary health care data development*, AIHW, Australian Government, accessed 10 May 2022.

Department of Health (2019), *National Strategic Action Plan for Kidney Disease - external site opens in new window*, Australian Government, accessed 10 May 2022.

Australian Government
Australian Institute of
Health and Welfare

Data sources, classifications and methods

Data sources

This page outlines the data sources used for the *Chronic kidney disease: Australian facts* report.

Australia and New Zealand Dialysis and Transplant registry

The Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry is a clinical quality registry that collects and produces a wide range of statistics on the outcomes of treatment of people with kidney failure. The registry collects information to monitor dialysis and transplant treatments from all kidney units in Australia and New Zealand. It operates under the South Australian Health and Medical Research Institute.

The ANZDATA Registry includes information on the status of treatment with kidney replacement therapy (KRT), including if a person has recovered their kidney function, people who had a transplant overseas, people who were lost to follow-up, and people who had a kidney transplant that failed and who died.

Data on the incidence and prevalence and treatment of kidney failure with KRT presented in this report excluded people who:

- recovered their kidney function
- were lost to follow-up
- died.

This is different from exclusion criteria used for these analyses in previous AIHW reports, which also excluded people who had a kidney transplant overseas and whose graft function failed. These people are now included because, regardless of where they received a transplant or whether their transplant is functioning, they are still receiving follow-up care or KRT in Australia.

Information about the data quality of the ANZDATA Registry can be found in the ANZDATA 45th Annual Report 2023 - external site opens in new window.

Diabetes, Obesity and Lifestyle Study

The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) is a national survey that was conducted by the International Diabetes Institute (now Baker Heart and Diabetes Institute). It collected national measurements of chronic kidney disease (CKD) biomarkers: serum creatinine and albuminuria for an adult population aged 25 and over (11,700 people). Of the eligible households, 70% responded to the biomedical survey, and 37% of eligible respondents got tested (Dunstan et al. 2002). Standardised creatinine results from the survey participants were supplied by the research team to conduct this analysis on comparable estimated glomerular filtration rate (eGFR) measures.

For more information on AusDiab, see About AusDiab - external site opens in new window.

National Health Measures Survey

In 2011–13, the Australian Heath Survey incorporated the first Australian Bureau of Statistics (ABS) biomedical collection – the National Health Measures Survey. It involved the collection of a range of blood and urine tests from over 11,000 participants across Australia, which were then tested for various chronic disease and nutrient biomarkers.

Urine samples were collected from respondents aged 5 and over, and blood samples from respondents aged 12 and over. 36% of the survey participants volunteered to get the biomedical tests, covering 85% of the sampled households. CKD biomarkers collected were used to derive the eGFR measure from the CKD-epi formula and the albumin:creatinine ratio (ABS 2014, Johnson et al. 2012).

For more information, see:

- Australian Health Survey: biomedical results for chronic diseases - external site opens in new window
- Australian Health Survey: biomedical results for chronic diseases methodology - external site opens in new window.

Data quality statement

The data quality statement for the National Health Measures Survey 2011–12 is available on the ABS website: Australian Health Survey: Biomedical Results for Chronic Diseases methodology, 2011-12 financial year - external site opens in new window. Australian Health Survey: biomedical results for chronic diseases - external site opens in new window

National Aboriginal and Torres Strait Islander Health Measures Survey

In 2012–13, the Australian Aboriginal and Torres Strait Islander Health Survey incorporated the first biomedical collection to be undertaken for the First Nations population in an ABS survey – the National Aboriginal and Torres Strait Islander Health Measures Survey (NATSIHMS). It involved the collection of a range of blood and urine tests from approximately 3,300 participants aged 18 years and over across Australia.

First results from this collection for biomarkers of chronic disease (such as diabetes, cardiovascular disease and kidney disease) and nutrients (such as vitamin D, iron and iodine) were published by the ABS (ABS 2014).

Further information can be found on the ABS website - external site opens in new window.

National Health Survey

The ABS conducts the National Health Survey (NHS) to obtain national information on the health status of Australians, their use of health services and facilities, and health-related aspects of their lifestyle. The most recent NHS was conducted in 2020–21, which is based on information self-reported by participants.

Previous versions of the NHS have primarily been administered by trained ABS interviewers and were conducted face-to-face. The 2020–21 NHS was conducted during the COVID-19 pandemic. To maintain the safety of survey respondents and ABS Interviewers, the survey was collected via online, self-completed forms.

Non-response is usually reduced through interviewer follow-up of households who have not responded. As this was not possible during lockdown periods, there were lower response rates than previous NHS cycles, which impacted sample representativeness for some sub-populations.

Additionally, the impact of COVID-19 and lockdowns might also have had direct or indirect impacts on people's usual behaviour over the 2020–21 period. Therefore, this report uses data from the 2017–18 NHS.

The NHS collects self-reported data on whether a respondent had one or more long-term health conditions; that is, conditions that lasted, or were expected to last, 6 months or more.

This report uses self-reported data to derive prevalence estimates for risk factors for CKD. It does not use self-reported data for the incidence and prevalence of CKD itself, because estimates based on these data are considered to be unreliable and vastly undercount the number of people with CKD in Australia.

When interpreting data from the 2017–18 NHS, some limitations need to be considered:

- Data that are self-reported rely on respondents knowing and providing accurate information.
- The survey does not include information from people living in nursing homes or otherwise institutionalised.
- Residents of *Very remote* areas and discrete First Nations communities were excluded from the survey. This is unlikely to affect national estimates but will have an impact on prevalence estimates by remoteness.

For more information, see National Health Survey: first results, 2017–18 - external site opens in new window.

Data quality statement

The data quality statement for the National Health Survey 2017–18 is available on the ABS website: 4363.0 - National Health Survey: Users' Guide, 2017–18 - external site opens in new window.

National Aboriginal and Torres Strait Islander Health Survey

The ABS conducts the National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) to obtain national information on the health of First Nations people, their use of health services and health-related aspects of their lifestyle. The most recent NATSIHS was conducted in 2018–19.

The NATSIHS collects information from First Nations people of all ages in non-remote and remote areas of Australia, including discrete First Nations communities.

For more information, see National Aboriginal and Torres Strait Islander Health Survey, 2018–19 - external site opens in new window.

Data quality statement

The data quality statement for the National Aboriginal and Torres Strait Islander Health Survey is available on the ABS website: National Aboriginal and Torres Strait Islander Health Survey methodology, 2018-19 financial year - external site opens in new window.

AIHW National Hospital Morbidity Database

The AIHW National Hospital Morbidity Database (NHMD) is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals.

Reporting to the NHMD occurs at the end of a person's admitted episode of care (separation or hospitalisation) and is based on the clinical documentation for that hospitalisation.

The NHMD is based on the Admitted Patient Care National Minimum Data Set (APC NMDS). It records information on admitted patient care (hospitalisations) in essentially all hospitals in Australia, and includes demographic, administrative and length-of-stay data, as well as data on the diagnoses of patients, the procedures they underwent in hospital and external causes of injury and poisoning.

The hospital separations data do not include episodes of non-admitted patient care given in outpatient clinics or emergency departments. Patients in these settings may be admitted later, with the care provided to them as admitted patients being included in the NHMD.

The following care types were excluded when undertaking the analysis: 7.3 (newborn – unqualified days only), 9 (organ procurement – posthumous) and 10 (hospital boarder).

The National Hospital Morbidity Database include information on people's area of usual residence at the time of hospitalisation.

For 2021–22, this was their SA2 based on the 2016 ASGS. In this report, 2016 SA2 values have been concorded to SA2 values based on the 2021 census prior to calculating rates

Further information about the NHMD can be found in Admitted patient care NMDS 2021–22- external site opens in new window- external site opens in new window - external site opens in new window.

AIHW National Non-admitted Patient Emergency Department Care Database

The AIHW National Non-admitted Patient Emergency Department Care Database (NNAPEDCD) is a compilation of episode-level records (including waiting times for care) for non-admitted patients who are registered for care in emergency departments in selected public hospitals. The database captures information only for physical presentations to emergency departments and does not include advice provided via telehealth or videoconferencing.

Patients being treated in emergency departments may be later admitted, including admission in the emergency department, another hospital ward or to hospital-in-the-home. For this reason, there is an overlap in the scope of the NNAPEDCD, the NMDS and the APC NMDS.

Principal diagnoses for episodes of care in the NNAPEDCD 2019–20 are coded according to the Emergency Department ICD-10-AM Principal Diagnosis Shortlist - external site opens in new window.

For more information on the NNAPEDCD, see Non-admitted patient emergency department care NMDS 2020–21 - external site opens in new window.

AIHW National Mortality Database

The AIHW National Mortality Database (NMD) comprises information about causes of death and other characteristics of the person, such as sex, age at death, area of usual residence and Indigenous status. The cause of death data are provided to the AIHW by the Registries of Births, Deaths and Marriages and the National Coronial Information System (managed by the Victorian Department of Justice); they include cause of death coded by the ABS. The data are maintained by the AIHW in the NMD.

In this report, deaths registered in 2019 and earlier are based on the final version of cause of death data; deaths registered in 2020 are based on the revised version; and deaths registered in 2021 and 2022 are based on the preliminary version. Revised and preliminary versions are subject to further revision by the ABS.

For data by Indigenous status, counts of death are reported for 8 jurisdictions combined – New South Wales, Australian Capital Territory, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Northern Territory. Death rates are reported for 5 jurisdictions combined – New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. These jurisdictions are considered to have adequate levels of First Nations identification in mortality data.

This report adjusts for Victorian additional death registrations of deaths that were registered in Victoria in 2017 and 2018 but were not provided to the ABS for compilation until 2019. As a result, the number of diabetes deaths reported for 2017 to 2019 may differ from previously reported numbers. For more detail, see the Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australian methodology- external site opens in new window- external site opens in new window - external site opens in new window.

The NMD includes information on people's area of usual residence prior to death. For 2022, this was their SA2 based on the 2021 ASGS. This location information from the National Mortality Database, along with IRSD values based on the ABS 2021 Census of Population and Housing, and estimated resident populations for 2022, have been used to approximate statistics for 2022 ASGS Remoteness Areas and 2022 IRSD SEIFA quintiles.

The data quality statements underpinning the AIHW NMD can be found in the following ABS publications:

- ABS quality declaration summary for Deaths, Australia methodology - external site opens in new window
- ABS quality declaration summary for Causes of death, Australia methodology - external site opens in new window.

For more information, see National Mortality Database (NMD).

AIHW Australian Burden of Disease Study

The Australian Burden of Disease Study (ABDS) undertaken by the AIHW provides information on the burden of disease for the Australian population. Burden of disease analysis measures the impact of fatal (or years of life lost, YLL) and non-fatal burden (years lived with disability, YLD), with the sum of non-fatal and fatal burden equating the total burden (disability-adjusted life year, DALY).

The ABDS 2023 is different to the 2003, 2011, 2015 and 2018 studies in that estimates have been produced for the current year (2023). It builds on work from the ABDS 2022, which was the first study where burden was estimated for the year of release (2022). ABDS 2023 includes disease burden estimates for the year of release (2023) for 220 diseases and injuries, including estimates of burden for COVID-19. This Study provides burden of disease estimates best matched to the public health context for the Australian population for 2023.

The 2018 study also provides estimates of how much of the burden can be attributed to 20 different risk factors. It also includes a component on the impact and causes of illness and death in First Nations people, which includes estimates of the gap in disease burden between First Nations and non-Indigenous Australians. Estimates of the burden of disease for First Nations people are available for 2003, 2011 and 2018.

For more information, see Burden of disease.

AIHW Disease Expenditure Database

The AIHW Disease Expenditure Database provides a broad picture of the use of health system resources classified by disease groups and conditions.

It contains estimates of expenditure by Australian Burden of Disease Study condition, age group and sex for admitted patient, emergency department, and outpatient hospital services, out-of-hospital medical services and prescription pharmaceuticals.

It does not allocate all expenditure on health goods and services by disease – for example, neither administration expenditure nor capital expenditure can be meaningfully attributed to any particular condition due to their nature.

For more information, see Health system spending on disease and injury in Australia, 2020-21.

In the 2020–21 study compared to previous disease expenditure studies, there were changes to the methods used for MBS mapping, Emergency Department (ED) analysis, Non-admitted patient analysis (NAP) and the identification of COVID-19 cases.

For further details on the methods used, refer to *Health system spending of disease and injury in Australia: Overview of analysis and methodology 2020–21*.

References

ABS (2014) *Australian Aboriginal and Torres Strait Islander health survey: biomedical results, 2012–13* - external site opens in new window, ABS, Australian Government, accessed 18 March 2022.

Dunstan DW, Zimmet PZ, Welborn TA, Cameron AJ, Adrian J, Shaw J et al. (2002) 'The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) – methods and response rates - external site opens in new window', Diabetes Research and Clinical Practice, 57:119–29, doi: 10.1016/s0168-8227(02)00025-6.

Johnson DW, Jones GRD, Mathew TH, Ludlow MJ, Doogue MP, Jose MD et al. (Australasian Creatinine Consensus Working Group) (2012) Chronic kidney disease and automatic reporting of estimated glomerular filtration rate: new developments and revised recommendations - external site opens in new window, *Medical Journal of Australia*, 197(4):222–223, doi: 10.5694/mja11.11329.

Classifications

International Statistical Classification of Diseases and Related Health Problems

Australia uses the International Statistical Classification of Diseases and Related Health Problems (ICD) to code causes of death (WHO 2019).

In this report, deaths were coded using the Tenth Revision of the ICD (ICD-10) (Table 1).

For hospital diagnoses, a classification modified for Australia, the ICD-10-AM classification (International Statistical Classification of Diseases and Related Health Problems, 11th Revision, Australian Modification) was used (Table 1).

For emergency department diagnoses, a classification modified for Australia, the ICD-10-AM (11th Revision) shortlist was used (Table 1).

Table 1: International Statistical Classification of Diseases and Related Health Problems (ICD) codes

Disease	ICD-10 / ICD-10-AM	ICD-10-AM shortlist
Chronic kidney disease		
Diabetic nephropathy	E10.2, E11.2, E13.2, E14.2	
Hypertensive kidney disease	I12, I13, I15.0, I15.1	I13.9
Glomerular diseases	N00–N08	N04.9, N05.9
Kidney tubulo-interstitial diseases	N11, N12, N14, N15, N16	N12
Chronic kidney failure	N18	N18.9
Unspecified kidney failure	N19	N19
Other disorders of kidney and ureter	N25–N28, N391, N392, D59.3, B52.0, E85.3	N28.9, D59.3
Congenital malformations	Q60–Q63	
Complications related to dialysis and kidney transplant	T82.4, T86.1	
Preparatory care for dialysis	Z49.0	
Kidney transplant and dialysis status	Z94.0, Z99.2	
Supplementary code for CKD stage 3-5, which maps to ICD-10-AM N18.3, N18.4 and N18.5	U87.1	
Dialysis		
Haemodialysis	Z49.1	
Peritoneal dialysis	Z49.2	
Comorbidities		
Diabetes	E10–E11, E13–E14, O24.0–O24.4, O24.9	
Cardiovascular disease	I00–I99 (excluding I84 Haemorrhoids), G45, Q20-Q26	

Acute kidney failure	N17.9

Sources: ACCD 2018; IHACPA 2022; WHO 2019.

References

ACCD (Australian Consortium for Classification Development) (2018) International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM) –11th edition, tabular list of diseases and alphabetic index of diseases - external site opens in new window, Adelaide: Independent Hospital Pricing Authority.

IHACPA (Independent Health and Aged Care Pricing Authority) (2022) Emergency Department ICD-10-AM Principal Diagnosis Short List - external site opens in new window, accessed 30 November 2022.

WHO (World Health Organization) (2019) International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) - external site opens in new window, WHO, Geneva.

Methods

This page outlines the methods used for the *Chronic kidney disease: Australian facts* report.

Age-standardised rates

Age-standardisation is a method of removing the influence of age when comparing populations with different age structures – either different populations at one time or the same population at different times.

Direct age-standardisation was used in this report. The Australian estimated resident population as at 30 June 2001 has been used as the standard population.

Significance testing

The observed value of a rate may vary because of the influence of chance and natural variation. To indicate if 2 rates are statistically different, 95% confidence intervals can be calculated, and statistically significant differences highlighted.

A 95% confidence interval describes a span of numbers around the estimate that has a 95% chance of including the true value. When comparing 2 groups, if the 2 confidence intervals do not overlap, the reader can be confident that the difference between the groups is real, and not due to chance.

Confidence intervals were calculated for survey data in this report.

Remoteness

Comparisons of regions in this report use the ABS Australian Statistical Geography Standard (ASGS) 2021 Remoteness Structure, which groups Australian regions into 6 remoteness areas.

The 6 remoteness areas are Major cities, Inner regional, Outer regional, Remote, Very remote and Migratory. These areas are defined using the Accessibility/Remoteness Index for Australia (ARIA), which is a measure of the remoteness of a location from the services that large towns or cities provide.

The IRSD values used in this report are based on the 2021 Census.

In some instances, data for remoteness areas have been combined because of small sample sizes.

It is possible that not every record in a data set will correspond directly to a remoteness area. Where data do not correspond, they have been excluded from analyses by remoteness area.

Further information on the ASGS is available on the ABS website - external site opens in new window.

Socioeconomic areas

Socioeconomic classifications in this report are based on the ABS Index of Relative Socio-economic Disadvantage (IRSD). Geographic areas are assigned a score based on social and economic characteristics of that area, such as income, educational attainment, public sector housing, unemployment and jobs in low-skill occupations. The IRSD relates to the average disadvantage of all people living in a geographical area. It cannot be presumed to apply to all individuals living in the area.

For the analyses in this report, the population is divided into 5 socioeconomic areas, with roughly equal populations (each around 20% of the total), based on the level of disadvantage of the statistical local area of their usual residence. The first group includes the 20% of areas with the highest levels of relative disadvantage (referred to as Group 1, lowest or most disadvantaged), while the last group includes the 20% of areas with the lowest levels of relative disadvantage (referred to as Group 5, highest or least disadvantaged).

The IRSD values used in this report are based on the 2021 Census.

It is possible that not every record in a dataset will correspond directly to one of these socioeconomic areas. Where data do not correspond, they have been excluded from analyses by socioeconomic area.

Further information is available on the ABS website- external site opens in new window - external site opens in new window.

First Nations people

In this report, comparisons are made between First Nations people and people who do not identify as Indigenous.

People with 'not-stated' Indigenous status are excluded from any analysis by Indigenous status, unless otherwise stated. In cases where people with 'not-stated' Indigenous status are included, the comparison is between Indigenous Australians and 'other Australians'.

Populations used

National populations

Population data are used throughout this report to calculate rates. The population data used are estimated resident populations (ERPs) derived from the ABS Census of Population and Housing.

The COVID-19 pandemic and the resulting Australian Government closure of the international border from 20 March 2020, caused significant disruptions to the usual Australian population trends. This report uses Australian Estimated Resident Population (ERP) estimates that reflect these disruptions.

In the year July 2020 to June 2021, the overall population growth was much smaller than the years prior – in particular there was a relatively large decline in the population of Victoria. ABS reporting indicates these were primarily due to net-negative international migration.

This may complicate interpretation of statistics calculated from these ERPs. For example, rates and proportions may be greater than in previous years due to decreases in the denominator (population size) of some sub-populations.

For more information: National, state and territory population, June 2023 | Australian Bureau of Statistics - external site opens in new window.

Throughout this report, rates of deaths and hospitalisations are age-standardised. In these cases, the standard population used to calculate the age-standardised rate is the Australian ERP as at 30 June 2001.

First Nations populations

The ABS 2016 Census base series B Indigenous population projections were used to derive rates (ABS 2019). To calculate non-Indigenous estimates, the Indigenous projections were subtracted from the total Australian estimated resident population data.

References

ABS (Australian Bureau of Statistics) (2019) *Estimates and projections, Aboriginal and Torres Strait Islander Australians* - external site opens in new window, ABS, Australian Government, accessed 1 December 2021.

Notes

Latest data update

17 June 2024

Update to Chronic kidney disease Summmary page including:

- New 2021–22 hospitalisations data
- New 2022 deaths data
- Data table: Chronic kidney disease: Australian facts added to Data.

14 Dec 2023

- New 2020–21 Expenditure data
- New 2023 Australian Burden of Disease Study data
- Data table: Chronic kidney disease Australian Facts added to Data.

30 Jun 2023

- New 2021 mortality data
- New 2021 ANZDATA
- New 2019–20 Expenditure data
- New 2022 Australian Burden of Disease Study data
- Data table: Chronic kidney disease Australian Facts added to Data.

9 Feb 2023

- New 2020–21 hospitalisations data and updates to information relating to COVID 19.
- Data table: Chronic kidney disease Australian Facts added to Data.

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Data

The data tables present the latest available data on chronic kidney disease in Australia as reported in the *Chronic kidney disease: Australian facts* report.

Data tables: Chronic kidney disease Australian facts

Data
XLSX 330Kb

Australian Government
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Report editions

This release

Chronic kidney disease: Australian facts | 17 Jun 2024

Previous releases

- Cardiovascular disease, diabetes and chronic kidney disease—Australian facts: risk factors 2015 | **Publication** | 25 Mar 2015
- Cardiovascular disease, diabetes and chronic kidney disease: Australian facts: prevalence and incidence 2014 | **Publication** | 19 Nov 2014
- Cardiovascular disease, diabetes and chronic kidney disease: Australian facts: morbidity—hospital care 2014 | **Publication** | 22 Dec 2014
- Cardiovascular disease, diabetes and chronic kidney disease: Australian facts mortality 2014 | **Publication** | 24 Oct 2014
- An overview of chronic kidney disease in Australia, 2009 | **Publication** | 27 May 2009
- Chronic kidney disease in Australia 2005 | **Publication** | 23 Nov 2005

Related material

Resources

Geographical variation in disease: diabetes, cardiovascular and chronic kidney disease

Resource

Chronic kidney disease prevalence among Australian adults over time

Resource

Incidence of end-stage kidney disease in Australia 1997–2013

Resource

Acute kidney injury in Australia: a first national snapshot

Resource

Profiles of Aboriginal and Torres Strait Islander people with kidney disease

Resource

Related topics

- Chronic disease
- Chronic kidney disease

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Archived content

Chronic kidney disease: Australian facts

Resource | *14 Dec 2023*
PDF 9.8Mb

Chronic kidney disease: Australian facts

Resource | *30 Jun 2023*
PDF 7.1Mb

Chronic kidney disease: Australian facts

Resource | *09 Feb 2023*
PDF 4.5Mb

Chronic kidney disease: Australian facts

Resource | *23 Aug 2022*
PDF 4.3Mb

Chronic kidney disease web report 2020

Resource | *15 Jul 2020*
PDF 679Kb

Note: request access to archived data tables via ckd@aihw.gov.au.