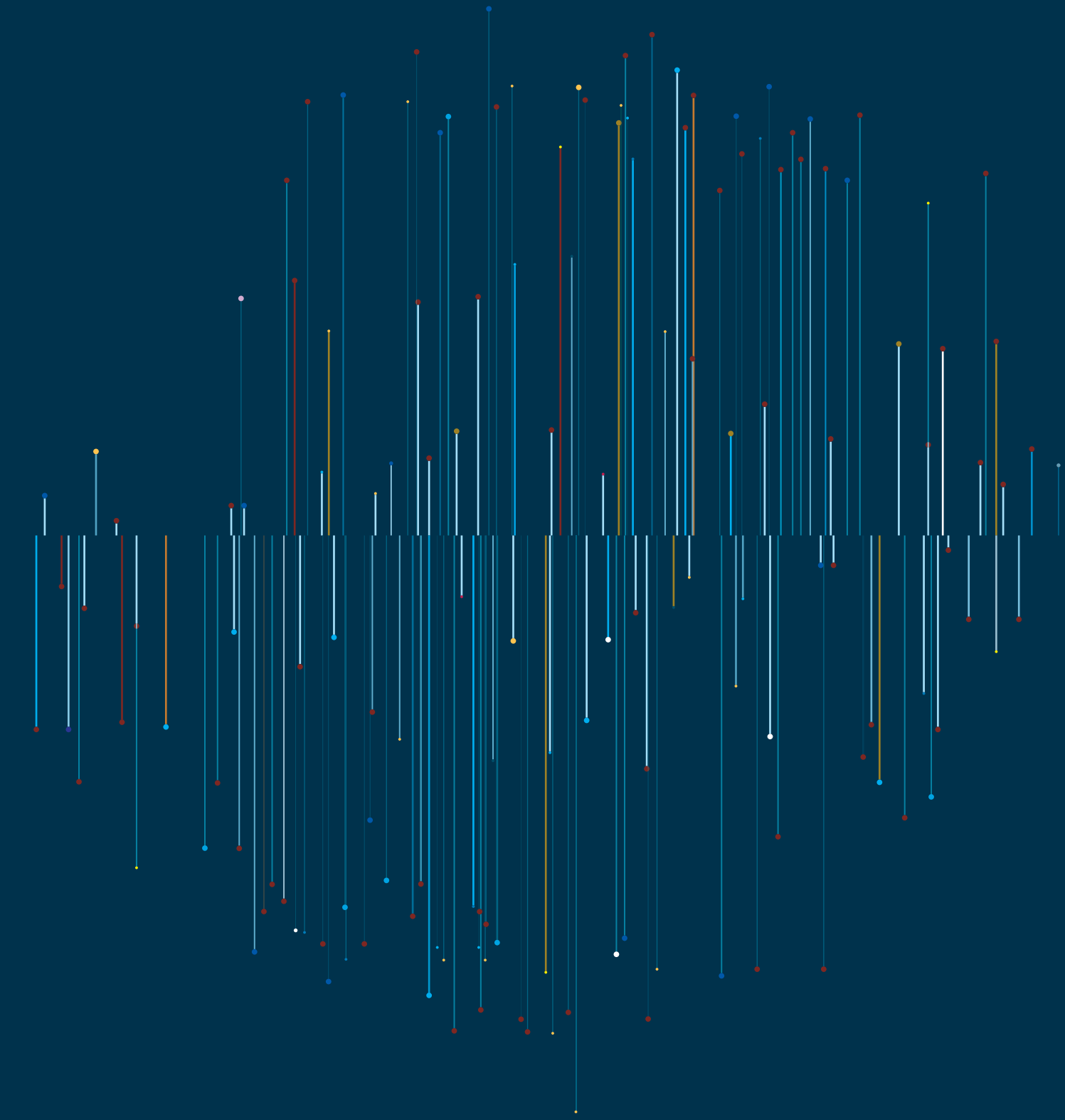
HIV, viral hepatitis and sexually transmissible infections in Australia

Annual surveillance report 2018



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HIV, viral hepatitis and sexually transmissible infections in Australia
Annual surveillance report 2018

The Kirby Institute

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in collaboration with networks in surveillance for HIV, viral hepatitis and sexually transmissible infections

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Contents

Figures

Tables

Preface

This is the 22nd annual review of health surveillance data for HIV, viral hepatitis and sexually transmissible infections in Australia. It is a reference document for organisations and individuals interested in the occurrence of these infectious diseases in Australia, drawing together relevant data from many sources into a single comprehensive report. The report is available through the website **kirby.unsw.edu.au** together with the Australian HIV Public Access Dataset, holding records of cases of HIV diagnosed in Australia by 31 December 2017 and reported by 31 March 2018.

The main findings of the report are presented as text, supported by figures. The underlying data are available online in tables at **kirby.unsw.edu.au**. A methodological summary follows the commentary and figures, along with references to other documents and reports which provide further information.

The accompanying report *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* presents a detailed analysis of the occurrence of bloodborne viral and sexually transmissible infections for use by Aboriginal and Torres Strait Islander health services and communities, among others. [1] The report is available at online at **kirby.unsw.edu.au**.

Some of the information in this report regarding risk behaviour is also published, along with further behavioural data, in the *Annual reports of trends in behaviour*,[2, 3] prepared by the Centre for Social Research in Health. Other relevant information is also published in the following reports prepared by the Kirby Institute:

- *Australian NSP survey: prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees national data report 2013–2017* [4]
- *Needle syringe program national minimum data collection national data report 2017*[5]
- *Australian NSP survey: prevalence of HIV, HCV and injecting and sexual behaviour among needle and syringe program attendees 20 year national data report 1995–2014* [6]
- *National prison entrants' bloodborne virus and risk behaviour survey report 2004, 2007, 2010, and 2013: prevalence of HIV, hepatitis C, hepatitis B, sexually transmissible infections and risk behaviours among Australian prison entrants.* [7]

Unless specifically stated otherwise, all data provided in the report are to the end of 2017, as reported by 31 March 2018. All data in this report are provisional and subject to future revision.

This report could not have been prepared without the collaboration of a large number of organisations throughout Australia. The ongoing contribution to national surveillance for HIV, viral hepatitis and sexually transmissible infections by these organisations, listed in the Acknowledgments, is gratefully acknowledged.

We acknowledge the late Scientia Professor David Cooper AC, Director of the Kirby Institute at UNSW Sydney who passed away in March 2018. David was a global pioneer in the response to HIV. His life was dedicated to understanding HIV and the development of effective treatment for the virus. He understood and acknowledged the critical role surveillance plays in the response to infectious disease epidemics. We thank him for his endless support, encouragement and expertise.

Abbreviations

ABS	Australian Bureau of Statistics
ACCESS	Australian Collaboration for Coordinated Enhanced Sentinel Surveillance
AIDS	acquired immunodeficiency syndrome
BBV	bloodborne virus
CI	confidence interval
DNA	deoxyribonucleic acid
HBsAg	hepatitis B surface antigen
HIV	human immunodeficiency virus
HPV	human papillomavirus
NESB	non-English speaking background
PEP	post-exposure prophylaxis
PrEP	pre-exposure prophylaxis
RNA	ribonucleic acid
STI	sexually transmissible infection
TasP	treatment as prevention
UNAIDS	Joint United Nations Programme on HIV/AIDS

Summary data

HIV

New HIV notifications

- There were 963 HIV notifications in Australia in 2017, the lowest number of notifications since 2010, with a 7% decline over the last five years, and a 5% decline between 2016 and 17.
- Male-to-male sex continues to be the major HIV risk exposure in Australia, reported for 607 (63%) HIV notifications in 2017, with heterosexual sex reported for 238 (25%) notifications, both male-to-male sex and injecting drug use for 53 (5%) notifications and injecting drug use for 33 (3%) notifications.
- The decrease in overall HIV notifications is attributed to an 11% decline in notifications reporting male-to-male sex as likely exposure over the past five years, and a 15% decline between 2016 and 2017.
- In comparison, there was a 10% increase between 2013 and 2017 in notifications reporting heterosexual sex, with a 14% increase between 2016 and 2017. A large component of this increase was due to the increase in the number of notifications among Australian-born men over these time periods (37% and 31% respectively).
- Of 238 HIV notifications in 2017 that were attributed to heterosexual sex, 61% were in males, and 45% were in people born in Australia. A further 15% were in people born in Sub-Saharan Africa, and 13% in people born in Asia.
- Based on the test for immune function (CD4+ cell count), 274 (36%) HIV notifications in 2017 were classified as late diagnoses (CD4+ cell count of less than 350 cells/μL), the highest proportion in the past 10 years. These diagnoses are likely to have been in people who had acquired HIV at least four years before diagnosis without being tested.
- Over the past five years (2013–2017) the proportion with late diagnoses was higher in people born in Central America (56%), Sub-Saharan Africa (47%) and Southeast Asia (42%). The proportion with late diagnoses was also higher in people with heterosexual sex as their HIV risk exposure (46%), men with bisexual sex as their HIV risk exposure (44%), and men aged over 50 years with male-to-male sex as their HIV risk exposure (37%).
- In 2017, there were 31 notifications among Aboriginal and Torres Strait Islander people. The age-standardised rate of HIV notification increased by 41% in the Aboriginal and Torres Strait Islander population between 2013 and 2016, compared with a 12% decline in Australian-born non-Indigenous people. In 2017 the notification rate was 1.6 times as high as in the Australian-born non-Indigenous population (4.6 per 100 000 and 2.8 per 100 000, respectively).
- Over the years 2015–2017, more HIV notifications in the Aboriginal and Torres Strait Islander population were attributed to heterosexual sex (21%) and injecting drug use (18%) than in the Australian-born non-Indigenous population (18% and 3%, respectively).
- In 2013–2017, among 191 babies born in Australian to women with HIV, 1% of newborns were diagnosed with HIV, compared with 27% in 1993–1997.

HIV incidence and prevalence

- HIV incidence among female sex workers remained at or below 0.13 per 100 person-years in the past five years (2013–2017), and was 0.13 per 100 person-years in 2017.
- In 2017 HIV prevalence (the proportion of all people in Australia who are living with HIV), was estimated to be 0.14%, which is low compared with other relevant high-income and Asia-Pacific countries.
- The self-reported HIV prevalence among gay and bisexual men participating in the Gay Community Periodic Surveys was 7.9% in 2017.
- HIV prevalence among people who inject drugs attending needle and syringe programs was estimated to be 2.1% in 2017, and 1% if gay and bisexual men are excluded.

Testing and care

- There were an estimated 27 545 people living with HIV in Australia in 2017. Of those, an estimated 24 646 (89%) were diagnosed, 23 414 (95% of those diagnosed) were retained in care (having had a viral load or CD4+ cell count in the past year), 21 560 (87% of those diagnosed) were receiving antiretroviral therapy, and 20 412 (95% of those on antiretroviral therapy) had suppressed viral load (less than 200 HIV-1 RNA copies/mL). This corresponds to 74% of all people living with HIV having suppressed viral load in 2017, which exceeds the UNAIDS 73% target for 2020, but is below the 86% target for 2030.
- There were an estimated 2899 (11%) people living with HIV in Australia in 2017 who were unaware of their HIV status (undiagnosed). Compared with overall, the estimated proportion with undiagnosed HIV was higher in people with heterosexual sex (17%) and injecting drug use (15%) as their HIV risk exposure, and lower in men with male-to-male sex as their HIV risk exposure (9%). The estimated proportion with undiagnosed HIV was also higher among people born in Southeast Asia (27%), and women (13%).
- Among gay and bisexual men attending sexual health clinics in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network, the proportion who had had a repeat HIV test within seven months of a previous test has risen by 36% within the past five years, from 42% in 2013 to 57% in 2017.

Prevention

- In 2017, according to the Gay Community Periodic Surveys, the majority (70%) of HIV-negative gay and bisexual men who had casual partners were using strategies (avoiding anal sex, using condoms, or biomedical prevention), to protect themselves against acquiring HIV, and this proportion has remained stable over the past 10 years. Conversely 30% were not consistently using any of these strategies. A greater proportion of men in the past five years reported using biomedical prevention strategies, including pre-exposure prophylaxis (PrEP) and treatment as prevention (TasP).
- During 2017, pre-exposure prophylaxis (PrEP) implementation projects continued in New South Wales, Queensland and Victoria and commenced in the Australian Capital Territory, Western Australia, South Australia, and Tasmania. By the end of 2017, a total of 15 895 gay and bisexual men at high risk of HIV were enrolled in PrEP implementation projects in these jurisdictions.

Interpretation

There has been a 7% decrease in the number of HIV notifications in Australia in the last five years due to a decrease in notifications among men reporting male-to-male sex. During this period, initiatives to promote and improve access to testing have increased repeat testing among gay and bisexual men. High treatment coverage has been achieved in 2017, with a corresponding increase in the proportion of people on treatment with a suppressed viral load, which reduces the risk of onward transmission to effectively zero. With 74% of people living with HIV having achieved suppressed viral load, for the first time Australia has reached the UNAIDS 2020 target of 73%, but work still needs to be done to achieve the 2030 target of 86%.

In the last few years, state-funded programs have provided PrEP to an increasing number of the gay and bisexual men at higher risk of HIV in Australia, and may indicate an impact on HIV transmission, when combined with ongoing improvements in treatment coverage. Nonetheless, PrEP uptake needs to increase across all jurisdictions and other populations to have the greatest benefit.

Conversely, there hasn't been a decline in HIV notifications in people who acquired HIV from heterosexual sex, with an increase in 2017, which needs to be carefully monitored. These individuals are still more likely to be diagnosed late (48%), including those born overseas (53%), indicating the importance of initiatives to raise awareness about HIV testing.

The rate of HIV notifications increased by 41% in the Aboriginal and Torres Strait Islander population between 2013 and 2016, compared with a 12% decline in Australian-born non-Indigenous people, and in 2017 remains 1.6 times as high as the Australian-born non-Indigenous population.

In other populations, harm reduction strategies to minimise HIV transmission among people who inject drugs have been highly successful and must be sustained. Extremely low rates of vertical HIV transmission from mother to newborn have been observed in Australia, reflecting successful comprehensive medical interventions. The incidence of HIV among women involved in sex work is extremely low—among the lowest in the world—due to highly successful HIV prevention for this priority population; this low incidence must also be sustained.

Overall, these data highlight the need to maintain and strengthen strategies of health promotion, testing, treatment and risk reduction, but also to expand and promote PrEP and other forms of prevention to people who could benefit from these strategies and to increase prevention initiatives in people born overseas and Aboriginal and Torres Strait Islander people.

Hepatitis C

New hepatitis C notifications

- In 2017 there were 10 537 hepatitis C notifications. About two-thirds (69%, 7256) of hepatitis C notifications in 2017 were in males.
- The overall notification rate of hepatitis C in Australia has declined slightly by 18% between 2008 and 2017, with the rate for 2017 the lowest in the last 10 years (43.3 per 100 000). This is despite an increase between 2015 and 2016, likely related to increased testing due to the availability of direct-acting antiviral (DAA) treatments.
- The age-standardised rate of hepatitis C notification in the Aboriginal and Torres Strait Islander population based on data from five jurisdictions (the Northern Territory, Queensland, South Australia, Tasmania and Western Australia) increased by 15% over the five past years, from 146.4 per 100 000 in 2013 to 168.1 per 100 000 in 2017, compared with a 13% decline in the non-Indigenous population (43.6 per 100 000 in 2012 to 38.4 per 100 000 in 2017). The hepatitis C notification rate in the Aboriginal and Torres Strait Islander population was 4.4 times as high as in the non-Indigenous population in 2017.
- Among people aged under 25 years (likely to have acquired hepatitis C more recently), the rate of notifications has declined by 16% in the past five years (17.5 per 100 000 in 2013 and 14.7 per 100 000 in 2017), with a greater 25% decline in the ten years 2008-2047 (from 19.6 to 14.7 per 100 000).
- In Aboriginal and Torres Strait Islander people aged under 25, the rate of hepatitis C notification was more than six times as high as in non-Indigenous people in 2017 (76.7 vs 12.2 per 100 000) and, was similar to the rate in 2013 (75.4 per 100 000), compared with a 22% decrease in non-Indigenous people.

Incidence, prevalence and morbidity

- The hepatitis C RNA prevalence among people who inject drugs attending needle and syringe programs was 25% in 2017, a 42% decrease from 43% in 2015.
- Between 2008 and 2015 there was a 64% increase in the estimated number of people with hepatitis C-related cirrhosis and a 42% decline from 2015 to 2017 (17 039 to 9833).
- The number of people receiving liver transplants due to chronic hepatitis C or hepatitis C-related hepatocellular carcinoma has decreased by 28% between 2013 (77, 40% of all transplants) and 2017 (66, 29% of all transplants).
- The estimated number of hepatitis C-related deaths increased by 74% from 480 in 2008 to 833 in 2015, then declined by 30% between 2015 and 2017 (583).

Testing and care

- At the start of 2017, there were an estimated 199 230 people living with chronic hepatitis C infection in Australia, reducing to an estimated 182 144 at the end of 2017.
- Of the 182 283 people living with chronic hepatitis C at the end of 2017, an estimated 145 838 (80%) had been diagnosed and 68 544 (47% of those diagnosed) had had a hepatitis C RNA test to confirm their chronic hepatitis C infection.
- Of the estimated 199 220 people living with chronic hepatitis C at the start of 2017, 21 370 (11%) received hepatitis C treatment during 2017 and 20 302 (95% of those treated) were cured during 2017.
- Access to new highly effective hepatitis C treatments led to a six-fold increase in the number of people receiving treatment between 2013 and 2017, with the greatest increase occurring between 2015 and 2016 (four-fold increase).
- In 2016, a higher proportion of people living with hepatitis C-related cirrhosis (49%) received treatment than of people with early to moderate fibrosis (10%) and severe fibrosis (17%).
- According to the Australian Needle and Syringe Program Survey in 2017, among respondents with self-reported chronic hepatitis C, 45% reported ever having received hepatitis C treatment, an increase from 11% in 2015.

Injecting risk behaviour

- The reuse of needles and syringes that have been used by others (receptive syringe sharing) is a major risk factor for transmission of hepatitis C. The overall proportion of Australian Needle and Syringe Program Survey respondents who reported receptive syringe sharing in the past year was 17% in 2017. Receptive syringe sharing was higher among Aboriginal and Torres Strait Islander survey respondents (26%) than among non-Indigenous respondents (15%).

Interpretation

There was an estimated 20% decline in deaths from hepatitis C related liver failure and liver cancer in 2016–2017, compared with an estimated two-fold increase in the seven years before new treatments were available. There has also been a 42% decline in cirrhosis in the last three years. This change reflects people accessing new direct-acting antiviral regimens subsidised by the Pharmaceutical Benefits Scheme from March 2016.There has been a high uptake of direct-acting antiviral therapies among people with hepatitis C, particularly those with more advanced liver disease. Since 2016, around 55 000 Australians have been treated with these highly curative therapies.

People who inject drugs are a key population for hepatitis C treatment and prevention, and the prevalence of active hepatitis C infection among this group declined from 43% to 25% between 2015 and 2017. Also, over the past two years, the proportion of people who inject drugs with hepatitis C who report treatment has increased dramatically, from 11% to 45%.

However, despite these improvements, in 2017 only 15% of the estimated number of people living with hepatitis C in Australia has been treated, 29% of all liver transplants were attributable to chronic hepatitis C or hepatitis C-related hepatocellular carcinoma, and there were an estimated 540 deaths in people living with chronic hepatitis C. More strategies are needed to raise awareness about the need for testing and availability of new hepatitis C treatments to virtually eliminate hepatitis C by 2030.

The increase in hepatitis C notifications between 2015 and 2016 after stable rates between 2012 and 2015 is likely related to an increase in testing due to the availability of new direct-acting antiviral medications. However, the declining notification rate in people under 25 years (who are likely to have acquired hepatitis C more recently) suggests that hepatitis C transmission remains stable at the population level. There has also been no decrease in the rates of receptive syringe sharing in the same period, highlighting the need for enhanced focus on prevention efforts.

Trends in hepatitis C notifications among Aboriginal and Torres Strait Islander people are very different from those among non-Indigenous people. The notification rate in Aboriginal and Torres Strait Islander people aged under 25 has been stable over the past five years, but the rate in non-Indigenous people in this age group has fallen. The difference in overall notification rates may reflect differences in injecting risk behaviours, with results from the Australian Needle and Syringe Program survey showing that Aboriginal and Torres Strait Islander people were almost twice as likely to report recent receptive syringe sharing in 2017. The difference could also be accounted for by disproportionate rates of Aboriginal and Torres Strait Islander people being in prison each year, a setting where hepatitis C screening is recommended on entry and where access to evidence-based harm-reduction strategies is very limited. There is a need for an increased focus on culturally appropriate harm reduction strategies for Aboriginal and Torres Strait Islander people in both community and prison settings. Behavioural factors have complex social determinants, intertwined with poverty and discrimination faced by many Aboriginal and Torres Strait Islander people. Similarly, health service access and utilisation are strongly influenced by these factors.

Hepatitis B

New hepatitis B notifications

- There were a total of 6102 hepatitis B notifications in Australia in 2017, with almost equal distribution among males (3256, 54%) and females (2831, 46%).
- The notification rate of hepatitis B in 2017 was highest in the 30–39 year age group (53.3 per 100 000) and 25–29 year age group (45.6 per 100 000).
- Over the five years 2013 to 2017, the annual notification rate of hepatitis B has declined by 13% in Australia (28.9 per 100 000 in 2013 and 25.0 per 100 000 in 2017). The hepatitis B notification rate has also declined in younger age groups over the past five years (53% decline in people aged 15–19 years, 64% decline in those aged 20–24 and 34% decline in those aged 25–29), in contrast to stable rates in older age groups aged 30–39, and aged 40 and over, reflecting the impact of the infant and adolescent vaccination programs.
- There was also a decline in the notification rate of newly acquired hepatitis B (evidence of hepatitis B acquisition in the two years prior to diagnosis) in younger age groups over the past five years (80% decline in those aged 15–19 years, 75% decline in those aged 20–24, and a 63% decline in those aged 25–29).
- The notification rate of hepatitis B among the Aboriginal and Torres Strait Islander population based on data from five jurisdictions (the Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia) declined by 37% between 2013 and 2017 (from 72 to 45 per 100 000). Similar to the overall trend in Australia, the greatest declines were observed in the younger age groups. In 2017, the notification rate of hepatitis B in the Aboriginal and Torres Strait Islander population was more than twice as high as in the non-Indigenous population (45.1 per 100 000 compared with 19.2 per 100 000).

Prevalence and morbidity

- There were an estimated 233 947 people living with chronic hepatitis B in Australia in 2017, of whom an estimated 50 169(21%) were born in Northeast Asia, 39 858(17%) were born in Southeast Asia, and 26 241(11%) were Aboriginal and Torres Strait Islander people.
- The estimated chronic hepatitis B prevalence was 6.2% in people born in Northeast Asia, 4.5% in people born in Southeast Asia, 4.0% in Aboriginal and Torres Strait Islander people, and 3.0% in gay and bisexual men, with overlaps in some of these categories.
- An estimated 479 deaths attributable to chronic hepatitis B infection occurred in 2017.

Testing and care

- In 2017 an estimated 64% (149 118) of people living with chronic hepatitis B in Australia had been diagnosed. Australia's Second National Hepatitis B Strategy (2014–2017) has a target of 80% of people living with chronic hepatitis B having been diagnosed.
- In 2017, 18% (43 218) of those living with chronic hepatitis B were receiving regular clinical care. Best practice indicates that all people diagnosed with chronic hepatitis B require regular monitoring to assess the stage and progression of their liver disease and to facilitate the commencement of treatment as needed.
- Treatment for hepatitis B is recommended for people with elevated hepatitis B viral load and abnormal liver function tests, or those who have advanced liver disease (cirrhosis), and Australia's Second National Hepatitis B Strategy (2014–2017) has a target of 15% of people living with chronic hepatitis B on treatment. In 2017 only 8% (18 851) of people living with chronic hepatitis B were estimated to be receiving antiviral therapy.

Prevention

- In 2017 coverage of infant hepatitis B vaccination at 12 months of age was 95% in the non-Indigenous population and 93% in the Aboriginal and Torres Strait Islander population, reaching 96% and 98% respectively by 24 months.

Interpretation

Hepatitis B in adolescents and adults in Australia is transmitted through a variety of pathways, including injecting drug use and sexual contact. However, most people living with chronic hepatitis B in Australia were born overseas and acquired hepatitis B at birth or in early childhood. Age-specific notification rates for both overall and newly acquired hepatitis B suggest a decline in the age groups (under 30 years) that are most likely to have benefited from the introduction of universal vaccination of infants in 2000 (1990 in the Northern Territory) and adolescent catch-up programs from 1998 (with variations by jurisdiction in when school-based vaccination programs were introduced). Maternal screening and vaccination of infants born to women with hepatitis B are also likely to have contributed to this decline.

Overall, of the people living with chronic hepatitis B in Australia in 2017, an estimated 36% remained undiagnosed. Of the people living with chronic hepatitis B, an estimated 18% were receiving care and 8% were receiving treatment. These data suggest an ongoing major gap in both the uptake of testing to diagnose chronic hepatitis B, and the uptake of monitoring and treatment to prevent morbidity and mortality, and there is a need to strengthen strategies to bridge these gaps

Chlamydia

Chlamydia notifications

- Chlamydia was the most frequently notified sexually transmissible infection (STI) in Australia in 2017, with a total of 100 775 notifications. Three-quarters (73%) of these notifications were among people aged 15–29 years.
- The annual rate of chlamydia notifications remained stable between 2011 and 2015, and then increased by 13% between 2015 and 2017 from 367.3 to 416.8 per 100 000. There was a larger increase in men (25%) than in women (4%) between 2015 and 2017, although the rate in women was higher than in men in 2017 (441.8 vs 394.9 per 100 000).
- In 2017, chlamydia notification rates were highest in the age groups 20–24 years (1975.4 per 100 000), 15–19 (1185.3 per 100 000) and 25–29 (1180.9 per 100 000). Over the past five years, there was a decline in the annual chlamydia notification rate among people aged 15–19 years (13% decline).
- The annual rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population based on data from four jurisdictions (Northern Territory, Queensland, South Australia and Western Australia) was 2.8 times that in the non-Indigenous population in 2017 (1193.9 per 100 000 compared with 427.0 per 100 000).

Incidence

- In 2017, chlamydia incidence in HIV-positive gay and bisexual men (36.1 per 100 person-years) was 1.6 times as high as in HIV-negative gay and bisexual men (23.1 per 100 person-years), with a 25% increase in HIV-positive gay and bisexual men and 43% increase in HIV-negative gay and bisexual men since 2013.
- In female sex workers, chlamydia incidence increased by 39% between 2013 and 2017 (from 7.1 to 9.9 per 100 person-years).

Testing and care

- In 2017, there were an estimated 255 227 (159 672 in men, 95 556 in women) new chlamydia infections in people aged 15–29 years. Of those, 29% were diagnosed (19% of men, 45% of women), 93% of those diagnosed received treatment (93% for both men and women) and 17% of those treated had a retest within six months (13% of men, 20% of women).
- The number of Medicare rebated chlamydia tests in Australia has double from 725 326 in 2009 to 1 451 544 in 2017.
- In the same time period, there was a 29% increase in the proportion of people aged 15–29 years attending general practice who had a Medicare rebated chlamydia test in a year.
- Between 2013 and 2017, a high proportion of gay and bisexual men (91-96%) attending sexual health clinics, were tested for chlamydia.
- The amount of testing in a population can influence notification trends. Between 2009 and 2017, the ratio of chlamydia notifications to Medicare-rebated chlamydia tests declined by 20% suggesting the notification trends observed are strongly influenced by increased testing.

Gonorrhoea

Gonorrhoea notifications

- There were 28 364 notifications of gonorrhoea in 2017, with about three-quarters of all notifications in males (21 010, 74%).
- Between 2013 and 2017, gonorrhoea notification rates increased by 80% (65.5 to 118.0 per 100 000), with an increase in both males (91%) and females (56%). The gonorrhoea notification rate in 2017 was higher in males (174.2 per 100 000) than in females (61.8 per 100 000).
- In males, the highest gonorrhoea notification rates were in the age groups 25–29 (531.0 per 100 000) and 20–24 years (445.3 per 100 000), and in females in the age groups 20–24 (240.9 per 100 000) and 15–19 years (191.7 per 100 000).
- Over the past five years (2013–2017), gonorrhoea notification rates increased in major cities (115% increase) and regional areas (39% increase) but were stable in remote areas.
- The rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population was 6.6 times that in the non-Indigenous population in 2017 (627.5 per 100 000 compared with 95.6 per 100 000). These data are from the Australian Capital Territory, the Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia. Over the years 2013–2017, gonorrhoea annual notification rates decreased by 19% in the Aboriginal and Torres Strait Islander population.
- In 2017, the ratio of male to female notifications among Aboriginal and Torres Strait Islander people was 0.9:1 compared with 3:1 in the non-Indigenous population. Also in 2017, almost a third (30%) of gonorrhoea notifications in Aboriginal and Torres Strait Islander people were in people aged 15–19 years, compared with 9% in the non-Indigenous population. The gonorrhoea notification rate in the Aboriginal and Torres Strait Islander population in 2016 was highest in remote and very remote areas (1444 per 100 000), which was 30 times as high as in the non-Indigenous population.

Incidence

- In 2017, gonorrhoea incidence in HIV-positive gay and bisexual men (35 per 100 person-years) was 1.6 times as high as in HIV-negative gay and bisexual men (22 per 100 person-years), with a 31% increase in HIV-positive gay and bisexual men and 34% increase in HIV-negative gay and bisexual men since 2013.
- In female sex workers gonorrhoea incidence increased by 47% between 2013 an 2017 (from 3.6 to 5.3 per 100 person-years).

Testing and care

- Results from the Gay Community Periodic Surveys show comprehensive STI testing in the past 12 months in gay and bisexual men increased from 40% in 2013 to 51% in 2017. 'Comprehensive' testing is defined as at least four samples from separate body sites collected for STI screening.
- Between 2013 and 2017, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests increased by 44% (from 1.4 to 1.9), with increases in both males (38%) and females (31%), these data suggest that the increases observed in notifications cannot be fully explained by more testing. The ratio was higher in males (4.5 in 2017) in each of the past five years than in females (0.7 in 2017).

Syphilis

Infectious Syphilis notifications

- There were 4398 notifications of infectious syphilis (infections of less than two years' duration) in 2017, with the majority of notifications in males (3733, 85%).
- Over the past five years (2013–2017), the notification rate of infectious syphilis increased 135% from 7.8 per 100 000 in 2013 to 18.3 per 100 000 in 2017, with an increase in both males (119%) and females (309%). The notification rate was higher in males (31.1 per 100 000) than in females (5.5 per 100 000) in 2017.
- In 2017, infectious syphilis notification rates were highest in people aged 25–29 years (43.7 per 100 000), 30–39 (36.3 per 100 000) and 20–24 (33.3 per 100 000).
- In 2017, infectious syphilis notification rates were higher in remote and very remote areas (62.9 per 100 000) than in major cities (17.8 per 100 000) and regional areas (14.1 per 100 000).
- Over the past five years (2013–2017), notification rates increased in all areas, with the greatest increases in remote areas (284% increase) and regional areas (271% increase), followed by major cities (127% increase). Increases were observed in both males and females in major cities, regional areas and remote areas.
- The rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population (102.5 per 100 000) in 2017 was 6.6 times as high as in the non-Indigenous population (15.5 per 100 000). The rate of notification of infectious syphilis among the Aboriginal and Torres Strait Islander population increased by 425% from 19.5 per 100 000 in 2013 to 102.5 per 100 000 in 2017 compared with a 112% increase in the non-Indigenous population (from 7.3 to 15.5 per 100 000).
- In 2017, just over half (54%) of infectious syphilis notifications in the Aboriginal and Torres Strait Islander population were among males compared with a large majority (94%) of all notifications in males in the non-Indigenous population. One in five (21%) infectious syphilis notifications in the Aboriginal and Torres Strait Islander population were in people aged 15–19 years, compared with only 2% in the non-Indigenous population.
- The infectious syphilis notification rate in the Aboriginal and Torres Strait Islander population in 2017 was highest in remote and very remote areas (171.8 per 100 000), which was 27 times as high as in the non-Indigenous population.
- Over the last 10 years (2008–2017), more than half (26, 59%) of the 44 congenital syphilis notifications were in the Aboriginal and Torres Strait Islander population.

Incidence

- In 2017, the incidence of infectious syphilis among HIV-positive gay and bisexual men attending sexual health clinics was 6.5 per 100 person-years, 2.2 times as high as the 3.0 per 100 person-years in HIV-negative gay and bisexual men. Between 2013 and 2017, infectious syphilis incidence fluctuated in gay and bisexual men among both HIV-negative men (between 2.8 and 3.4 per 100 person-years) and HIV-positive men (between 6.0 and 9.0 per 100 person-years).
- In 2017, infectious syphilis incidence in female sex workers was 0.1 per 100 person-years, and fluctuated between 0.1 and 0.4 per 100 person-years over the past five years (2013–2017).

Testing and care

- Among gay and bisexual men attending sexual health clinics in the ACCESS network, the average number of syphilis tests per person increased by 18% from 1.4 in 2013 to 1.7 in 2017.

Other sexually transmissible infections

Donovanosis, once a frequently diagnosed sexually transmissible infection among remote Aboriginal populations, is now close to elimination, with only two cases notified since 2011.

Following the introduction of vaccination against human papillomavirus in 2007 (introduced in 2007 for girls and in 2013 for boys aged 12 to 13 years), a high three-dose coverage has been achieved nationally in both girls (80% in 2017) and boys (76% in 2017) turning 15 years of age. Indicators of the success of this program include the following:

- Among Australian-born women under 21 years attending sexual health clinics for their first visit, the proportion diagnosed with genital warts has fallen since 2007 from 11.0% to 0.5% in 2017, a reduction of 96%.
- Among heterosexual men under 21 years attending sexual health clinics for their first visit, the proportion diagnosed with genital warts has also fallen from 9.3% in 2007 to 1.1% in 2017, a reduction of 93%, with a 33% decline since 2013 when male vaccination was introduced.
- The rate of detection of high-grade histological abnormalities has fallen from 11.6 per 1000 women aged under 20 years undergoing cervical cancer screening (Pap screening) in 2007 to 3.9 per 1000 in 2016 (66% decline), and from 18.9 per 1000 to 10.6 per 1000 (44% decline) in women aged 20–24 years.

Interpretation

Both testing and notifications of chlamydia have increased in the past five years. However, the vast majority of infections in young people (15–29 years) remain undiagnosed and untreated, highlighting the need for testing to be routinely offered to sexually active adolescents and young adults.

Gonorrhoea and infectious syphilis in Australia are diagnosed primarily in gay and bisexual men in urban settings, and in young heterosexual Aboriginal and Torres Strait Islander people in remote areas, though gonorrhoea and infectious syphilis notification rates among women in urban settings have increased steadily.

Gonorrhoea and infectious syphilis have been diagnosed more frequently in the past five years in gay and bisexual men, with the highest rates in younger men and in men with HIV. Explanations for these increases in gay and bisexual men include more comprehensive screening, a change to more sensitive gonorrhoea testing technology, an increasing trend in condomless anal sex in the context of the greater availability and awareness of highly effective HIV prevention strategies. Efforts to improve health promotion, testing and treatment in gay and bisexual men need to be strengthened.

The increase in the ratio of gonorrhoea notifications to Medicare-rebated tests among both men and women between 2013 and 2017 suggests increasing transmission through heterosexual sex, highlighting the need for health promotion, enhanced testing and partner notification in heterosexual men and women. In female sex workers, the rise in chlamydia and gonorrhoea incidence in recent years highlights the need for enhanced focus on prevention strategies.

In the Aboriginal and Torres Strait Islander population, notification rates of sexually transmissible infections remain higher than in the non-Indigenous population: gonorrhoea (seven times as high), infectious syphilis (seven times as high) and chlamydia (three times as high). The increases in infectious syphilis in young Aboriginal people in remote communities, along with cases of congenital syphilis, emphasise the need to enhance culturally appropriate health promotion, testing and treatment strategies in this population.

1 HIV

Details of HIV notifications are given in this chapter.

1.1 HIV notifications

This section focuses on people diagnosed with HIV for the first time in Australia ('notifications'). In 2017 there were a total of 963 HIV notifications in Australia: 846 (88%) in males, 694 (72%) in people aged 30 years and above, and 31 (3%) among people reported to be Aboriginal and/or Torres Strait Islander. A quarter (241) of all notifications in 2017 were classified as newly acquired (evidence of HIV acquisition in the 12 months prior to diagnosis) (Table 1.1.2).

There were an additional 286 HIV cases previously diagnosed overseas with a confirmatory test conducted in Australia; 37% were in NSW, 23% in Queensland, and 19% in Victoria (Table 1.1.1). These notifications are included in estimates of people diagnosed and living with HIV but excluded from further analyses in this report.

Table 1.1.1 Number of new cases of HIV in Australia, 2017, by state/territory and whether HIV was first diagnosed in Australia or overseas

	Place of first diagnosis of HIV		
	Australia	Overseas	Total cases
State/Territory			
Australian Capital Territory	13	6	19
New South Wales	310	107	417
Northern Territory	11	2	13
Queensland	185	67	252
South Australia	45	16	61
Tasmania	11	4	15
Victoria	310	55	365
Western Australia	78	29	107
Total	**963**	**286**	**1249**

Source: State and Territory health authorities; includes all states and territories

A total of 38 172 notifications of HIV have been reported in Australia since 1984, of which 34 800 were among males and 3 021 among females. In the five-year period 2008–2012, the number of HIV notifications increased by 18%, but in the subsequent five-year period 2013–2017 the number of notifications decreased by 7%. With 963 cases in 2017, the number of HIV notifications has dropped below a thousand for the first time in six years (Figure 1.1.1). A similar pattern has been seen in male notifications over the last 10 years, with an increase of 21% between 2008 and 2012, and an 8.4% decrease in the most recent five-year period. In contrast, notifications among females have been relatively stable over the same period, with 110 HIV notifications in 2008 and 108 in 2017 (Figure 1.1.1, Table 1.1.2).

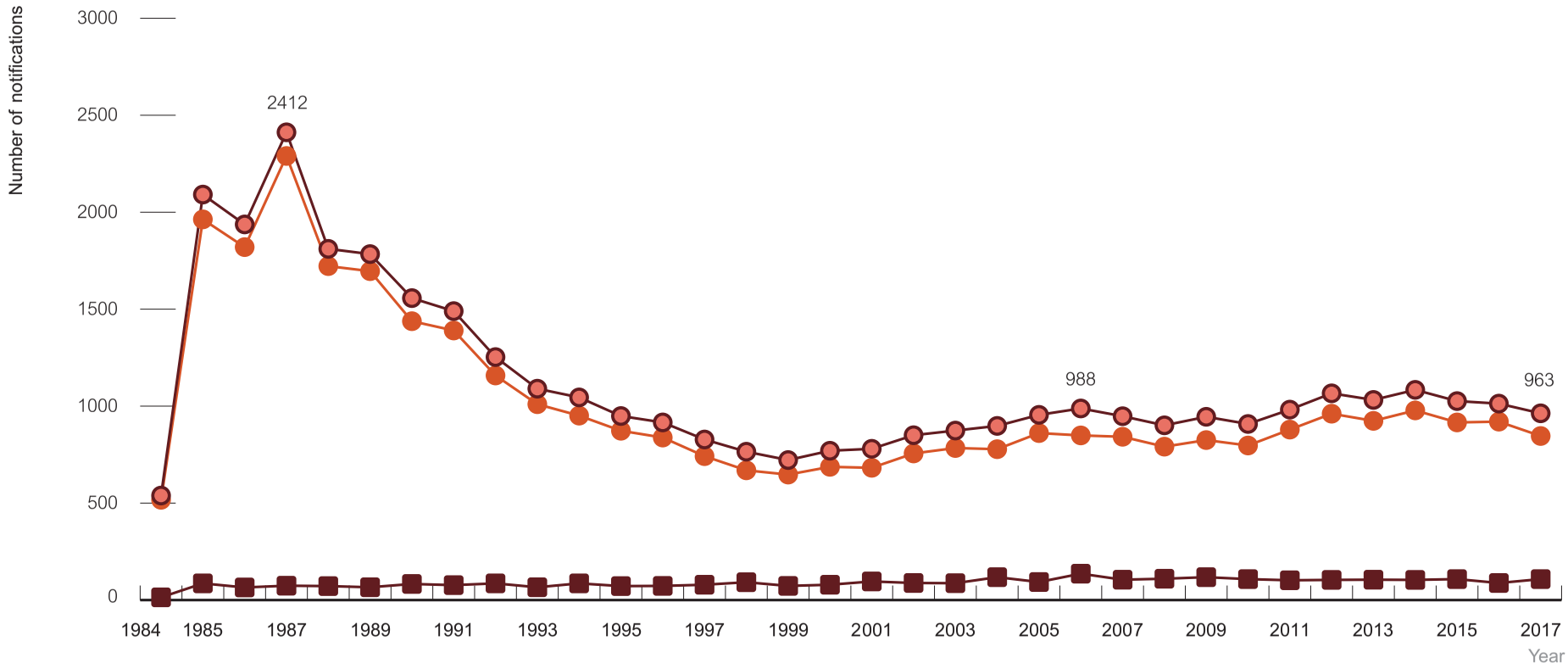
Table 1.1.2 Characteristics of HIV notifications, 2008–2017

	Year of HIV diagnosis										
Characteristic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2008–2017[a]
Total cases[b]	901	945	908	982	1066	1032	1084	1026	1013	963	9920
Sex											
Male	791	825	797	879	961	924	978	916	920	846	8837
Female	110	118	108	102	104	105	104	108	88	108	1055
Median age (years)											
Male	37	37	37	37	36	37	34	35	34	35	36
Female	31	32	31	32	31	34	35	36	34	34	33
Aboriginal and Torres Strait Islander status											
Non-Indigenous	868	911	875	954	1027	992	1,036	969	962	922	9516
Aboriginal and Torres Strait Islander	19	24	22	24	33	26	33	39	46	31	297
Not reported	14	10	11	4	6	14	15	18	5	10	107
Age group in years											
0-14	7	10	6	8	1	6	3	3	5	2	51
15-19	12	13	13	17	22	23	14	19	11	11	155
20-29	240	253	230	263	318	271	317	297	313	256	2758
30-39	296	304	286	305	323	288	346	303	310	312	3073
40-49	219	221	229	239	224	247	217	208	196	174	2174
50+	127	144	144	150	178	197	187	196	178	208	1709
Language spoken at home[c]											
English	688	717	679	780	797	528	836	734	735	537	7,031
Other language	56	93	76	80	85	75	105	129	135	133	967
Not reported	157	135	153	122	184	429	143	163	143	293	1,922
Newly acquired[d]	284	301	305	371	396	347	425	398	365	241	3,433
(% of new diagnoses)	31.5	31.9	33.6	37.8	37.2	33.6	39.2	38.8	36.0	25.0	34.6
Late and advanced HIV status at HIV diagnosis[e]											
Late HIV diagnosis, %	31.4	35.0	35.0	28.8	31.5	32.0	28.5	28.9	32.7	35.9	31.8
Advanced HIV diagnosis, %	17.2	20.5	20.0	18.9	17.8	18.4	16.7	15.9	19.5	22.5	18.6
Median CD4+ cell count, cells/μL	430	408	400	429	430	420	440	440	420	390	420
State/Territory, n											
ACT	7	11	13	11	17	21	18	14	13	13	138
NSW	326	339	310	333	408	355	346	348	317	310	3392
NT	10	12	5	9	20	13	9	9	23	11	121
QLD	174	182	209	196	208	181	246	203	195	185	1979
SA	39	50	34	57	31	58	39	44	42	45	439
TAS	11	14	9	15	13	11	16	16	19	11	135
VIC	262	262	236	279	267	307	302	283	312	310	2820
WA	72	75	92	82	102	86	108	109	92	78	896
HIV exposure risk category											
Male-to-male sex[f]	587	598	589	687	743	680	761	700	712	607	6664
Male-to-male sex and injecting drug use	32	38	22	32	34	44	50	49	51	53	405
Injecting drug use	32	23	23	20	25	28	31	30	14	33	259
Heterosexual sex	207	231	208	193	207	217	201	205	209	238	2117
Person from a high–prevalence country[g]	82	80	73	45	50	36	46	38	35	41	527
Partner from a high–prevalence country	12	20	22	27	21	26	30	33	29	32	252
Partner at high risk[h]	27	29	18	33	31	44	28	39	38	30	317
Not further specified	86	102	95	88	105	111	97	95	107	135	1021
Receipt of blood/tissue[i]	0	1	0	0	4	3	0	8	1	0	17
Mother with/at risk of HIV	5	8	5	7	1	4	3	4	5	3	45
Other/undetermined	38	46	61	43	52	56	38	30	21	29	414

a Not adjusted for multiple reporting.
b Includes sex of 'Other' and 'Not reported'.
c Language spoken at home was sought among cases of HIV newly diagnosed from 1 January 2004.
d Newly acquired HIV was defined as newly diagnosed infection with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis. In Victoria from April 2016 there was a change in the laboratory reporting of HIV confirmatory results such that there are expected to be fewer indeterminate results requiring follow-up. This will therefore reduce the number of results which were previously used to provide evidence for newly acquired HIV infections.
e Late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/μL, and advanced HIV as newly diagnosed infection with a CD4+ cell count of less than 200 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnosis, irrespective of CD4+ cell count.
f Includes men who had sex with both men and women.
g High–prevalence countries include those with ≥1% estimated prevalence in at least one of the 10 years 2006–2015. See Methodology for list of high–prevalence countries.
h A person who injects drugs, a bisexual male, a recipient of blood or tissue, or a person with haemophilia or clotting disorder.
i Includes receipt of blood/tissue overseas, so does not indicate transmission through blood products in Australia.

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.1 HIV notifications in Australia, 1984–2017, by sex



	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	517	1963	1820	2290	1722	1696	1438	1390	1158	1010	951	873	838	742	669	647	687	682	756	784	778	861	849	842	791	825	797	879	961	924	978	916	920	846
Women	14	86	65	74	72	66	83	77	86	66	86	72	73	79	92	73	79	96	88	87	118	93	136	105	110	118	108	102	104	105	104	108	88	108
Total[a]	539	2091	1937	2412	1811	1784	1557	1490	1253	1090	1045	949	916	828	765	722	770	780	850	874	898	955	988	948	901	945	908	982	1066	1032	1084	1026	1013	963

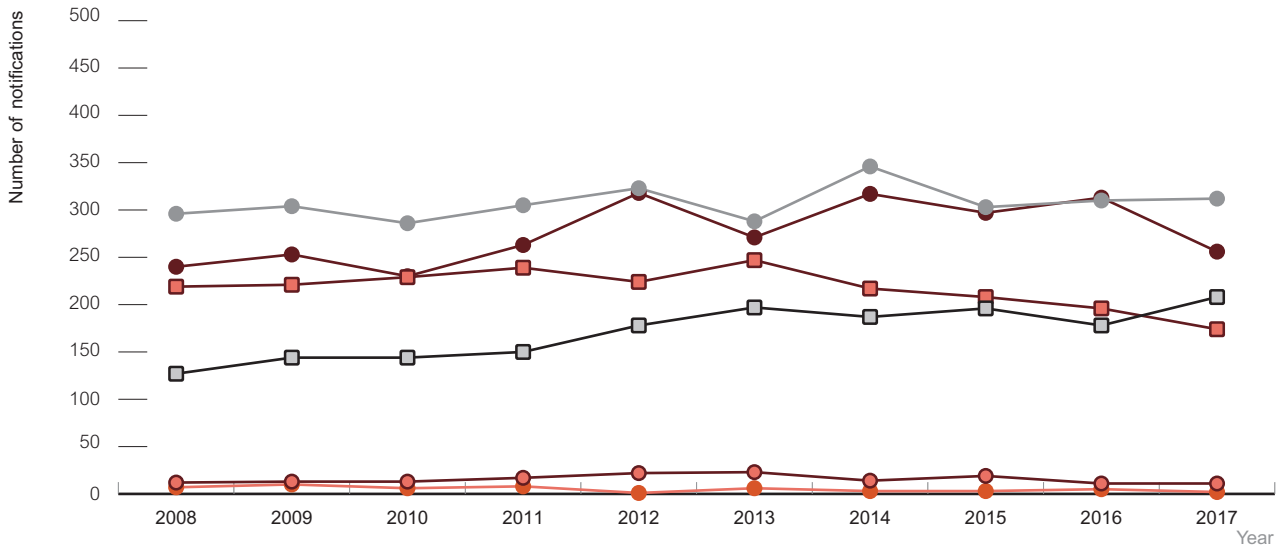
a Total includes transgender people and people for whom data on sex was missing.

Source: State and territory health authorities; see Methodology for detail.

Demographics

In 2017 the largest number of notifications was in the age group 30–39 years (312), followed by those aged 20–29 (256) and those aged over 50 (208) (Figure 1.1.2, Table 1.1.2). Over the five years 2013–2017, the number of HIV notifications increased by 5% in the 50+ age group and decreased by 30% in the 40–49 age group. The number of notifications remained low in younger age groups, with 11 notifications in the 15–19 age group and two in the 0–14 age group in 2017; the number of notifications in both age groups fluctuated over the past five years.

Figure 1.1.2 HIV notifications in Australia, 2008–2017, by age group



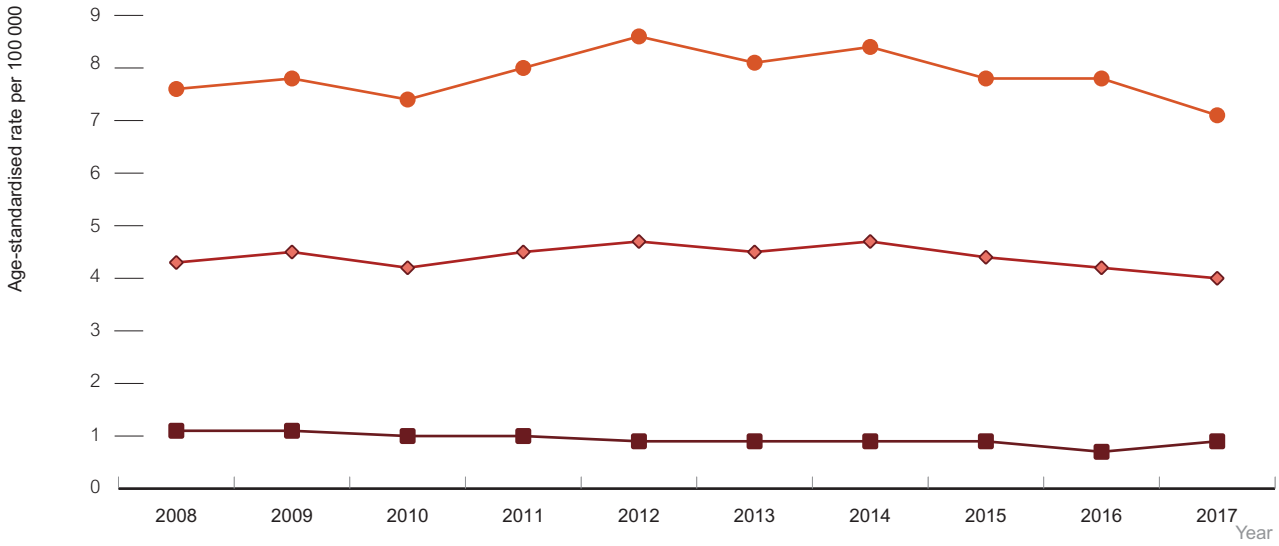
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	7	10	6	8	1	6	3	3	5	2
15–19	12	13	13	17	22	23	14	19	11	11
20–29	240	253	230	263	318	271	317	297	313	256
30–39	296	304	286	305	323	288	346	303	310	312
40–49	219	221	229	239	224	247	217	208	196	174
50+	127	144	144	150	178	197	187	196	178	208

Source: State and territory health authorities; see Methodology for detail.

HIV

The notification rate of HIV in 2017 was 4.0 per 100 000, representing a 11% decline in the past five years, from 4.5 per 100 000 in 2013 (Figure 1.1.3). In males the notification rate has declined by 12% in the last five years, from 8.1 per 100 000 in 2013, to 7.1 per 100 000 in 2017. The notification rate in females has remained stable over the past five years (between 0.7 and 0.9 per 100 000), but is low compared with that in males (0.9 vs 7.1 per 100 000 in 2017).

Figure 1.1.3 HIV notifications, rate per 100 000 population, 2008–2017, by sex

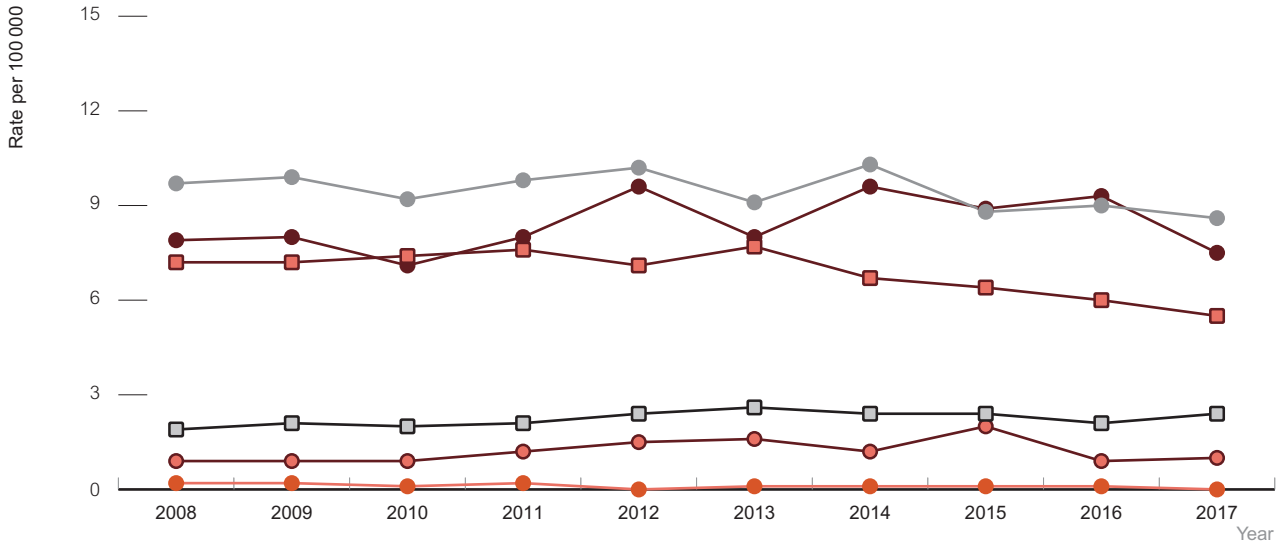


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	7.6	7.8	7.4	8.0	8.6	8.1	8.4	7.8	7.8	7.1
Women	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.7	0.9
Total	4.3	4.5	4.2	4.5	4.7	4.5	4.7	4.4	4.2	4.0

Source: State and territory health authorities; see Methodology for detail.

In 2017 HIV notification rates were highest in the age group 30–39 years (8.6 per 100 000), followed by the 20–29 age group (7.5 per 100 000) and the 40–49 age group (5.5 per 100 000), with a 29% decline in the 40–49 age group, and 5% decline in the 30–39 year age group in the last five years (Figure 1.1.4). A similar trend was observed for these age groups in males (Figure 1.1.5). HIV notification rates among females were lower than in males in all age groups over the past 10 years (2008–2017) (Figure 1.1.6). In 2017, HIV notification rates were highest among women aged 30–39 years (2.4 per 100 000), followed by those aged 20–29 (1.5 per 100 000). Rates have declined by almost half among women aged 20–29 years since 2008, when the rate was 2.5 per 100 000.

Figure 1.1.4 HIV notification rate per 100 000 population, 2008–2017, by age group

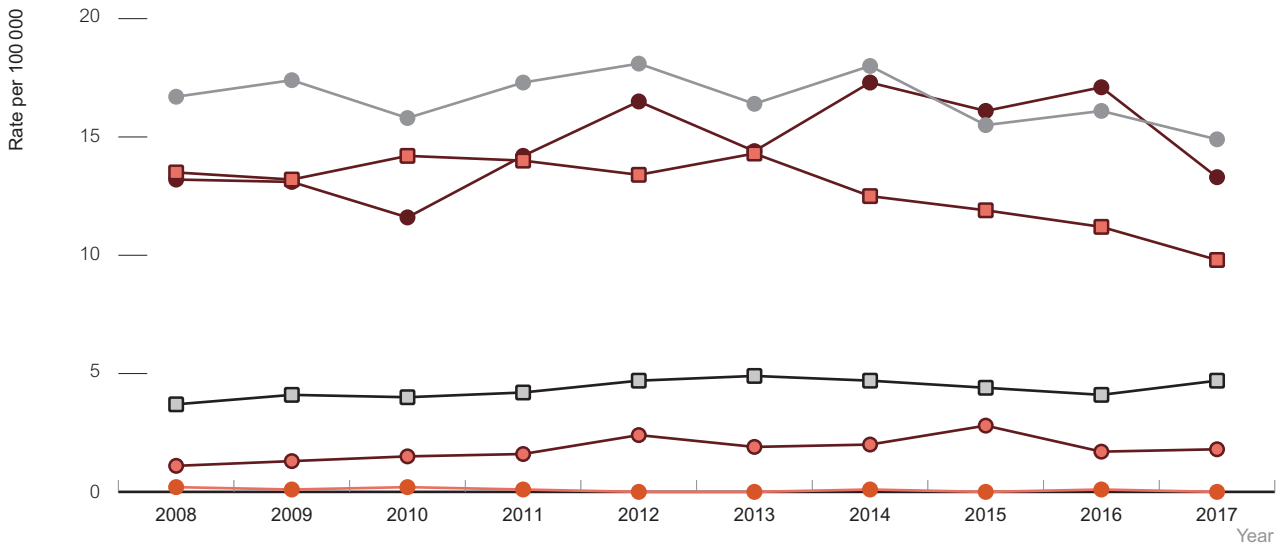


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.2	0.2	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.0
15–19	0.9	0.9	0.9	1.2	1.5	1.6	1.2	2.0	0.9	1.0
20–29	7.9	8.0	7.1	8.0	9.6	8.0	9.6	8.9	9.3	7.5
30–39	9.7	9.9	9.2	9.8	10.2	9.1	10.3	8.8	9.0	8.6
40–49	7.2	7.2	7.4	7.6	7.1	7.7	6.7	6.4	6.0	5.5
50+	1.9	2.1	2.0	2.1	2.4	2.6	2.4	2.4	2.1	2.4

Source: State and territory health authorities; see Methodology for detail.

HIV

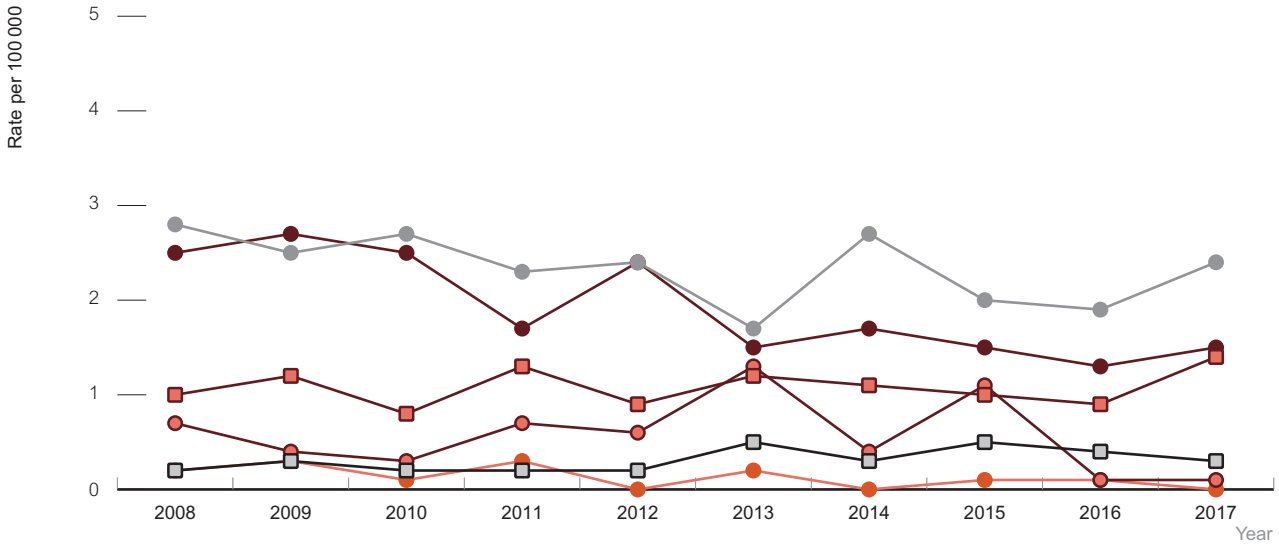
Figure 1.1.5 HIV notification rate per 100 000 population, 2008–2017, by age group, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.2	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.0
15–19	1.1	1.3	1.5	1.6	2.4	1.9	2.0	2.8	1.7	1.8
20–29	13.2	13.1	11.6	14.2	16.5	14.4	17.3	16.1	17.1	13.3
30–39	16.7	17.4	15.8	17.3	18.1	16.4	18.0	15.5	16.1	14.9
40–49	13.5	13.2	14.2	14.0	13.4	14.3	12.5	11.9	11.2	9.8
50+	3.7	4.1	4.0	4.2	4.7	4.9	4.7	4.4	4.1	4.7

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.6 HIV notification rate per 100 000 population, 2008–2017, by age group, females



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.2	0.3	0.1	0.3	0.0	0.2	0.0	0.1	0.1	0.0
15–19	0.7	0.4	0.3	0.7	0.6	1.3	0.4	1.1	0.1	0.1
20–29	2.5	2.7	2.5	1.7	2.4	1.5	1.7	1.5	1.3	1.5
30–39	2.8	2.5	2.7	2.3	2.4	1.7	2.7	2.0	1.9	2.4
40–49	1.0	1.2	0.8	1.3	0.9	1.2	1.1	1.0	0.9	1.4
50+	0.2	0.3	0.2	0.2	0.2	0.5	0.3	0.5	0.4	0.3

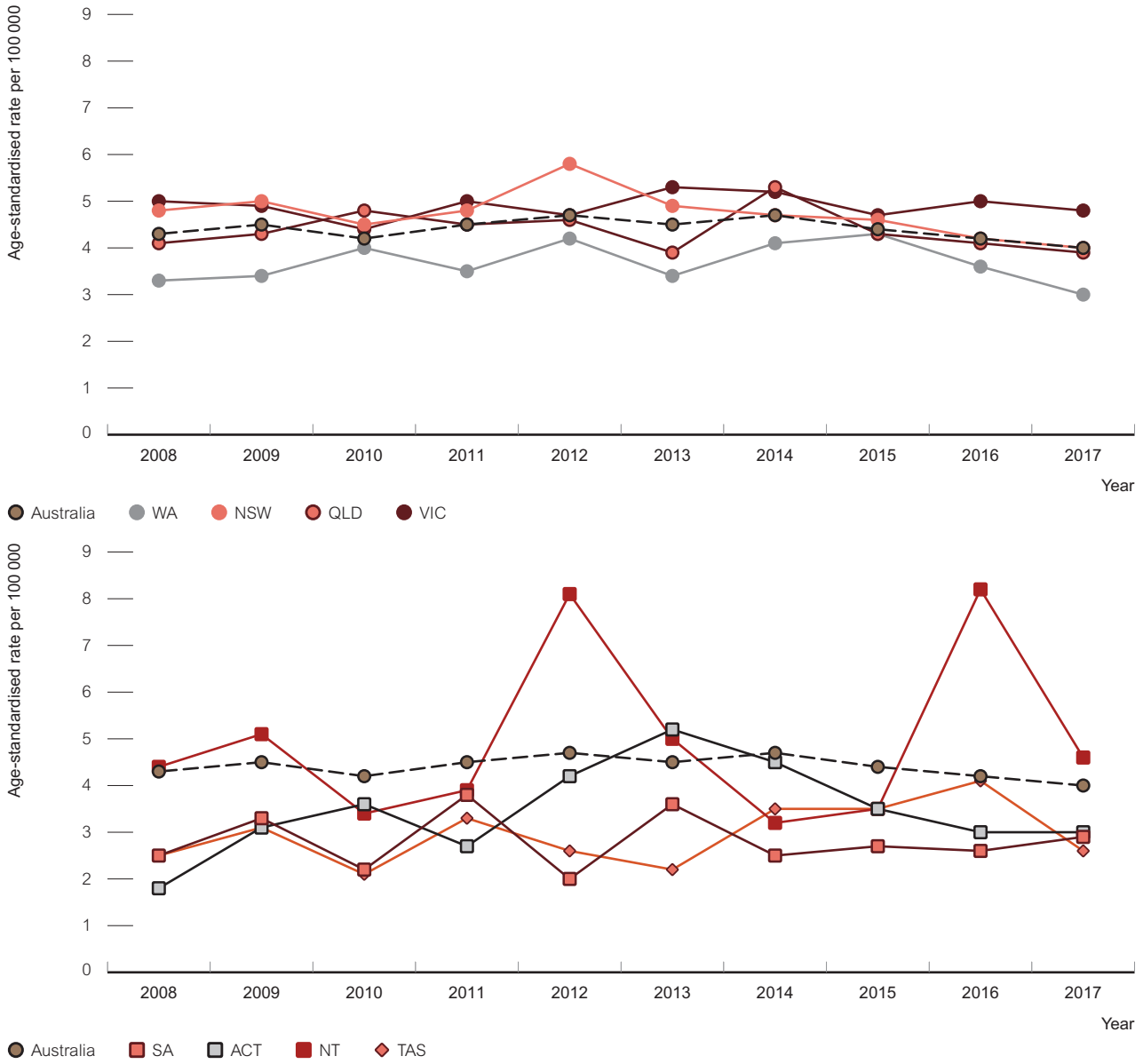
Source: State and territory health authorities; see Methodology for detail.

Recent trends in the population rate of newly diagnosed HIV have differed across jurisdictions in Australia. Only New South Wales has observed a long-term decline in its HIV notification rate (Figure 1.1.7, Table 1.1.3), but some declines have been observed in other jurisdictions in recent years.

The HIV notification rate in New South Wales declined by 17% between 2008 and 2017, from 4.8 per 100 000 to 4.0 per 100 000. In Victoria, the rate of HIV notification has fluctuated between 4.4 and 5.0 per 100 000 over the past 10 years (2008–2017) and was 4.8 per 100 000 people in 2017. In Queensland, the HIV notification rate fluctuated between 3.9 and 5.3 per 100 000 over the past 10 years and was 3.9 per 100 000 in 2017. The rate of HIV notification in Western Australia has fluctuated between 3.0 and 4.3 per 100 000 in the past 10 years, and was at its lowest point of 3.0 per 100 000 in 2017 (Figure 1.1.7, Table 1.1.3).

In the Australian Capital Territory, Tasmania and the Northern Territory the numbers of notifications each year are smaller, so trends need to be interpreted with caution. In the Australian Capital Territory in the past 10 years, notification rates have increased and reached a similar level to NSW in 2014 (4.5 per 100 000 in 2014), declining again in 2017 to 3.0 per 100 000. The rates have fluctuated in Tasmania (2.2 per 100 000 to 4.2 per 100 000) and the Northern Territory (3.2 per 100 000 to 8.1 per 100 000) over the past 10 years (Figure 1.1.7, Table 1.1.2).

Figure 1.1.7 HIV notification rates per 100 000 population, 2008–2017, by state/territory



Source: State and territory health authorities; see Methodology for detail.

Table 1.1.3 New HIV notifications, rate per 100 000 population, 2008–2017, by state/territory

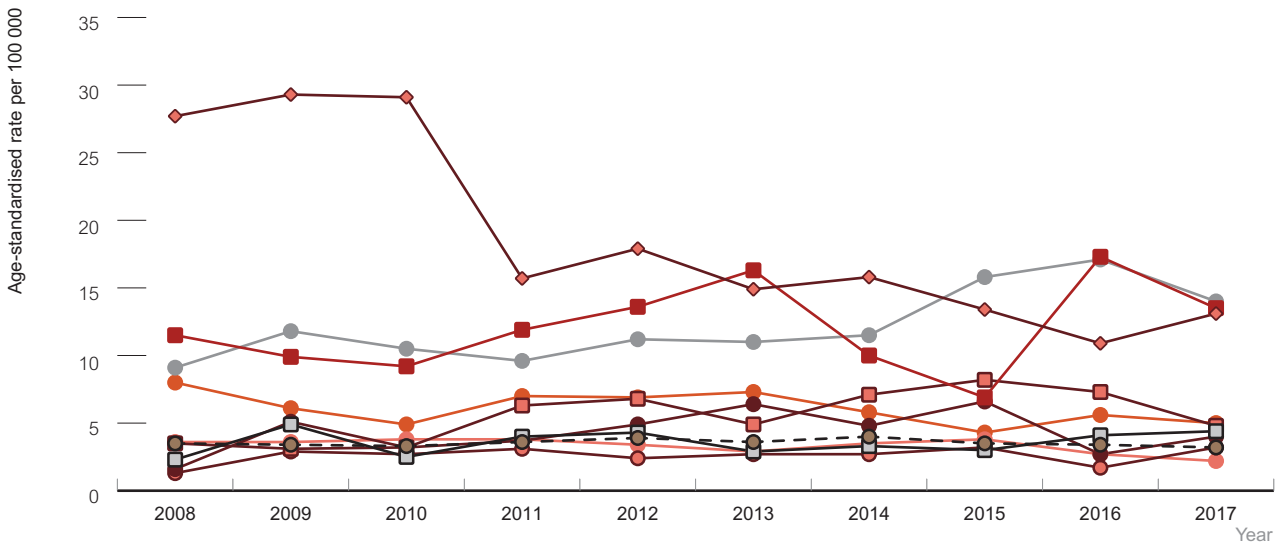
State/Territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	1.8	3.1	3.6	2.7	4.2	5.2	4.5	3.5	3.0	3.0
New South Wales	4.8	5.0	4.5	4.8	5.8	4.9	4.7	4.6	4.2	4.0
Northern Territory	4.4	5.1	3.4	3.9	8.1	5.0	3.2	3.5	8.2	4.6
Queensland	4.1	4.3	4.8	4.5	4.6	3.9	5.3	4.3	4.1	3.9
South Australia	2.5	3.3	2.2	3.8	2.0	3.6	2.5	2.7	2.6	2.9
Tasmania	2.5	3.1	2.1	3.3	2.6	2.2	3.5	3.5	4.1	2.6
Victoria	5.0	4.9	4.4	5.0	4.7	5.3	5.2	4.7	5.0	4.8
Western Australia	3.3	3.4	4.0	3.5	4.2	3.4	4.1	4.3	3.6	3.0
Australia	4.3	4.5	4.2	4.5	4.7	4.5	4.7	4.4	4.2	4.0

Source: State and Territory health authorities; includes all states and territories.

HIV notification rates over the 10-year period 2008–-2017 differed by region of birth. Among Australian-born people, the HIV notification rate was stable from 2008 to 2017 (between 3.2 and 4.0 per 100 000) (Figure 1.1.8). Among people born overseas, the highest HIV notification rates in 2017 were in people born in Southeast Asia (14.0 per 100 000), the Americas (North, Central and South America) (13.5 per 100 000), and Sub-Saharan Africa (13.1 per 100 000).

Rates of HIV among people born in the Americas have fluctuated between 6.9 and 17.3 per 100 000 over the 10-year period. The HIV notification rate for those born in Southeast Asia fluctuated over the past 10 years but increased sharply between 2014 and 2016 (from 11.5 per 100 000 in 2014 to 17.1 per 100 000 in 2016) but declined again in 2017 to 14.0 per 100 000. Rates have increased steadily in those born in Northeast Asia (from 3.1 per 100 000 in 2009 to 7.3 per 100 000 per 100 000 in 2016), and decreased again in 2017 to 4.8 per 100 000. Among those born in Sub-Saharan Africa the rate of HIV notification has fallen by 53% since 2008 (from 27.7 to 13.1 per 100 000 in 2017) (Figure 1.1.8).

Figure 1.1.8 HIV notification rates per 100 000 population, 2008–2017, by region of birth



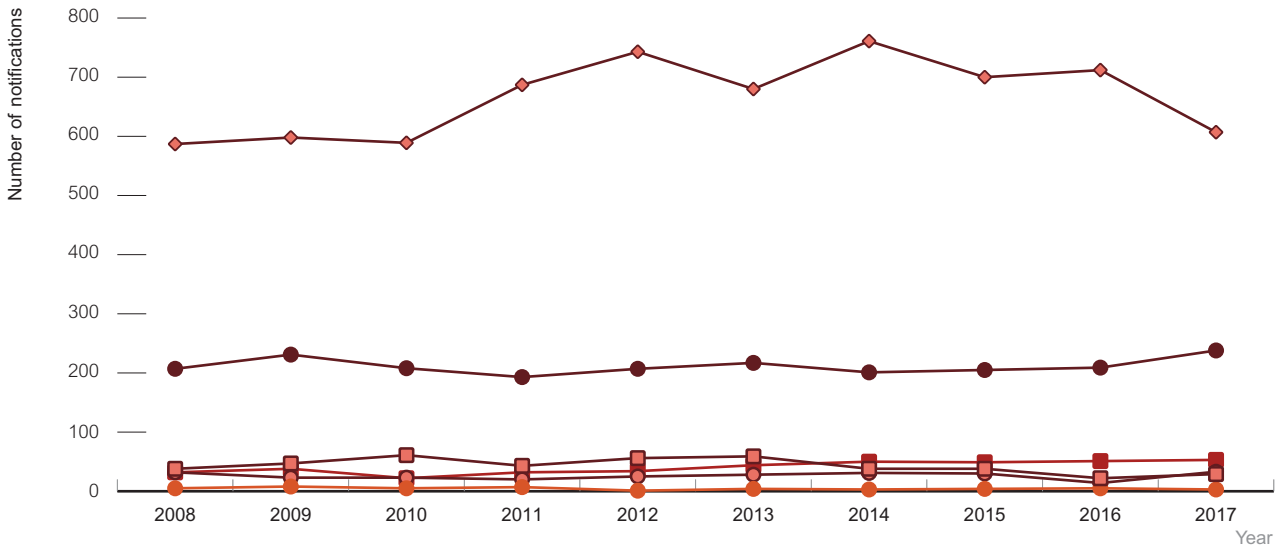
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	3.5	3.4	3.3	3.6	3.9	3.6	4.0	3.5	3.4	3.2
Oceania and Antarctica	8.0	6.1	4.9	7.0	6.9	7.3	5.8	4.3	5.6	5.0
Northwest Europe	3.6	3.6	3.8	3.8	3.4	2.9	3.5	3.8	2.7	2.2
Southern and Eastern Europe	1.3	2.9	2.7	3.1	2.4	2.7	2.7	3.2	1.7	3.2
North Africa and the Middle East	1.6	5.1	3.2	3.7	4.9	6.4	4.8	6.6	2.7	4.0
Southeast Asia	9.1	11.8	10.5	9.6	11.2	11.0	11.5	15.8	17.1	14.0
Northeast Asia	3.5	3.1	3.2	6.3	6.8	4.9	7.1	8.2	7.3	4.8
Southern and Central Asia	2.3	4.9	2.5	4.0	4.3	2.9	3.3	3.0	4.1	4.4
Americas	11.5	9.9	9.2	11.9	13.6	16.3	10.0	6.9	17.3	13.5
Sub-Saharan Africa	27.7	29.3	29.1	15.7	17.9	14.9	15.8	13.4	10.9	13.1

Source: State and territory health authorities; see Methodology for details.

HIV risk exposure

Transmission of HIV in Australia continues to occur primarily through male-to-male sexual contact (Figure 1.1.9, Table 1.1.2). About two thirds (63%; 607) of HIV notifications were attributed to male-to-male sex in 2017, a 7% decrease from 70% (712) in 2016. Heterosexual sex accounted for 238 (25%) of notifications, an increase from 21% (209) in 2016. In 2017, other risk exposures were: both male-to-male sex and injecting drug use for 53 (6%) notifications, and injecting drug use only for 33 (3%) notifications (Figure 1.1.9, Table 1.1.2).

Figure 1.1.9 Number of HIV notifications, 2008–2017, by exposure category



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Male-to-male sex	587	598	589	687	743	680	761	700	712	607
Male-to-male sex and injecting drug use	32	38	22	32	34	44	50	49	51	53
Injecting drug use	32	23	23	20	25	28	31	30	14	33
Heterosexual sex	207	231	208	193	207	217	201	205	209	238
Mother with/at risk of HIV infection	5	8	5	7	1	4	3	4	5	3
Other/undetermined	38	47	61	43	56	59	38	38	22	29

Notes: The 'male-to-male sex' category includes men who had sex with both men and women. One diagnosis was attributed to occupational exposure in healthcare or other settings in the 10 years 2008–2017 and was grouped in the 'Other' category.

Source: State and territory health authorities; see Methodology for detail.

Subpopulations

Gay and bisexual men: Men who have sex with men may identify as gay, bisexual, queer, transgender or other identities. However, notifications only record data on the presumed HIV risk exposure, which is behavioural, so 'male-to-male sex' is used when describing HIV notifications. In recognition of the limitations of reporting sex as 'transgender', improvements are being made to the recording of the sex variable for HIV notifications.

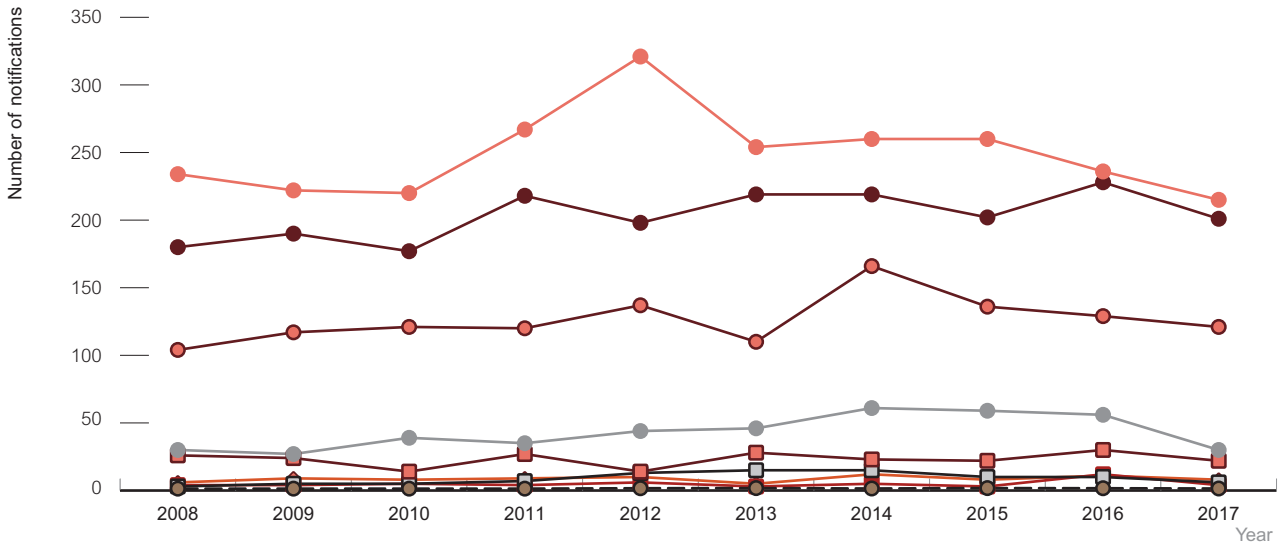
The median age at HIV diagnosis for men reporting male-to-male sex as HIV risk exposure was 36 years in 2008 and 35 years in 2017 (data not shown). Of the 607 cases of HIV newly diagnosed in 2017 for whom exposure to HIV included male-to-male sex, 67 (11%) also reported sex with women. There were an additional 53 men for whom the HIV risk exposure was male-to-male sex and injecting drug use (Figure 1.1.9, Table 1.1.2).

There was a 3% decline in HIV notifications reporting male-to-male sex as likely exposure over the past 10 years, increasing to an 11% decline in the last five years, and a 15% decline between 2016 and 2017, largely due to decreases in New South Wales (236 to 215) and Western Australia (56 to 30) (Figure 1.1.10).

Over the past 10 years the number of HIV notifications in Australian-born men with male-to-male sex as an exposure risk has decreased by 21% from 407 in 2007 to 320 in 2017 (Figure 1.1.11). Conversely, the proportion who were born in Asia (Southeast Asia, Northeast Asia, and Southern and Central Asia) has increased over the past 10 years from 28% in 2008 to 52% in 2017 (Figure 1.1.12). The number of HIV notifications in men born in countries other than Asia has remained stable between 2013 and 2017 (range 113–134) (Figure 1.1.11).

Among men born overseas with male-to-male sex as their risk exposure, the proportion who were born in Asia (Southeast Asia, Northeast Asia, and Southern and Central Asia) has increased over the past 10 years from 28% in 2008 to 52% in 2017 (Figure 1.1.11).

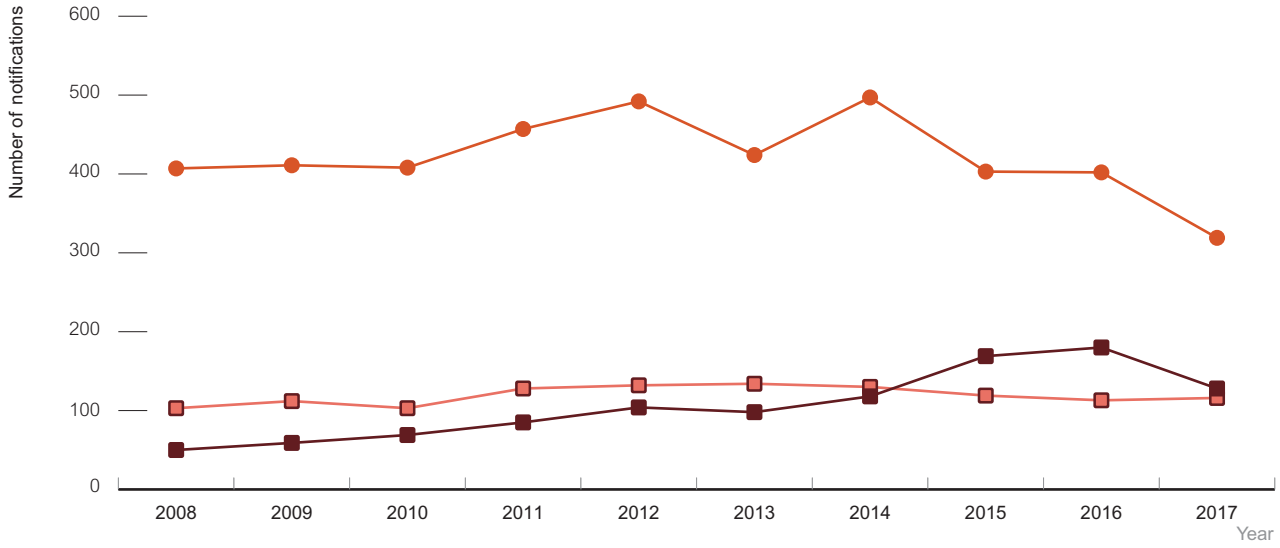
Figure 1.1.10 HIV notifications in men who reported male-to-male-sex as exposure risk, 2008–2017, by state/territory



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ACT	3	5	5	7	13	15	15	10	10	6
NSW	234	222	220	267	321	254	260	260	236	215
NT	4	4	5	4	6	3	5	3	12	4
QLD	104	117	121	120	137	110	166	136	129	121
SA	26	24	14	27	14	28	23	22	30	22
TAS	6	9	8	9	10	5	12	8	11	8
VIC	180	190	177	218	198	219	219	202	228	201
WA	30	27	39	35	44	46	61	59	56	30

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.11 HIV notifications in men who reported male-to-male sex as an exposure risk, 2008–2017, by region of birth

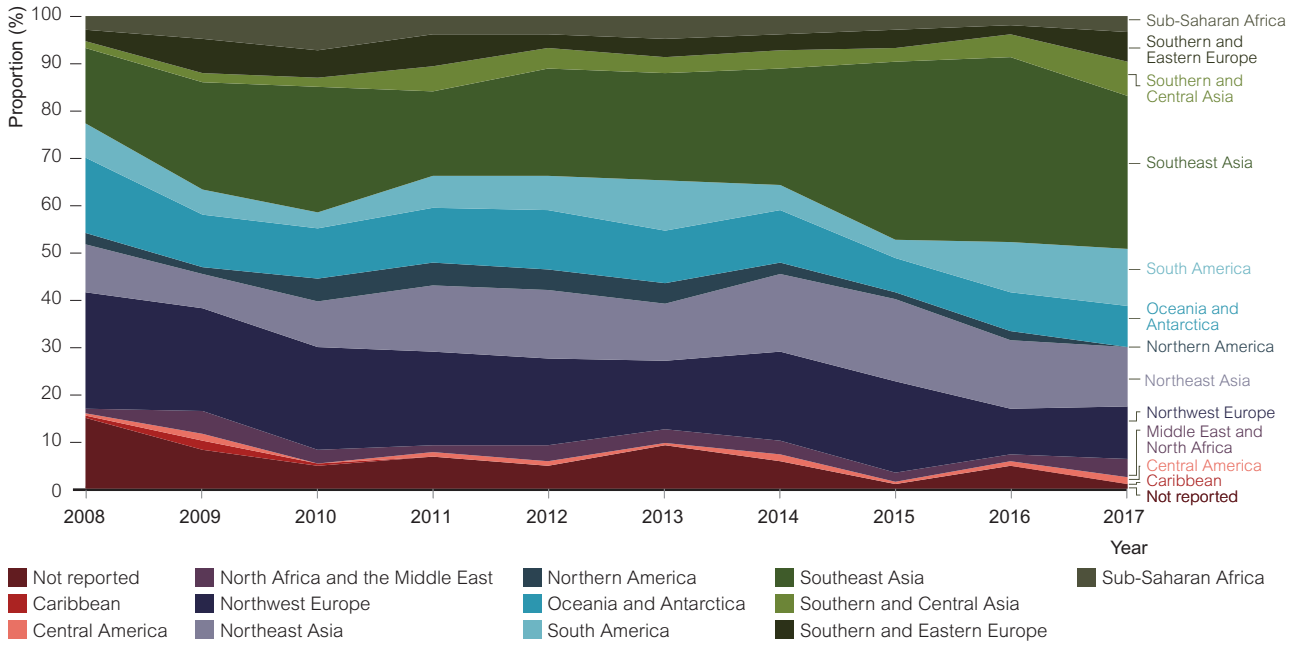


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Born in Australia	407	411	408	457	492	424	497	403	402	319
Born in Asia	50	59	69	85	104	98	118	169	180	128
Born in Other	103	112	103	128	132	134	130	119	113	116

Source: State and territory health authorities; see Methodology for detail.

HIV

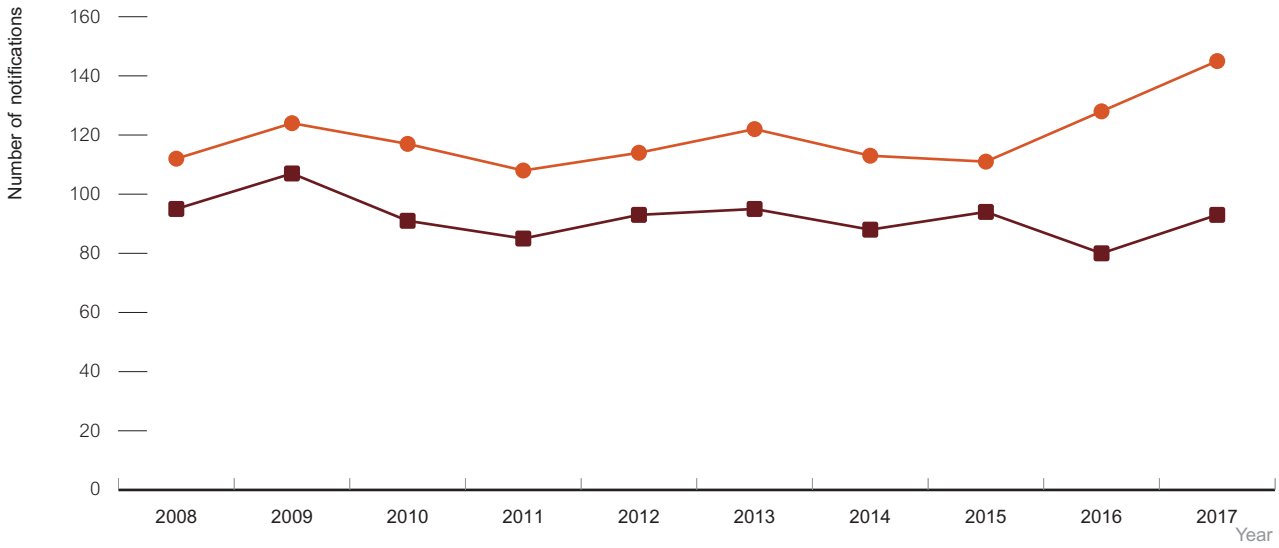
Figure 1.1.12 Proportion of HIV notifications in non-Australian-born men with male-to-male sex as risk exposure, 2008–2017, by region of birth



Source: State and territory health authorities.

Heterosexuals: Of 238 HIV notifications in 2017 for which exposure to HIV was attributed to heterosexual sex, 145 were in men and 93 in women (Figure 1.1.13).The number of notifications attributed to heterosexual sex has increased in men by 19% in the last five years, and has fluctuated in women, but remained relatively stable.

Figure 1.1.13 Number of HIV notifications reporting exposure as heterosexual sex, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	112	124	117	108	114	122	113	111	128	145
Women	95	107	91	85	93	95	88	94	80	93

Source: State and territory health authorities; see Methodology for detail.

In 2017, nine men (6%) were reported as having a sexual partner at high risk of HIV, 16 (11%) were born in a high-prevalence country, and 20 (30%) had had sex with a person from a high-prevalence country; for 90 (62%) the sexual contact risk was not further specified (Figure 1.1.14). Of men in the 'heterosexual contact risk not further specified' category, two thirds (62%) were born in Australia (data not shown).

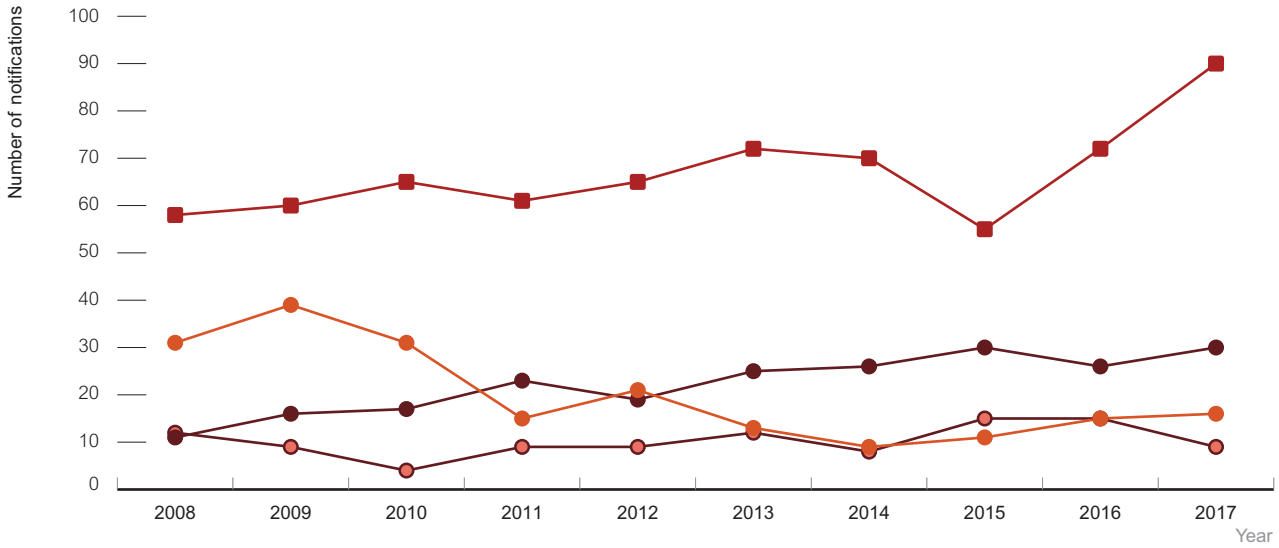
In 2017, 21 women (23%) were reported as having a sexual partner at high risk of HIV, 25 (27%) were born in a high-prevalence country, and 2% (2) had had sex with a person from a high-prevalence country; for 45 (48%) sexual contact risk was not further specified (Figure 1.1.15). Of women in the 'heterosexual contact risk not further specified' category, 44% were born in Australia (data not shown).

High-prevalence countries are countries with an adult HIV prevalence in the past 10 years of 1% or more. 'Partner at high risk of HIV' refers to a person who injects drugs, is a man who as sex with other men or has other known risk factors for HIV (see Methodology for details).

Over the 10-year period 2008–2017 the number of HIV notifications reporting heterosexual sex has remained relatively stable in most states and territories of Australia with some fluctuations (Figure 1.1.16).

In the 10-year period 2008–2017, the number of heterosexual notifications in Australian-born males has increased by 45%, from 49 in 2008 to 89 in 2017 (Figure 1.1.17), but there has been very little change in females (Figure 1.1.8). Heterosexual notifications among both males and females born in Asia have declined in the last 10 years, by 55% and 47%, respectively. Heterosexual notifications in people born in Sub-Saharan Africa and other regions of birth have remained relatively steady over the same time period.

Figure 1.1.14 Number of HIV notifications in men with exposure risk other than male-to-male sex, 2008–2017, by risk exposure category



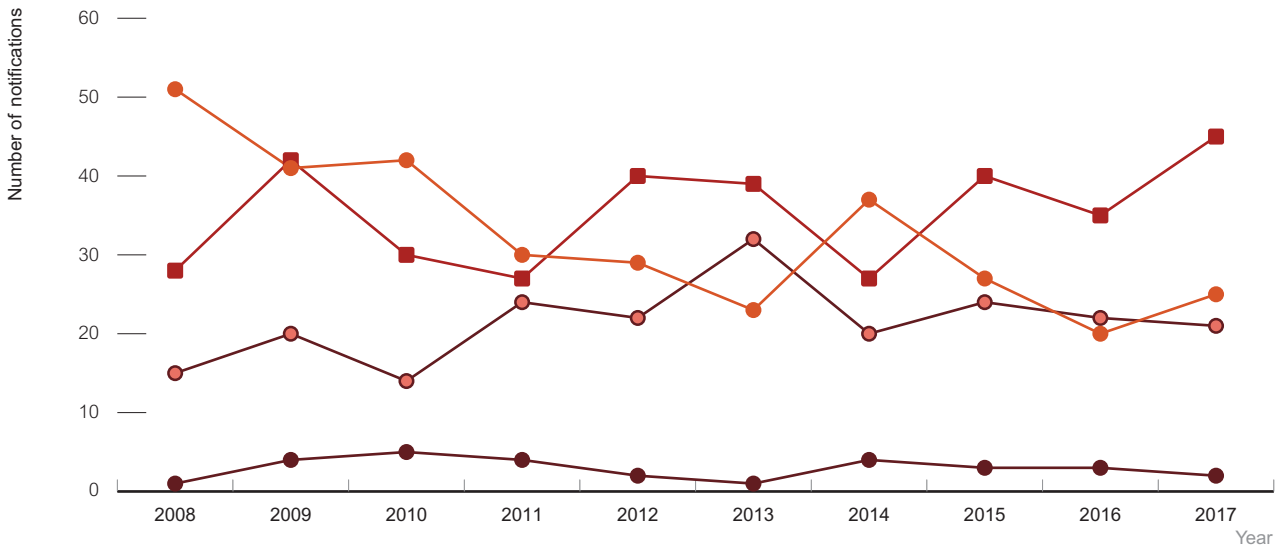
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Partner at high risk of HIV[a]	12	9	4	9	9	12	8	15	15	9
Person from a high–prevalence country	31	39	31	15	21	13	9	11	15	16
Partner from a high–prevalence country	11	16	17	23	19	25	26	30	26	30
Heterosexual contact risk not further specified	58	60	65	61	65	72	70	55	72	90

a Includes a sexual partner who injects drugs, a bisexual man, someone who received blood/tissue, or a person with haemophilia/clotting disorder (see Methodology for detail).

Source: State and territory health authorities; see Methodology for detail.

HIV

Figure 1.1.15 Number of HIV notifications in women, 2008–2017, by risk exposure category

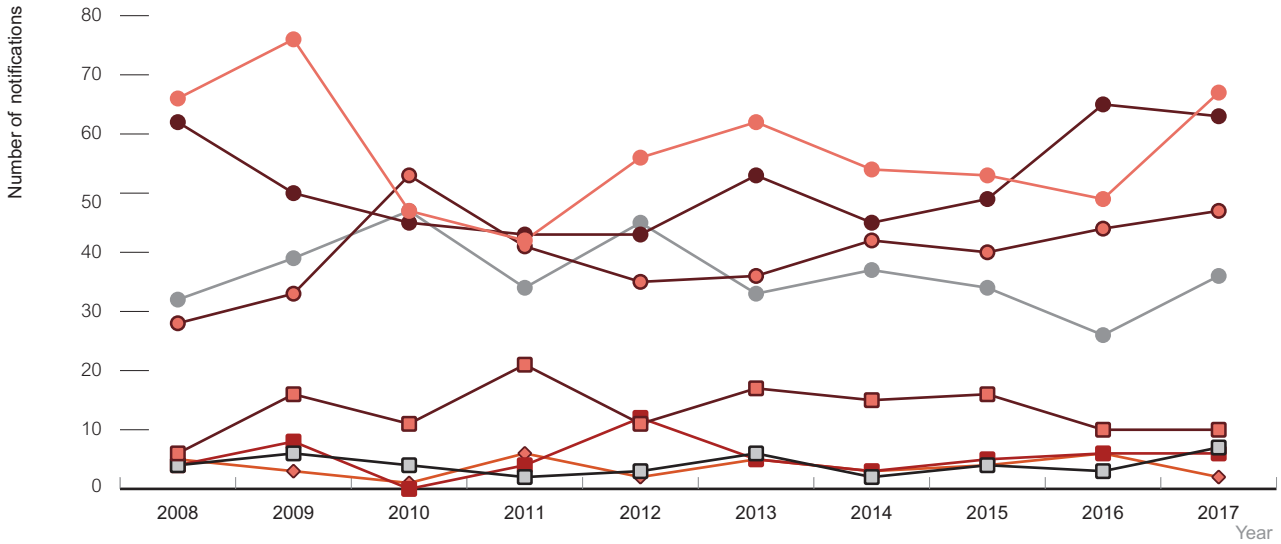


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Partner at high risk of HIV[a]	15	20	14	24	22	32	20	24	22	21
Person from a high–prevalence country	51	41	42	30	29	23	37	27	20	25
Partner from a high–prevalence country	1	4	5	4	2	1	4	3	3	2
Heterosexual contact risk not further specified	28	42	30	27	40	39	27	40	35	45

a Includes a sexual partner who injects drugs, a bisexual man, someone who received blood/tissue, or a person with haemophilia/clotting disorder.

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.16 HIV notifications in those who reported heterosexual sex as exposure risk, 2008–2017, by state/territory

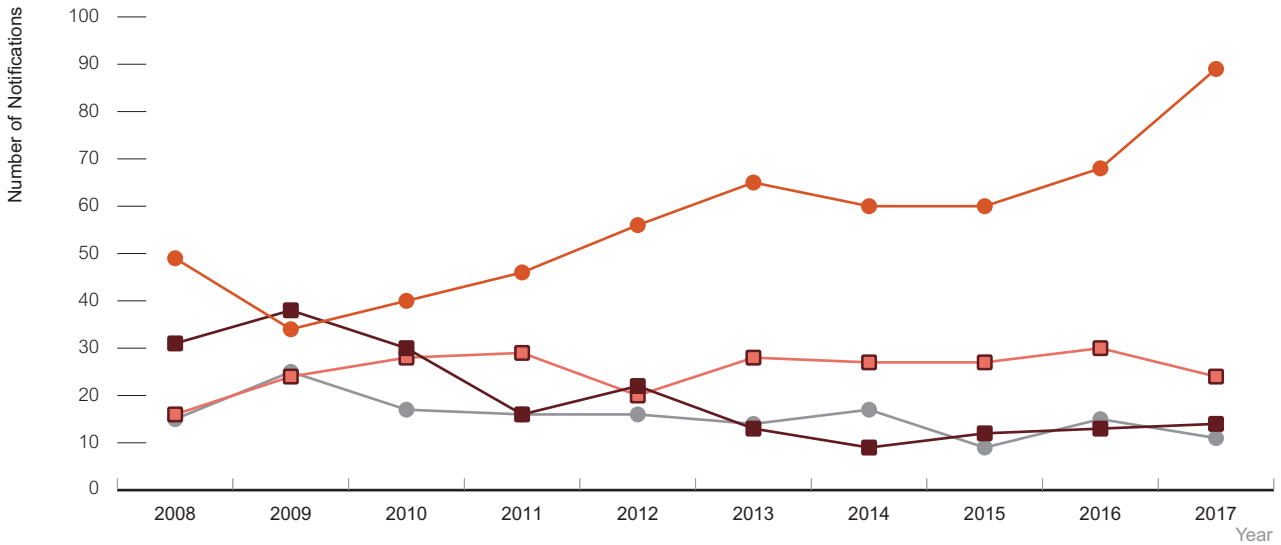


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ACT	4	6	4	2	3	6	2	4	3	7
NSW	66	76	47	42	56	62	54	53	49	67
NT	4	8	0	4	12	5	3	5	6	6
QLD	28	33	53	41	35	36	42	40	44	47
SA	6	16	11	21	11	17	15	16	10	10
TAS	5	3	1	6	2	5	3	4	6	2
VIC	62	50	45	43	43	53	45	49	65	63
WA	32	39	47	34	45	33	37	34	26	36

Source: State and territory health authorities; see Methodology for detail.

HIV

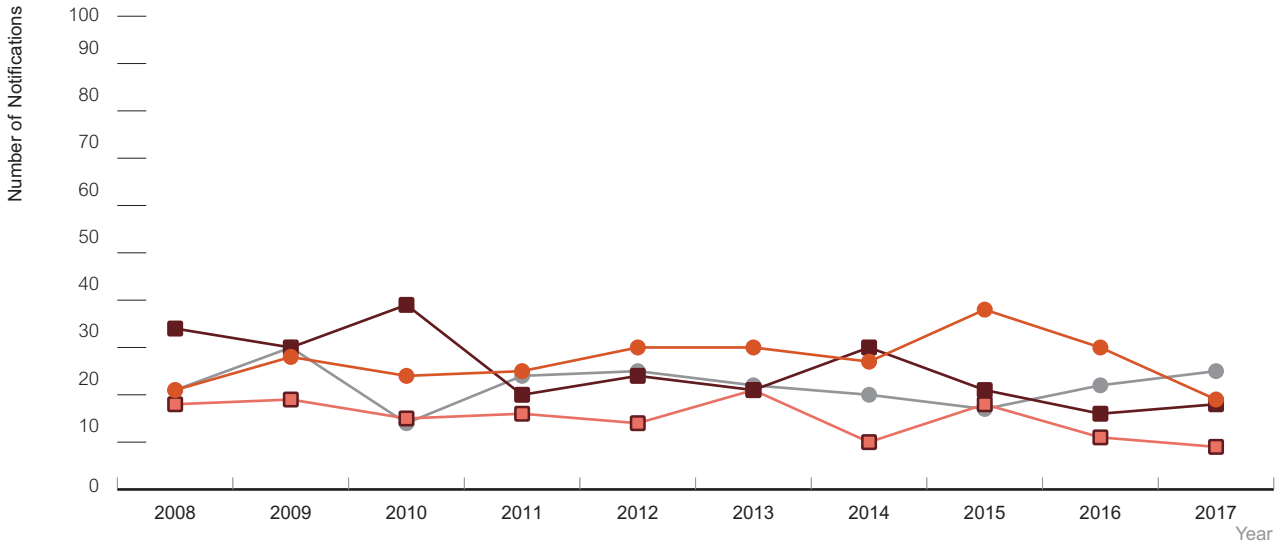
Figure 1.1.17 HIV notifications in people who report heterosexual sex as exposure risk, 2008–2017, by region/country of birth, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	49	34	40	46	56	65	60	60	68	89
Sub-Saharan Africa	15	25	17	16	16	14	17	9	15	11
Asia	31	38	30	16	22	13	9	12	13	14
Other	16	24	28	29	20	28	27	27	30	24

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.18 HIV notifications in people who report heterosexual sex as exposure risk, 2008–2017, by region/country of birth, females



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	21	28	24	25	30	30	27	38	30	19
Sub-Saharan Africa	21	30	14	24	25	22	20	17	22	25
Asia	34	30	39	20	24	21	30	21	16	18
Other	18	19	15	16	14	21	10	18	11	9

Source: State and territory health authorities; see Methodology for detail.

Aboriginal and Torres Strait Islander people: In 2017, 31 HIV notifications were in the Aboriginal and Torres Strait Islander population (3% of total 963 notifications). The majority of Aboriginal and Torres Strait Islander notifications in 2017 were in males (74%, 23) and the median age at diagnosis was 33.5 years (Table 1.1.4). For comparison of HIV notification rates among the Aboriginal and Torres Strait Islander and the non-Indigenous populations, the non-Indigenous population is restricted to those born in Australia. This is done to exclude HIV notifications in overseas-born people, in whom trends can fluctuate in response to immigration patterns, and to focus on HIV infection endemic to Australia.

Age-standardised rates of HIV notification among the Aboriginal and Torres Strait Islander population were similar to the Australian-born non-Indigenous population in 2008, after which they started diverging; in 2016 rates were 2.2 times as high among the Aboriginal and Torres Strait Islander population (6.5 per 100 000 compared with 3.0 per 100 000 in the Australian-born non-Indigenous population) (Figure 1.1.20). The rate among Aboriginal and Torres Strait Islander people decreased between 2016 and 2017 from 6.5 per 100 000 to 4.6 per 100 000. Trends in HIV notification rates in the Aboriginal and Torres Strait Islander population are based on small numbers and may reflect localised occurrences rather than national patterns (see Figure 1.1.4 for the number of notifications by jurisdiction).

In the five years 2013–2017, a greater proportion of HIV notifications in Aboriginal and Torres Strait Islander people were attributed to heterosexual sex (21%) or injecting drug use (18%) than in the Australian-born non-Indigenous population (18% and 3%, respectively) (Table 1.4.5).

Table 1.1.4 Characteristics of cases of HIV notifications in Aboriginal and Torres Strait Islander people, 2008–2017.

	Year of HIV diagnosis										
Characteristic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2008–2017[a]
Total cases[b]	19	24	22	24	33	26	33	39	46	31	297
Sex											
Male	15	20	15	18	27	22	25	35	41	23	241
Female	4	3	7	6	6	4	7	4	4	7	52
Median age in years	36	37	35	32.5	27	36	33.5	37	30	33.5	33
Newly acquired HIV[c]	6	7	5	5	10	9	8	12	15	7	84
(% of new diagnoses)	31.6	29.2	22.7	20.8	30.3	34.6	24.2	30.8	32.6	22.6	28.3
Late and advanced HIV infection status at HIV diagnosis (%)[d]											
Late HIV diagnosis, %	33.3	40.9	25.0	34.8	37.5	40.0	30.0	29.4	26.2	30.8	32.0
Advanced HIV diagnosis, %	20.0	31.8	10.0	30.4	29.2	25.0	20.0	14.7	14.3	7.7	19.5
State/Territory											
Australian Capital Territory	0	0	0	0	0	0	0	0	0	0	0
New South Wales	8	9	7	6	11	8	7	7	10	8	81
Northern Territory	1	0	1	2	2	1	1	1	5	1	15
Queensland	2	8	8	8	14	9	14	13	20	11	107
South Australia	4	2	1	1	1	2	0	2	2	5	20
Tasmania	0	1	0	1	0	2	2	2	0	1	9
Victoria	0	1	3	1	5	4	6	7	5	2	34
Western Australia	4	3	2	5	0	0	3	7	4	3	31
HIV exposure category, %											
Male-to-male sex[a]	47.4	41.7	54.6	62.5	69.7	23.1	39.4	53.9	58.7	38.7	49.8
Male-to-male sex and injecting drug use	5.3	12.5	4.6	0.0	6.1	19.2	9.1	10.3	15.2	6.5	9.4
Injecting drug use	36.8	8.3	18.2	4.2	6.1	23.1	27.3	15.4	4.4	25.8	15.8
Heterosexual sex	10.5	16.7	13.6	25.0	18.2	30.8	15.2	18.0	19.6	25.8	19.5
Mother with/at risk of HIV infection	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Other/undetermined exposure	0.0	20.8	9.1	4.2	0.0	3.9	9.1	2.6	2.2	3.2	5.1

a Not adjusted for multiple reporting.

b Includes 'Other/not reported'

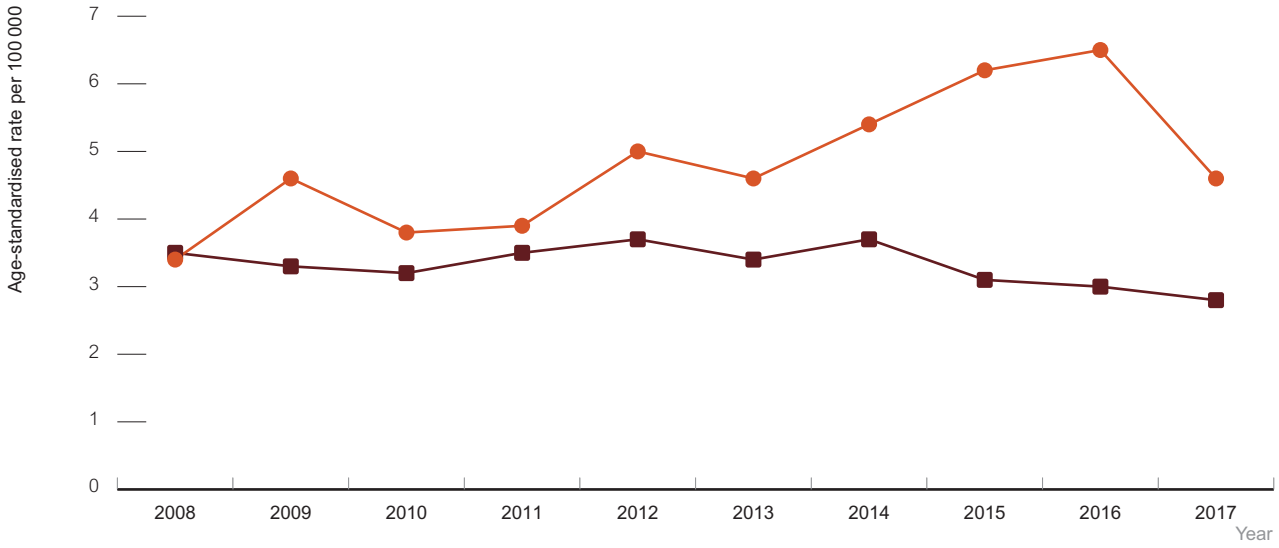
c Newly acquired HIV was defined as a new HIV diagnosis with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis.

d Late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/μL, and advanced HIV as newly diagnosed infection with a CD4+ cell count of less than 200 cells/μL. Newly acquired HIV was not categorised as a late or advanced diagnosis irrespective of CD4+ cell count.

e Includes men who had sex with both men and women.

Source: State and territory health authorities.

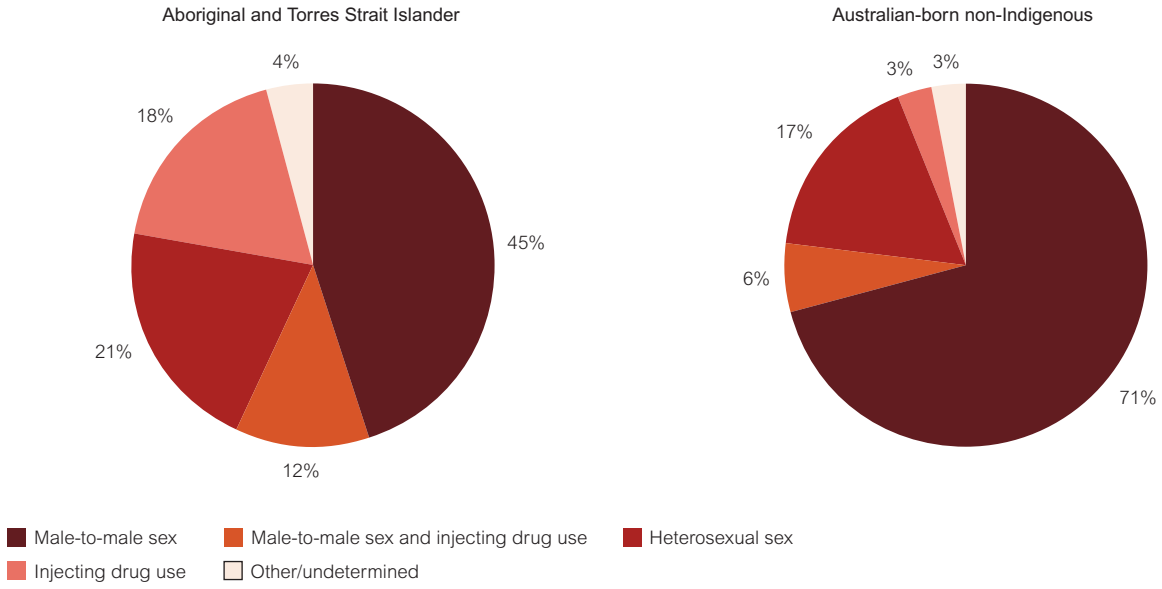
Figure 1.1.19 HIV notification rate per 100 000 Australian-born population, 2008–2017, by Aboriginal and Torres Strait Islander status



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Aboriginal and Torres Strait Islander	3.4	4.6	3.8	3.9	5.0	4.6	5.4	6.2	6.5	4.6
Australian-born non-Indigenous	3.5	3.3	3.2	3.5	3.7	3.4	3.7	3.1	3.0	2.8

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.20 HIV notification exposure category, 2013–2017, by Aboriginal and Torres Strait Islander status

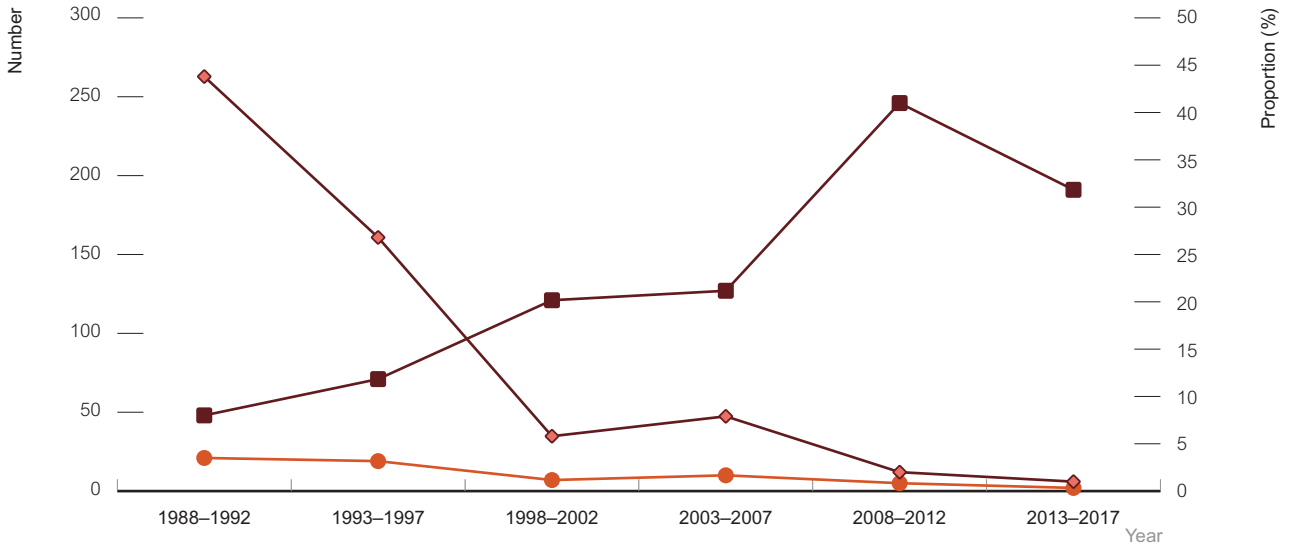


Note: **Percentages may not add to 100% due to rounding**

Source: State and territory health authorities; see Methodology for detail.

Pregnant women: Over the last 30 years a total of 804 cases of perinatal HIV exposure among children born in Australia have been reported. Among 246 children born to HIV-positive mothers in the period 2013–2017, the HIV transmission rate from mothers was 1%, compared with 44% in the period 1988–1992 and 27% in 1993–1997 (Figure 1.1.21). In the past 10 years, the transmission rate was highest in 2015 (4.1%) but has been 0.0% in six of the last 10 years, including 2017 (Figure 1.1.22).

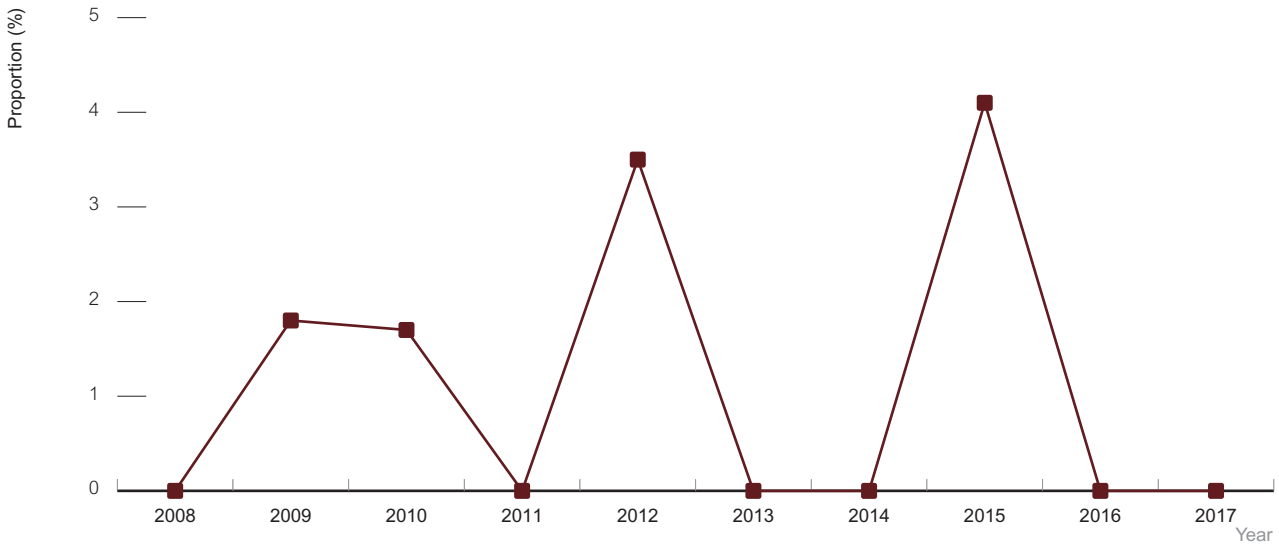
Figure 1.1.21 Number of Australian-born children perinatally exposed to HIV and proportion HIV-positive, 1985–2017, by year of birth



	1988–1992	1993–1997	1998–2002	2003–2007	2008–2012	2013–2017
Perinatally exposed	48	71	121	127	246	191
HIV-positive (n)	21	19	7	10	5	2
HIV-positive (%)	43.8	26.8	5.8	7.9	2.0	1.0

Source: Australian Paediatric Surveillance Unit; see Methodology for detail.

Figure 1.1.22 Proportion of Australian-born perinatally exposed infants who were HIV-positive, 2008–2017, by year of birth



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
HIV-positive (%)	0.0	1.8	1.7	0.0	3.5	0.0	0.0	4.1	0.0	0.0

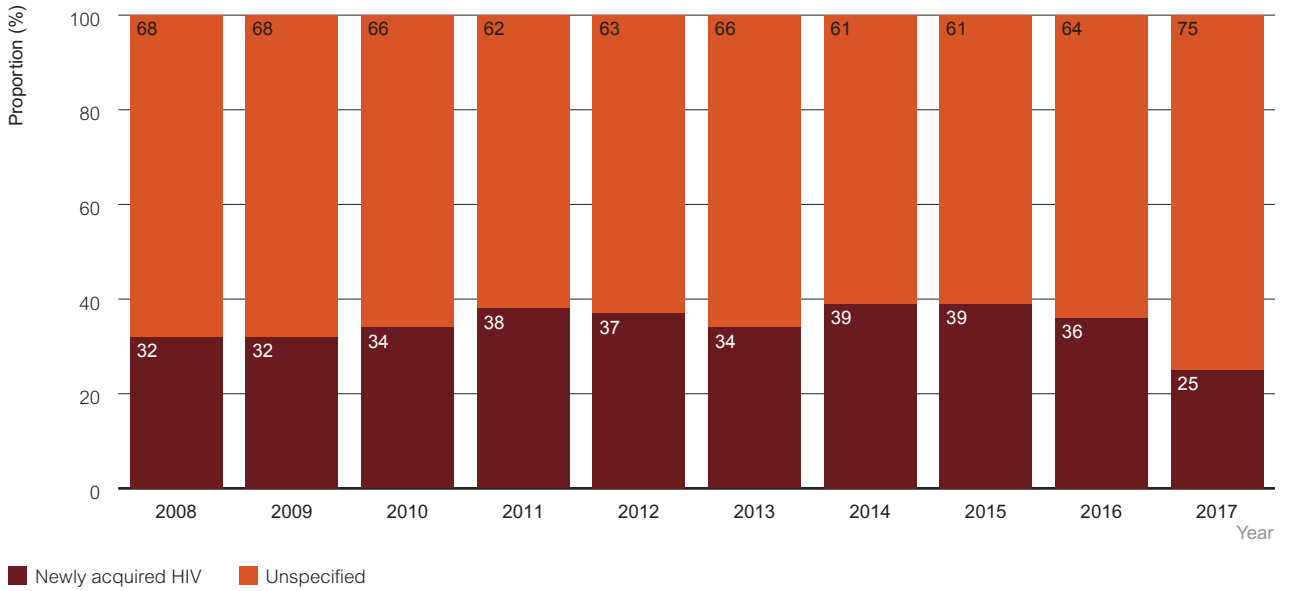
Source: Australian Paediatric Surveillance Unit; see Methodology for detail.

HIV notifications classified as newly acquired

For some newly diagnosed HIV notifications, it is possible to determine whether they were acquired in the 12 months prior to diagnosis, on the basis of a recent prior negative or indeterminate HIV test and clinical markers (see Methodology for further details). The proportion of all new notifications that were reported to be newly acquired increased from 32% in 2008 to 38% in 2011. This proportion was relatively stable until 2017, when only 25% of notifications were reported as newly acquired (Table 1.1.2, Figure 1.1.23). Trends in the proportion of HIV notifications classified as newly acquired need to be interpreted cautiously as rises could reflect increases in regular testing (allowing determination of recent infection) rather than an actual increase in the number of newly acquired infections. When considering these data, it is important to also note that changes to testing practices across a number of jurisdictions in 2016 and 2017 mean that fewer indeterminate results are recorded. These changes will therefore reduce the number of results which were previously used to provide evidence for newly acquired HIV infections.

The rates of newly acquired HIV notifications in 2017 varied by jurisdiction, with the highest in New South Wales (1.4 per 100 000), Queensland (1.1 per 100 000) and Victoria (0.9 per 100 000) (Figure 1.1.24). In the Australian Capital Territory, Tasmania and the Northern Territory the numbers of notifications each year are smaller, so trends need to be interpreted with caution (Figure 1.1.24).

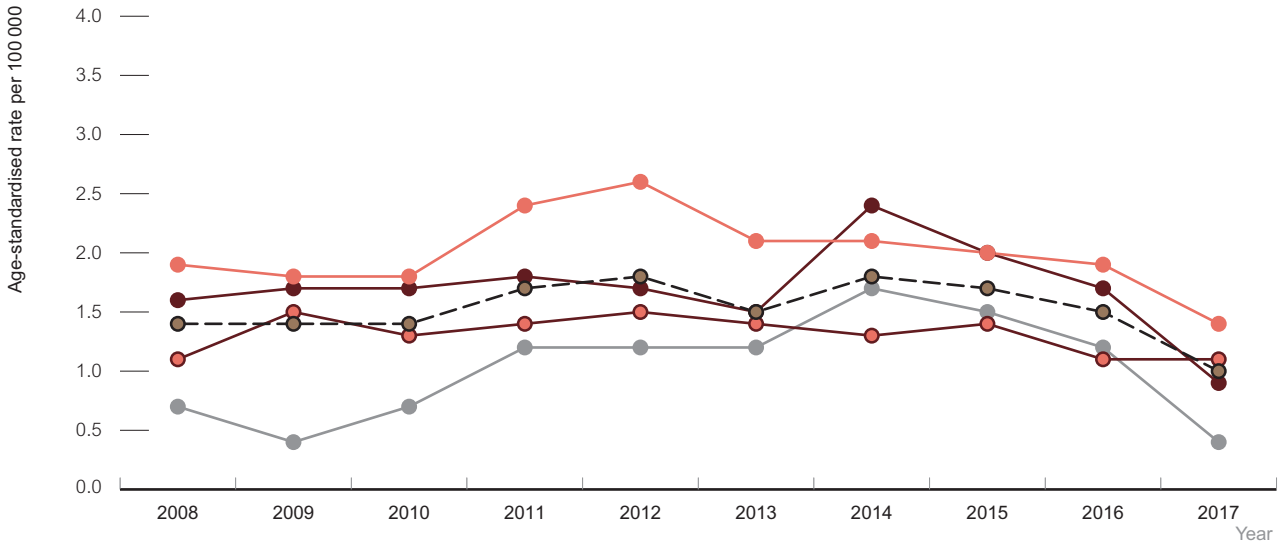
Figure 1.1.23 HIV notifications in Australia, 2008–2017, by newly acquired HIV status and year



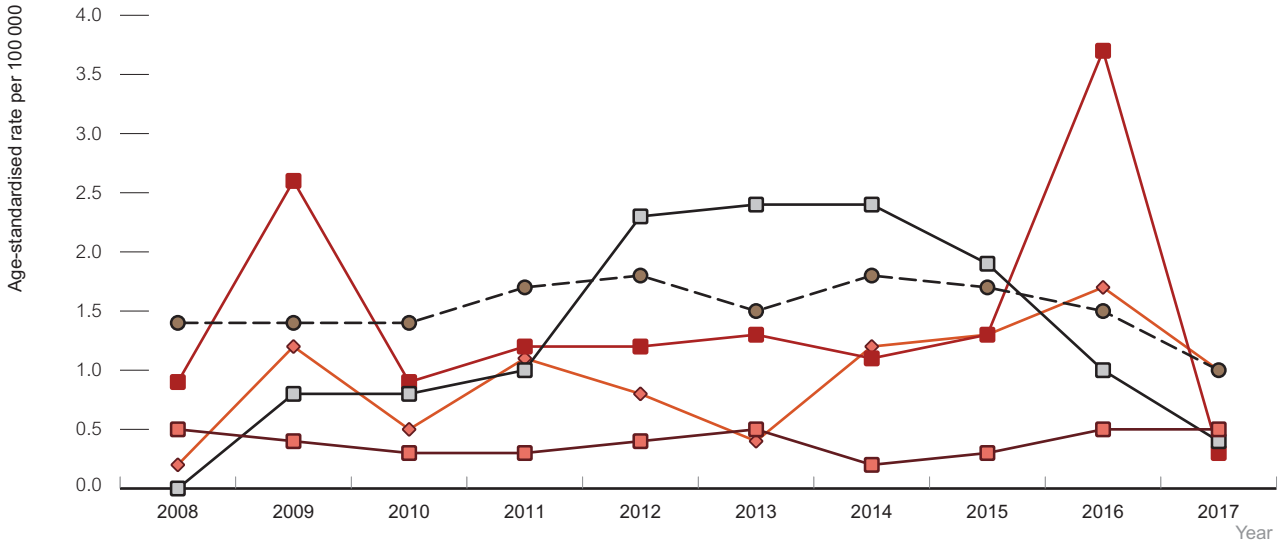
Note: Newly acquired HIV was defined as newly diagnosed infection with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis. Unspecified notifications are all notifications that do not meet the definition for newly acquired HIV.

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.24 HIV notification rates per 100 000 population, by state/territory, 2008–2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NSW	1.9	1.8	1.8	2.4	2.6	2.1	2.1	2.0	1.9	1.4
QLD	1.1	1.5	1.3	1.4	1.5	1.4	1.3	1.4	1.1	1.1
VIC	1.6	1.7	1.7	1.8	1.7	1.5	2.4	2.0	1.7	0.9
WA	0.7	0.4	0.7	1.2	1.2	1.2	1.7	1.5	1.2	0.4
Australia	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7	1.5	1.0

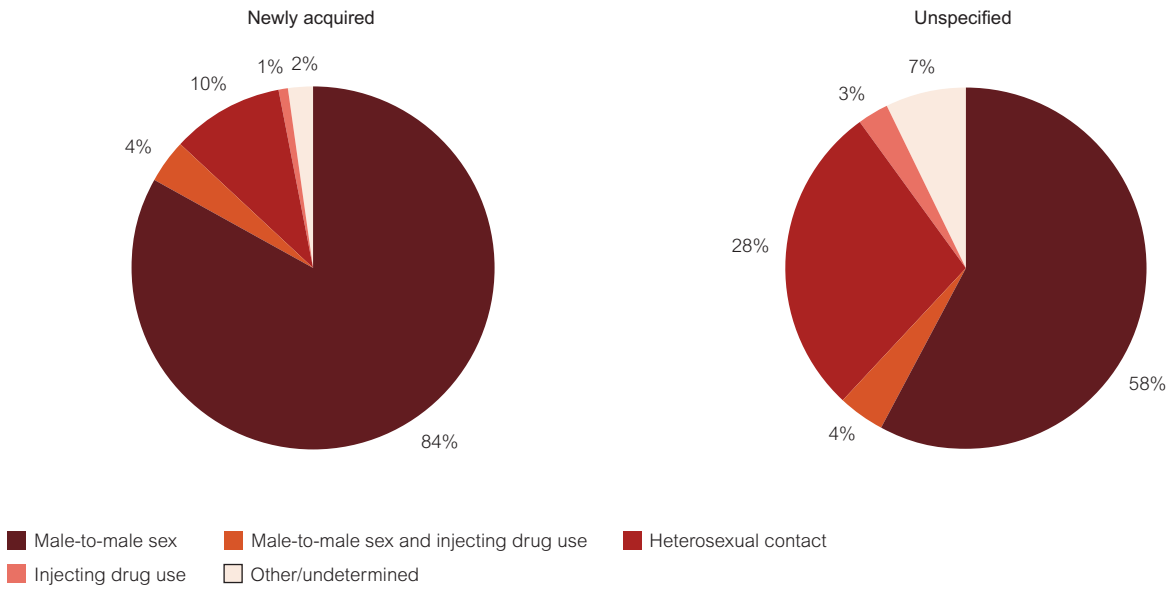


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ACT	0.0	0.8	0.8	1.0	2.3	2.4	2.4	1.9	1.0	0.4
NT	0.9	2.6	0.9	1.2	1.2	1.3	1.1	1.3	3.7	0.3
SA	0.5	0.4	0.3	0.3	0.4	0.5	0.2	0.3	0.5	0.5
TAS	0.2	1.2	0.5	1.1	0.8	0.4	1.2	1.3	1.7	1.0
Australia	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7	1.5	1.0

Source: State and territory health authorities; see Methodology for detail.

Over the past 10 years (2008–2017) men with male-to-male sex as their HIV risk exposure accounted for 84% of newly acquired HIV diagnoses, compared with 58% of unspecified HIV diagnoses (not classified as newly acquired) (Figure 1.1.25); this probably reflects more frequent testing among gay and bisexual men. Over the past 10 years, the number of newly acquired HIV notifications in men reporting male-to-male sex peaked at 365 in 2014 and then decreased by 49% to 187 in 2017, representing an overall decrease of 21% between 2008 and 2017, and a 36% decrease in the past five years (Figure 1.1.26).

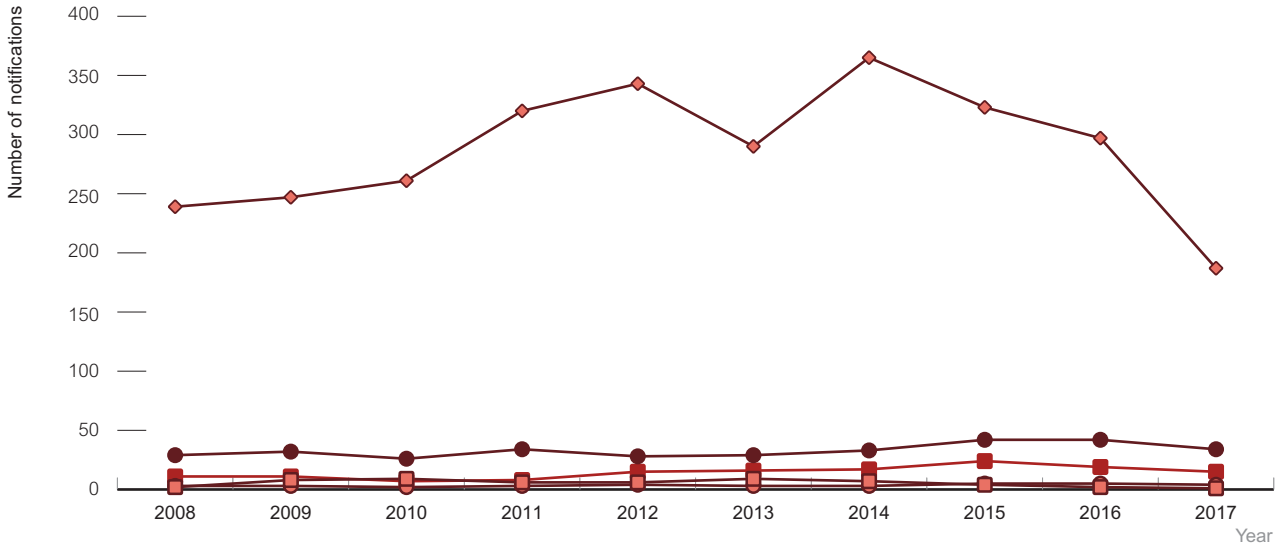
Figure 1.1.25 HIV notifications classified as newly acquired or unspecified, 2008–2017, by HIV exposure category



Note: Newly acquired HIV was defined as newly diagnosed infection with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis. Unspecified notifications are all notifications that do not meet the definition for newly acquired HIV.

Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.26 Number of HIV notifications classified as newly acquired, 2008–2017, by exposure risk category



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Male-to-male sex	239	247	261	320	343	290	365	323	297	187
Male-to-male sex and injecting drug use	11	11	7	8	15	16	17	24	19	15
Injecting drug use	3	3	2	3	4	3	3	5	5	4
Heterosexual sex	29	32	26	34	28	29	33	42	42	34
Other/undetermined	2	8	9	6	6	9	7	4	2	1

Source: State and territory health authorities; see Methodology for detail.

HIV

Clinical and immunological markers of timing of HIV diagnosis

Monitoring the likely place of HIV acquisition and HIV subtype can provide information to assist understanding of the potential influence of travel and migration on HIV diagnosis trends. The known trajectory of CD4+ cell count per microlitre and time of arrival among those born overseas can also be used to estimate the proportion of infections acquired before arriving in Australia.

Likely place of HIV acquisition

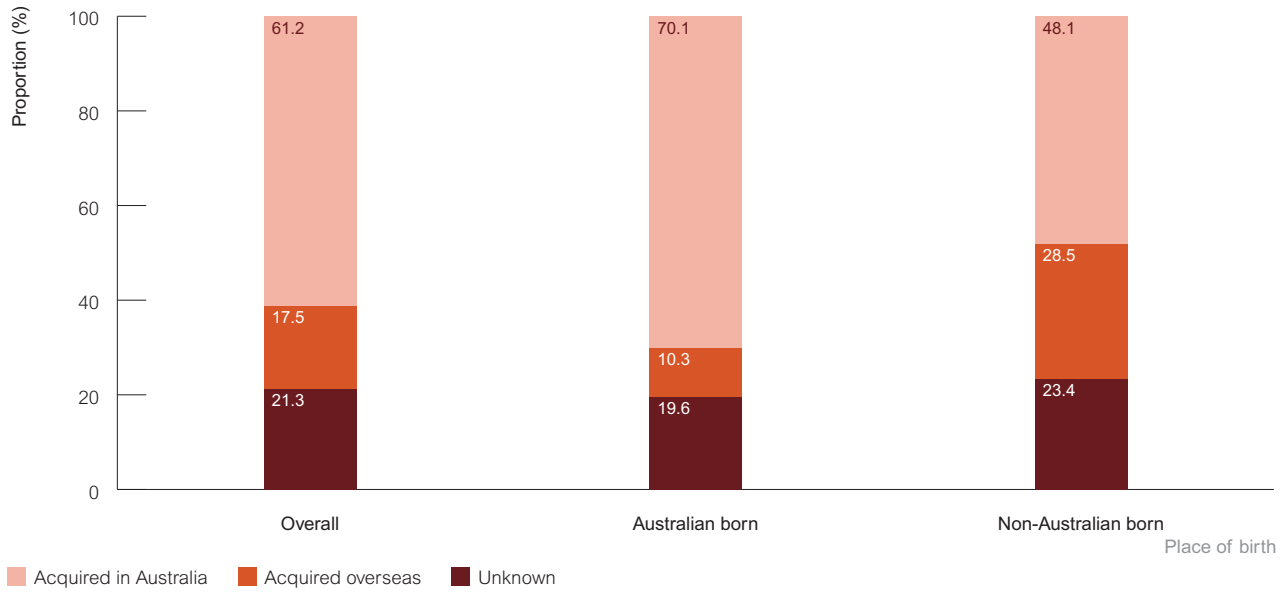
Between 2014 and 2017, notifications of HIV included the likely place of HIV acquisition reported by the clinician, i.e. acquired in Australia, acquired overseas or place of acquisition unknown (see Methodology for further details).

Of HIV notifications with male-to-male sex as their HIV exposure risk, 70% of Australian-born men were likely to have acquired HIV in Australia, compared with just under half (48%) of men born outside Australia. Among Australian-born men a further 20% of newly diagnosed men were likely to have acquired HIV overseas, compared with 23% of men born overseas (Figure 1.1.27).

Of HIV notifications among Australian-born people with heterosexual sex as HIV exposure risk, 40% were likely to have been acquired in Australia compared with 17% in people born outside Australia. Similarly, 41% of newly diagnosed infections were likely to have been acquired overseas among Australian-born people compared with 58% in people born overseas (Figure 1.1.28).

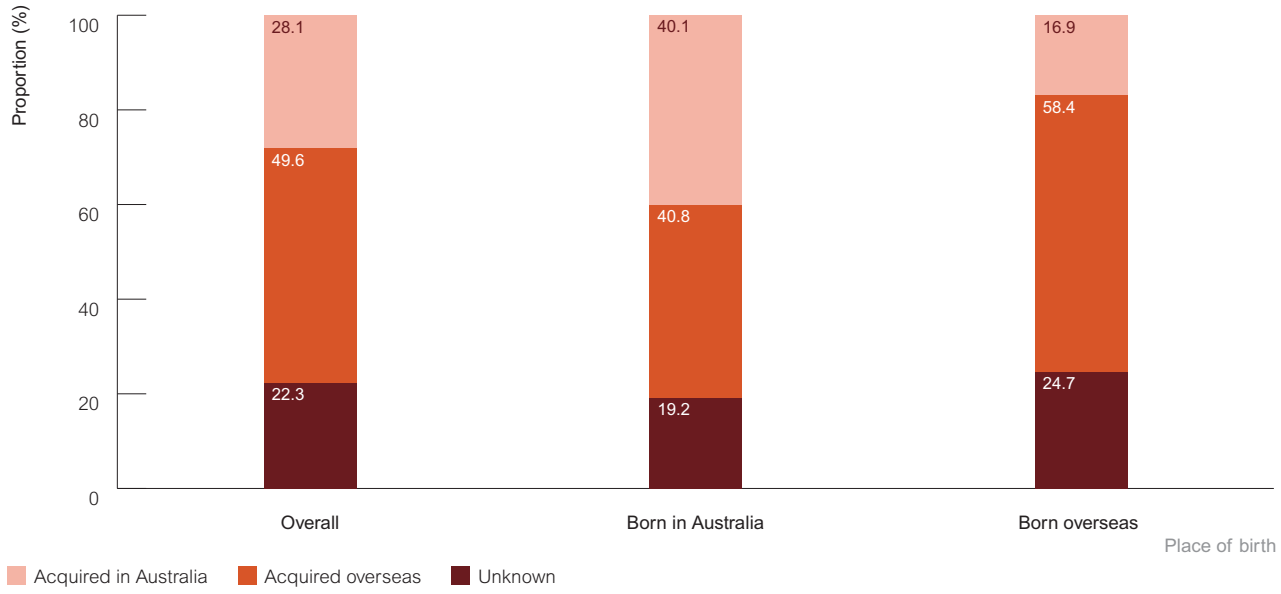
The above figures may not represent the true proportions, as the likely place of acquisition was reported as unknown for between 17% and 28% of new notifications, depending on country of birth and HIV risk exposure.

Figure 1.1.27 Likely place of HIV acquisition in HIV notifications in men who reported male-to-male sex as an exposure risk, 2014–2017, by country of birth



Source: State and territory health authorities; see Methodology for detail.

Figure 1.1.28 Likely place of HIV acquisition in HIV notifications in people who reported heterosexual sex as exposure risk, 2014–2017, by country of birth



Source: State and territory health authorities; see Methodology for detail.

HIV

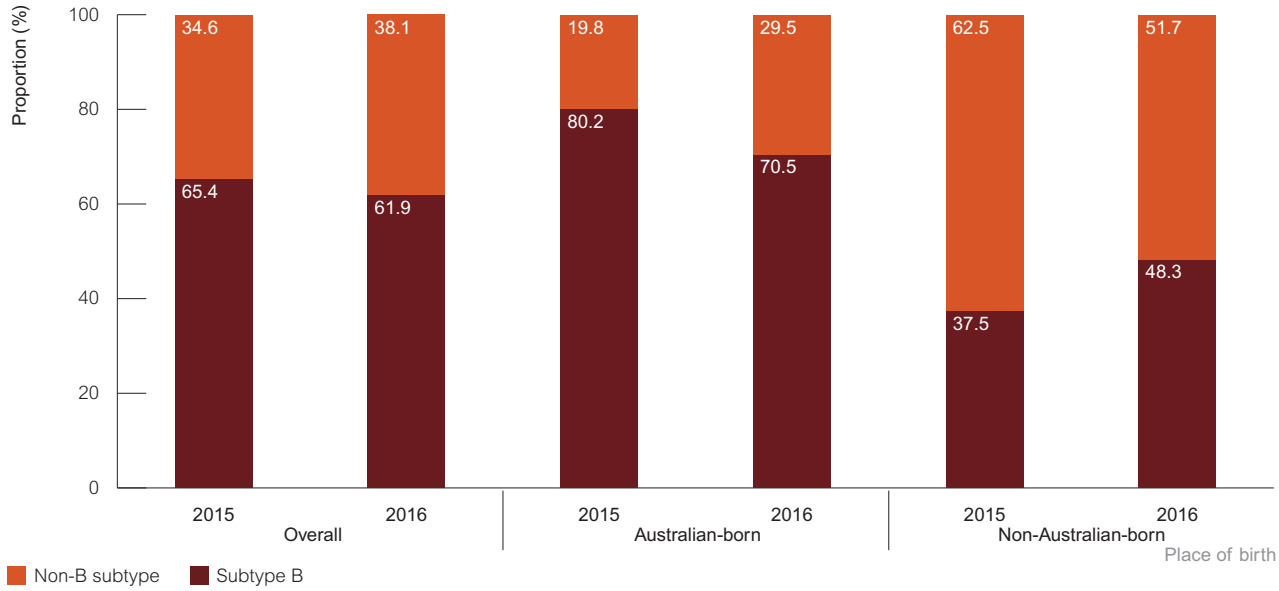
HIV subtype

HIV subtype has been included in this report for the second time, as changes in the distribution of subtypes at a population level can inform prevention programs. There are at least nine subtypes of HIV-1 virus globally, A, B, C, D, F, G, H, J and K. Additionally, different subtypes can combine, creating what is known as a 'circulating recombinant form'. The dominant HIV subtype in the Americas, Western Europe and Australasia is subtype B.[8, 9] Subtype C is more common in India and high-prevalence countries of Sub-Saharan Africa.

HIV subtype testing is performed for all HIV notifications in Australia. In this report we have included HIV subtype based on HIV notifications that were tested for subtype in New South Wales and South Australia in 2015 and 2016. These data may not be representative of all new infections Australia-wide, as typing is not undertaken on all notifications and therefore these figures should be interpreted with caution. Future reports will aim to include data from all jurisdictions (see Methodology for further details).

Similar patterns in subtype by exposure risk were demonstrated for 2015 and 2016. For 2016, in Australian-born men with male-to-male sex as HIV exposure risk, the majority (70.5%) of HIV notifications were subtype B, compared with just under half (48.3%) of notifications in non-Australian-born men (Figure 1.1.29). In contrast, among people with heterosexual sex as their exposure risk in 2016, non-B subtypes were more prevalent, being reported for nearly two-thirds (60%) of notifications in Australian-born people and 75% of people born outside Australia (Figure 1.1.30).

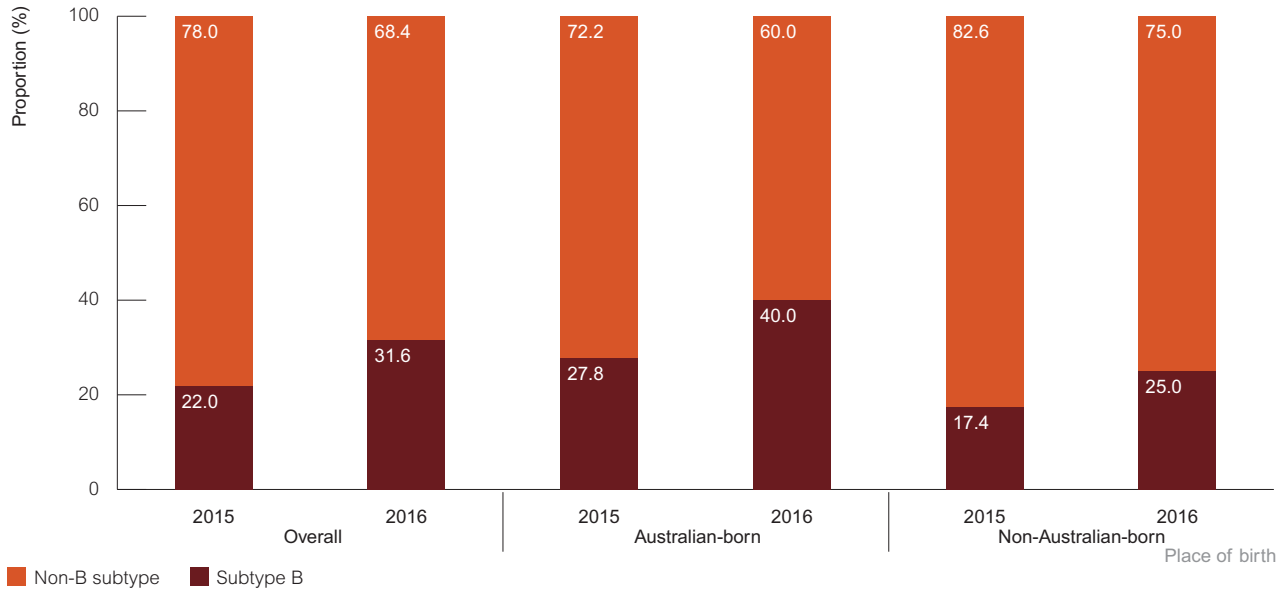
Figure 1.1.29 HIV subtype distribution in HIV notifications in men who reported male-to-male sex as their exposure risk, 2015 and 2016, by country of birth



Note: New South Wales and South Australia. Excludes notifications where HIV subtype testing was not performed.

Source: State/territory health authorities, NSW NHMRC Partnership Project; see Methodology for detail.

Figure 1.1.30 HIV subtype distribution in HIV notifications in those who reported heterosexual sex as their exposure risk, 2015 and 2016, by country of birth



Note: New South Wales and South Australia. Excludes notifications where HIV subtype testing was not performed.

Source: State/territory health authorities, NSW NHMRC Partnership Project; see Methodology for detail.

Late and advanced HIV diagnoses

CD4+ cell count at HIV diagnosis can indicate how long a person has had HIV before being diagnosed. CD4+ cell count is above 500 cells/μL in most people without HIV, and declines on average by 50 to 100 cells/μL per year in people with HIV.[10] Late HIV diagnosis is defined as CD4+ cell count less than 350 cells/μL at diagnosis (see Methodology for further details).

While the proportion of newly diagnosed HIV cases with a late diagnosis has remained relatively stable over the past 10 years, the proportion was at its highest in 2017 (36%), (Table 1.1.2). As the number of newly acquired infections decline (see Figure 1.1.12 for further detail), late diagnoses will make up a greater proportion of diagnoses. In 2017, among people reporting heterosexual sex as their exposure risk 48% were diagnosed late, compared with 31% in those reporting male-to-male sex.

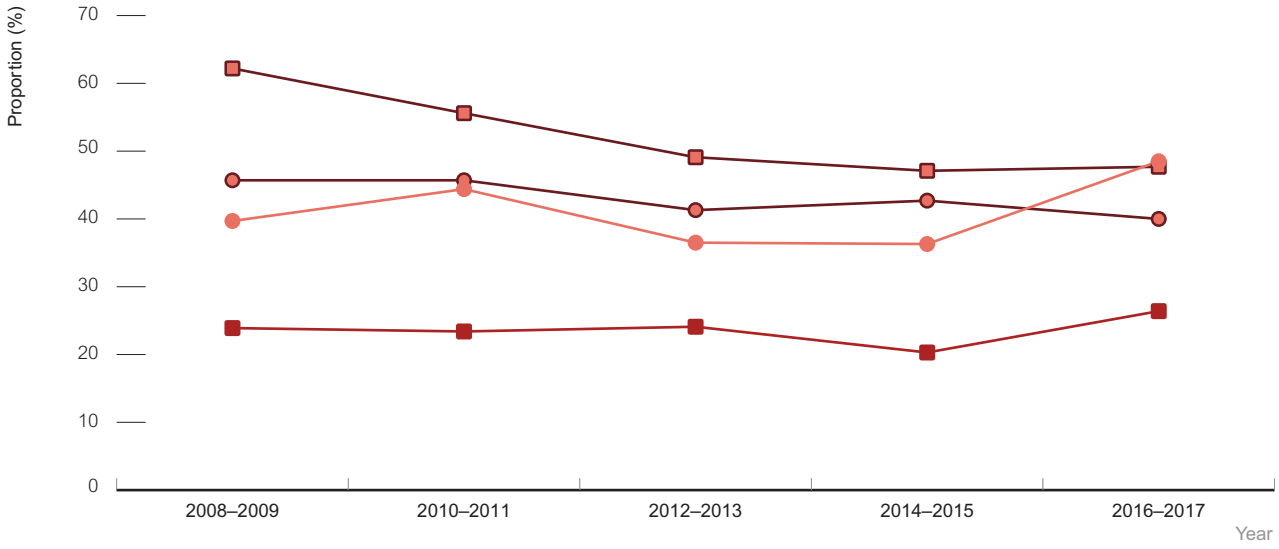
Over the past five years (2013–2017) the proportion of HIV notifications with late diagnosis was highest in people born in Sub-Saharan Africa (53%), Southeast Asia (48%) and Central America (43%) (data not shown).

Late HIV diagnoses by key characteristics and exposure category

Over the past 10 years (2008–2017), there has been a steady reduction in the proportion of late diagnoses among people born in countries with high HIV prevalence (1% or higher) (62% to 48%). Late diagnoses in men reporting sex with both men and women have fluctuated in the last 10-years, but remain high, at 49% in 2017. The proportion has been relatively stable among people with a partner from a high-prevalence country (46% to 40%) as well as people reporting only male-to-male sex, or male-to-male sex and injecting drug use (24% to 20%) (Figure 1.1.31).

Among HIV notifications attributed to male-to-male sex in the last five years (2013–2017), late diagnosis was more common among men reporting sex with both men and women (42%), men reporting injecting drug use as well as sex with both men and women (41%), older men (over 50 years) (38%), men born in East Asia (37%), and men living in regional areas (30%), (Table 1.1.5, Figure 1.1.31). In this period, over half (52%) of all late diagnoses were among men reporting male-to-male sex as their exposure risk and 80% of all late diagnoses were among people residing in urban areas (data not shown).

Figure 1.1.31 Proportion of late HIV diagnoses, 2008–2017, by selected exposure category



	2008–2009	2010–2011	2012–2013	2014–2015	2016–2017
Male-to-male sex and male-to-male sex and injecting drug use	23.9	23.4	24.1	20.3	26.4
Men reporting sex with both men and women	39.7	44.4	36.5	36.3	48.5
From a high prevalence-country	62.2	55.6	49.1	47.1	47.7
Partner from a high prevalence-country	45.7	45.7	41.3	42.7	40.0

Note: Late HIV diagnosis was defined as new HIV diagnoses with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

Source: State and territory health authorities

Table 1.1.5 Late HIV diagnoses[a] in men reporting an exposure category that included male-to-male sex, 2013–2017, by key characteristics

Category		Number diagnosed[b]	Number with late diagnosis (%)
Exposure	Total	3179	807 (25.4%)
Male-to-male-sex	Male-to-male-sex	2667	623 (23.4%)
	Male-to-male-sex and injecting drug use	161	35 (21.7%)
	Men reporting sex with both men and women	297	127 (42.3%)
	Men reporting sex with both men and women and injecting drug use	54	22 (40.7%)
Region of birth	Australia	1926	435 (22.6%)
	East Asia[c]	554	207 (37.4%)
	Sub-Saharan Africa	36	8 (22.2%)
	Other/not reported	663	157 (23.7%)
Aboriginal and Torres Strait Islander status[d]	Australian-born non-Indigenous	1812	415 (22.9%)
	Aboriginal and Torres Strait Islander	89	18 (20.2%)
Age group (years)	<30	1055	196 (18.6%)
	30–39	979	234 (23.9%)
	40–49	630	181 (28.7%)
	50+	515	196 (38.1%)
Place of residence[e]	Urban	2719	670 (24.6%)
	Regional	365	110 (30.1%)
	Remote	17	5 (29.4%)
State	Australian Capital Territory	55	17 (30.9%)
	New South Wales	1269	315 (24.8%)
	Northern Territory	28	9 (32.1%)
	Queensland	668	163 (24.4%)
	South Australia	130	62 (47.7%)
	Tasmania	45	13 (28.9%)
	Victoria	730	175 (24%)
	Western Australia	254	53 (20.9%)

a Late HIV diagnosis was defined as new HIV diagnoses with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

b Denominator only includes those for whom a CD4+ cell count was available.

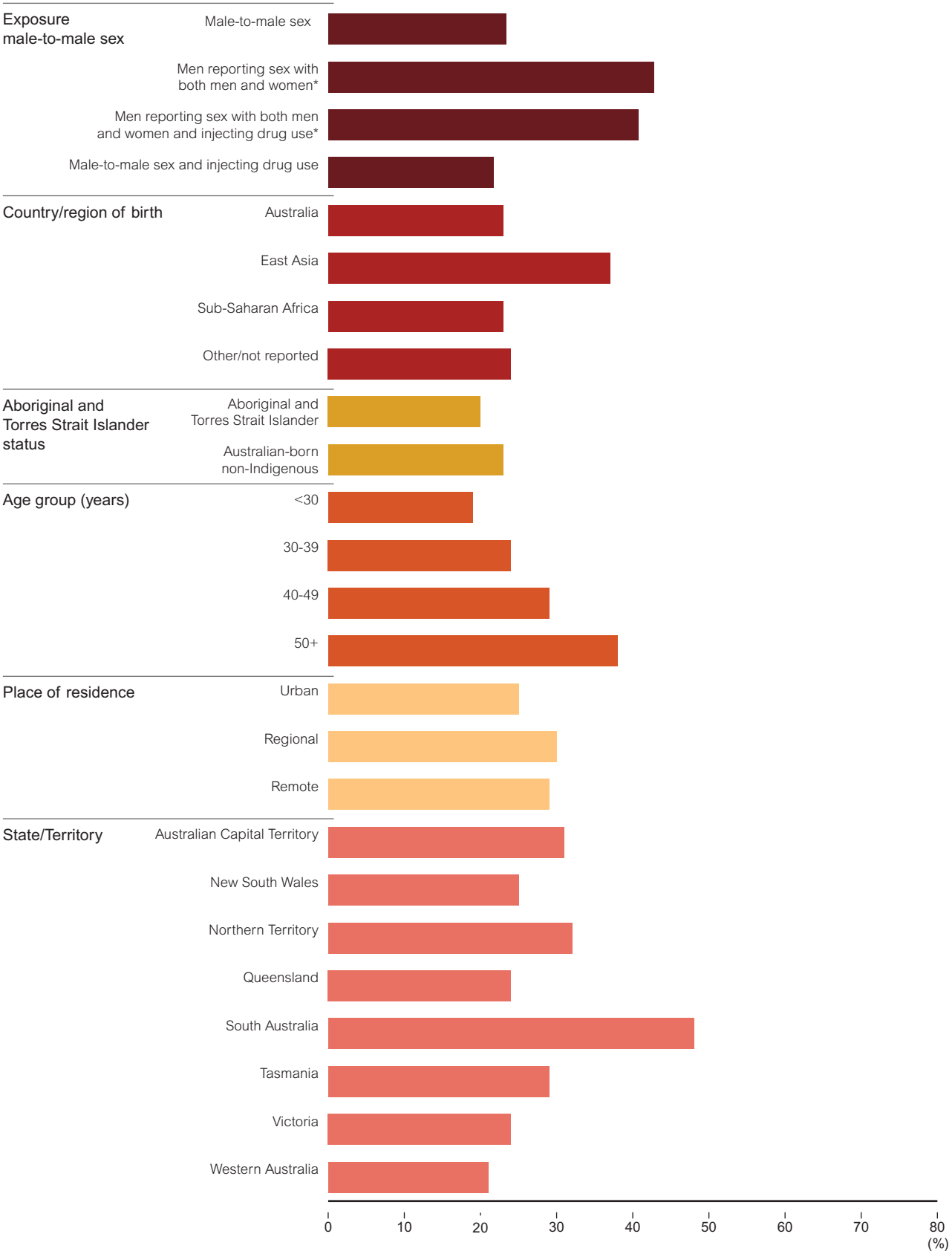
c Includes ABS regions Southeast Asia and Northeast Asia.

d Does not add to total Australian population, as only includes Australian-born non-Indigenous.

e Excludes notifications with no postcode provided.

Source: State and territory health authorities.

Figure 1.1.32 Proportion of late HIV diagnoses in men reporting an exposure category that included male-to-male sex, 2013–2017, by subcategory (n = 3179)



Note: Late HIV diagnosis was defined as an HIV notification with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

Source: State and territory health authorities.

A high proportion of late diagnoses were reported in people with heterosexual sex as an exposure risk (48% overall, 49% in men and 45% in women), with variation by key demographic characteristics and HIV risk exposure (Table 1.1.6, Figure 1.1.33 and Figure 1.1.34).

Table 1.1.6 Late HIV diagnoses[a] in people reporting heterosexual sex as their exposure category, 2013–2017, by key characteristics

		Heterosexual sex – men		Heterosexual sex – women	
Category		Number diagnosed[b]	Number with late diagnosis (%)	Number diagnosed[b]	Number with late diagnosis (%)
Exposure heterosexual sex	Total	522	257 (49.2%)	375	170 (45.3%)
	From high-prevalence country	50	25 (50%	113	62 (54.9%)
	Partner from high-prevalence country	130	57 (43.9%)	11	3 (27.3%)
	Partner at high HIV risk	52	21 (40.4%)	100	33 (33%)
	Heterosexual sex not further specified	250	154 (43.1%)	151	72 (47.4%)
Country birth	Australia	297	140 (47.1%)	132	43 (32.6%)
	Sub-Saharan Africa	48	23 (47.9%)	87	44 (50.6%)
	East Asia[c]	36	24 (66.7%)	86	52 (60.5%)
	Other/not reported	141	70 (49.6%)	70	31 (44.3%)
Aboriginal and Torres Strait Islander status	Aboriginal and Torres Strait Islander	22	10 (45.5%)	14	5 (35.7%)
	Australian-born non-Indigenous	275	130 (47.3%)	118	38 (32.2%)
Age group in years	<30	71	20 (28.2%)	112	32 (28.6%)
	30–39	125	54 (43.2%)	128	67 (52.3%)
	40–49	134	69 (51.5%)	75	32 (42.7%)
	50+	192	114 (59.4%)	61	40 (65.6%)
Place of residence	Urban	382	196 (51.3%)	270	127 (47%)
	Regional	115	55 (47.8%)	89	39 (43.8%)
	Remote	11	3 (27.3%)	7	0 (0%)
State	Australian Capital Territory	7	3 (42.9%)	13	8 (61.5%)
	New South Wales	164	82 (50%)	112	55 (49.1%)
	Northern Territory	11	4 (36.4%)	13	9 (69.2%)
	Queensland	113	46 (40.7%	80	33 (41.3%)
	South Australia	33	18 (54.6%)	31	13 (41.9%)
	Tasmania	13	6 (46.2%)	7	4 (57.1%)
	Victoria	82	46 (56.1%)	63	24 (38.1%)
	Western Australia	99	52 (52.5%)	56	24 (42.9%)

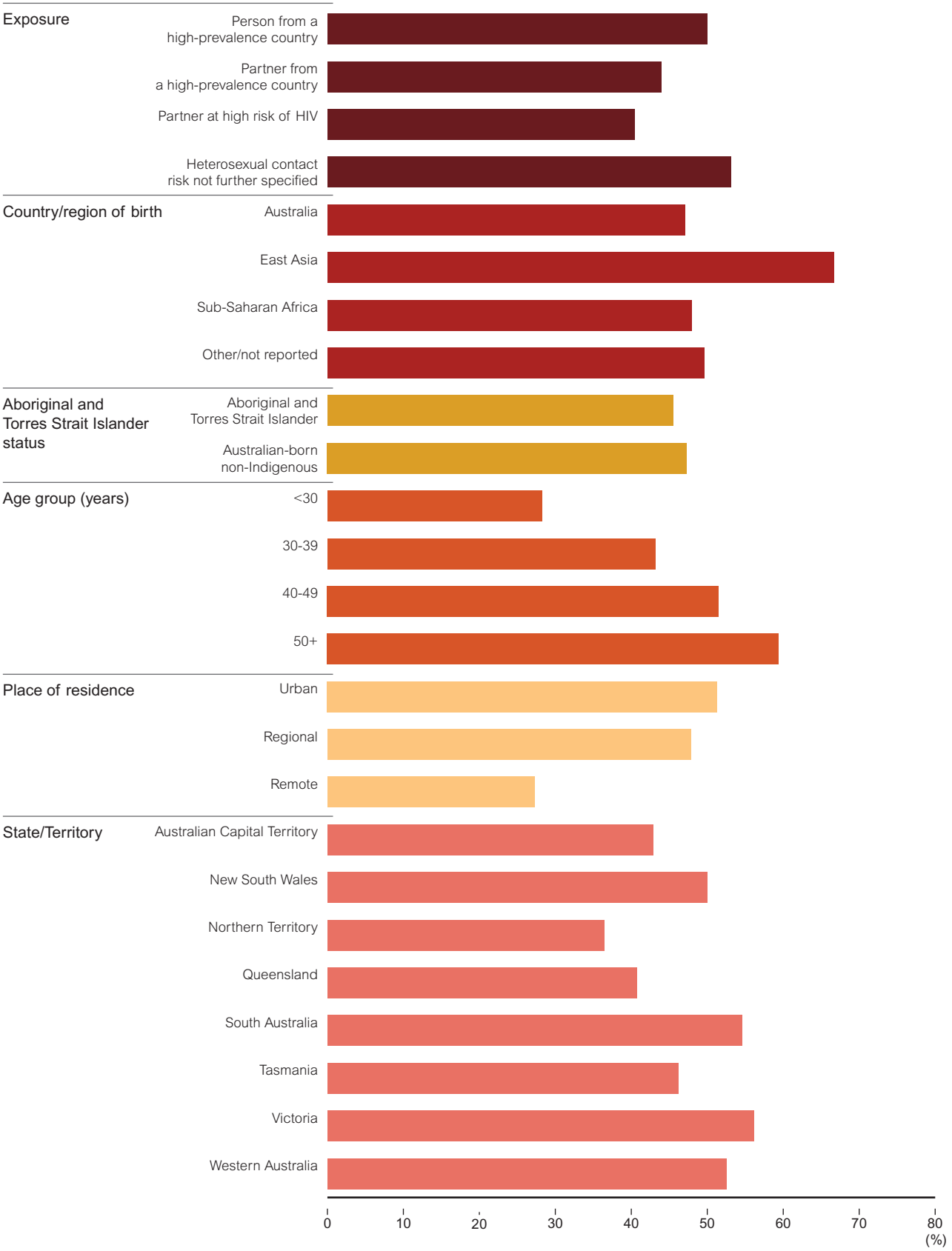
a Late HIV diagnosis was defined as an HIV notification with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

b Denominator only includes those for whom a CD4+ cell count was available.

c Includes ABS regions Southeast Asia and Northeast Asia.

Source: State and territory health authorities

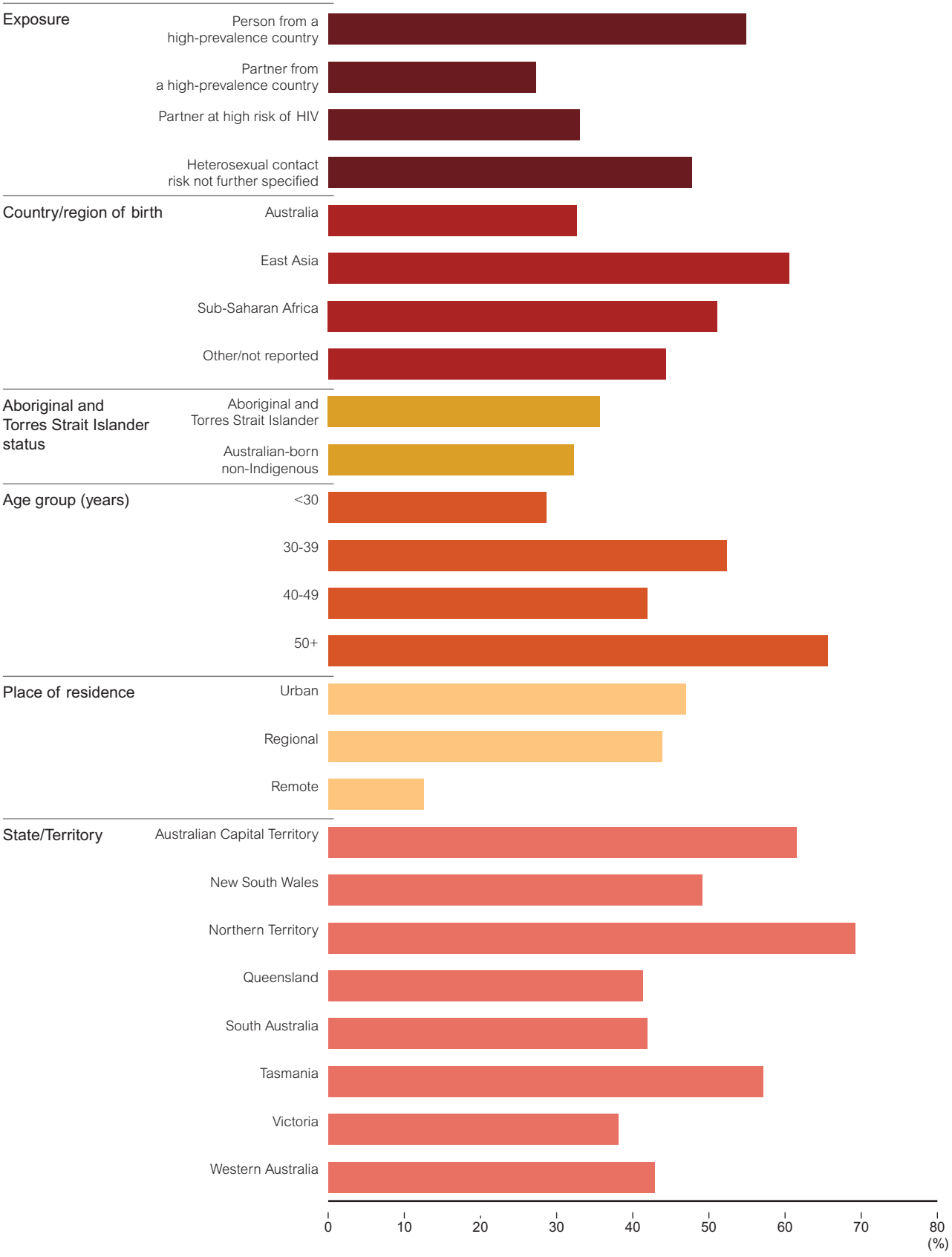
Figure 1.1.33 The proportion of late HIV diagnoses in men who reported heterosexual sex as an exposure risk, 2013–2017, by subcategory (*n* = 522)



Note: Late HIV diagnosis was defined as an HIV notification with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

Source: State and territory health authorities.

Figure 1.1.34 The proportion of late HIV diagnoses in women who reported heterosexual sex as an exposure risk, 2013–2017, by subcategory (*n* = 375)



Note: Late HIV diagnosis was defined as an HIV notification with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

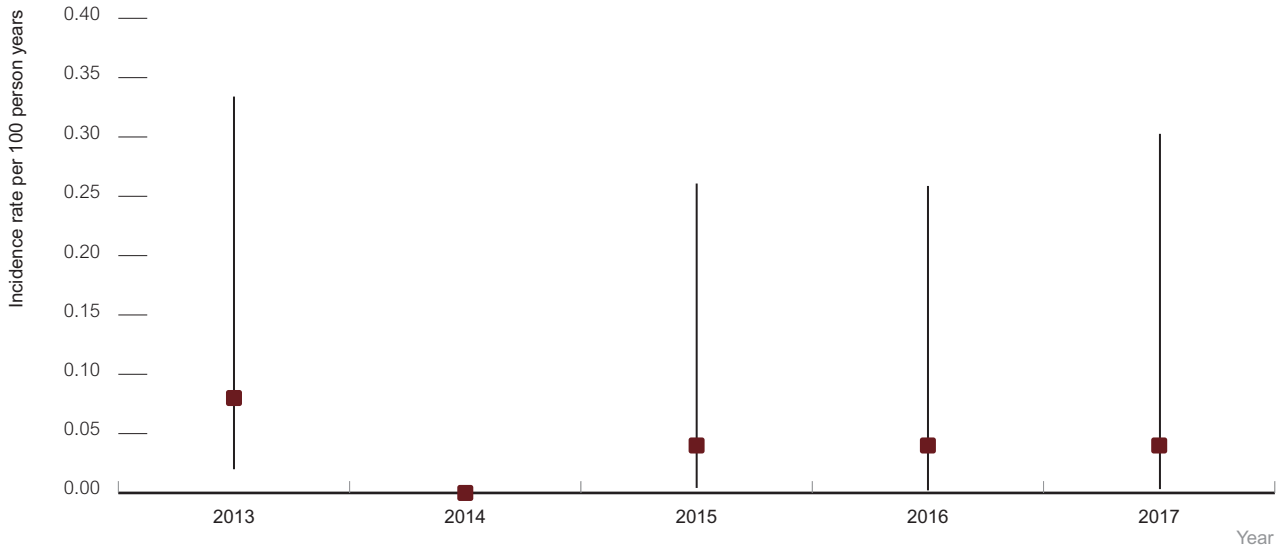
Source: State and territory health authorities

1.2 HIV incidence

HIV incidence is the best indicator of changes in transmission in a population. HIV incidence is calculated from the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) project by dividing the number of seroconversions among people undergoing repeat HIV testing at sexual health services by the person's time at risk (determined by the time between repeat HIV tests). Further details about the methods used can be found in the Methodology.

For the years 2013–2017, among female sex workers attending sexual health services who had at least one repeat HIV test (*n* = 7212), there were five seroconversions during 12 771 person-years at risk, equating to an overall HIV incidence of 0.04 per 100 person-years (95% CI 0.02–0.09). The HIV incidence remained at or under 0.08 per 100 person-years over the past five years (Figure 1.2.1).

Figure 1.2.1 HIV incidence rate per 100 person-years in female sex workers attending sexual health clinics, 2013–2017



	2013	2014	2015	2016	2017
Female sex workers	0.08	0.00	0.04	0.04	0.04

Note: These incidence estimates represent populations attending sexual health clinics and may not be generalised to broader priority populations.

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail.

In the same time period among female sex-workers attending General Practice Clinics collaborating in the ACCESS project (*n* = 65), there were no seroconversions in 101 person-years recorded (Data not shown).

1.3 Number of people living with HIV and prevalence

Number of people living with HIV

At the end of 2017, among the 27 545 people estimated to be living with HIV in Australia, 20 922 infections were attributable to male-to-male sex exposure, 6245 to heterosexual sex, 605 to injecting drug use and, 168 to 'other' exposures (vertical transmission to newborn, blood/tissue recipient, healthcare setting, haemophilia/coagulation disorder) (Table 1.3.1).

There were an estimated 582 people living with HIV in Australia at the end of 2017 who were reported to be Aboriginal and Torres Strait Islander at the time of HIV diagnosis. After adjusting for missing country of birth data, there were 2529 people living with HIV born in Southeast Asia and 1553 born in Sub-Saharan Africa (Table 1.3.1).

Table 1.3.1 Estimated number of people living with HIV and HIV prevalence, 2017, by selected exposure risk category and subpopulation

	People living with HIV (range)	Number diagnosed (range)	Number undiagnosed (range)	Proportion undiagnosed	HIV prevalence (range)	Population size (>15 years of age)[b]
Demographics						
Exposure risk category						
Men who have sex with men	20 922 (18 165 to 23 886)	19 084 (16 767 to 21 453)	1 839 (1 398 to 2 432)	8.8%		
Heterosexuals	6 245 (5 534 to 7 055)	5 210 (135 to 165)	1 034 (803 to 1 381)	16.6%		
People who inject drugs	605 (499 to 747)	514 (454 to 574)	91 (45 to 173)	15.1%		
Other	168	150 (135 to 165)	18	10.1%		
Sub-population						
Males	24 206 (21 115 to 27 530)	21 677 (19 132 to 24 264)	2 529 (1 983 to 3 267)	10.4%	0.25% (0.22% to 0.28%)	9 821 733
Females	3 349 (2 993 to 3 727)	2 920 (2 677 to 3 158)	428 (316 to 569)	12.8%	0.03% (0.03% to 0.04%)	10 140 499
Australian born non-Indigenous	12 914 (11 511 to 13 926)	11 684 (10 677 to 12 333)	1 230 (833 to 1 592)	9.5%	0.07% (0.07% to 0.08%)	16 688 144
Aboriginal and Torres Strait Islander people	582 (490 to 678)	498 (448 to 526)	84 (42 to 152)	14%	0.11% (0.09% to 0.12%)	524 166
Born in Sub-Saharan Africa	1 553 (1 307 to 1 793)	1 356 (1 179 to 1 506)	197 (128 to 288)	12.7%	0.47% (0.40% to 0.54%)	326 216
Born in Southeast Asia	2 529 (2 100 to 2 919)	1 839 (1 610 to 2 033)	690 (490 to 885)	27.2%	0.41% (0.33% to 0.47%)	618 784
Other country of birth	5 071 (4 218 to 5 914)	4 550 (3 850 to 5 189)	4 322 (3 518 to 5 127)	14.8%	0.11% (0.10% To 0.13%)	4 329 088
Total[1]	**27 545** (24 141 to 31 126)	**24 646** (21 850 to 27 477)	**2 899** (2 291 to 3 649)	**10.5%**	**0.14%** (0.12% to 0.16%)	**19 962 232**

a Sum of subpopulations will not add to the total estimated people living with HIV due to different death rate assumptions for Aboriginal and Torres Strait Islander people.

b Population estimates not available for men who have sex with men, heterosexuals or people who inject drugs

Source: See Methodology for details of mathematical modelling used to generate estimates.

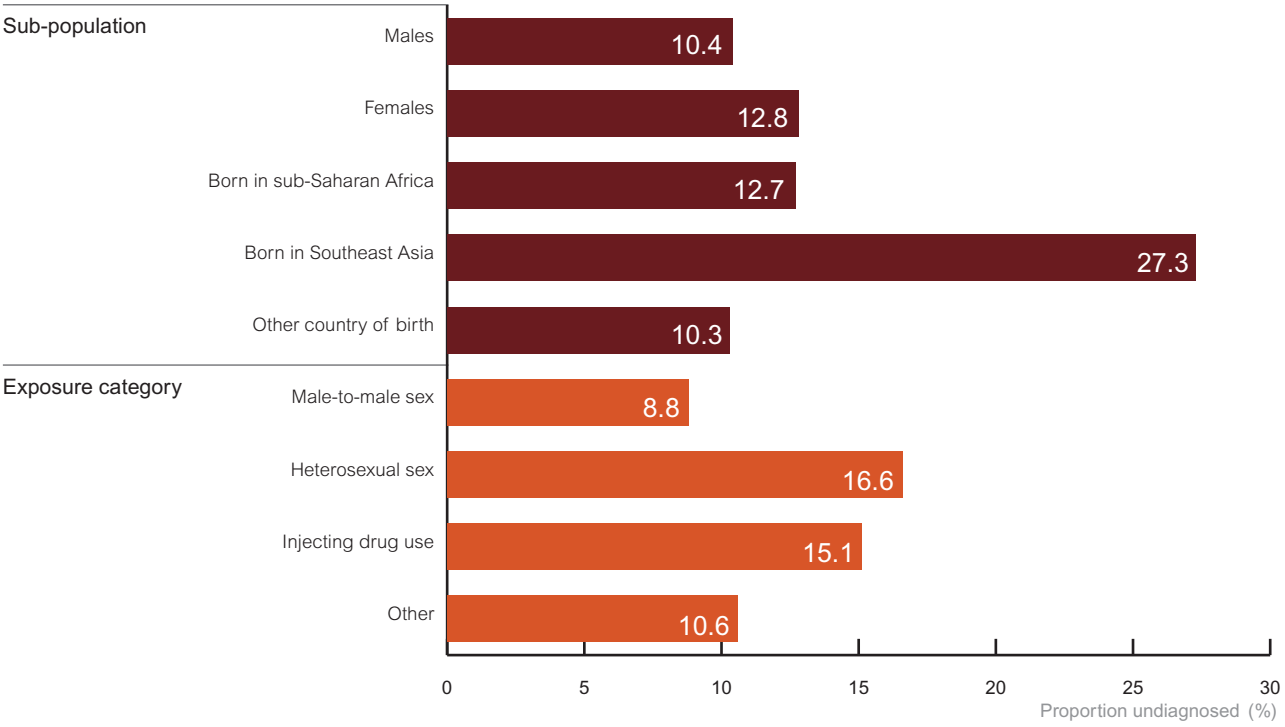
HIV

Undiagnosed HIV infection

In 2017, there were an estimated 2899 people (11% of all people living with HIV) living with HIV who were unaware of their HIV status (undiagnosed). The proportion undiagnosed was higher in females (13%) than in males (10%) and higher in Aboriginal and Torres Strait Islander people (14%) than in the Australian-born non-Indigenous population (10%). People born in Southeast Asia had the highest proportion with undiagnosed HIV (27%), compared with people born in sub-Saharan Africa (13%) and other countries (10%) (Figure 1.3.1, Table 1.3.1).

The proportion with undiagnosed HIV was lower in men with male-to-male sex as an exposure risk (9%) than in people with heterosexual risk exposure (17%) and people who inject drugs (15%) (Figure 1.3.1, Table 1.3.1).

Figure 1.3.1 Estimated proportion of people living with HIV who are undiagnosed, 2017, by demographic group and exposure

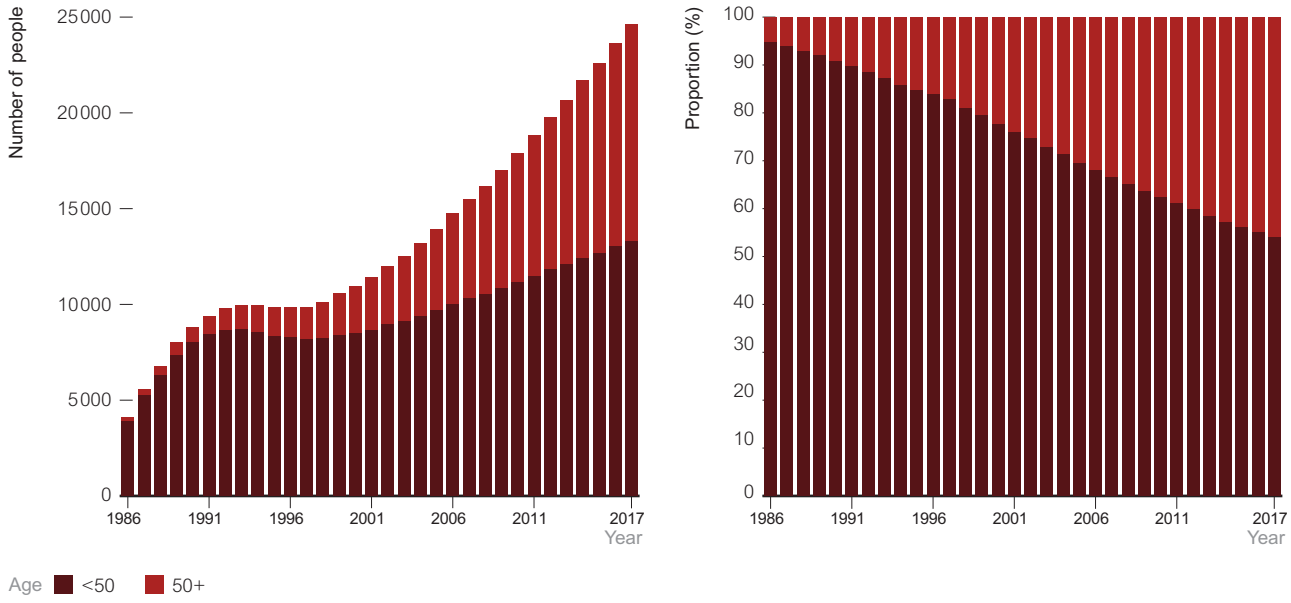


Source: See Methodology for details of mathematical modelling used to generate estimates.

Age of people living with diagnosed HIV

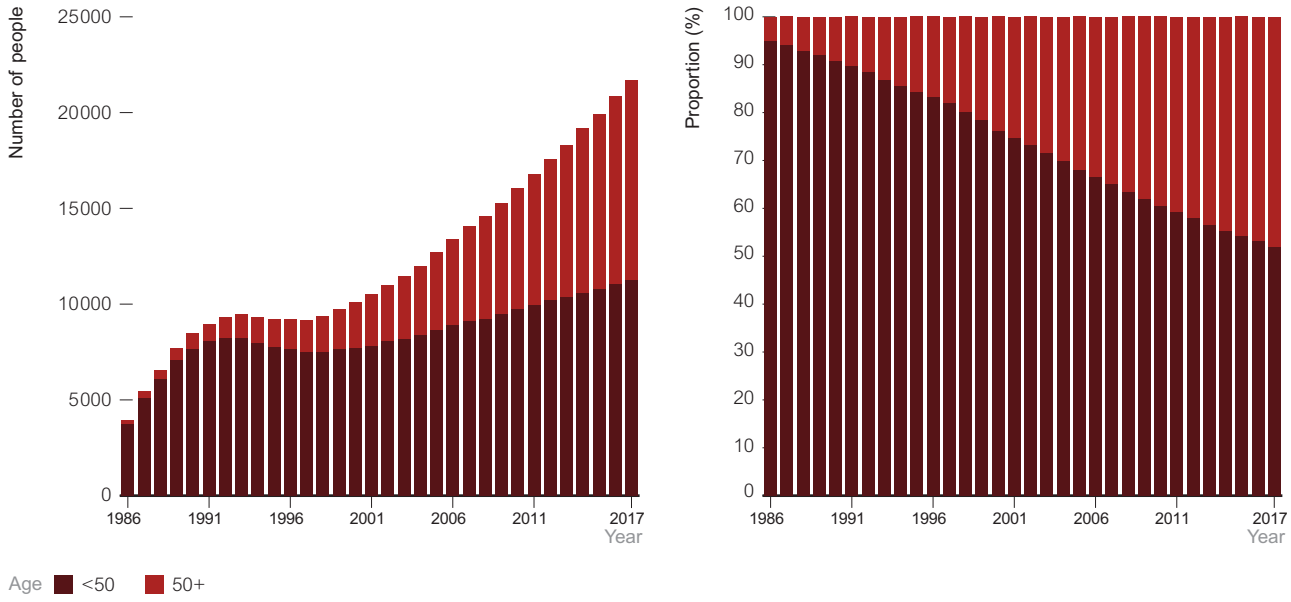
Since 1986 the number of people diagnosed with HIV has increased sixfold (from 4110 in 1986 to 24 645 in 2017). The age of the HIV-positive population has increased quite dramatically since 1986 due to the emergence of antiretroviral therapy in the mid-1990s, resulting in vastly improved survival in people with HIV, largely through reductions in AIDS-related complications. Of all people living with diagnosed HIV in 1986, only 5% were aged over 50 years compared with 46% aged over 50 years in 2017 (Figure 1.3.2). In men the pattern was similar, whereas in women the proportion aged over 50 years in 2017 was 33% compared with 17% in 1986 (Figure 1.3.2, Figure 1.3.3 and Figure 1.3.4 and Table 1.3.2).

Figure 1.3.2 Number and proportion of people living with diagnosed HIV including age distribution, 1986–2017



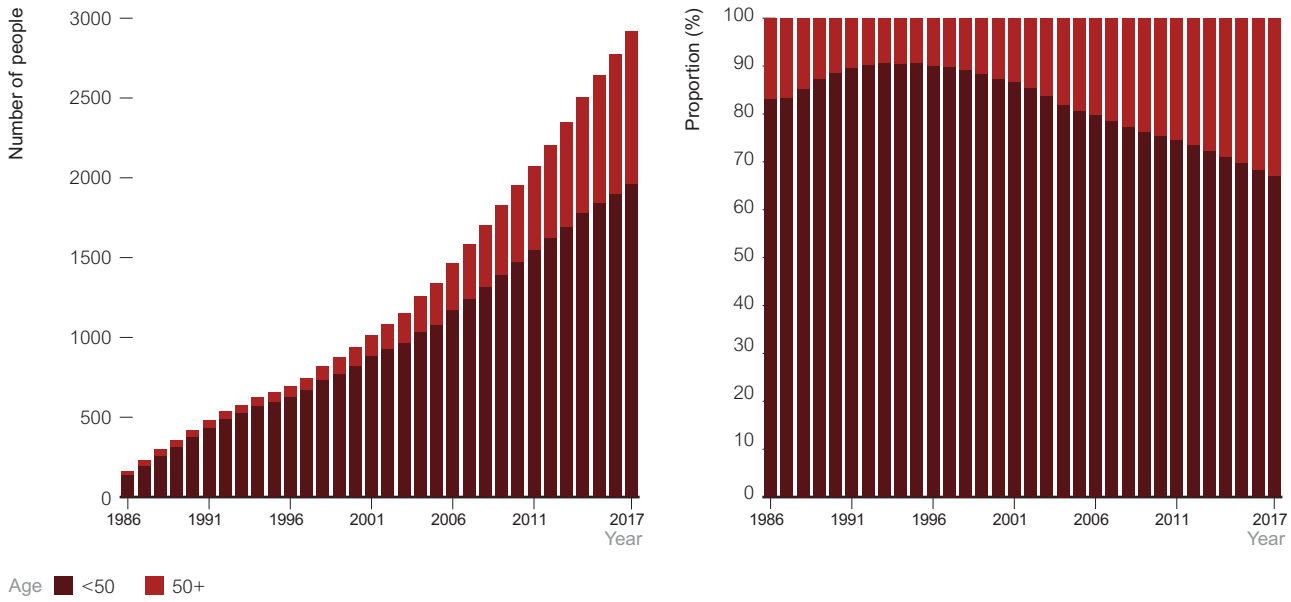
Source: See Methodology for details of mathematical modelling used to generate estimates.

Figure 1.3.3 Number and proportion of people living with HIV and diagnosed, 1986–2017, including age distribution, males



Source: See Methodology for details of mathematical modelling used to generate estimates.

Figure 1.3.4 Number and proportion of people living with HIV and diagnosed including age distribution, 1986–2017, females



Source: See Methodology for details of mathematical modelling used to generate estimates.

Table 1.3.2 Number of people living with HIV and diagnosed, 2008–2017, by sex and age group

Age (Years)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total										
<50	10 500	10 817	11 146	11 476	11 830	12 088	12 374	12 678	13 021	13 284
50+	5 654	6 189	6 763	7 321	7 936	8 586	9 314	9 904	10 622	11 361
Males										
<50	9 230	9 471	9 722	9 940	10 185	10 346	10 581	10 803	11 062	11 248
50+	5 330	5 817	6 347	6 854	7 406	7 980	8 589	9 118	9 763	10 428
Females										
<50	1 314	1 390	1 471	1 545	1 618	1 691	1 778	1 841	1 893	1 956
50+	387	435	483	529	583	653	726	803	882	963

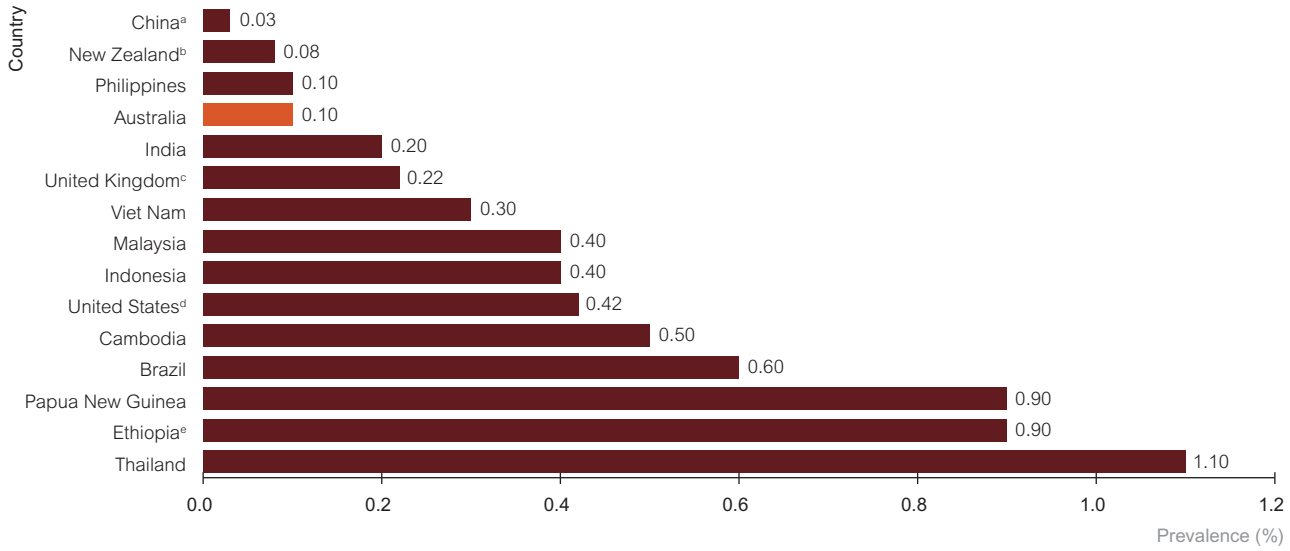
Source: See Methodology for details of mathematical modelling used to generate estimates.

HIV prevalence

The estimated HIV prevalence in Australia (the proportion of people who are living with HIV) in 2017 was 0.14% among adults aged older than 15 years (Figure 1.3.5). The prevalence in Australia is low compared with that reported to UNAIDS by other high-income countries including the United Kingdom (0.16 in 2016), the United States (0.42% in 2015) and countries in the Asia-Pacific region (Figure 1.3.5). HIV prevalence among Aboriginal and Torres Strait Islander people was estimated to be 0.11% in 2017 (Table 1.3.1).

For every 100 people living and diagnosed with HIV in Australia, there were 4.7 HIV notifications in 2008, declining by 13% to 4.1 in 2017 (Figure 1.3.6). These data are used to provide an indication of transmission rates among people living and diagnosed with HIV, and suggest the transmission rate is declining, probably due to a very high proportion being virally suppressed.

Figure 1.3.5 Estimated HIV prevalence in selected countries, 2017

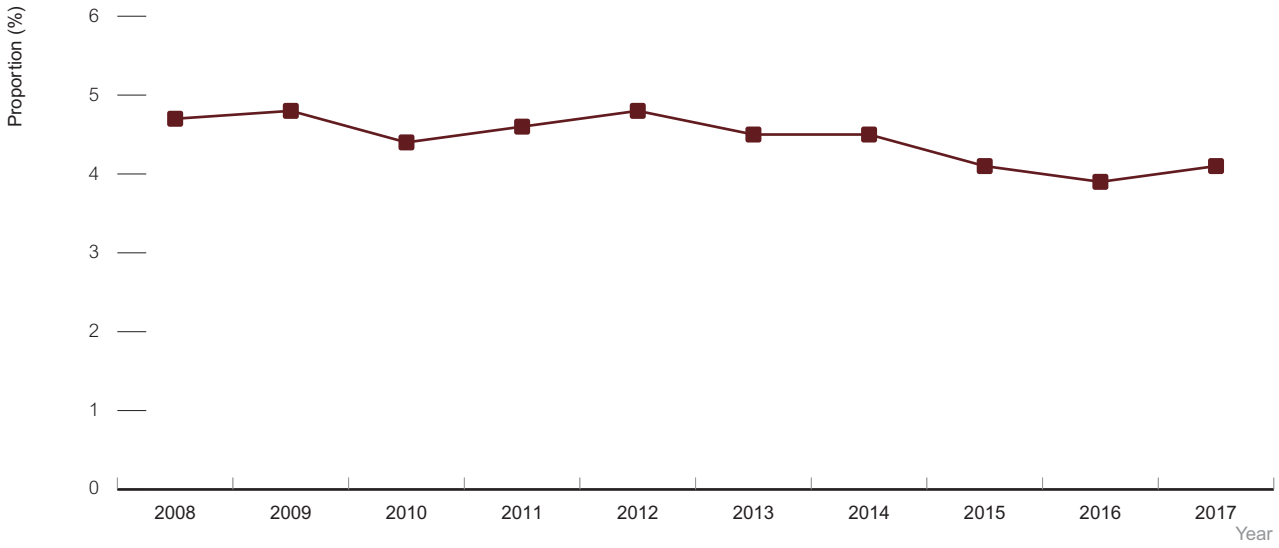


a 2013 prevalence
b 2017 prevalence[11]
c 2016 prevalence[12]
d 2015 prevalence in those aged 13 years and older[13]
e 2015 prevalence

Source: UNAIDS and relevant country reports; Countries included reflect number of Australian notifications by country of birth and key geographic and political countries in the Australian context.

HIV

Figure 1.3.6 Annual HIV notifications as a proportion of the estimated number of people living with HIV and diagnosed, 2008–2017

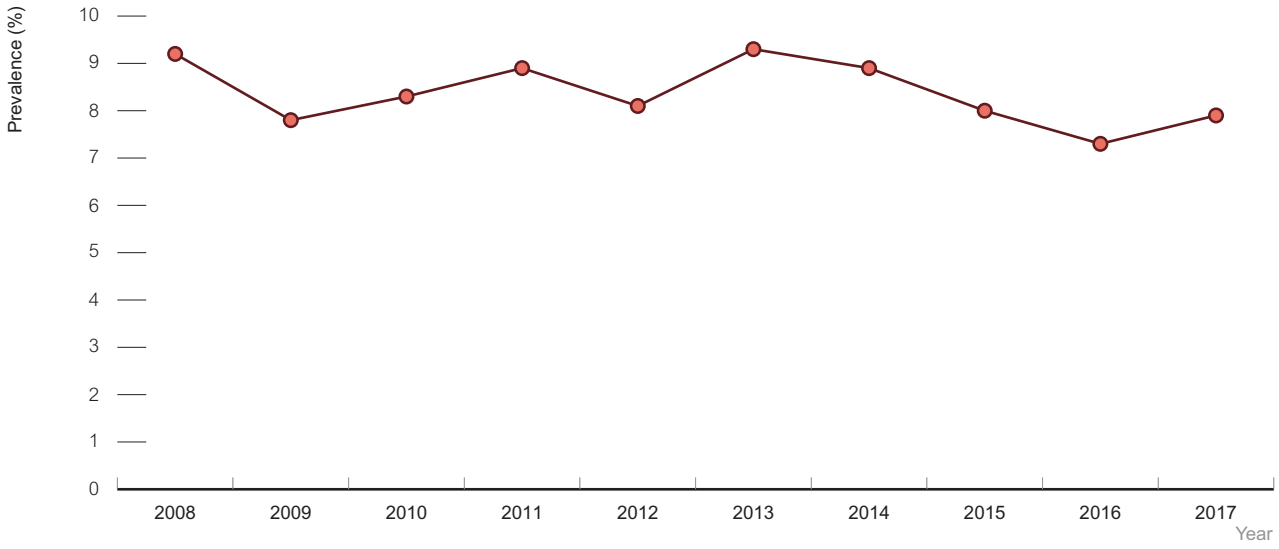


Proportion (%)									
4.7	4.8	4.4	4.6	4.8	4.5	4.5	4.1	3.9	4.1

Source: State and territory health authorities; see Methodology for detail on mathematical modelling for estimates of the number of people living with HIV.

Australia has a concentrated epidemic among gay and bisexual men. According to the Gay Community Periodic Surveys, the unadjusted prevalence of HIV among men in the survey decreased by 14% over the past 10 years from 9.2% in 2008 to 7.9% in 2017 (Figure 1.3.7). These data reflect community-attached gay and bisexual men and are based on self-reported HIV status and therefore need to be interpreted with caution.

Figure 1.3.7 Self-reported HIV prevalence among men participating in the Gay Community Periodic Surveys, 2008–2017

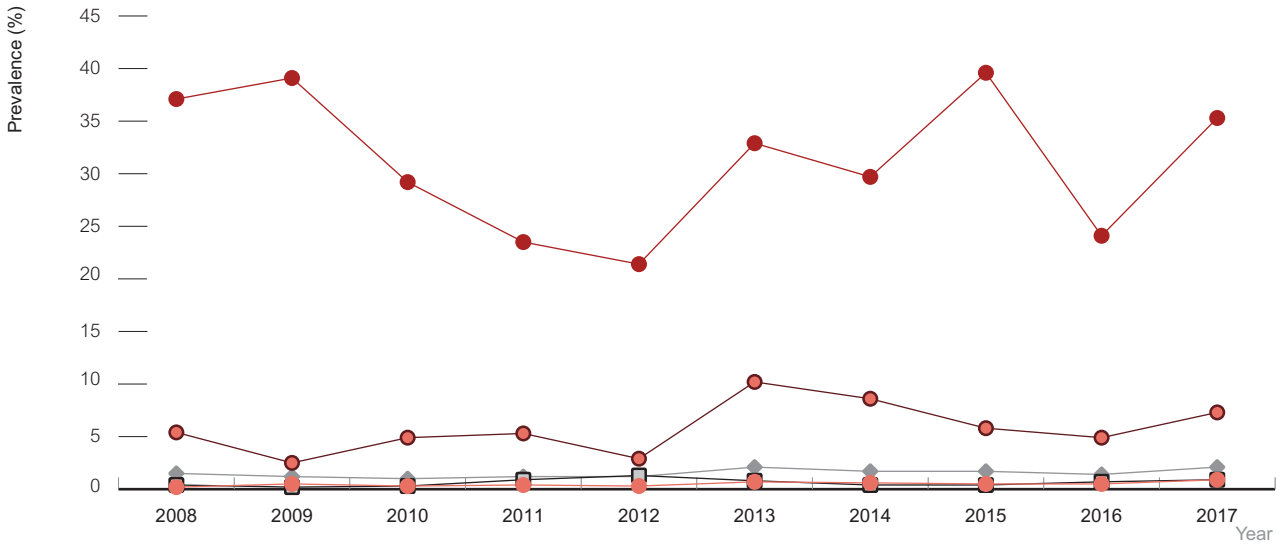


HIV prevalence (%)									
9.2	7.8	8.3	8.9	8.1	9.3	8.9	8.0	7.3	7.9

Source: Gay Community Periodic Surveys; see Methodology for detail.

HIV prevalence is low among people who inject drugs, with a prevalence ranging between 1.0% and 2.1% among people attending needle and syringe programs in the past 10 years (2.1% in 2017), and 0.7% if gay and bisexual men are excluded from the sample (Figure 1.3.8).

Figure 1.3.8 HIV prevalence among people seen at needle and syringe programs, 2008–2017, by gender and sexual identity



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Male homosexual (%)	37.1	39.1	29.2	23.5	21.4	32.9	29.7	39.6	24.1	35.3
Male bisexual (%)	5.4	2.5	4.9	5.3	2.9	10.2	8.6	5.8	4.9	7.3
Male heterosexual (%)	0.2	0.5	0.3	0.4	0.3	0.7	0.6	0.5	0.5	0.9
Females (%)	0.4	0.2	0.3	0.9	1.3	0.8	0.4	0.4	0.7	0.9
Total (%)	1.5	1.2	1	1.2	1.2	2.1	1.7	1.7	1.4	2.1

Source: Australian Needle and Syringe Program Survey, see Methodological Notes for detail.

HIV

1.4 HIV testing and care

The HIV diagnosis and care cascade

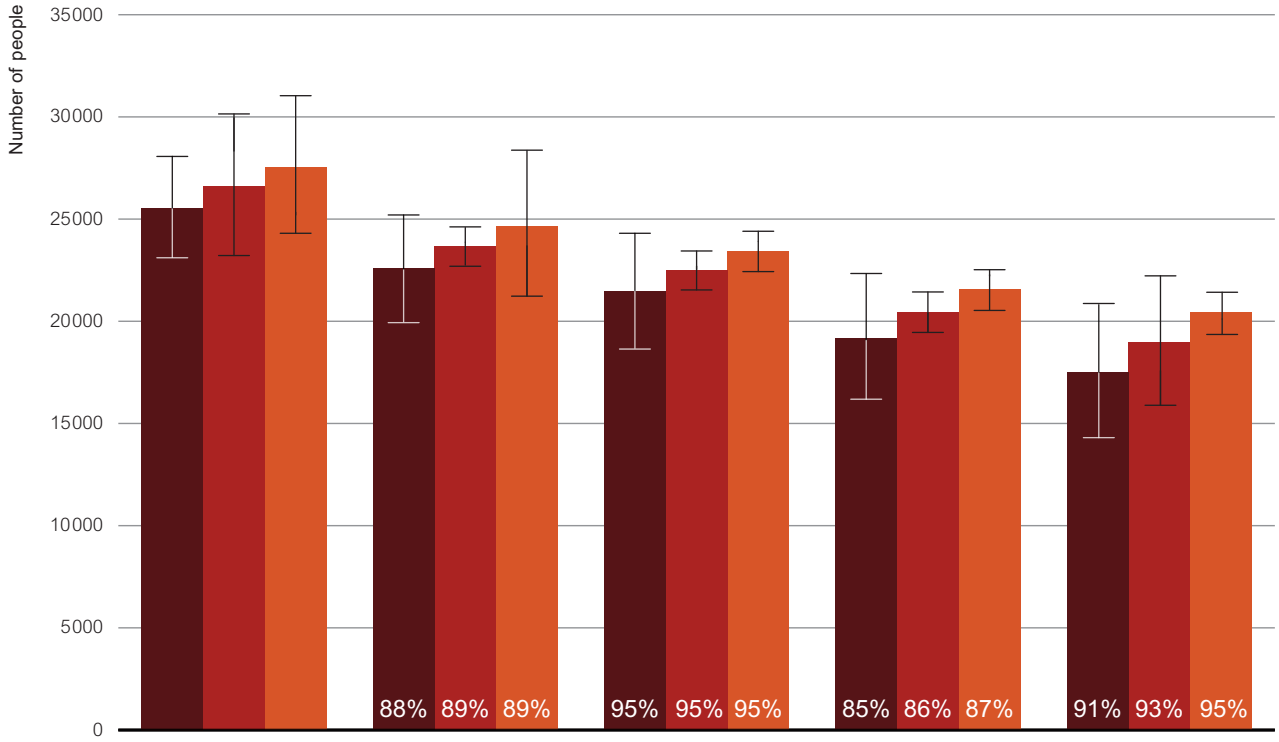
This report includes the 'HIV diagnosis and care cascade', which estimates the number of people living with HIV in Australia, and the number and proportion of people with HIV who are diagnosed, receiving antiretroviral treatment, retained in care (having had a viral load or CD4+ cell count in the past year) and have suppressed viral load (<200 HIV-1 RNA copies/mL). These estimates are used to support the improvement of the delivery of services to people with HIV across the entire continuum of care. Using available data and accounting for uncertainties, the number of people in each stage of the cascade in Australia was estimated (Figure 1.4.1, Table 1.4.1). Methods and the associated uncertainties are described in detail in the Methodology. The approach and presentation have been refined from previous years based on recommendations from a national stakeholder reference group (see Acknowledgments section), and therefore estimates reported this year cannot be directly compared with estimates reported in previous years.

UNAIDS has set targets for HIV diagnosis and treatment by the year 2020: 90% of all people living with HIV to be diagnosed, 90% of all people with diagnosed HIV to be on antiretroviral therapy, and 90% of all people receiving antiretroviral therapy to have suppressed viral load. This corresponds to 73% of all people living with HIV having suppressed viral load. UNAIDS also has set targets of 95% for each of the steps by 2030.

In 2017, it was estimated that there were 27 545 people living with HIV in Australia. Of these an estimated 24 646 (89%) had been diagnosed, 23 414 (95% of those diagnosed) were retained in care, 21 560 (87% of those diagnosed) were receiving antiretroviral therapy, and 20 412 (95% of those on antiretroviral therapy) had suppressed viral load (Figure 1.4.1). This corresponds to 74% of people living with HIV and diagnosed with suppressed viral load in 2017, exceeding the UN target of 73% for the first time.

Focusing on the 95% targets, Australia is tracking towards the achievement of the first two targets, and has attained the third target (95% of all people receiving antiretroviral therapy with suppressed viral load). The cascade also shows the gaps at the end of 2017. An estimated 7133 (26%) of all people living with HIV did not have suppressed viral load. Of these, 41% were undiagnosed, 17% were diagnosed but not in care, 26% were in care but not on antiretroviral therapy, and 16% were on antiretroviral therapy but had not achieved suppressed viral load (Figure 1.4.2).

Figure 1.4.1 The HIV diagnosis and care cascade, 2015–2017



	Living with HIV	Living with HIV and diagnosed	Retained in care	Receiving antiretroviral therapy	Supressed viral load
2015	25 543	22 583	21 454	19 164	17 505
2016	26 578	23 644	22 462	20 413	18 945
2017	27 545	24 646	23 414	21 560	20 412

Source: See Methodology for details of mathematical modelling used to generate estimates.

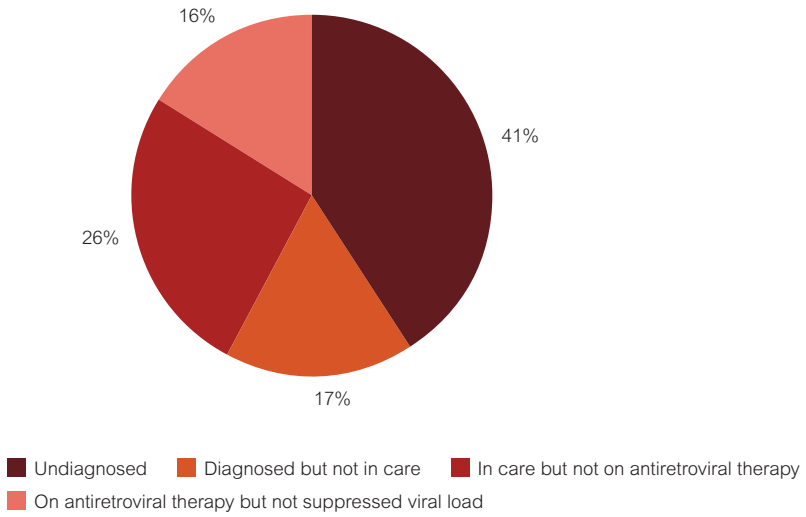
HIV

Table 1.4.1 The HIV diagnosis and care cascade estimates, 2015–2017

Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2015	25 543 (22 570 to 28 718)	22 583 (20 127 to 25 076)	21 454 (18 396 to 24 775)	19 164 (18 254 to 20 079)	17 505 (16 559 to 18 467)
2016	26 578 (23 399 to 29 957)	23 644 (21 026 to 26 296)	22 462 (19 218 to 25 980)	20 413 (19 473 to 21 358)	18 945 (17 957 to 19 947)
2017	27 545 (24 141 to 31 126)	24 646 (21 850 to 27 477)	23 414 (19 970 to 27 147)	21 560 (20 592 to 22 533)	20 412 (19 387 to 21 450)

Source: See Methodology for details of mathematical modelling used to generate estimates.

Figure 1.4.2 People living with HIV who have not achieved suppressed viral load by cascade stage, 2017

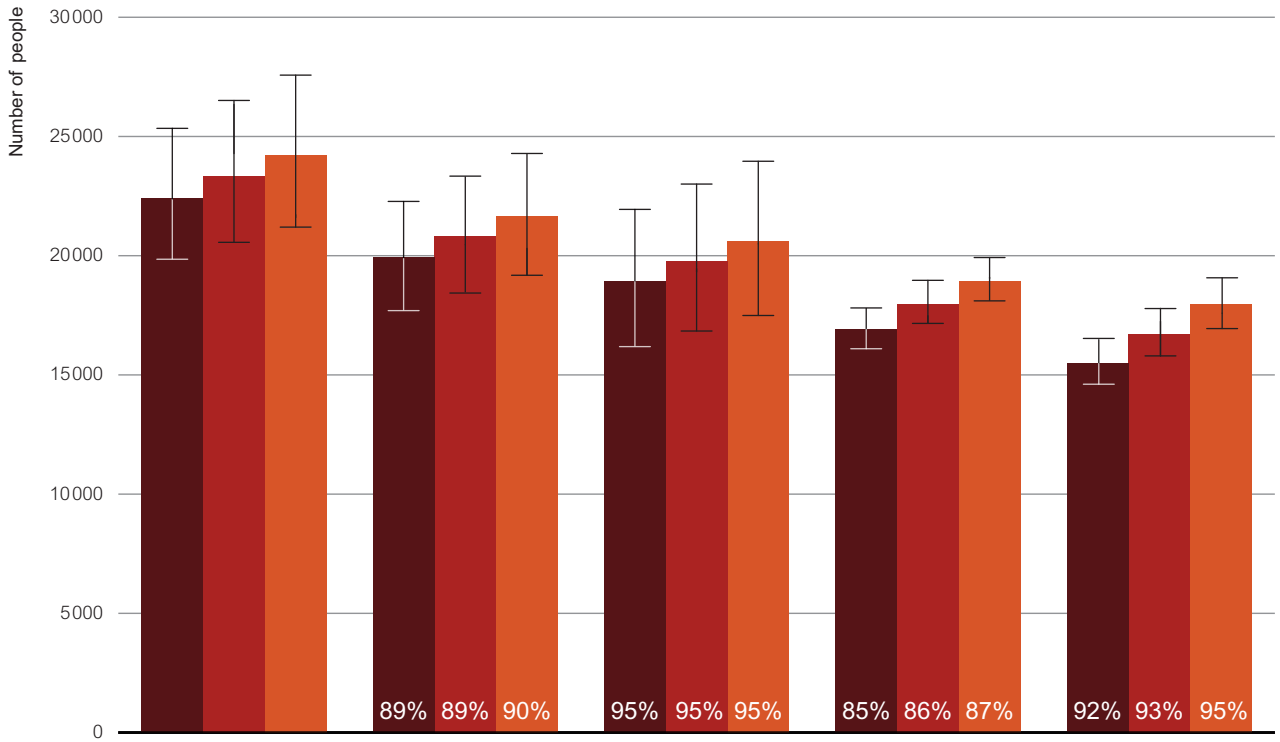


Source: See Methodology for details of mathematical modelling used to generate estimates.

The HIV diagnosis and care cascade for males

It was estimated that there were 24 206 males living with HIV in Australia in 2017. Of these an estimated 21 677 (90%) were diagnosed, 20 593 (95% of those diagnosed) were retained in care, 18 949 (86% of those diagnosed) were receiving antiretroviral therapy, and 17 953 (95% of those on antiretroviral therapy) had suppressed viral load (Figure 1.4.3, Table 1.4.2). This corresponds to 74% of all males living with HIV with suppressed viral load in 2017.

Figure 1.4.3 The HIV diagnosis and care cascade, 2015–2017, males



	Living with HIV	Living with HIV and diagnosed	Retained in care	Receiving antiretroviral therapy	Supressed viral load
2015	22 420	19 922	18 926	16 920	15 488
2016	23 342	20 826	19 785	17 981	16 699
2017	24 206	21 677	20 593	18 949	17 953

Source: See Methodology for details of mathematical modelling used to generate estimates.

HIV

Table 1.4.2 The HIV diagnosis and care cascade estimates, 2015–2017, males

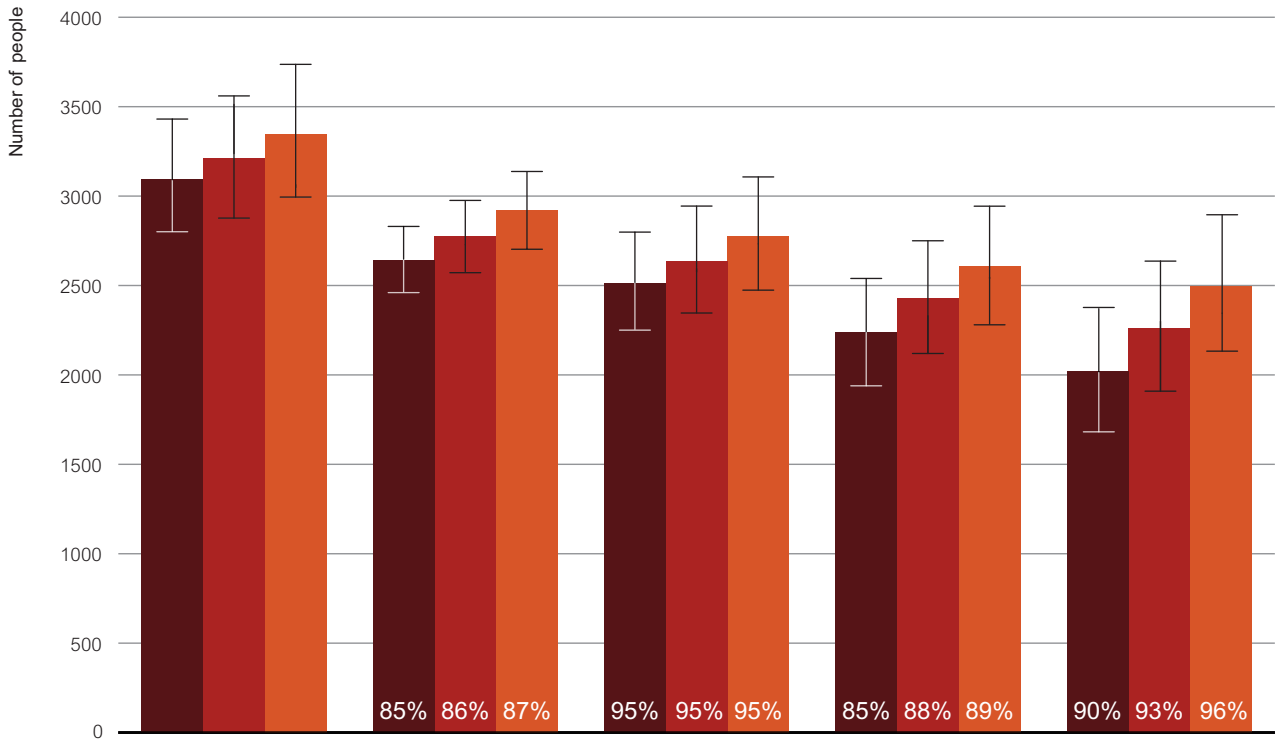
Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2015	22 420 (19 752 to 25 311)	19 922 (17 678 to 22 207)	18 926 (16 158 to 21 941)	16 920 (16 075 to 17 768)	15 488 (14 530 to 16 467)
2016	23 342 (20 476 to 26 447)	20 826 (18 439 to 23 253)	19 785 (16 853 to 22 974)	17 981 (17 108 to 18 856)	16 699 (15 705 to 17 715)
2017	24 206 (21 115 to 27 530)	21 677 (19 132 to 24 264)	20 593 (17 487 to 23 972)	18 949 (18 053 to 19 849)	17 953 (16 930 to 18 996)

Source: See Methodology for details of mathematical modelling used to generate estimates.

The HIV diagnosis and care cascade for females

It was estimated that there were 3349 females living with HIV in Australia in 2017. Compared with males, a lower proportion were estimated to be diagnosed (87%) but a higher proportion were receiving antiretroviral therapy (89% of those diagnosed) and had suppressed viral load (96% of those on antiretroviral therapy) (Figure 1.4.4, Table 1.4.3). This corresponds to 75% of all females living with HIV with suppressed viral load in 2017.

Figure 1.4.4 The HIV diagnosis and care cascade, 2015–2017, females



	Living with HIV	Living with HIV and diagnosed	Retained in care	Receiving antiretroviral therapy	Supressed viral load
2015	3095	2645	2512	2242	2019
2016	3215	2777	2638	2432	2260
2017	3349	2920	2774	2611	2499

Source: See Methodology for details of mathematical modelling used to generate estimates.

Table 1.4.3 The HIV diagnosis and care cascade estimates, 2015–2017, females

Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2015	3095 (2792 to 3421)	2645 (2437 to 2849)	2512 (2227 to 2814)	2242 (1931 to 2556)	2019 (1666 to 2398)
2016	3215 (2886 to 3561)	2777 (2552 to 2997)	2638 (2332 to 2961)	2432 (2107 to 2759)	2260 (1891 to 2653)
2017	3349 (2993 to 3727)	2920 (2677 to 3158)	2774 (2447 to 3120)	2611 (2274 to 2950)	2499 (2118 to 2900)

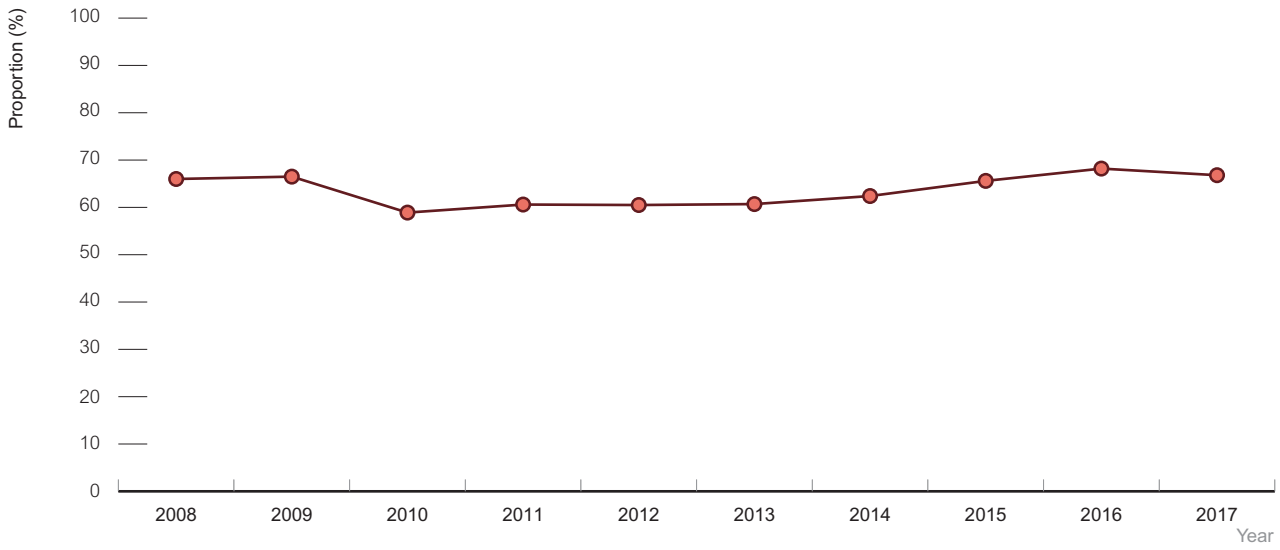
Source: See Methodology for details of mathematical modelling used to generate estimates.

HIV testing

National testing guidelines recommend HIV testing in a number of contexts, such as according to exposure risk, during antenatal care, for certain healthcare workers, and for particular priority populations.[14] Guidelines recommend all sexually active gay and other men who have sex with men should retest every 12 months, or every three to six months for men at higher risk based on behavioural criteria.[15]

Behavioural surveys show the proportion tested in a year in Australia in selected priority populations. In the Gay Community Periodic Surveys 67% of non-HIV-positive gay and bisexual men in 2017 self-reported having had an HIV test in the 12 months prior to the survey, increasing by 10% in the past five years (Figure 1.4.5). According to the Australian Needle and Syringe Program Survey, in 2017 almost half of people (49%) who inject drugs attending needle and syringe programs self-reported having had an HIV test in the 12 months prior to the survey (Figure 1.4.6).

Figure 1.4.5 Proportion of non-HIV-positive gay and bisexual men tested for HIV in the 12 months prior to completing the survey, 2008–2017

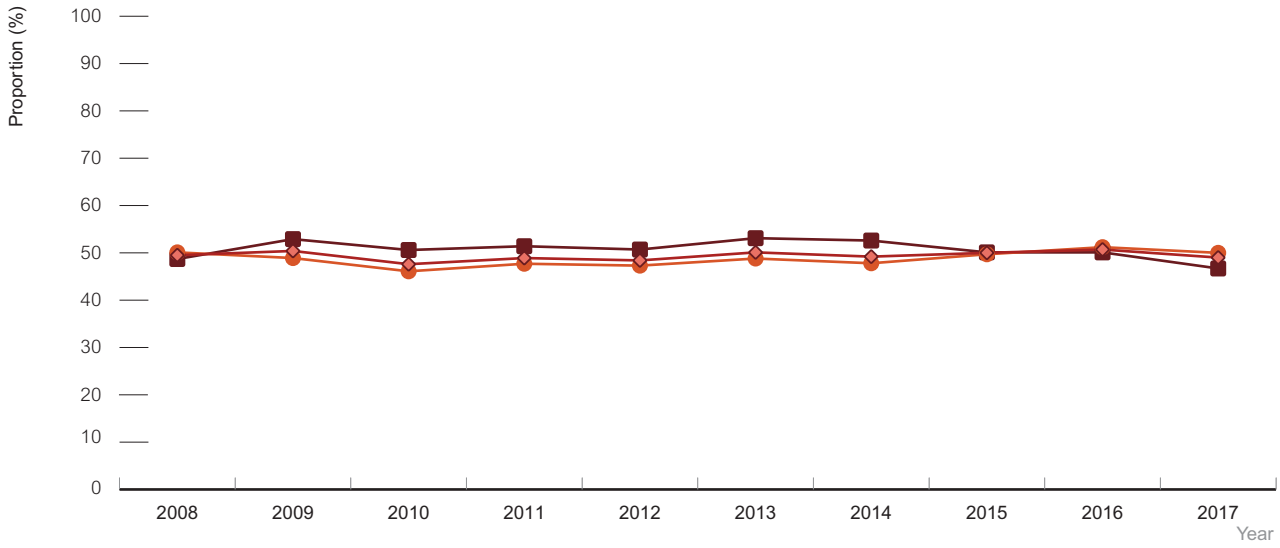


Proportion (%)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	66.0	66.5	58.9	60.6	60.5	60.7	62.4	65.6	68.2	66.8

Source: Gay Community Periodic Surveys; see Methodology for detail.

HIV

Figure 1.4.6 Proportion of people who inject drugs attending needle and syringe programs who reported an HIV test in the past 12 months, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men (%)	50.1	48.9	46.1	47.7	47.3	48.8	47.8	49.7	51.2	50.0
Women (%)	48.7	52.9	50.6	51.4	50.7	53.1	52.6	50.1	50.1	46.7
Total (%)	49.5	50.4	47.6	48.9	48.4	50.1	49.2	50.0	50.7	49.0

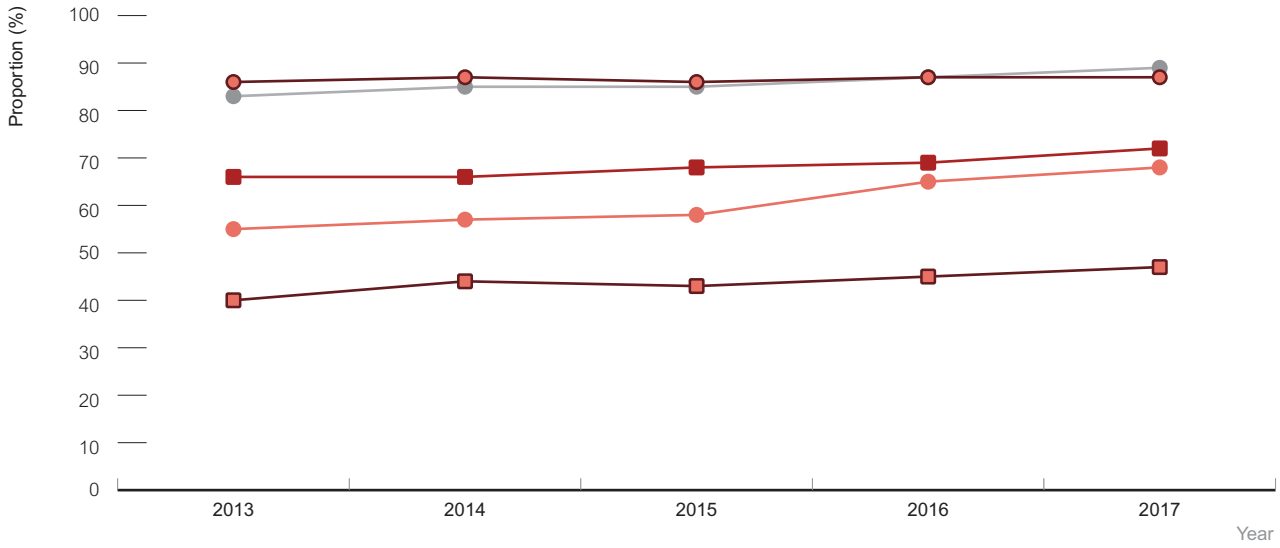
Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

According to the Gay Community Periodic Surveys, the most common locations for their latest HIV testing in the previous 12 months among non-HIV-positive gay and bisexual men in 2017 were a general practice (39%) and a sexual health clinic (33%). Data from these clinical services therefore provide further information about HIV testing patterns.

At the 44 sentinel sexual health clinics across Australia participating in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network (see Methodology for further detail), between 2013 and 2017 the proportion of gay and bisexual men who were tested for HIV at least once in a year has remained steady, between 86% and 87% (Figure 1.4.7). Among gay and bisexual men attending high-caseload general practice clinics, the proportion who were tested for HIV at least once in a year increased from 55% in 2013 to 68% in 2017 (Figure 1.4.7). There was a 25% increase in the proportion of gay and bisexual men attending sexual health clinics who had a repeat HIV test within 13 months of a previous HIV test, from 55% in 2013 to 68% in 2017, and a 36% increase in the proportion of men who had a repeat HIV test within seven months, from 42% in 2013 to 57% in 2017, with the increases mostly occurring between 2015 and 2016 (Figure 1.4.8).

Among other priority populations attending sexual health clinics participating in the ACCESS network, the proportion of female sex workers who were tested for HIV at least once in a year remained over 80% for each of the years since 2012, and was 89% in 2017 (Figure 1.4.7). Among people attending sexual health clinics who were recorded as currently injecting drugs, 72% received an HIV test in 2017. By contrast, among young heterosexuals attending sexual health clinics, only 47% received an HIV test in 2017 (Figure 1.4.7).

Figure 1.4.7 Proportion of sexual health and high-caseload general practice clinic attendees tested for HIV in a year, 2012–2017, by priority population

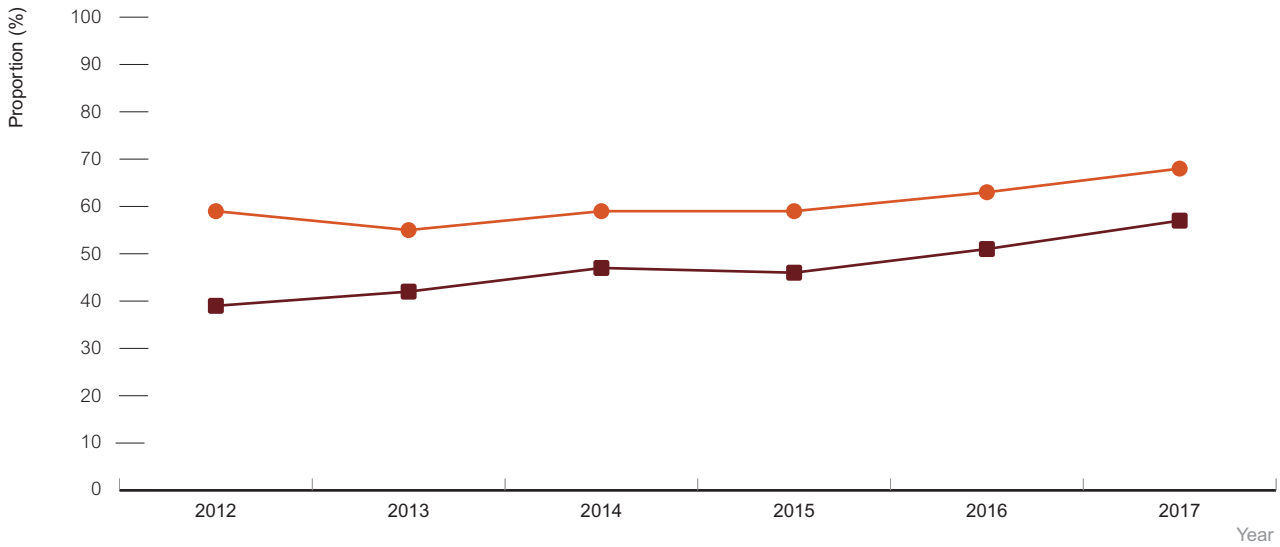


	2013	2014	2015	2016	2017
Heterosexuals aged 16–29y, sexual health clinic (%)	40	44	43	45	47
Female sex workers, sexual health clinic (%)	83	85	85	87	89
People who inject drugs, sexual health clinic (%)	66	66	68	69	72
Gay and bisexual men, sexual health clinic (%)	86	87	86	87	87
Gay and bisexual men, general practice clinic (%)	55	57	58	65	68

Note: High-caseload general practice clinics include primary healthcare general practice clinics with a high-caseload of gay and bisexual men.

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail.

Figure 1.4.8 HIV retesting among gay and bisexual men attending sexual health clinics, 2012–2017



	2012	2013	2014	2015	2016	2017
Re-tested at 1–7 months (%)	39	42	47	46	51	57
Re-tested at 1–13 months (%)	59	55	59	59	63	68

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail.

HIV

HIV care

HIV treatment

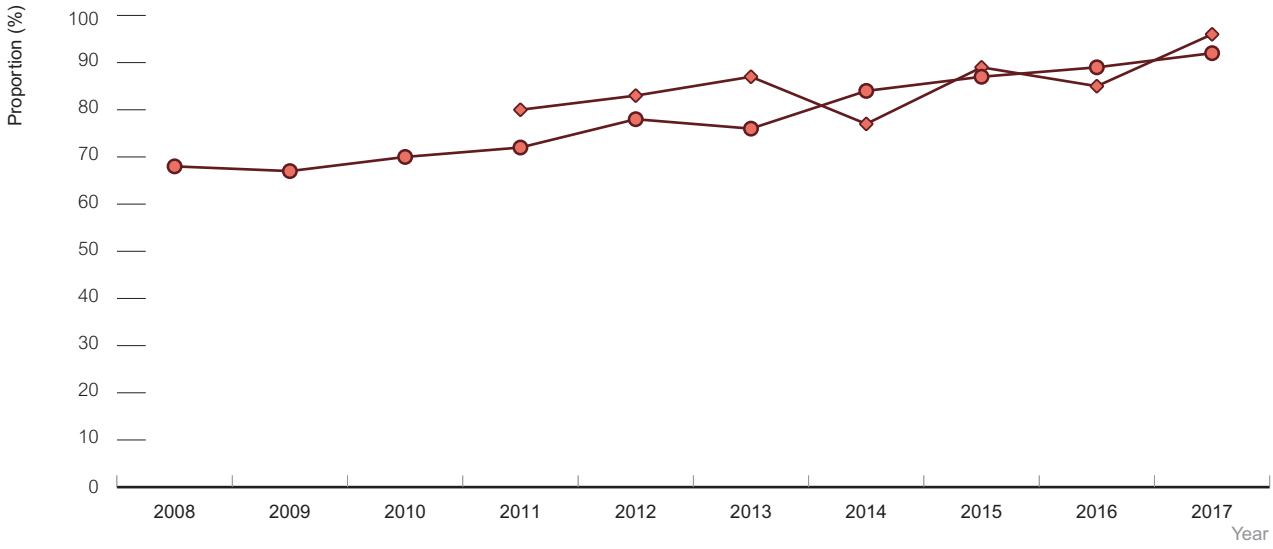
There has been a large increase over the past 10 years in the number of people living with HIV, the proportion taking effective treatments and the proportion achieving suppressed viral load. HIV treatments do not cure the infection, but prevent it from causing illness and—while undetectable viral load is maintained—virtually eliminate the risk of onward transmission to sexual partners. This is referred to as 'treatment as prevention' (TasP).

The estimated treatment coverage among people diagnosed with HIV in Australia is presented in the diagnosis and care cascades (Figure 1.4.1, Figure 1.4.3 and Figure 1.4.4): 87% of people with diagnosed HIV were receiving antiretroviral therapy overall in 2016 (87% of males and 89% of females).

Information on treatment coverage is also available for subpopulations. According to the Gay Community Periodic Surveys, the proportion of gay and bisexual men diagnosed with HIV who reported receiving antiretroviral treatment increased from 68% in 2008 to 78% in 2012 and 92% in 2017. Among men attending the 44 sexual health clinics participating in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network, the proportion receiving antiretroviral treatment increased from 80% in 2011 to 96% in 2017 (Figure 1.4.9).

Antiretroviral treatment guidelines are updated annually in Australia. This results in changes to recommended drug combinations. Antiretroviral drugs have differing potency and side-effect profiles, and it is important to monitor their use. Of HIV antiretroviral treatments dispensed in 2017 and reimbursed by the Pharmaceutical Benefits Scheme, abacavir/dolutegravir/lamivudine (Triumeq) was the most commonly prescribed fixed-dose combination triple regimen (5550 people), followed by efavirenz/emtricitabine/tenofovir (Atripla; 1860 people) and rilpivirine/emtricitabine/tenofovir (Evipler; 1860 people). Emtricitabine/tenofovir alafenamide (Descovy) was the most common dual nucleoside/nucleotide reverse transcriptase inhibitor (N(t)RTI) fixed-dose combination (3730 people), followed by emtricitabine/tenofovir (Truvada; 3090 people) and abacavir/lamivudine (Kivexa; 1270 people). Dolutegravir (Tivicay) was the most common third agent (3060 persons); it is generally combined with a fixed-dose combination N(t)RTI agent (Table 1.4.4).

Figure 1.4.9 Proportion of HIV-positive men receiving antiretroviral treatment, 2008–2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ACCESS Sexual health clinics (%)				80	83	87	77	89	85	96
Gay Community Periodic Survey (%)	68	67	70	72	78	76	84	87	89	92

Source: Gay Community Periodic Surveys; ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail, ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail.

Table 1.4.4 Number of people with HIV receiving antiretroviral treatment, 2017, by type of treatment (drug class)

Drug class	Antiretroviral agent	Number of unique patients who received the antiretroviral agent in 2017
Nucleoside analogue reverse transcriptase inhibitors		
	abacavir (Ziagen)	240
	lamivudine/zidovudine (Combivir)	270
	didanosine (Videx EC)	≤30
	emtricitabine (Emtriva)	100
	abacavir/lamivudine (Kivexa)	1 270
	Lamivudine (Zeffix)	570
	stavudine (Zerit)	≤30
	Tenofov ir (Viread)	470
	abacavir/lamivudine/zidovudine (Trizivir)	≤30
	emtricitabine/tenofovir (Truvada)	3 090
	emtricitabine/tenofovir alafenamide (Descovy)	3 730
	zidovudine (Retrovir)	≤30
Non-nucleoside analogue reverse transcriptase inhibitors		
	efavirenz (Stocrin)	370
	etravirine (Intelence)	440
	Nevirapine (Viramune)	1 770
	rilpivirine (Edurant)	250
Protease inhibitors		
	atazanavir (Reyataz)	1 090
	darunavir (Prezista, Prezcobix)	2 190
	indinavir (Crixivan)	≤30
	lopinavir/ritonavir (Kaletra)	210
	nelfinavir (Viracept)	40
	ritonavir (Telzir, Norvir)	2 110
	saquinavir (Invirase)	0
	tipranavir (Aptivus)	≤30
	atazanavir/cobicistat (Evotaz)	230
Entry inhibitors		
	enfuvirtide (Fuzeon)	0
	maraviroc (Celsentri)	270
Integrase inhibitors		
	Dolutegravir (Tivicay)	3 060
	raltegravir (Isentress)	2 270
Combination class agents		
	efavirenz/emtricitabine/tenofovir (Atripla)	1 860
	rilpivirine/emtricitabine/tenofovir (Evipler)	1 860
	elvitegravir/cobicistat/tenofovir/emtricitabine (Stribild)	380
	abacavir/dolutegravir/lamivudine (Triumeq)	5 550
	emtricitabine/rilpivirine/tenofovir/alafenamide (Odefsey)	1 320
	elvitegravir/cobicistat/emtricitabine/tenofovir alafenamide (Genvoya)	4 700
Total patients		**21 060**

Source: Pharmaceutical Benefits Scheme 10% sample using Pharmdash. Excludes temporary residents who are ineligible for Medicare. See Methodology for detail.

HIV transmitted drug resistance

Due to the scale-up of HIV treatments and pre-exposure prophylaxis (PrEP) in Australia it is important to monitor the prevalence of transmitted HIV drug resistance. HIV resistance testing is performed for all new HIV diagnoses in Australia. In this report we focus on surveillance drug resistance mutations in HIV notifications, as recommended by the World Health Organization, using data from New South Wales and South Australia for 2015 and 2016 (see Methodology for further details). These data may not be nationally representative but provide information about resistance patterns in these states. Future reports will aim to include data from all jurisdictions.

In 2016, 12% of new HIV notifications tested for HIV drug resistance had any surveillance drug resistance mutation. The prevalence of surveillance drug resistance mutations varied by drug class: 2% for protease inhibitors, 3% for nucleoside reverse transcriptase inhibitors, and 9% for non-nucleoside reverse transcriptase inhibitors (Table 1.4.5). There were four surveillance drug resistance mutations detected in South Australia for 2015 and none in 2016, for emtricitabine (one of the drugs commonly used for PrEP in Australia in combination with tenofovir, known as Truvada) (data not shown).

Table 1.4.5 Proportion of HIV notifications with surveillance drug resistance mutations, 2015–2016, overall and in male-to-male sex exposure category

	Individuals tested (n)	Protease inhibitor (%)	Nucleoside reverse transcriptase inhibitor (%)	Non-nucleoside reverse transcriptase inhibitor (%)	Any surveillance drug resistance mutation (%)
HIV Exposure Category					
2015					
Male-male-sex	213	6 (2.8%)	11 (5.2%)	12 (5.6%)	25 (11.7%)
All Exposures	270	6 (2.2%)	14 (5.2%)	12 (4.4%)	28 (10.4%)
2016					
Male-to-male sex	205	3 (1.5%)	7 (3.4%)	20 (9.8%)	25 (12.2%)
All Exposures	244	5 (2.0%)	8 (3.3%)	22 (9.0%)	29 (11.9%)

Note: New South Wales and South Australia. Excludes notifications where HIV subtype testing was not performed.

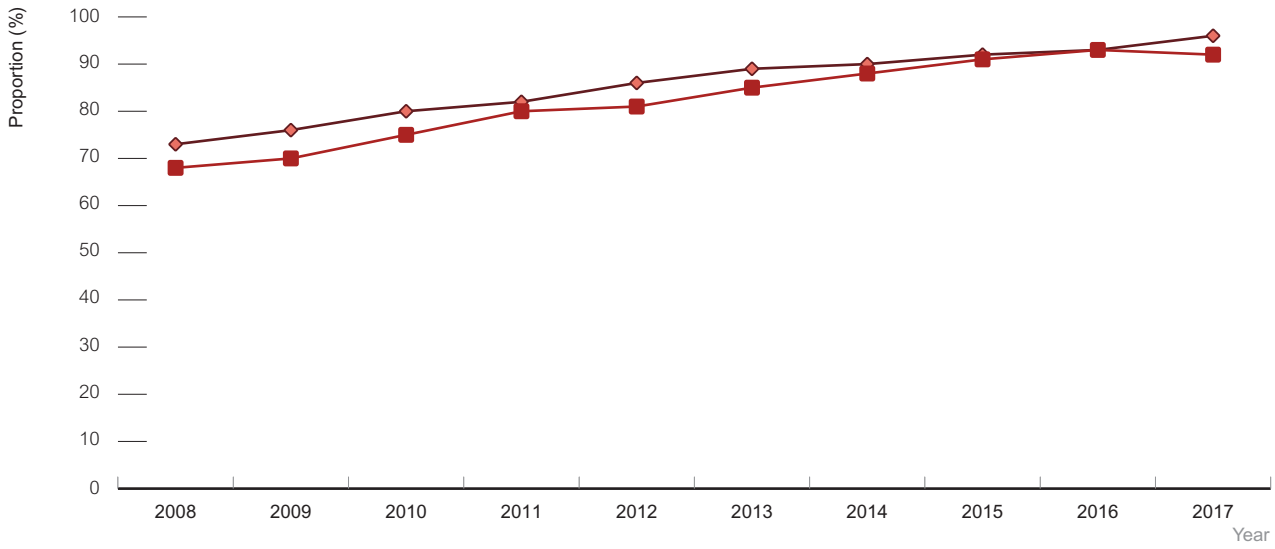
Source: State/territory health authorities; NSW NHMRC Partnership Project; see Methodology for detail.

Suppressed viral load

HIV viral load represents the amount of HIV virus in a person's blood, with higher levels increasing the chances of HIV transmission during risk exposures. Studies have shown that regularly taking combination antiretroviral treatment sustains a suppressed viral load and reduces the likelihood of HIV transmission to effectively zero.[16] As treatment coverage has increased in Australia, there has been a corresponding increase in the proportion of people with suppressed viral load (<200 copies/mL). This increase has been observed consistently in two difference data sources: from 86% in 2012 to 96% in 2017 in the Australian HIV Observational Database and from 79% in 2012 to 91% in 2017 at 44 sexual health clinics across Australia participating in the ACCESS network (Figure 1.4.10). See Methodology for further detail.

Among priority populations accessing sexual health clinics, the highest proportion with a suppressed viral load in 2017 was gay and bisexual men (92%), followed by people from a NESB (89%) (Figure 1.4.11). A lower but still substantial proportion of people who inject drugs achieved suppressed viral load in 2017 (79%).

Figure 1.4.10 Proportion of patients with suppressed viral load from patients in the Australian HIV Observational Database, and gay and bisexual men attending sexual health clinics and high case load GP clinics in ACCESS, 2008–2017



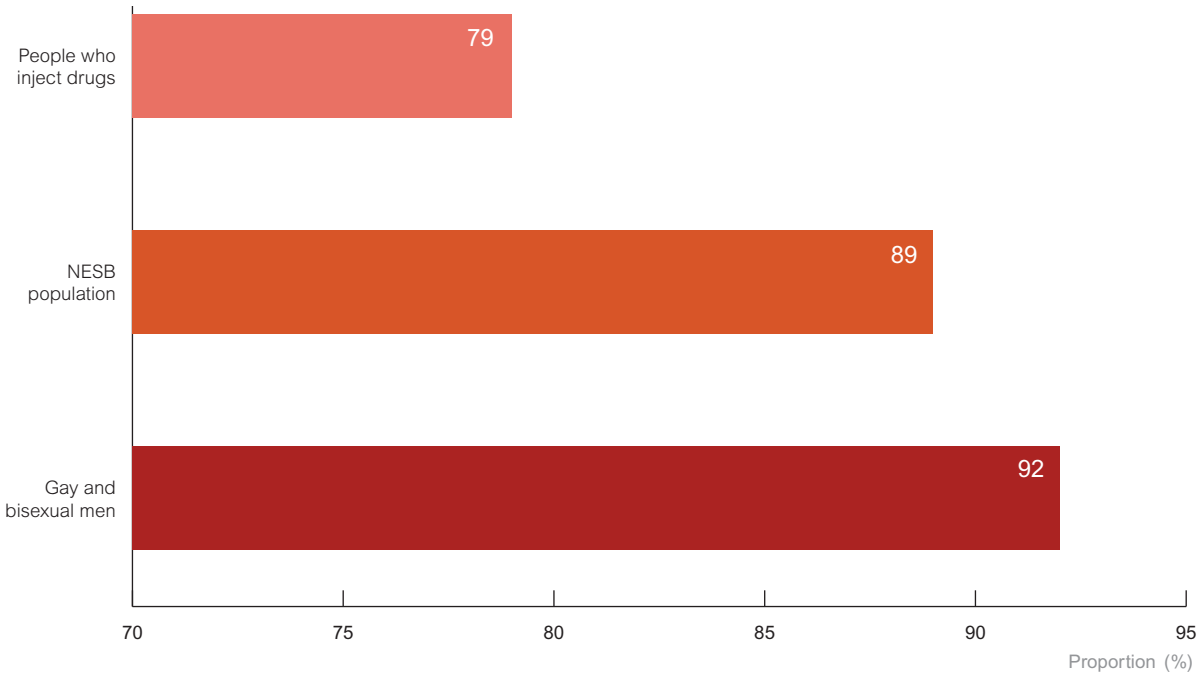
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AHOD (%)	73	76	80	82	86	89	90	92	93	96
Gay and bisexual men (%)	68	70	75	80	81	85	88	91	93	92

Note: Suppressed viral load equals 200 copies/mL or less. High-caseload general practice clinics include primary healthcare general practice clinics with a high-caseload of gay and bisexual men.

Source: Australian HIV Observational Database, ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail.

HIV

Figure 1.4.11 Proportion of patients with suppressed viral load from patients attending sexual health clinics, 2017, by priority population



Note: Suppressed viral load equals 200 copies/mL or less. High-caseload general practice clinics include primary healthcare general practice clinics with a high-caseload of gay and bisexual men.

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for detail.

1.5 HIV prevention

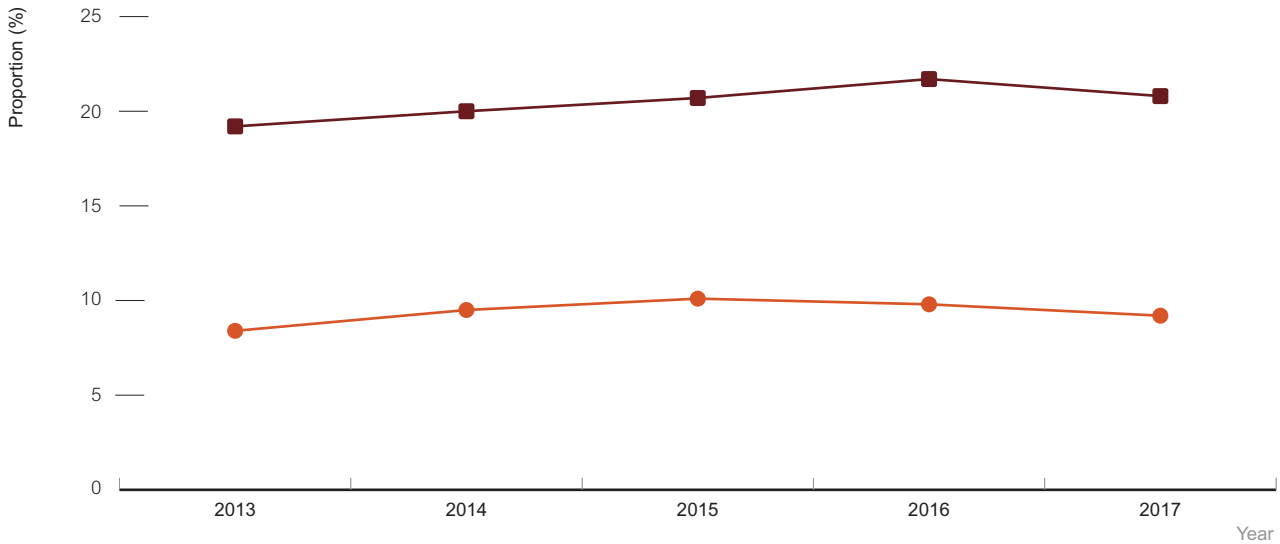
Primary prevention strategies aim to protect people from acquiring HIV. They include: condom use; harm reduction strategies such as needle and syringe programs, opioid substitution therapy and peer interventions to reduce injecting risk behaviour;[17, 18] and biomedical prevention strategies such as post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP). Testing and treatment are secondary prevention, as they prevent transmission to others due to behavioural change after diagnosis, or starting treatment and achieving undetectable (suppressed) viral load, which reduces the risk of onward transmission to zero.

According to the Gay Community Periodic Surveys, 30% of HIV-negative gay and bisexual men engaging in anal intercourse (insertive or receptive) with casual partners in the past six months reported not consistently using condoms or biomedical preventions with casual partners of unknown HIV or PrEP status. This proportion has been stable in the last five years and was 28% in 2013 (Figure 1.5.1).

In contrast, the number of men using biomedical prevention strategies, such as PrEP, has increased (see section on pre-exposure prophylaxis below). Further information regarding sexual risk behaviour appears in the *Annual reports of trends in behaviour*,[3] prepared by the Centre for Social Research in Health.

Information on condom use in the Australian population is also available. The Australian Study of Health and Relationships (ASHR) is a national population-representative telephone survey of 20 000 people conducted every 10 years. The second ASHR, conducted in 2012–2013, indicated that about half of heterosexual men (48%) and women (47%) who had casual partners in the previous six months reported always using condoms. Of men who had anal intercourse with casual male partners, 58% reported that they had always used condoms in the previous six months.[19]

Figure 1.5.1 HIV risk behaviour in men with casual partners, 2013–2017



	2013	2014	2015	2016	2017
CLAIC (any receptive): HIV negative not on PrEP/HIV status unknown (%)	19.2	20	20.7	21.7	20.8
CLAIC (insertive only): HIV-negative not on PrEP/HIV status unknown (%)	8.4	9.5	10.1	9.8	9.2

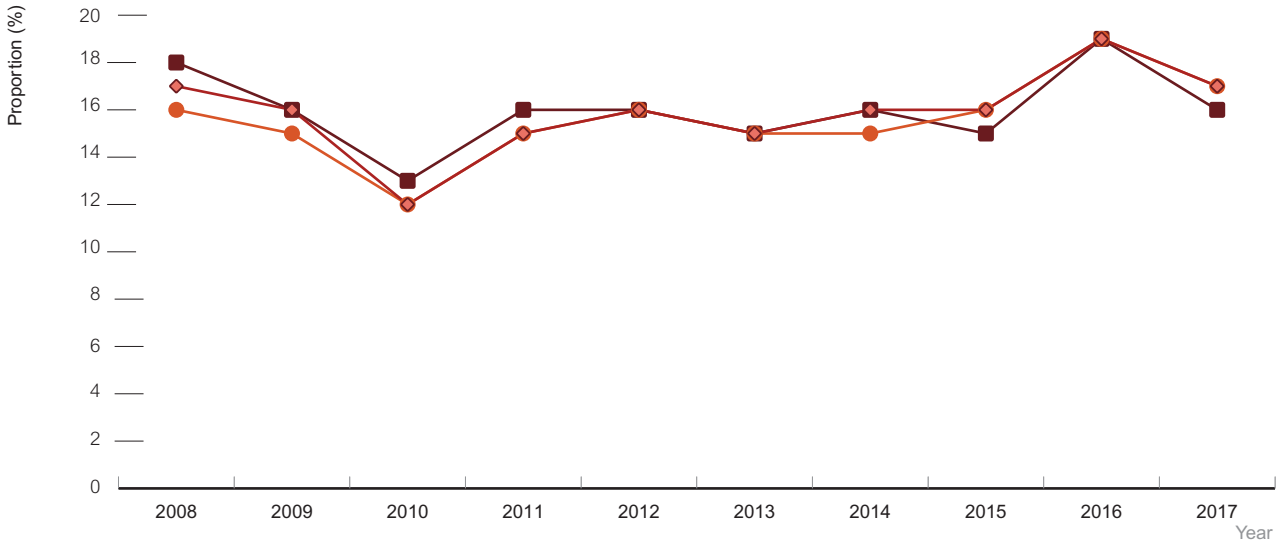
Note: Unadjusted data; CLAIC – condomless anal intercourse; UVL – undetectable viral load.

Source: Gay Community Periodic Surveys; see Methodology for detail.

Use of sterile needles and syringes

The reuse of needles and syringes that have been used by others (receptive syringe sharing) is the major risk factor for the transmission of HIV and viral hepatitis among people who inject drugs. Harm reduction strategies such as needle and syringe programs, opioid substitution therapy and peer interventions can reduce injecting risk behaviour.[17, 18] Opioid substitution has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[20-22] Health promotion is important to enhance the effectiveness of these harm reduction strategies and to support people to inject safely. Each year over the past 10 years, between 12% and 19% of people who inject drugs attending needle and syringe programs reported receptive syringe sharing in the last month, with similar rates in men and women (Figure 1.5.2).

Figure 1.5.2 Proportion of people seen at needle and syringe programs reporting receptive syringe sharing in the past month, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men (%)	16	15	12	15	16	15	15	16	19	17
Women (%)	18	16	13	16	16	15	16	15	19	16
Total (%)	17	16	12	15	16	15	16	16	19	17

Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

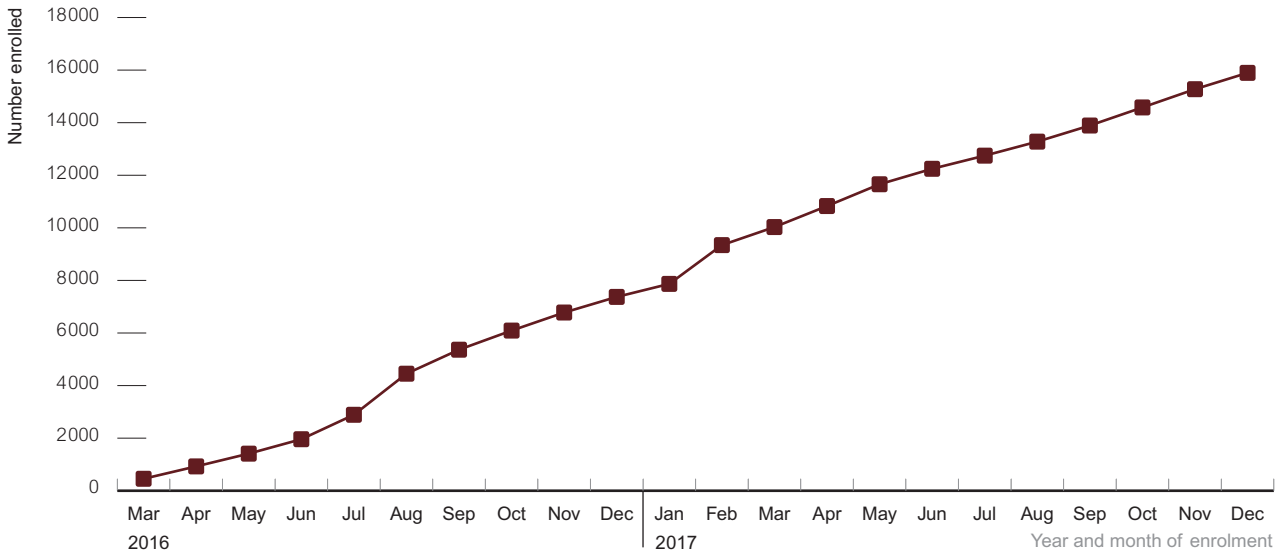
Blood screening

Since 1985, all blood donors have been screened for HIV to prevent onward transmission. There has been no known case of HIV acquisition through blood transfusion in Australia since the late 1990s. For further information, see *Transfusion-transmissible infections in Australia: 2017 surveillance report*, prepared by the Kirby Institute, UNSW Sydney and Australian Red Cross Blood Service.[23]

Pre-exposure prophylaxis (PrEP)

PrEP is the use of antiretroviral treatment by HIV-negative people to reduce their risk of acquiring HIV. PrEP is highly effective in people who use it according to guidelines. From 2014, small-scale PrEP demonstration projects commenced in New South Wales and Victoria and in 2015 in Queensland. In 2016 large state-funded PrEP implementation programs commenced in New South Wales (March), Victoria (July) and Queensland (November). By November 2017, with the exception of the Northern Territory, every state had initiated a PrEP implementation program. Enrolment data from these implementation projects show that 15 895 gay men in Australia were taking PrEP to prevent HIV by the end of 2017 (Figure 1.5.3). In addition, some people who are not included in these data are accessing PrEP by personally importing PrEP from overseas.

Figure 1.5.3 Cumulative number of gay men enrolled in PrEP implementation programs, 2016 and 2017, by month



Mar 2016	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2017	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
455	926	1411	1960	2889	4452	5365	6092	6779	7373	7868	9343	10 030	10 829	11 658	12 246	12 746	13 279	13 892	14 580	15 274	15 895

Source: EPIC-NSW (New South Wales), QPrEPd (Queensland) and PrEPX (Victoria); see Methodology for detail.

HIV

2 Hepatitis C

2.1 Hepatitis C notifications

This section focuses on people notified with hepatitis C in Australia, including newly acquired hepatitis C notifications (evidence of hepatitis C acquisition within two years before diagnosis) and unspecified hepatitis C notifications (cases that do not meet any of the criteria for a newly acquired case and are aged more than 24 months at time of diagnosis).

A total of 10 537 hepatitis C notifications were reported in Australia in 2017, of which 1210 (11%) occurred among Aboriginal and Torres Strait Islander people and 4145 (39%) were among the non-Indigenous population; there were a further 5182 (49%) notifications in people whose Indigenous status was not reported. Aboriginal and Torres Strait Islander people comprise 3% of the Australian population, but accounted for at least 11% of all hepatitis C notifications in 2017, reflecting a disproportionate burden of disease (Table 2.1.1).

In 2017, a majority of cases of hepatitis C notifications were in males (69%, 7256), 89% (9378) were in people aged 25 years and above, and 58% (6111) were diagnosed in people residing in major cities. The majority of notifications in 2017 (94%, 9924) were reported as unspecified and only 613 (6%) were reported as newly acquired infections (Table 2.1.1).

Table 2.1.1 Characteristics of new hepatitis C notifications, 2008–2017

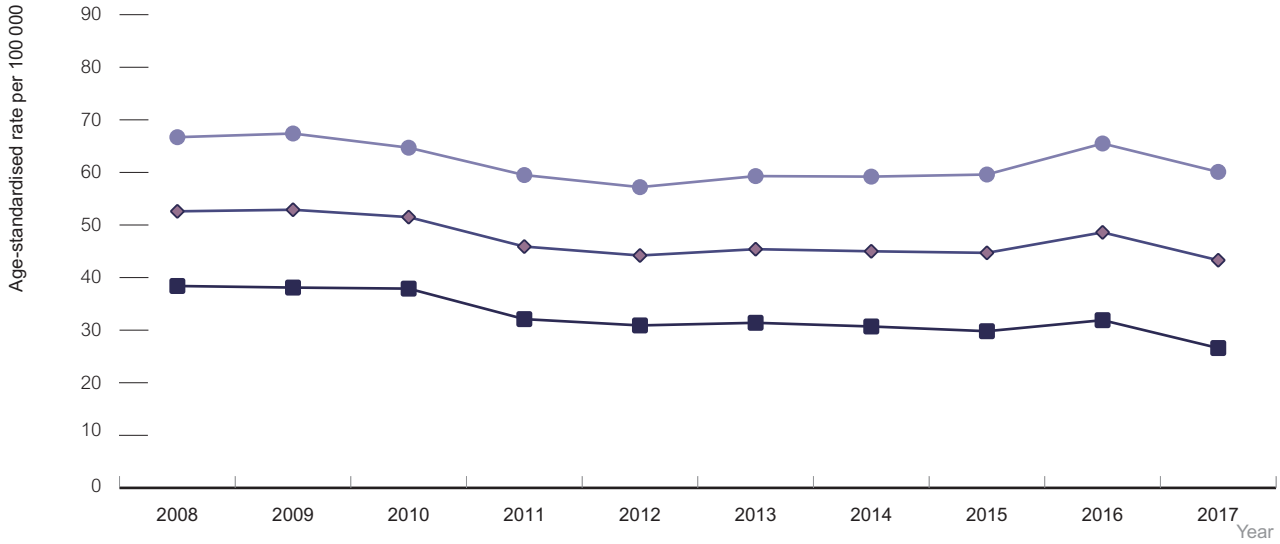
	Year of diagnosis									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Characteristic										
Total cases	11 018	11 338	11 219	10 120	9 927	10 403	10 446	10 551	11 637	10 537
Sex										
Male	6 960	7 191	7 026	6 536	6 425	6 775	6 849	6 992	7 766	7 256
Female	4 034	4 091	4 120	3 551	3 479	3 604	3 581	3 535	3 850	3 263
Missing	24	56	73	33	23	24	16	24	21	18
Age group										
0-14	34	49	43	31	32	23	36	25	26	26
15-19	291	277	245	241	242	300	218	218	225	194
20-24	1 059	981	947	881	915	991	906	965	919	935
25-29	1 563	1 537	1 505	1 304	1 293	1 210	1 221	1 228	1 284	1 232
30-39	3 130	3 215	3 251	2 833	2 748	2 831	2 859	2 848	3 056	2 732
40+	4 940	5 256	5 198	4 811	4 689	5 034	5 196	5 250	6 121	5 414
Missing	1	23	30	19	8	14	10	16	6	4
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	693	652	766	782	835	902	983	1 023	1 151	1 210
Non-Indigenous	4 730	4 431	4 367	3 927	3 873	3 918	3 805	3 781	4 481	4 145
Not reported	5 595	6 255	6 086	5 411	5 219	5 583	5 658	5 747	6 005	5 182
Newly acquired[a]	364	401	383	621	707	669	710	820	741	613
Area of residence										
Major cities	6 968	7 256	7 078	6 425	6 103	6 565	6 359	6 377	7 025	6 111
Inner regional	2 354	2 215	2 190	2 012	2 018	2 064	2 305	2 297	2 600	2 366
Outer regional	1 059	988	1 004	973	1 072	1 123	1 105	1 184	1 216	1 179
Remote	203	181	185	180	176	190	159	178	156	162
Very remote	86	72	67	68	86	72	71	64	83	55
Missing data	348	626	695	462	472	389	447	451	557	664
State/territory										
ACT	200	163	223	188	145	183	174	188	184	138
NSW	3 407	4 034	3 929	3 347	3 261	3 508	3 521	3 511	4 029	4 078
NT	209	168	169	206	191	256	180	200	194	151
QLD	2 568	2 613	2 618	2 372	2 336	2 440	2 552	2 532	2 770	2 362
SA	578	545	528	516	512	526	494	503	527	438
TAS	347	281	267	229	262	229	231	263	257	233
VIC	2 367	2 412	2 438	2 192	2 164	2 172	2 171	2 233	2 472	1 953
WA	1 342	1 122	1 047	1 070	1 056	1 089	1 123	1 121	1 204	1 184

a Newly acquired hepatitis C is defined as newly diagnosed hepatitis C infection with laboratory or clinical evidence of acquisition in the two years before diagnosis. Enhanced surveillance procedures related to hepatitis C vary by state/territory. The total number of cases reported here is likely to be an underestimation of the true number of newly acquired infections.

Source: Australian National Notifiable Diseases Surveillance System.

Between 2008 and 2017 there was a 16% decrease in the hepatitis C notification rate from 52.6 to 44.2 per 100 000 (Figure 2.1.1). The notification rates declined by 16% between 2008 and 2012, and have been relatively stable since, with an increase in 2016. This pattern is seen in both males and females (Figure 2.1.1). It is important to note that the increase in notification rate in 2016 may reflect increased testing in response to the availability of new direct-acting antiviral treatments.

Figure 2.1.1 Hepatitis C notification rate per 100 000 population, 2008–2017, by sex



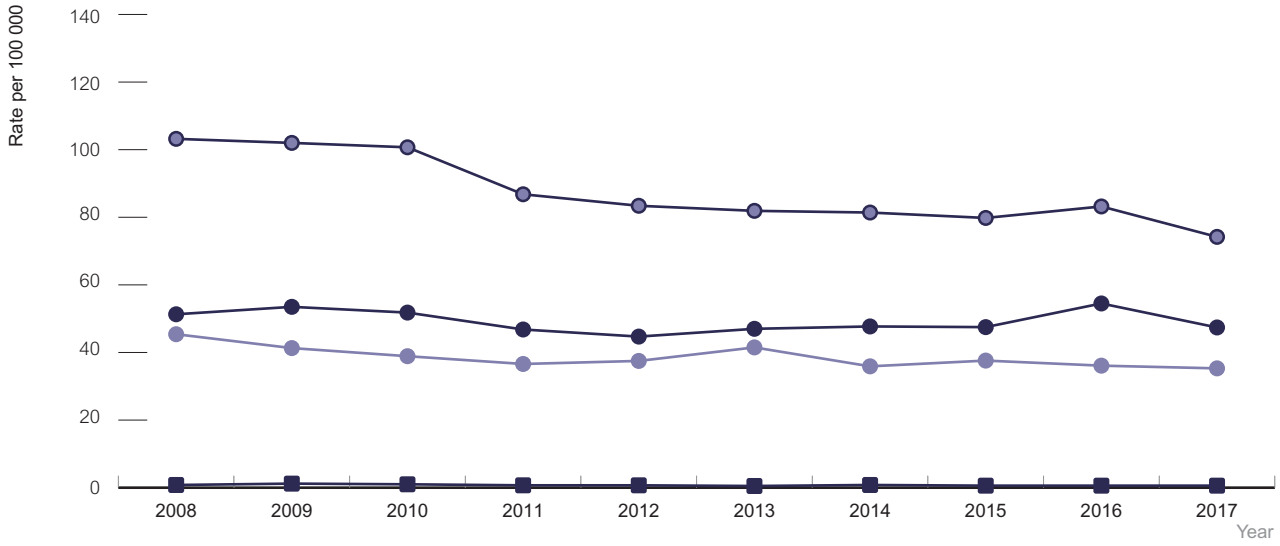
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	66.7	67.4	64.7	59.5	57.2	59.3	59.2	59.6	65.5	60.1
Women	38.4	38.1	37.9	32.1	30.9	31.4	30.7	29.8	31.9	26.6
Total	52.6	52.9	51.5	45.9	44.2	45.4	45.0	44.7	48.6	43.3

Source: Australian National Notifiable Diseases Surveillance System.

The age group 25–39 years has had the highest rate of notification over the past 10 years (2008–2017), which was 74.2 per 100 000 in 2017, compared with 47.4 per 100 000 in the 40+ age group, and 35.3 per 100 000 in the 15–24 age group in 2017 (Figure 2.1.2). Over the past five years (2013–2017), the rate of notification of hepatitis C has declined by 15% in the 15–24 age group, 9% in the 25–39 age group, and remained relatively steady among people aged 40 or over (Figure 2.1.2). A similar pattern by age group was observed among males and females (Figure 2.1.3 and Figure 2.1.4).

As the primary route of transmission of hepatitis C is sharing of injecting equipment, a practice that typically starts in late adolescence or early adulthood, trends in the rate of notifications in those under 25 years can be a proxy for the incidence of hepatitis C infection in recent years.[6] Among people aged under 25 years, there has been a 25% decrease in the notification rate between 2008 and 2017, from 19.6 per 100 000 in 2008 to 14.7 per 100 000 in 2017, with a 16% decline in the last five years (Figure 2.1.5). The decline appears to have been predominantly among females, with a 53% decline from 18.6 per 100 000 in 2008 to 8.8 per 100 000 in 2017. In males the rate of notification has fluctuated over the last 10 years, with no change overall at 20.4 per 100 000 in 2008 and 20.2 per 100 000 in 2017 (Figure 2.1.5).

Figure 2.1.2 Hepatitis C notification rate per 100 000 population, 2008–2017, by age group



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.8	1.2	1.0	0.7	0.7	0.5	0.8	0.6	0.6	0.6
15–24	45.4	41.3	38.9	36.6	37.5	41.5	35.9	37.6	36.1	35.3
25–39	103.2	102.0	100.7	86.8	83.4	81.9	81.4	79.8	83.2	74.2
40+	51.3	53.5	51.8	46.8	44.7	47.0	47.7	47.5	54.5	47.4

Source: Australian National Notifiable Diseases Surveillance System.

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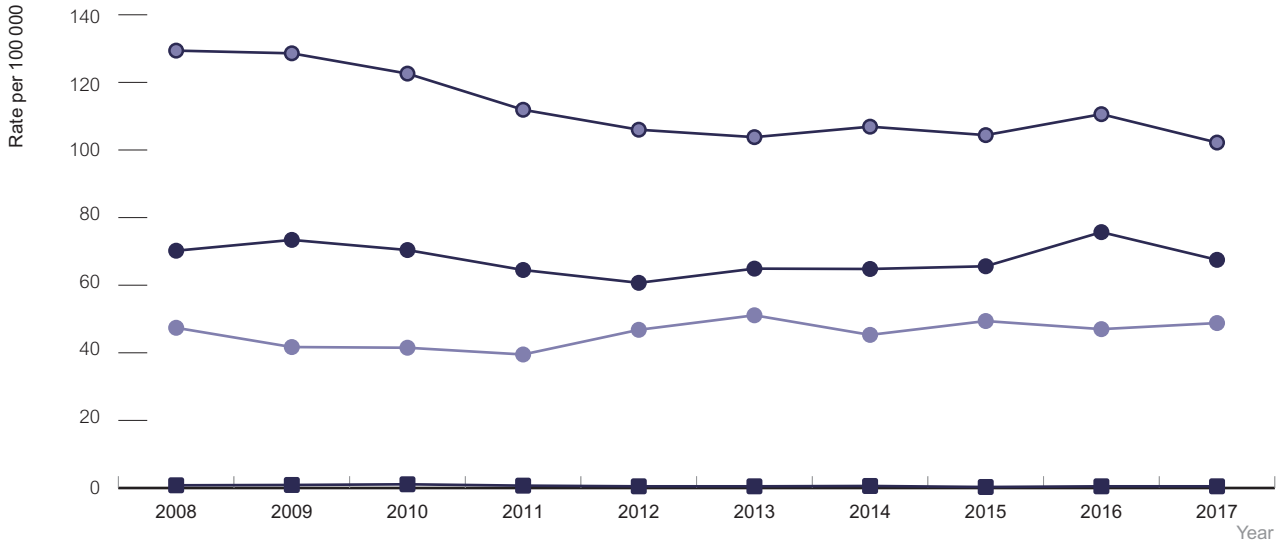
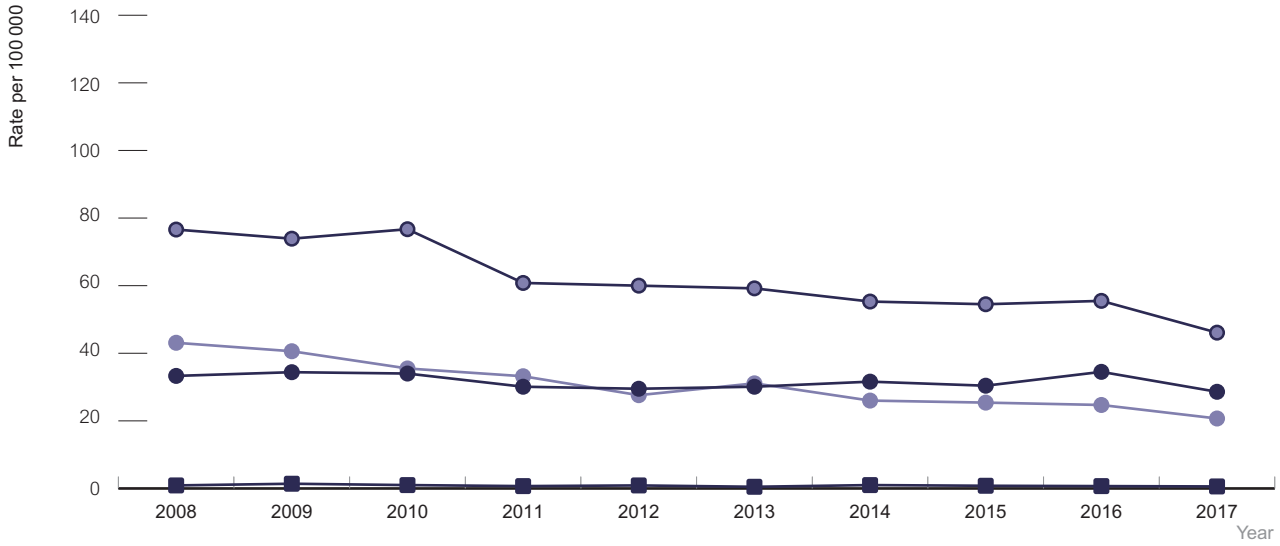
Figure 2.1.3 Hepatitis C notification rate per 100 000 population, 2008–2017, by age group, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.8	0.9	1.1	0.7	0.5	0.5	0.6	0.3	0.5	0.5
15–24	47.4	41.7	41.5	39.5	46.8	51.1	45.3	49.4	47.0	48.8
25–39	129.4	128.6	122.6	111.9	106.0	103.8	106.9	104.4	110.6	102.2
40+	70.2	73.4	70.4	64.5	60.7	64.9	64.8	65.6	75.7	67.5

Source: Australian National Notifiable Diseases Surveillance System.

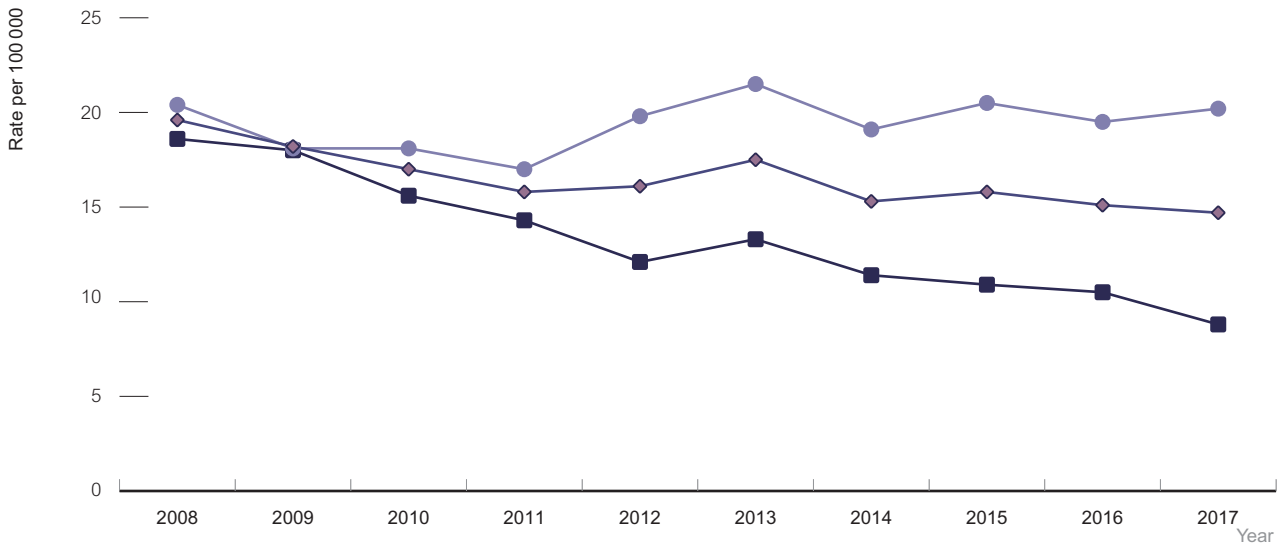
Figure 2.1.4 Hepatitis C notification rate per 100 000 population, 2008–2017, by age group, females



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.9	1.4	1.0	0.7	0.9	0.5	1.0	0.8	0.7	0.6
15–24	43.1	40.6	35.5	33.2	27.6	31.1	26.0	25.4	24.7	20.7
25–39	76.6	73.9	76.7	60.8	60.0	59.2	55.3	54.5	55.5	46.1
40+	33.3	34.4	34.0	30.1	29.5	30.1	31.6	30.4	34.5	28.6

Source: Australian National Notifiable Diseases Surveillance System.

Figure 2.1.5 Hepatitis C notification rate per 100 000 population in people aged 25 years and under, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	20.4	18.1	18.1	17.0	19.8	21.5	19.1	20.5	19.5	20.2
Women	18.6	18.0	15.6	14.3	12.1	13.3	11.4	10.9	10.5	8.8
Total	19.6	18.2	17.0	15.8	16.1	17.5	15.3	15.8	15.1	14.7

Source: Australian National Notifiable Diseases Surveillance System.

The rate of hepatitis C notifications in 2017 was highest in the Northern Territory (58.0 per 100 000), followed by New South Wales (52.3 per 100 000), Queensland (49.0 per 100 000), and Tasmania (48.6 per 100 000) (Figure 2.1.6, Table 2.1.2). Between 2008 and 2017, hepatitis C notification rates declined in all jurisdictions except New South Wales, though with some fluctuations, particularly in the Northern Territory.

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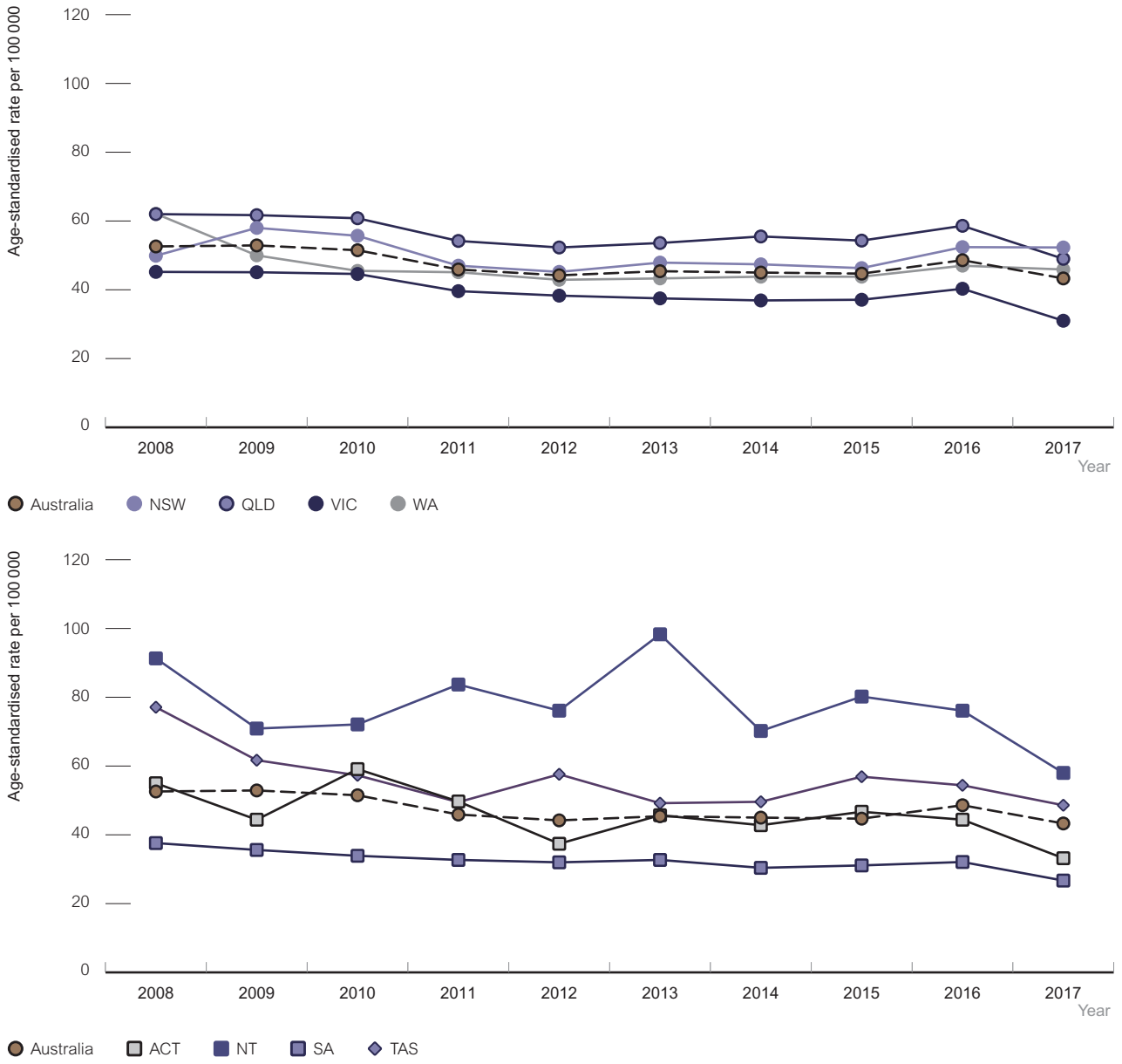
Figure 2.1.6 Hepatitis C notification rate per 100 000 population, 2008–2017, by state/territory



Source: Australian National Notifiable Diseases Surveillance System.

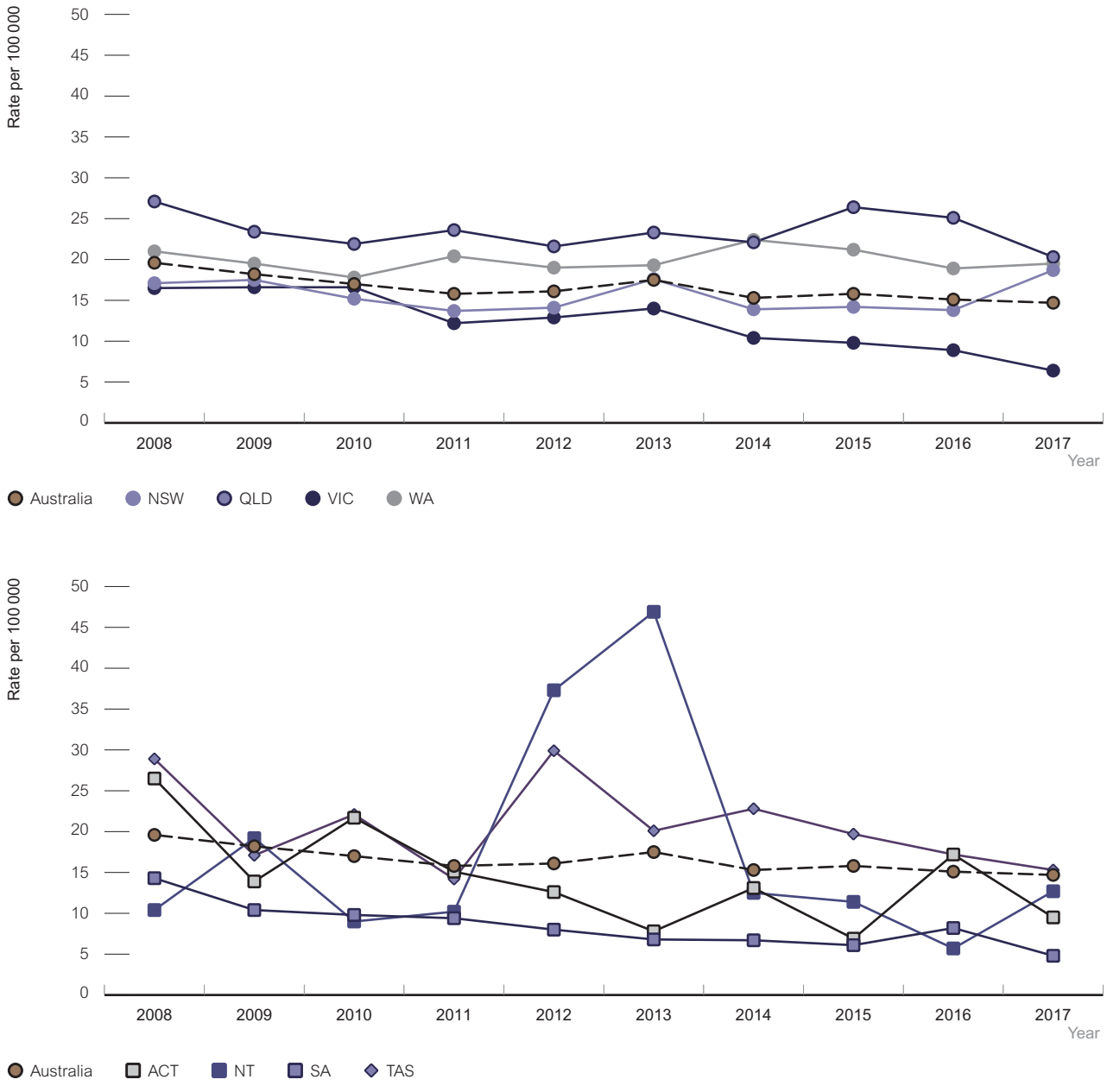
Table 2.1.2 Hepatitis C notification rate per 100 000 population, 2008–2017, by state/territory

State/territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	55.0	44.4	59.1	49.7	37.4	45.7	42.8	46.7	44.4	33.2
New South Wales	49.9	58.0	55.7	47.0	45.2	47.9	47.4	46.3	52.4	52.3
Northern Territory	91.3	70.9	72.1	83.7	76.1	98.3	70.2	80.2	76.1	58.0
Queensland	62.0	61.7	60.8	54.2	52.3	53.6	55.5	54.3	58.6	49.0
South Australia	37.6	35.6	33.9	32.7	32.0	32.7	30.4	31.1	32.1	26.7
Tasmania	77.1	61.7	57.3	49.5	57.6	49.2	49.6	56.9	54.4	48.6
Victoria	45.2	45.1	44.6	39.6	38.3	37.5	36.9	37.1	40.3	31.0
Western Australia	62.1	50.0	45.5	45.0	42.9	43.3	43.8	43.8	47.0	45.9
Australia	52.6	52.9	51.5	45.9	44.2	45.4	45.0	44.7	48.6	43.3

Source: Australian National Notifiable Diseases Surveillance System.

Among people under 25 years of age, the hepatitis C notification rate over the past five years (2013–2017) varied, with stable rates in New South Wales and Western Australia, declines in Victoria, South Australia, and Tasmania, and fluctuating rates in Queensland, the Northern Territory and the Australian Capital Territory (Figure 2.1.7, Table 2.1.3).

Figure 2.1.7 Hepatitis C notification rate per 100 000 population in people under 25 years of age, 2008–2017, by state/territory



Source: Australian National Notifiable Diseases Surveillance System.

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Table 2.1.3 Hepatitis C notification rate per 100 000 population in people under 25 years of age, 2008–2017, by state/territory

State/territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	26.5	13.9	21.7	15.1	12.6	7.8	13.1	6.9	17.2	9.5
New South Wales	17.1	17.5	15.2	13.7	14.1	17.6	13.9	14.2	13.8	18.7
Northern Territory	10.4	19.2	9.0	10.2	37.3	46.9	12.5	11.4	5.7	12.7
Queensland	27.1	23.4	21.9	23.6	21.6	23.3	22.1	26.4	25.1	20.3
South Australia	14.3	10.4	9.8	9.4	8.0	6.8	6.7	6.1	8.2	4.8
Tasmania	28.9	17.1	22.1	14.2	29.9	20.1	22.8	19.7	17.2	15.3
Victoria	26.5	16.6	16.6	12.2	12.9	14.0	10.4	9.8	8.9	6.4
Western Australia	21.0	19.5	17.8	20.4	19.0	19.3	22.4	21.2	18.9	19.5
Australia	19.6	18.2	17.0	15.8	16.1	17.5	15.3	15.8	15.1	14.7

Source: Australian National Notifiable Diseases Surveillance System.

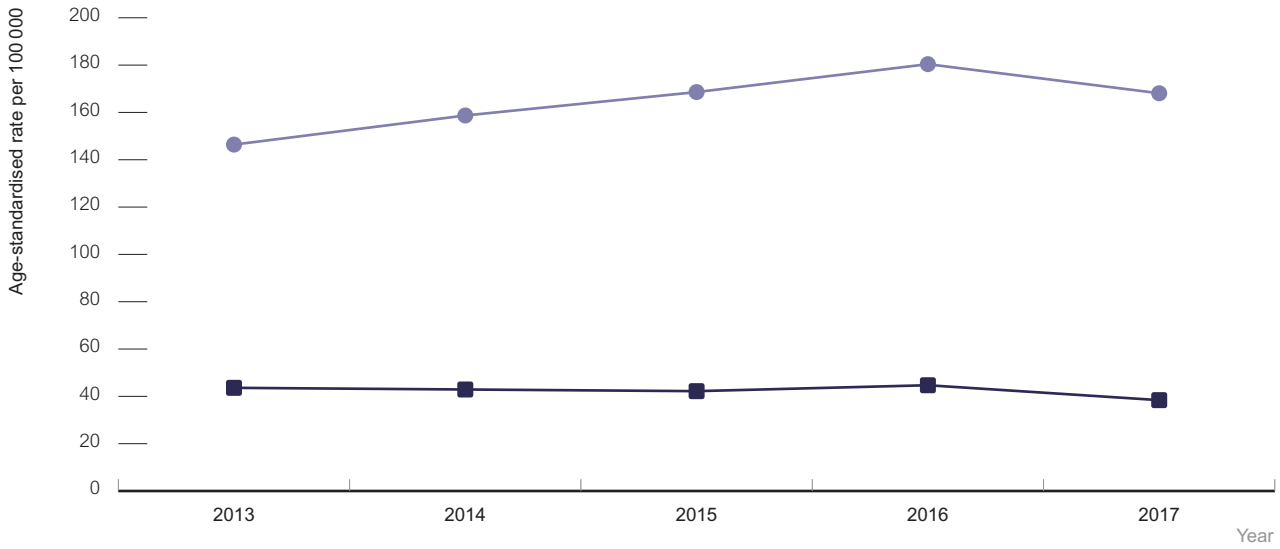
Aboriginal and Torres Strait Islander notification rates for hepatitis C are based on data from five jurisdictions (the Northern Territory, Queensland, South Australia, Tasmania and Western Australia) where Aboriginal and Torres Strait Islander status was ≥50% complete for hepatitis C notifications for each of the five years (2013–2017). Almost two thirds (61%) of the Aboriginal and Torres Strait Islander population reside in these jurisdictions so it is important to note that the notification rates are not necessarily nationally representative. Incomplete information on Aboriginal and Torres Strait Islander status can underestimate the true extent of these infections in the Aboriginal and Torres Strait Islander population and may not reflect national trends.

In 2017, age-standardised rates of hepatitis C notification were four times as high among the Aboriginal and Torres Strait Islander population (168.1 per 100 000) as in the non-Indigenous population (38.4 per 100 000). Rates of hepatitis C diagnosis among Aboriginal and Torres Strait Islander people have increased by 15%, from 146.4 per 100 000 in 2013 to 168.1 per 100 000 in 2017 (Figure 2.1.8), but there has been a 7% decline in the last year, from 180.4 per 100 000 in 2016.

In people aged under 25, the rate of hepatitis C notification in 2017 among Aboriginal and Torres Strait Islander people was six times as high as in non-Indigenous people (76.7 vs 12.2 per 100 000), similar to the 75.4 per 100 000 in 2013, compared with a 22% decrease in non-Indigenous people over the same time period (data not shown). See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further detail.[1]

In Queensland, South Australia and Western Australia, the age-standardised rate of hepatitis C notification was four to eight times as high in the Aboriginal and Torres Strait Islander population as in the non-Indigenous population in 2017, and since 2013 has increased in all South Australia and Western Australia, with the greatest increase in Western Australia (40%) (Figure 2.1.9). In Queensland, similar to nationally overall, the rates increased in 2016, but decreased again in 2017. In the Northern Territory, the rate of hepatitis C notification was lower in the Aboriginal and Torres Strait Islander population than the non-Indigenous population in 2017 (33.8 vs 65.8 per 100 000). In Tasmania the rate of hepatitis C notification was higher in the Aboriginal and Torres Strait Islander population than in the non-Indigenous population in 2017 (95.0 vs 45.4 per 100 000), but the notification rates in the Aboriginal and Torres Strait Islander population fluctuated over the past five years between 62.7 and 97.2 per 100 000 (Figure 2.1.9).

Figure 2.1.8 Hepatitis C notification rate per 100 000 population, 2013–2017, by Aboriginal and Torres Strait Islander status



	2013	2014	2015	2016	2017
Non-Indigenous	43.6	42.9	42.2	44.7	38.4
Aboriginal and Torres Strait Islander	146.4	158.7	168.6	180.4	168.1

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year (Northern Territory, Queensland, South Australia, Tasmania and Western Australia).

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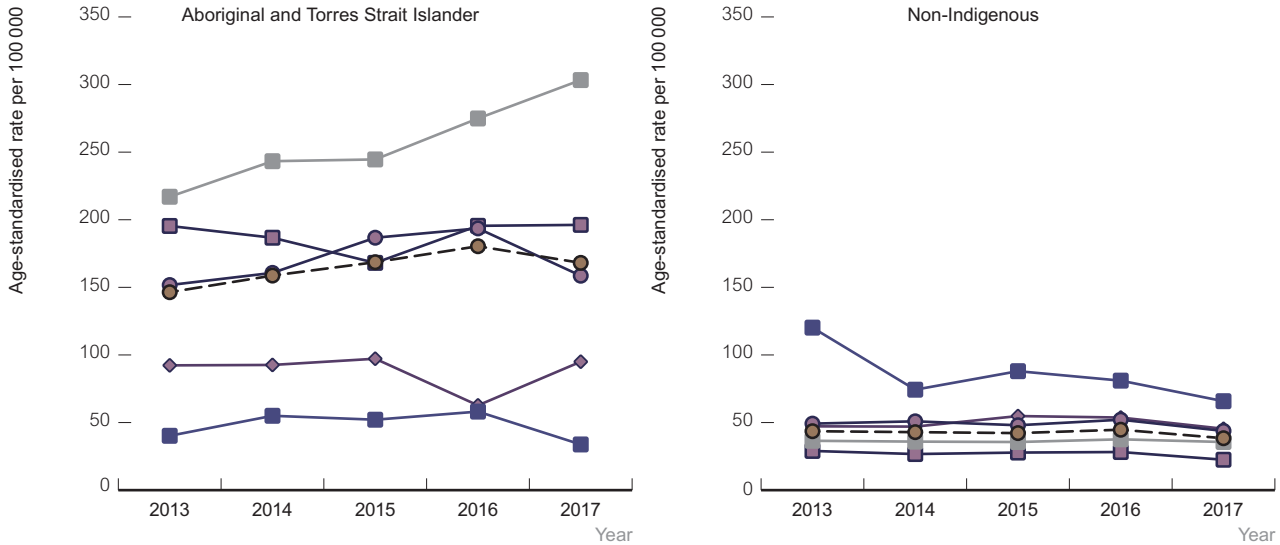
Figure 2.1.9 Hepatitis C notification rate per 100 000 people, 2013–2017, by Aboriginal and Torres Strait Islander status and state/territory



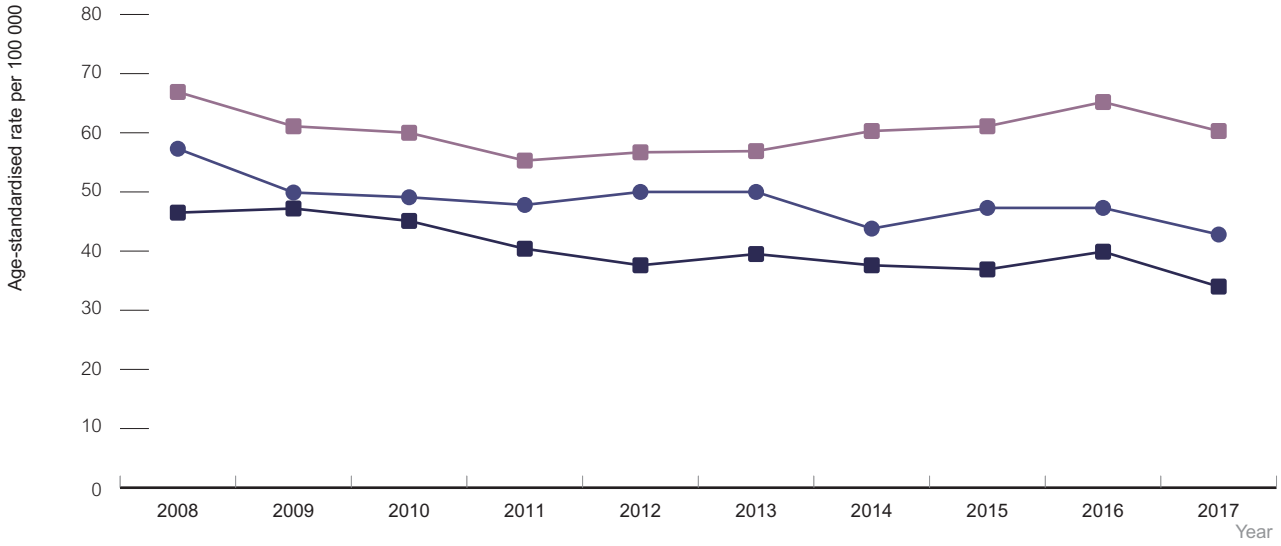
	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Australia	146.4	158.7	168.6	180.4	168.1	43.6	42.9	42.2	44.7	38.4
NT	40.2	55.0	52.1	58.1	33.8	120.2	74.3	88.0	81.0	65.8
TAS	92.3	92.6	97.2	62.7	95.0	47.2	47.0	54.8	53.7	45.4
WA	217.0	243.3	244.6	274.9	303.3	36.5	35.9	35.6	37.6	35.6
SA	195.4	186.7	168.1	195.5	196.2	29.0	26.7	27.8	28.2	22.5
QLD	151.7	160.7	186.7	193.6	158.6	49.2	50.9	48.0	52.1	43.8

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year (Northern Territory, Queensland, South Australia, Tasmania and Western Australia).

In 2017, rates of notification of hepatitis C were higher in inner and outer regional areas (60.3 per 100 000) than in remote and very remote areas (42.8 per 100 000) and major cities (34.0 per 100 000) (Figure 2.1.10). Notification rates declined in major cities and remote and very remote areas between 2008 and 2017, with a 27% change in major cities, from 46.5 per 100 000 population in 2008 to 34.0 per 100 000 population in 2017. Notification rates were relatively stable in inner and outer regional areas. In the five-year period 2013–2017, rates were relatively stable in major cities and remote and very remote areas in the four years to 2016, with a decline in the most recent year (Figure 2.1.10). In inner and outer regional areas, rates increased between 2013 and 2016, and then declined again in the most recent year.

Among males, there was very little change in the notification rate in inner and outer regional areas (89.0 in 2008 and 86.9 in 2017), compared with a 26% decline in remote and very remote areas and 22% decline in major cities (Figure 2.1.11). Among females, there was less difference in the notification rates between regions, and in 2017 they were 22.6 per 100 000 in major cities, 34.3 in inner and outer regional areas, and 33.6 in remote and very remote areas. Between 2008 and 2017, the notification rate declined in all regions, by 25% in inner and outer regional and remote and very remote areas, and by 36% in major cities (Figure 2.1.12).

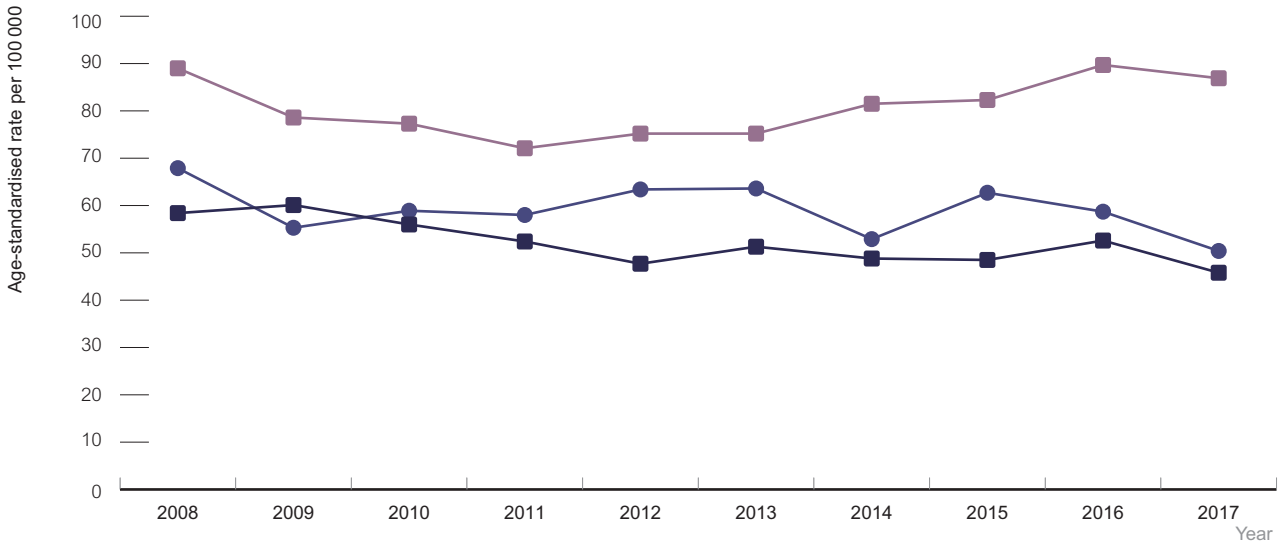
Figure 2.1.10 Hepatitis C notification rate per 100 000 population, 2008–2017, by region of residence



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	46.5	47.2	45.1	40.4	37.6	39.5	37.6	36.9	39.9	34.0
Inner and outer regional	66.9	61.1	60.0	55.3	56.7	56.9	60.3	61.1	65.2	60.3
Remote and very remote	57.3	49.9	49.1	47.8	50.0	50.0	43.8	47.3	47.3	42.8

Source: Australian National Notifiable Diseases Surveillance System.

Figure 2.1.11 Hepatitis C notification rate per 100 000 population, 2008–2017, by region of residence, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	58.4	60.1	56.0	52.4	47.7	51.3	48.8	48.5	52.6	45.8
Inner and outer regional	89.0	78.6	77.3	72.1	75.2	75.2	81.5	82.3	89.7	86.9
Remote and very remote	67.9	55.3	58.9	58.0	63.4	63.6	52.9	62.7	58.7	50.4

Source: Australian National Notifiable Diseases Surveillance System.

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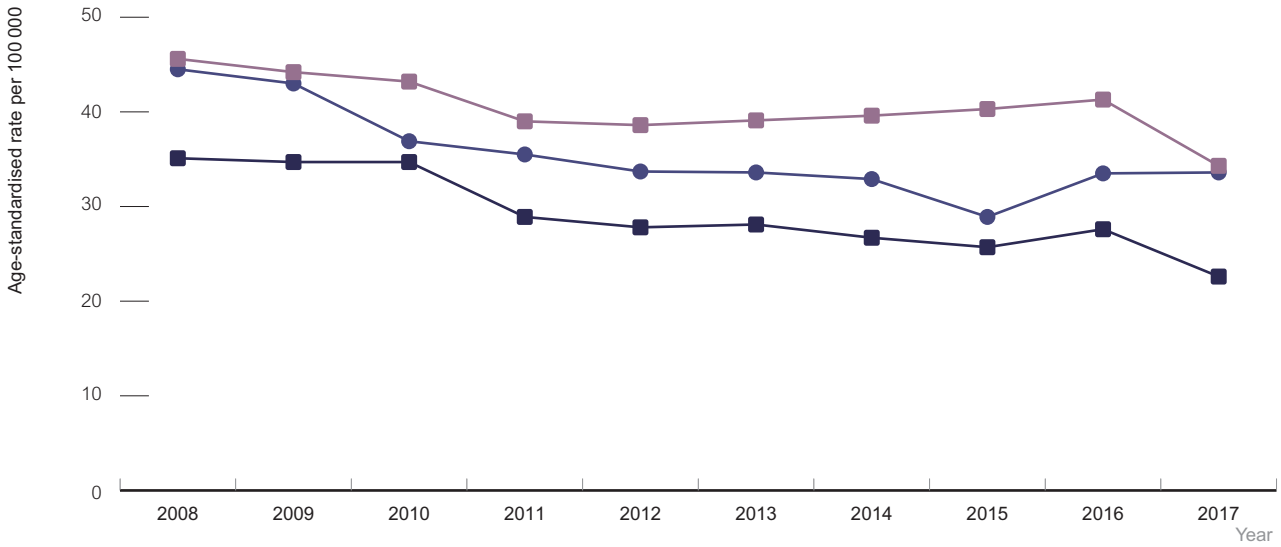
Figure 2.1.12 Hepatitis C notification rate per 100 000 population, 2008–2017, by region of residence, females



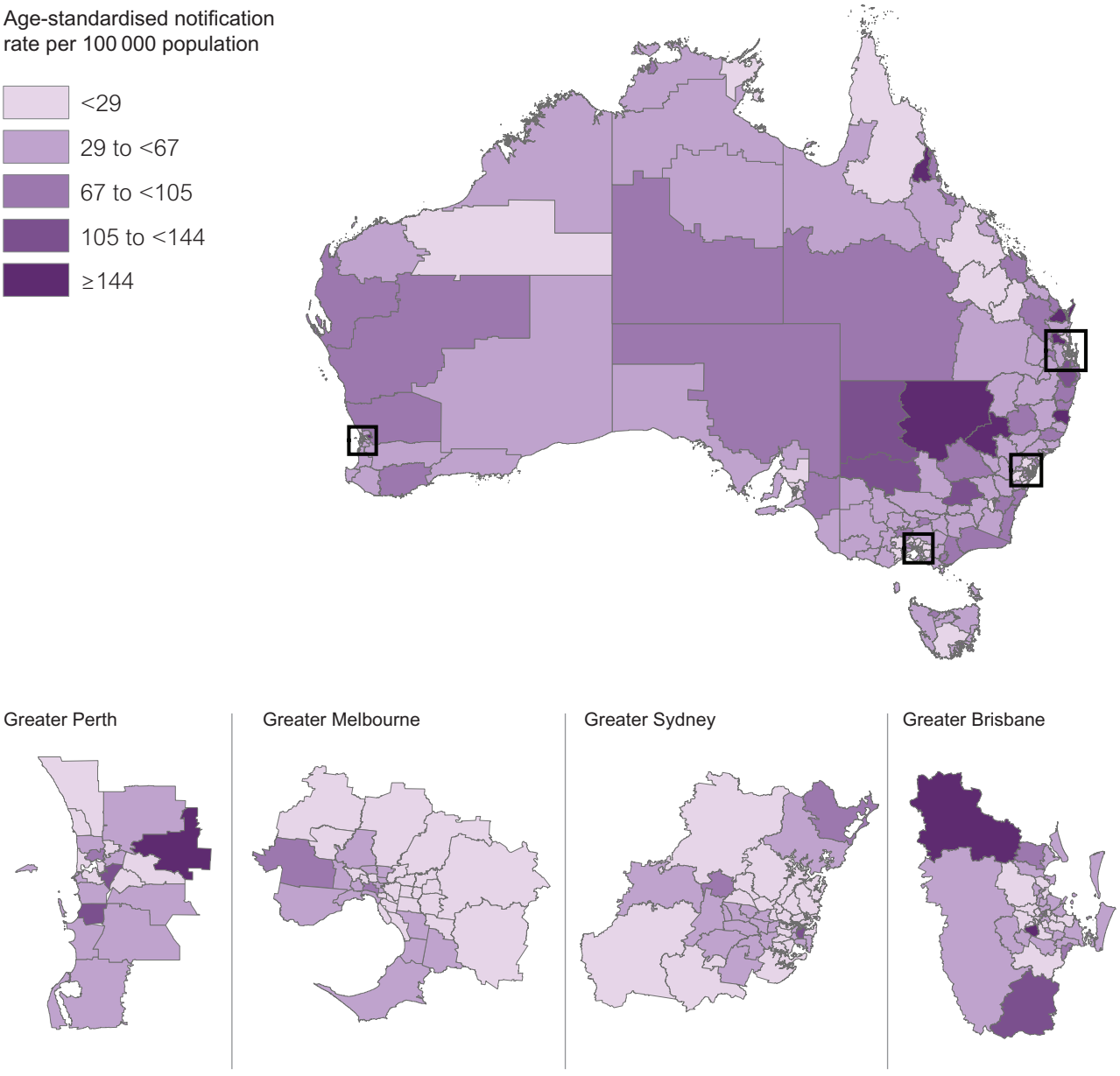
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	35.1	34.7	34.7	28.9	27.8	28.1	26.7	25.7	27.6	22.6
Inner and outer regional	45.6	44.2	43.2	39.0	38.6	39.1	39.6	40.3	41.3	34.3
Remote and very remote	44.5	43.0	36.9	35.5	33.7	33.6	32.9	28.9	33.5	33.6

Source: Australian National Notifiable Diseases Surveillance System.

This report includes age-standardised hepatitis C notification rates by statistical area level 3 (SA3; population size generally between 30 000 and 130 000 persons; see Methodology for details) represented as geographical maps of Australia and major cities (Figure 2.1.13).

Based on average hepatitis C notification rates between 2015 and 2017, there were variations in rates within states and territories as well as major cities. Hepatitis C notification rates were higher predominantly in some parts of the eastern states of Australia and in some areas within major cities (Figure 2.1.13). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of hepatitis C notifications, particularly in SA3s with smaller population sizes. Higher notification rates in some SA3s may be related to viral hepatitis screening programs in prison settings, and may not be representative of the rates in general population in these areas. Caution should be taken in interpreting these rates.

Figure 2.1.13 Average age-standardised hepatitis C notification rate per 100 000 population, by statistical area level 3, 2015–2017, Australia and major cities (population >2 million)



Note: Average hepatitis C notification rates for the three-year period 2015–2017 were used to minimise the influence of fluctuation in the number of hepatitis C notifications.

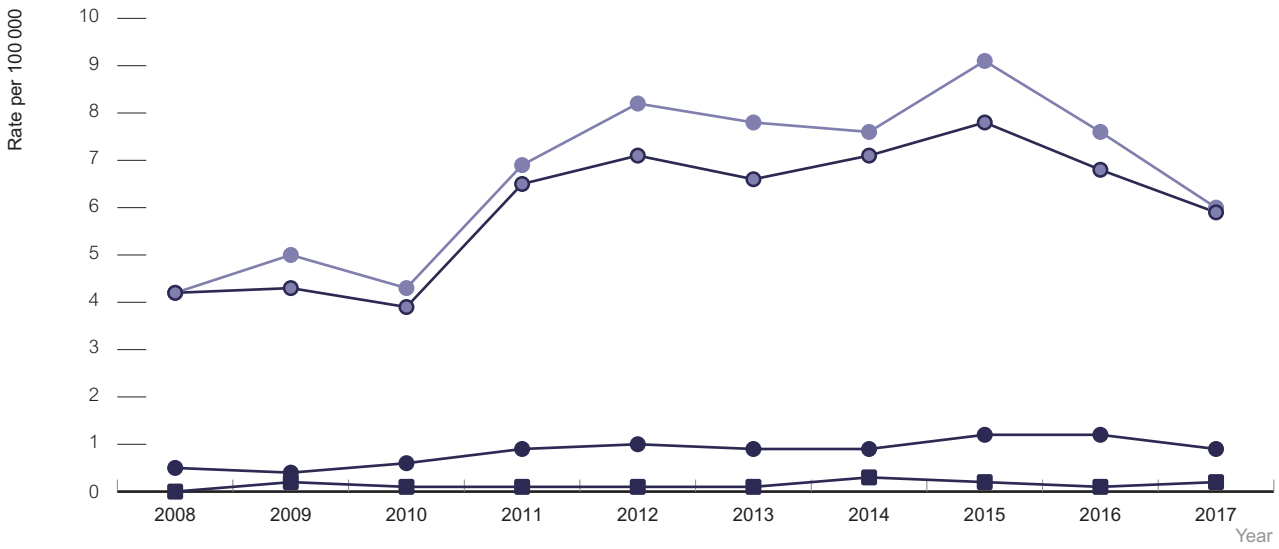
Source: Australian National Notifiable Diseases Surveillance System.

Newly acquired hepatitis C notifications

This section focuses on newly acquired hepatitis C. Hepatitis C is recorded as newly acquired if a person previously known not to have hepatitis C within the last two years has been tested and now found to have it. These data on newly acquired infections should be interpreted with caution, as they are likely to underestimate the true number of newly acquired infections in the community for several reasons. Infections are rarely symptomatic in the early stages and most cases therefore remain undetected. Also, even if testing is conducted, it may be difficult to be sure that an infection was newly acquired unless the person has had a recent negative test before the positive diagnosis or clinical evidence of newly acquired hepatitis C.

Data from Queensland on newly acquired hepatitis C from 2010 onwards have been included in this report, and this should be considered when looking at trends over time. The highest notification rates of newly acquired hepatitis C over the past 10 years (2008–2017) were in the age groups 15–24 and 25–39 years (6.0 and 5.9 per 100 000 in 2017, respectively), with fluctuation between 2010 (when Queensland data were included) and 2015, and a decline between 2015 and 2017 (Figure 2.1.14).

Figure 2.1.14 Newly acquired hepatitis C notification rate per 100 000 population, 2008–2017, by age group



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.0	0.2	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.2
15–24	4.2	5.0	4.3	6.9	8.2	7.8	7.6	9.1	7.6	6.0
25–39	4.2	4.3	3.9	6.5	7.1	6.6	7.1	7.8	6.8	5.9
40+	0.5	0.4	0.6	0.9	1.0	0.9	0.9	1.2	1.2	0.9

Source: Australian National Notifiable Diseases Surveillance System.

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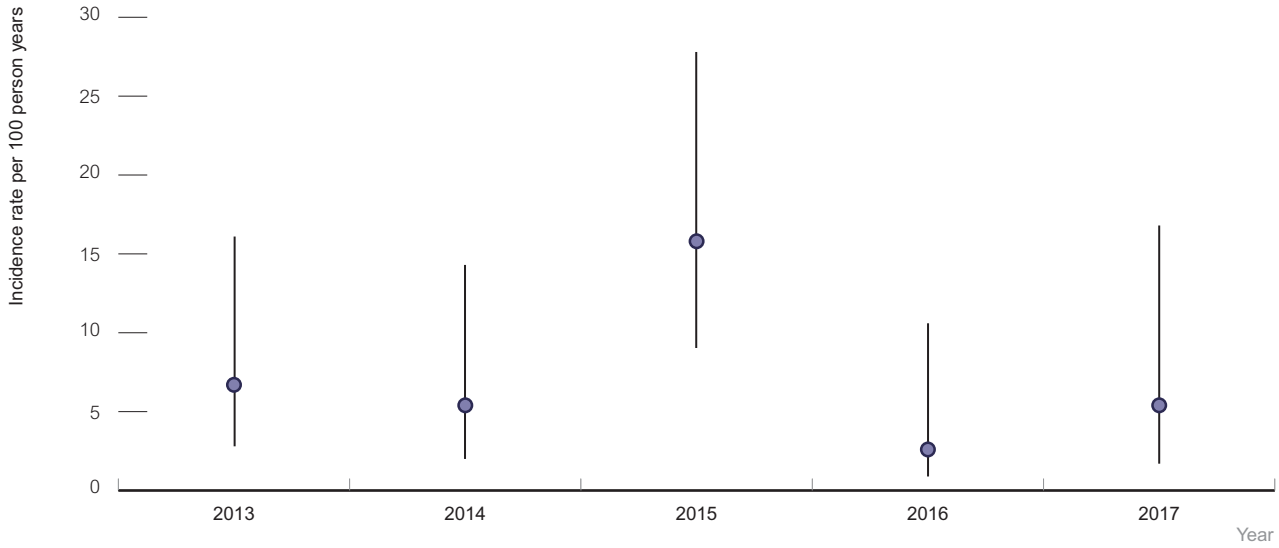
2.2 Hepatitis C incidence

Hepatitis C incidence represents new transmissions and is an important indicator of the effectiveness of prevention programs to protect people from acquiring hepatitis C.

Among people attending the Kirketon Road Centre in Sydney on more than one occasion, hepatitis C incidence over a period of five years (2013-2017) fluctuated between 2.6 and 15.8 per 100 person-years, being lowest in 2016 at 2.6 (Figure 2.2.1).

The confidence intervals for the incidence estimates overlap, meaning the differences observed each year are not statistically significant, and caution should be taken in interpretation due to the small number of seroconversions per year.

Figure 2.2.1 Estimated annual incidence of hepatitis C among people who inject drugs seen at Kirketon Road Centre Sydney, 2013–2017



6.7	5.4	15.8	2.6	5.4

Source: Kirketon Road Centre; see Methodology for detail.

2.3 Number of people living with hepatitis C and prevalence

Number of people living with chronic hepatitis C

At the end of 2017, an estimated 182 144 people were living with chronic hepatitis C in Australia. The highest estimated numbers of people living with chronic hepatitis C were in New South Wales (64 864, 36%), Victoria (46 701, 26%) and Queensland (38 315, 21%), followed by other states and territories (Table 2.1.4).

Table 2.1.4 Estimated number of people living with chronic hepatitis C at the end of 2017, by state/territory

State/territory	Estimated number of people living with chronic hepatitis C at the end of 2017	Range	Proportion of all people living with chronic hepatitis C at the end of 2017
Australian Capital Territory	2 533	1 549 – 2 602	1%
New South Wales	64 588	44 639 – 67 285	35%
Northern Territory	3 131	2 306 – 3 330	2%
Queensland	38 623	27 396– 41 013	21%
South Australia	8 728	5 753 – 8 980	5%
Tasmania	3 349	2 248 – 3 545	2%
Victoria	43 841	30 125 – 45 490	26%
Western Australia	17 075	12 464 – 18 283	9%
Australia	182 144	128 845 – 192 981	100%

Source: See Methodology for detail

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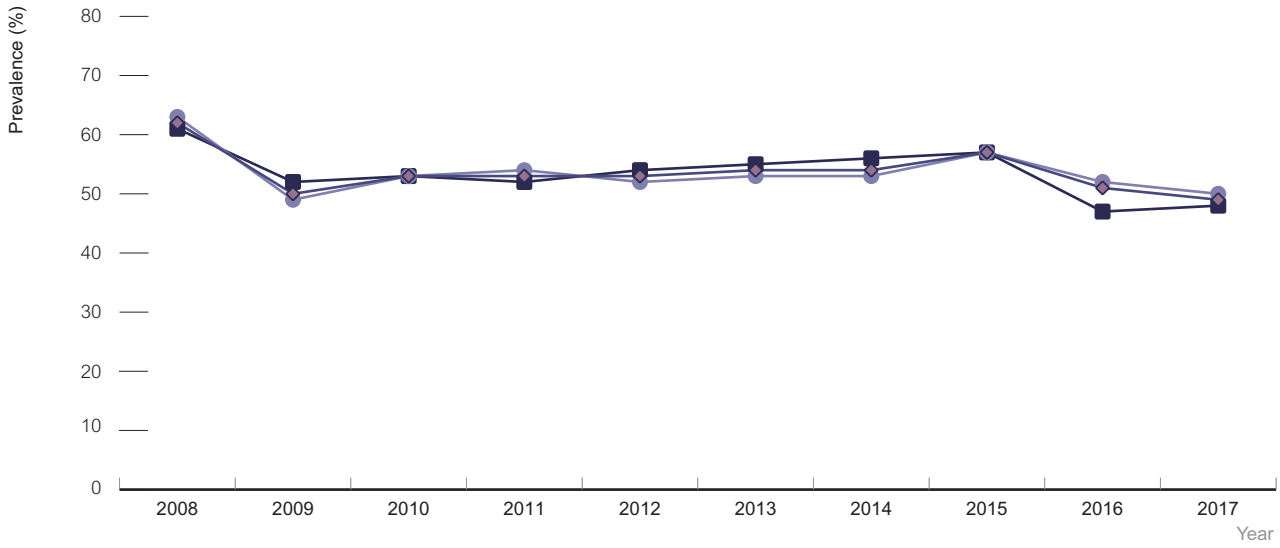
2.4 Hepatitis C prevalence

Australia has a concentrated chronic hepatitis C epidemic among key populations including but not restricted to people who inject drugs, prisoners with a history of injecting drug use, and people from high-prevalence countries (where the prevalence of hepatitis C is higher than 3.5%).

Data collected from the annual Australian Needle and Syringe Program Surveys provide insights into the demographic characteristics, risk behaviour and self-reported bloodborne virus prevalence among people who inject drugs (those who attend needle and syringe programs). According to the Australian Needle and Syringe Program Survey, the prevalence of hepatitis C remains high among people who inject drugs, with 49% hepatitis C antibody prevalence in 2017 (50% among men, 48% among women) (Figure 2.4.1). Hepatitis C antibody prevalence has remained stable in the 10-year period 2008–2017 (Figure 2.4.1). In 2015, the Australian Needle and Syringe Program Survey commenced hepatitis C RNA testing. The hepatitis C RNA prevalence in 2017 was 25% and has declined by 42% since 2015, when it was 43% (Figure 2.4.2).[25] It is important to note that RNA testing is only available for approximately half of the Australian Needle and Syringe Program Survey respondents.

Hepatitis C antibody prevalence is also high among prison entrants at 24% in men and 28% in women in 2016, according to the National Prison Entrants' Bloodborne Virus Survey (Figure 2.4.3).

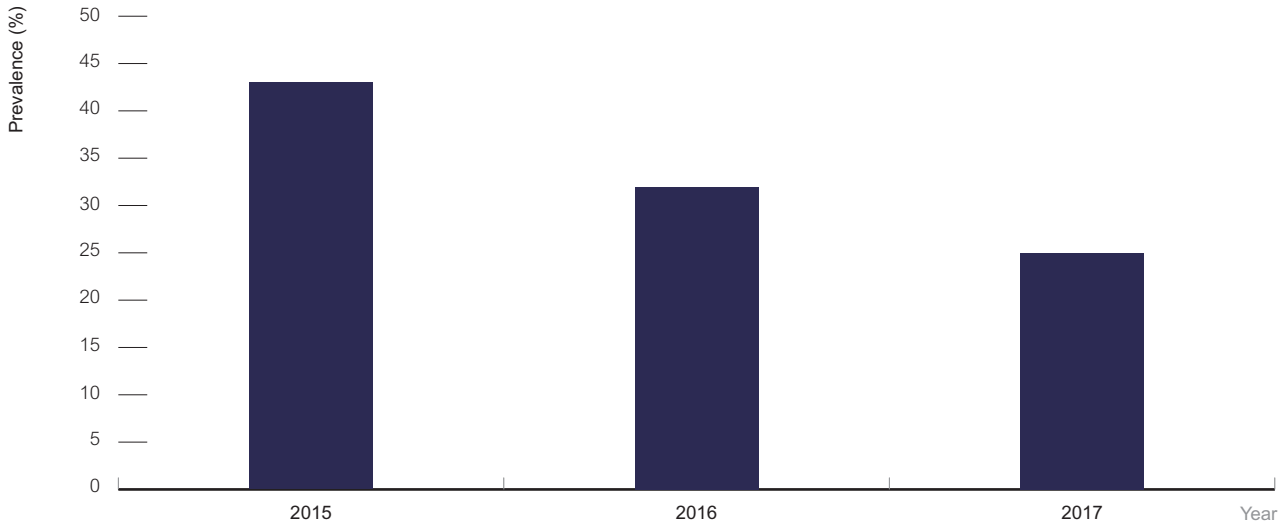
Figure 2.4.1 Hepatitis C antibody prevalence among people seen at needle and syringe programs, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	63	49	53	54	52	53	53	57	52	50
Women	61	52	53	52	54	55	56	57	47	48
Total	62	50	53	53	53	54	54	57	51	49

Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

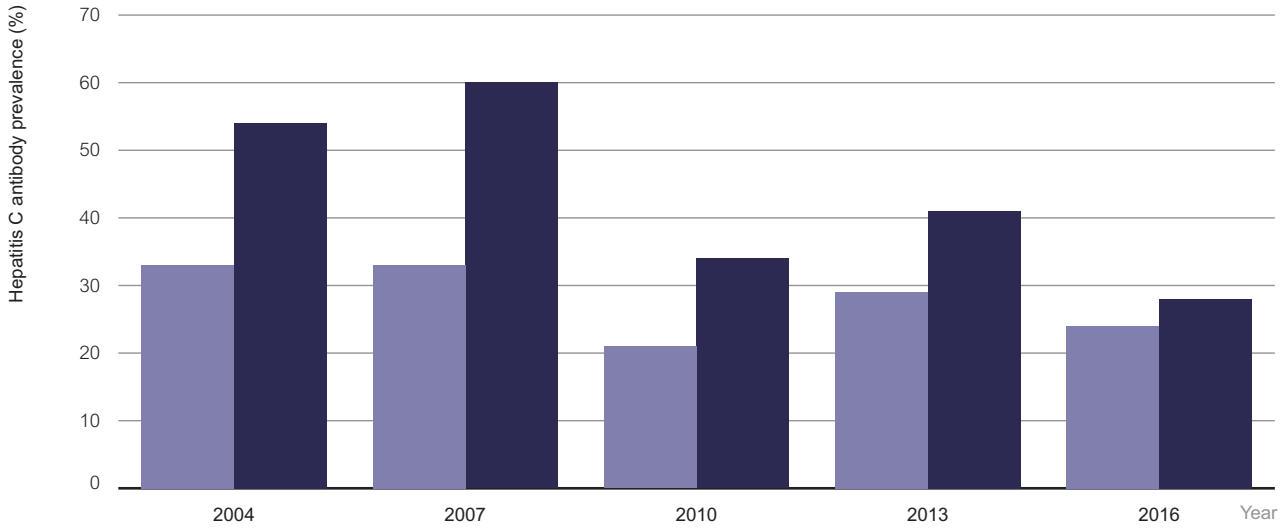
Figure 2.4.2 Hepatitis C RNA prevalence among people seen at needle and syringe programs, 2015-2017



	2015	2016	2017
Prevalence	43	32	25

Source: Iversen J, et al[25]

Figure 2.4.3 Hepatitis C antibody prevalence among prison entrants, 2004, 2007, 2010, 2013 and 2016, by sex



	2004	2007	2010	2013	2016
Men	33.0	33.0	21.0	29.0	24.0
Women	54.0	60.0	34.0	41.0	28.0
Total	34.6	35.5	22.1	31.0	24.5

Source: National Prison Entrants' Bloodborne Virus Survey (NPEBBVS); see Methodology for detail.

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2.5 Hepatitis C morbidity

The following estimates are based on mathematical modelling, incorporating the impact of hepatitis C treatment. By the end of 2017, an estimated 145 294 people living with chronic hepatitis C had early to moderate fibrosis (stages F0–F2), 25 261 had severe fibrosis (stage F3), 9833 had hepatitis C-related cirrhosis (stage F4), and 1600 had decompensated cirrhosis/hepatocellular carcinoma, with variations by state and territory (Table 2.5.1).

Table 2.5.1 Hepatitis C-related morbidity estimates, 2017, by state/territory

State/territory	Early to moderate fibrosis[a]	Severe fibrosis[b]	Cirrhosis[c]	Decompensated cirrhosis or hepatocellular carcinoma
Australian Capital Territory	2 051	335	120	23
New South Wales	51 377	9 020	3 517	581
Northern Territory	2 512	413	174	26
Queensland	30 620	5 389	2 192	338
South Australia	7 047	1 207	392	73
Tasmania	2 709	466	142	25
Victoria	35 023	6 100	2 292	367
Western Australia	13 434	2 410	1 036	154
Australia	145 294	25 261	9 833	1 600

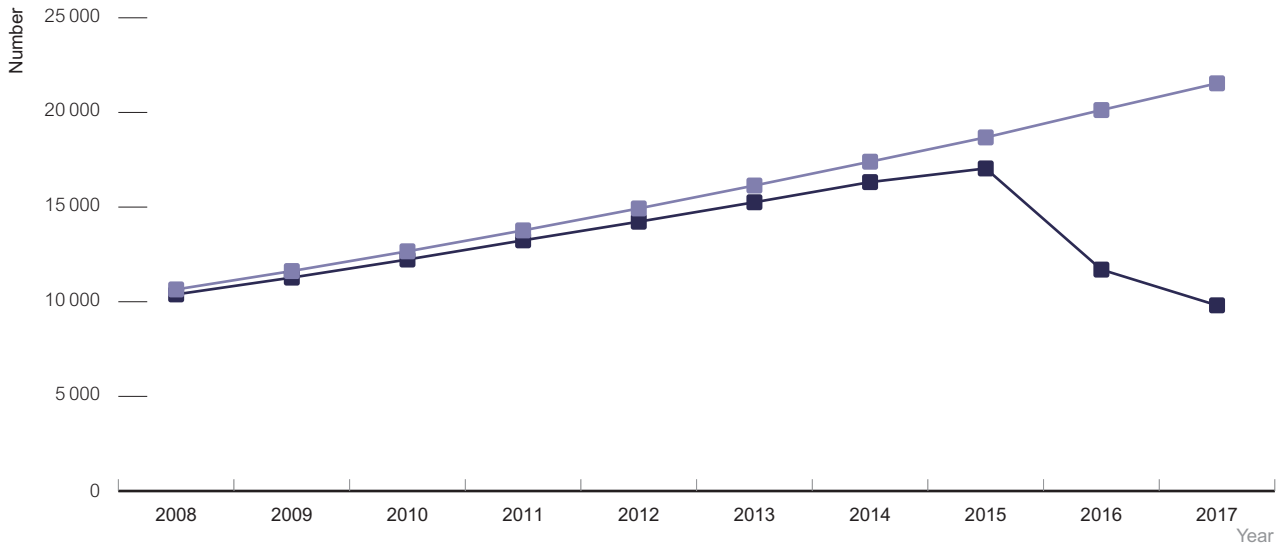
a Stages F0, F1 and F2.
b Stage F3.
c Stage F4.
Source: See Methodology for detail.

The estimated number of people living with chronic hepatitis C who had hepatitis C-related cirrhosis increased by 64% from 10 388 in 2008 to 17 039 in 2015, then declined by 42% between 2015 and 2017 (9833) (Figure 2.5.1).

Among people who were living with chronic hepatitis C (including those who have been cured), between 2008 and 2017, the estimated number with hepatitis C-related cirrhosis increased by 102% (10 650 to 21 536) (Figure 2.5.1). People who have been cured of chronic hepatitis C are included as they may still develop morbidity after treatment.

Among people who were living with chronic hepatitis C (including those who have been cured), the estimated number of new cases of hepatitis C-related decompensated cirrhosis increased by 84% from 829 in 2008 to 1522 in 2015, then was stable between 2015 and 2017 (1535). The estimated number of new cases of hepatitis C-related hepatocellular carcinoma increased by 81% from 432 in 2008 to 782 in 2015, then was stable between 2015 and 2017 (798). The estimated number of hepatitis C-related deaths increased by 74% from 480 in 2008 to 833 in 2015, then declined by 30% between 2015 and 2017 (583) (Figure 2.5.2).

Figure 2.5.1 Estimated number of people living with hepatitis C with hepatitis C-related cirrhosis, 2008–2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cirrhosis - people living with chronic hepatitis C	10 388	11 275	12 230	13 243	14 228	15 255	16 320	17 042	11 698	9 810
Cirrhosis - people living with chronic hepatitis C infection and those who have been cured	10 650	11 621	12 664	13 769	14 929	16 139	17 398	18 681	20126	21538

Source: See Methodology for detail.

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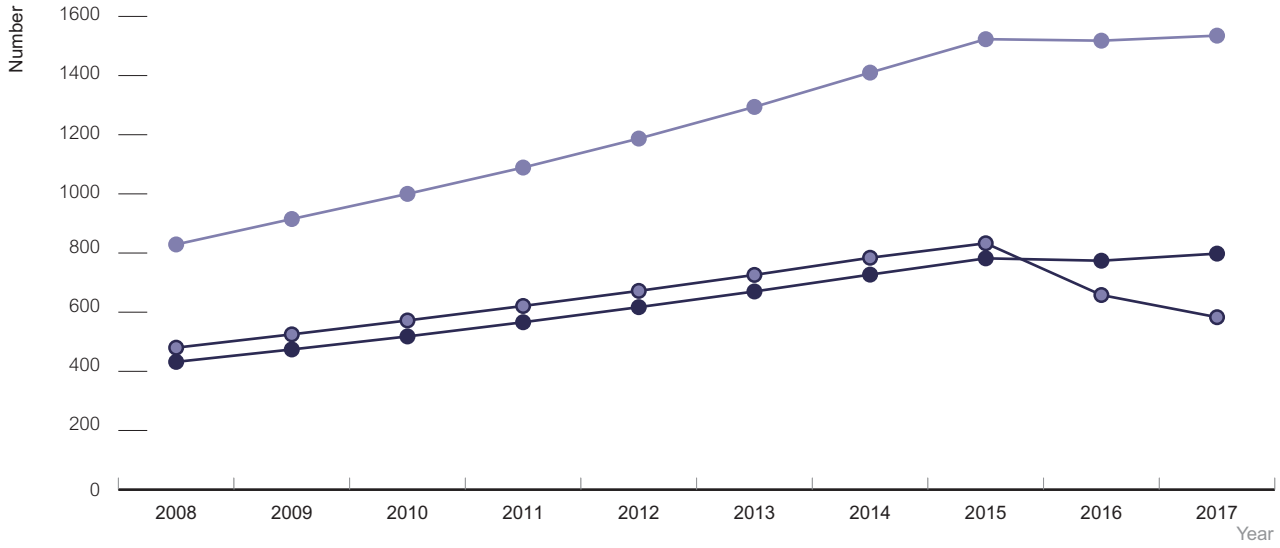
Figure 2.5.2 Estimated number of incident cases of hepatitis C-related decompensated cirrhosis, hepatocellular carcinoma and deaths, 2008–2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Decompensated cirrhosis	829	915	1000	1089	1187	1294	1410	1523	1518	1535
Hepatocellular carcinoma	432	474	518	566	617	670	727	782	774	798
Deaths	480	525	572	621	672	726	784	833	658	583

Note: Includes people with chronic hepatitis C infection and those who have been cured of infection but still have hepatitis C-related severe fibrosis or cirrhosis.
Source: See Methodology for detail.

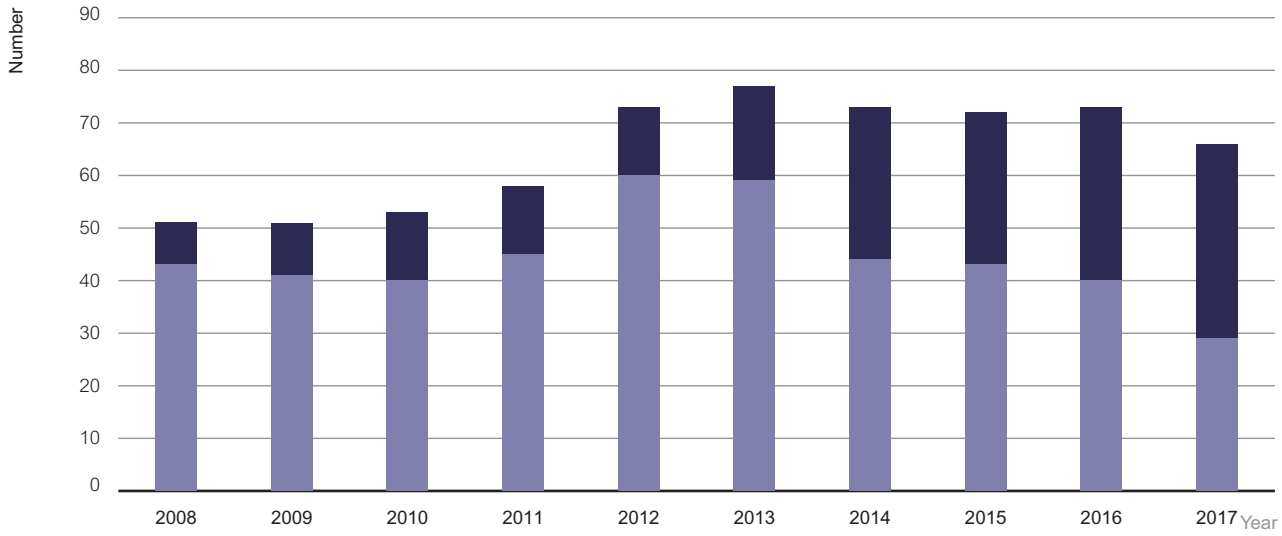
There is no comprehensive registry of advanced illness related to hepatitis C in Australia. One indicator of the extent of illness caused by hepatitis C is the number of liver transplants due to chronic infection. The number of people having liver transplants due to chronic hepatitis C or hepatitis C-related hepatocellular carcinoma has decreased by 14% between 2013 (77, 40% of all transplants) and 2017 (66, 29% of all transplants). The proportion of hepatitis C-related transplants accounted for by hepatocellular carcinoma has increased from 23% (n=18) in 2013 to 56% (n=37) in 2017 (Table 2.5.2 and Figure 2.5.5).

Table 2.5.2 Number and proportion of liver transplants, 2008–2017, by primary diagnosis

	Year																			
	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Primary diagnosis																				
Chronic hepatitis B	3	1.9	7	4.8	2	1.2	5	3.1	1	0.6	5	2.5	5	2.6	7	3.2	3	1.3	4	1.8
Chronic hepatitis C	43	27.7	41	28.1	40	24.5	45	28.0	60	33.3	59	29.8	44	22.7	43	19.6	40	17.2	29	12.9
Chronic hepatitis B/C/D	5	3.2	1	0.7	2	1.2	2	1.2	1	0.6	4	2.0	0	0.0	2	0.9	0	0.0	2	0.9
Hepatocellular carcinoma	21	13.5	24	16.4	26	16.0	23	14.3	22	12.2	30	15.2	45	23.2	47	21.5	50	21.5	60	26.8
Hepatitis B–related hepatocellular carcinoma	*6*	*3.9*	*5*	*3.4*	*5*	*3.1*	*3*	*1.9*	*6*	*3.3*	*4*	*2.0*	*8*	*4.1*	*10*	*4.6*	*4*	*1.7*	*9*	*4.0*
Hepatitis C–related hepatocellular carcinoma	*9*	*5.8*	*8*	*5.5*	*13*	*8.0*	*13*	*8.1*	*13*	*7.2*	*18*	*9.1*	*29*	*14.9*	*29*	*13.2*	*33*	*14.2*	*37*	*16.5*
Hepatitis B/C/D–related hepatocellular carcinoma	*1*	*0.6*	*0*	*0.0*	*0*	*0.0*	*8*	*0.0*	*1*	*0.6*	*1*	*0.5*	*0*	*0.0*	*0*	*0.0*	*0*	*0.0*	*2*	*0.9*
Hepatitis negative	*5*	*3.2*	*11*	*7.5*	*8*	*4.9*	*7*	*4.3*	*2*	*1.1*	*7*	*3.5*	*8*	*4.1*	*8*	*3.7*	*13*	*5.6*	*12*	*5.4*
Other	65	53.5	73	50.0	93	57.1	86	53.4	96	53.3	100	50.5	100	51.5	120	54.8	140	60.1	129	70.1
Total	119	100	146	100	163	100	161	100	180	100	198	100	194	100	219	100	233	100	224	100

Source: Australian and New Zealand Liver Transplant Registry; See Methodology for detail.

Figure 2.5.3 Number of liver transplants due to chronic hepatitis C and hepatitis C related hepatocellular carcinoma, 2008–2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Hepatitis C related hepatocellular carcinoma	8	10	13	13	13	18	29	29	33	37
Chronic hepatitis C	43	41	40	45	60	59	44	43	40	29

Source: Australian and New Zealand liver Transplant Registry; see Methodology for detail.

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2.6 Hepatitis C testing and care

The hepatitis C diagnosis and care cascade

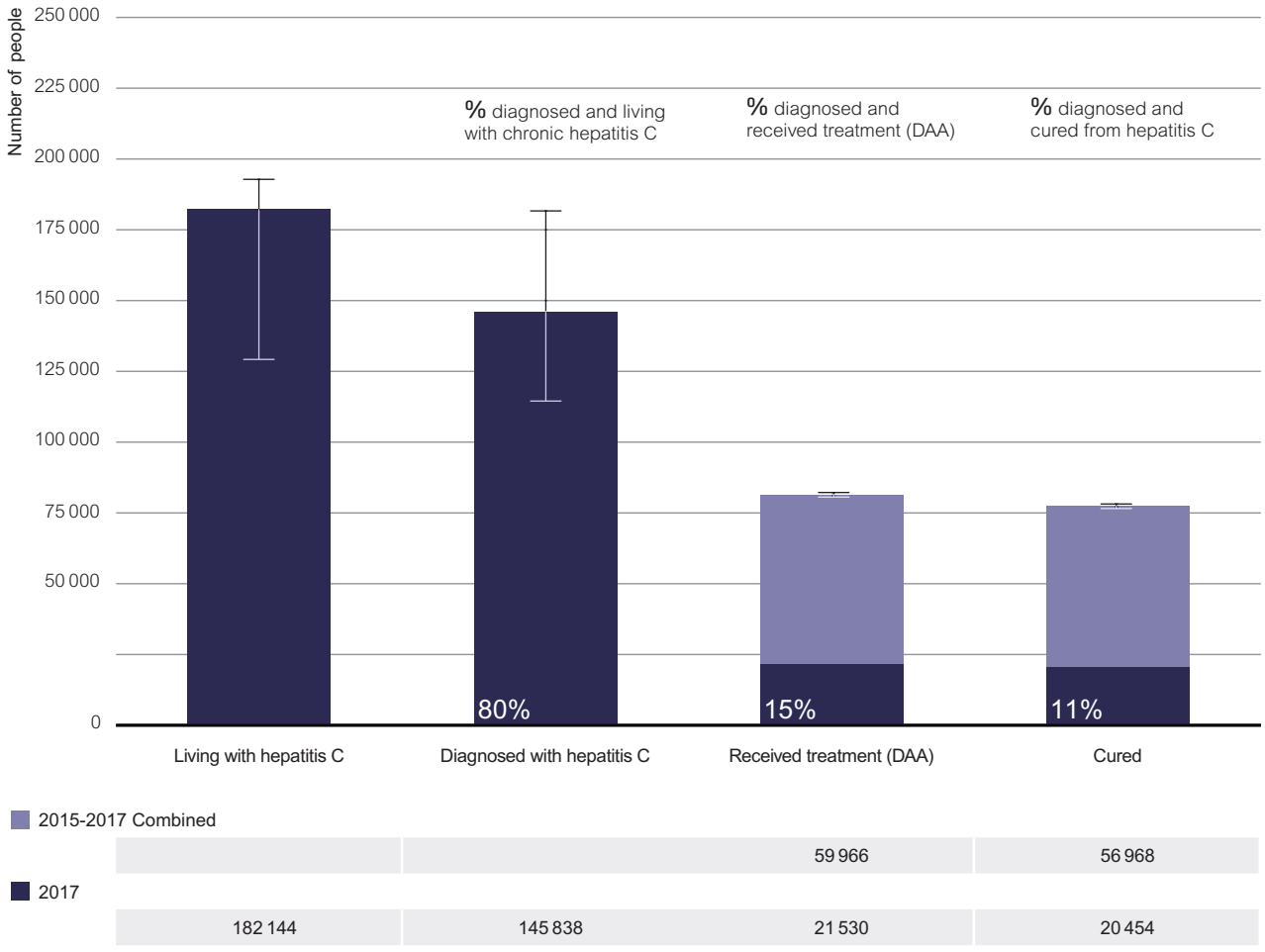
This section includes the hepatitis C diagnosis and care 'cascade', with estimates of the number of people living with chronic hepatitis C in Australia, and the number and proportion of people who have been diagnosed, had hepatitis C RNA testing done and received antiviral treatment. These estimates are used to support the improvement of the delivery of services to people living with chronic hepatitis C infection across the entire continuum of care—from diagnosis of chronic hepatitis C infection to initiation of antiviral therapy and cure. Using available data and accounting for uncertainties, the number and proportions of people in each stage of the cascade in Australia were estimated (Figure 2.6.1 and Table 2.6.1).

Methods and the associated uncertainties are described in detail in the Methodology. The approach was informed by recommendations from a national stakeholder reference group (see Acknowledgments for further detail).

At the end of 2017, an estimated 182 144 people were living with chronic hepatitis C in Australia (Figure 2.6.1), down from 199 230 in 2016. Of those living with chronic hepatitis C in 2017, an estimated 145 838 (80%) were diagnosed and 68 544 (47% of those diagnosed) had a hepatitis C RNA test to confirm their chronic hepatitis C infection (Figure 2.6.1).

Of the those people living with chronic hepatitis C that had an hepatitis C RNA test, 21 530 (31%) received hepatitis C direct-acting antiviral treatment during the year and 20 454 (95% of those treated) were cured during 2017 (Figure 2.6.1). The number cured in 2017 is down 34% when compared with the number cured at the end of 2016 (30 970). The Australian Government has endorsed the World Health Organization targets of 90% of people living with chronic hepatitis C infection in 2015 to be diagnosed, with 80% treatment coverage by 2030.

Figure 2.6.1 The hepatitis C diagnosis and care cascade, 2017



2015-2017 Combined			59 966	56 968
2017	182 144	145 838	21 530	20 454

Note: Due to updated modelling methods, estimates may be different from figures presented in previous years of reporting. For 'Received treatment (DAA)' and 'Cured', the top of the bar represents the cumulative number for the years 2015–2017and the dark bar represents the cumulative number in the DAA era (2016-2017).

Source: See Methodology for details of mathematical modelling used to generate estimates.

Table 2.6.1 The hepatitis C diagnosis and care cascade estimates, 2017

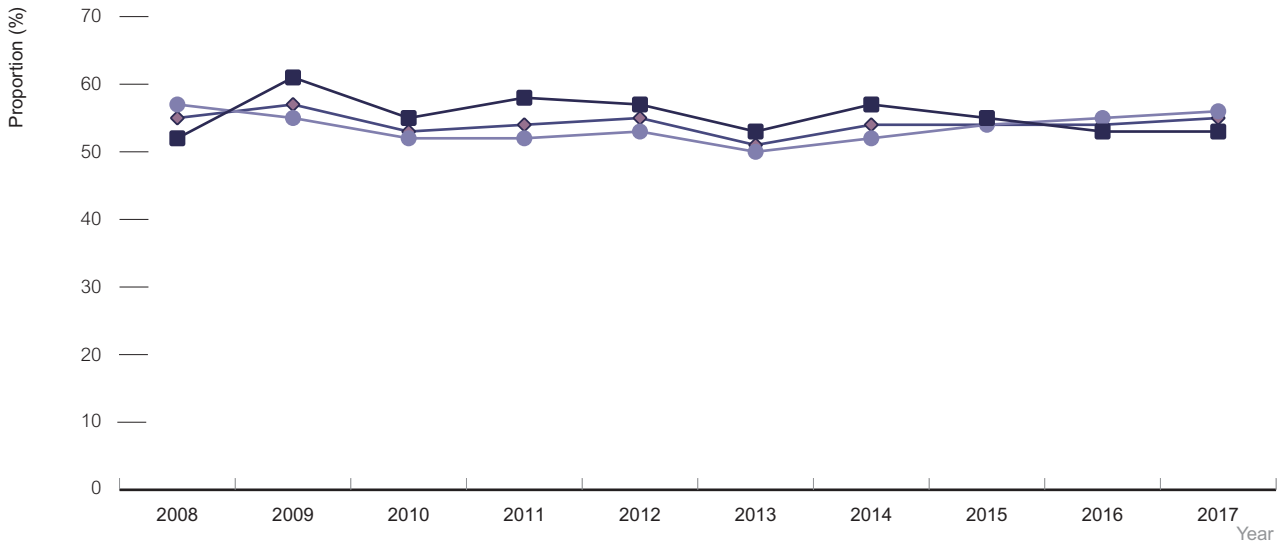
Cascade stage	Estimated to end of 2017	Range
Living with chronic hepatitis C	182 144	128 845 – 192 981
Diagnosed with chronic hepatitis C	145 838	114 314 – 181 735
Received DAA hepatitis C treatment in 2017	21 530	
Cured of hepatitis C in 2017	20 454	

Source: See Methodology for details of mathematical modelling used to generate estimates.

Hepatitis C testing

Data from the Australian Needle and Syringe Program Survey show that in 2017, about half (55%) of survey respondents reported having had a hepatitis C antibody test in the 12 months before the survey (56% of men and 53% of women) (Figure 2.6.2). Over the past 10 years (2008–2017) the overall proportion reporting hepatitis C testing in the past 12 months fluctuated between 51% and 57%. Self-reported hepatitis C testing levels have consistently been higher in survey respondents who are hepatitis C antibody positive than in those who are hepatitis C antibody negative (63% vs 46% in 2017) (Figure 2.6.3).

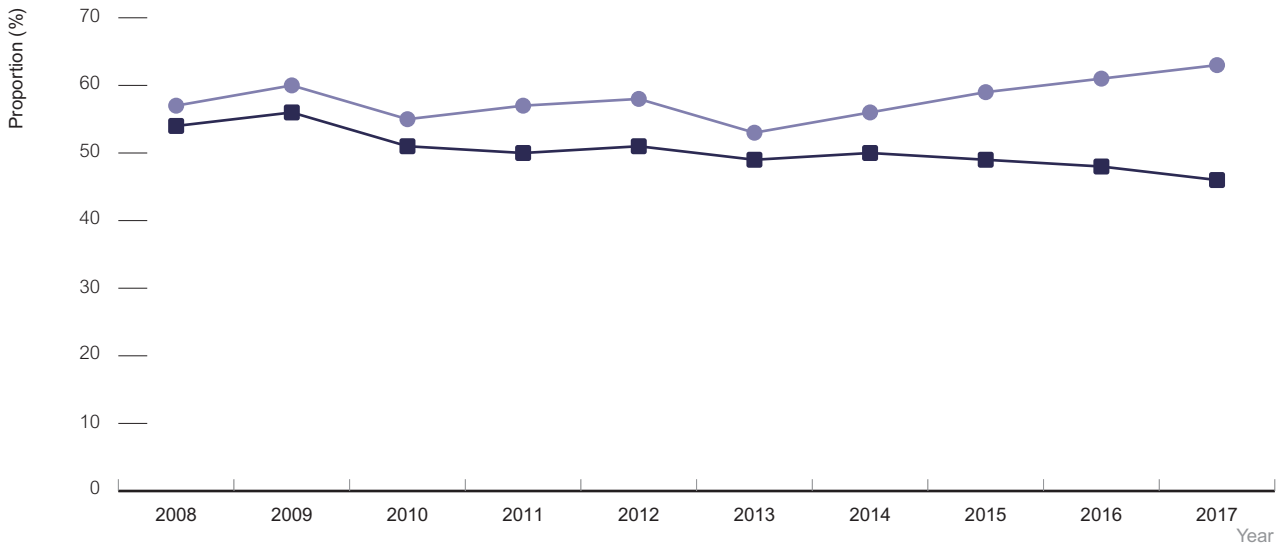
Figure 2.6.2 Proportion of people who inject drugs seen at needle and syringe programs who reported a hepatitis C antibody test in the past 12 months, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	57	55	52	52	53	50	52	54	55	56
Women	52	61	55	58	57	53	57	55	53	53
Total	55	57	53	54	55	51	54	54	54	55

Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

Figure 2.6.3 Proportion of people who inject drugs seen at needle and syringe programs who reported a hepatitis C antibody test in the past 12 months, 2008–2017, by hepatitis C antibody status



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
HCV antibody positive (%)	57	60	55	57	58	53	56	59	61	63
HCV antibody negative (%)	54	56	51	50	51	49	50	49	48	46

Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

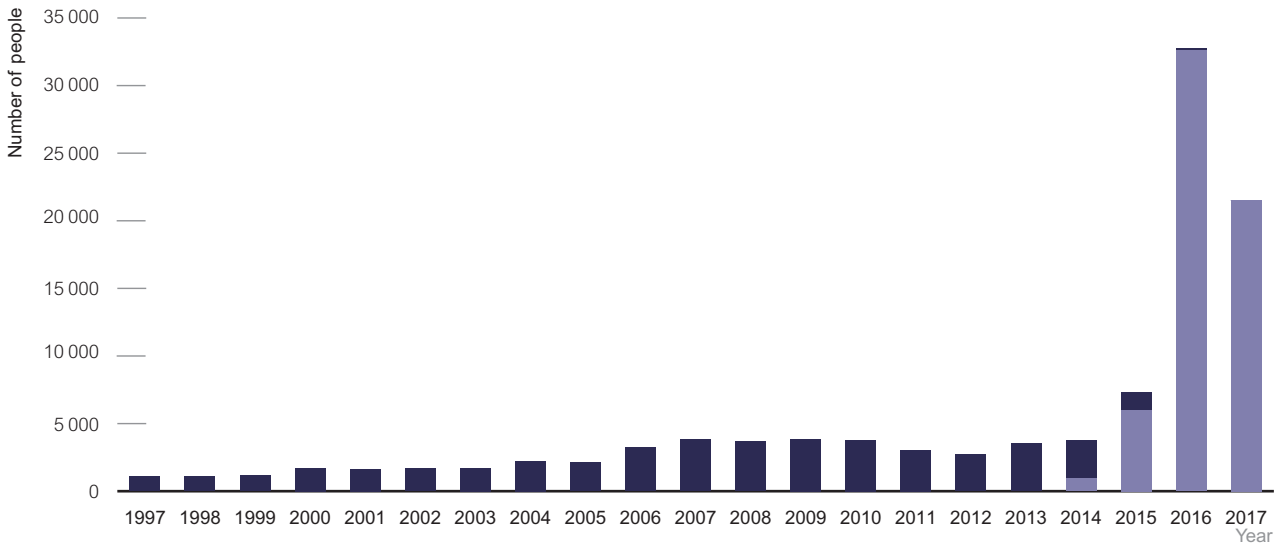
Hepatitis C treatment

An estimated 21 530 people received hepatitis C treatment in 2017, compared with 32 760 in 2016 and 7326 in 2015 (Figure 2.6.4). Subsidised interferon-free direct-acting antiviral regimens became available in Australia from March 2016. The initial increase in 2015 reflects people accessing direct-acting antivirals though personal importation, pharmaceutical company compassionate access programs and clinical trials, prior to the public funding through the Pharmaceutical Benefits Scheme. Access to new highly effective hepatitis C treatments led to a 4-fold increase in the number of people receiving treatment between 2015 and 2016. The large initial DAA uptake in 2016 likely reflects a 'warehouse' effect, with many patients awaiting DAA treatment access [26]. Since this time the DAA treatment initiations per month have stabilised.

In 2017, 12% of all people estimated to be living with hepatitis C in Australia initiated direct-acting antiviral therapy, varying by jurisdiction between 7% and 19% (Table 2.6.2).

A higher proportion of people with hepatitis C-related early fibrosis (stage F0) at the start of 2016 were estimated to have received the treatment (30%) in 2017 compared with 15% with early-to-moderate fibrosis (stage F2-F4) and 25% with moderate fibrosis (F3) (Figure 2.6.5).

Figure 2.6.4 The estimated number of people living with hepatitis C who received treatment, 1997–2017



Source: Pharmdash, pharmaceutical companies.

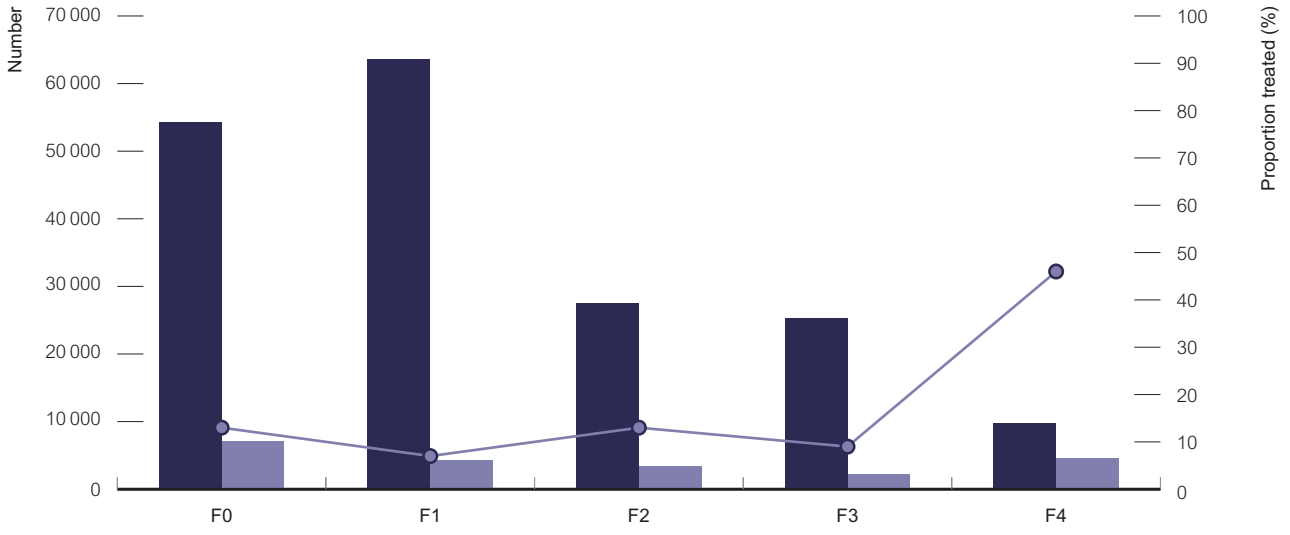
HCV

Table 2.6.2 Number and proportion of people with chronic hepatitis C infection initiating direct-acting antiviral therapy, 2017, by state/territory

State/Territory	Number initiating direct-acting antiviral therapy in 2017	Estimated number of people living with chronic hepatitis C at the end of 2017	Proportion of people initiating direct-acting antiviral therapy in 2017
Australian Capital Territory	360	2 533	14%
New South Wales	7 820	64 588	12%
Northern Territory	230	3 131	7%
Queensland	3 960	38 623	10%
South Australia	1 470	8 728	17%
Tasmania	660	3 349	20%
Victoria	5 160	43 841	12%
Western Australia	1 870	17 075	11%
Australia	21 530	182 144	12%

Source: See Methodology for detail.

Figure 2.6.5 Number and proportion of people living with chronic hepatitis C at the start of 2017 who received treatment during 2017, by stage of disease



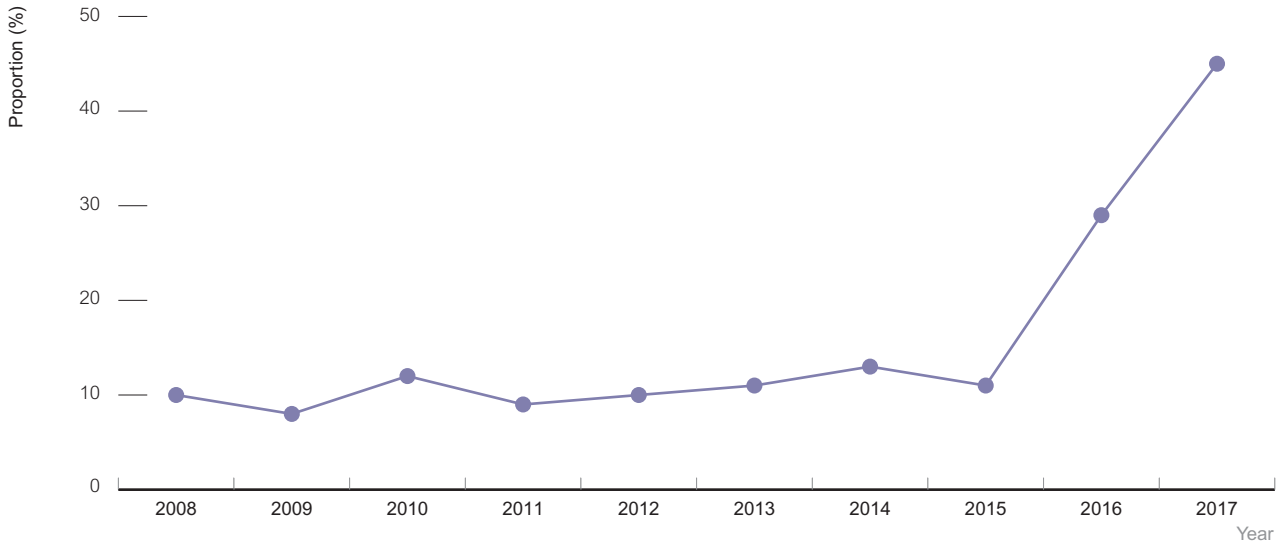
	F0	F1	F2	F3	F4
Living with chronic hepatitis C at the start of 2016	54 201	63 561	27 431	25 247	9 810
Treated in 2017	7 105	4 306	3 445	2 153	4 521
Proportion treated (%)	13	7	13	9	46

Source: See Methodology for detail.

According to the Australian Needle and Syringe Program Survey in 2017, among respondents with self-reported chronic hepatitis C, 45% reported ever having received hepatitis C treatment, an increase from 11% in 2015, which reflects improved access through subsidised interferon-free direct-acting antiviral regimens from March 2016. There were also increases in the proportion receiving hepatitis C treatment in Aboriginal and Torres Strait Islander survey respondents between 2015 and 2017. Please refer to the *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for more information.[1]

Participants in the Australian Needle and Syringe Program Survey are broadly similar to the overall population of needle and syringe program attendees in Australia in terms of age, sex and last drug injected.[4] However, while consistent with other sources of surveillance data, the extent to which Australian Needle and Syringe Program Survey results can be generalised to the broader Australian population of people who inject drugs cannot be ascertained.

Figure 2.6.6 Proportion of hepatitis C antibody positive people seen at needle and syringe programs with a lifetime history of hepatitis C treatment, 2008–2017



Lifetime history of treatment (%)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	10	8	12	9	10	11	13	11	29	45

a Denominator for lifetime history of treatment is restricted to people with hepatitis C antibody positive serology and excludes people who self-reported spontaneous clearance.

Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

HCV

2.7 Hepatitis C prevention

The reuse of needles and syringes that have been used by others (receptive syringe sharing) is the major risk factor for the transmission of HIV and hepatitis among people who inject drugs. Harm reduction strategies such as needle and syringe programs, opioid substitution therapy as well as community education and peer interventions can reduce injecting risk behaviour.[17, 18] Opioid substitution has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[20-22] Health promotion is important to enhance the effectiveness of these harm reduction strategies and to support people to inject more safely.

At a community level, mathematical modelling suggests achieving a high coverage of hepatitis C antiviral treatment can reduce the population prevalence of hepatitis C and therefore lead to reduced incidence (treatment as prevention).[27] Secondary prevention strategies to reduce the risk of progression to hepatocellular carcinoma include improving access to diagnosis and antiviral treatment and engagement in regular ongoing liver cancer monitoring for all people with cirrhosis even when cured of hepatitis C infection.

Injecting risk behaviour

Data from the Australian Needle and Syringe Program Survey show that rates of receptive syringe sharing have been generally stable over the past 10 years Each year over the past 10 years, between 12% and 19% of people who inject drugs attending needle and syringe programs reported receptive syringe sharing in the last month, with similar rates in men and women (see Figure 1.5.2 on page 70).

Rates of receptive syringe sharing have consistently been higher in Aboriginal and Torres Strait Islander survey respondents, with 26% reporting this in 2017 compared with 15% among the non-Indigenous respondents. Please refer to the *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for more information.[1]

HCV

3 Hepatitis B

3.1 Hepatitis B notifications

This section focuses on people notified with hepatitis B infection in Australia, including newly acquired hepatitis B notifications (evidence of hepatitis B acquisition within two years before diagnosis) and unspecified (those without evidence of newly acquired infection).

There were 6102 notifications of hepatitis B infection in Australia in 2017. Of these, 151 (2%) were among the Aboriginal and Torres Strait Islander population, 2810 (46%) were among the non-Indigenous population, and there were a further 3141 (51%) notifications for which Indigenous status was not reported.

In 2017, just over half (54%, 3256) of hepatitis B notifications were in males, 91% (5548) were in people aged 25 years and above, and 85% (5210) were in people residing in major cities. Of the 6102 hepatitis B notifications in 2017, the vast majority (98%, 5961) were reported as unspecified, probably representing chronic hepatitis B infection, and only 141 (2%) were reported as newly acquired (Table 3.1.1).

Table 3.1.1 Characteristics of hepatitis B notifications, 2008–2017

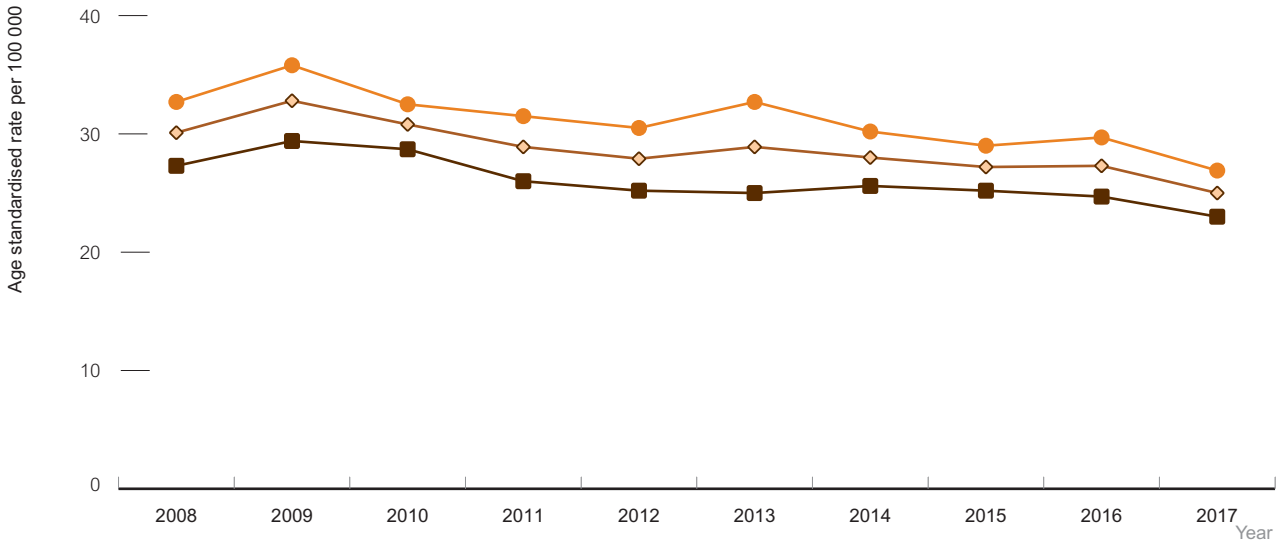
Characteristic	Year of diagnosis									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total cases	6350	7057	6738	6422	6296	6642	6506	6422	6513	6102
Sex										
Male	3447	3849	3548	3502	3429	3741	3491	3406	3515	3256
Female	2868	3151	3128	2879	2834	2875	2987	2997	2971	2831
Missing	35	57	62	41	33	26	28	19	27	15
Age group										
0-14	164	137	127	89	87	91	76	70	81	48
15-19	282	323	275	221	206	259	163	160	176	123
20-24	738	791	687	664	593	599	524	454	424	382
25-29	1036	1135	1156	1138	1090	1059	1013	1008	867	843
30-39	1764	1975	1889	1770	1818	1930	1988	1905	2066	1861
40+	2356	2686	2597	2535	2500	2704	2739	2820	2897	2844
Missing	10	10	7	5	2	0	3	5	2	1
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	295	266	274	235	200	210	172	233	178	151
Non-Indigenous	2769	2852	2462	2268	2429	2566	2516	2429	2871	2810
Not reported	3286	3939	4002	3919	3667	3866	3818	3760	3464	3141
Newly acquired[a]	262	248	230	190	192	172	169	143	160	141
Area of residence										
Major cities	5301	5960	5572	5434	5286	5445	5527	5432	5609	5210
Inner regional	355	404	410	332	362	385	405	402	361	364
Outer regional	321	299	334	321	385	499	338	333	331	270
Remote	105	100	99	85	78	86	66	79	38	33
Very remote	117	102	99	99	86	90	60	65	55	67
Missing data	151	192	224	151	99	137	110	111	119	158
State/territory										
ACT	58	108	95	94	107	112	97	82	91	84
NSW	2272	2796	2853	2485	2309	2500	2509	2356	2381	2321
NT	193	161	161	152	196	331	153	161	109	101
QLD	829	974	1034	821	790	866	947	1039	1059	919
SA	282	307	286	312	246	293	331	344	293	282
TAS	67	84	55	51	71	58	60	42	40	44
VIC	1932	1988	1917	1944	1886	1870	1787	1825	1874	1800
WA	717	639	607	563	591	612	622	573	666	551

a Newly acquired hepatitis B is defined as newly diagnosed hepatitis B infection with laboratory or clinical evidence of acquisition in the two years before diagnosis. Enhanced surveillance procedures related to hepatitis B vary by state/territory. The total number of cases reported here is likely to be an underestimation of the true number of newly acquired infections.

Source: Australian National Notifiable Diseases Surveillance System.

The notification rate of hepatitis B in Australia has declined by 17% in the past 10 years, from 30.1 per 100 000 in 2008 to 25.0 per 100 000 in 2017. Rates have been consistently higher among males than females, and were 26.9 and 23.0 per 100 000 in 2017, respectively (Figure 3.1.1).

Figure 3.1.1 Hepatitis B notification rate per 100 000 population, 2008–2017, by sex

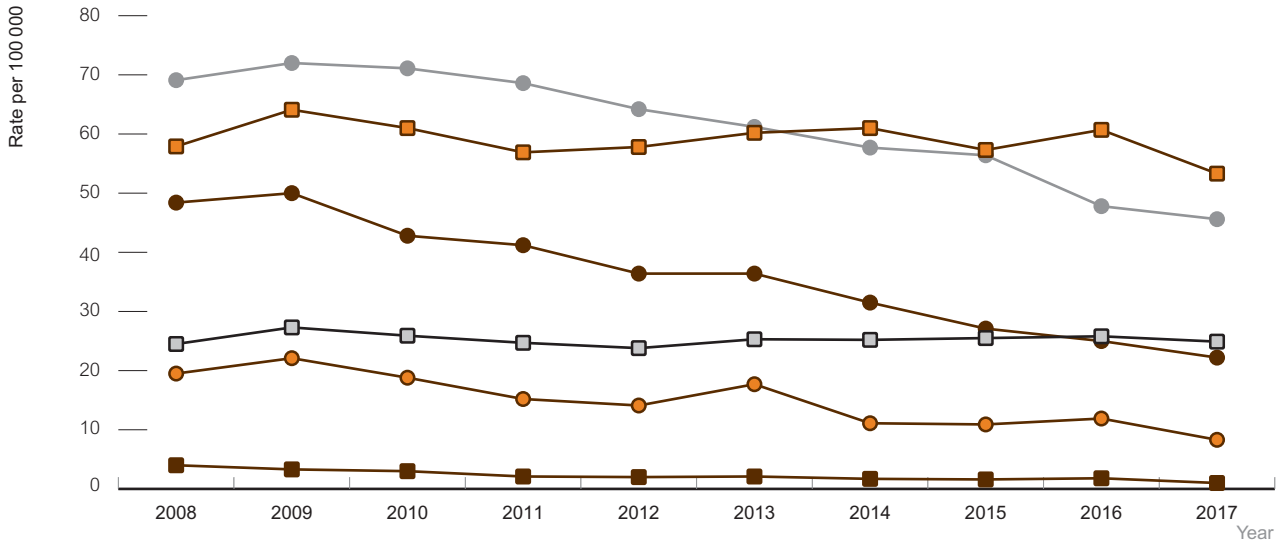


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Males	32.7	35.8	32.5	31.5	30.5	32.7	30.2	29.0	29.7	26.9
Females	27.3	29.4	28.7	26.0	25.2	25.0	25.6	25.2	24.7	23.0
Total	30.1	32.8	30.8	28.9	27.9	28.9	28.0	27.2	27.3	25.0

Source: Australian National Notifiable Diseases Surveillance System.

The rate of notification has declined between 2008 and 2017 in the younger age groups including 15–19 years (57%, 19.5 to 8.3 per 100 000), 20–24 years (54%, 48.4 to 22.2 per 100 000) and 25–29 years (34%, 69.1 to 45.6 per 100 000) (Figure 3.1.2). Overall the rates in those aged under 25 years have declined by 58%. In contrast, notification rates have remained relatively stable in those aged 30–39 years (57.9 per 100 000 in 2008 to 53.3 per 100 000 in 2017) and 40 years and over (24.5 per 100 000 in 2008 to 24.9 per 100 000 in 2017) (Figure 3.1.2). Rates have been consistently low among those aged 0–14 years old.

Figure 3.1.2 Hepatitis B notification rate per 100 000 population, 2008–2017, by age group



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	4.0	3.3	3.0	2.1	2.0	2.1	1.7	1.6	1.8	1.0
15–19	19.5	22.1	18.8	15.2	14.1	17.7	11.1	10.9	11.9	8.3
20–24	48.4	50.0	42.8	41.2	36.4	36.4	31.5	27.1	25.0	22.2
25–29	69.1	72.0	71.1	68.6	64.2	61.2	57.7	56.4	47.8	45.6
30–39	57.9	64.1	61.0	56.9	57.8	60.2	61.0	57.3	60.7	53.3
40+	24.5	27.3	25.9	24.7	23.8	25.3	25.2	25.5	25.8	24.9

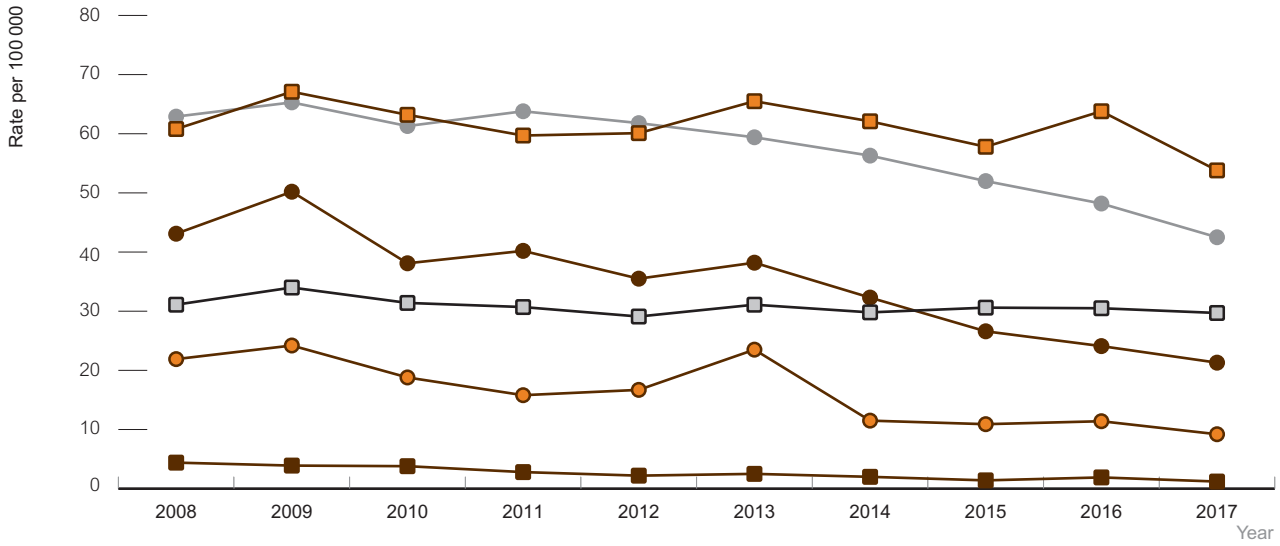
Source: Australian National Notifiable Diseases Surveillance System.

HBV

Among males, the highest hepatitis B notification rates in 2017 were in the age groups 30–39 years (53.8 per 100 000) and 25–29 years (42.5 per 100 000). The rates have been relatively stable in the 30–39 age group over the past 10 years, but have decreased by 32% in the 25–29 age group from 62.9 per 100 000 in 2008 to 42.5 per 100 000 in 2017 (Figure 3.1.3). In the same period, rates also decreased in the 0–14, 15–19 and 20–24 age groups by 72%, 58% and 51% respectively (Figure 3.1.3).

Similarly, among females, the hepatitis B notification rate in 2017 was highest in the age group 30–39 years (52.4 per 100 000) followed by the 25–29 age group (48.5 per 100 000). In the last 10 years (2008–2017), the female notification rate declined by 35% in the 25–29 year age group (75.0 to 48.5 per 100 000). The hepatitis B notification rates also decreased in the 0–14, 15–19 and 20–24 age groups by 76%, 56% and 57% respectively. Similar to males, rates in females have been stable in the 30–39 age group over the past 10 years (Figure 3.1.4).

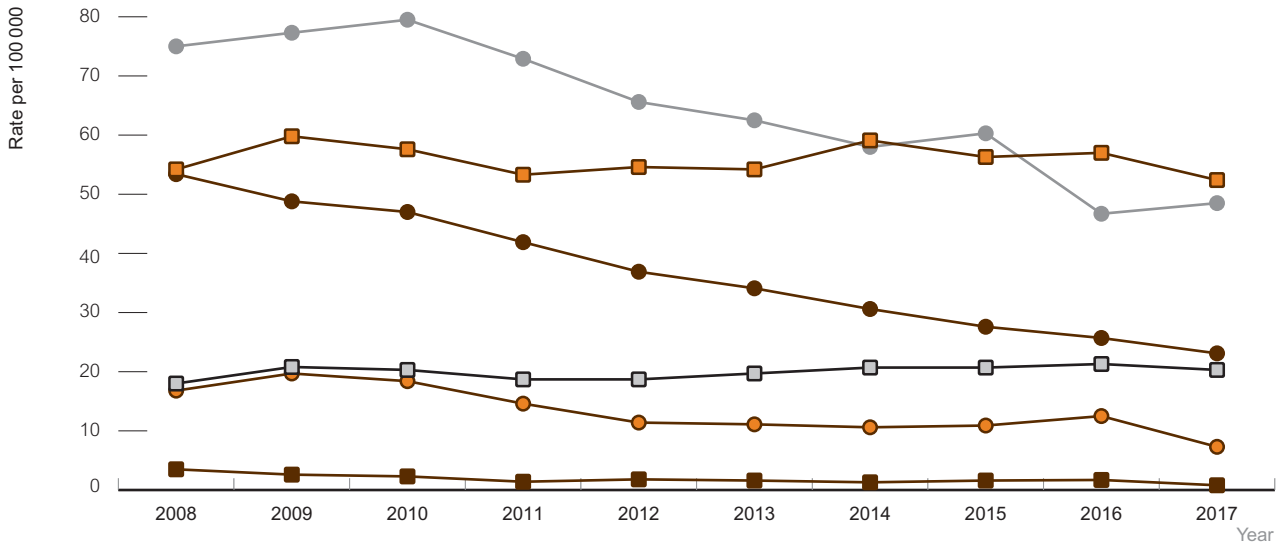
Figure 3.1.3 Hepatitis B notification rate per 100 000 population, 2008–2017, by age group, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	4.4	3.9	3.8	2.8	2.2	2.5	2.0	1.4	1.9	1.2
15–19	21.9	24.2	18.8	15.8	16.7	23.5	11.5	10.9	11.4	9.2
20–24	43.1	50.2	38.1	40.2	35.5	38.2	32.3	26.6	24.1	21.3
25–29	62.9	65.3	61.3	63.8	61.8	59.4	56.3	52.0	48.2	42.5
30–39	60.8	67.1	63.2	59.7	60.1	65.5	62.1	57.8	63.8	53.8
40+	31.1	34.0	31.4	30.7	29.1	31.1	29.8	30.6	30.5	29.7

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.1.4 Hepatitis B notification rate per 100 000 population, 2008–2017, by age group, females



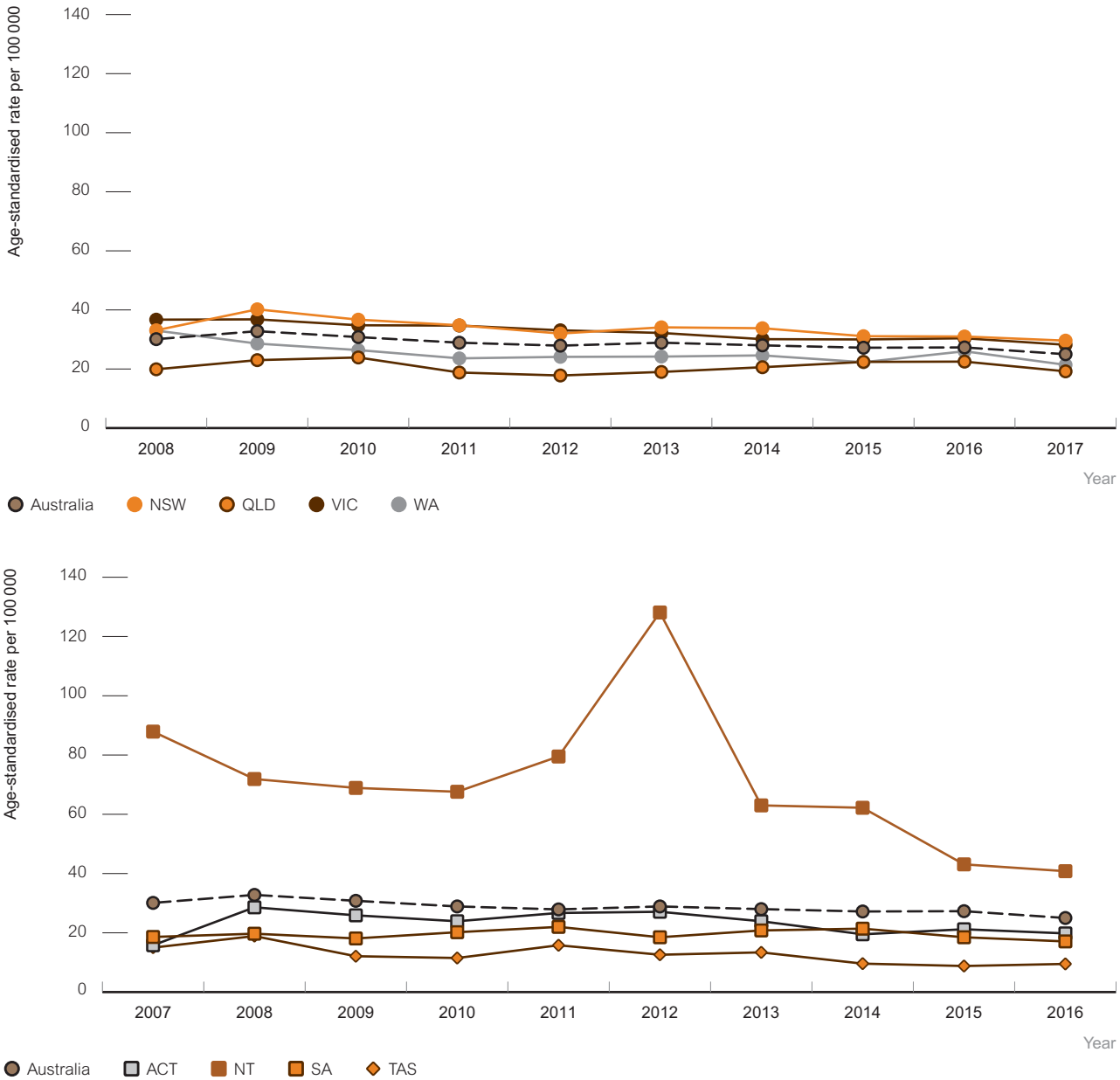
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	3.5	2.6	2.3	1.4	1.8	1.6	1.3	1.6	1.7	0.8
15–19	16.8	19.7	18.4	14.6	11.4	11.1	10.6	10.9	12.5	7.3
20–24	53.4	48.8	47.0	41.9	36.9	34.1	30.6	27.6	25.7	23.1
25–29	75.0	77.3	79.5	72.9	65.6	62.5	58.0	60.3	46.7	48.5
30–39	54.2	59.8	57.6	53.3	54.6	54.2	59.1	56.3	57.0	52.4
40+	18.0	20.8	20.3	18.7	18.7	19.7	20.7	20.7	21.3	20.3

Source: Australian National Notifiable Diseases Surveillance System.

HBV

The notification rate of hepatitis B infection in Australia has consistently been highest in the Northern Territory but has fallen by 54% over the past 10 years (from 87.9 per 100 000 in 2008 to 40.8 per 100 000 in 2017). In most other jurisdictions the rate of hepatitis B diagnosis has fluctuated over the past 10 years, with declines in more recent years (Figure 3.1.5. and Table 3.1.2).

Figure 3.1.5 Hepatitis B notification rate per 100 000 population, 2008–2017, by year and state/territory



Source: National Notifiable Diseases Surveillance System

Table 3.1.2 Age-standardised rates of hepatitis B notification per 100 000 population, 2008–2017, by state/territory

State/territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	15.8	28.6	25.9	23.9	26.7	27.1	23.9	19.5	21.2	19.8
New South Wales	33.1	40.2	36.7	34.8	32.0	34.1	33.8	31.1	31.0	29.6
Northern Territory	87.9	71.9	68.9	67.6	79.5	128.1	63.0	62.2	43.1	40.8
Queensland	19.9	23.0	23.9	18.8	17.8	19.0	20.6	22.4	22.5	19.2
South Australia	18.6	19.7	18.1	20.2	22.0	18.5	20.8	21.4	18.5	17.1
Tasmania	15.0	18.9	12.1	11.5	15.8	12.6	13.4	9.6	8.8	9.5
Victoria	36.7	36.8	34.8	34.7	33.1	32.2	30.1	30.0	30.4	28.2
Western Australia	33.0	28.6	26.4	23.6	24.1	24.2	24.6	22.3	26.0	21.4
Australia	30.1	32.8	30.8	28.9	27.9	28.9	28.0	27.2	27.3	25.0

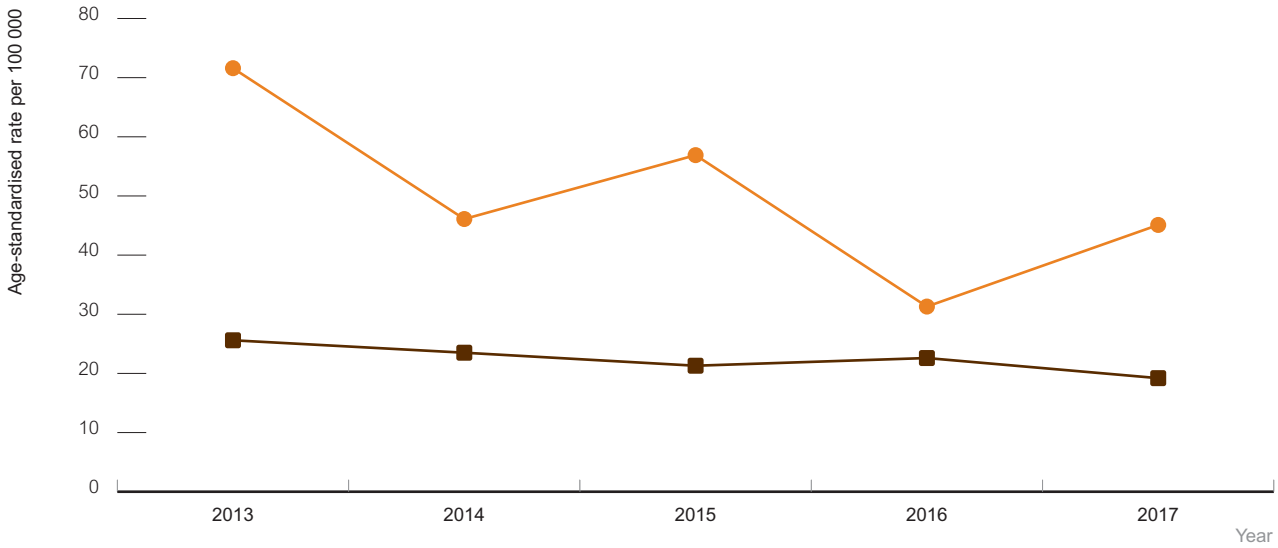
Source: National Notifiable Diseases Surveillance System.

HBV

Aboriginal and Torres Strait Islander notification rates for hepatitis B are based on data from five jurisdictions (Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia), where Aboriginal and Torres Strait Islander status was ≥50% complete for hepatitis B notifications for each the five years (2013–2017). Approximately a third of the Aboriginal and Torres Strait Islander population reside in these jurisdictions so it is important to note that the notification rates are not necessarily nationally representative.

In 2017, the notification rate of newly diagnosed hepatitis B infection for the Aboriginal and Torres Strait Islander population in these jurisdictions was more than twice as high as for the non-Indigenous population (45.1 per 100 000 compared with 19.2 per 100 000) (Figure 3.1.6). In the Aboriginal and Torres Strait Islander population the rate decreased by 37% from 71.6 per 100 000 in 2013 to 45.1 per 100 000 in 2017, and in the non-Indigenous population rates were lower with a smaller decline in the last five years (25.6 per 100 000 in 2013 and 19.2 per 100 000 in 2017). The largest declines have been observed in younger age groups, which likely reflects the Aboriginal and Torres Strait Islander population being eligible for childhood vaccination, whereas non-Indigenous notifications also include people born overseas, where vaccination programs vary considerably. For further information on hepatitis B notification rates by Aboriginal and Torres Strait Islander status and age, please refer to *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018*.[1]

Figure 3.1.6 Hepatitis B notification rate per 100 000 population, 2013–2017, by Aboriginal and Torres Strait Islander status

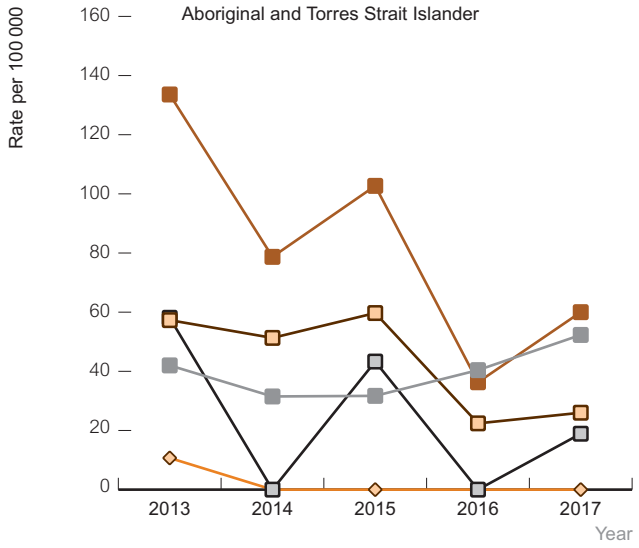


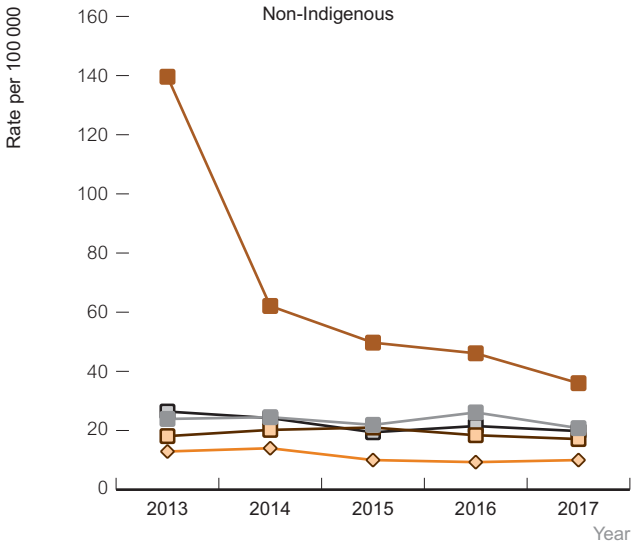
	2013	2014	2015	2016	2017
Non-Indigenous	25.6	23.5	21.3	22.6	19.2
Aboriginal and Torres Strait Islander	71.6	46.1	56.9	31.3	45.1

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year (Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia).

The overall hepatitis B notification rates in the Aboriginal and Torres Strait Islander population in the Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia were higher than in the non-Indigenous population in each of the past five years (2013–2017). In this period, hepatitis B notification rates were stable in the Aboriginal and Torres Strait Islander population in Western Australia (13% increase in the non-Indigenous population) and declined by 55% in South Australia (stable in the non-Indigenous population). Hepatitis B notification rates in the Aboriginal and Torres Strait Islander population in the Northern Territory fluctuated over the past five years but declined overall by 68% compared with 74% decline in the non-Indigenous population (Figure 3.1.7). Trends in state/territory hepatitis notification rates in the Aboriginal and Torres Strait Islander population are based on small numbers and caution should be taken in interpretation. Please refer to *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details of the numbers of hepatitis B notifications by jurisdiction.[1]

Figure 3.1.7 Hepatitis B notification rate per 100 000, 2013–2017, by state/territory and Aboriginal and Torres Strait Islander status





	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
ACT	58.1	0.0	43.3	0.0	18.9	26.4	24.2	19.4	21.5	19.8
NT	133.6	78.7	102.7	36.3	60.0	139.6	62.1	49.7	46.1	36.0
SA	57.3	51.3	59.7	22.4	26.0	18.1	20.2	21.0	18.4	17.1
TAS	10.7	0.0	0.0	0.0	0.0	12.9	14.0	10.0	9.3	10.0
WA	42.0	31.5	31.7	40.4	52.3	23.9	24.5	21.9	26.1	20.8

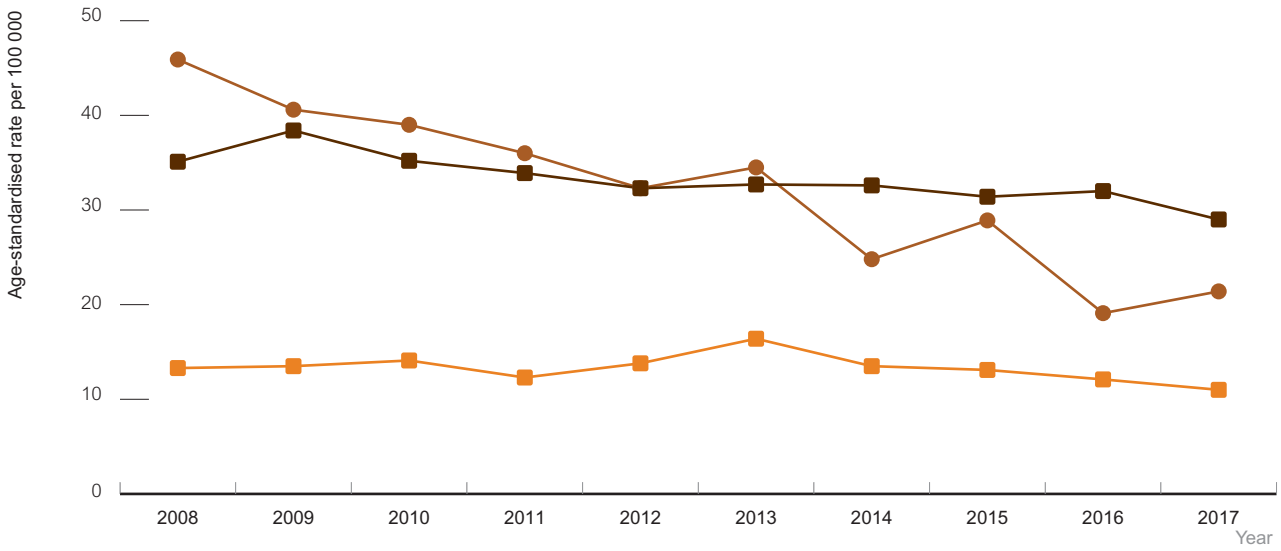
Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year (Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia).

The higher rates of newly diagnosed hepatitis B in the Aboriginal and Torres Strait Islander population than in the non-Indigenous population reflect the higher prevalence of chronic hepatitis B among Aboriginal and Torres Strait Islander people. This relates to historical vertical and early childhood transmission, particularly in the pre-vaccine era, with some additional infections through sexual and blood contact in adolescence and adulthood. Aboriginal and Torres Strait Islander people also have higher rates of risk factors for adult hepatitis B acquisition, including receptive syringe sharing among people who inject drugs. (See above under Hepatitis C prevention, p. 100.)

HBV

Rates of hepatitis B notification were higher in 2017 in major cities (29.0 per 100 000) than in remote and very remote areas (21.4 per 100 000) and inner and outer regional areas (11.0 per 100 000). Rates over the past 10 years have declined in remote areas by 53% from 45.9 per 100 000 in 2008 to 21.4 per 100 000 in 2017. In major cities rates declined by 17% from 35.1 per 100 000 in 2008 to 29.0 per 100 000 in 2017. In inner and outer regional areas, rates were relatively stable between 2008 and 2012, but have declined by 33% in the five-year period 2013–2017 (Figure 3.1.8). The pattern was similar among males and females, with notification rates lowest in inner and outer regional areas for both sexes (Figure 3.1.9 and Figure 3.1.10).

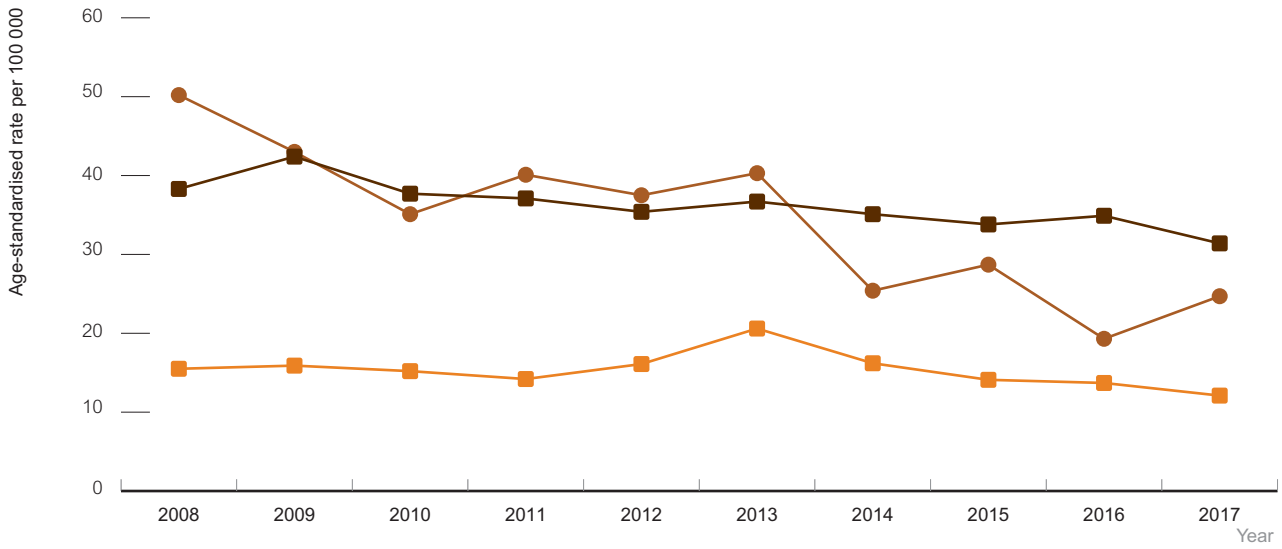
Figure 3.1.8 Hepatitis B notification rate per 100 000 population, 2008–2017, by region of residence



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	35.1	38.4	35.2	33.9	32.3	32.7	32.6	31.4	32.0	29.0
Inner and outer regional	13.3	13.5	14.1	12.3	13.8	16.4	13.5	13.1	12.1	11.0
Remote and very remote	45.9	40.6	39.0	36.0	32.3	34.5	24.8	28.9	19.1	21.4

Source: National Notifiable Diseases Surveillance System.

Figure 3.1.9 Hepatitis B notification rate per 100 000 population, 2008–-2017, by region of residence, males

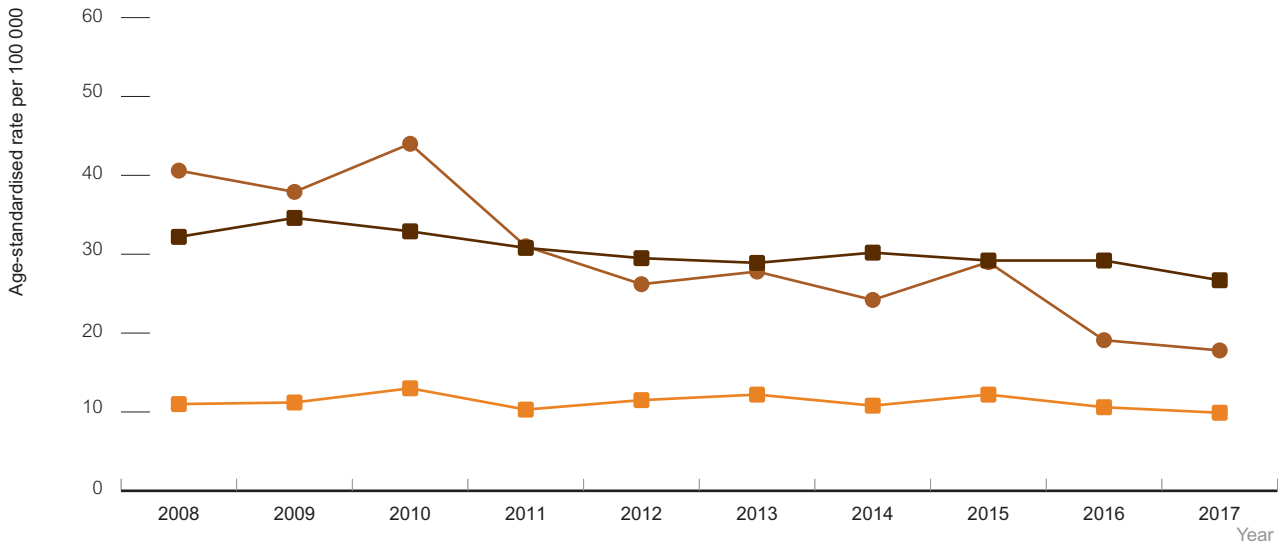


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	38.3	42.4	37.7	37.1	35.4	36.7	35.1	33.8	34.9	31.4
Inner and outer regional	15.5	15.9	15.2	14.2	16.1	20.6	16.2	14.1	13.7	12.1
Remote and very remote	50.2	43.0	35.1	40.1	37.5	40.3	25.4	28.7	19.3	24.7

Source: National Notifiable Diseases Surveillance System.

HBV

Figure 3.1.10 Hepatitis B notification rate per 100 000 population, 2008–-2017, by region of residence, females



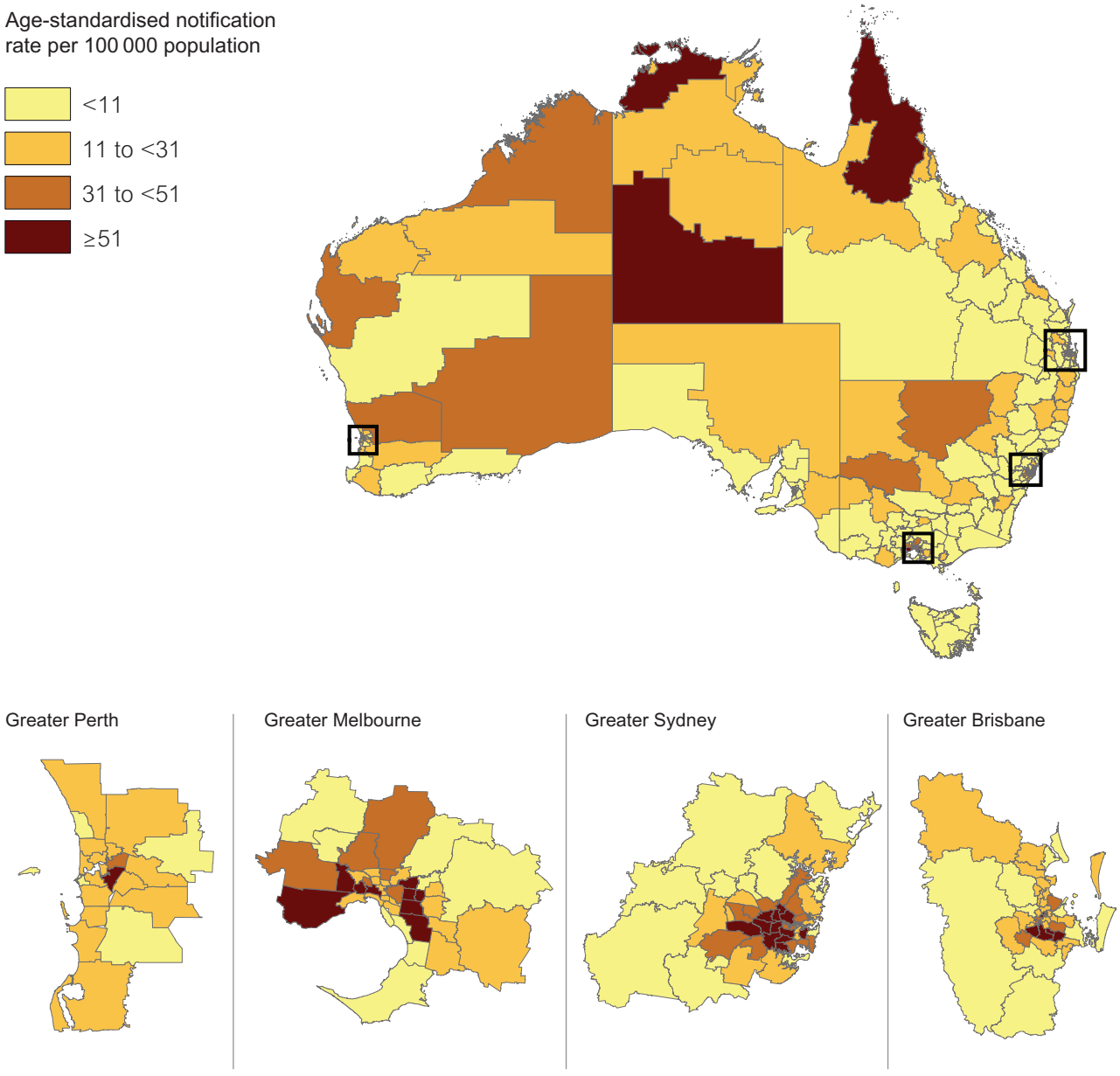
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	32.2	34.6	32.9	30.8	29.5	28.9	30.2	29.2	29.2	26.7
Inner and outer regional	11.0	11.2	13.0	10.3	11.5	12.2	10.8	12.2	10.6	9.9
Remote and very remote	40.6	37.9	44.0	31.0	26.2	27.8	24.2	29.0	19.1	17.8

Source: National Notifiable Diseases Surveillance System.

This report includes age-standardised hepatitis B notification rates by statistical area level 3 (SA3; population size generally between 30 000 and 130 000 persons; see Methodology for details) represented as geographical maps of Australia and major cities (Figure 3.1.11).

Based on average hepatitis B notification rates between 2015 and 2017, there were variations in rates within states and territories as well as major cities. Hepatitis B notification rates were higher predominantly in some regional and remote areas of central and northern Australia. In major cities, rates were higher in inner city areas and some outer metropolitan areas (Figure 3.1.11). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of hepatitis B notifications, particularly in SA3s with smaller populations. Higher notification rates in some SA3s may be related to viral hepatitis screening programs in prison settings, and may not be representative of the rates in the general population in these areas. Caution should be taken in interpreting these rates.

Figure 3.1.11 Average age-standardised hepatitis B notification rate per 100 000 population, by statistical area level 3, 2015–2017, Australia and major cities (population >2 million)



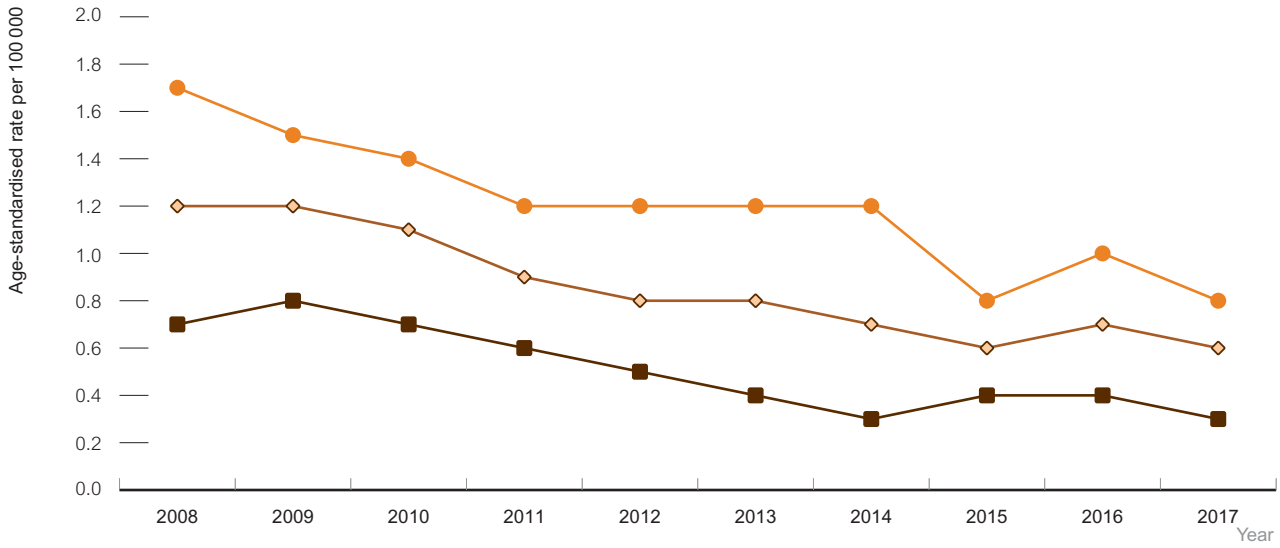
Note: Average hepatitis B notification rates for the three-year period 2015–2017 were used to minimise the influence of fluctuation in the number of hepatitis B notifications.

Source: State and territory health authorities.

Newly acquired hepatitis B

For some hepatitis B notifications, it is possible to determine that the infection was acquired in the two years before diagnosis, on the basis of a prior negative test or other serological factors; these cases are defined as newly acquired hepatitis B. There has been a 54% decline in the rate of newly acquired hepatitis B cases over the past 10 years, from 1.2 per 100 000 in 2008 to 0.6 per 100 000 in 2017, with decline in both males (52%) and females (56%). In 2017, the rate of newly acquired hepatitis B was 2.5 times as high in males as in females (0.8 vs 0.3 per 100 000) (Figure 3.1.12).

Figure 3.1.12 Newly acquired hepatitis B notification rate per 100 000 population, 2008–2017, by sex



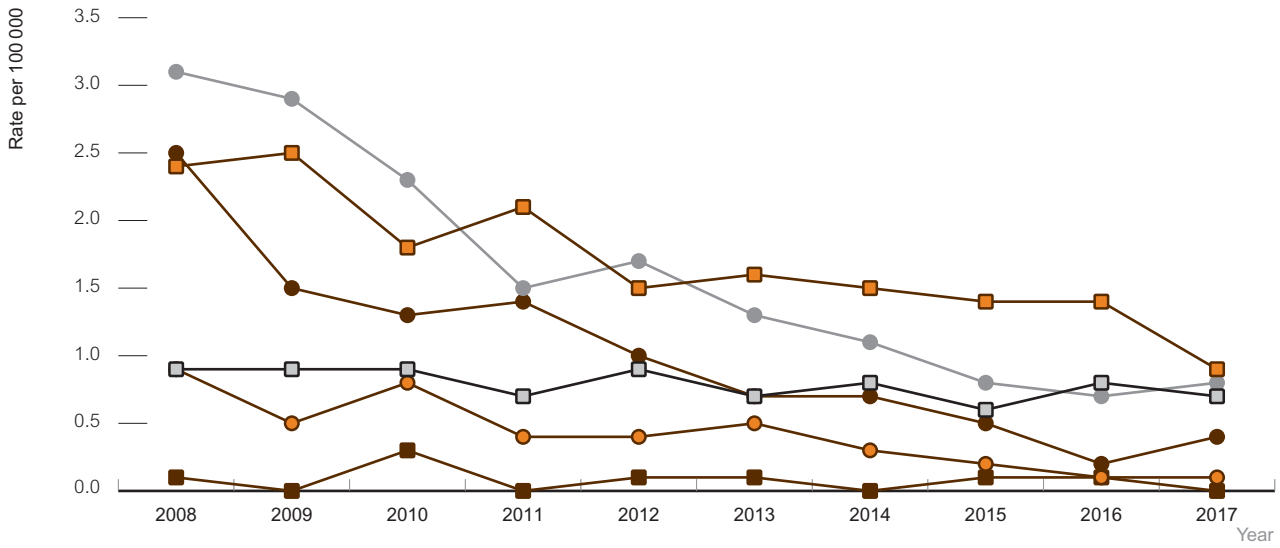
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Males	1.7	1.5	1.4	1.2	1.2	1.2	1.2	0.8	1.0	0.8
Females	0.7	0.8	0.7	0.6	0.5	0.4	0.3	0.4	0.4	0.3
Total	1.2	1.2	1.1	0.9	0.8	0.8	0.7	0.6	0.7	0.6

Source: Australian National Notifiable Diseases Surveillance System.

HBV

In 2017, newly acquired hepatitis B notification rates were highest in the age groups 30–39 years (0.9 per 100 000), 40 years and over (0.8 per 100 000) and 25–29 years (0.4 per 100 000) (Figure 3.1.13). The rate of notification of newly acquired hepatitis B declined in most age groups. The declines were greatest in the age groups 15–19 (85%, 0.9 to 0.1 per 100 000) and 20–24 years (84%, 2.5 to 0.4 per 100 000) (Figure 3.1.13). Rates were stable among those over 40 years (0.9 per 100 000 in 2008 and 0.7 per 100 000 in 2017) and children under 15 (0.1 per 100 000 in 2008 and 0.0 per 100 000 in 2017).

Figure 3.1.13 Newly acquired hepatitis B notification rate per 100 000 population, 2008–2017, by age group



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0-14	0.1	0.0	0.3	0.0	0.1	0.1	0.0	0.1	0.1	0.0
15-19	0.9	0.5	0.8	0.4	0.4	0.5	0.3	0.2	0.1	0.1
20-24	2.5	1.5	1.3	1.4	1.0	0.7	0.7	0.5	0.2	0.4
25-29	3.1	2.9	2.3	1.5	1.7	1.3	1.1	0.8	0.7	0.8
30-39	2.4	2.5	1.8	2.1	1.5	1.6	1.5	1.4	1.4	0.9
40+	0.9	0.9	0.9	0.7	0.9	0.7	0.8	0.6	0.8	0.7

Source: Australian National Notifiable Diseases Surveillance System.

3.2 Number of people living with hepatitis B and prevalence

Number of people living with hepatitis B

At the end of 2017, there were an estimated 233 947 people (range 222 706 – 246 015) living with chronic hepatitis B in Australia. Of those, an estimated 29 791(13%) were Australian-born non-Indigenous people, 50 169 (21%) were born in Northeast Asia, 39 858 (17%) were born in Southeast Asia, and 26 241 (11%) were Aboriginal and Torres Strait Islander people (the estimates by subpopulation may overlap) (Table 3.2.1). People born in Southeast Asia and Northeast Asia, together with Aboriginal and Torres Strait Islander people, represent 10% of the Australian population,[28] but account for half of all people living with chronic hepatitis B in Australia. The estimated number of people living with hepatitis B was also higher among people who inject drugs (13 386 and gay and bisexual men (10 470). The prevalence estimates in overseas-born Australians reflect the prevalence in the country of their birth, which is particularly high in the Asia-Pacific region (Figure 3.2.1).

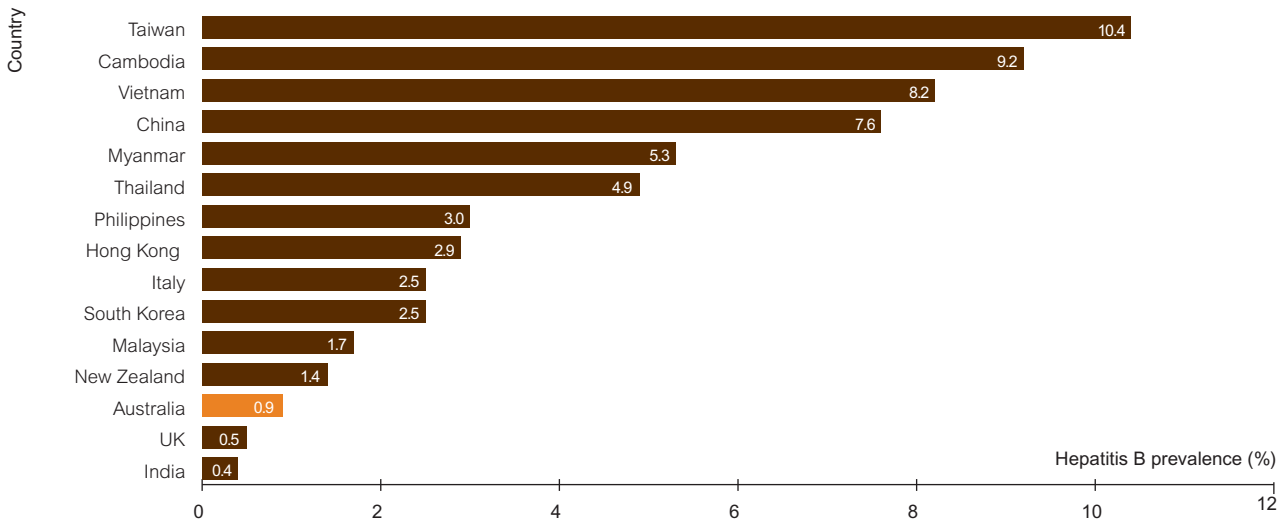
Table 3.2.1 Estimated number of people living with chronic hepatitis B and estimated prevalence, 2017, by subpopulation

Population	People living with chronic hepatitis B	Proportion of all people living with chronic hepatitis B	Hepatitis B prevalence
Total	233 947 (222 706–246 015)		
Australian-born non-Indigenous	29 791	12.7%	0.2%
Born in Northeast Asia	50 169	21.4%	6.2%
Born in Southeast Asia	39 858	17.0%	4.5%
Born in Sub-Saharan Africa	8 167	3.5%	2.6%
Other regions of birth	55 866	23.9%	1.0%
Aboriginal and Torres Strait Islander people	26 241	11.2%	4.0%
People who inject drugs	13 386	5.7%	4.0%
Gay and bisexual men	10 470	4.5%	3.0%

Note: Estimates by subpopulation may overlap.
Source: WHO Collaborating Centre for Viral Hepatitis, Doherty Institute.

HBV

Figure 3.2.1 Estimated prevalence of chronic hepatitis B infection in Australia and other countries, 2016

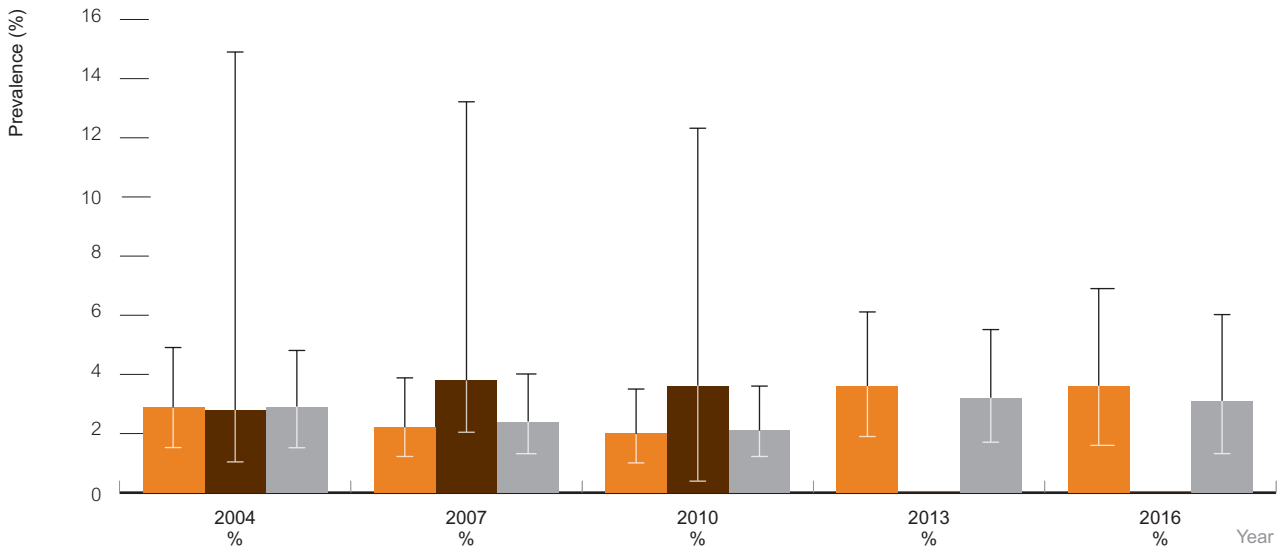


Source: Adjusted Australian antenatal prevalence data,[28] international population seroprevalence data,[29, 30] WHO Collaborating Centre for Viral Hepatitis, Doherty Institute.

Hepatitis B prevalence

According to the National Prison Entrants' Bloodborne Virus and Risk Behaviour Survey, in 2016, 3.1% of respondents were hepatitis B surface antigen positive, 3.6% in men and 0% in women (Figure 3.2.2). These data are from prisoners tested for hepatitis B on entry to Australian prisons (see Methodology for further details). Note that as there are small numbers of female prisoners (n=36 in 2017), these data should be interpreted with caution.

Figure 3.2.2 Hepatitis B surface-antigen prevalence among prison entrants, by year of survey and sex



	2004 %	2007 %	2010 %	2013 %	2016 %
Men	2.9	2.2	2.0	3.6	3.6
Women	2.8	3.8	3.6	0.0	0.0
Total	2.9	2.4	2.1	3.2	3.1

Source: National Prison Entrants' Bloodborne Virus Survey.

Data from published studies linking hepatitis B notifications to perinatal data collections suggest that among Aboriginal women giving birth in the Northern Territory [31] and New South Wales [32] hepatitis B prevalence rates are around 80% lower in women born after childhood hepatitis B vaccination was introduced in 1988 than in those born in the pre-vaccine period. For further information on hepatitis B prevalence rates by Aboriginal and Torres Strait Islander status, please refer to *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018*.[1]

Hepatitis B morbidity

There is no comprehensive registry of advanced disease related to hepatitis B in Australia. One indicator of the extent of disease caused by hepatitis B is the number of liver transplants due to chronic infection. Of the liver transplants in 224 people in 2017, 13 (6%) were attributable to chronic hepatitis B infection (see *Hepatitis C* section, Table 2.5.2).

There were an estimated 479 (range 465 to 501) deaths attributable to chronic hepatitis B in 2017, compared with 504 (range 489 to 527) in 2016. The majority of these deaths were attributable to hepatocellular carcinoma, which was responsible for 327 deaths (range 317 to 342) in 2017, while 152 people (range 148 to 159) died due to decompensated cirrhosis.

These estimates are produced by the WHO Collaborating Centre for Viral Hepatitis at the Doherty Institute and were derived from modelling, which may not correlate with transplant data. A number of factors influence the selection of candidates for transplant, and the numbers may not necessarily be a reflection of the overall morbidity and mortality attributable to individual causes of liver disease.

3.3 Hepatitis B testing and care

The hepatitis B diagnosis and care cascade

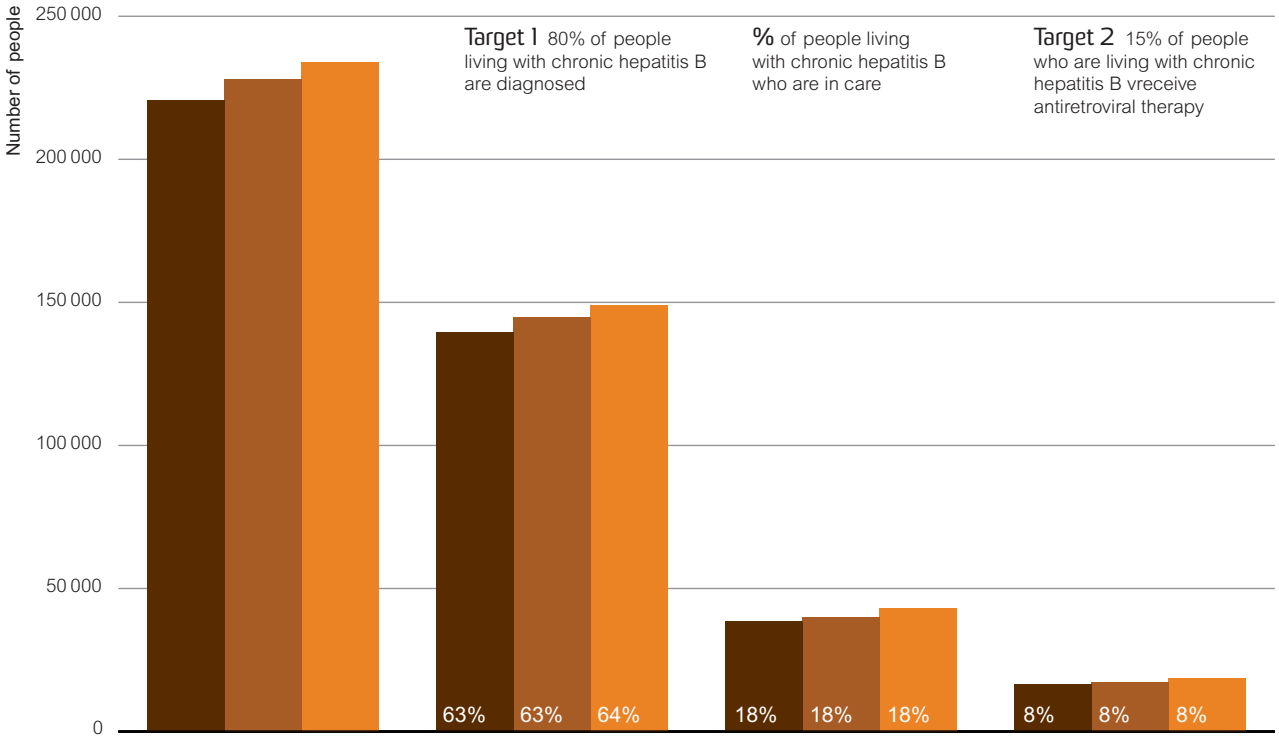
This section includes the hepatitis B diagnosis and care 'cascade', which estimates the number of people living with chronic hepatitis B infection in Australia, number diagnosed, number retained in care and number receiving antiviral treatment.

These estimates are produced by the WHO Collaborating Centre for Viral Hepatitis at the Doherty Institute, and are intended to support improvements in the delivery of services to people with hepatitis B infection. Proportions of people in each stage of the cascade in Australia were estimated using available data. The approach was informed by recommendations from a national stakeholder reference group (see Methodology for further detail).

At the end of 2017, an estimated 233 947 people were living with chronic hepatitis B in Australia. Of those, an estimated 149 118(64%) were diagnosed, 43 218 (18% of those living with chronic infection) were receiving care (monitored or had received antiviral therapy), and 18 851 (8% of those living with chronic infection) received antiviral therapy (Figure 3.3.1).

Australia's Second National Hepatitis B Strategy (2014–2017) has a target of 80% of all people living with chronic hepatitis B diagnosed, and 15% of all people living with chronic hepatitis B receiving treatment.[33]

Figure 3.3.1 The hepatitis B diagnosis and care cascade, 2015–2017



	Living with hepatitis B infection	Diagnosed with hepatitis B infection	Receiving care	Received treatment
2015	220 774	139 507	38 694	16 622
2016	227 976	144 742	40 090	17 192
2017	233 947	149 118	43 218	18 851

Note: Due to updated modelling methods, estimates may be different from figures presented in previous years of reporting.
Source: WHO Collaborating Centre for Viral Hepatitis, Doherty Institute; see Methodology for detail.

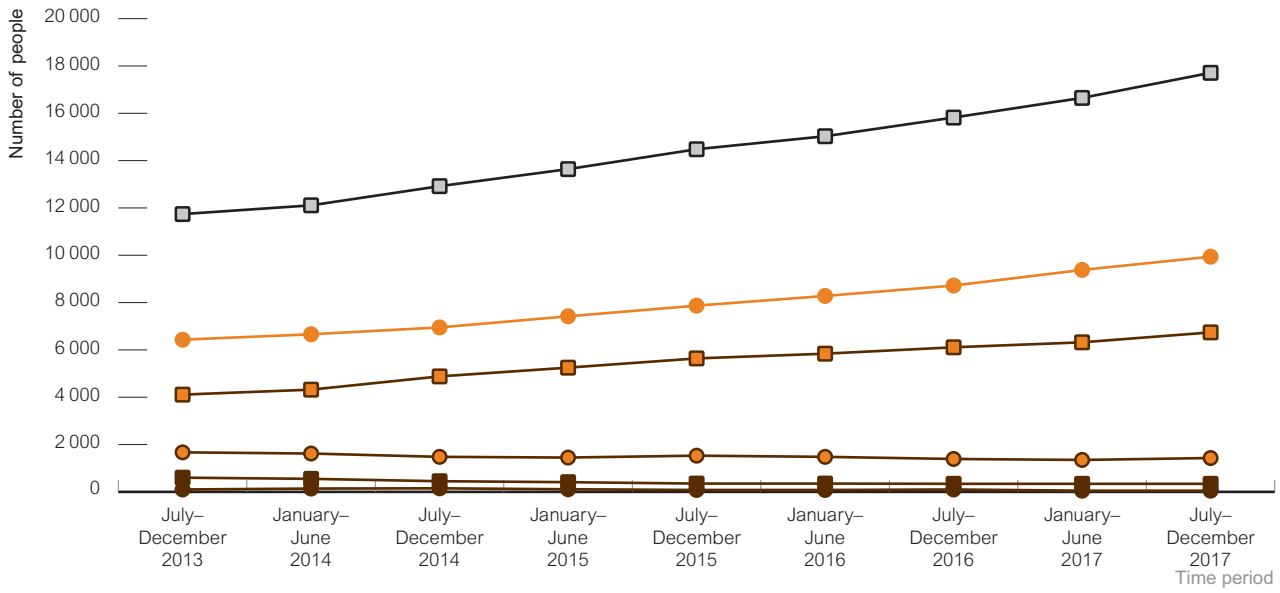
HBV

3.4 Hepatitis B treatment

While treatment for hepatitis B is not curative, it can prevent morbidity and mortality associated with infection. In general, people who are chronically infected but do not have any signs of significant viral replication or active liver damage do not need treatment. However, it is important to closely monitor liver health with regular (at least annual) liver function tests and quantitative viral DNA tests. Treatment for hepatitis B should be considered in people with elevated hepatitis B viral load, abnormal liver function tests, or advanced liver disease (cirrhosis).

Between July 2013 and December 2017 there was a 35% increase in the number of people who were dispensed hepatitis B antiviral treatment, from 11 740 between July and December 2013 to 17 710 between July and December 2017 (Figure 3.4.1). However, the population of people living with chronic hepatitis B has also grown in recent years (see *The hepatitis B diagnosis and care cascade*, on page 119). Of people who received hepatitis B antiviral treatments in July–December 2017, 56% received entecavir, and 38% tenofovir (Figure 3.4.1).

Figure 3.4.1 Estimated number of people dispensed antiviral drugs for hepatitis B, 2013–2017, by drug type



	July–December 2013	January–June 2014	July–December 2014	January–June 2015	July–December 2015	January–June 2016	July–December 2016	January–June 2017	July–December 2017
adefovir	600	550	450	410	350	350	340	340	340
entecavir	6 430	6 660	6 950	7 420	7 870	8 280	8 720	9 380	9 940
lamivudine (hep B)	1 670	1 620	1 480	1 450	1 530	1 480	1 390	1 350	1 430
peginterferon alfa-2a	100	140	150	110	80	80	100	50	50
tenofovir	4 110	4 320	4 880	5 250	5 640	5 840	6 110	6 320	6 740
any drug	11 740	12 110	12 920	13 640	14 480	15 030	15 820	16 650	17 710

Note: Excludes tenofovir dispensing for HIV co-infected patients. Patients on telbivudine are excluded; there were no more than 30 for most time periods.

Source: Pharmaceutical Benefits Scheme 10% sample using Pharmdash. Excludes temporary residents who are ineligible for Medicare. See Methodology for detail.

3.5 Hepatitis B prevention

Vaccination is the corner-stone of hepatitis B primary prevention. Other strategies to protect people from acquiring hepatitis B infection include use of sterile needles and syringes and ancillary equipment among people who inject drugs, condom use, universal precautions in healthcare settings, monitoring of pregnant women living with chronic hepatitis B and their babies, and screening of blood donors.[35] Secondary prevention strategies to reduce the risk of progression to hepatocellular carcinoma include improving access to diagnosis, monitoring and antiviral treatment for those with evidence of active liver disease.

Treatment for hepatitis B controls viral replication and resulting liver damage, which profoundly reduces progression to advanced liver disease and hepatocellular carcinoma.

Hepatitis B vaccination

Patterns of hepatitis B infection in Australia should be interpreted with knowledge of the history of hepatitis B immunisation programs. In the Northern Territory, hepatitis B screening was introduced for all pregnant women and vaccination to infants born to mothers living with chronic infection in 1985; universal infant vaccination was implemented in 1990, and a catch-up program for children aged 6–16 years was introduced in 1998. In other states and territories, hepatitis B vaccination of all infants commenced in 2000, and a universal adolescent (11–14 years) school-based hepatitis B vaccination catch-up program commenced in 1998 in Victoria and Tasmania, in 1999 in South Australia and the Australian Capital Territory, in 2002 in Western Australia, in 2004 in New South Wales, and in 2007 in Queensland (Figure 3.5.1).[36]

Over the past five years (2013–2017), hepatitis B vaccination coverage rates for children remained high in Australia (Figure 3.5.2). In 2017, hepatitis B vaccination coverage at 12 months was 93% in the Aboriginal and Torres Strait Islander children and 95% in non-Indigenous children, reaching 98% and 96% at 24 months respectively (Figure 3.5.2). The lower rates at 12 months in the Aboriginal and Torres Strait Islander children suggest issues around timeliness of completion of the vaccination course, which may lead to increased risk of disease acquisition.

Figure 3.5.1 Roll-out of hepatitis B vaccination in Australia, by year

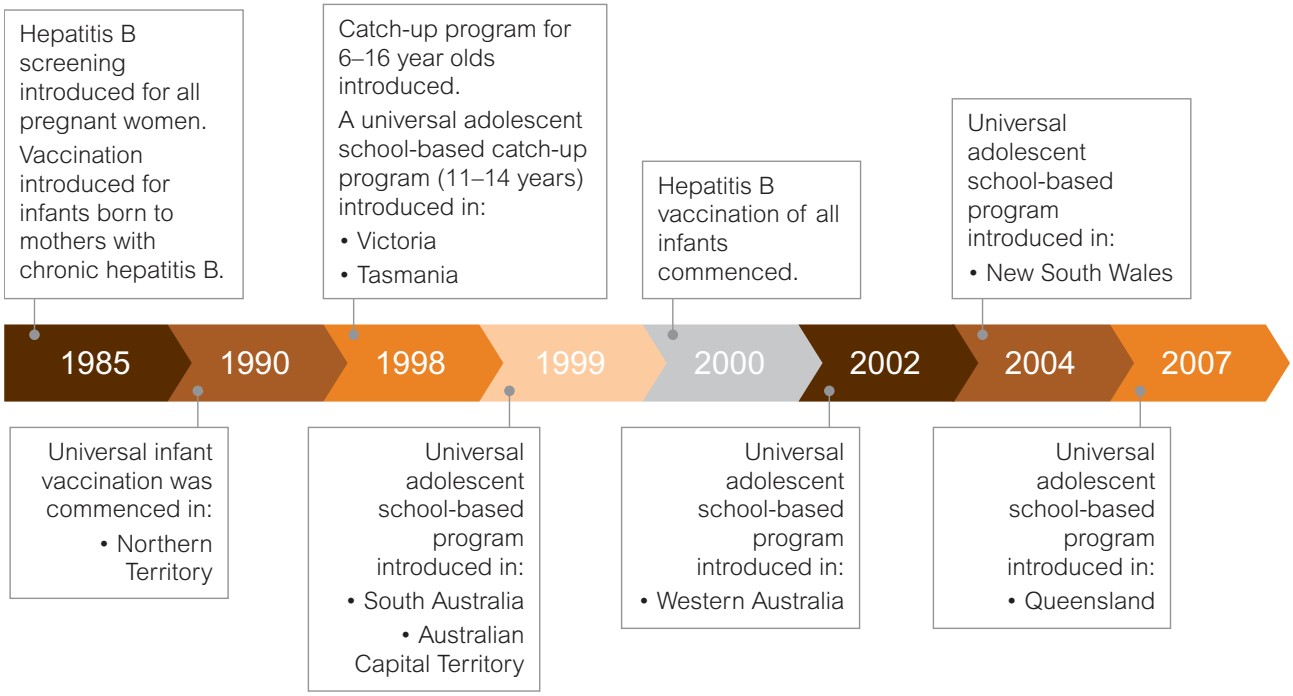
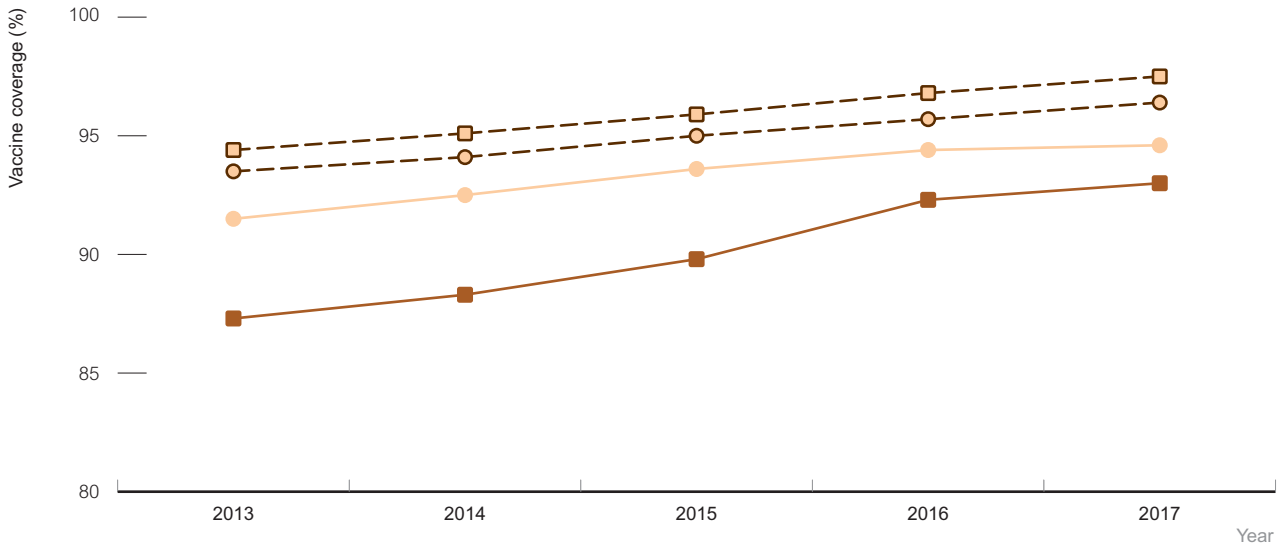


Figure 3.5.2 Hepatitis B vaccination coverage estimates at 12 and 24 months, 2013–2017, by Aboriginal and Torres Strait Islander status



	2013	2014	2015	2016	2017
Aboriginal and Torres Strait Islander children 12 months (%)	87.3	88.3	89.8	92.3	93.0
Aboriginal and Torres Strait Islander children 24 months (%)	94.4	95.1	95.9	96.8	97.5
Non-Indigenous 12 months (%)	91.5	92.5	93.6	94.4	94.6
Non-Indigenous 24 months (%)	93.5	94.1	95.0	95.7	96.4

Source: National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases; see Methodology for detail.

HBV

4 Sexually transmissible infections

This chapter gives details of STI notifications. Please see pp. 10–13 for summary data.

4.1 Chlamydia

See p. 10 for summary.

Chlamydia notifications

Previous reports (2015 and 2016 data) did not include chlamydia notifications for Victoria. Complete chlamydia notifications are now available for Victoria for all years, so they are included in both national and state/territory reporting in this report.

Chlamydia was the most frequently notified sexually transmissible infection in Australia. In 2017, there were 100 775 notifications, 7015 (7%) of which were among the Aboriginal and Torres Strait Islander population, 31 502 (31%) were among the non-Indigenous population, and Indigenous status was not reported for 62 258 (62%) notifications (Table 4.1.1). In 2017, 52 318 (52%) of chlamydia notifications were in females, 73 380 (73%) were in people aged 15–29 years, and 73 035 (72%) were in people residing in major cities (Table 4.1.1).

In 2017, the female-to-male sex ratio was 2.3:1 in the age group 15–19 years, 1.1:1 in those aged 20–24 and 0.7:1 in those aged 25–29 (data not shown). Age-and sex-specific patterns of notification may be influenced by differential testing rates.

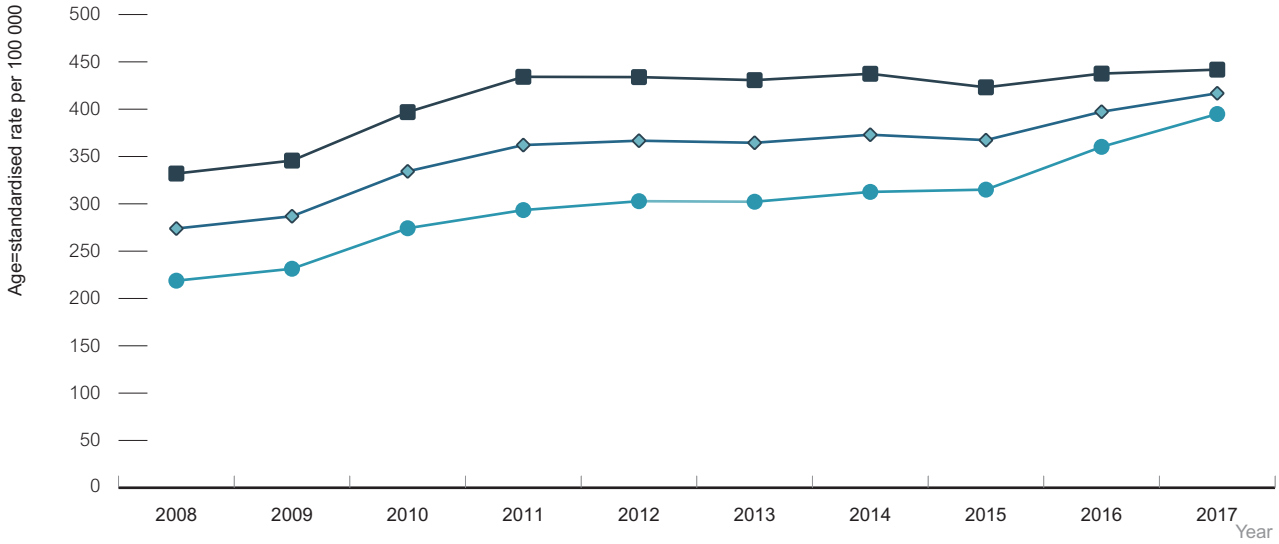
Table 4.1.1 Characteristics of chlamydia notifications, 2008–2017

	Year of diagnosis									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Characteristic										
Total cases	58 615	63 183	74 357	81 074	83 119	83 761	86 788	86 409	94 555	100 775
Sex										
Male	23 708	25 912	31 048	33 499	34 997	35 406	37 026	37 635	43 434	48 335
Female	34 814	37 175	43 126	47 452	48 020	48 322	49 720	48 733	51 046	52 318
Missing	93	96	183	123	102	33	42	41	75	122
Age group										
0–14	582	603	734	748	784	726	685	507	504	452
15–19	15 046	16 350	20 054	21 814	21 093	19 956	19 179	17 486	17 581	17 570
20–24	21 238	23 182	26 941	29 801	30 462	30 472	31 686	30 699	32 522	33 979
25–29	10 634	11 384	13 019	14 241	14 810	15 962	17 130	17 790	20 112	21 831
30–39	7 404	7 775	8 866	9 344	10 264	10 750	11 651	12 975	15 383	17 262
40+	3 678	3 815	4 664	5 020	5 602	5 872	6 448	6 931	8 430	9 655
Missing	33	74	79	106	104	23	9	21	23	26
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	5 649	5 480	6 828	7 223	7 145	7 076	6 831	6 697	6 971	7 015
Non-Indigenous	24 305	26 905	32 006	35 281	36 481	27 350	27 674	27 542	29 504	31 502
Not reported	28 661	30 798	35 523	38 570	39 493	49 335	52 283	52 170	58 080	62 258
Area of residence										
Major cities	38 460	42 015	48 953	53 814	55 740	56 302	59 099	59 939	66 963	73 035
Inner regional	8 902	9 835	12 137	13 082	13 146	12 585	13 189	12 605	13 101	13 215
Outer regional	6 524	6 723	7 783	8 625	8 753	8 832	8 578	8 186	8 385	8 200
Remote	1 711	1 619	2 039	2 071	2 165	2 082	1 980	1 948	1 931	1 895
Very remote	2 107	2 043	2 337	2 152	2 020	2 170	2 206	2 041	2 036	1 980
Missing data	911	948	1 108	1 330	1 295	1 790	1 736	1 690	2 139	2 450
State/territory										
ACT	997	951	1 161	1 261	1 283	1 270	1 197	1 266	1 362	1 466
NSW	14 001	14 951	18 231	20 582	21 316	20 833	22 928	22 603	26 043	29 008
NT	2 286	2 445	2 662	2 629	2 722	3 004	2 997	2 737	2 630	2 667
QLD	15 190	16 689	19 211	18 639	18 829	20 327	21 134	21 182	22 756	23 395
SA	3 711	3 850	4 401	5 267	5 066	5 531	5 495	5 385	5 483	5 912
TAS	1 472	1 466	2 008	1 776	1 781	1 538	1 776	1 666	1 688	1 582
VIC	12 313	14 011	16 531	19 270	20 357	19 542	19 926	20 398	22 787	25 253
WA	8 642	8 820	10 152	11 650	11 765	11 716	11 335	11 169	11 806	11 492

Source: Australian National Notifiable Diseases Surveillance System.

The notification rate of chlamydia increased steadily between 2008 and 2011, remained relatively stable between 2011 and 2015, and increased by 13% from 637.3 per 100 000 in 2015 to 416.8 per 100 000 in 2017, with a similar trend in both males and females (Figure 4.1.1). The notification rate has been higher in females than males in each of the past 10 years and in 2017 was 441.8 per 100 000 in females and 394.9 per 100 000 in males.

Figure 4.1.1 Chlamydia notification rate per 100 000, 2008–2017, by sex

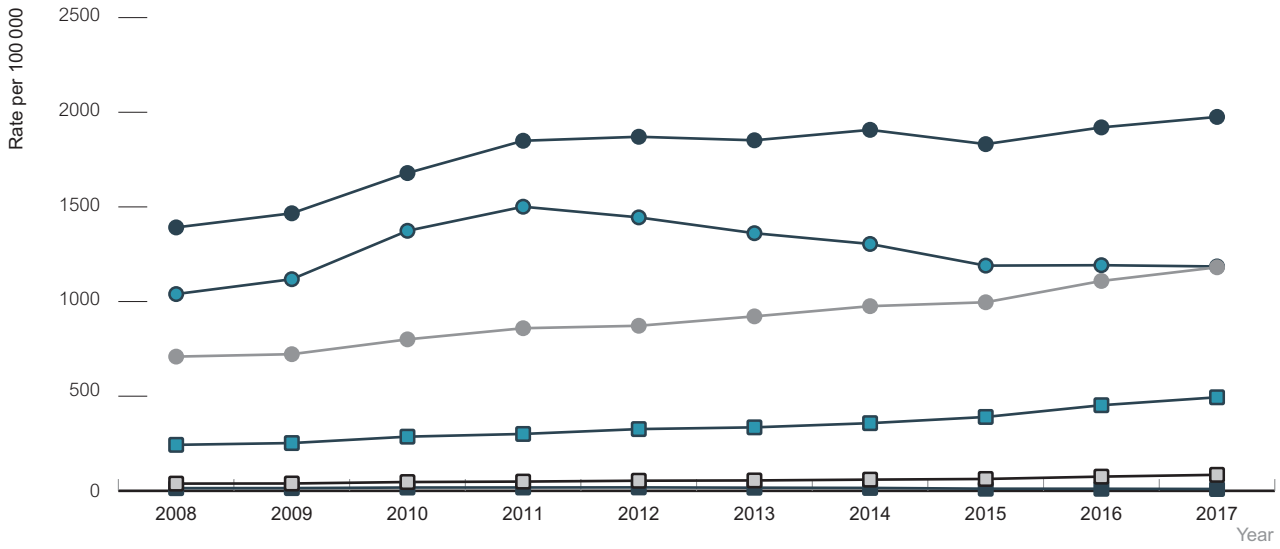


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Males	218.8	231.4	274.2	293.4	302.8	302.2	312.6	315.0	360.2	394.9
Females	332.0	345.7	396.9	434.2	433.9	430.7	437.4	423.1	437.6	441.8
Total	273.9	286.9	334.3	362.1	366.7	364.5	373.0	367.3	397.3	416.8

Source: Australian National Notifiable Diseases Surveillance System

The trends in chlamydia notification rates varied by age group. Over the 10-year period 2008–2017, notification rates have been highest in the age groups 20–24, 15–19 and 25–29 years (1975.4, 1185.3 and 1180.9 per 100 000 in 2017, respectively). While notification rates in those aged 20–24 have remained relatively stable in the last five years, rates in the 15–19 age group have declined by 13%, from 1361.1 per 100 000 in 2013 to 1185.3 per 100 000 in 2017 (Figure 4.1.2). The decline in notification rates from 2013 in those aged 15–19 was in both males and females (Figure 4.1.3 and Figure 4.1.4). Notification rates in the 25–29 age group have increased by 28% in the last five years, from 921.7 per 100 000 in 2013 to 1180.9 per 100 000 in 2017, with a similar pattern seen in both males and females. While notification rates in the age group 30–39 years are lower overall, they have increased by 47% in the last five years, from 335.4 per 100 000 in 2015 to 494.2 per 100 000 in 2017.

Figure 4.1.2 Chlamydia notification rate per 100 000, 2008–2017, by year and age group

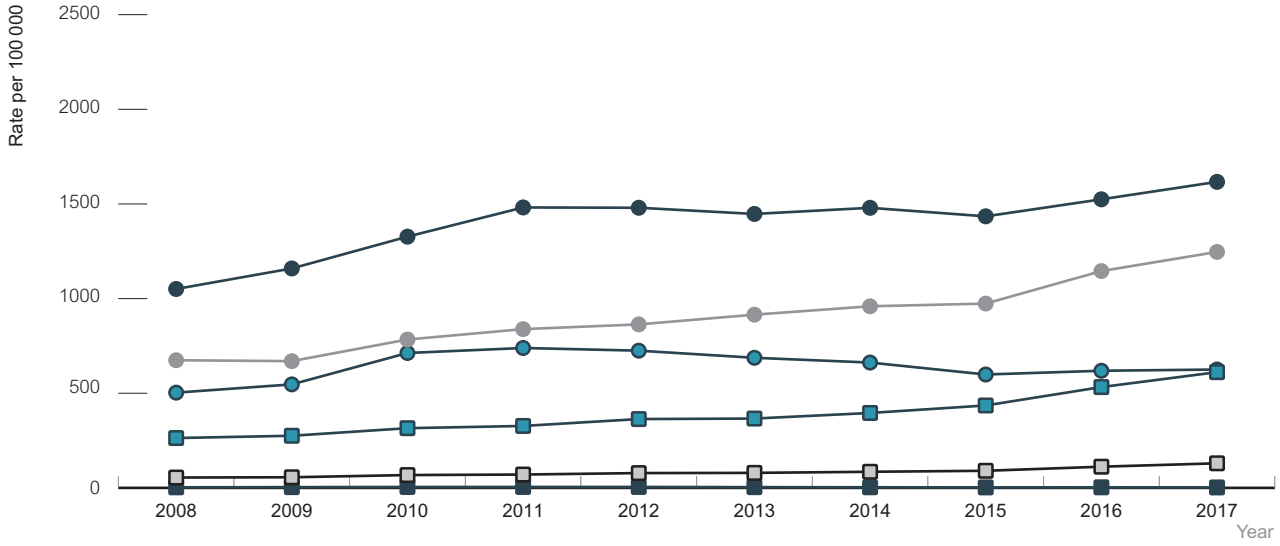


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	14.2	14.5	17.5	17.7	18.2	16.6	15.4	11.3	11.0	9.8
15–19	1039.5	1118.1	1373.7	1501.0	1444.6	1361.1	1304.2	1189.8	1192.0	1185.3
20–24	1391.6	1466.2	1678.8	1849.4	1870.5	1851.9	1907.1	1831.6	1920.0	1975.4
25–29	709.1	721.9	800.2	859.1	872.0	921.7	975.6	996.2	1108.7	1180.9
30–39	243.0	252.4	286.2	300.5	326.2	335.4	357.5	390.3	452.3	494.2
40+	38.2	38.8	46.5	48.9	53.4	54.9	59.2	62.7	75.1	84.6

Source: Australian National Notifiable Diseases Surveillance System

STIs

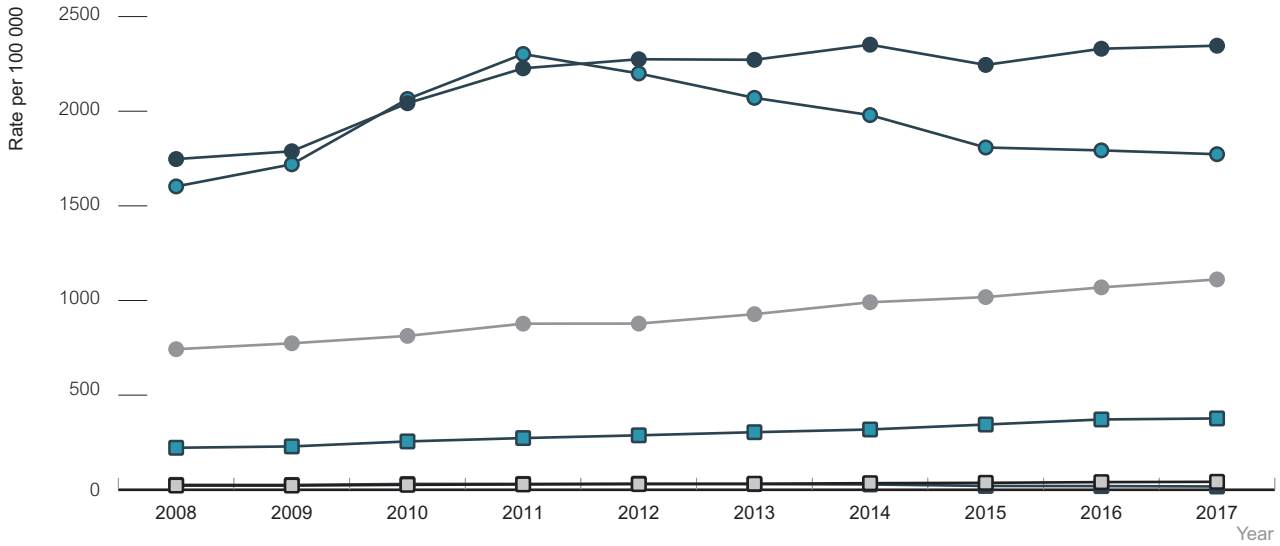
Figure 4.1.3 Chlamydia notification rate per 100 000, 2008–2017, by year and age group, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	3.0	4.0	4.8	5.0	5.0	3.9	3.3	2.6	3.0	2.4
15–19	503.2	546.8	712.6	739.1	724.9	687.3	662.1	599.0	618.8	625.3
20–24	1050.7	1159.2	1327.2	1481.5	1479.9	1447.2	1479.6	1434.6	1524.5	1616.7
25–29	674.3	669.6	783.8	838.7	863.7	915.1	959.4	973.7	1145.4	1246.6
30–39	263.3	275.4	315.4	327.2	363.6	366.3	395.8	435.4	532.6	611.4
40+	54.7	56.1	67.8	70.5	78.2	79.3	85.1	90.3	111.9	129.8

Source: Australian National Notifiable Diseases Surveillance System

Figure 4.1.4 Chlamydia notification rate per 100 000, 2008–2017, by year and age group, females

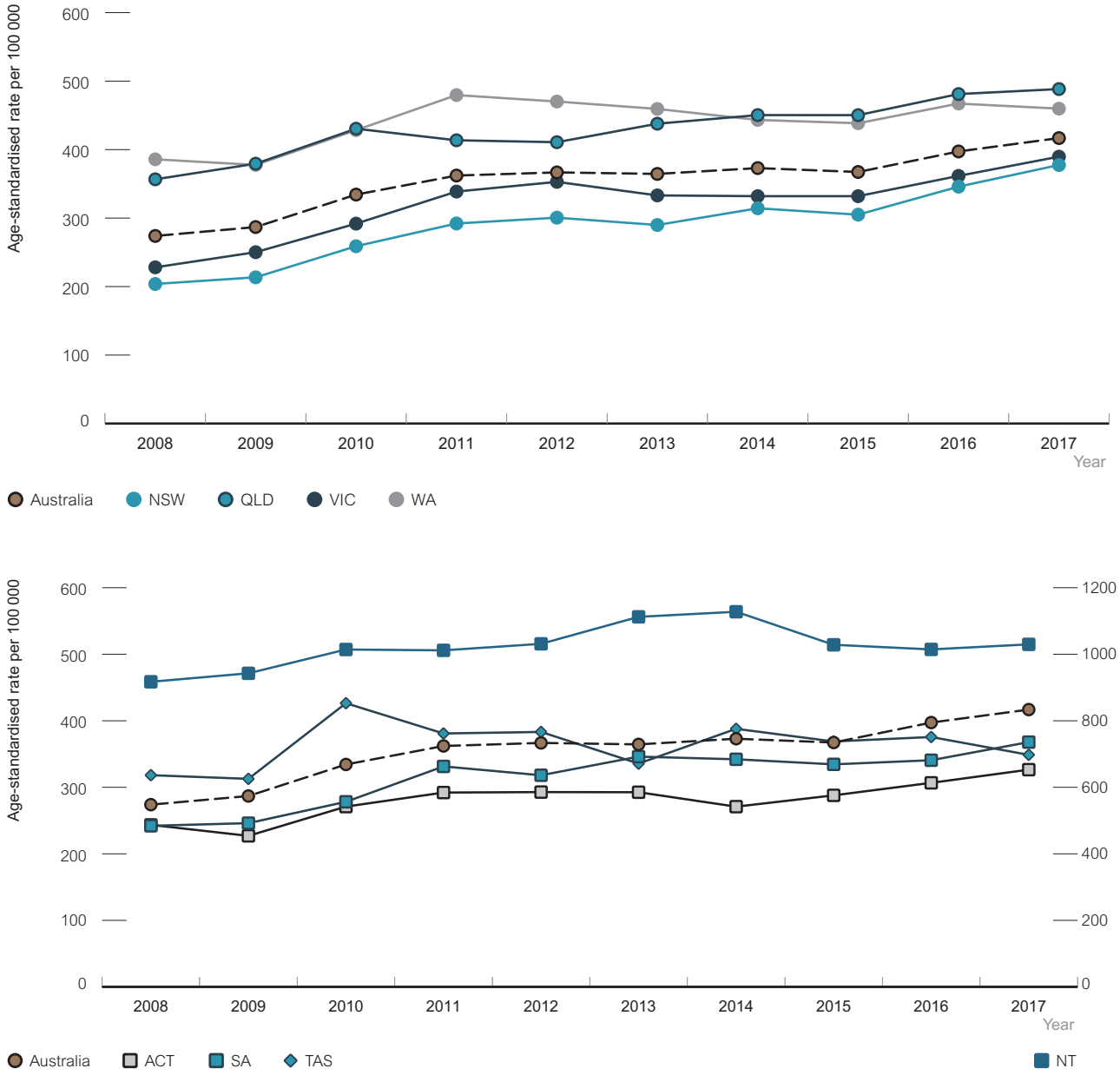


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	25.9	25.5	30.7	31.0	32.2	29.9	28.2	20.4	19.5	17.5
15–19	1602.6	1719.5	2064.4	2302.0	2199.5	2070.5	1979.5	1808.3	1793.0	1772.8
20–24	1747.2	1788.3	2042.2	2226.7	2274.5	2271.7	2351.5	2244.6	2330.1	2346.0
25–29	742.7	773.9	813.0	877.6	878.0	927.8	990.7	1018.0	1069.3	1111.4
30–39	222.0	229.1	255.5	273.2	287.7	304.2	318.6	344.8	371.5	376.9
40+	22.5	22.5	26.2	28.4	30.0	31.9	34.9	36.8	40.5	42.1

Source: Australian National Notifiable Diseases Surveillance System

Between 2013 and 2017 in New South Wales, there was a 30% increase in chlamydia notification rates from 289.9 to 377.5 per 100 000. Similarly, in Queensland there was a steady increase from 437.8 to 488.4 per 100 000. Between 2016 and 2017, notification rates increased by 9% in New South Wales and by 8% in South Australia and Victoria (Figure 4.1.5; Table 4.1.2).

Figure 4.1.5 Chlamydia notification rate per 100 000 population, 2008–2017, by year and state/territory



Source: Australian National Notifiable Diseases Surveillance System

STIs

Table 4.1.2 Age-standardised rates of chlamydia notification per 100 000 population, 2008–2017, by state/territory

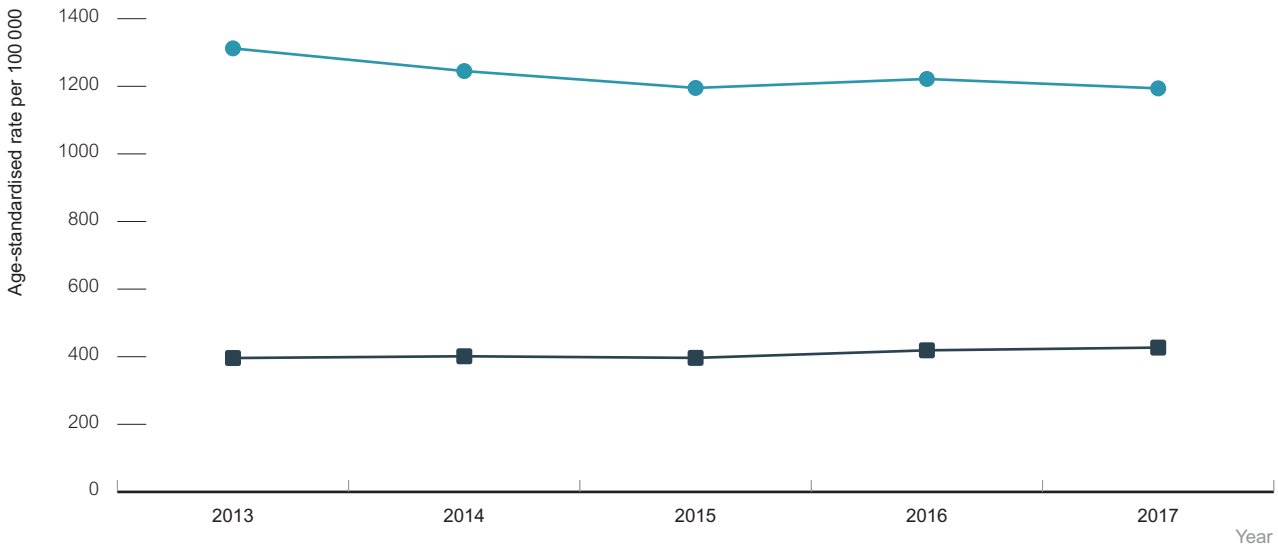
State/territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	243.5	227.0	271.0	292.1	292.8	292.6	270.9	287.9	306.7	326.5
New South Wales	203.8	213.5	258.9	292.1	300.6	289.9	314.3	305.0	345.9	377.5
Northern Territory	917.2	942.7	1014.2	1011.7	1031.3	1112.4	1127.7	1028.4	1014.5	1029.7
Queensland	356.6	379.4	430.5	413.6	410.8	437.8	450.4	450.3	481.1	488.4
South Australia	242.1	246.1	278.2	331.4	318.1	346.1	342.1	334.5	340.7	367.9
Tasmania	318.2	312.8	426.4	380.9	383.2	335.6	387.9	368.9	375.6	348.8
Victoria	228.1	250.2	291.9	338.7	352.9	333.1	332.0	332.0	361.6	389.7
Western Australia	385.8	377.6	428.4	479.6	470.2	459.4	443.3	438.5	467.2	459.8
Australia	273.9	286.9	334.3	362.1	366.7	364.5	373.0	367.3	397.3	416.8

Source: National Notifiable Diseases Surveillance System.

Aboriginal and Torres Strait Islander notification rates for chlamydia are based on data from four jurisdictions (the Northern Territory, Queensland, South Australia and Western Australia), where Aboriginal and Torres Strait Islander status was ≥50% complete for chlamydia notifications for each of the past five years (2013–2017). Just over half (57%) of the Aboriginal and Torres Strait Islander population reside in these jurisdictions, so it is important to note that the notification rates are not necessarily nationally representative.

The rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population declined by 9% between 2013 and 2017, but remained around three times greater than the non-Indigenous population in 2017 (1193.9 vs 427.0 per 100 000) (Figure 4.1.6).

Figure 4.1.6 Chlamydia notification rate per 100 000, 2013–2017, by Aboriginal and Torres Strait Islander status

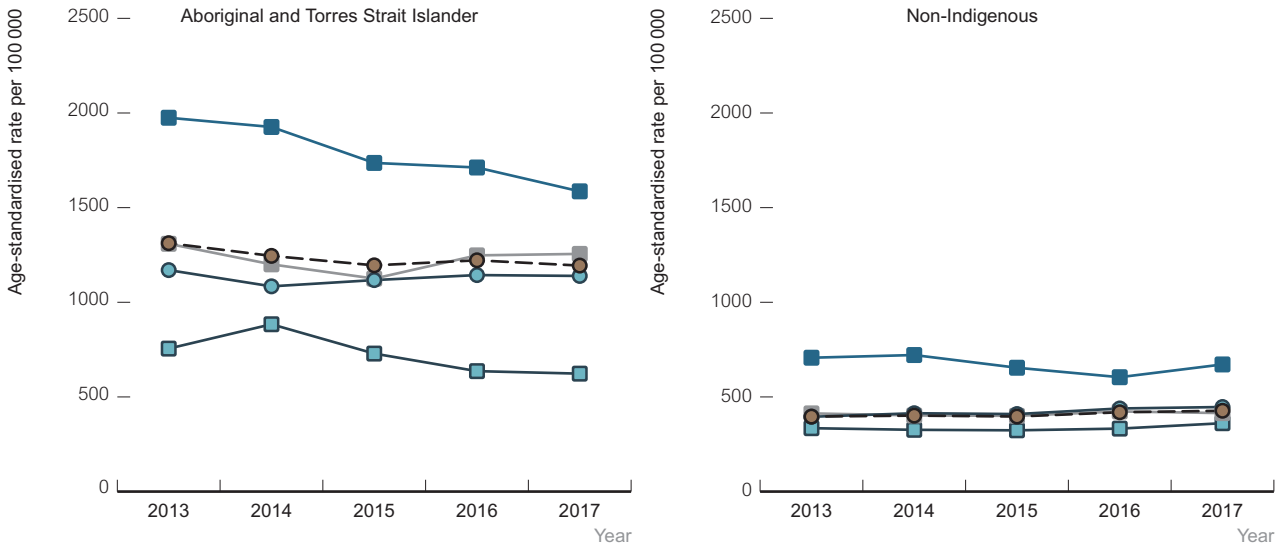


	2013	2014	2015	2016	2017
Non-Indigenous	396.1	401.3	396.5	418.9	427.0
Aboriginal and Torres Strait Islander	1312.2	1245.1	1195.1	1221.7	1193.9

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year (Northern Territory, Queensland, South Australia and Western Australia).

Between 2013 and 2017, the chlamydia notification rate was higher in the Aboriginal and Torres Strait Islander population than the non-Indigenous population in the Northern Territory, Queensland, South Australia and Western Australia (Figure 4.1.7). In 2017, notification rates for the Aboriginal and Torres Strait Islander population were highest in the Northern Territory (1586.1 per 100 000), followed by Western Australia (1255.6 per 100 000), Queensland (1139.2 per 100 000) and South Australia (623.0 per 100 000). Rates have declined by 20% in the Aboriginal and Torres Strait Islander population in the Northern Territory over the five-year period between 2013 and 2017 (1974.9 to 1586.1 per 100 000 in 2017), compared with a 5% decline in the non-Indigenous population (707.1 to 671.6 per 100 000 in 2017).

Figure 4.1.7 Chlamydia notification rate per 100 000, 2013–2017, by Aboriginal and Torres Strait Islander status and state/territory

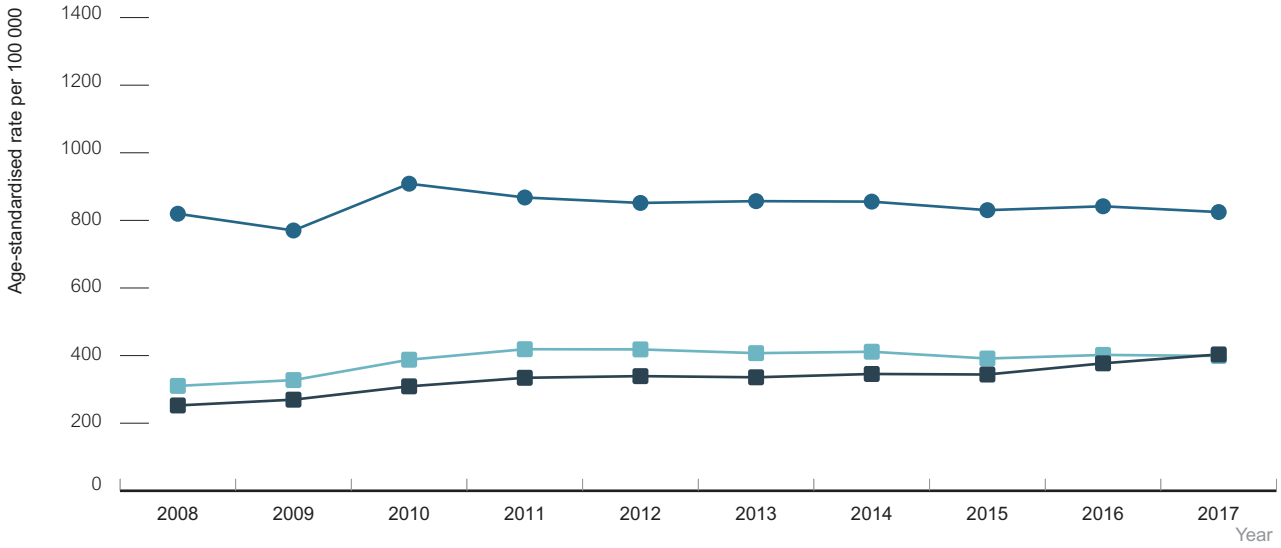


	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Australia	1312.2	1245.1	1195.1	1221.7	1193.9	396.1	401.3	396.5	418.9	427.0
WA	1308.9	1200.4	1125.1	1247.8	1255.6	413.0	402.3	400.1	423.3	414.6
NT	1974.9	1926.1	1736.2	1712.0	1586.1	707.1	721.3	654.2	604.2	671.6
QLD	1170.0	1084.2	1117.3	1143.7	1139.2	395.1	413.8	409.5	439.0	446.7
SA	755.3	883.9	729.0	636.2	623.0	334.8	326.2	323.6	332.6	361.1

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year (Northern Territory, Queensland, South Australia and Western Australia).

Notification rates of chlamydia have been highest and remained stable in remote and very remote regions in the five-year period from 2013 to 2017 (824.6 per 100 000 in 2017) (Figure 4.1.8). Notification rates increased by 19% in major cities in the same period (339.2 to 403.4 per 100 000 in 2017), but declined by 5% in inner and outer regional areas (418.3 to 398.9 per 100 000) (Figure 4.1.8). A similar pattern was seen in both males and females, but in females there was a larger decline in inner and outer regional areas (10%), and the rates were stable in the major cities (Figure 4.1.9 and Figure 4.1.10).

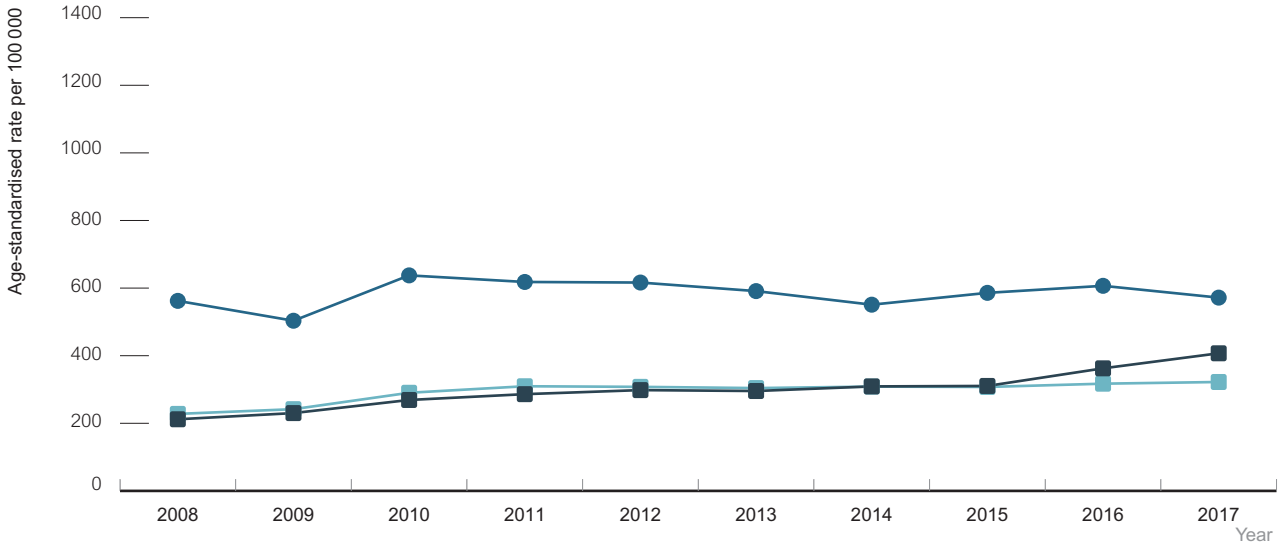
Figure 4.1.8 Chlamydia notification rate per 100 000 population, 2008–2017, by region of residence



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	252.5	269.6	309.0	334.3	339.2	335.8	345.6	344.0	377.1	403.4
Inner and outer regional	310.3	327.5	387.8	418.9	418.3	407.2	411.4	391.3	402.0	398.9
Remote and very remote	819.6	770.1	908.5	867.7	851.6	856.9	855.5	830.2	841.7	824.6

Source: Australian National Notifiable Diseases Surveillance System

Figure 4.1.9 Chlamydia notification rate per 100 000 population, 2008–2017, by region of residence, males

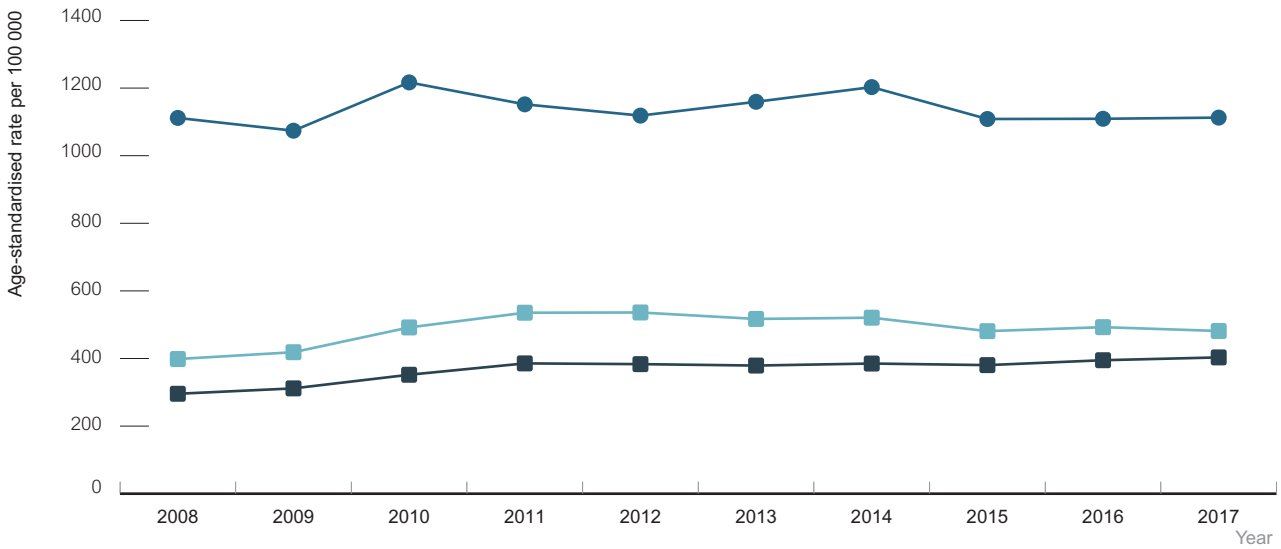


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	211.9	230.2	269.0	286.2	298.2	295.5	309.1	310.5	362.6	407.1
Inner and outer regional	227.8	241.8	290.3	309.6	307.8	304.2	308.6	307.5	317.2	322.2
Remote and very remote	562.2	503.4	637.6	618.1	616.4	591.1	550.9	585.9	606.7	571.8

Source: Australian National Notifiable Diseases Surveillance System

STIs

Figure 4.1.10 Chlamydia notification rate per 100 000 population, 2008–2017, by region of residence, females



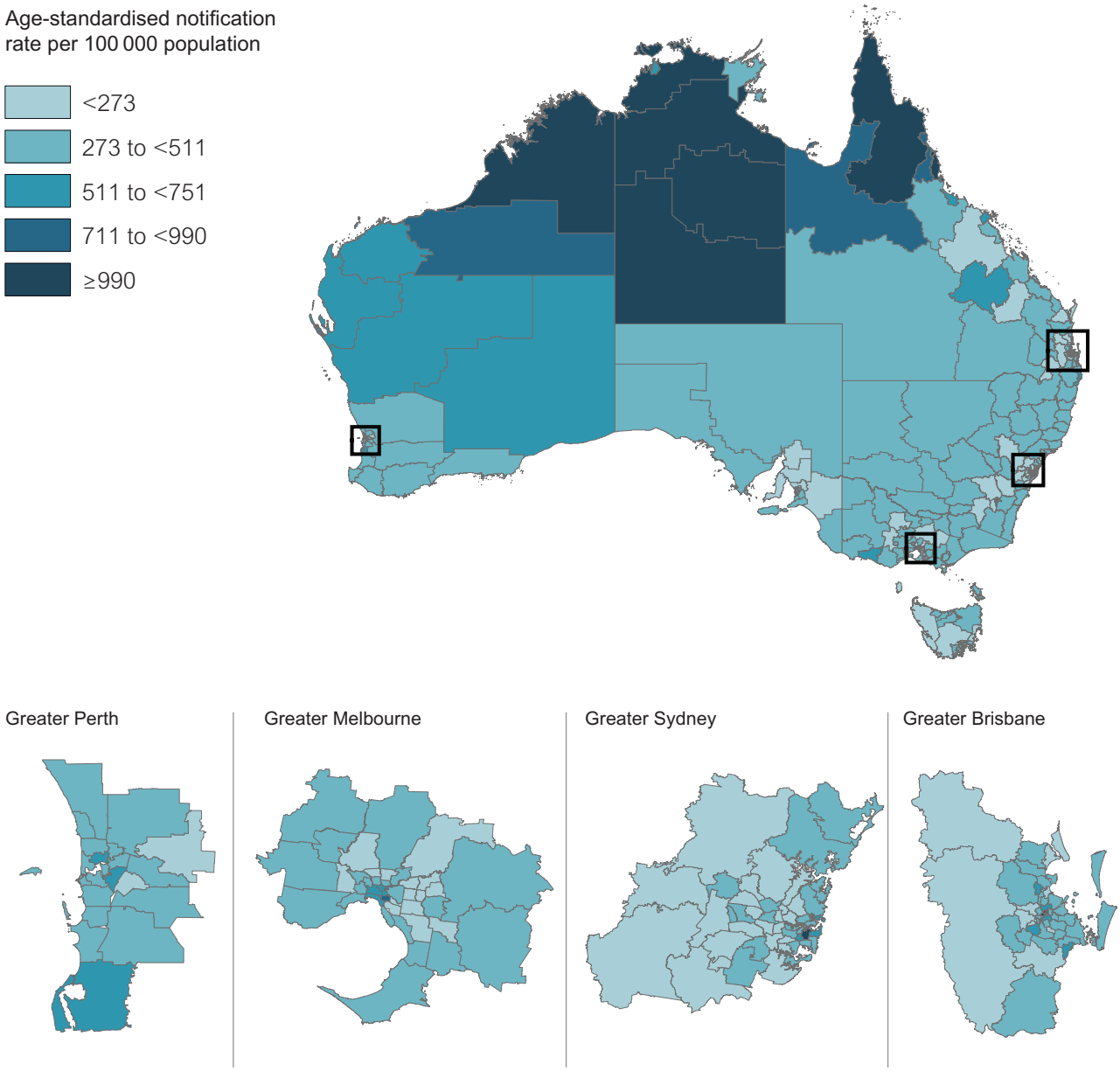
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	295.6	311.6	351.9	385.5	383.3	379.1	385.1	380.4	394.9	403.2
Inner and outer regional	398.4	418.6	491.9	535.4	536.1	517.0	520.7	480.9	492.7	481.4
Remote and very remote	1111.7	1073.9	1216.8	1151.9	1118.6	1159.4	1202.9	1108.5	1109.2	1112.6

Source: Australian National Notifiable Diseases Surveillance System

This report includes age-standardised chlamydia notification rates by statistical area level 3 (SA3; population size generally between 30 000 and 130 000 persons; see Methodology for details) represented as geographical maps of Australia and major cities (Figure 4.1.11).

Based on average chlamydia notification rates between 2015 and 2017, there were variations in rates within states and territories as well as major cities. High chlamydia notification rates were predominantly in regional and remote areas of central and northern Australia. There was also more variation in some major cities than others ( ). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of chlamydia notifications, particularly in SA3s with smaller populations. Higher notification rates in some SA3s may be related to specific STI screening programs. Caution should be taken in interpreting these rates.

Figure 4.1.11 Average age-standardised chlamydia notification rate per 100 000 population, by statistical area level 3, 2015–2017, Australia and major cities (population >2 million)



Note: Average chlamydia notification rates for the three-year period 2015–2017 were used to minimise the influence of fluctuation in the number of chlamydia notifications.

Source: Australian National Notifiable Diseases Surveillance System.

Chlamydia incidence

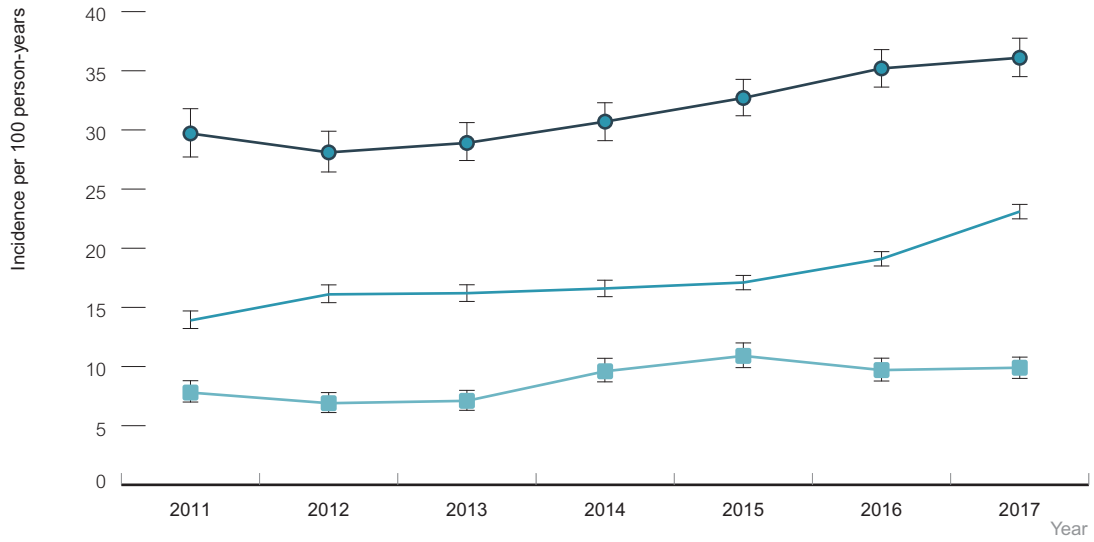
Chlamydia incidence is an important indicator of new transmissions, reflecting the impact of current prevention programs, whereas prevalence reflects the burden of disease. Chlamydia incidence is available from the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network and is calculated by dividing the number of incident infections (negative test followed by a positive test) among people undergoing repeat chlamydia testing at sexual health services by the person's time at risk (determined by the time between repeat chlamydia tests). These incidence estimates represent populations attending sexual health clinics and may not be generalisable to the broader priority populations. Further details about the methods used can be found in the Methodology.

In 2017, chlamydia incidence in HIV-positive gay and bisexual men was 36.1 per 100 person-years, which was 1.6 times as high as in HIV-negative gay and bisexual men (23.1 per 100 person-years). There was a 25% increase in chlamydia incidence in HIV-positive gay and bisexual men since 2013 (from 28.9 per 100 person-years) and a 43% increase in HIV-negative gay and bisexual men since 2013 (from 16.2 per 100 person-years) (Figure 4.1.12).

In female sex workers chlamydia incidence increased by 39% between 2013 and 2017 (from 7.1 to 9.9 per 100 person-years) (Figure 4.1.12).

Caution should be taken with interpretation as some confidence intervals overlap, indicating that these between-year differences are not statistically significant.

Figure 4.1.12 Chlamydia incidence in sexual health clinic attendees, 2011–2017, by select population



	2011	2012	2013	2014	2015	2016	2017
HIV-negative gay and bisexual men	13.9	16.1	16.2	16.6	17.1	19.1	23.1
HIV-positive gay and bisexual men	29.7	28.1	28.9	30.7	32.7	35.2	36.1
Female sex workers	7.8	6.9	7.1	9.6	10.9	9.7	9.9

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

STIs

Chlamydia testing and care

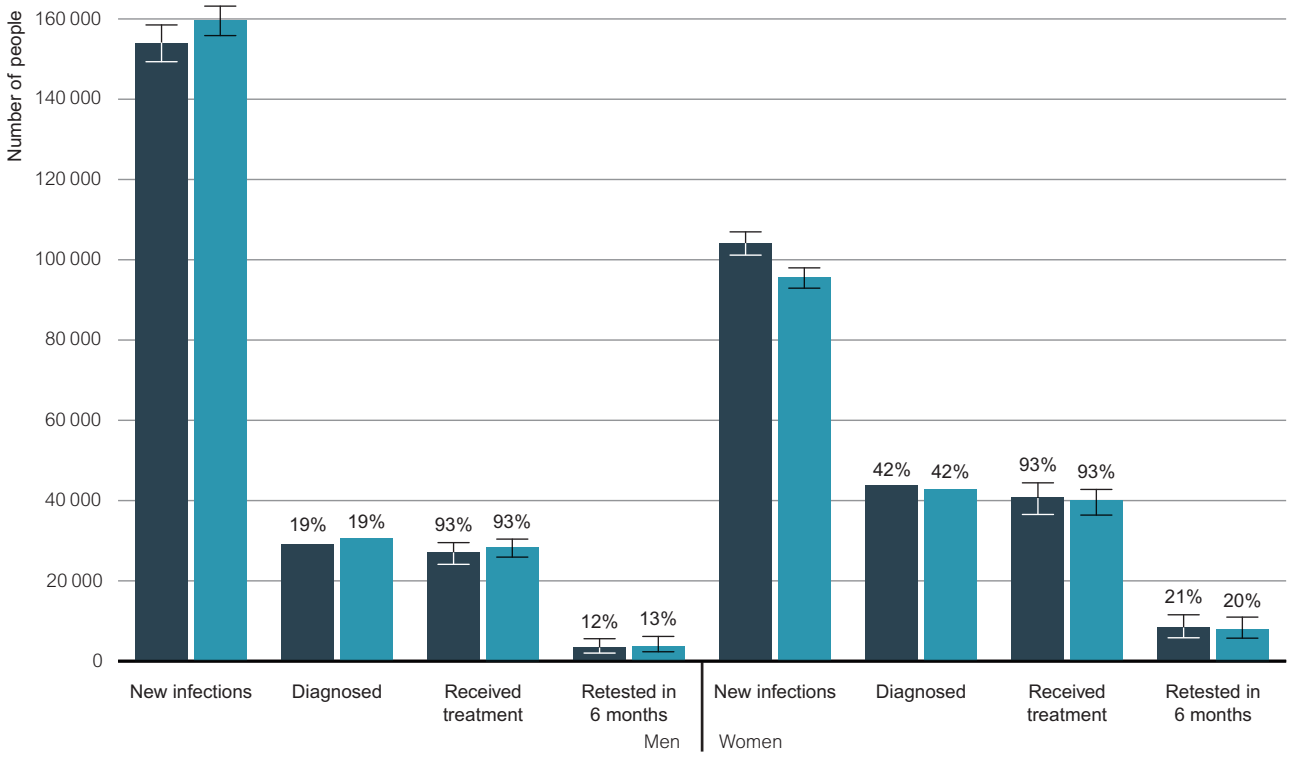
The chlamydia diagnosis and care cascade

This report includes the chlamydia diagnosis and care 'cascade' for people aged 15–29 years, which estimates the number and proportion of people with new chlamydia infections in Australia, and the number and proportion who were diagnosed, received treatment and had a retest within six weeks to six months of diagnosis, as recommended in clinical guidelines.[14] These estimates are used to support the improvement of delivery of services to people with chlamydia across the entire continuum of care—from diagnosis of infection, uptake of treatment, and management (retesting). Using available data and accounting for uncertainties, the proportions of people in each stage of the cascade in Australia were estimated (Figure 4.1.13). Methods and the associated uncertainties are described in detail in the Methodology. The approach was informed by recommendations from a national stakeholder reference group (see Acknowledgments section). The cascade focuses on people aged 15–29 years, as guidelines recommend annual testing in this group and most chlamydia diagnoses occur in this age group. The cascade includes estimates for both men and women.

By the end of 2017, there were an estimated 255 228 (159 672 in men, 95 556 in women) new chlamydia infections in the 15–29 age group, including reinfections. Of those, an estimated 73 299 (29%, 19% men, 42% women) were diagnosed, 68 428 (93% of those diagnosed, 93% for both men and women) received treatment, and 11 758 (17% of those treated, 13% men, 20% women) had a retest between six weeks and six months after diagnosis (Figure 4.1.13).

The cascade shows that there was a higher estimated number of new infections in men than women aged 15–29 years in both 2016 and 2017. This reflects the fact that infections in men are acquired both by heterosexual men and by gay and bisexual men, among whom reinfection rates are higher.[37] However, it is estimated that a lower proportion of men than women are diagnosed (19% vs 42% in both 2016 and 2017). The proportion treated was similar for men and women, but the proportion in 2017 who had a retest following treatment was higher in women than men (20% vs 13%). The greatest gaps in the cascade were therefore at the diagnosis and retesting steps.

Figure 4.1.13 The chlamydia diagnosis and care cascade in people aged 15–29 years, 2016–2017, by sex



	New infections (Men)	Diagnosed (Men)	Received treatment (Men)	Retested in 6 months (Men)	New infections (Women)	Diagnosed (Women)	Received treatment (Women)	Retested in 6 months (Women)
2016	154 007	29 023	27 088	3 383	104 132	43 762	40 845	8 394
2017	159 672	30 491	28 465	3 724	95 556	42 808	39 963	8 034

Source: See Methodology for further details of mathematical modelling used to generate estimates.

Chlamydia testing

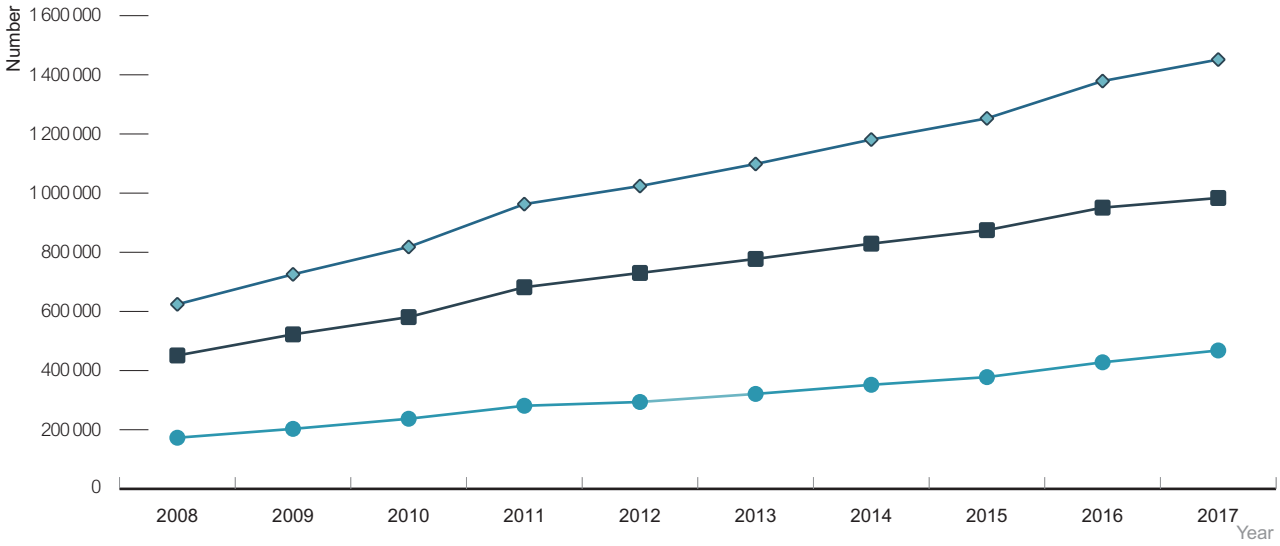
Clinical guidelines recommend the opportunistic offer of chlamydia screening to all young people at least annually, and regular testing for sex workers.[14] Annual testing is recommended for sexually active gay and bisexual men, and testing every three to six months for higher risk men based on behavioural criteria and those taking pre-exposure prophylaxis (PrEP).[15] Chlamydia testing data are included in this report from a number of sources including Medicare, sexual health clinics and high-caseload general practice clinics.

Medicare-rebated chlamydia tests

The number of Medicare-rebated chlamydia tests in Australia has increased by 10% from 624 047 in 2008 to 1 451 544 in 2017, with increases in both males (131% increase) and females (88% increase) (Figure 4.1.14). The number of chlamydia tests conducted in females in 2017 was 2.0 times as high as in males. It is important to note that these tests capture Medicare-rebated tests; testing conducted in government hospitals and sexual health services may not be included. The numbers given here are therefore likely to underestimate all chlamydia tests conducted in Australia.

Between 2013 and 2017, there was little change in the proportion of people aged 15–29 years attending general practice who had a Medicare-rebated chlamydia test in a year (8% increase in men, 2% decrease in women), but overall testing levels remained low (14% tested in 2017) (Figure 4.1.15). The proportion tested was higher among women than men in all years since 2009, and was 18% in women and 9% in men in 2017.

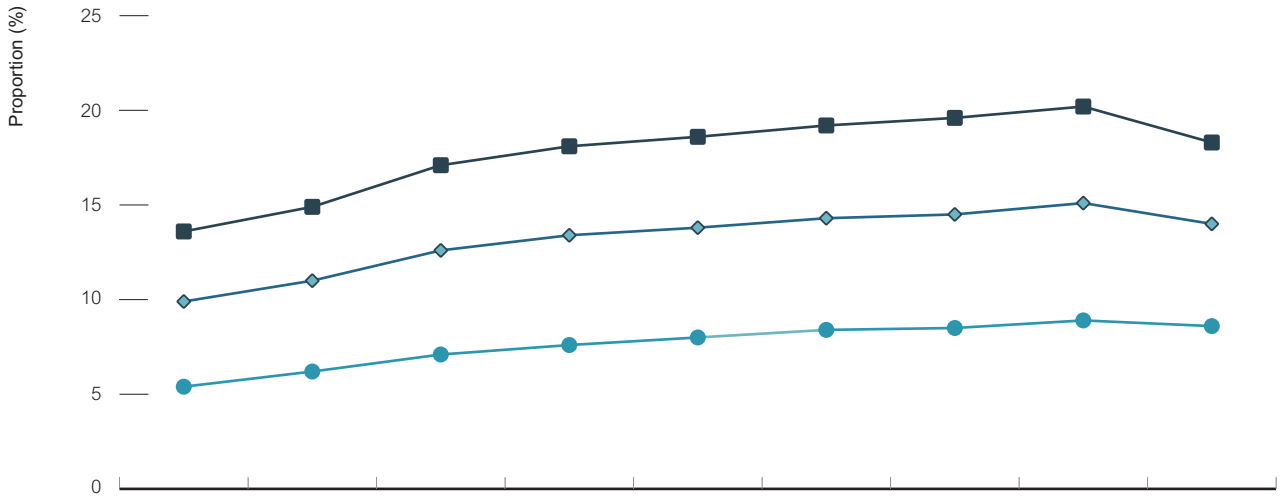
Figure 4.1.14 Number of Medicare-rebated chlamydia tests in Australia, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	172 922	202 914	237 095	281 008	293 809	321 079	351 937	377 918	427 985	467 988
Women	451 125	522 412	580 842	681 816	730 110	777 428	829 151	874 814	950 928	983 556
Total	624 047	725 326	817 937	962 824	1 023 919	1 098 507	1 181 088	1 252 732	1 378 913	1 451 544

Source: Medicare.

Figure 4.1.15 Proportion of general practice attendees aged 15–29 years who had a Medicare-rebated chlamydia test in a year, 2008–2017, by sex



	2009 %	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %	2016 %	2017 %
Men	5.4	6.2	7.1	7.6	8.0	8.4	8.5	8.9	8.6
Women	13.6	14.9	17.1	18.1	18.6	19.2	19.6	20.2	18.3
Overall	9.9	11.0	12.6	13.4	13.8	14.3	14.5	15.1	14.0

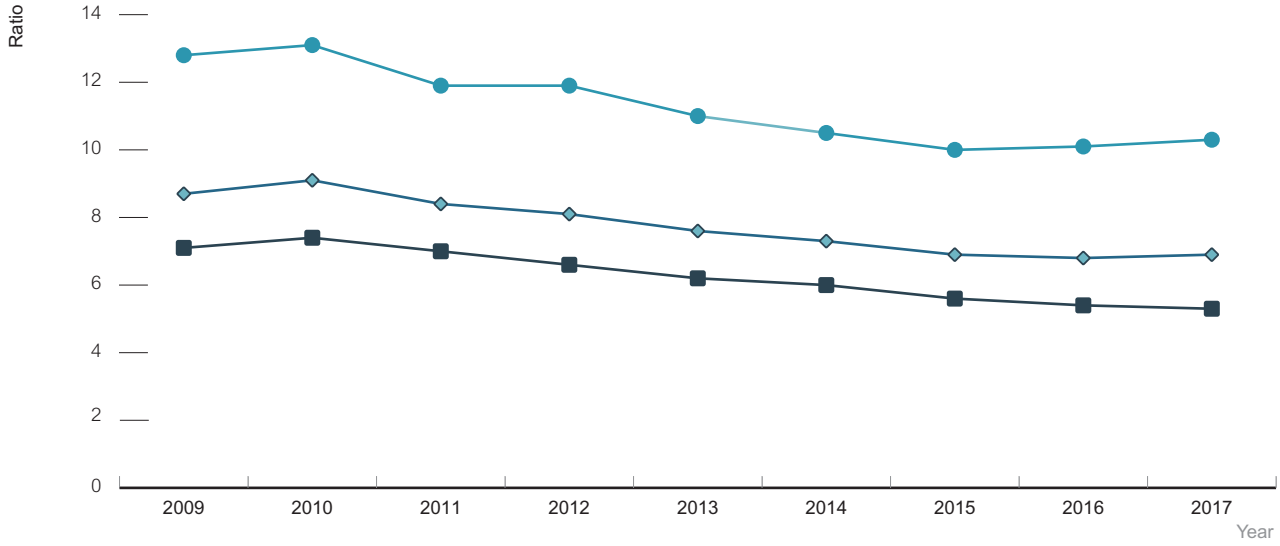
Source: Medicare.

It is important to consider trends in chlamydia notifications in the context of patterns of testing, as changes in notification rates can be an indication of changes in testing, changes in disease incidence, or both. Between 2013 and 2017, the ratio of chlamydia notifications to Medicare-rebated chlamydia tests declined by 9% from 7.6 in 2013 to 6.9 in 2017, with declines in both males (15% decline) and females (15% decline) (Figure 4.1.16). The ratio was higher in males in each of the years since 2007 than in females (10.3 vs 5.3 in 2017).

Between 2013 and 2017, in males there were declines in the ratio of chlamydia notifications to Medicare-rebated chlamydia tests in younger age groups (15% decline in those aged 15–19 years, 8% decline in those aged 20–24) However, those aged 30-39 and those aged over 40 years demonstrated an increase in this ratio (11% and 13% respectively). (Figure 4.1.17). The ratio has remained higher in younger men (19.5 in the 15–19 age group, 16.8 in the 20–24 age group and 12.5 in the 25–29 age group in 2017) (Figure 4.1.17). Between 2013 and 2017 there were also declines in younger women (15% decline in the 15–19 age group, 9% decline in the 20–24 age group), but the rates remained stable in other age groups (Figure 4.1.18). Since 2009, the ratio has remained higher in younger women (13.3 in the 15–19 age group, 8.3 in the 20–24 age group and 4.8 in the 25–29 age group in 2017) (Figure 4.1.18).

These data indicate that the increases observed in chlamydia notification rates have been influenced by testing rates. (See also under *Chlamydia notifications* section, p. 124.)

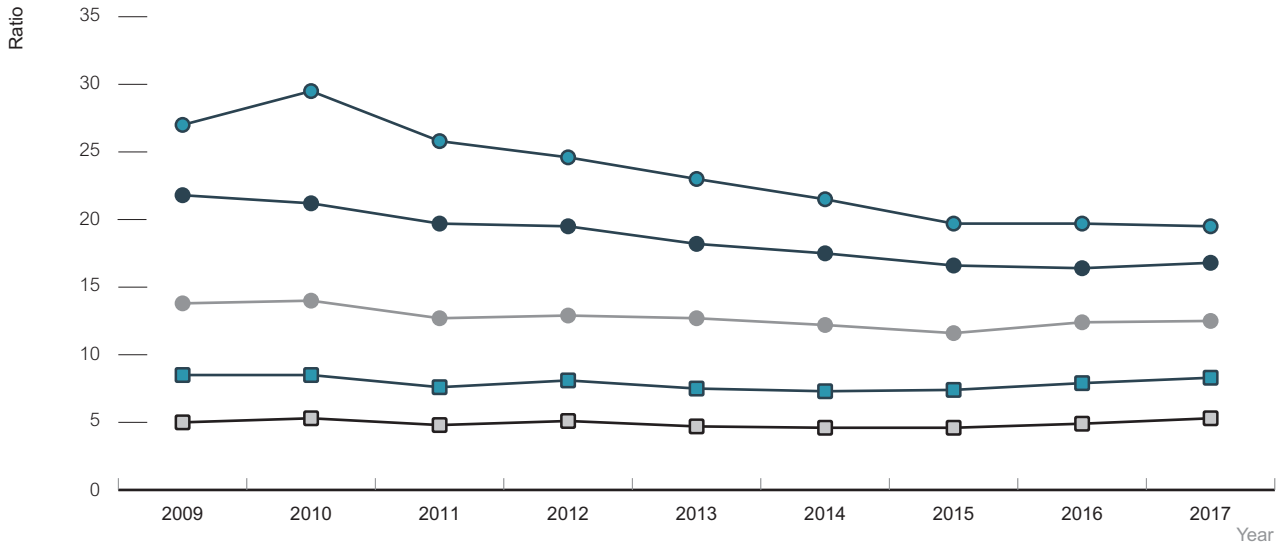
Figure 4.1.16 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008–2017, by sex



	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	12.8	13.1	11.9	11.9	11.0	10.5	10.0	10.1	10.3
Women	7.1	7.4	7.0	6.6	6.2	6.0	5.6	5.4	5.3
Total	8.7	9.1	8.4	8.1	7.6	7.3	6.9	6.8	6.9

Source: Medicare; Australian National Notifiable Diseases Surveillance System.

Figure 4.1.17 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008–2017, by age group, men

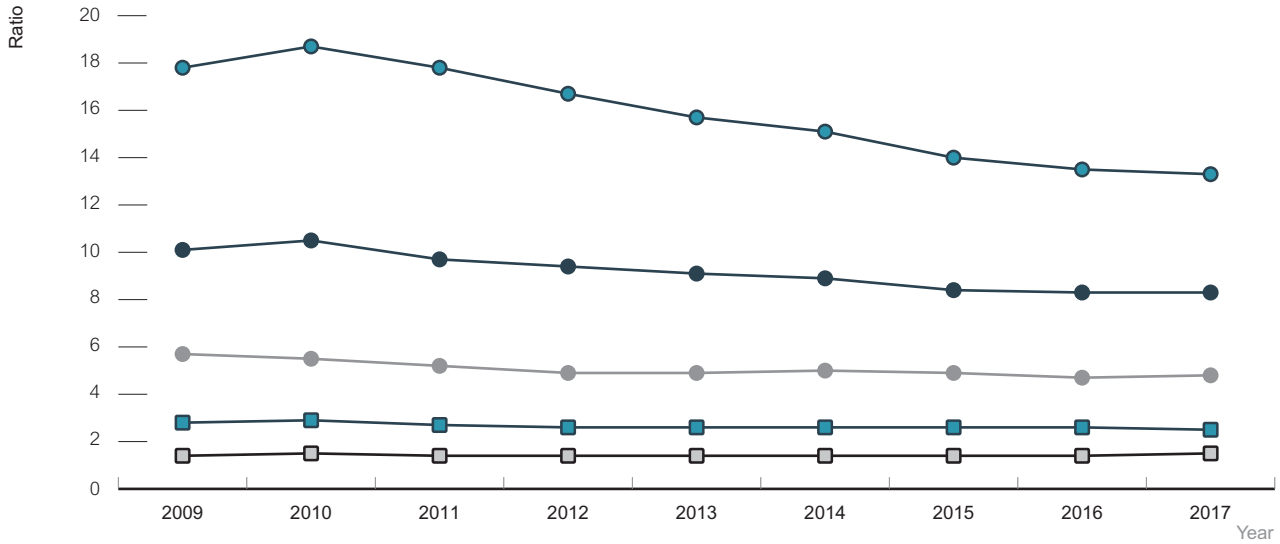


	2009	2010	2011	2012	2013	2014	2015	2016	2017
15–19	27.0	29.5	25.8	24.6	23.0	21.5	19.7	19.7	19.5
20–24	21.8	21.2	19.7	19.5	18.2	17.5	16.6	16.4	16.8
25–29	13.8	14.0	12.7	12.9	12.7	12.2	11.6	12.4	12.5
30–39	8.5	8.5	7.6	8.1	7.5	7.3	7.4	7.9	8.3
40+	5.0	5.3	4.8	5.1	4.7	4.6	4.6	4.9	5.3

Source: Medicare; Australian National Notifiable Diseases Surveillance System.

STIs

Figure 4.1.18 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008–2017, by age group, women



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
15–19	17.8	18.7	17.8	16.7	15.7	15.1	14.0	13.5	13.3	
20–24	10.1	10.5	9.7	9.4	9.1	8.9	8.4	8.3	8.3	
25–29	5.7	5.5	5.2	4.9	4.9	5.0	4.9	4.7	4.8	
30–39	2.8	2.9	2.7	2.6	2.6	2.6	2.6	2.6	2.5	
40+	1.4	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.5	

Source: Medicare; Australian National Notifiable Diseases Surveillance System.

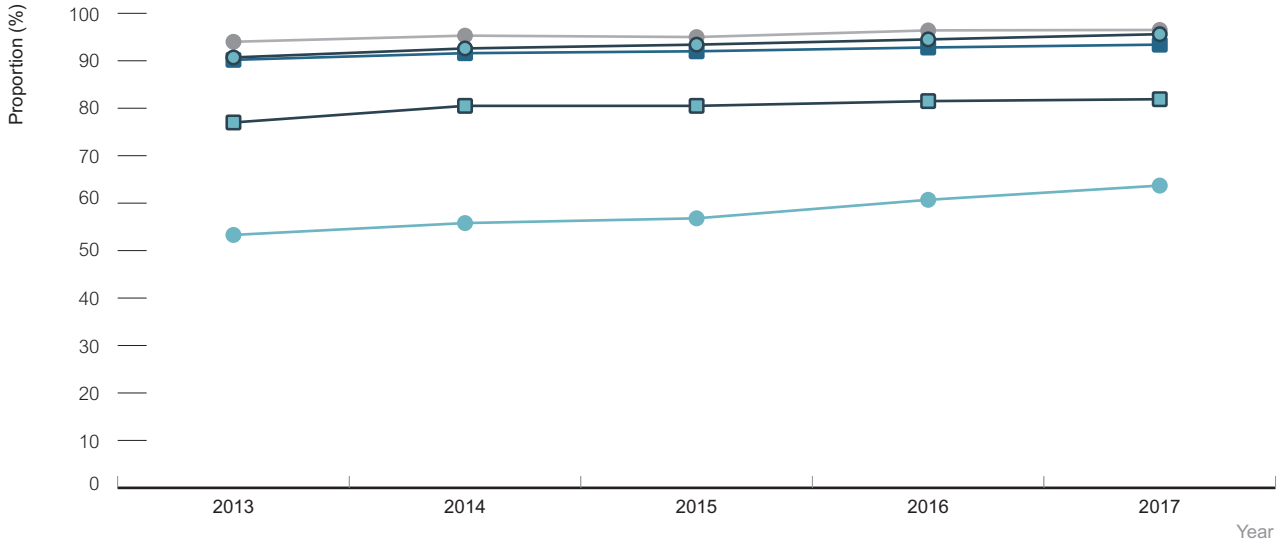
Testing at sentinel sexual health clinics

At 44 sexual health clinics participating in the ACCESS network (see Methodology for further detail), between 2013 and 2017 a high proportion of female sex workers (94 to 97%), gay and bisexual men (91% to 96%), people who inject drugs (90 to 93%) and young heterosexuals aged 16–29 years (77% to 82%) were tested for chlamydia in a year (Figure 4.1.19).

Testing at high-caseload sentinel general practice clinics

At 24 general practice clinics with high caseloads of gay and bisexual men participating in the ACCESS network (see Methodology for further detail), between 53% and 64% of gay and bisexual men were tested for chlamydia each year between 2013 and 2017 (Figure 4.1.19). The uptake of chlamydia testing at general practices may reflect a high caseload of HIV-positive men, as chlamydia testing is usually conducted concurrently with HIV management checks. However, given that gay and bisexual men often attend such clinics for a range of reasons unrelated to sexual health, offering testing may not be appropriate, or the men may have recently received sexual health testing elsewhere.

Figure 4.1.19 Proportion of clinic attendees tested for chlamydia in a year, 2012–2017, by clinic type and population



	2013	2014	2015	2016	2017
Heterosexuals aged 16–29, sexual health clinic (%)	77.0	80.5	80.5	81.5	81.9
Female sex workers, sexual health clinic (%)	94.0	95.3	95.0	96.4	96.5
People who inject drugs, sexual health clinic (%)	90.2	91.6	92.0	92.8	93.4
Gay and bisexual men, sexual health clinic (%)	90.7	92.6	93.4	94.5	95.6
Gay and bisexual men, general practice clinic (%)	53.3	55.8	56.8	60.7	63.7

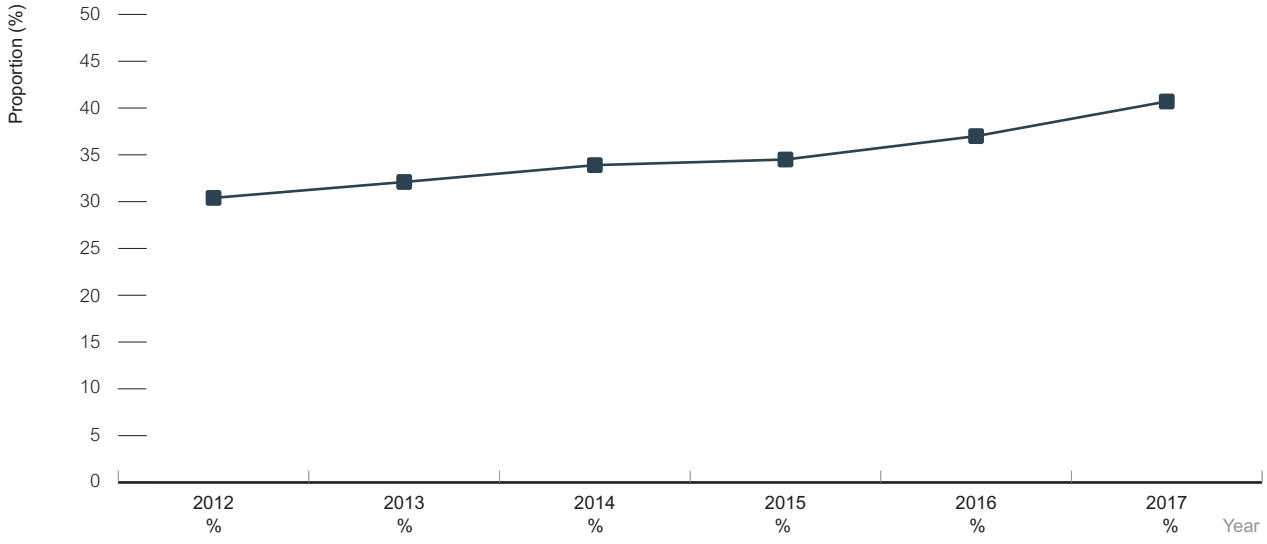
Note: General practice clinics include primary healthcare general practice clinics with high caseloads of gay and bisexual men.
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

STIs

Repeat chlamydia testing

Clinical guidelines recommend retesting for chlamydia following diagnosis to detect re-infections.[14] At the 44 sexual health clinics participating in the ACCESS network, 41% of people diagnosed with chlamydia were retested between six weeks and six months following their diagnosis in 2017, as recommended in the guidelines (Figure 4.1.20).

Figure 4.1.20 Chlamydia retesting six weeks to six months following diagnosis at sexual health clinics, 2013–2017



	2012 %	2013 %	2014 %	2015 %	2016 %	2017 %
Retested in 6 months	30.4	32.1	33.9	34.5	37.0	40.7

Note: General practice clinics include primary healthcare general practice clinics with high caseloads of gay and bisexual men.
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

4.2 Gonorrhoea

See p. 11 for summary.

Gonorrhoea notifications

There were 28 364 gonorrhoea notifications in Australia in 2017, an increase of 16% from 23 875 notifications in 2016. Of these, 4119 (15%) were among the Aboriginal and Torres Strait Islander population, 15 284 (54%) were in the non-Indigenous population, and there were a further 8961 (32%) for which Aboriginal and Torres Strait Islander status was not reported (Table 4.2.1).

In 2017, about three-quarters of notifications were in males (21 010, 74%), resulting in a male-to-female ratio of 3:1. In 2017, 53% (14 934) of notifications were in people aged 15–29 years and 74% (21 074) were in people residing in major cities (Table 4.2.1).

In 2017, the ratio of male to female notifications in the Aboriginal and Torres Strait Islander population was 0.9:1 compared with 3:1 in the non-Indigenous population. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

Table 4.2.1 Characteristics of gonorrhoea notifications, 2008–2017

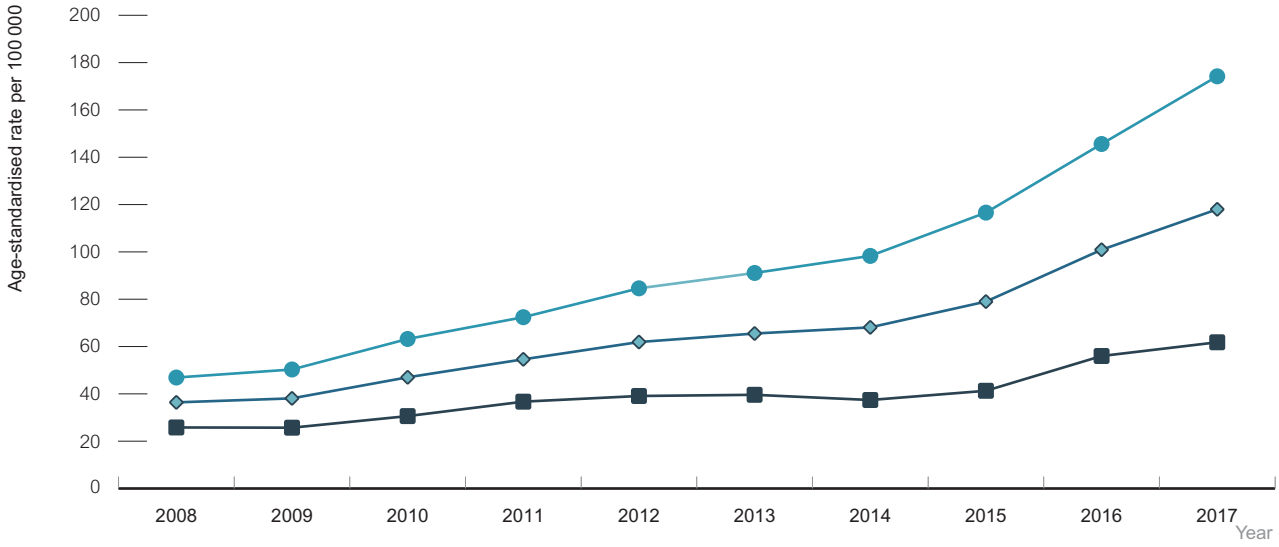
	Year of diagnosis									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Characteristic										
Total cases	7 673	8 265	10 304	12 084	13 859	14 885	15 697	18 505	23 875	28 364
Sex										
Male	4 991	5 506	7 001	8 086	9 578	10 457	11 448	13 736	17 316	21 010
Female	2 673	2 731	3 282	3 960	4 273	4 406	4 203	4 738	6 498	7 282
Missing	9	28	21	38	8	22	46	31	61	72
Age group										
0-14	183	149	191	244	264	230	251	218	257	198
15-19	1 595	1 636	1 996	2 313	2 357	2 243	2 044	2 014	2 383	2 588
20-24	1 813	2 112	2 560	2 838	3 274	3 421	3 681	4 123	4 975	5 957
25-29	1 296	1 479	1 866	2 200	2 590	2 966	3 269	4 058	5 324	6 389
30-39	1 581	1 664	2 023	2 370	2 904	3 307	3 351	4 560	6 283	7 779
40+	1 202	1 208	1 651	2 086	2 450	2 711	2 890	3 470	4 599	5 451
Missing	3	17	17	33	20	7	11	62	54	2
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	353	3 223	3 097	4 575	4 259	4 202	3 550	3 587	3 790	4 119
Non-Indigenous	2 249	2 624	3 420	4 130	5 429	6 748	7 451	9 047	11 792	15 284
Not reported	1 889	2 418	2 977	3 379	4 171	3 935	4 696	5 871	8 293	8 961
Area of residence										
Major cities	3 498	4 241	5 436	6 389	8 268	9 065	10 481	13 048	17 846	21 074
Inner regional	274	398	470	570	722	754	791	859	1 191	1 554
Outer regional	1 118	1 023	1 271	1 730	1 602	1 481	1 396	1 363	1 476	1 606
Remote	937	839	1 058	1 165	1 074	1 079	937	977	1 005	970
Very remote	1 674	1 598	1 801	1 943	1 788	1 734	1 462	1 537	1 567	1 560
Missing data	172	166	268	287	405	772	630	721	790	1 600
State/territory										
ACT	21	55	56	128	92	114	120	141	201	250
NSW	1 331	1 653	2 301	2 882	4 127	4 233	4 855	5 448	6 996	9 219
NT	1 551	1 551	1 933	1 952	1 822	1 955	1 741	1 829	1 771	1 757
QLD	1 638	1 785	2 384	2 947	2 690	2 728	2 723	3 034	4 030	5 065
SA	487	368	470	440	543	807	736	794	1 110	1 272
TAS	25	21	20	19	35	69	65	56	82	117
VIC	927	1 491	1 755	1 885	2 463	3 030	3 263	4 898	6 325	7 345
WA	1 693	1 341	1 385	1 831	2 087	1 949	2 194	2 305	3 360	3 339

Source: Australian National Notifiable Diseases Surveillance System.

Between 2013 and 2017, there was an 80% increase in notification rates from 65.5 per 100 000 in 2013 to 118.0 per 100 000 in 2017, with increases in both men (91%) and women (56%) in this period (Figure 4.2.1). The gonorrhoea notification rate has been higher in males than females in each of the years since 2008 and was 174.2 per 100 000 in males and 61.8 per 100 000 in females in 2017.

By 2012, most laboratories in Australia had switched to using a dual chlamydia and gonorrhoea testing protocol in which if one of the tests was ordered both tests were performed automatically.[38] The emphasis on testing for chlamydia in young people has therefore led to a substantial rise in the number of tests conducted for gonorrhoea, which may partly explain much of the increase in notifications in women prior to 2012, but not since then.

Figure 4.2.1 Gonorrhoea notification rate per 100 000 population, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	46.9	50.3	63.2	72.4	84.6	91.1	98.3	116.6	145.6	174.2
Women	25.8	25.7	30.6	36.7	39.1	39.6	37.4	41.3	56.0	61.8
Total	36.4	38.1	47.0	54.6	61.9	65.5	68.1	79.0	100.9	118.0

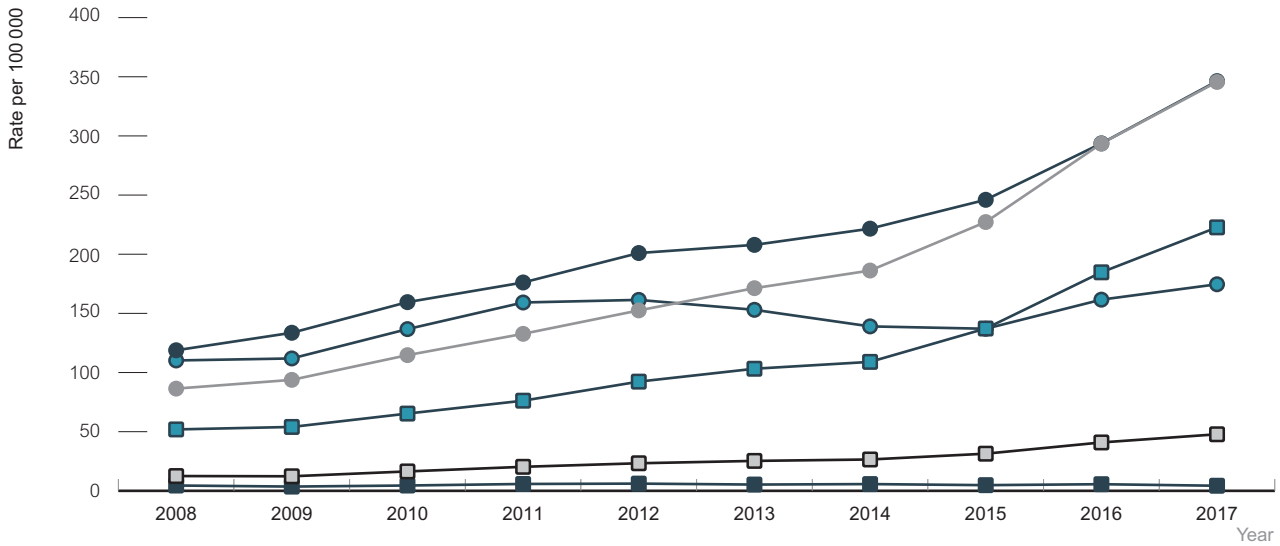
Source: Australian National Notifiable Diseases Surveillance System.

STIs

Between 2013 and 2017, the notification rate of gonorrhoea increased every year in all age groups 20 years and above (Figure 4.2.2). In the age group 15–19 years, rates decreased from 161.4 per 100 000 in 2012 to 137.0 per 100 000 in 2015, then increased in the last two years, and were 174.6 per 100 000 in 2017 (Figure 4.2.2). Between 2013 and 2016, in both men and women, the largest increases were in those aged 30–39 years (123% men, 93% women), 25–29 years (112% men, 76% women) and 20–24 years (65% men, 68% women) (Figure 4.2.3 and Figure 4.2.4). Gonorrhoea notification rates in men were higher in most age groups in 2017 than in women, except in the 15–19 age group (191.7 versus 157.6 per 100 000).

Almost a third (31%) of gonorrhoea notifications in Aboriginal and Torres Strait Islander people in 2017 were in people aged 15–19 years, compared with 6% in the non-Indigenous population. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

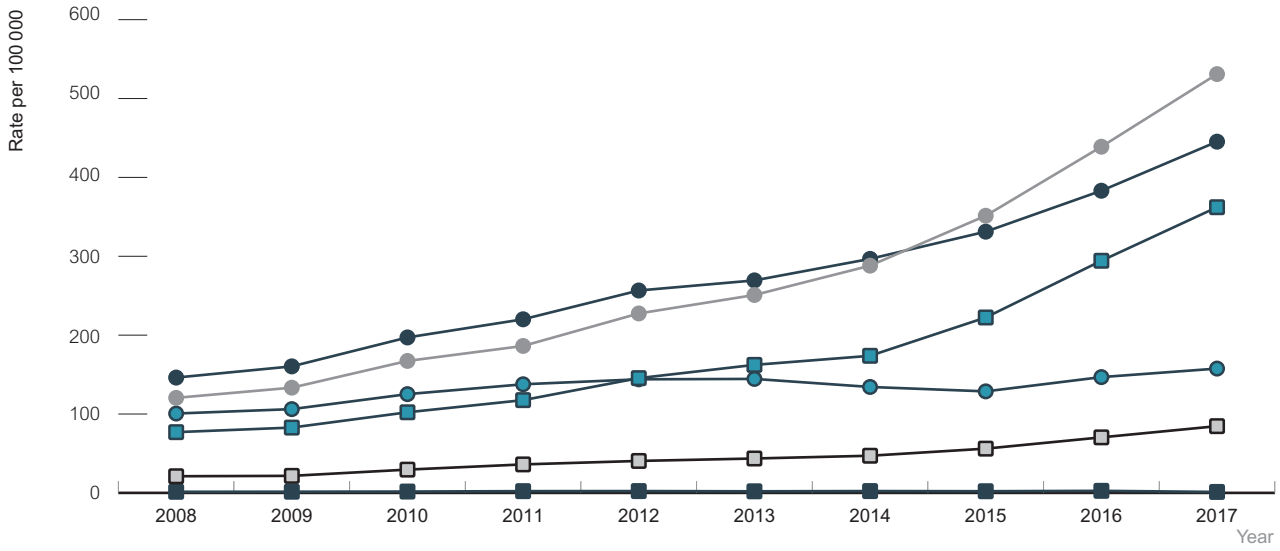
Figure 4.2.2 Gonorrhoea notification rate per 100 000 population, 2008–2017, by age group



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	4.5	3.6	4.5	5.8	6.1	5.3	5.7	4.8	5.6	4.3
15–19	110.2	111.9	136.7	159.2	161.4	153.0	139.0	137.0	161.6	174.6
20–24	118.8	133.6	159.5	176.1	201.0	207.9	221.6	246.0	293.7	346.3
25–29	86.4	93.8	114.7	132.7	152.5	171.3	186.2	227.2	293.5	345.6
30–39	51.9	54.0	65.3	76.2	92.3	103.2	109.0	137.2	184.7	222.7
40+	12.5	12.3	16.4	20.3	23.3	25.3	26.5	31.4	40.9	47.8

Source: Australian National Notifiable Diseases Surveillance System.

Figure 4.2.3 Gonorrhoea notification rate per 100 000 population, 2008–2017, by age group, males

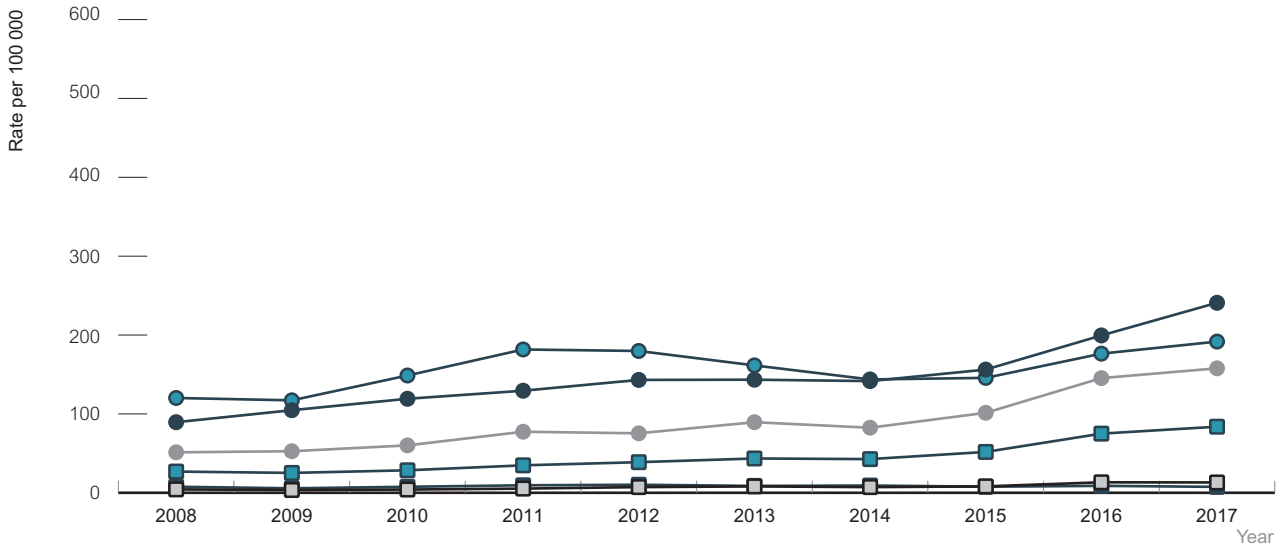


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	1.4	1.5	1.7	2.2	2.3	2.0	2.3	2.1	2.6	1.2
15–19	100.6	106.2	125.2	137.7	144.0	144.5	134.3	128.7	146.8	157.6
20–24	146.2	160.4	197.1	220.1	256.6	269.4	296.7	331.2	383.1	445.3
25–29	120.5	133.4	167.3	186.3	227.5	250.9	288.1	351.4	438.9	531.0
30–39	77.0	82.8	102.2	117.6	145.5	162.3	173.8	222.4	294.3	362.2
40+	21.1	21.6	29.5	36.1	40.5	43.6	47.1	56.1	70.4	84.6

Source: Australian National Notifiable Diseases Surveillance System.

STIs

Figure 4.2.4 Gonorrhoea notification rate per 100 000 population, 2008–2017, by age group, females

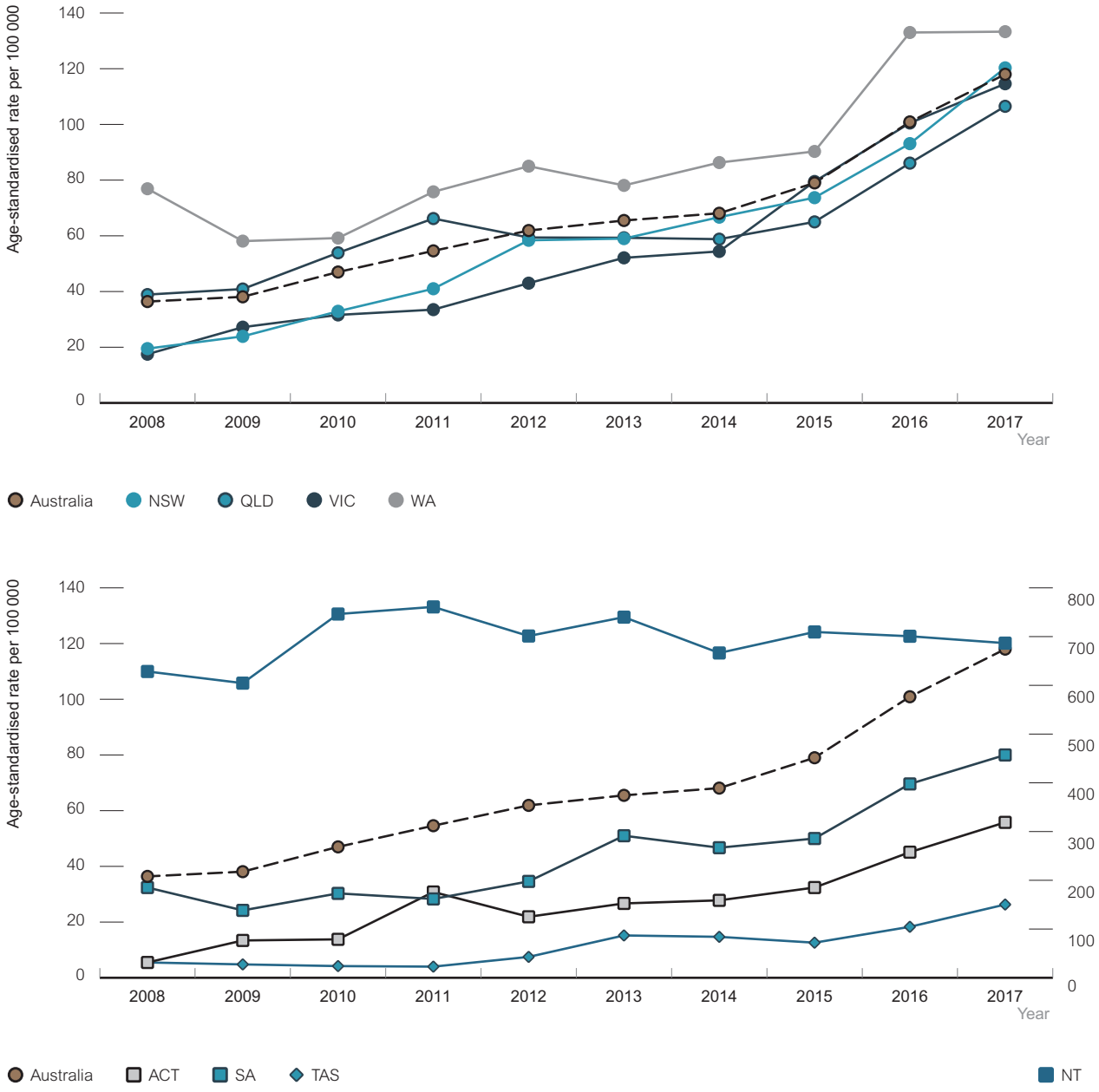


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	7.7	5.7	7.6	9.5	10.2	8.7	9.2	7.7	8.8	7.5
15–19	120.2	117.2	148.7	181.7	179.8	161.5	143.7	145.7	176.4	191.7
20–24	89.5	104.7	119.2	129.4	143.1	143.4	141.6	156.2	199.5	240.9
25–29	51.3	52.7	60.1	77.4	75.4	89.5	82.5	101.4	145.4	157.8
30–39	26.9	25.2	28.5	34.8	38.8	43.5	42.7	51.8	75.0	83.8
40+	4.3	3.5	4.1	5.3	7.2	8.1	7.2	8.1	13.3	13.1

Source: Australian National Notifiable Diseases Surveillance System.

In general, over the past five years (2013–2017), gonorrhoea notification rates increased in all jurisdictions, except the Northern Territory. In 2017, gonorrhoea notification rates were highest in the Northern Territory (686.6 per 100 000), followed by Western Australia (133.0 per 100 000) and New South Wales (120.3 per 100 000) (Figure 4.2.5 and Table 4.2.2).

Figure 4.2.5 Gonorrhoea notification rate per 100 000 population, 2008–2017, by state/territory



Note: The Northern Territory is displayed on the right-hand vertical axis.
Source: Australian National Notifiable Diseases Surveillance System.

Table 4.2.2 Age-standardised gonorrhoea notifications rates per 100 000 population, 2007–2016, by state/territory

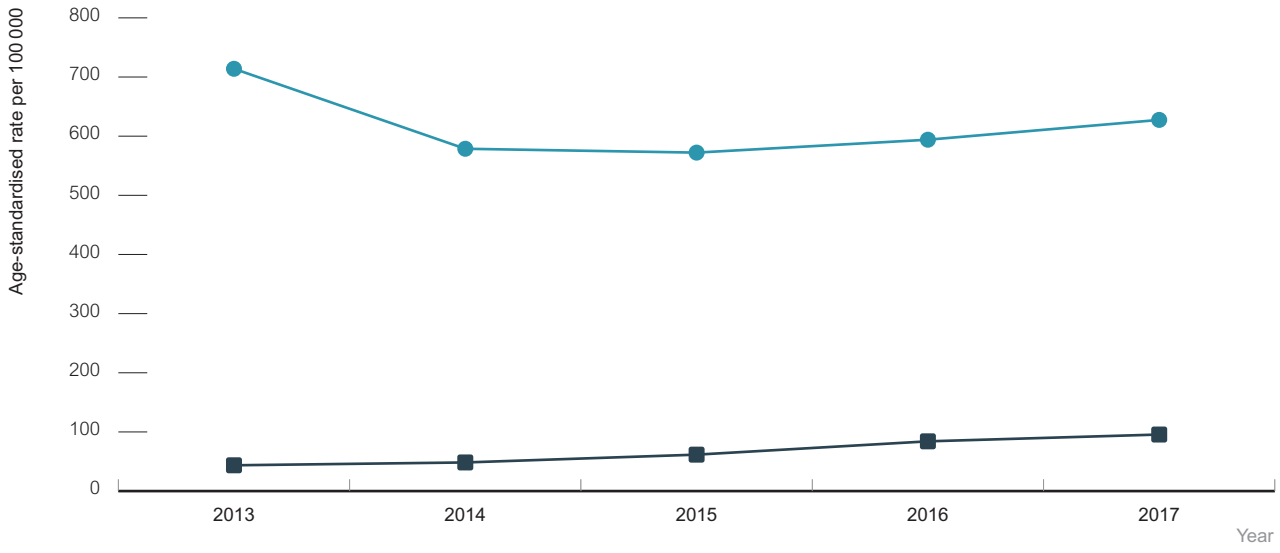
State/territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	5.5	13.4	13.8	30.8	21.9	26.7	27.8	32.4	45.1	55.8
New South Wales	19.5	23.9	32.9	41.0	58.4	59.0	66.7	73.7	93.1	120.3
Northern Territory	628.4	604.5	746.3	760.9	701.2	739.9	666.4	709.5	700.7	686.6
Queensland	38.9	40.9	53.9	66.2	59.4	59.3	58.8	65.0	86.1	106.5
South Australia	32.4	24.2	30.3	28.3	34.6	51.0	46.7	50.0	69.6	80.0
Tasmania	5.5	4.8	4.2	4.0	7.5	15.2	14.7	12.6	18.3	26.3
Victoria	17.5	27.2	31.6	33.5	43.0	52.1	54.4	79.5	100.5	114.6
Western Australia	76.9	58.1	59.2	75.8	85.0	78.1	86.3	90.3	133.0	133.3
Australia	36.4	38.1	47.0	54.6	61.9	65.5	68.1	79.0	100.9	118.0

Source: Australian National Notifiable Diseases Surveillance System.

Aboriginal and Torres Strait Islander notification rates for gonorrhoea are based on data from seven jurisdictions (Australian Capital Territory, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia), where Aboriginal and Torres Strait Islander status was ≥50% complete for gonorrhoea notifications for each of the past five years (2013–2017). Approximately two thirds (69%) of the Aboriginal and Torres Strait Islander population reside in these jurisdictions so it is important to note that these notification rates are not necessarily nationally representative.

Between 2013 and 2015, the rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population fell by 19% from 713.9 per 100 000 in 2013 to 572.2 per 100 000 in 2015, compared with a 11% increase in the non-Indigenous population from 43.6 per 100 000 in 2013 to 61.6 per 100 000 in 2015 (Figure 4.2.6). Between 2015 and 2017 the gonorrhoea notification rates have increased in both populations, by 10% in the Aboriginal and Torres Strait Islander population (from 572.2 to 627.5 per 100 000) and by 55% in the non-Indigenous population (from 61.6 to 95.6 per 100 000). In 2017 the notification rate in the Aboriginal and Torres Strait Islander population was 6.6 times as high as in the non-Indigenous population (627.5 per 100 000 compared with 95.6 per 100 000).

Figure 4.2.6 Gonorrhoea notification rate per 100 000 population, 2013–2017, by Aboriginal and Torres Strait Islander status

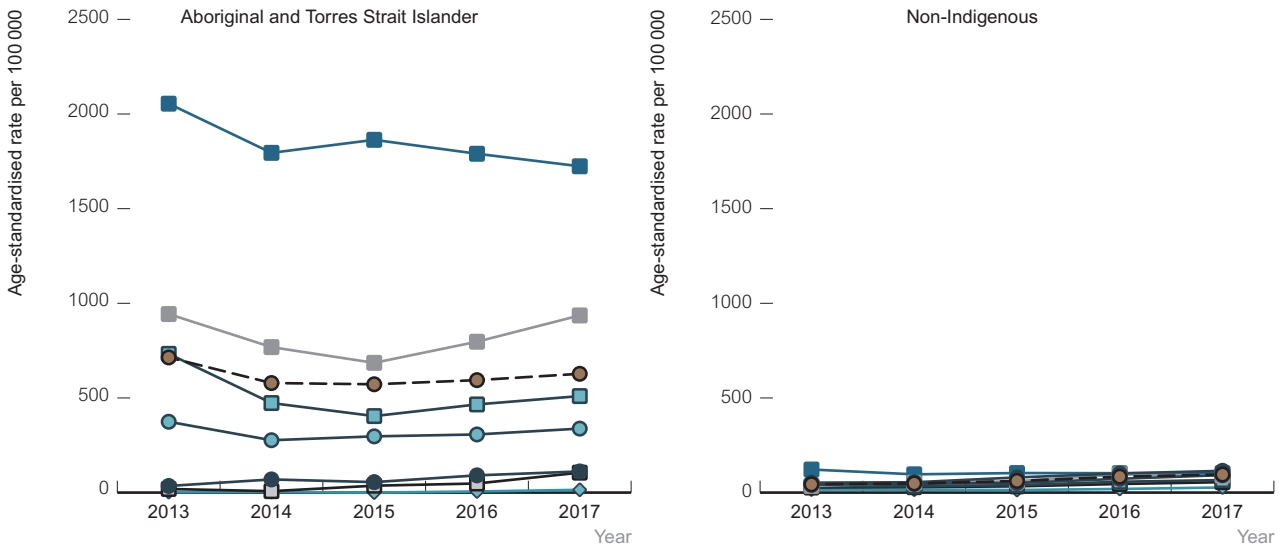


	2013	2014	2015	2016	2017
Non-Indigenous	43.6	48.4	61.6	84.1	95.6
Aboriginal and Torres Strait Islander	713.9	578.7	572.2	594.0	627.5

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions (Australian Capital Territory, Northern Territory, Queensland, South Australia, Victoria, Western Australia and Tasmania) in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year.

Between 2013 and 2017, the gonorrhoea notification rate in the Aboriginal and Torres Strait Islander population was highest in the Northern Territory (1723.9 per 100 000 in 2017), followed by Western Australia (935.8 per 100 000 in 2017) and South Australia (509.8 per 100 000 in 2017) (Figure 4.2.7). In 2017, notification rates were higher in the Aboriginal and Torres Strait Islander population than the non-Indigenous population in all jurisdictions except Tasmania and Victoria (Figure 4.2.7). The gonorrhoea notification rate in the Aboriginal and Torres Strait Islander population in 2017 was highest in remote and very remote areas (1442.9 per 100 000), which was 29 times as high as the rate in the non-Indigenous population (49 per 100 000). See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

Figure 4.2.7 Gonorrhoea notification rate per 100 000 population, 2013–2017, by state/territory and Aboriginal and Torres Strait Islander status

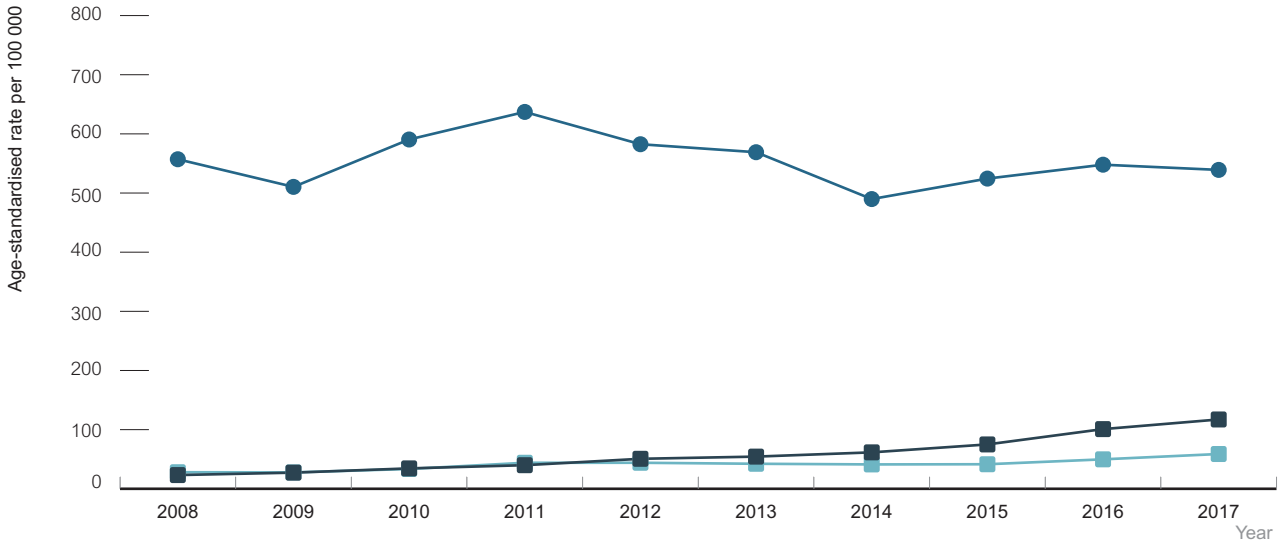


	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Australia	713.9	578.7	572.2	594.0	627.5	43.6	48.4	61.6	84.1	95.6
ACT	19.1	7.5	36.4	48.0	105.3	26.7	28.5	33.0	45.3	55.0
NT	2054.6	1794.8	1863.6	1790.0	1723.9	121.8	96.4	103.2	102.4	102.6
QLD	374.2	276.6	297.0	307.1	338.0	41.5	46.5	51.0	72.8	92.3
SA	733.0	473.0	404.1	465.7	509.8	33.3	33.4	39.2	57.2	66.2
TAS	2.5	2.8	0.0	5.8	14.6	16.0	15.4	13.6	19.1	27.0
VIC	34.9	69.5	55.3	91.0	111.6	52.4	54.5	80.0	101.1	114.9
WA	943.2	768.5	685.4	797.0	935.8	34.9	52.0	59.9	95.8	89.8

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions (Australian Capital Territory, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia) in which Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year.

Between 2013 and 2017, gonorrhoea notification rates increased in major cities (115% increase) and inner and outer regional areas (39% increase) but were relatively stable in remote and very remote areas (Figure 4.2.8). In 2017, gonorrhoea notification rates were highest in remote areas (539.1 per 100 000), followed by major cities (117.2 per 100 000) and regional areas (58.8 per 100 000) (Figure 4.2.8). A similar trend was seen in both males and females. The notification rates in major cities for both males and females more than doubled between 2013 and 2017 (an increase of 114% and 122% respectively) (Figure 4.2.9 and Figure 4.2.10).

Figure 4.2.8 Gonorrhoea notification rate per 100 000, 2008–2017, by region of residence

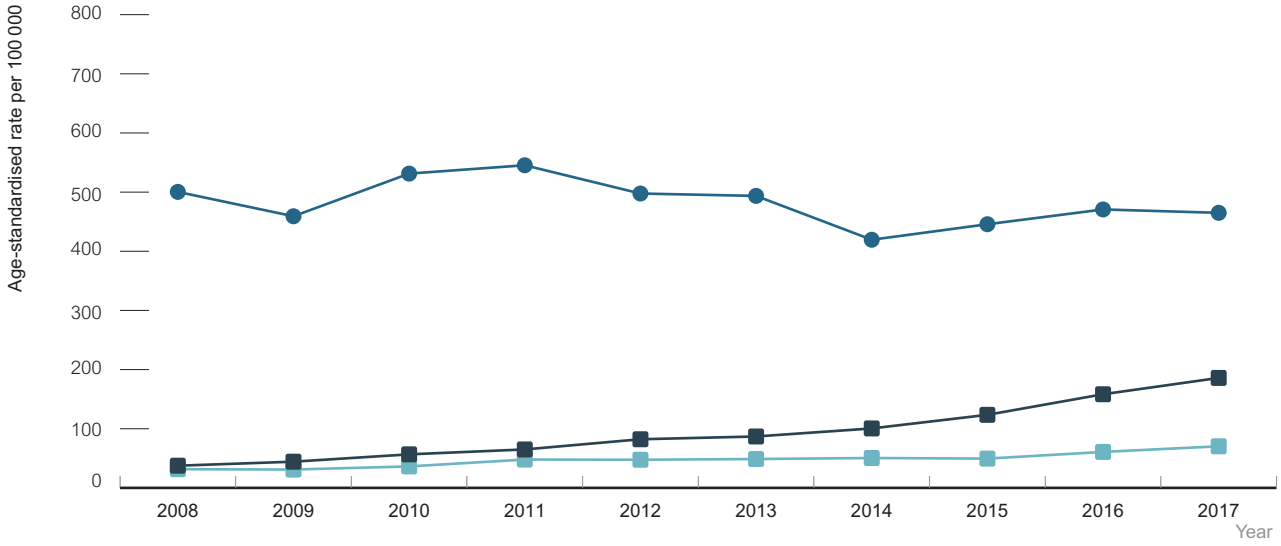


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	23.2	27.3	34.5	39.9	50.7	54.4	61.6	75.0	100.9	117.2
Inner and outer regional	28.0	27.7	33.5	44.0	44.0	42.3	41.2	41.5	49.8	58.8
Remote and very remote	557.1	510.4	590.5	637.1	582.5	569.0	489.8	524.4	547.9	539.1

Source: Australian National Notifiable Diseases Surveillance System.

STIs

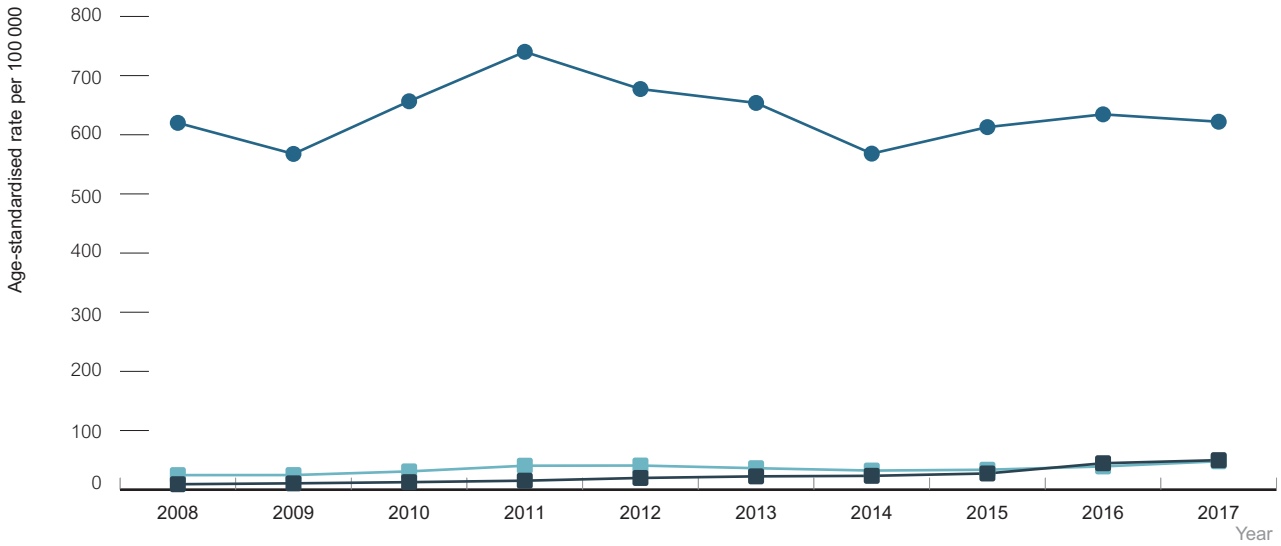
Figure 4.2.9 Gonorrhoea notification rate per 100 000, 2008–2017, by region of residence, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	37.5	44.3	56.7	65.0	82.2	86.9	100.5	123.5	158.3	185.9
Inner and outer regional	31.6	31.0	36.3	47.9	47.6	48.8	50.5	49.5	60.8	70.3
Remote and very remote	500.4	459.2	531.3	545.4	497.6	493.6	419.5	445.7	470.7	465.0

Source: Australian National Notifiable Diseases Surveillance System.

Figure 4.2.10 Gonorrhoea notification rate per 100 000, 2008–2017, by region of residence, females



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	9.2	10.7	12.7	15.2	19.8	22.5	23.4	27.4	44.7	49.9
Inner and outer regional	24.6	24.7	30.9	40.5	40.8	36.3	32.3	33.7	39.3	48.0
Remote and very remote	620.1	567.6	656.6	740.2	677.3	653.8	568.1	612.9	634.5	622.0

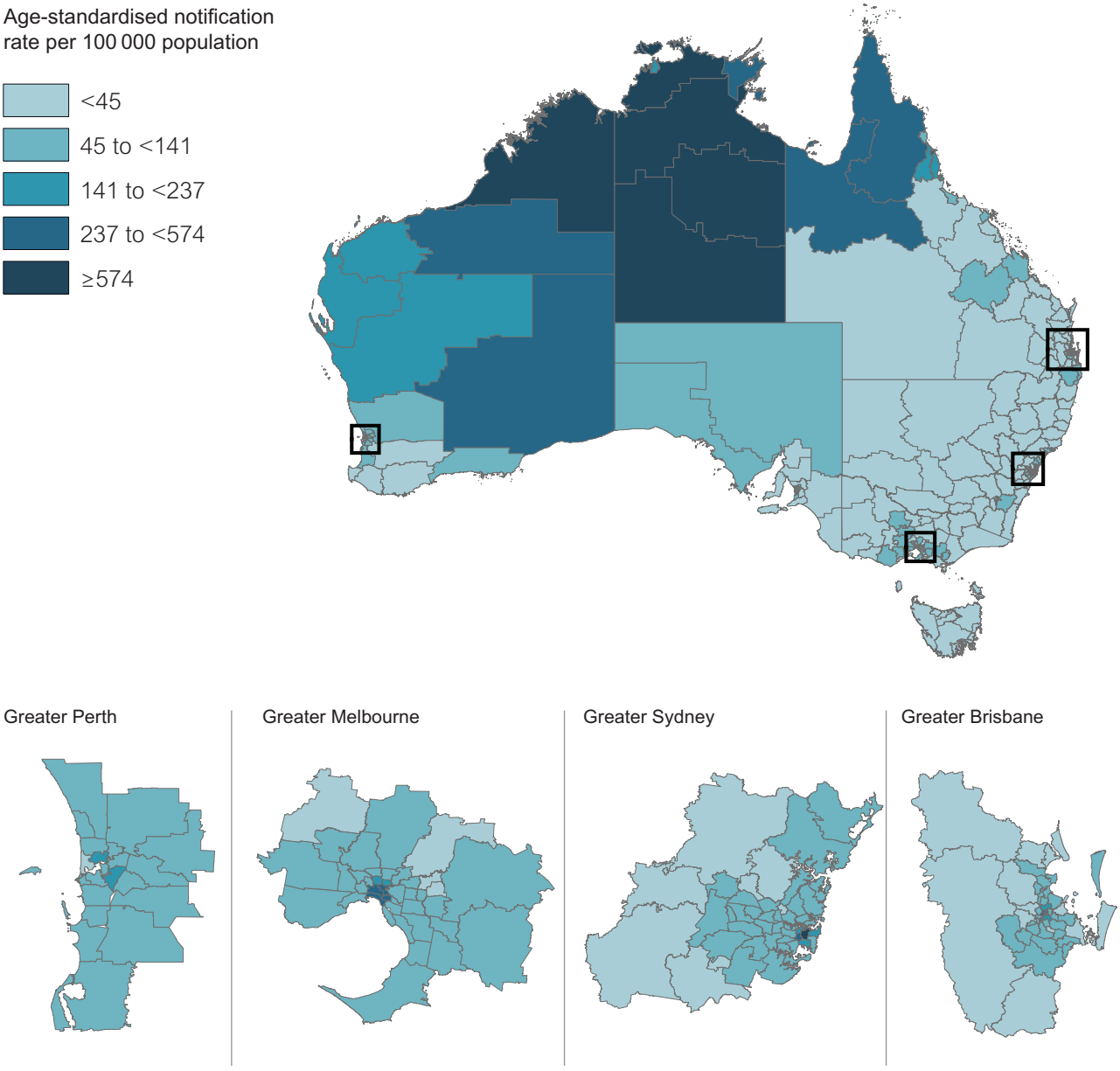
Source: Australian National Notifiable Diseases Surveillance System.

This report includes age-standardised gonorrhoea notification rates by statistical area level 3 (SA3; population size generally between 30 000 and 130 000 persons; see Methodology for details) represented as geographical maps of Australia and major cities (Figure 4.2.11).

Based on average gonorrhoea notification rates between 2015 and 2017, there were variations in rates within states and territories as well as major cities. High gonorrhoea notification rates were predominantly in regional and remote areas of central and northern Australia (Figure 4.2.11). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of gonorrhoea notifications, particularly in SA3s with smaller population sizes. Higher notification rates in some SA3s may be related to specific STI screening programs. Caution should be taken in interpreting these rates.

Figure 4.2.11 Average age-standardised gonorrhoea notification rate per 100 000 population, by statistical area level 3, 2015–2017, Australia and major cities (population >2 million)

Note: Average gonorrhoea notification rates for the three-year period 2015–2017 were used to minimise the influence of fluctuation in the number of gonorrhoea notifications.



Source: State and territory health authorities.

Gonorrhoea incidence

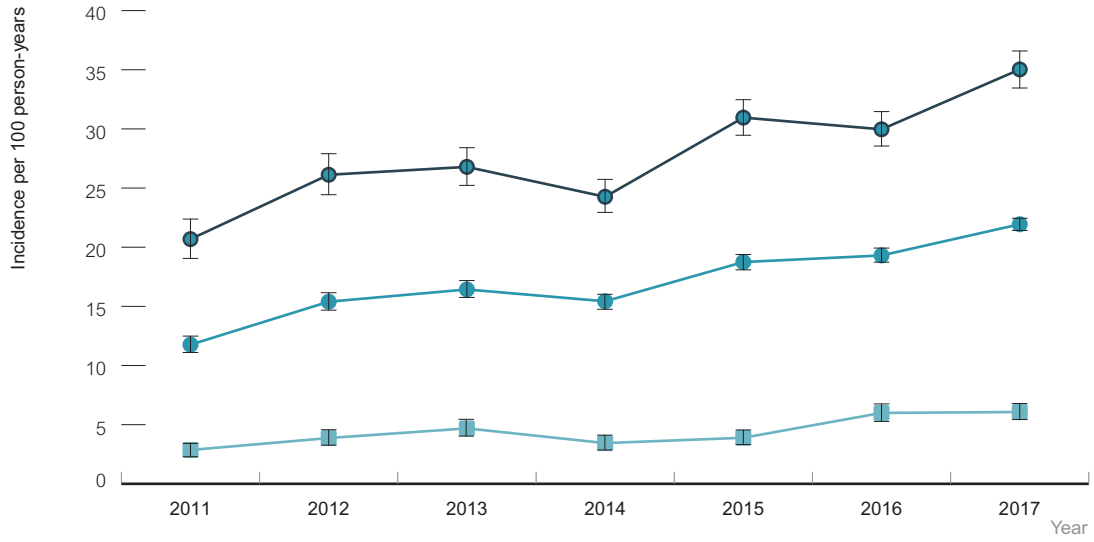
Gonorrhoea incidence is an important indicator of new transmissions, reflecting the impact of current prevention programs, whereas prevalence reflects the burden of disease. Gonorrhoea incidence is available from the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network and is calculated by dividing the number of incident infections (negative test followed by a positive test) among people undergoing repeat gonorrhoea testing at sexual health services by the person's time at risk (determined by the time between repeat gonorrhoea tests). These incidence estimates represent populations attending sexual health clinics and may not be generalisable to the broader priority populations. Further details about the methods used can be found in the Methodology.

In 2017, gonorrhoea incidence was 35.0 per 100 person-years in HIV-positive gay and bisexual men, 60% higher than in HIV-negative gay and bisexual men (21.9 per 100 person-years). In the past five years 2013-2017) gonorrhoea incidence has increased in both HIV-positive (31% increase) and HIV-negative (34% increase) gay and bisexual men (Figure 4.2.12).

In female sex workers gonorrhoea incidence was 6.1 per 100 person-years in 2017, increasing by 30% from 4.0 per 100 person-years in 2013 (Figure 4.2.12).

Caution should be taken with interpretation as confidence intervals overlap, indicating that between-year differences are not statistically significant.

Figure 4.2.12 Gonorrhoea incidence in sexual health clinic attendees, 2011–2017, by population



	2011	2012	2013	2014	2015	2016	2017
HIV-negative gay and bisexual men	11.8	15.4	16.4	15.4	18.7	19.3	21.9
HIV-positive gay and bisexual men	20.7	26.1	26.8	24.3	31.0	30.0	35.0
Female sex workers	2.9	3.9	4.7	3.4	3.9	6.0	6.1

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

Gonorrhoea testing and care

The gonorrhoea diagnosis and care cascade

This report includes the gonorrhoea diagnosis and care 'cascade' for gay and bisexual men, which estimates the number and proportion of gay and bisexual men with new gonorrhoea infections in Australia, and the number and proportion who were diagnosed, received treatment and had a retest within six weeks to six months after diagnosis, as recommended in clinical guidelines.[14]

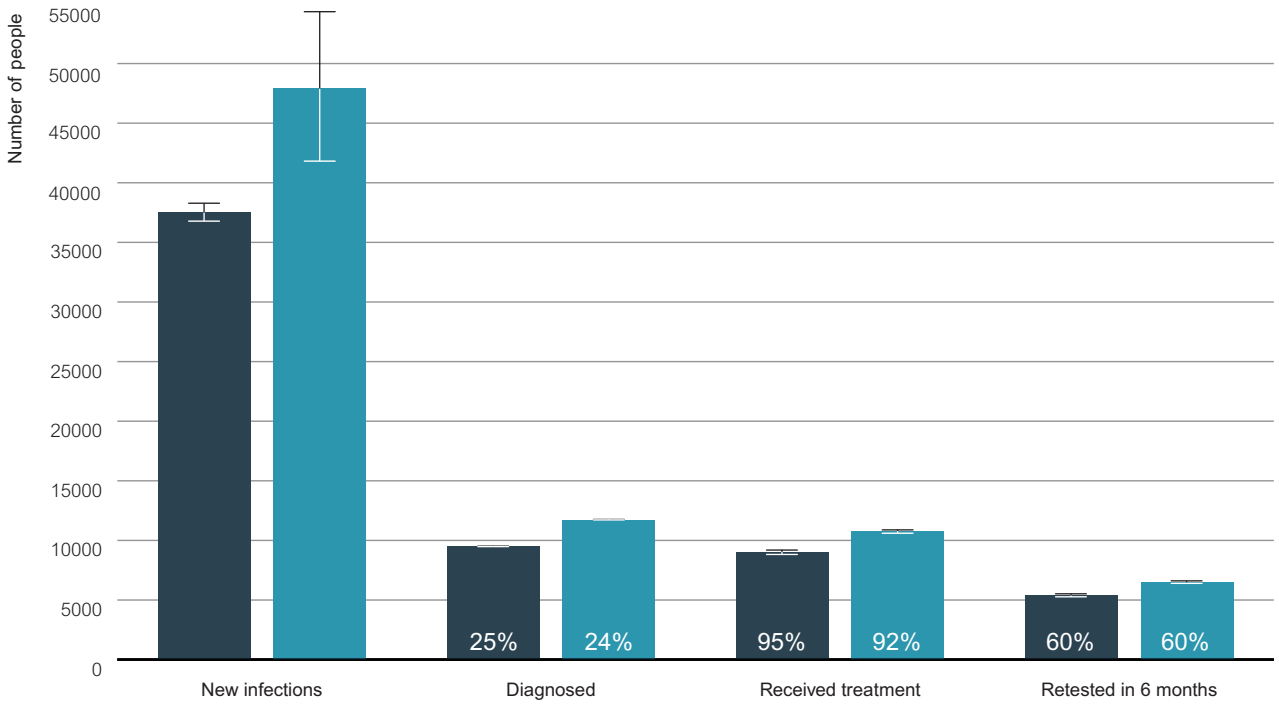
These estimates are used to support the improvement of the delivery of services to gay and bisexual men diagnosed with gonorrhoea across the entire continuum of care—from diagnosis of infection and uptake of treatment to management (retesting). As gonorrhoea is concentrated largely in gay and bisexual men and in young people living in remote Aboriginal communities, these populations are the focus of these cascades. Further data are needed to prepare data for a cascade for young people living in remote Aboriginal communities, which will be explored for future reporting.

Using available data and accounting for uncertainties, the proportions of gay and bisexual men in each stage of the cascade in Australia were estimated (Figure 4.2.13). Methods and the associated uncertainties are described in detail in the Methodology. The approach was informed by recommendations from a national stakeholder reference group (see Acknowledgments section). The cascade focuses on gay and bisexual men, as guidelines recommend regular testing in this group and a significant proportion of gonorrhoea notifications occur in this group.

By the end of 2017, there were an estimated 47 909 new gonorrhoea infections in gay and bisexual men, an increase of 28% since 2016. Of those 2017 infections, an estimated 11 724 (25%) were diagnosed, 10 765 (92% of those diagnosed) received treatment, and 6459 (60% of those treated) had a retest between six weeks and six months after diagnosis (Figure 4.2.13).

The cascade shows that the greatest gap in the gonorrhoea cascade among gay and bisexual men was at the diagnosis step. It is important to note that many men may clear gonorrhoea naturally without treatment, particularly throat infections,[39] and may have had a test during 2017 which was negative (not counted in the diagnosis step). Conversely, most men with urethral infections would have rapidly developed symptoms and sought diagnosis and treatment.[40] Even so, it would be ideal for these infections to be detected soon after infection to prevent further transmission. It is also important to note that the total infections were calculated based on incidence estimates from men undergoing repeat testing at sexual health clinics (see Methodology for details), who are likely to be at higher risk of gonorrhoea, so the total of new infections is likely to be an overestimation.

Figure 4.2.13 The gonorrhoea diagnosis and care cascade in gay and bisexual men, 2016–2017



	New infections	Diagnosed	Received treatment	Retested in 6 months
2016	37 537	9 482	9 008	5 405
2017	47 909	11 724	10 765	6 459

Source: See Methodology for further details of mathematical modelling used to generate estimates.

Gonorrhoea testing

Clinical guidelines recommend the opportunistic offer of gonorrhoea screening to all young people at least annually in areas of high prevalence, and regular testing for sex workers.[14] Annual testing is recommended for sexually active gay and bisexual men, and testing every three to six months for men at higher risk on the basis of behavioural criteria and men taking pre-exposure prophylaxis (PrEP).[15] Gonorrhoea testing data are included in this report from a number of sources including Medicare, sexual health clinics and high-caseload general practice clinics.

Medicare-rebated gonorrhoea tests

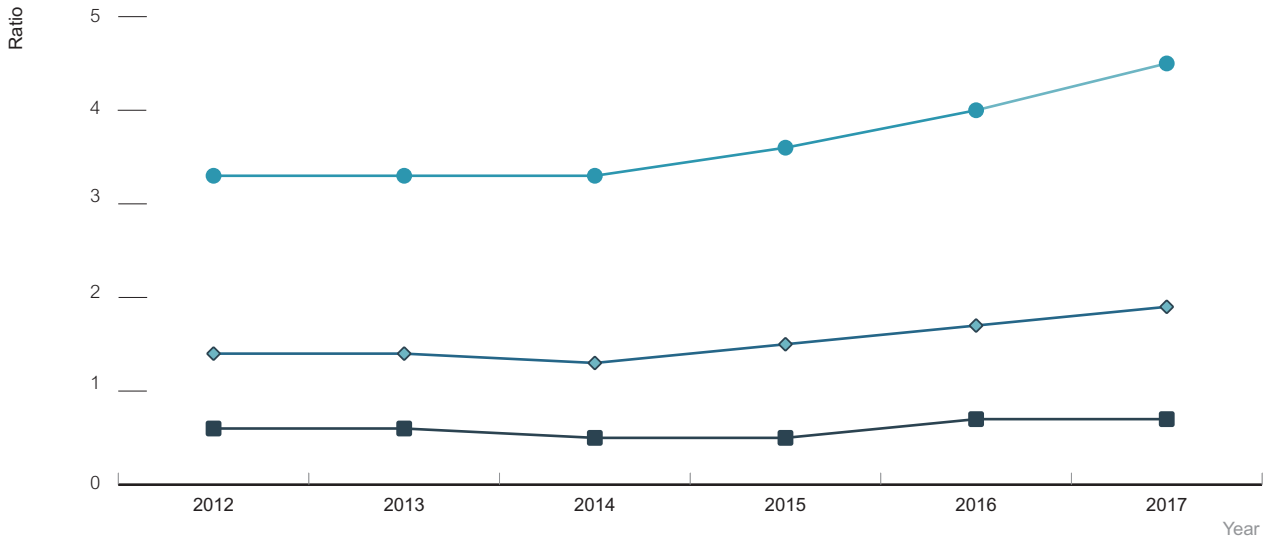
As most laboratories since 2012 have switched to using dual chlamydia and gonorrhoea tests (i.e., if one of the tests is ordered, both tests are performed), Medicare-rebated chlamydia tests can be used to indicate the level of gonorrhoea testing. For this reason the data presented below if for the period 2012 to 2017.

Between 2012 and 2014, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests remained stable (1.3 to 1.4), but increased by 38% from 1.3 in 2014 to 1.9 in 2017, with an increase in both males (36%) and females (40%) since 2014 (Figure 4.2.14). The ratio has been higher in males than females in each of the years since 2012 (3.3 vs 0.6 in 2017) (Figure 4.2.14).

In 2017, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests in men increased to over 4.0 in all age groups except for those aged over 40 years. The ratio was highest in the age group 25–29 years (5.3), followed by the 30–39 and 15–19 age groups (6.0 each) (Figure 4.2.15). The ratio was lower in women than men in all age groups, with an increase in all age groups of women between 2016 and 2017 with the exception of those aged over 40 years (Figure 4.2.16). In 2017, the highest ratio in women was in the age group 15–19 years (1.4), followed by the 20–24 (0.8) and 25–29 age groups (0.7) (Figure 4.2.16).

These trends suggest that the increase in notifications in most age groups since 2014 is related more to increased transmission and less to increased testing (see Gonorrhoea notifications, pp, 143).

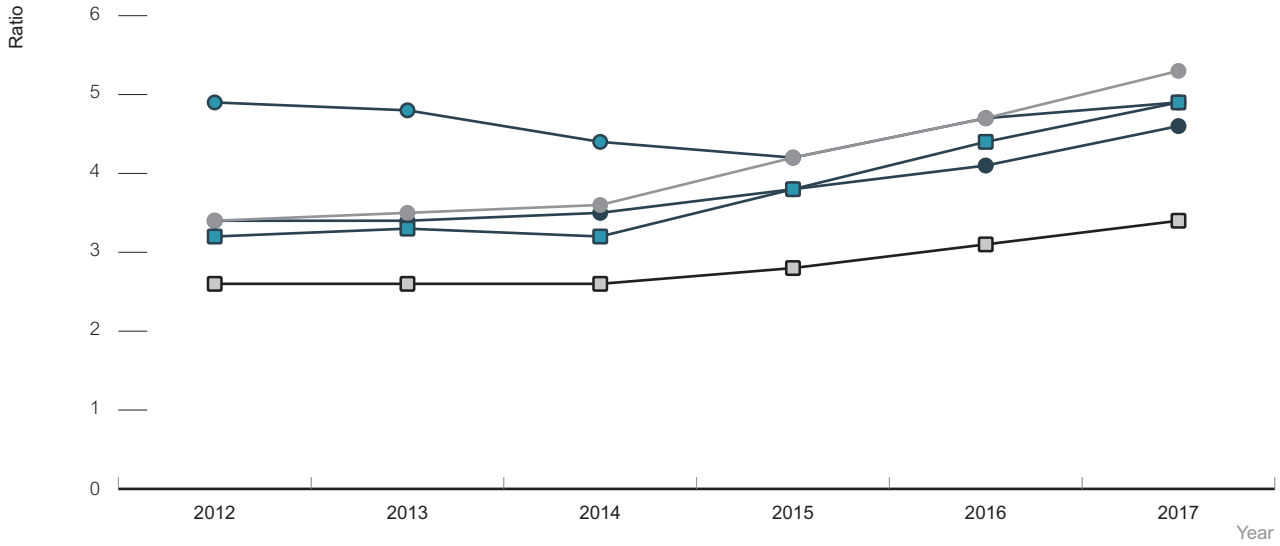
Figure 4.2.14 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012–2017, by sex



	2012	2013	2014	2015	2016	2017
Male	3.3	3.3	3.3	3.6	4.0	4.5
Female	0.6	0.6	0.5	0.5	0.7	0.7
Total	1.4	1.4	1.3	1.5	1.7	1.9

Source: Australian National Notifiable Diseases Surveillance System; Medicare.

Figure 4.2.15 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012–2017, by age group, men

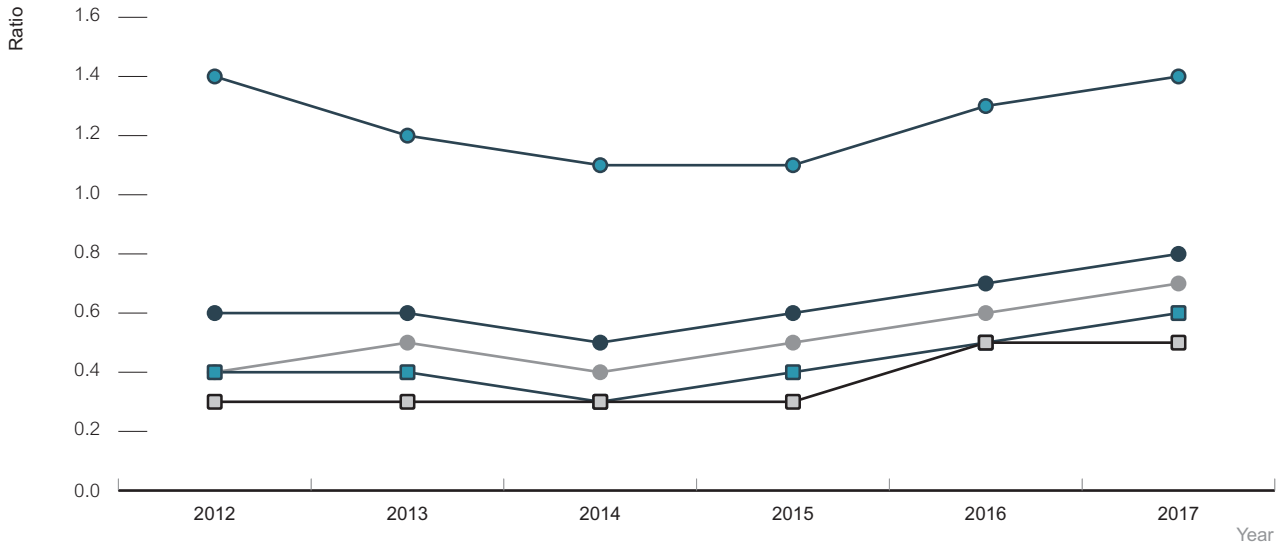


	2012	2013	2014	2015	2016	2017
15–19	4.9	4.8	4.4	4.2	4.7	4.9
20–24	3.4	3.4	3.5	3.8	4.1	4.6
25–29	3.4	3.5	3.6	4.2	4.7	5.3
30–39	3.2	3.3	3.2	3.8	4.4	4.9
40+	2.6	2.6	2.6	2.8	3.1	3.4

Source: Australian National Notifiable Diseases Surveillance System; Medicare.

STIs

Figure 4.2.16 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012–2017, by age group women



	2012	2013	2014	2015	2016	2017
15–19	1.4	1.2	1.1	1.1	1.3	1.4
20–24	0.6	0.6	0.5	0.6	0.7	0.8
25–29	0.4	0.5	0.4	0.5	0.6	0.7
30–39	0.4	0.4	0.3	0.4	0.5	0.6
40+	0.3	0.3	0.3	0.3	0.5	0.5

Source: Australian National Notifiable Diseases Surveillance System; Medicare.

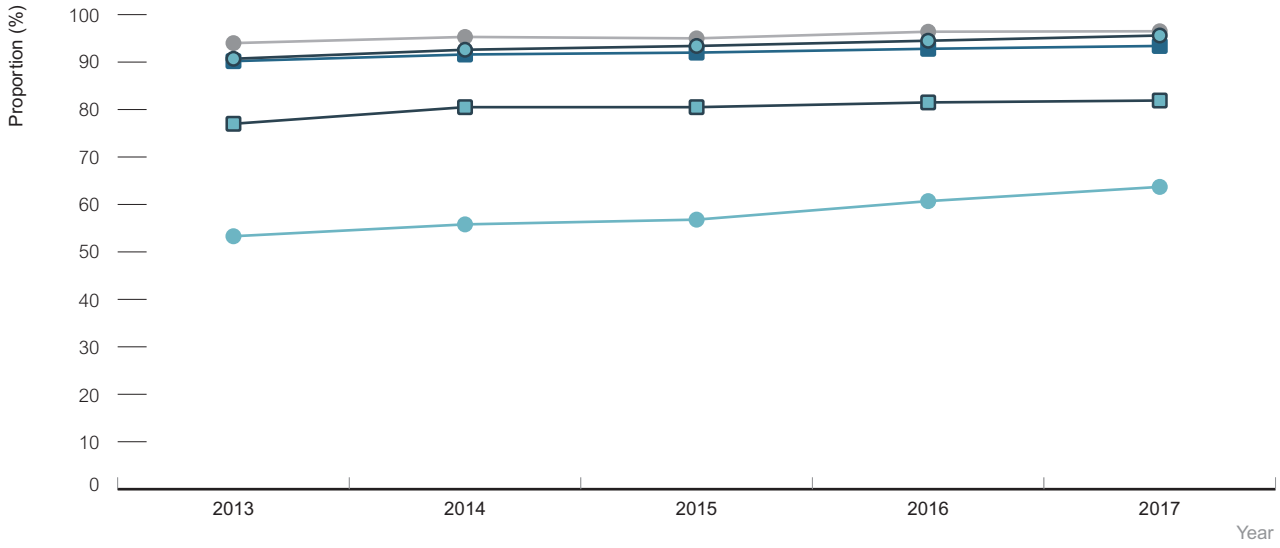
Testing at sentinel sexual health clinics

At 44 sexual health clinics participating in the ACCESS network (see Methodology for further detail), between 2013 and 2017 a high proportion of gay and bisexual men (91% to 96%), young heterosexuals aged 16–29 years (77% to 82%) and people who inject drugs (90% to 93%) were tested for gonorrhoea in a year, and nearly all female sex workers were tested (94% to 97%) (Figure 4.2.17).

Testing at high-caseload sentinel general practice clinics

At 24 general practice clinics with a high caseload of gay and bisexual men participating in the ACCESS network (see Methodology for further detail), between 53% and 64% of gay and bisexual men were tested for gonorrhoea each year between 2013 and 2017 (Figure 4.2.17). The uptake of gonorrhoea testing at general practices may reflect a high caseload of HIV-positive men, as gonorrhoea testing is usually conducted concurrently with HIV management checks. However, given that gay and bisexual men attend such clinics for a range of reasons often unrelated to sexual health, offering testing may not be appropriate, or men may have recently received sexual health testing elsewhere.

Figure 4.2.17 Proportion of clinic attendees tested for gonorrhoea in a year, 2013–2017, by clinic type and population



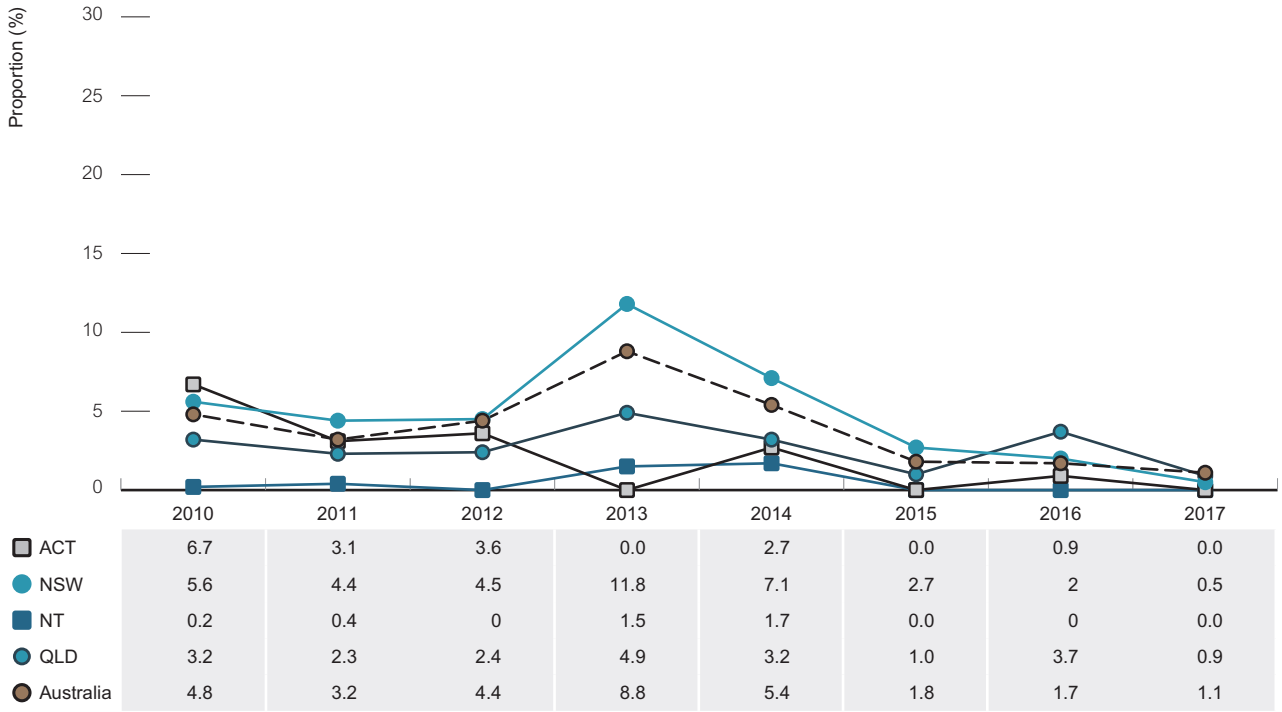
	2013	2014	2015	2016	2017
Heterosexuals aged 16–29, sexual health clinic (%)	77.0	80.5	80.5	81.5	81.9
Female sex workers, sexual health clinic (%)	94.0	95.3	95.0	96.4	96.5
People who inject drugs, sexual health clinic (%)	90.2	91.6	92.0	92.8	93.4
Gay and bisexual men, sexual health clinic (%)	90.7	92.6	93.4	94.5	95.6
Gay and bisexual men, general practice clinic (%)	53.3	55.8	56.8	60.7	63.7

Note: General practice clinics include primary healthcare general practice clinics with a high caseload of gay and bisexual men.
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

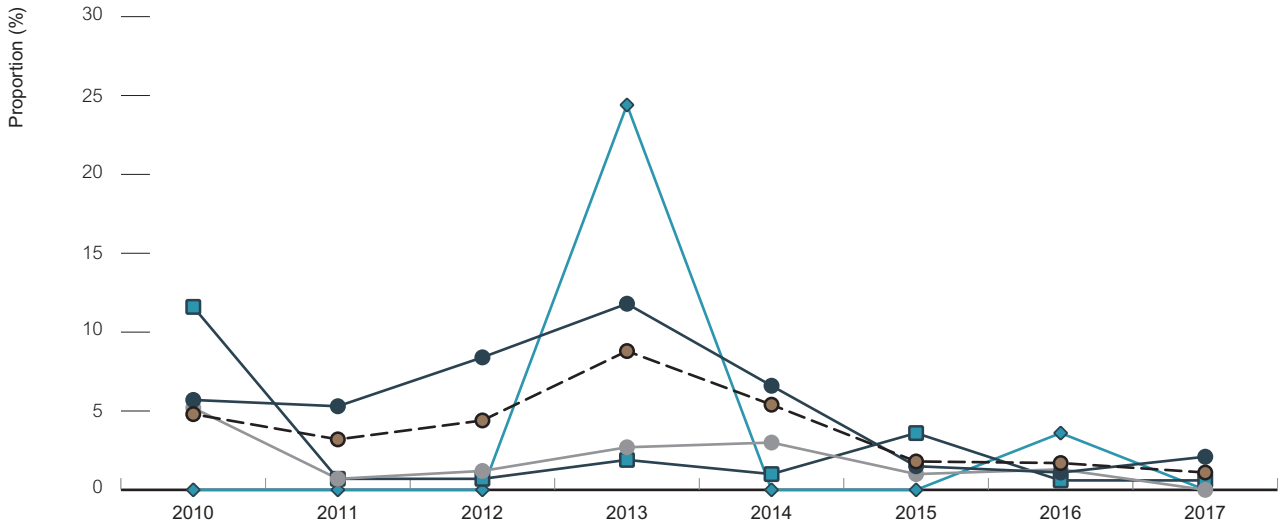
Antimicrobial resistance

Since 1981, the Australian Gonococcal Surveillance Programme has monitored antimicrobial resistance in clinical isolates of *Neisseria gonorrhoeae* in all states and territories. Ceftriaxone in combination with azithromycin is currently the recommended treatment for gonorrhoea in most places in Australia (except for some areas in Northern Australia where amoxicillin and azithromycin are used). Reduced susceptibility to the first-line gonorrhoea treatment (ceftriaxone) is emerging in urban Australia.[14] Between 2013 and 2017, the proportion of gonococcal isolates tested for antimicrobial resistance with decreased susceptibility to ceftriaxone fluctuated between 1.1% and 8.8% (1.1% in 2017) (Figure 4.2.18). Reduced susceptibility was highest in Victoria (2.1%) and Queensland (0.9%) in 2017 (Figure 4.2.18). In 2017, no gonococcal isolates showed resistance to ceftriaxone (data not shown).

Figure 4.2.18 Proportion of gonococcal isolates tested at the Australian Gonococcal Surveillance Programme with decreased susceptibility to ceftriaxone, 2010–2017, by state/territory



	2010	2011	2012	2013	2014	2015	2016	2017
ACT	6.7	3.1	3.6	0.0	2.7	0.0	0.9	0.0
NSW	5.6	4.4	4.5	11.8	7.1	2.7	2	0.5
NT	0.2	0.4	0	1.5	1.7	0.0	0	0.0
QLD	3.2	2.3	2.4	4.9	3.2	1.0	3.7	0.9
Australia	4.8	3.2	4.4	8.8	5.4	1.8	1.7	1.1



	2010	2011	2012	2013	2014	2015	2016	2017
SA	11.6	0.7	0.7	1.9	1	3.6	0.6	0.6
TAS	0	0	0	24.4	0	0.0	3.6	0.0
VIC	5.7	5.3	8.4	11.8	6.6	1.5	1.1	2.1
WA	5.2	0.7	1.2	2.7	3	1.0	1.3	0.0
Australia	4.8	3.2	4.4	8.8	5.4	1.8	1.7	1.1

Note: Decreased susceptibility was defined as having an MIC (minimum inhibitory concentration) between 0.06 and 0.125 mg/L.
Source: Australian Gonococcal Surveillance Programme.[41]

4.3 Syphilis

See summary on p. 12.

Infectious syphilis notifications

An expanded infectious syphilis national case definition was implemented in July 2015 in all jurisdictions except in New South Wales, where it was implemented in July 2016.[42] The revised case definition includes a new subcategory of 'probable' infectious syphilis to capture infectious syphilis cases in people without a prior testing history, particularly young people aged 15–19 years. The probable infectious syphilis cases are included in the number of infectious syphilis notifications in 2015, 2016 and 2017.

There were 4398 infectious syphilis notifications (infections of less than two years' duration) in Australia in 2017. In 2017, 779 (18%) notifications were among the Aboriginal and Torres Strait Islander population, 3314 (75%) were among the non-Indigenous population and 305 (7%) did not have Indigenous status reported (Table 4.3.1). In 2017, 85% (3733) of infectious syphilis notifications were in males, 37% (1622) were in people aged 15–29 years, and 73% (3197) were in people residing in major cities.

In 2017, half (50%) of notifications of infectious syphilis in the Aboriginal and Torres Strait Islander population were among males compared with the majority (92%) of all notifications in males in the non-Indigenous population. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

Table 4.3.1 Characteristics of infectious syphilis notifications, 2008–2017

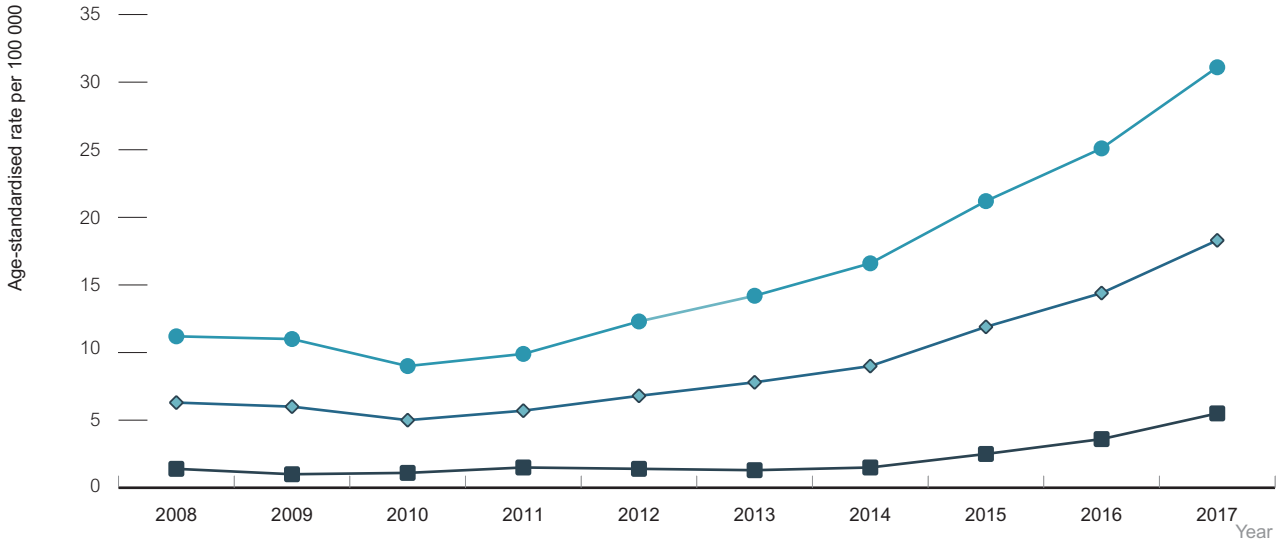
	Year of diagnosis									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Characteristic										
Total cases	1318	1282	1098	1253	1536	1768	2067	2765	3381	4398
Sex										
Male	1172	1171	976	1088	1382	1618	1900	2471	2953	3733
Female	146	107	114	162	152	149	166	289	415	647
Missing[a]	0	4	8	3	2	1	1	4	10	18
Age group										
0–14	8	3	0	11	6	9	11	17	17	23
15–19	73	39	42	89	72	73	99	144	177	242
20–24	133	145	141	156	187	198	244	404	426	572
25–29	196	180	154	173	214	226	306	465	616	808
30–39	402	363	308	320	390	492	570	744	975	1269
40+	506	548	448	501	666	770	837	991	1170	1483
Missing[a]	0	4	5	3	1	0	0	0	0	1
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	182	116	143	197	175	152	246	443	532	779
Non-Indigenous	1103	1129	918	1011	1273	1489	1689	2122	2545	3314
Not reported	33	37	37	45	88	127	132	200	304	305
Area of residence										
Major cities	1002	1044	823	942	1191	1293	1570	1835	2394	3197
Inner regional	60	77	48	74	99	136	96	147	156	231
Outer regional	82	61	97	60	76	75	134	212	379	543
Remote	46	23	43	51	41	35	55	134	133	130
Very remote	91	43	48	80	48	46	53	116	115	167
Missing data	37	34	39	46	81	183	159	321	204	130
State/territory										
ACT	4	11	14	10	15	10	18	14	13	33
NSW	423	521	405	397	505	614	789	755	882	1116
NT	83	38	43	30	14	23	72	206	229	322
QLD	199	193	229	337	390	336	397	575	681	1083
SA	46	37	22	18	45	41	29	92	85	158
TAS	8	10	6	6	14	21	16	17	6	10
VIC	381	389	299	332	477	640	653	944	1149	1356
WA	174	83	80	123	76	83	93	162	336	320

a Cases for which age and sex are missing are being followed up.

Source: Australian National Notifiable Diseases Surveillance System.

Over the past five years (2013–2017), the notification rate of infectious syphilis increased by 135% from 7.8 per 100 000 in 2013 to 18.3 per 100 000 in 2017, with increases in both males (119%) and females (309%). The notification rate has remained higher in males than females in each of the years since 2008, and was 31.1 per 100 000 in males and 5.5 per 100 000 in females in 2017 (Figure 4.3.1).

Figure 4.3.1 Infectious syphilis notification rate per 100 000 population, 2008–2017, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Male	11.2	11.0	9.0	9.9	12.3	14.2	16.6	21.2	25.1	31.1
Female	1.4	1.0	1.1	1.5	1.4	1.3	1.5	2.5	3.6	5.5
Total	6.3	6.0	5.0	5.7	6.8	7.8	9.0	11.9	14.4	18.3

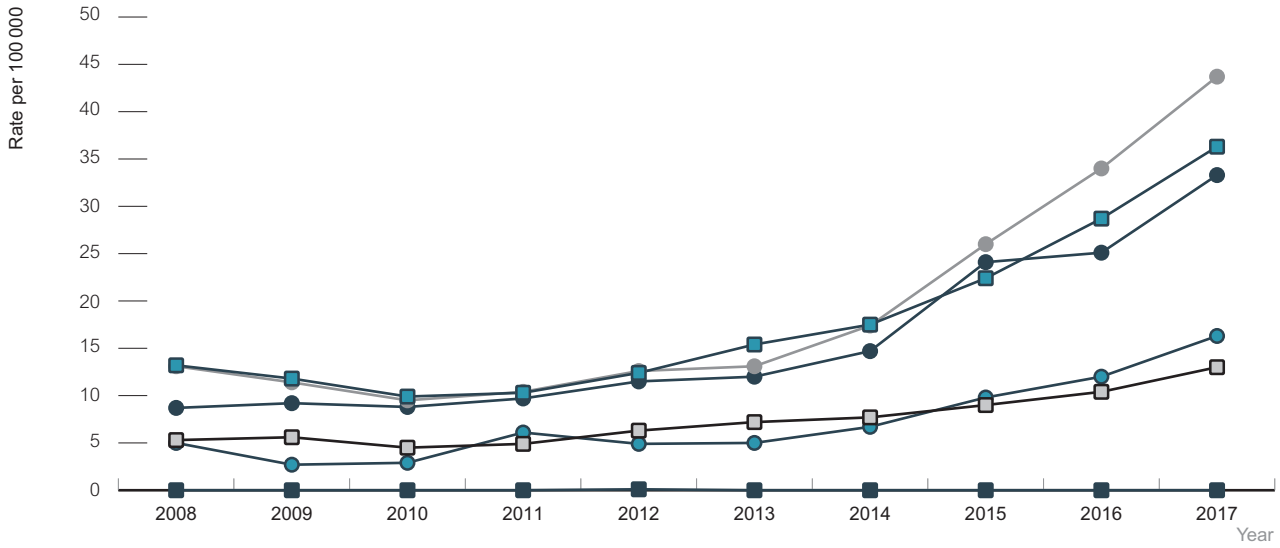
Source: Australian National Notifiable Diseases Surveillance System.

In 2017, the notification rate of diagnosis of infectious syphilis was highest in the age groups 25–29 years (43.7 per 100 000), 30–39 years (36.3 per 100 000) and 20–24 years (33.3 per 100 000) (Figure 4.3.2), with increases in these age groups between 2013 and 2017 (235%, 137% and 176% respectively) (Figure 4.3.2). There was also a 2266% increase in the 15–19 age group from 5.0 per 100 000 in 2013 to 16.3 per 100 000 in 2017 (Figure 4.3.2).

In 2017 notification rates of infectious syphilis among males were highest in men aged 25–29 years (73.1 per 100 000), 30–39 years (64.2 per 100 000) and 20–24 years (50.4 per 100 000), with increases since 2013 in all age groups 15 years and above (Figure 4.3.3). In women the highest rates in 2017 were in the age groups 15–19 years (15.9 per 100 000), 20–24 (15.1 per 100 000) and 25–29 (13.7 per 100 000), with increases since 2013 in all age groups 15 years and above (Figure 4.3.4).

In 2017, 19% of infectious syphilis notifications in the Aboriginal and Torres Strait Islander population were in people aged 15–19 years, compared with only 3% in the non-Indigenous population. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

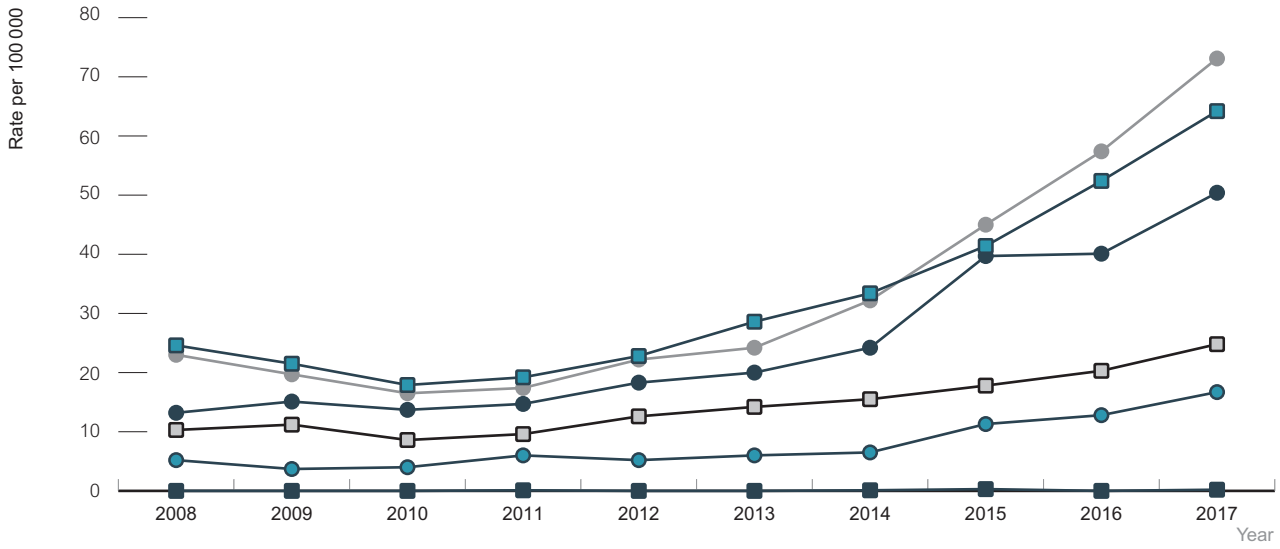
Figure 4.3.2 Infectious syphilis notification rate per 100 000, 2008–2017, by year and age group



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.2	0.1	0.0	0.3	0.1	0.2	0.2	0.4	0.4	0.5
15–19	5.0	2.7	2.9	6.1	4.9	5.0	6.7	9.8	12.0	16.3
20–24	8.7	9.2	8.8	9.7	11.5	12.0	14.7	24.1	25.1	33.3
25–29	13.1	11.4	9.5	10.4	12.6	13.1	17.4	26.0	34.0	43.7
30–39	13.2	11.8	9.9	10.3	12.4	15.4	17.5	22.4	28.7	36.3
40+	5.3	5.6	4.5	4.9	6.3	7.2	7.7	9.0	10.4	13.0

Source: Australian National Notifiable Diseases Surveillance System.

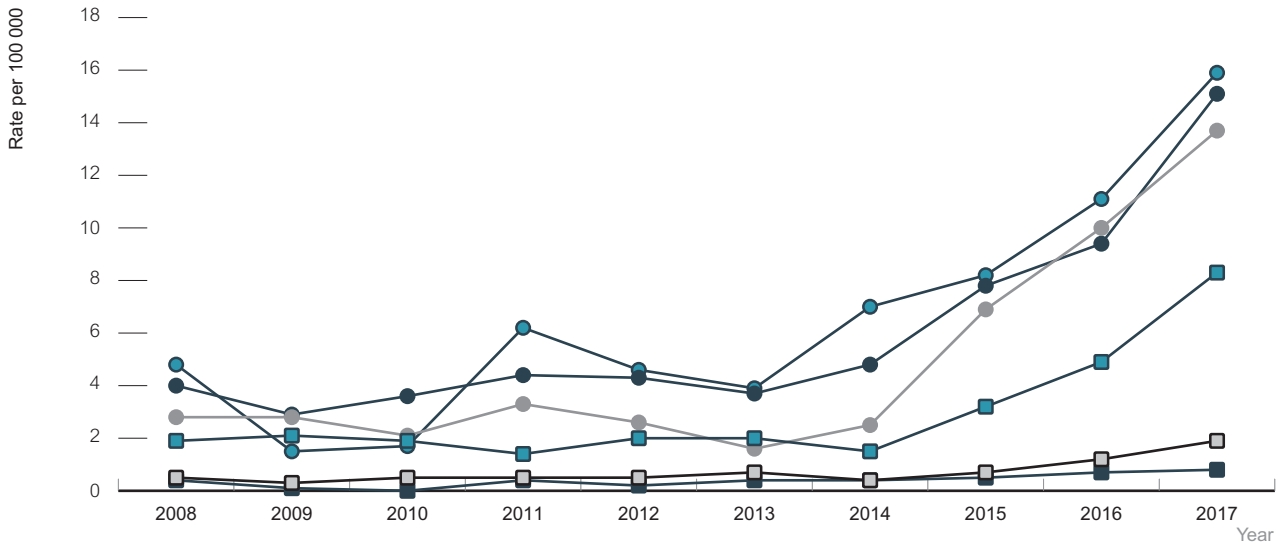
Figure 4.3.3 Infectious syphilis notification rate per 100 000, 2008–2017, by year and age group, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.0	0.2
15–19	5.2	3.7	4.0	6.0	5.2	6.0	6.5	11.3	12.8	16.7
20–24	13.2	15.1	13.7	14.7	18.3	20.0	24.2	39.7	40.1	50.4
25–29	23.0	19.7	16.5	17.4	22.2	24.2	32.2	45.0	57.4	73.1
30–39	24.6	21.5	17.9	19.2	22.8	28.6	33.4	41.4	52.4	64.2
40+	10.3	11.2	8.6	9.6	12.6	14.2	15.5	17.8	20.3	24.8

Source: Australian National Notifiable Diseases Surveillance System.

Figure 4.3.4 Infectious syphilis notification rate per 100 000, 2008–2017, by year and age group, females

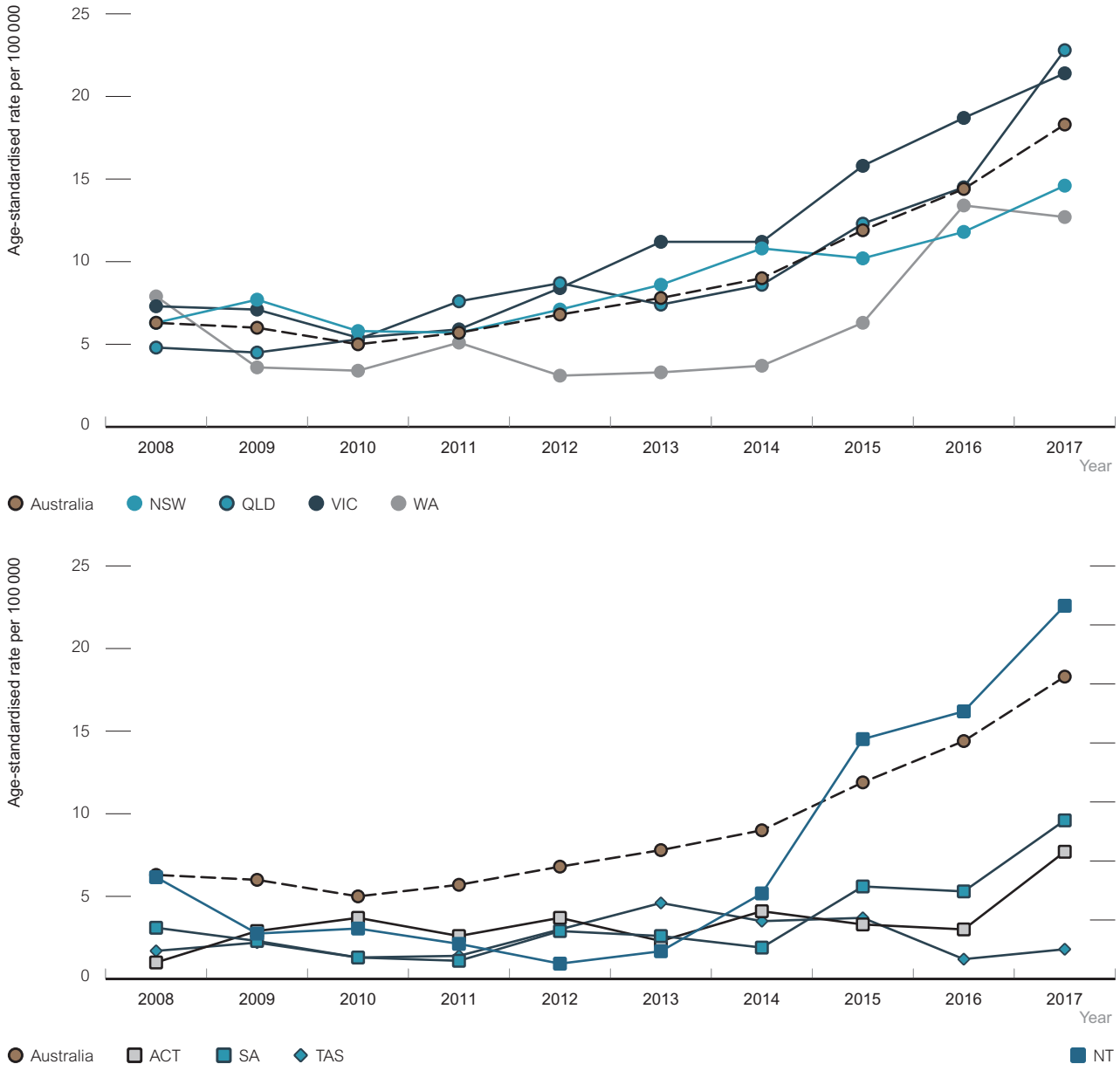


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.4	0.1	0.0	0.4	0.2	0.4	0.4	0.5	0.7	0.8
15–19	4.8	1.5	1.7	6.2	4.6	3.9	7.0	8.2	11.1	15.9
20–24	4.0	2.9	3.6	4.4	4.3	3.7	4.8	7.8	9.4	15.1
25–29	2.8	2.8	2.1	3.3	2.6	1.6	2.5	6.9	10.0	13.7
30–39	1.9	2.1	1.9	1.4	2.0	2.0	1.5	3.2	4.9	8.3
40+	0.5	0.3	0.5	0.5	0.5	0.7	0.4	0.7	1.2	1.9

Source: Australian National Notifiable Diseases Surveillance System.

Between 2013 and 2017, infectious syphilis notification rates increased in New South Wales (70%), Victoria (91%) and more than doubled in both Queensland (208%), and Western Australia (280%). The Northern Territory record a more than 12-fold increase in the notification rate of infectious syphilis (1245%). Rates increased in all jurisdictions between 2013 and 2017, except in Tasmania, where they fluctuated (Figure 4.3.5 and Table 4.3.2).

Figure 4.3.5 Infectious syphilis notification rate per 100 000, 2008–2017, by state/territory



*Right hand axis relates to the infectious syphilis notification rate in the Northern Territory

Source: Australian National Notifiable Diseases Surveillance System.

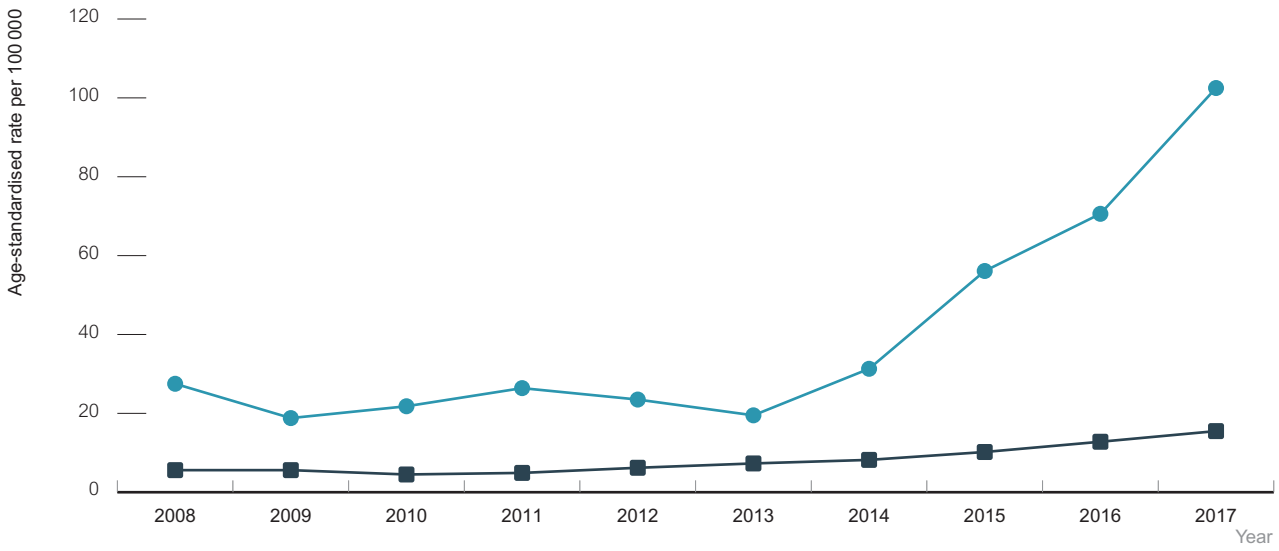
Table 4.3.2 Age-standardised rates of infectious syphilis notification per 100 000 population, 2008–2017, by state/territory

State/territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	1.0	2.9	3.7	2.6	3.7	2.3	4.1	3.3	3.0	7.7
New South Wales	6.3	7.7	5.8	5.7	7.1	8.6	10.8	10.2	11.8	14.6
Northern Territory	34.5	15.4	17.1	11.9	5.2	9.4	29.0	81.3	90.7	126.5
Queensland	4.8	4.5	5.3	7.6	8.7	7.4	8.6	12.3	14.5	22.8
South Australia	3.1	2.3	1.3	1.1	2.9	2.6	1.9	5.6	5.3	9.6
Tasmania	1.7	2.2	1.3	1.4	3.0	4.6	3.5	3.7	1.2	1.8
Victoria	7.3	7.1	5.4	5.9	8.4	11.2	11.2	15.8	18.7	21.4
Western Australia	7.9	3.6	3.4	5.1	3.1	3.3	3.7	6.3	13.4	12.7
Australia	6.3	6.0	5.0	5.7	6.8	7.8	9.0	11.9	14.4	18.3

Source: National Notifiable Diseases Surveillance System.

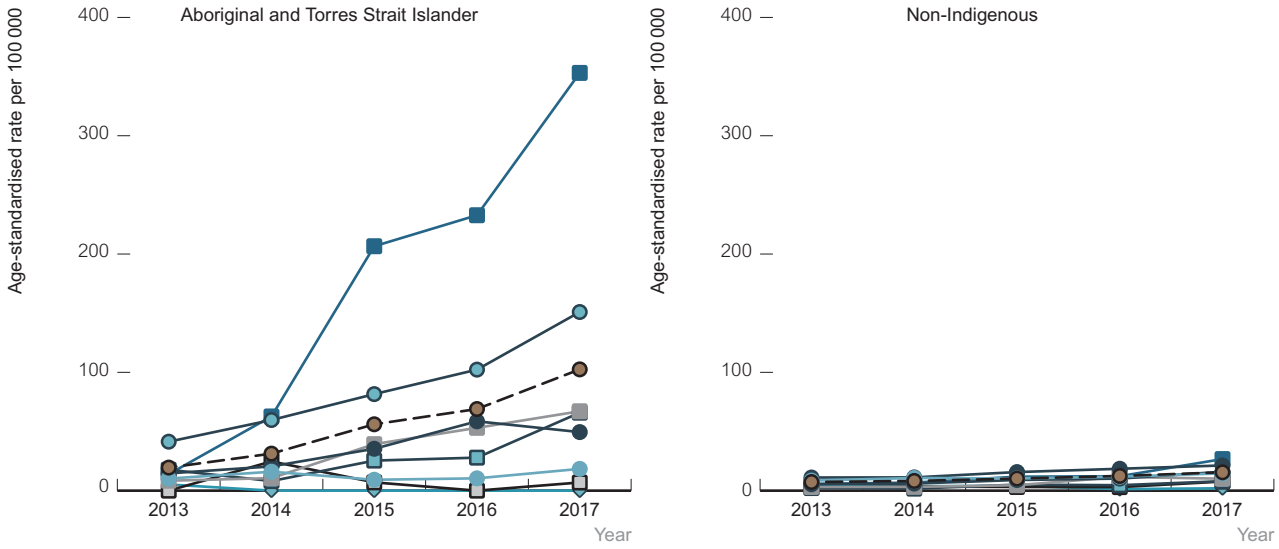
On the basis of data from all jurisdictions, the rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population in 2017 (102.5 per 100 000) was 6.6 times as high as in the non-Indigenous population (15.5 per 100 000). The notification rate of infectious syphilis among the Aboriginal and Torres Strait Islander population has increased fivefold from 19.5 per 100 000 in 2013 to 102.5 per 100 000 in 2017, compared with a doubling in the non-Indigenous population (from 7.3 to 15.5 per 100 000) (Figure 4.3.6). In 2017, the notification rate of infectious syphilis among Aboriginal and Torres Strait Islander people was highest in the Northern Territory (353.1 per 100 000) and Queensland (151.0 per 100 000) (Figure 4.3.7), corresponding with regions in which there was an outbreak of infectious syphilis.[43]

Figure 4.3.6 Infectious syphilis notification rate per 100 000, 2008–2017, Aboriginal and Torres Strait Islander status



Source: Australian National Notifiable Diseases Surveillance System. Includes all jurisdictions, as Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year.

Figure 4.3.7 Infectious syphilis notification rate per 100 000, 2013–2017, state/territory and Aboriginal and Torres Strait Islander status



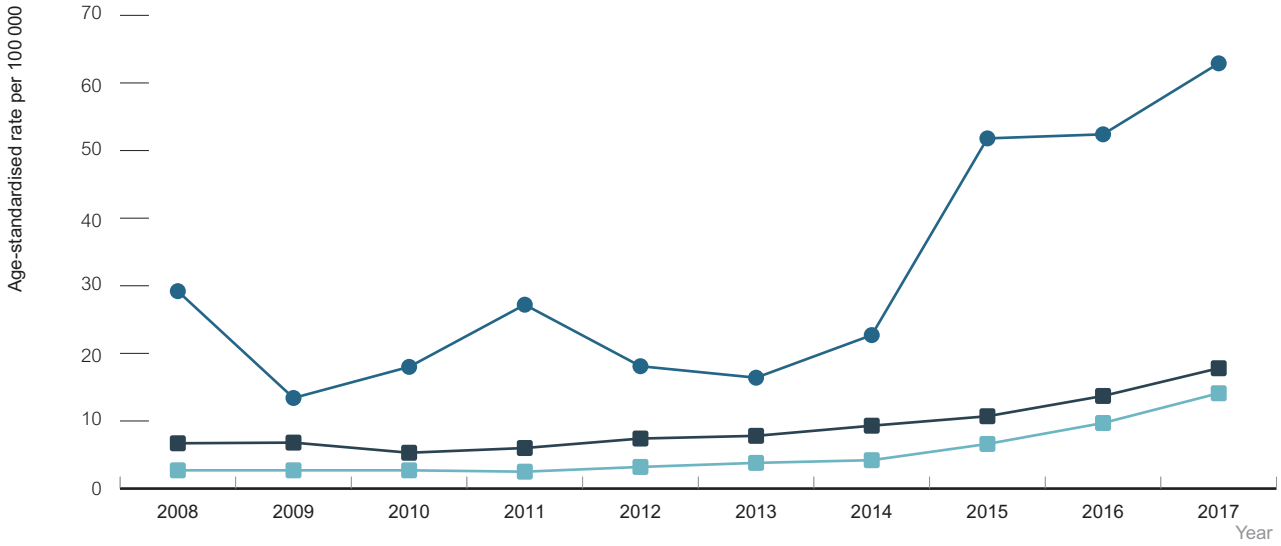
	Aboriginal and Torres Strait Islander					Non-Indigenous				
Australia	19.5	31.3	56.1	69.0	102.5	7.3	8.2	10.2	12.4	15.5
ACT	0.0	24.7	7.0	0.0	6.9	2.4	3.5	3.1	3.0	7.7
NSW	10.2	16.0	9.2	10.4	18.4	8.5	10.7	10.3	11.8	14.6
NT	13.9	62.7	206.6	232.8	353.1	5.7	6.8	11.8	12.2	26.7
QLD	41.4	59.7	81.6	102.3	151.0	5.4	6.0	9.0	10.2	16.0
SA	17.7	8.1	25.4	27.9	65.9	2.2	1.7	5.1	4.6	8.0
TAS	5.2	0.0	0.0	0.0	0.0	4.6	3.8	4.0	1.3	2.0
VIC	14.6	20.5	35.4	58.6	49.5	11.1	11.2	15.7	18.5	21.3
WA	8.4	10.6	39.3	53.1	67.1	3.1	3.2	4.6	11.6	10.1

Source: Australian National Notifiable Diseases Surveillance System. Includes all jurisdictions, as Aboriginal and Torres Strait Islander status was reported for ≥50% of notifications for each year.

In 2017, infectious syphilis notification rates were higher in remote and very remote areas (62.9 per 100 000) than in major cities (17.8 per 100 000) and regional areas (14.1 per 100 000). Over the past five years (2013–2017), notification rates increased in all areas, with the greatest increase in remote areas (284% increase) followed by regional areas (271% increase) and major cities (127% increase) (Figure 4.3.8). In males the difference in rates in the difference regions was lower, but the increases were lower (273% increase in remote areas, 209% increase in regional areas and 121% increase in major cities) (Figure 4.3.9). Among females, the notification rate in remote and very remote areas was eight and 27 times as high as in inner and outer regional areas, and major cities respectively (Figure 4.3.10). In females the increases between 2017 and 2008 were greatest in inner and outer regional areas (533%), followed by remote and very remote areas (300%). In major cities, notification rates in females increased by 240% over the same period.

The infectious syphilis notification rate in the Aboriginal and Torres Strait Islander population in 2017 was highest in remote and very remote areas (171.8 per 100 000), which was 27 times as high as in the non-Indigenous population. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

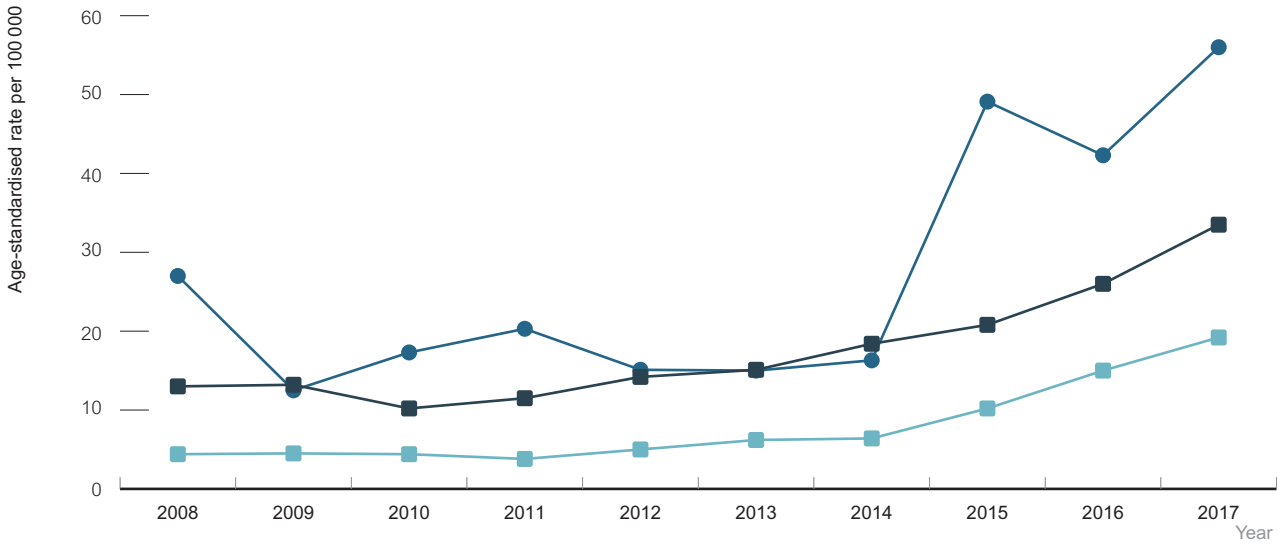
Figure 4.3.8 Infectious syphilis notifications per 100 000 population, 2008–2017, by region of residence



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	6.7	6.8	5.3	6.0	7.4	7.8	9.3	10.7	13.7	17.8
Inner and outer regional	2.7	2.7	2.7	2.5	3.2	3.8	4.2	6.6	9.7	14.1
Remote and very remote	29.2	13.4	18.0	27.2	18.1	16.4	22.7	51.8	52.4	62.9

Source: Australian National Notifiable Diseases Surveillance System.

Figure 4.3.9 Infectious syphilis notifications per 100 000 population, 2008–2017, by region of residence, males

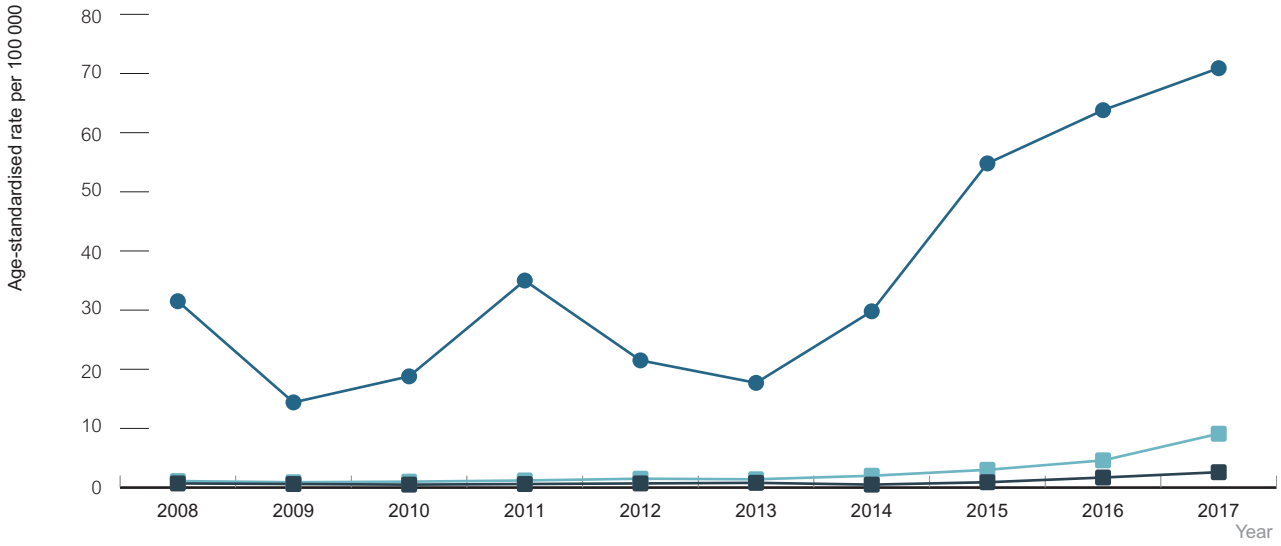


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	13.0	13.2	10.2	11.5	14.2	15.1	18.4	20.8	26.0	33.5
Inner and outer regional	4.4	4.5	4.4	3.8	5.0	6.2	6.4	10.2	15.0	19.2
Remote and very remote	27.0	12.5	17.3	20.3	15.1	15.0	16.3	49.1	42.3	56.0

Source: Australian National Notifiable Diseases Surveillance System.

STIs

Figure 4.3.10 Infectious syphilis notifications per 100 000 population, 2008–-2017, by region of residence, females



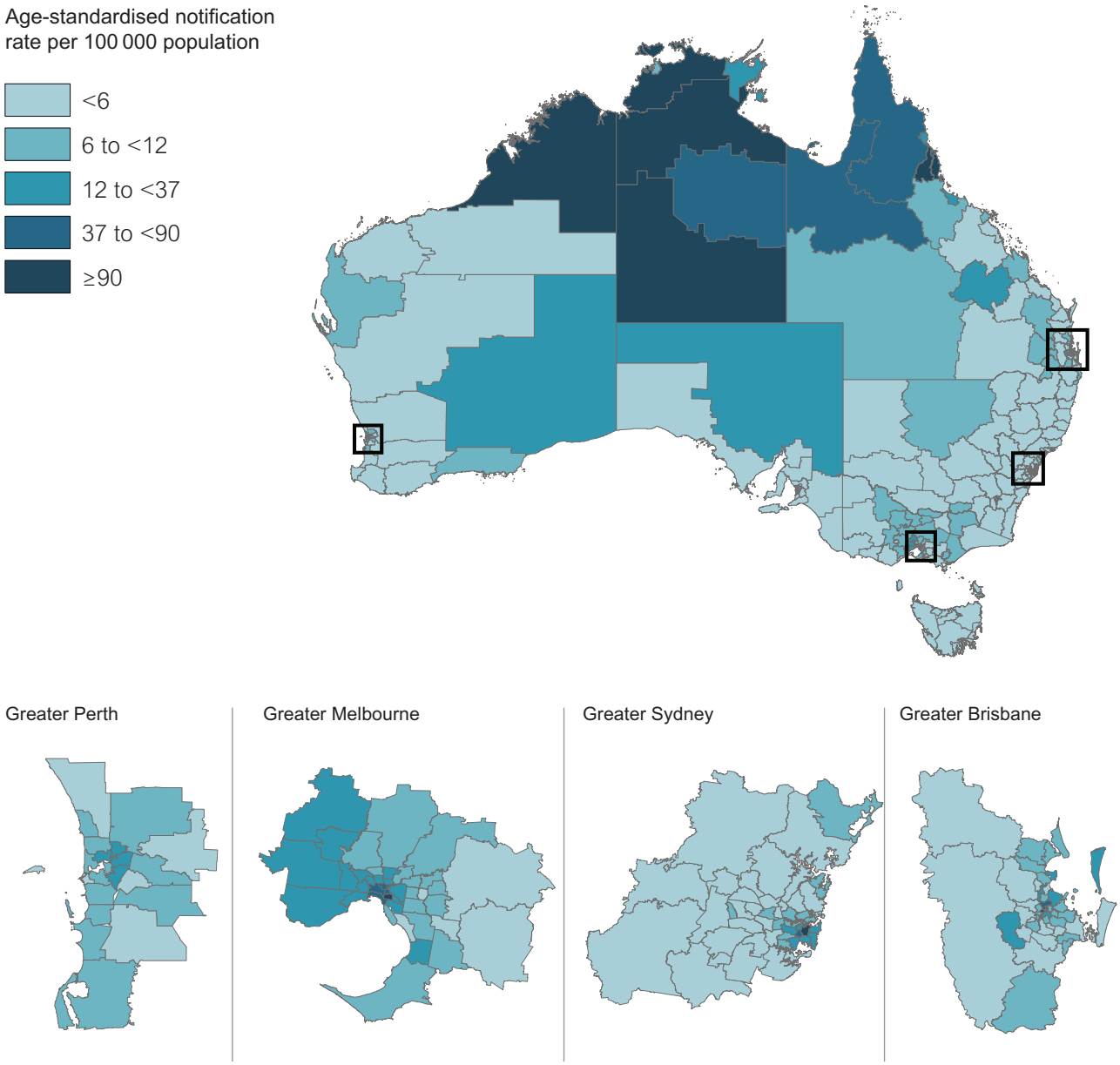
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Major cities	0.7	0.6	0.5	0.6	0.7	0.8	0.5	0.9	1.7	2.6
Inner and outer regional	1.1	0.9	1.0	1.2	1.5	1.4	2.0	3.0	4.6	9.1
Remote and very remote	31.5	14.4	18.8	35.0	21.5	17.7	29.8	54.8	63.8	70.9

Source: Australian National Notifiable Diseases Surveillance System.

This report includes age-standardised infectious syphilis notification rates by statistical area level 3 (SA3; population size generally between 30 000 and 130 000 persons; see Methodology for details) represented as geographical maps of Australia and major cities (Figure 4.3.11).

Based on average infectious syphilis notification rates between 2015 and 2017, there were variations in rates within states and territories as well as major cities. High infectious syphilis notification rates were predominantly in regional and remote areas of central and northern Australia, and some areas within major cities (Figure 4.3.11). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of infectious syphilis notifications, particularly in SA3s with smaller population sizes. Caution should be taken in interpreting these rates.

Figure 4.3.11 Average age-standardised infectious syphilis notification rate per 100 000 population, by statistical area level 3, 2015–2017, Australia and major cities (population >2 million)



Note: Average infectious syphilis notification rates for the three-year period 2015–2017 were used to minimise the influence of fluctuation in the number of infectious syphilis notifications.

Source: National Notifiable Diseases Surveillance System.

Infectious syphilis incidence

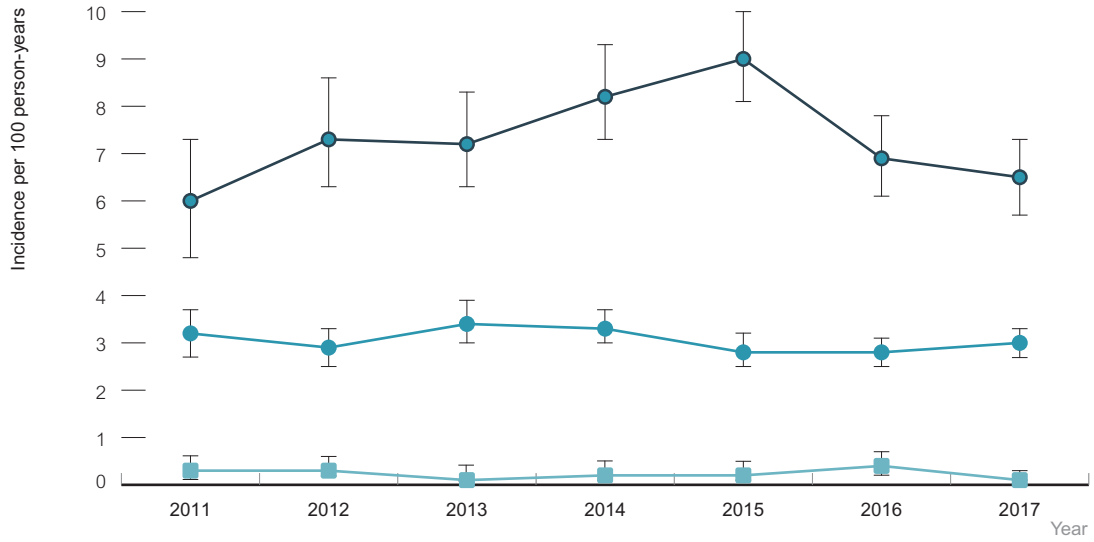
Infectious syphilis incidence is an important indicator of new transmissions, reflecting the impact of current prevention programs, whereas prevalence reflects the burden of disease. Infectious syphilis incidence is available from the ACCESS network and is calculated by dividing the number of incident infections (negative test followed by a syphilis diagnosis) among people undergoing repeat syphilis testing at sexual health services by the person's time at risk (determined by the time between repeat syphilis tests). These incidence estimates represent populations attending sexual health clinics and may not be generalisable to broader priority populations. Further details about the methods used can be found in the Methodology.

In 2017, the incidence of infectious syphilis among HIV-positive gay and bisexual men attending sexual health clinics was 6.5 per 100 person-years, 2.2 times as high as the 3.0 per 100 person-years in HIV-negative gay and bisexual men. Between 2013 and 2017, infectious syphilis incidence fluctuated in both HIV-negative (between 2.8 and 3.4 per 100 person-years) and HIV-positive (between 6.0 and 9.0 per 100 person-years) gay and bisexual men (Figure 4.3.12).

In 2017, infectious syphilis incidence in female sex workers was 0.1 per 100 person-years, and fluctuated between 0.1 and 0.4 per 100 person-years over the past five years (2013–2017) (Figure 4.3.12).

Caution should be taken with interpretation as confidence intervals overlap, indicating that between-year differences are not statistically significant.

Figure 4.3.12 Infectious syphilis incidence in sexual health clinic attendees, 2011–2017, by population



	2011	2012	2013	2014	2015	2016	2017
HIV-negative gay and bisexual men	3.2	2.9	3.4	3.3	2.8	2.8	3.0
HIV-positive gay and bisexual men	6.0	7.3	7.2	8.2	9.0	6.9	6.5
Female sex workers	0.3	0.3	0.1	0.2	0.2	0.4	0.1

Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

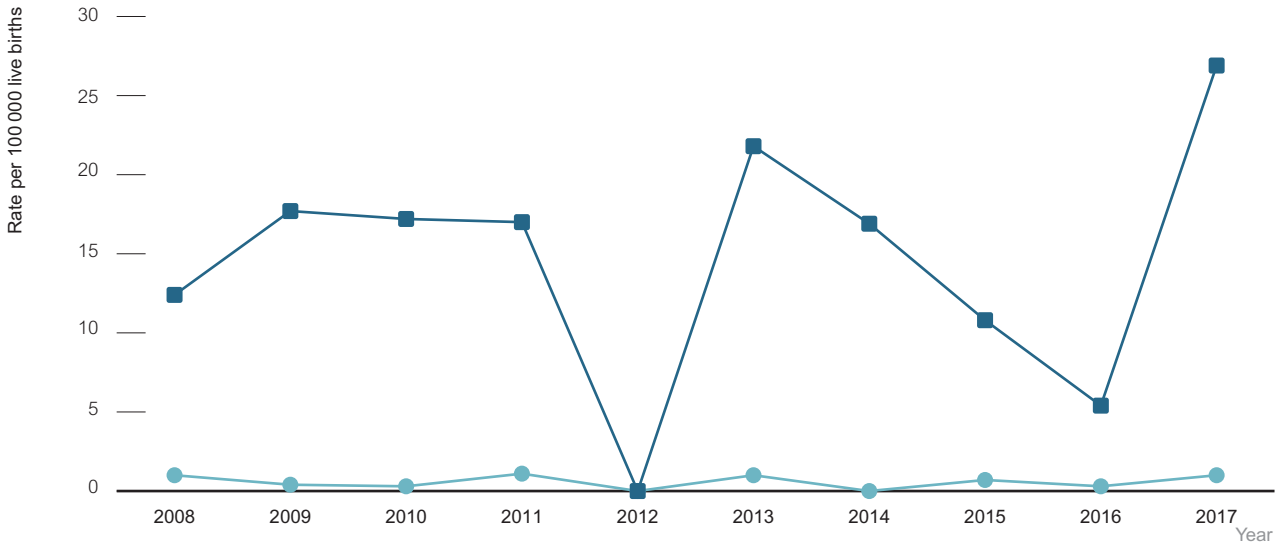
STIs

Congenital syphilis

In Australia, 20 cases of congenital syphilis were notified between 2008 and 2012, and 24 between 2013 and 2017. Of those, 55% (11 of 20) were in the Aboriginal and Torres Strait Islander population between 2008 and 2012 and 63% (15 of 24) between 2013 and 2017. In 2017, eight cases of congenital syphilis were notified, five in the Aboriginal and Torres Strait Islander and three in the non-Indigenous populations. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2018* for further details.[1]

The notification rate of congenital syphilis in the Aboriginal and Torres Strait Islander population was 26.9 per 100 000 live births in 2017, which is 27 times as high as the non-Indigenous notification rate of 1.0 per 100 000 (Figure 4.3.13). Enhanced systems are being established to collect additional clinical information about mothers infected with syphilis and their children.

Figure 4.3.13 Congenital syphilis rate per 100 000 live births, 2008–2017, by Aboriginal and Torres Strait Islander status



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Aboriginal and Torres Strait Islander births	12.4	17.7	17.2	17.0	0.0	21.8	16.9	10.8	5.4	26.9
Non-Indigenous births	1.0	0.4	0.3	1.1	0.0	1.0	0.0	0.7	0.3	1.0

Note: 2017 rates were based on the number of live births in 2016, as 2017 births data were not available at the time of reporting.
Source: Australian National Notifiable Diseases Surveillance System.

Syphilis testing

Clinical guidelines recommend at least annual STI testing for all sexually active gay and bisexual men, increasing to every three to six months for men with higher risk behaviour, and at each monitoring visit for HIV-positive gay and bisexual men.[15] Syphilis testing data are included in this report from sexual health clinics and high-caseload general practice clinics.

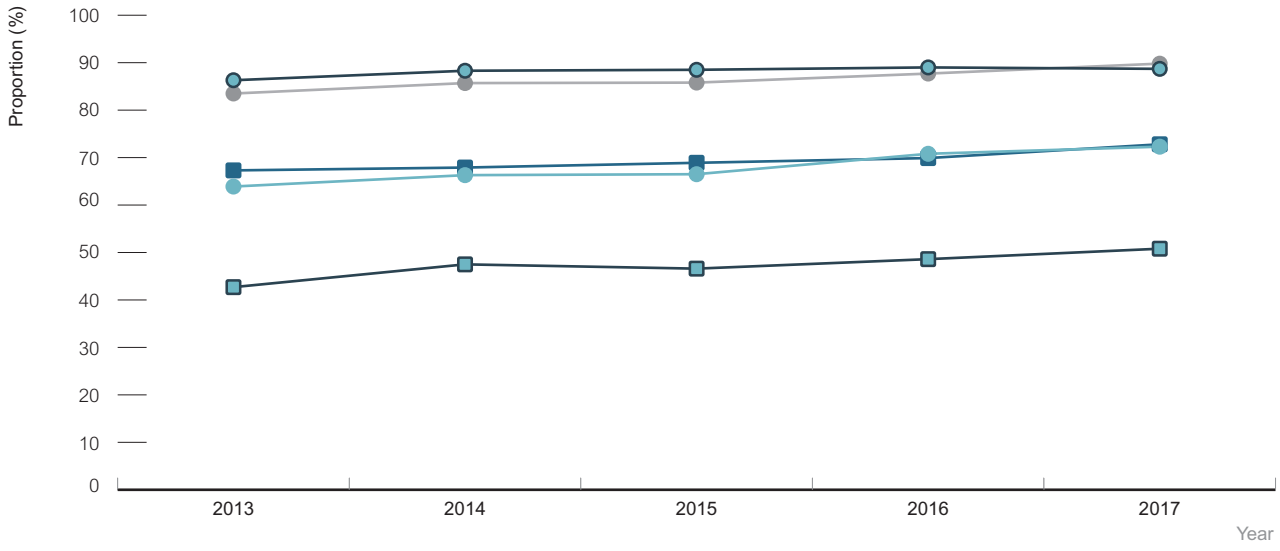
Testing at sentinel sexual health clinics

At 44 sexual health clinics participating in the ACCESS network (see Methodology for further detail), between 2013 and 2017 a high proportion of gay and bisexual men (86% to 89%) and female sex workers (84% to 90%) were tested for syphilis in a year. The proportion tested was lower for young heterosexuals aged 16–29 years (43% to 51%) and people who inject drugs (67% to 73%), but the proportion tested rose in this period (Figure 4.3.14).

Testing at high-caseload sentinel general practice clinics

At seven general practice clinics with high caseloads of gay and bisexual men participating in the ACCESS network (see Methodology for further detail), between 64% and 72% of gay and bisexual men were tested for syphilis each year between 2013 and 2017 (Figure 4.3.14). The uptake of syphilis testing at sentinel general practices may reflect a high caseload of HIV-positive men, as syphilis testing is usually conducted concurrently with HIV management checks.

Figure 4.3.14 Proportion of clinic attendees tested for syphilis in a year, 2013–2017, by clinic type and population



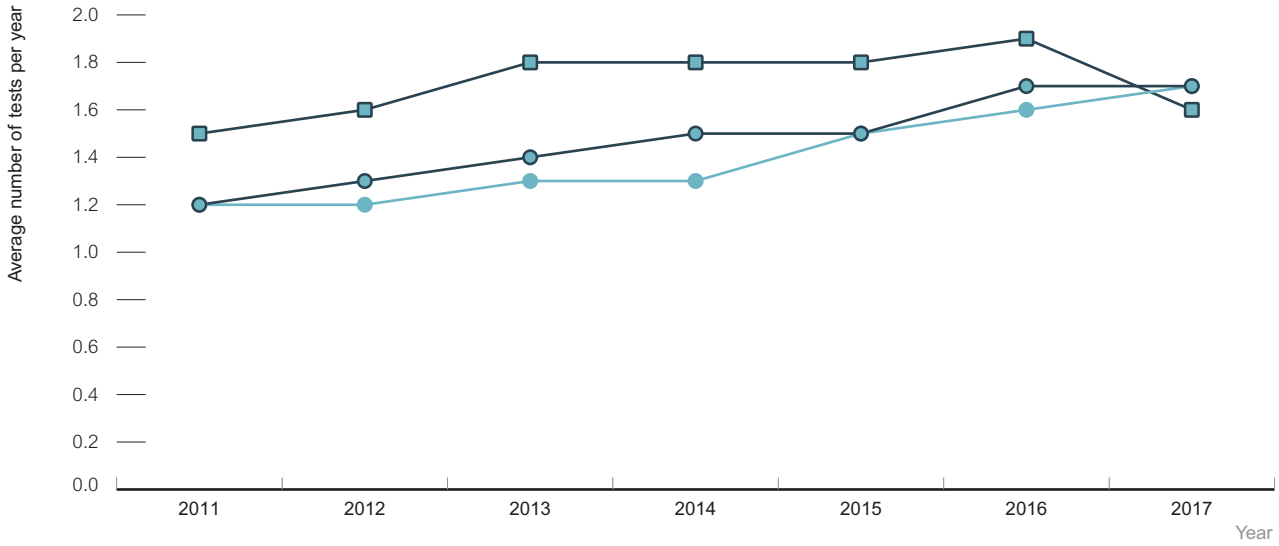
	2013	2014	2015	2016	2017
Heterosexuals aged 16-29y, sexual health clinic (%)	42.7	47.5	46.6	48.6	50.8
Female sex workers, sexual health clinic (%)	83.5	85.7	85.8	87.7	89.8
People who inject drugs, sexual health clinic (%)	67.3	67.9	68.9	69.9	72.8
Gay and bisexual men, sexual health clinic (%)	86.3	88.3	88.5	89.0	88.7
Gay and bisexual men, general practice clinic (%)	63.9	66.3	66.5	70.8	72.3

Note: General practice clinics include primary healthcare general practice clinics with high caseloads of gay and bisexual men.
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

Syphilis tests per year

The number of syphilis tests per year in gay and bisexual men can give an indication of compliance with recommendations in the clinical guidelines.[15] The average number of syphilis tests in gay and bisexual men attending sexual health clinics and high-caseload general practice clinics in the ACCESS network increased by 18% from 1.4 in 2013 to 1.7 in 2017. This change was due to a 28% increase the number of tests in HIV-negative gay and bisexual men (1.3 to 1.7) and was contrary to an 11% decline in tests in HIV-positive gay and bisexual men (1.8 to 1.6) (Figure 4.3.15). In 2017, the average number of syphilis tests was higher in HIV-negative gay and bisexual men (1.7) than in HIV-positive gay and bisexual men (1.6) (Figure 4.3.15).

Figure 4.3.15 Average number of syphilis tests per year in gay and bisexual men, 2011–2017, by HIV status



	2011	2012	2013	2014	2015	2016	2017
All gay and bisexual men	1.2	1.3	1.4	1.5	1.5	1.7	1.7
HIV-negative gay and bisexual men	1.2	1.2	1.3	1.3	1.5	1.6	1.7
HIV-positive gay and bisexual men	1.5	1.6	1.8	1.8	1.8	1.9	1.6

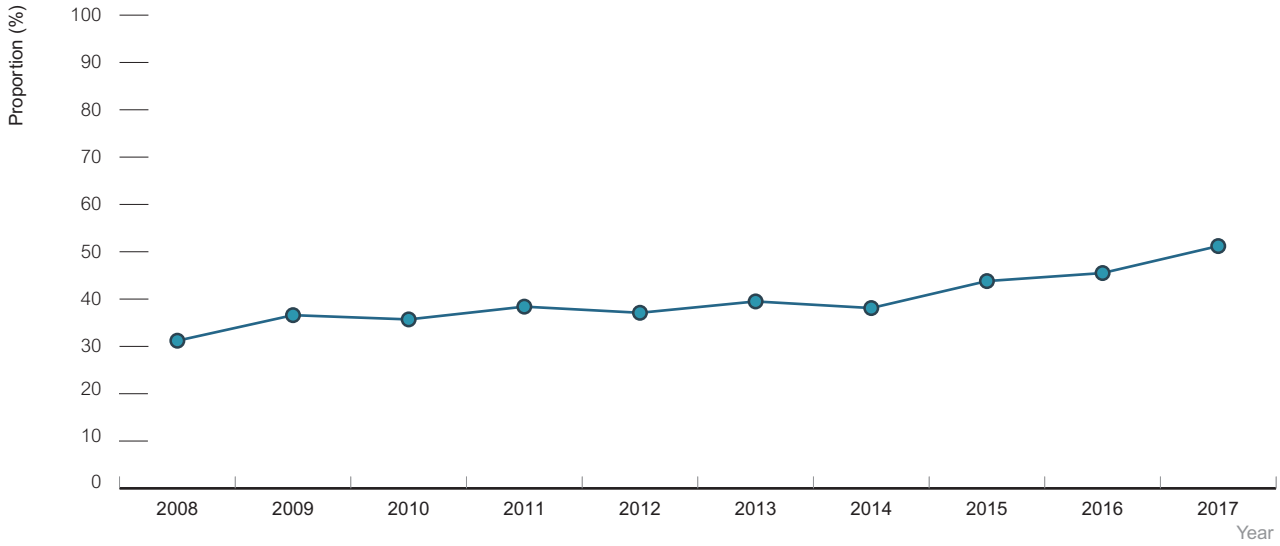
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

Comprehensive STI testing

National STI testing guidelines recommend regular testing in a number of key populations. Annual comprehensive HIV and STI testing is recommended for all sexually active gay and bisexual men, increasing to testing every three to six months for men with higher risk behaviour.[15] Testing for HIV, syphilis and hepatitis B is recommended as part of routine antenatal screening, including chlamydia testing for young women. For sexually active people aged under 30 years, annual opportunistic chlamydia testing is recommended, and testing for gonorrhoea is recommended in areas of high prevalence.[14]

In 2017 in the Gay Community Periodic Surveys, 51% of gay and bisexual men reported comprehensive STI testing (at least four samples collected) in the 12 months prior to the survey. The proportion of men reporting comprehensive testing increased from 31% in 2008 to 51% in 2017 (Figure 4.3.16). The change is largely attributed to increased collection of rectal and throat swabs. For more information, see *Annual reports of trends in behaviour*.[3]

Figure 4.3.16 Gay and bisexual men reporting comprehensive STI testing in the 12 months prior to the survey, 2008–2017



Proportion (%)									
31.2	36.6	35.7	38.4	37.1	39.5	38.1	43.8	45.5	51.2

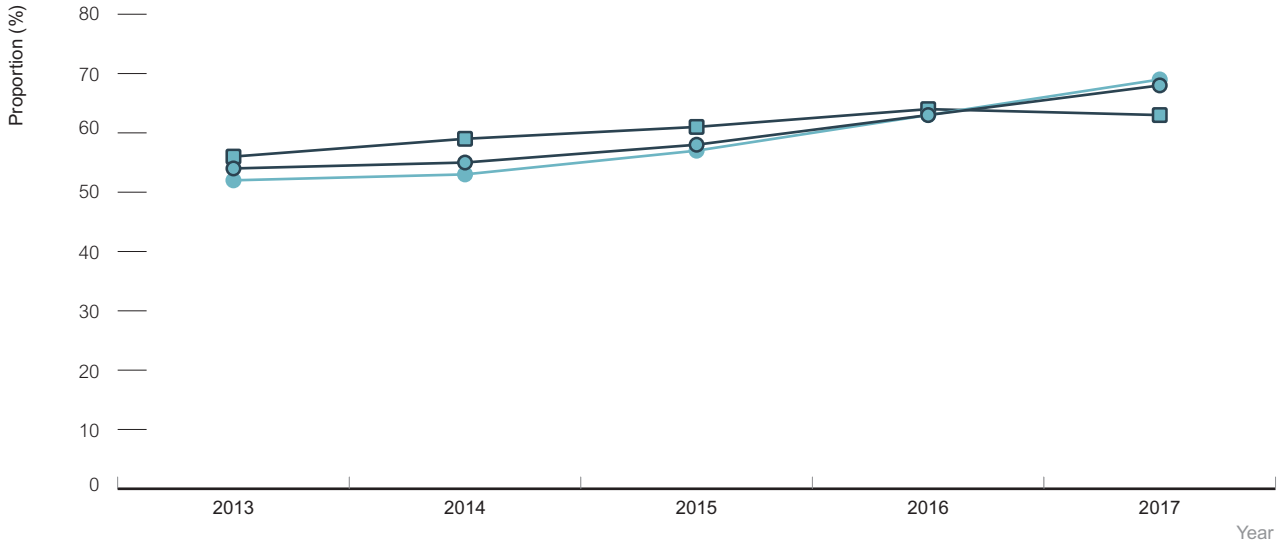
Note: Comprehensive testing is defined as the collection of samples of at least four of the following: anal swab, throat swab, penile swab, urine, blood.
Source: Gay Community Periodic Surveys.

STIs

Repeat comprehensive testing

At 44 sexual health clinics in the ACCESS network, 68% of gay and bisexual men in 2017 had a repeat comprehensive STI screen (includes chlamydia and gonorrhoea test on any anatomical site, syphilis and HIV in HIV-negative men) within 13 months of a previous comprehensive screen, increasing from 54% in 2013 (Figure 4.3.17). The proportion with repeat comprehensive screening was higher for HIV-positive gay and bisexual men (56% to 64%) than for HIV-negative gay and bisexual men (52% to 63%) between 2013 and 2016, but in 2017 was higher among HIV-negative men (63% versus 69%) (Figure 4.3.17).

Figure 4.3.17 Repeat comprehensive STI screen within 13 months of a test among gay and bisexual men attending sexual health clinics, 2013–2017, by HIV status



	2013	2014	2015	2016	2017
Gay and bisexual men (%)	54	55	58	63	68
HIV negative gay and bisexual men (%)	52	53	57	63	69
HIV positive gay and bisexual men (%)	56	59	61	64	63

Note: Repeat screening pertains to a retrospective 13-month period. A comprehensive screen is defined as a test for chlamydia and gonorrhoea (any anatomical site), syphilis and HIV (among HIV-negative men).

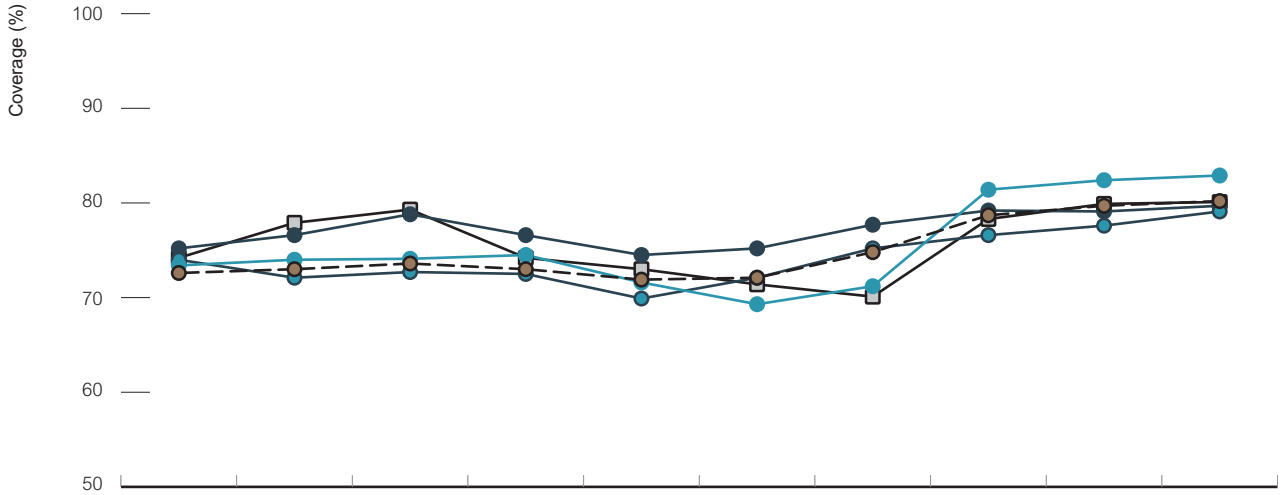
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

4.4 Human papillomavirus infection

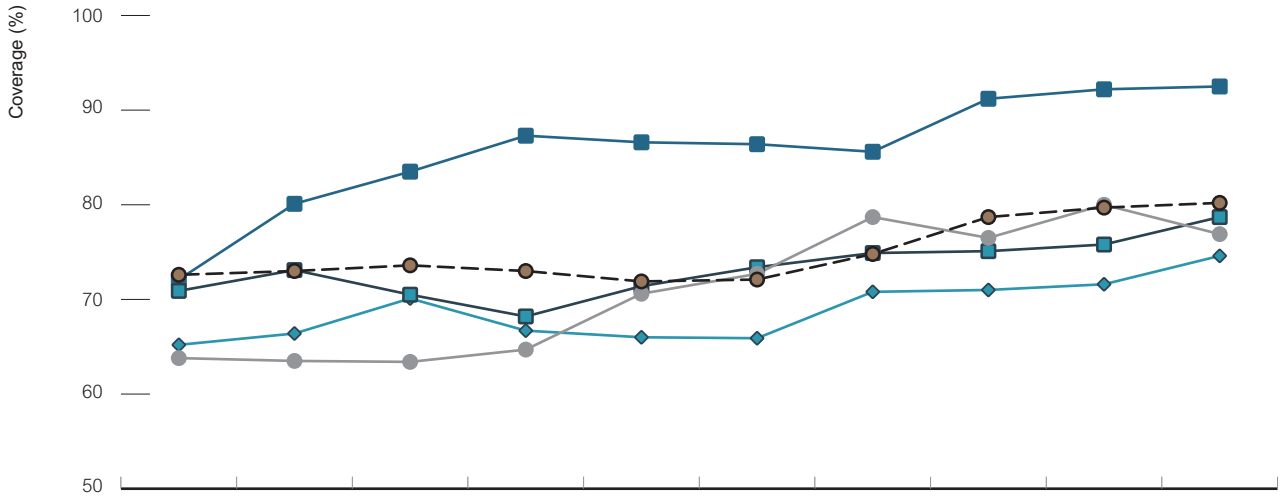
Human papillomavirus vaccination

In Australia all girls aged 12 to 13 years have been routinely offered three doses of human papilloma virus (HPV) vaccination since 2007, as have boys of the same age since 2013. Since 2008, a high coverage with three vaccine doses has been achieved in girls turning 15 years of age in all states and territories (75% to 93% in 2017) (Figure 4.4.1). In boys turning 15 years of age, three-dose vaccination coverage was 70% and above in all states and territories in 2017, except Tasmania, where coverage was 64% (Figure 4.4.1).

Figure 4.4.1 Three-dose HPV vaccination coverage for girls turning 15 years of age, 2007–2016, by state/territory



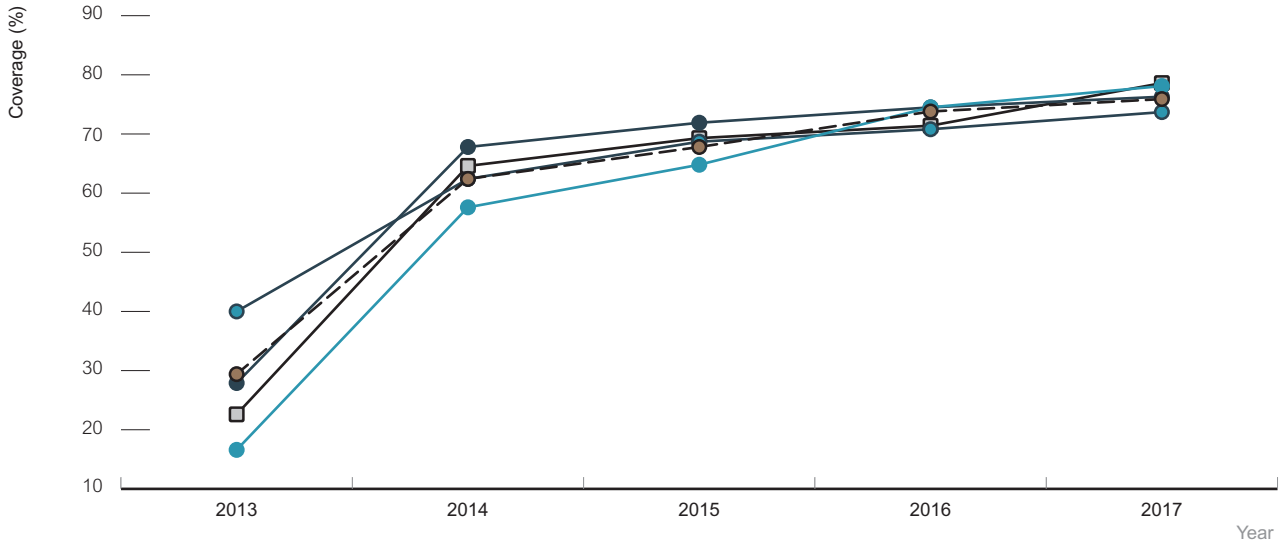
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	72.6	73.0	73.6	73.0	71.9	72.1	74.8	78.7	79.7	80.2
NSW	73.4	74.0	74.1	74.5	71.6	69.3	71.2	81.4	82.4	82.9
QLD	74.0	72.1	72.7	72.5	69.9	72.1	75.2	76.6	77.6	79.1
VIC	75.2	76.6	78.8	76.6	74.5	75.2	77.7	79.2	79.1	79.7
ACT	74.2	77.9	79.3	74.2	73.0	71.4	70.1	78.3	79.9	80.1



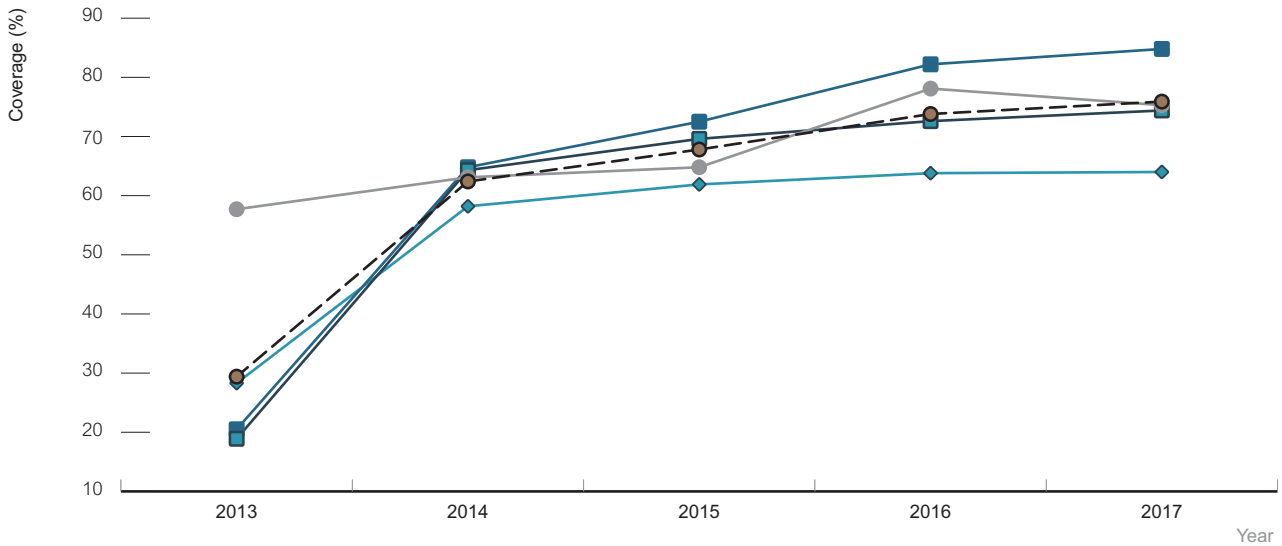
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	72.6	73.0	73.6	73.0	71.9	72.1	74.8	78.7	79.7	80.2
NT	72.1	80.1	83.5	87.3	86.6	86.4	85.6	91.2	92.2	92.5
SA	70.9	73.1	70.5	68.2	71.4	73.4	74.9	75.1	75.8	78.7
TAS	65.2	66.4	70.1	66.7	66.0	65.9	70.8	71.0	71.6	74.6
WA	63.8	63.5	63.4	64.7	70.6	72.7	78.7	76.5	80.0	76.9

Source: National HPV Vaccination Program Register.

Figure 4.4.2 Three-dose HPV vaccination coverage for boys turning 15 years of age, 2013–2017, by state/territory



Australia	29.4	62.4	67.8	73.8	75.9
NSW	16.6	57.6	64.8	74.5	78.1
QLD	40.0	62.4	68.7	70.8	73.7
VIC	27.9	67.8	71.9	74.5	76.3
ACT	22.6	64.6	69.3	71.4	78.6



Australia	29.4	62.4	67.8	73.8	75.9
NT	20.5	64.8	72.5	82.2	84.8
SA	18.9	64.3	69.6	72.6	74.4
TAS	28.3	58.2	61.9	63.8	64.0
WA	57.7	63.1	64.8	78.1	75.3

Source: National HPV Vaccination Program Register.

Genital warts notifications

The Genital Warts Surveillance Network has evaluated the impact of the national HPV vaccination program on genital warts notifications in various populations attending a national network of sexual health clinics (see Methodology for details).

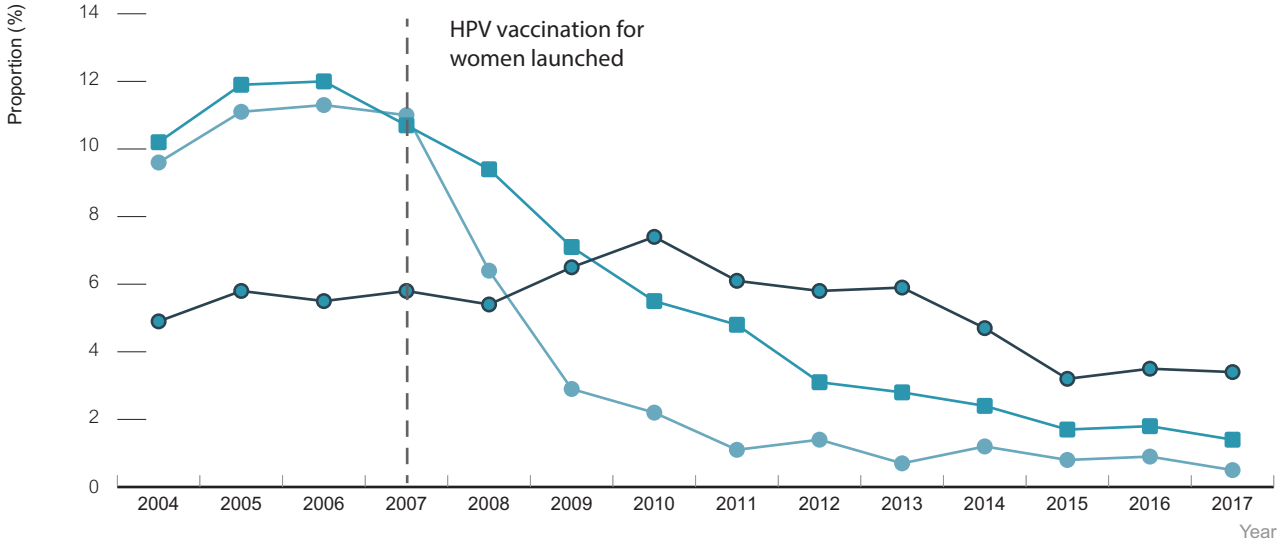
Information available from 43 sexual health clinics included in the Genital Warts Surveillance Network shows a 96% reduction in genital warts diagnoses at first visit among Australian-born women aged under 21 years from 11.0% in 2007 to 0.5% in 2017 (Figure 4.4.3). In women aged 21 to 30 years there was an 87% decline from 10.7% in 2007 to 1.4% in 2017, reflecting the catch-up vaccination campaign in women aged up to 26 years in 2007 to 2009. The proportion of genital warts diagnoses in females older than 30 years fluctuated and was 3.4% in 2017 (Figure 4.4.3). In Australian-born heterosexual males aged under 21 years, there was an 88% reduction in genital warts diagnoses at first visit from 9.3% in 2007 to 1.1% in 2017 (33% reduction since 2013 when male vaccination was introduced) (Figure 4.4.4). In men aged 21–30 years, there was a 76% reduction from 16.6% in 2007 to 3.9% in 2017 (40% reduction since 2013 when male vaccination was introduced). The proportion of genital warts diagnoses in men older than 30 years has shown a downward trend starting 2010 and was 5.5% in 2017, a reduction of 53% (Figure 4.4.4).

In Aboriginal and Torres Strait Islander females there was an even greater reduction in genital warts diagnoses at first visit in the age groups under 21 years (100%) and 21–29 years (100%) between 2007 and 2017, with 0% prevalence of genital warts in both age groups in 2017 (Figure 4.4.5). The proportion of genital warts diagnoses in Aboriginal and Torres Strait Islander women older than 30 years fluctuated and was 2.3% in 2017 (Figure 4.4.5).

In Aboriginal and Torres Strait Islander males there was a large reduction in genital warts diagnoses at first visit in those aged under 21 (82%) and 21–29 years (80%) between 2007 and 2017, but the rate has fluctuated since 2013 when male vaccination was introduced (Figure 4.4.6). The proportion of genital warts diagnoses in Aboriginal and Torres Strait Islander men older than 30 years has fluctuated and was 3.9% in 2017 (Figure 4.4.6).

The proportion of genital warts diagnoses in Australian-born gay and bisexual men at first visit has also declined since the introduction of male vaccination in 2013 (72% in gay men, 51% in bisexual men) (Figure 4.4.7). The gradual decline is largely explained by an increasing denominator as a greater number of asymptomatic men are attracted to the clinics for screening.

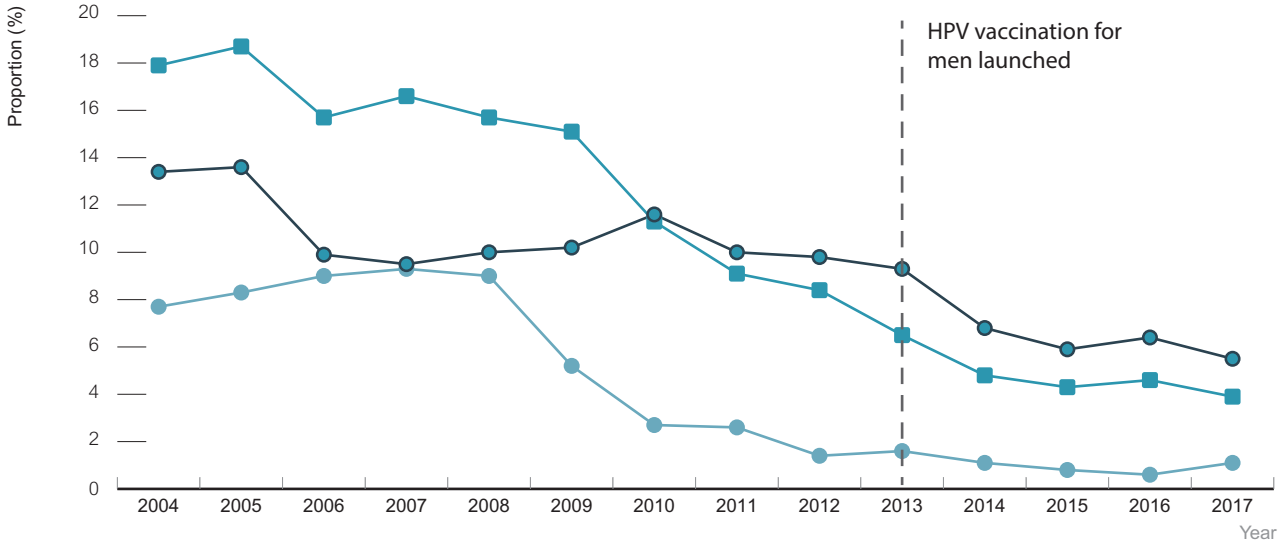
Figure 4.4.3 Proportion of Australian-born non-Indigenous females diagnosed with genital warts at first visit at sexual health clinics, 2004–2017, by age group



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<21 years (%)	9.6	11.1	11.3	11.0	6.4	2.9	2.2	1.1	1.4	0.7	1.2	0.8	0.9	0.5
21–30 years (%)	10.2	11.9	12.0	10.7	9.4	7.1	5.5	4.8	3.1	2.8	2.4	1.7	1.8	1.4
>30 years (%)	4.9	5.8	5.5	5.8	5.4	6.5	7.4	6.1	5.8	5.9	4.7	3.2	3.5	3.4

Note: Excludes Aboriginal and Torres Strait Islander females.
Source: Genital Wart Surveillance Network.

Figure 4.4.4 Proportion of Australian-born non-Indigenous heterosexual males diagnosed with genital warts at first visit at sexual health clinics, 2004–2017, by age group

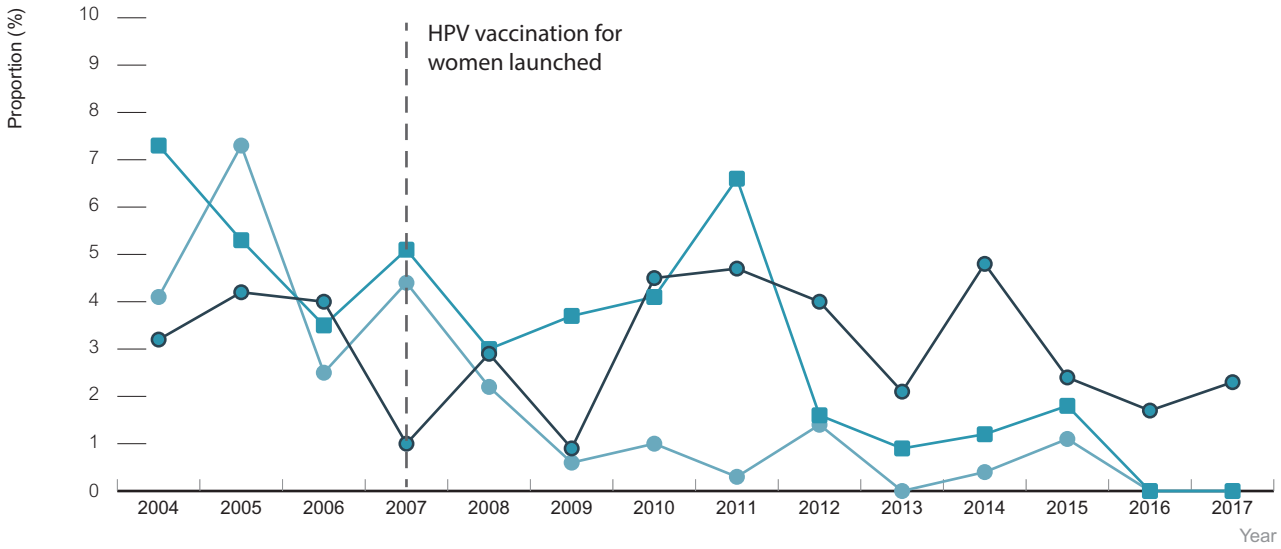


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<21 years (%)	7.7	8.3	9.0	9.3	9.0	5.2	2.7	2.6	1.4	1.6	1.1	0.8	0.6	1.1
21–30 years (%)	17.9	18.7	15.7	16.6	15.7	15.1	11.3	9.1	8.4	6.5	4.8	4.3	4.6	3.9
>30 years (%)	13.4	13.6	9.9	9.5	10.0	10.2	11.6	10.0	9.8	9.3	6.8	5.9	6.4	5.5

Note: Excludes Aboriginal and Torres Strait Islander males.

Source: Genital Wart Surveillance Network.

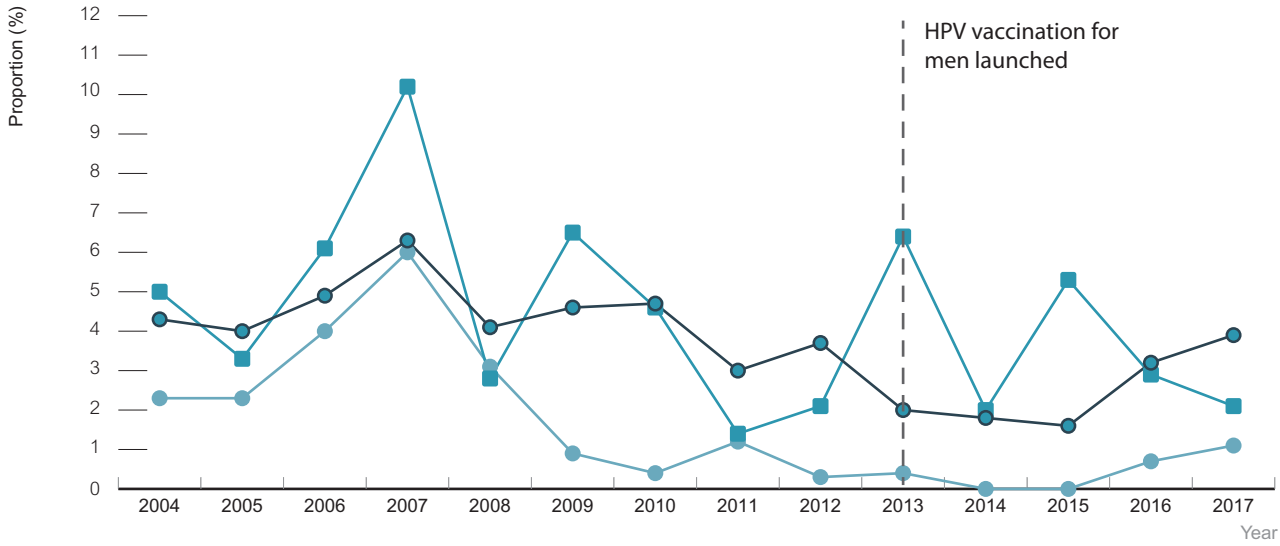
Figure 4.4.5 Proportion of Aboriginal and Torres Strait Islander females diagnosed with genital warts at first visit at sexual health clinics, 2004–2017, by age group



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<21 years (%)	4.1	7.3	2.5	4.4	2.2	0.6	1.0	0.3	1.4	0.0	0.4	1.1	0.0	0.0
21–29 years (%)	7.3	5.3	3.5	5.1	3.0	3.7	4.1	6.6	1.6	0.9	1.2	1.8	0.0	0.0
≥30 years (%)	3.2	4.2	4.0	1.0	2.9	0.9	4.5	4.7	4.0	2.1	4.8	2.4	1.7	2.3

Source: Genital Wart Surveillance Network.

Figure 4.4.6 Proportion of Aboriginal and Torres Strait Islander males diagnosed with genital warts at first visit at sexual health clinics, 2004–2017, by age group



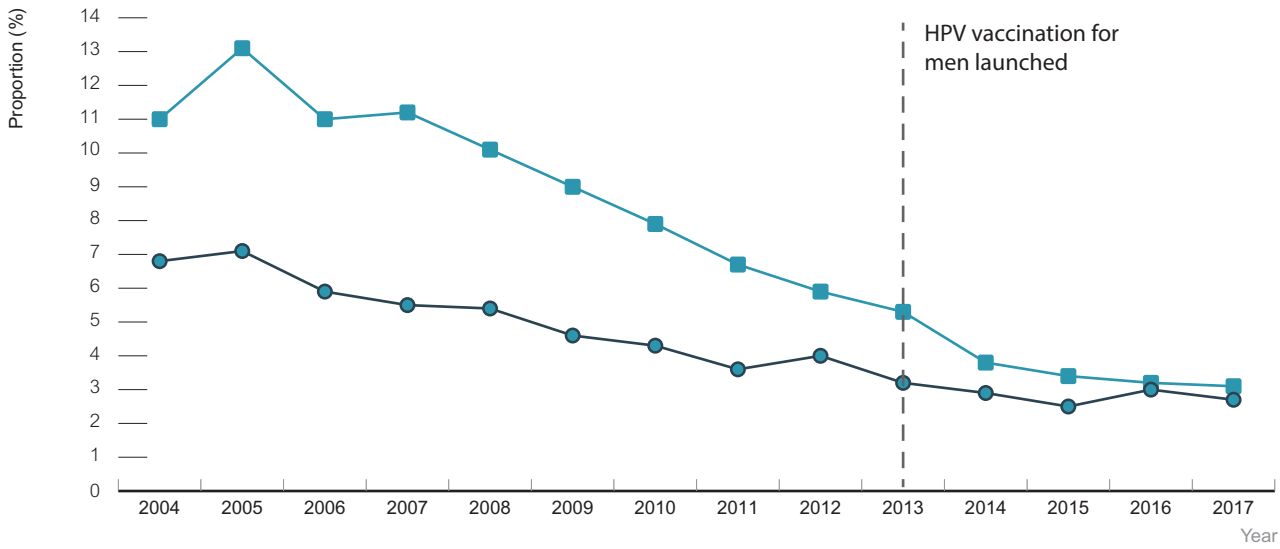
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<21 years (%)	2.3	2.3	4.0	6.0	3.1	0.9	0.4	1.2	0.3	0.4	0.0	0.0	0.7	1.1
21–29 years (%)	5.0	3.3	6.1	10.2	2.8	6.5	4.6	1.4	2.1	6.4	2.0	5.3	2.9	2.1
≥30 years (%)	4.3	4.0	4.9	6.3	4.1	4.6	4.7	3.0	3.7	2.0	1.8	1.6	3.2	3.9

Note: Excludes Aboriginal and Torres Strait Islander females.

Source: Genital Wart Surveillance Network.

STIs

Figure 4.4.7 Proportion of Australian-born non-Indigenous gay or bisexual men diagnosed with genital warts at first visit at sexual health clinics, 2004–2017



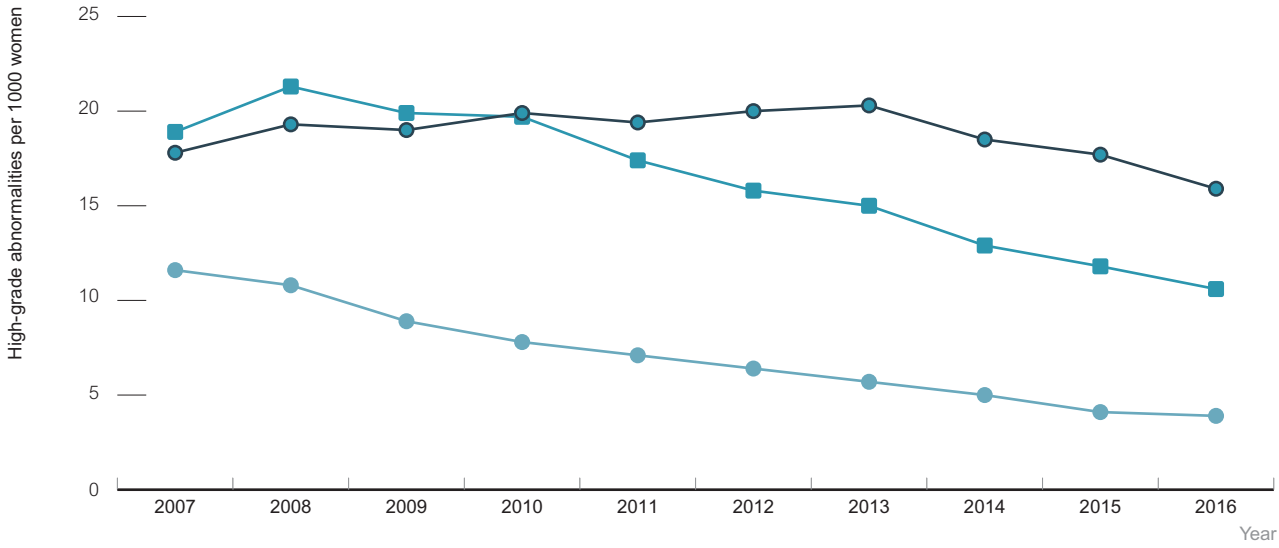
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gay men (%)	11.0	13.1	11.0	11.2	10.1	9.0	7.9	6.7	5.9	5.3	3.8	3.4	3.2	3.1
Bisexual men (%)	6.8	7.1	5.9	5.5	5.4	4.6	4.3	3.6	4.0	3.2	2.9	2.5	3.0	2.7

Source: Genital Wart Surveillance Network.

High-grade cervical abnormalities

Another indicator of the success of the HPV vaccination program in girls is the reduction in the detection of high-grade abnormalities in women undergoing cervical cancer screening (Pap screening). Between 2007 and 2016 the detection rate of high-grade abnormalities per 1000 women undergoing Pap screening declined in women aged under 20 years (66% decline) and 20–24 years (44% decline). In women aged 25–29 years the detection rate has fallen since 2013 (from 20.3 to 15.9 per 1000) (Figure 4.4.8).

Figure 4.4.8 Detection of high-grade abnormalities in women undergoing cervical cancer screening (Pap screening), 2007–2016, by age group



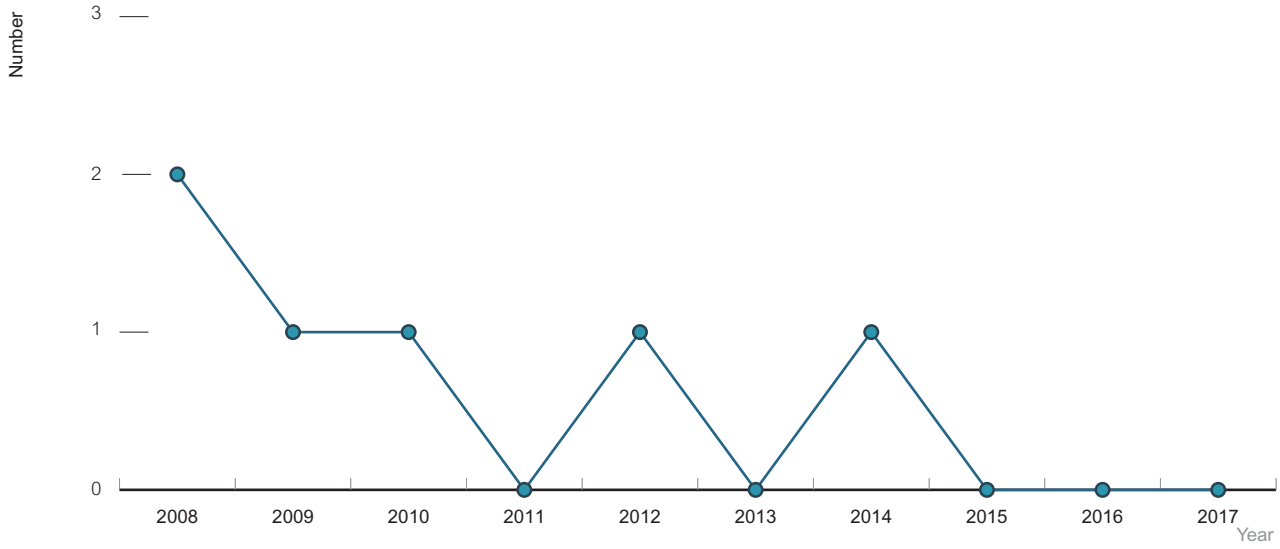
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<20 (%)	11.6	10.8	8.9	7.8	7.1	6.4	5.7	5.0	4.1	3.9
20–24 (%)	18.9	21.3	19.9	19.7	17.4	15.8	15.0	12.9	11.8	10.6
25–29 (%)	17.8	19.3	19	19.9	19.4	20	20.3	18.5	17.7	15.9

Source: Australian Institute of Health and Welfare, Cervical screening in Australia 2018[44]; see Methodological notes for details.

4.5 Donovanosis

Australia is on track to eliminate donovanosis, once a frequently diagnosed sexually transmissible infection among remote Aboriginal populations, with only two cases notified since 2011, one in 2012 and one in 2014 (Figure 4.5.1).

Figure 4.5.1 Donovanosis notifications, 2008–2017



2	1	1	0	1	0	1	0	0	0

Source: Australian National Notifiable Diseases Surveillance System.

STIs

Methodology

The National HIV Registry

National surveillance for HIV notifications

HIV is a notifiable disease in each state/territory health jurisdiction in Australia. All new HIV diagnoses are reported by doctors and laboratories to state/territory health authorities. Information sought on the notification forms includes: name code (based on the first two letters of the family name and the first two letters of the given name), sex, date of birth, postcode, country of birth, Aboriginal and/or Torres Strait Islander status, date of HIV diagnosis, CD4+ cell count at diagnosis, likely place of HIV acquisition, source of exposure to HIV and evidence of newly acquired HIV (see below). If the person was born overseas, language spoken at home and date of arrival in Australia are also recorded. These data are then forwarded to the Kirby Institute for collation and analysis. The database where HIV notifications are stored is referred to as the National HIV Registry.

Information on country of birth has been reported by all jurisdictions since 2002 and language spoken at home has been reported by New South Wales, Queensland and Victoria since 2004 and by all jurisdictions since 2008. Information on date of arrival in Australia and likely place of acquisition has been reported by all jurisdictions since 2014.

In New South Wales, information on cases of newly diagnosed HIV was sought only from the diagnosing doctor prior to 2008. From 2008, information was also sought from the doctors to whom the person with HIV was referred, and follow-up was carried out for cases for which the information sought at HIV notification was incomplete. These new procedures resulted in more complete information on HIV notifications and reassignment of cases found to have been newly diagnosed in earlier years.

The procedures used for national HIV surveillance of newly diagnosed HIV are available at kirby.unsw.edu.au.

Newly acquired HIV

Newly acquired HIV is defined as newly diagnosed HIV with evidence of a negative or indeterminate HIV antibody test or a diagnosis of primary HIV (seroconversion illness) within the previous 12 months. Information on the date of the last negative or indeterminate test or date of onset of primary HIV has been routinely sought from each state/territory health jurisdiction since 1991.

Late and advanced HIV diagnosis

Advanced HIV diagnosis is defined as newly diagnosed HIV with a CD4+ cell count of less than 200 cells/μL, and late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/μL. HIV notifications classified as newly acquired HIV were not categorised as late or advanced diagnoses irrespective of CD4+ cell count.

Rates of HIV diagnosis

Age-standardised notification rates were calculated using population denominators obtained from the Australian Bureau of Statistics (ABS) by state, year, sex and age (ABS series 3101051-3101058) and were standardised using ABS Standard Population Catalogue 3100DO003_201212. Population denominators by country/region of birth were based on the standard Australian Classification of Countries (ABS series 1269.0), with proportion of population by region of birth and year ascertained from ABS SuperTable data. Population denominators by year, sex, age and state for Aboriginal and Torres Strait Islander people were obtained from ABS catalogue 32380 estimated and projected population. ABS regional population denominators by age, sex, Indigenous status and state were obtained from ABS catalogue 32380do009_2011.xls and from 2011 Census-based Aboriginal and Torres Strait Islander Population Projections by Age, Sex and Remoteness Area (2011–2026). Remoteness area categories for these data were ‘metropolitan’, ‘inner and outer regional’ and ‘remote and very remote’. State-based proportions were assigned based on proportions by age, sex and state for each remoteness region in 2011 estimates.

Rates of HIV in Aboriginal and Torres Strait Islander populations were compared with Australian-born non-Indigenous populations unless otherwise stated. This was done so the epidemiology excludes imported HIV cases, where trends can fluctuate in response to immigration patterns, and focuses on HIV infection endemic to Australia.

HIV-transmitted drug resistance and subtype

Testing to determine HIV subtype and drug resistance mutations is performed for all new HIV diagnoses by reference laboratories in Australia. This information is not currently collected at national level. In New South Wales and South Australia, HIV drug resistance and subtype information for new HIV diagnoses in 2015 and 2016 was provided where testing was performed. In New South Wales this information is collected as part of a National Health and Medical Research Council Partnership Project, and in South Australia it is routinely collected by health authorities.

Only resistance testing performed within 12 months of diagnosis was included and reported as a measure of transmitted drug resistance. Of all resistance mutations, surveillance drug resistance mutations (SDRMs) were identified and reported using a WHO–endorsed list of SDRMs that includes 93 mutations (34 nucleoside reverse transcriptase inhibitor; 19 non–nucleoside reverse transcriptase; 40 protease inhibitor.[45] All subtypes other than B were categorised as non–B subtype.

High HIV-prevalence countries

Countries recognised by UNAIDS as having a national prevalence above 1% in any of the years in the past 10 years (2008–2017) were considered high–prevalence. The following countries were considered high–prevalence:

Angola	Democratic Republic of the	Jamaica	South Africa
Bahamas	Congo (Zaire)	Kenya	South Sudan
Barbados	Djibouti	Lesotho	Suriname
Belize	Dominican Republic	Liberia	Swaziland
Benin	Equatorial Guinea	Malawi	Tanzania
Botswana	Ethiopia	Mali	Thailand
Burkina Faso	Gabon	Mozambique	Togo
Burundi	Gambia	Namibia	Trinidad and Tobago
Cameroon	Ghana	Nigeria	Uganda
Central African Republic	Guinea	Panama	Ukraine
Chad	Guinea-Bissau	Russian Federation	Zambia
Republic of the Congo	Guyana	Rwanda	Zimbabwe
Cote D'Ivoire	Haiti	Sierra Leone	

Australian Paediatric Surveillance Unit

Cases of perinatal exposure to HIV were reported to the Kirby Institute by paediatricians through the Australian Paediatric Surveillance Unit (apsu.org.au), and also notified through state and territory health authorities according to national HIV surveillance procedures. Further details of perinatal exposure to HIV data collection are described elsewhere.[46, 47]

Australian National Notifiable Diseases Surveillance System

The National Notifiable Diseases Surveillance System (NNDSS) (health.gov.au/internet/main/publishing.nsf/content/cda-surveil-nndss-nndssintro.htm) was established in 1990 under the auspices of the Communicable Diseases Network of Australia. NNDSS coordinates the national surveillance of more than 50 communicable diseases or disease groups. Under this scheme, notifications are made to the state/territory health authorities under the provisions of the public health legislation in the respective jurisdictions. Computerised, de-identified unit records of notifications are supplied to the Australian Government Department of Health on a daily basis for collation, analysis and publication on the NNDSS website (health.gov.au/cda/source/cda-index.cfm), updated daily, and in the quarterly journal *Communicable Diseases Intelligence*.

Notification data provided include a unique record reference number, state or territory identifier, disease code, date of onset, date of diagnosis to the relevant health authority, sex, age, Aboriginal and Torres Strait Islander status and postcode of residence.

'Diagnosis date' was used to define the period of analysis. This date represents either the onset date or, where the date of onset was not known, the earliest of the specimen collection date, the notification date, and the notification receipt date. As considerable time may have elapsed between the onset and diagnosis dates for syphilis (unspecified), hepatitis B (unspecified) and hepatitis C (unspecified), the earliest of specimen collection date, health professional notification date and public health unit notification receipt date was used.

Viral hepatitis

New notifications of viral hepatitis (hepatitis B and C) are notifiable conditions in all state/territory health jurisdictions in Australia. Cases were notified by the diagnosing laboratory, medical practitioner, hospital or a combination of these sources, through state/territory health authorities, to the National Notifiable Diseases Surveillance System (NNDSS). Age-standardised population rates of diagnosis of viral hepatitis were calculated for each state/territory using yearly population estimates provided by the ABS as described above.

Hepatitis B infection and hepatitis C infection were classified as newly acquired if evidence was available of acquisition in the 24 months prior to diagnosis. Newly acquired hepatitis B notification data were available from all health jurisdictions. Newly acquired hepatitis C notifications were available from all health jurisdictions, and in Queensland from 2010 onwards. Newly acquired hepatitis C from Queensland has been included for the first time in this report as enhanced surveillance procedures were recently implemented.

Sexually transmissible infections

Diagnoses of sexually transmissible infections were notified by state/territory health authorities to the National Notifiable Disease Surveillance System (NNDSS), maintained by the Australian Government Department of Health. Chlamydia was notifiable in all health jurisdictions except New South Wales prior to 1998. Gonorrhoea was notifiable in all health jurisdictions and infectious syphilis was notifiable in all jurisdictions since 2004. In most health jurisdictions, diagnoses of sexually transmissible infections were notified by the diagnosing laboratory, the medical practitioner, hospital or a combination of these sources (Table M1).

Table M1 Source of notification of sexually transmissible infections to the National Notifiable Disease Surveillance System, by state/territory

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Diagnosis								
Gonorrhoea	Doctor Laboratory Hospital	Laboratory	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory
Infectious syphilis	Doctor Laboratory Hospital	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory
Chlamydia	Doctor Laboratory Hospital	Laboratory	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Laboratory	Doctor Laboratory	Doctor Laboratory
Donovanosis	Not notifiable	Laboratory	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Laboratory	Doctor Laboratory	Doctor Laboratory

Age-standardised rates of notification for chlamydia, gonorrhoea and infectious syphilis were calculated using analogous procedures to those described above for HIV notifications (see HIV notifications methodology).

Age-standardised notification rates by statistical area level 3

The number of HIV notifications for 2015–2017 was obtained from the National HIV Registry (see above). The numbers of hepatitis C, hepatitis B, chlamydia, gonorrhoea and infectious syphilis notifications for 2015–2017 were obtained from the Australian National Notifiable Diseases Surveillance System (NNDSS) (see above). Notifications of these infections with missing age and missing or invalid postcodes (i.e. postcodes denoting Australian Bureau of Statistics (ABS) unallocated delivery areas or post office boxes) were excluded from this analysis.

Age-standardised notification rates were presented as geographical maps of Australia by statistical area level 3 (SA3) and for selected greater capital city statistical areas (GCCSA) with populations over two million (Greater Brisbane, Greater Melbourne, Greater Perth and Greater Sydney). Both geographical units (SA3s and GCCSAs) belong to the hierarchies of regions defined by the ABS under the Australian Statistical Geography Standard. SA3s generally have populations between 30 000 and 130 000 persons, with some exceptions for areas with particularly low or particularly high population density. GCCSAs are regions designed to capture the 'socioeconomic extent' of the state and territory capital cities.

The postcode of residence was matched to the corresponding ABS SA3 using the ABS Australian Statistical Geography Standard Geographic Correspondences (2016), CG_POSTCODE_2017_SA3_2016 file. Only spatial SA3s were retained for geographical mapping, excluding non-spatial categories such as migratory, offshore, shipping and 'No usual address' SA3s. There are 340 SA3 spatial units under the Australian Statistical Geography Standard 2016. Four spatial SA3s representing other territories (Christmas Island, Cocos (Keeling) Islands, Jervis Bay and Norfolk Island) were excluded from the analysis. Where a postcode was split into more than one SA3, the entire postcode was allocated to the SA3 containing the largest proportion of the postcode.

Crude notification rates were calculated for each of the infections by five-year age group using the ABS estimated resident population 2015–2016 by SA3. The 2016 estimated resident population was used for the 2017 calendar year as small-area population data for 2017 by age group was unavailable at the time of development. All crude rates were age-standardised using the ABS Standard Population Catalogue 31010DO003_201212. Geographical mapping of chlamydia notification rates excludes Victoria as notification data for 2015 and 2016 were not available at the time of reporting. The average notification rates for the past three years (2015–2017) were calculated to minimise the influence of fluctuation in the number of notifications, particularly in SA3s with smaller populations. Age-standardised notification rates were categorised based on the standard deviation of disease-specific age-standardised notification rates across SA3s as described below and colour coded (lighter colours representing lower rates and darker colours higher rates).

For HIV, hepatitis B, hepatitis C and chlamydia, where the standard deviation (SD) of notification rates was below or close to the mean and there was considerable spread across the range of values, the following intervals were chosen:

Interval 1	Less than mean minus 0.5 SD
Interval 2	Mean minus 0.5 SD to mean plus 0.5 SD
Interval 3	Mean plus 0.5 SD to mean plus 1.5 SD
Interval 4	Mean plus 1.5 SD to mean plus 2.5 SD, or more than mean plus 1.5 SD
Interval 5	More than mean plus 2.5 SD

For gonorrhoea and infectious syphilis, where standard deviation of notification rates was equal to at least twice the mean with considerable positive skew, the following intervals were chosen:

Interval 1	Less than mean minus 0.25 SD
Interval 2	Mean minus 0.25 SD to mean plus 0.25 SD
Interval 3	Mean plus 0.25 SD to mean plus 0.75 SD
Interval 4	Mean plus 0.75 SD to mean plus 2.5 SD
Interval 5	More than mean plus 2.5 SD

Note that some rates are based on a small number of notifications, and in areas with low population density rates are based on small denominators, particularly in SA3s with population below the general ABS population threshold of 30 000 persons. It should also be noted that over half of SA3s (56%) are in greater capital city statistical areas, so collectively SA3s in these urban areas account for a large number of notifications even if rates are low to moderate. HIV remains a highly concentrated epidemic geographically, with gay and bisexual men as the most affected population being unevenly represented among the general population across Australia. The notification rates of hepatitis B and C in some SA3s may be influenced by the location of prisons and correctional centres where viral hepatitis screening is recommended on entry, and may not be representative of the rates in the general population in these areas. For chlamydia and gonorrhoea, notification rates may be influenced by specific STI screening programs in some SA3s. Therefore, caution should be taken in interpreting these rates.

Diagnosis and care cascade

HIV diagnosis and care cascade

The approach taken to develop the HIV diagnosis and care cascade was informed by recommendations from a national stakeholder reference group (see Acknowledgments for members of the reference group).

Estimating the number of people with diagnosed HIV

To estimate the number of people living with diagnosed HIV, we performed a simple calculation using annual notifications, estimated mortality rates and emigration rates.

Annual HIV notifications data was provided by Australia's National HIV registry. Due to incomplete or inaccurate recording of name codes the registry contains multiple reports for some individuals especially during the early stages of the epidemic. To estimate the number of duplicates we applied a statistical technique which has previously been applied to Australia's National HIV Registry.[48] This calculation estimated the number of duplicate notifications annually up to 2016, resulting in 8.1% duplicate notifications by 2016 with the majority of duplicates occurring early in the epidemic. For 2017, we assumed all notifications were unique.

We combined two approaches to estimate the number of deaths among people diagnosed with HIV. To estimate the number of deaths up to 2003 we used a linkage study conducted between Australia's National Death Index and the National HIV Registry for cases to the end of 2003.[48] This study calculated HIV- and AIDS-related deaths and calculated standardised mortality ratios for people with HIV during different eras of antiretroviral therapy. It identified 8519 deaths among people diagnosed with HIV or AIDS to the end of 2003. Of these deaths, 6900 were recorded in the National HIV Registry, meaning that 19% of all deaths were missing from the registry. Due to the backdating of deaths in the National HIV Registry after 2003, we used this percentage to inflate the number of recorded deaths in the registry until the end of 2003 (inflating the 7102 deaths recorded to the end of 2003 to 8768 deaths overall) and estimated the overall average mortality rate for diagnosed people living with HIV prior to 2003. After 2003 we used annual mortality rates from the Australian HIV Observational Database (AHOD).[49] Between 2004 and 2017, similar annual mortality rates were estimated for the AHOD cohort regardless of whether people were retained, lost or returned to follow-up. We used the annual overall mortality rate from AHOD as the best estimate and the 95% confidence interval as a range in our calculations for the number of diagnosed people living with HIV.

We also considered the impact of emigration. As people are not included in the National HIV Registry until they have been diagnosed in Australia (even if they have been diagnosed previously overseas) we did not consider the entry of people living with diagnosed HIV.

We estimated an emigration rate for diagnosed people living with HIV using data from the ABS and follow-up data of people recently diagnosed in New South Wales.[50] New South Wales Health has followed up all people diagnosed with HIV during 2013 and 2014 and reported that up to 4% of people move overseas soon after their diagnosis. As these data are for notifications in recent years we assume this is an upper bound and reduce the number of annual notifications by 2% with a range of 0–4% to reflect this initial migration. As there is likely to be a flux of people leaving temporarily and returning to Australia (some of whom may still receive care and treatment while overseas), we used data on the annual number of people in the overall population who permanently leave Australia (provided by the ABS for 1976–2016 in series 340102) and the estimated resident population (ABS series 310104) to calculate an overall annual emigration rate. Since 1981 this rate has risen from around 0.1% to 0.4% of the resident population leaving Australia permanently. From June 2017, permanent removals are no longer recorded by the ABS due to the removal of the green card from customs processes upon leaving Australia. For the 2017 cascade estimates, we assumed the same emigration rate as for 2016. The permanent rate of departure is the lower bound of the overall rate at which Australian residents leave Australia for longer than 12 months. However, diagnosed people living with HIV require ongoing care and treatment which is not subsidised in many countries, so we assume the permanent rate of departure is a reasonable estimate for the population of diagnosed people living with HIV. We adjusted this rate to reflect the different emigration rates for men and women older than 15 years in the general population. Overall, we assumed a range in the annual emigration rate between zero and double the overall rate of permanent departure.

Our overall estimate of the number of people diagnosed with HIV in Australia each year is obtained by adding the number of unique notifications to the previous year's estimate and subtracting the number of deaths and emigrants using the mortality and migration rates.

Subpopulation estimates

We also provided HIV estimates for the number of people living with HIV and the number of people diagnosed for each exposure risk category, region of birth, males, females, and Aboriginal and Torres Strait Islander status.

For each subpopulation, we estimated the proportion of duplicates separately. We also adjusted the death and emigration rates to reflect the differences in these rates in males and females in the general population. Mortality and migration rates were adjusted for the Indigenous and non-Indigenous Australian-born population to reflect the higher overall mortality in Aboriginal and Torres Strait Islanders as reported by the ABS (abs.gov.au/ausstats/abs@.nsf/mf/3302.0). We also assumed no Indigenous people living with diagnosed HIV move overseas. Finally, we separately estimated the emigration rate for males and females and by region of birth to reflect the large differences in emigration. We did this using net overseas migration departures for 2004–2015 (which were provided to the Kirby Institute by the ABS by age, sex, jurisdiction and age; ABS series 34120) calculating the relative difference between the subpopulation and the overall net overseas migration rates and applying this to the overall migration rate for diagnosed people living with HIV. For years before 2004 and after 2015 we estimated the relative emigration rate using linear regression. Similarly, we assumed a higher post-diagnosis emigration rate for overseas-born people based on the NSW six-monthly follow-up data (which was 0.72% for Australian-born people and 10.08% for overseas-born people).

Estimating the number of people living with HIV

To estimate the overall number of people living with HIV, both diagnosed and undiagnosed, we used the European Centre for Disease Prevention and Control (ECDC) HIV Modelling Tool (version 1.3.0) to estimate the proportion of people with HIV who are undiagnosed.[51]

The ECDC tool is a multi-state back-calculation model using notifications data and estimates for the rate of CD4+ cell count decline to fit notification rates over time, producing estimates for HIV incidence, time between infection and diagnosis, and the undiagnosed population by CD4+ cell count strata, using surveillance data on new HIV and AIDS notifications. To run the model, notifications data is split by CD4+ cell count strata, whether the patient had AIDS at the time of diagnosis, and optional risk of exposure categories. Diagnosis rates can be adjusted to reflect changes over time and whether people with HIV are more likely to be diagnosed at later stages of infection.

For the cascade estimates we divided all annual notifications into those attributed to male-to-male sex, heterosexual contact, injecting drug use, and 'other' risk exposures. We ran the ECDC tool for each exposure risk category as well as overall (with all groups combined) and excluding male-to-male sex. Separate models were run for Indigenous and non-Indigenous Australian-born populations, males and females, and for each region of birth. The tool's diagnosis rate options were adjusted to best fit the data on CD4+ cell count at diagnosis.

For validation we compared the model estimates for undiagnosed gay and bisexual men with empirical data from the COUNT study.[52] This study was conducted alongside routine behavioural surveillance surveys in which gay and homosexually active men from Sydney, Melbourne, Canberra and Perth were recruited from a range of gay community sites in 2013–2014. In this study 8.9% of participants were previously undiagnosed with HIV (95% CI 5.8–13.5%). This is closely matched by the ECDC tool estimated percentage undiagnosed in 2014 for gay and bisexual men of 8.4% (range: 7.6–9.2%).

The overall prevalence of HIV in Australia and for each subpopulation was then estimated by inflating the calculated number of people living with diagnosed infection by the estimated level of undiagnosed infection. Because the ECDC model is run separately, the sum of number undiagnosed for individual subpopulations can be different from the overall population estimate.

Estimating the number retained in care

To estimate the number of people living with HIV retained in care we used available clinical data on the proportion of HIV-positive people attending a clinic who receive an annual CD4+ or viral load test. An issue with clinic data is that people can appear to be lost to follow-up, and hence not in care, when they have just transferred to another clinic. A recent study in a network of the six main HIV clinical care sites in Victoria estimated that between 91.4% and 98.8% of HIV-positive patients were retained in care.[53] This estimate was obtained by cross-referencing of clinical data between sites and phone tracing individuals who had accessed care between February 2011 and June 2013 but who had not accessed care between June 2013 and February 2014. We assume these results are broadly representative of HIV-positive patients in Australia and assume a best estimate of 95% of people living with HIV retained in care with a range equal to the range for percentage retained after follow-up.[53]

Estimating antiretroviral treatment coverage

We estimated the number of people receiving antiretroviral therapy using a 10% sample of Pharmaceutical Benefits Scheme (PBS) patient-level script claims data provided by the company Prospection. This is a data set of randomised patient-level de-identified PBS script claims from 2006 to the present. Currently the data includes over 170 million script claims and over three million patients. It includes all PBS-listed drugs with HIV indications. Our estimate is the number of unique patients in the PBS data who filled in at least one script in the 12 months prior to the end of December 2017 multiplied by 10. We assumed that 10% of the Australian population were sampled to estimate the uncertainty range as a 95% confidence interval (which equates to approximately 5%).

To the PBS number we added an estimate for the number of HIV-positive temporary residents taking antiretroviral therapy, as temporary residents are not eligible for Medicare and hence not counted in the 10% sample. The National Association of People with HIV Australia (NAPWHA) recently obtained data on the number of people receiving antiretroviral therapy through compassionate access schemes from the three major pharmaceutical companies providing antiretroviral therapy in Australia. Based on this data we estimate 500 (range: 450–550) HIV-positive temporary residents living in Australia are on antiretroviral therapy.[54] We split this estimate into males and females on therapy using the proportions of males and females from the Australian HIV Observational Database Temporary Residents Access Study (ATRAS).[54, 55] We split this estimate into males and females on therapy using the proportions of males and females from the Australian HIV Observational Database Temporary Residents Access Study (ATRAS).[55]

Estimating levels of virological suppression

We define virological suppression as less than 200 viral copies per ml. The proportion of people on antiretroviral therapy with viral suppression is taken to be the proportion of people recorded in the Australian HIV Observational Database (AHOD) who had less than 200 viral copies per ml at their last viral load test. Uncertainty bounds were estimated by calculating the 95% confidence interval for this proportion. We estimate the number of people living with HIV on antiretroviral therapy with viral suppression by multiplying this proportion and range by the estimated number of people receiving antiretroviral therapy.

PrEP enrolment data and associated estimates

The number of gay and bisexual men receiving PrEP was based on number enrolled in PrEP implementation projects in New South Wales (EPIC–NSW), Queensland (QPrEPd) and Victoria (PrEPX) by the end of 2017.

Hepatitis C diagnosis and care cascade

This cascade was developed collaboratively between the Kirby Institute and the Center for Disease Analysis (centerforda.com). The approach taken to develop the hepatitis C diagnosis and care cascade was informed by recommendations from an Australian stakeholder reference group (see Acknowledgments for members of the reference group).

Number of people living with hepatitis C

This estimate was derived using a difference equation mathematical model, as described below:

- To determine hepatitis C incidence as a result of injecting drug use, the model used estimates of the number of people who had injected drugs in Australia over the last three decades, the pattern of injecting drug use and estimates of hepatitis C incidence among people who inject drugs derived from cohort studies.
- The relative change in incidence since 2005 was informed by hepatitis C notifications in people aged 15–29 years, reflecting the population most at risk of acquiring infection. As the primary route of transmission is injecting drug use, a practice that primarily starts in late adolescence or early adulthood, trends in the rate of notifications in those aged under 30 years can be interpreted as a surrogate for the incidence of hepatitis C.
- The estimates of hepatitis C incidence due to injecting drug use were then adjusted in accordance with epidemiological data to allow for hepatitis C infections through other transmission routes, including infection in migrants.
- The model also includes the effects of treatment with associated sustained virological response rates reflecting treatment regimen, genotype and access to direct-acting antivirals through compassionate access and clinical trials in 2014–2015 and through generic supply in 2015. From 2016 the sustained response rates were based on antiviral treatment from clinical studies and reflected the disease stage at initiation.
- Estimates of the number of people experiencing long-term sequelae of chronic hepatitis C were then obtained from the estimated pattern of hepatitis C incidence using rates of progression derived from cohort studies. People cured with late stages of disease had a lower progression rate to both decompensated cirrhosis and hepatocellular carcinoma.
- Estimates of the numbers of people living with chronic hepatitis C in 2017 were adjusted to allow for mortality related to hepatitis C, injecting drug use and unrelated to hepatitis C or injecting.

Further information about the methods can be obtained by contacting the Center for Disease Analysis (centerforda.com).

Number of people diagnosed and living with chronic hepatitis C

This estimate was derived from totalling all hepatitis C notifications from 1991 to 2017 and adjusting for spontaneous hepatitis C clearance, mortality, hepatitis C cure through treatment, and overseas migration, with adjustments as follows:

- The proportion with spontaneous hepatitis C clearance was estimated at 20%.
- The annual proportion with mortality among people with a hepatitis C notification in NSW (1993–2017) was extrapolated to the total number of hepatitis C notifications in Australia.
- The estimated number of individuals cured of hepatitis was deducted from the number of total hepatitis C notifications.
- The level of overseas migration was assumed to be small, given the characteristics of the infected population, and given by the annual number of permanent departures for the general population divided by the estimated resident population as estimated by the ABS (series 340102).

Number of people who have received a confirmatory RNA test

To estimate the number of people previously diagnosed with hepatitis C (either antibody-positive or by RNA test) who have received an RNA test (to confirm viraemic infection) we used published data from the 2015 Australian Needle Syringe Program Survey.[56] Of all people who responded in the survey in 2015 who self-reported a previous diagnosis of hepatitis C, 47% (95% CI: 43–52%) self-reported a confirmatory hepatitis C test. We assumed this estimate and range is broadly representative of the chronically infected population. We multiplied this percentage by the number diagnosed and living with chronic hepatitis C to estimate the number diagnosed who have been RNA tested. The range is given by the 95% confidence interval multiplied by the corresponding lower and upper value for diagnosed with hepatitis C.

Number of people who have ever received hepatitis C treatment

To estimate the numbers of people treated for hepatitis C we totalled the number of prescriptions dispensed to public patients, reported by the Pharmaceutical Benefits Scheme (PBS), since 1997.

- For estimates in 2013–2017, data from longitudinal tracking of a 10% random sample of PBS prescriptions were used.
- For 2014 and 2015, we included estimates for the number of patients receiving direct-acting antiviral therapies through clinical trials, patient access programs and generic drugs.
- For 2016–2017, we assumed all treated patients received direct-acting antivirals following their listing on the PBS. We estimated the number of people receiving treatment in 2016 and 2017 using the 10% sample of PBS patient-level script claims data provided by the company Prospection. Our estimate is the number of unique patients in the PBS data who filled in at least one script in the 12 months prior to the end of December 2017 multiplied by 10. We assumed that 10% of the Australian population were sampled to estimate the uncertainty range as a 95% confidence interval (which equates to approximately 5%).
- The numbers of interferon-based hepatitis C treatments dispensed were adjusted for multiple counting considering the duration of treatment for each regimen and the treatment compliance rate.
- For genotype-specific regimens, a distribution of 50% genotype 1 and 50% genotypes 2 or 3 was assumed.
- The total number treated was adjusted for annual mortality and overseas migration (using the same overseas migration rate as for the diagnosed stage).
- People who were cured of chronic hepatitis C were assumed to have reduced rates of disease progression to decompensated cirrhosis (76% reduction[57, 58]) and hepatocellular carcinoma (77% reduction[59]). [57, 58]) and hepatocellular carcinoma (77% reduction[59]).
- The cured population with decompensated cirrhosis was assumed to have a 50% reduction in liver-related death rate.
- The general population mortality rate was used for those who were successfully cured. The hepatitis C mortality rate from people with a hepatitis C notification in New South Wales was used for patients who did not achieve sustained virological response.
- We estimated the proportion of direct-acting antiviral treatments initiated by patients in each fibrosis stage using REACH-C study data.[60] The number of people on treatment with cirrhosis, decompensated cirrhosis and hepatocellular carcinoma was estimated from data on planned duration. As REACH-C is likely to be biased towards early disease, given community and primary care-based involvement, we adjusted the estimates to reflect higher coverage of direct-acting antiviral treatment in the F3 and F4 stages.

Number of people who have ever achieved treatment-induced hepatitis C cure

This component was estimated by taking the number of people receiving hepatitis C treatment in each year and multiplying it by the proportion with sustained virological response reported in the literature (regimen-specific). We assumed the following:

- Australian data on the proportion with sustained virological response were prioritised, if available. A distribution of 50% genotype 1 and 50% genotypes 2 or 3 among people receiving hepatitis C treatment was assumed for interferon-based therapies.
- A 95% sustained virological response rate (range: 90–97%) was used for therapies in F0–F3 fibrosis stages and a 90% rate was used in the F4 fibrosis stage (cirrhosis) and for people with decompensated cirrhosis and people with hepatocellular carcinoma.
- The total number cured was adjusted for annual mortality and overseas migration as for the diagnosed and treated stages.

Hepatitis B diagnosis and care cascade

Cascade estimates were developed by the WHO Collaborating Centre for Viral Hepatitis at the Doherty Institute. The approach taken to develop the hepatitis B diagnosis and care cascade was informed by recommendations from a national stakeholder reference group. This included representatives from: The Kirby Institute; ASHM; Hepatitis Australia; NSW Ministry of Health; Queensland Department of Health; Department of Health and Human Services, Tasmanian Government; Department of Health and Human Services Victoria; WA Health; Australian Government Department of Health; South Australia Health; WHO Collaborating Centre for Viral Hepatitis, The Doherty Institute; Centre for Social Research in Health; Australian Injecting and Illicit Drug Users League; Burnet Institute; Australasian Sexual Health Alliance; Australian Liver Association; Scarlet Alliance.

Diagnosis

The proportion of people living with chronic hepatitis B who have been diagnosed was estimated using model-derived estimates of the total number of people who have ever had chronic hepatitis B in Australia as the denominator and the cumulative number of notifications of hepatitis B from 1971 to 2017 as the numerator. Mortality is not included in this aspect of the analysis and therefore the proportion derived represents those ever having lived with chronic hepatitis B that have ever been diagnosed.

Monitoring

The number of people who received monitoring for chronic hepatitis B in 2015–2017 was determined using Department of Human Services data regarding rebates for an annual hepatitis B viral load test, which is recommended for all people living with chronic hepatitis B. This item is specific to people living with chronic hepatitis B who are not receiving treatment and is limited to one test per year. The number of viral load tests was adjusted to account for the use of the on-treatment Medicare Benefit Schedule item in those not on treatment for billing purposes.

Treatment

The number of people receiving treatment for chronic hepatitis B in 2015–2017 was derived using pharmaceutical dispensing data from the Department of Human Services Australia regarding the number of scripts dispensed for treatment indicated for hepatitis B virus infection (adefovir, entecavir, lamivudine, telbivudine, tenofovir and pegylated interferon). Patient-level estimates, allowing removal of those receiving tenofovir for the treatment of HIV and to avoid duplication of people receiving combination therapy, were used for validation.

Detailed methodology and source references can be found in the published paper which described the derivation of these estimates[61] and in the methods of the National Hepatitis B Mapping Project Reports (http://www.ashm.org.au/HBV/more-about/hepatitis-b-mapping-project).

A combined estimate of people in care for chronic hepatitis B was derived by combining the number who received monitoring while not on treatment and those on treatment. Each of these estimates is expressed as a proportion of the total number living with chronic hepatitis B as derived using the prevalence methodology outlined above.

Number of people living with hepatitis B

The estimate of the number of people living with hepatitis B virus infection in Australia was developed by the WHO Collaborating Centre for Viral Hepatitis at the Doherty Institute, using a deterministic compartmental mathematical model of hepatitis B virus infection in the Australian population from 1951 to 2050. The model was parameterised using a wide range of data sources including the Australian Bureau of Statistics (ABS), existing mathematical models, surveillance notifications, epidemiological research and clinical studies. Important factors such as migration, attributable and all-cause mortality, the ageing of the population, the variable natural history of chronic hepatitis B infection, the impact of treatment and vaccination were all incorporated. The changing prevalence over time, due predominately to increases in infant vaccination in migration source countries, was accounted for in this updated model used prevalence estimates across different time periods and applied these to migration data according to age group and year of arrival for countries of birth for the majority of migrants to Australia. Model construction included sensitivity analyses around critical parameters such as the force of infection (FoI) and migration estimates. Model outcomes have been validated using a range of external data, particularly national and Victorian serosurvey results. These were not used to parameterise the model to allow independent comparison with modelled outcomes. The plausible range estimated for the number of individuals living with chronic hepatitis B for 2014–2017 was derived by allowing the FoI and the proportion of migrants entering the population with chronic hepatitis B to vary according to a given distribution. These distributions were chosen to reflect prior knowledge regarding the FoI within Australia and prevalence of chronic hepatitis B in source countries. This was achieved by using Latin hypercube sampling; for full details of this technique see reference.[62] The mathematical model described above was run using 1000 different combinations of the parameters being varied, which produced a range of overall estimates. The minimum and maximum estimates produced by the model were taken to define the plausible range around the point estimate value.

The national model was applied to each state and territory using state-specific demographic information obtained from the ABS including births, deaths, migration and age distribution. Some of the data sources differed from the national model due to availability and appropriateness of data.
Modelled estimates presented may vary from those in the National Hepatitis B Mapping Reports due to methodological differences. However, integration of these methods to produce consistent estimates is ongoing.

Hepatitis B prevalence according to population

The proportion of people living with chronic hepatitis B in each population group and the relative prevalence in each was determined using the Census method, attributing prevalence of chronic hepatitis B by country of birth, Aboriginal and Torres Strait Islander status, and other risk status applied to Australian population data provided in the 2016 Census.

The estimated prevalence of chronic hepatitis B according to country of birth was derived from combining multiple published sources into an average point estimate. The estimates used comprised two Australian antenatal seroprevalence studies,[63, 64] the estimates from which were then adjusted upwards to account for the disparity in prevalence between men and women as identified in an Australian seroprevalence study;[65] a study of hepatitis B prevalence in migrants to the United States;[29] and the most recent global seroprevalence study conducted as part of the Global Burden of Disease Project.[66] The Australian prevalence figure was obtained from local modelled estimates as described above. Detailed methodology and sources, including individual seroprevalence estimates and population figures, can be obtained from the published paper.[67]

Prevalence estimates for Aboriginal women giving birth are from two published studies. The New South Wales study[68] linked data from two statutory registers, the NSW Perinatal Data Collection (which records all births in NSW of babies at least 400 grams birthweight or 20 weeks gestation) and the NSW Notifiable Conditions Information System (which records all notifications of conditions notifiable under the NSW Public Health Acts 1991 and 2010). The study was limited to women resident in NSW, of reproductive age (10–55 years at time of giving birth), who gave birth to their first child between January 2000 (when routine antenatal screening began) and December 2012.

The Northern Territory study[69] linked data from the Northern Territory Perinatal Register (which records all births in the Northern Territory of babies at least 400 grams birthweight or 20 weeks gestation) and the Northern Territory Notifiable Diseases System (which contains a record of every diagnosis of hepatitis B in the Northern Territory). The study was limited to all women giving birth in as public patients in the Northern Territory between September 2005 and 31 December 2010. Women born overseas or not usually resident in the Northern Territory were excluded.

The chlamydia diagnosis and care cascade

Chlamydia notifications

We obtained the number of chlamydia notifications for 15-29-year-old males and females in Australia directly from the National Notifiable Diseases Surveillance System (NNDSS).

Estimating new infections

New Chlamydia infections were estimated using the modelling approach described elsewhere [70]. This method uses a Bayesian statistical approach to calibrate model parameters to the notifications data from NNDSS, the number of tests for chlamydia obtained by Medicare (item numbers 69316, 69317, and 69319), and annual population estimates for each sex and age group published by the Australian Bureau of Statistics (ABS) over 2001-2015. Model outcomes were validated through comparison against chlamydia prevalence among 16-29-year-olds measured in 2011 by the Australian Chlamydia Control Effectiveness Pilot (ACCEPt).

The model outputs 95% credible intervals for the annual number of incident chlamydia cases in 15-19-, 20-24-, and 25-29-year-old males and females. We summed the incident chlamydia cases for each age group to estimate the number of new infections. The range corresponds to the lower and upper bound of the credible intervals with the midpoint corresponding to our best estimate.

Estimating treatment and re-testing

We estimated chlamydia treatment following diagnosis and retesting after treatment using multiple sources describing chlamydia infection and care across urban, regional, and remote areas and multiple service contexts.

From the NNDSS notifications data 74.0%, 22.2%, and 3.8% of notifications in 15-29-year-olds occur across urban, regional, and remote areas respectively. Based on the on a previous published study in 2013, 11% of these notifications occurred in sexual health clinics [71]. We divided the remainder of notifications into those made in general practice (80%) and other contexts (9%) using data from the first Australian Study of Health and Relationships data published in 2014 [72].

Treatment following diagnosis

Based on data from NSW sexual health clinics almost all people diagnosed with chlamydia in urban and regional areas were treated (ranging from 99-100% of those diagnosed) in 2013 [73]. In NSW remote areas the percentage diagnosed is a little lower at 96% [73]. A published study in 2014 produced a lower estimate of 85% for remotes areas in the Northern Territory [74]. Data from Western Australian general practices suggest a much lower rate of treatment with 92% receiving a script for treatment after diagnosis[75]. Based on this data we assumed 92% of patients attending urban and regional general practice clinics receive treatment with 99% of patients in other clinical settings receiving treatment. In remote areas, we assumed 90% of those diagnosed were treated. Taking a weighted average by multiplying the notifications breakdown across regions by the estimated percentage treated, we estimate 93.4% of people diagnosed with chlamydia were treated in 2016. We assumed a range from 90% (corresponding to the percentage treated in remote areas) to 100%. Assuming the same treatment proportion and range for males and females and multiplying by the number of notifications we estimated the number of 15-29-year-old males and females who received treatment after diagnosis.

Re-testing after treatment

From the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of STIs and BBVs (ACCESS), 11-27% of 15-29-year-olds diagnosed with chlamydia nationally were re-tested for chlamydia within 1.5 to 6 months after treatment. In general practice, the re-testing percentage ranges from 13 to 20%. In urban sexual health clinics the re-testing rate is higher ranging from 37 to 39%. For regional and remote sexual health clinics , 24-29% of males and females re-tested within 1.5 to 6 months after treatment. Taking a weighted average by multiplying the notifications breakdown across regions by the notifications breakdown across contexts we estimate 17.2% of people diagnosed with chlamydia are re-tested after treatment. We assumed a range from 11.0 to 26.9% (corresponding to the range in percentage re-tested across all estimates). Males had a lower re-testing percentage than females, 13.1 (range: 7.7-22.8%) vs 20.1 (range: 13.4-29.8%), respectively. Applying these re-testing percentages and range for males and females and multiplying by the number of notifications we estimated the number of 15-29-year-old males and females who re-tested for chlamydia after treatment.

The gonorrhoea diagnosis and care cascade

Estimating new infections

The number of new gonorrhoea infections was calculated by applying an incidence estimate of 25.04 per 100 years (range: 24.27-25.84; from ACCESS sexual health clinic data weighted by HIV-positive status) to a population estimate of 191 332 (172 198 – 210 465) sexually active gay and bisexual men in Australia. The population estimate was derived by multiplying the ABS estimate for males aged 16-69 years (8 848 112) to estimates of the proportion of gay and bisexual identified men (3.2%) with same-sex experience in the last 12 months (68%) taken from the second Australian Study of Health and Relationships [76] with an assumed range of +/- 10%.

Notifications

We obtained the number of gonorrhoea notifications for gay and bisexual men in Australia by first calculating the proportion of 2017 notifications in males in major cities (61.0%) and other areas of residence (27.9%) attributable to male to male sex, in jurisdictions (Australian Capital Territory, New South Wales, Victoria, Western Australia, South Australia, Tasmania) which collect enhanced data. These proportions were then applied to gonorrhoea notifications among men in major cities and other areas of residence in jurisdictions which do not collect enhanced data (Queensland and Northern Territory) to derive a national estimate of notifications among gay and bisexual men in 2017.

Treatment

Based on data from 44 sexual health clinics from the ACCESS network, it was estimated that 91.8% (95% CI: 90.6-92.9%) of all gay and bisexual men diagnosed with gonorrhoea in 2017 received treatment.

Re-testing after treatment

Based on data from 44 sexual health clinics from the ACCESS network, it was estimated that 60% of all gay and bisexual men who received treatment for gonorrhoea in 2017 were re-tested within 1.5 to 6 months after treatment.

The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS)

Briefly, the ACCESS project is a national sexual health surveillance network using routinely collected de-identified demographic, testing, diagnosis and treatment data from health services and laboratories across Australia to monitor the sexual health of high-risk population groups including gay and bisexual men, injecting drug users, Aboriginal and

Torres Strait Islander people, sex workers and young people. The ACCESS project has been described in more detail elsewhere.[70] The project is managed collaboratively between the Kirby Institute, the Burnet Institute and the National Reference Laboratory. In total, ACCESS collects data from over 110 health services, pharmacies and laboratories.

ACCESS data were used for the following indicators:

- Among people attending high-caseload general practice clinics and/or sexual health clinics, the proportion tested for HIV and, where relevant, retested.
- The result of the last viral load test among HIV-positive patients seen at high-caseload general practice clinics and/or sexual health clinics.
- HIV incidence, estimated using methodology similar to that used previously.[77] HIV incidence was calculated based on an observed positive HIV test in patients with more than one HIV test with the first test result being negative. Patients were at risk between the first negative HIV test and the later of last-ever negative HIV test or seroconversion (the midpoint between last negative HIV-test and first positive HIV-test). For any calendar year, at-risk time commenced from the later of: (a) 1 January for that year and (b) first-ever negative HIV test if in that year until the earlier of: (a) seroconversion date, last-ever negative HIV test if not HIV-positive and b) 31 December for that year. HIV incidence and confidence intervals were calculated using the person-years method.
- The incidence of chlamydia, gonorrhoea and infectious syphilis among selected priority populations.
- Proportion of diagnoses of genital warts at first visit to sexual health clinics, by select population.

The Australian Gonococcal Surveillance Program (AGSP)

The AGSP is a collaborative project involving gonococcal reference laboratories in each state/territory and is coordinated by the NSW Gonococcal Reference Laboratory at the Prince of Wales Hospital, Sydney. The primary objective of the program is to monitor antibiotic susceptibility of isolates of *Neisseria gonorrhoeae* to assist in the effective treatment of gonorrhoea. Information on sex and site of isolation of gonococcal strains was also collected (AGSP 2014). The proportion of gonococcal referred isolates with decreased susceptibility to ceftriaxone (minimum inhibitory concentration or MIC 0.06–0.125 mg/L) was obtained from the AGSP.

The Australian HIV Observational Database (AHOD)

The Australian HIV Observational Database (AHOD) is a collaborative study that records observational data on the natural history of HIV and its treatment. The primary objective of AHOD is to monitor the pattern of antiretroviral treatment use by demographic factors and markers of HIV stage. Other objectives are to monitor how often people with HIV change antiretroviral treatments and the reasons for treatment change. Methodology associated with AHOD has been described in detail elsewhere.[49]

Information is collected from hospitals, general practitioner sites and sexual health clinics throughout Australia. Participating sites contribute data biannually from established computerised patient management systems. Core variables from these patient management systems are transferred electronically to the Kirby Institute, where the data are collated and analysed. By March 2018, 31 participating clinical sites had been enrolled into AHOD, including data on over 4557 people.

AHOD data were used for the result of the last viral load test among HIV-positive patients.

Australian Institute of Health and Welfare's National Cervical Screening Program

The National Cervical Screening Program (NCSP) aims to reduce cases of cervical cancer, as well as associated illness and death, through an organised approach to cervical screening aimed at identifying and treating high-grade abnormalities before potential development of cervical cancer. The Cervical screening in Australia series is published annually to provide regular monitoring of NCSP participation and performance.

The rate of high-grade abnormalities detected by histology in cervical screening was obtained from the Australian Institute of Health and Welfare publication *Cervical screening in Australia 2018*.[44] (https://www.aihw.gov.au/reports/cancer-screening/cervical-screening-in-australia-2018/contents/table-of-contents).

The Australian Needle and Syringe Program Survey (ANSPS)

The ANSPS is conducted annually over a one- to two-week period in October at more than 50 needle and syringe programs (NSPs) to provide serial point prevalence estimates of HIV and hepatitis C and to monitor injecting behaviour among people who inject drugs. All clients attending NSPs during one week in 2009 (51 sites), 2010 (53 sites), 2011 (53 sites), 2012 (52 sites), 2013 (52 sites), 2014 (51 sites), 2015 (47 sites), 2016 (50 sites) and 2017 (52 sites) were asked to complete a brief self–administered questionnaire and to provide a fingerprick blood spot sample for HIV and hepatitis C antibody testing. The ANSPS methodology has been described in detail elsewhere.[4]

ANSPS data were used for the following indicators:

- Proportion reporting receptive syringe sharing. Receptive syringe sharing was determined from the question: 'How many times in the last month did you reuse a needle and syringe after someone else had used it, including your sex partner (even if it was cleaned)?'
- The proportion of people who inject drugs reporting a HIV test in the past 12 months.
- Hepatitis C prevalence among survey respondents (RNA and antibody prevalence).
- Proportion of people self-reporting testing for hepatitis C in the last 12 months, by sex and hepatitis C antibody status. Antibody status is determined through serological testing conducted as part of the survey.
- Proportion of people seen at NSPs reporting current or past hepatitis C treatment. The denominator for past treatment is restricted to people with hepatitis C antibody-positive serology and excludes people who self-reported spontaneous clearance. The denominator for treatment in the past 12 months is restricted to people with hepatitis C antibody-positive serology and excludes people who self-reported spontaneous or treatment-induced viral clearance. Excludes people who reported treatment-induced clearance more than 12 months ago.

The Australian and New Zealand Liver Transplant Registry (ANZLTR)

ANZLTR is a network of liver transplant centres in Australia and New Zealand which has collected information on the characteristics of people undergoing liver transplantation. People undergoing liver transplantation have been routinely tested for hepatitis B and hepatitis C since antibody testing became available in 1990. Information was sought on the primary and secondary causes of liver disease including the results of tests for hepatitis B and hepatitis C. The information was forwarded to the Liver Transplant Registry located at Princess Alexandra Hospital in Brisbane. The number of liver transplants by primary cause of liver disease and hepatitis status where the primary diagnosis was hepatocellular carcinoma was obtained from the ANZLTR.

The Australian Red Cross Blood Service

Estimated prevalence of HIV, hepatitis and hepatitis C in blood donors was obtained from the Australian Red Cross Blood Service. All blood donations in Australia have been screened for HIV-1 antibodies since May 1985, for HIV-2 antibodies since April 1992 and for hepatitis C antibody from 1990. Prior to donation, all donors are required to sign a declaration that they do not have a history of any specified factors associated with a higher risk of HIV and other bloodborne infections. In all state/territory health jurisdictions, detailed information is routinely sought on donors found to have antibody to HIV-1, HIV-2 or hepatitis C, and reports are routinely forwarded to the Kirby Institute.

The Second Australian Study of Health and Relationships (ASHR2)

The ASHR2 methodology has been described in detail elsewhere.[78].The ASHR2 methodology has been described in detail elsewhere.[78]. Briefly, this was a telephone random survey of 20 000 people drawn from the Australian population from October 2013 to November 2013 to survey sexual and reproductive health. The proportion of participants reporting recent condom use for heterosexual sex was obtained from the Australian Study of Health and Relationships (ASHR2).[79]

The Gay Community Periodic Surveys (GCPS)

The Gay Community Periodic Surveys are conducted annually using time and location convenience samples of men at gay community venues and events in capital cities (Sydney, Melbourne, Brisbane, Adelaide, Perth and Canberra). The report is prepared by the Centre for Social Research in Health, UNSW Sydney. The methodology associated with the Gay Community Periodic Surveys has been described in detail elsewhere.[80]

Data from the Gay Community Periodic Surveys was used for the following indicators:

- HIV prevalence in gay men using self-reported HIV-positive status.
- The proportion of non-HIV-positive gay men reporting having been tested for HIV within the last 12 months.
- Self-reported use of antiretroviral therapy for the treatment of HIV.

The Kirketon Road Centre

Incidence of hepatitis C was monitored among people with a history of injecting drug use attending the Kirketon Road Centre, a primary care clinic in central Sydney. Incidence of hepatitis C was calculated among people who were retested following a negative test for hepatitis C antibody when first assessed at the Centre. Repeat hepatitis C antibody testing was carried out on the basis of assessment of risk behaviour for hepatitis C. The timing of hepatitis C seroconversion was estimated as the mid-point between the last negative test and the first positive test. Indeterminate hepatitis C antibody tests were considered to be negative in the analysis.

Medicare

Medicare is delivered by the Australian Government Department of Human Services and pays rebates on specified services and procedures. Publicly available Medicare online data on number of tests for *Chlamydia trachomatis* as identified by item numbers 69316, 69317 and 69319 were obtained by sex, age, state and quarter (medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp#info).

National Centre for Immunisation Research and Surveillance (NCIRS)

The primary function of NCIRS is to perform research aimed at reducing the incidence of vaccine-preventable diseases and improving vaccine uptake, in children and adults, including surveillance. Hepatitis B vaccine coverage was estimated using data from the NCIRS surveillance of immunisation coverage and the Australian Childhood Immunisation Register.

National Human Papillomavirus (HPV) Vaccination Program Register

The HPV Register was established in early 2008 to support the National HPV Vaccination Program, and is fully funded by the Australian Government. The Register monitors and evaluates the HPV vaccination program through the registration of immunisation providers, the creation of individual consumer immunisation records, mailing of completion statements and reminder letters, and the generation of statistical reports on the National HPV Vaccination Program (hpvregister.org.au/). Data on HPV vaccine coverage in males and females turning 15 years of age was obtained from the register.

National Prison Entrants' Bloodborne Virus Survey

This survey is a consecutive cross-sectional sample of prison entrants over a two-week period. While previous iterations of the survey collected data in parallel over a two-week period in October (the same time as the community NSP survey), the timing of the 2016 survey varied between jurisdictions. In 2016, the survey was conducted between October and December, with one prison conducting the survey in February 2017. Participants were 431 of the 862 (50%) prisoners entering Australian correctional centres who were offered the survey. The survey was not conducted in New South Wales or Western Australia in 2016. The 2016 survey report presents the findings for the 431 participants for whom sufficient pathology and questionnaire data were available. The survey methodology has been described in detail elsewhere.[7]

National Prison Entrants' Bloodborne Virus Survey data were used for the following indicators:

- Hepatitis C prevalence among prison entrants
- Hepatitis C treatment among prison entrants
- Hepatitis B susceptibility in incoming prisoners.

Pharmdash

Data on dispensed prescriptions for a Pharmaceutical Benefits Scheme (PBS) 10% sample is updated every quarter and supplied to a number of approved users or clients including Prospection, which provides a dashboard interface

(Pharmdash) for querying the PBS 10% sample (pbs.gov.au/info/industry/useful-resources/sources/). The 10% sample of the PBS is a randomised patient-level de-identified PBS script claims database from 2006 to the present. Currently the database has 170 million script claims and three million patients. It includes all PBS-listed drugs with HIV indications.

Pharmdash data were used for the following indicators:

- The number of people receiving antiretroviral treatment. The overall total number of people receiving antiretroviral therapy was taken as the number of unique patients in the PBS data who filled at least one script in the 12 months prior to the end of December 2017 multiplied by 10. Given the size of the sample we assumed a negligible range in this estimate.
- Total number of patients receiving treatment for HIV per year. The overall total number of people receiving antiretroviral therapy was taken as the number of unique patients in the PBS data who filled at least one script in the 12 months prior to the end of December 2017 multiplied by 10. Similarly estimates of patient numbers dispensed individual antiretroviral drug types were developed.

Medical and epidemiological terms

age-standardised rate of infection: The proportion of infected people in a particular population, adjusted mathematically to account for the age structure of the population so that comparisons can be made between populations with different age structures (i.e. with more or fewer younger people).

AIDS: Acquired immunodeficiency syndrome, the spectrum of conditions caused by damage to the immune system in advanced HIV infection.

area of residence: Locations of residence, indicated by postcode, are classified into one of three categories: major cities, inner or outer regional areas, and remote or very remote areas (i.e. areas with relatively unrestricted, partially restricted and restricted access to goods and services).

bacterium: A type of single-celled micro-organism. Some bacteria cause illness in humans, and most can be treated with antibiotics.

chlamydia: A sexually transmissible infection caused by a bacterium (*Chlamydia trachomatis*). The infection causes no symptoms in about 80% of cases. In people with symptoms, the infection causes inflammation of the urethra (the tube through which urine passes out of the body), leading to some pain and penile discharge in men, and to painful urination and bleeding between menstrual periods in women. Complications of chlamydia can be serious for women, including pelvic inflammatory disease, ectopic pregnancy and infertility. Throat and anal infections do not usually cause symptoms. Chlamydia is curable by antibiotics.

congenital: A condition (disease or physical abnormality) present from birth. Congenital conditions may be inherited; or acquired during foetal development or at birth.

diagnosis: A labelling or categorisation of a condition, usually by a doctor or other healthcare professional, on the basis of testing, observable signs and symptoms reported by the patient. 'Newly diagnosed infection' means that a person previously not known to have the infection has been tested and now found to have the infection.

deoxyribonucleic acid (DNA): is an acid in the chromosomes in the centre of the cells of living things. DNA determines the particular structure and functions of every cell and is responsible for characteristics being passed on from parents to their children.

donovanosis: A sexually transmissible infection caused by a bacterium, *Klebsiella* (or *Calymmatobacterium*) *granulomatis*. The most common symptom is the presence of one or more painless ulcers or lesions in the genital or anal regions. If not treated, the ulcers or lesions can progress and become complicated by other bacterial infections, ultimately resulting in damage to the affected part of the body. Donovanosis is curable by antibiotics. Donovanosis was once common in central and northern Australia, and is now very rare.

endemic: A disease is endemic if it is common in a region or local area, or in a group of people

gonorrhoea: A sexually transmissible infection caused by a bacterium (*Neisseria gonorrhoeae*). Gonorrhoea has no symptoms in about 80% of women and 50% of men. Symptoms are similar to those of chlamydia, as are the complications. Most men with urethral gonorrhoea will eventually develop symptoms. Throat and anal infections do not usually cause symptoms. Gonorrhoea can be cured with antibiotics.

hepatitis B virus infection: A viral infection transmissible by blood and sexual contact and from mother to child at birth. Most healthy adults will not have any symptoms and are able to get rid of the virus without any problems. Some adults are unable to get rid of the virus, leading to chronic infection. The focus of this report is chronic hepatitis B infection. 'Newly diagnosed' hepatitis B infection means that a person previously not known to have the infection has been tested and now found to have the infection. 'Newly acquired' infections are those that have been acquired within the past two years.

hepatitis C virus infection: A viral infection transmissible by blood contact as well as from mother to newborn. Some people get rid of the virus, but the majority develop ongoing chronic infection. The focus of this report is chronic hepatitis C infection. 'Newly diagnosed' hepatitis C infection means that a person previously not known to have the infection has been tested and now found to have the infection. 'Newly acquired' infections are those that have been acquired within the past two years.

human immunodeficiency virus (HIV): HIV is transmissible by sexual and blood contact as well as from mother to child. If untreated, HIV can progress to AIDS.

human papillomavirus (HPV) infection: Of over 140 types of HPV that infect humans, about 40 affect the anal and genital area, mostly without causing any disease. This subset of HPV types is sexually transmissible and is occasionally transmitted from mother to child. Two HPV types (6 and 11) cause most genital warts. Two other HPV types (16 and 18) cause most cervical and anal cancers, and an increasing proportion of mouth and throat cancers. Many less common HPV types also occasionally cause cancers. Most people acquire at least one genital HPV infection through their lives, but the great majority clear the infection.

incidence: The rate at which a condition occurs in a population, usually expressed as the number of diagnoses (or pregnancies, injuries etc.) over a period of time during which people are exposed to risk (see person-years). Incidence is an important indicator of new transmissions, reflecting the impact of current prevention programs, whereas prevalence reflects the burden of disease

infection: The condition of having bacteria or viruses multiplying in the body. Many infections cause no symptoms, so the person may be unaware they have an infection unless they are tested.

newly acquired HIV: This means the person has become infected within the past year.

newly diagnosed HIV: This means that a person previously not known to have the virus has been tested and now found to have the virus.

notifiable disease: A disease is notifiable if doctors and/or laboratories are required to report cases to the authorities for disease surveillance, i.e. monitoring of disease at population level.

person-years: A measure of the **incidence** of a condition (e.g. a disease or pregnancy) over variable time periods. If 100 people are exposed to the risk of an infection for a year, or 50 people are exposed for two years, the number of infections can be reported 'per 100 person-years'.

prevalence: The number of cases of a condition at a single time, usually expressed as a proportion (percentage, or per 100 000 people) of the population. Prevalence decreases if people with the condition die or are cured, and increases as new cases occur.

primary HIV infection (or seroconversion illness): A flu-like illness that occurs soon after infection with HIV.

ribonucleic acid: is a polymeric molecule essential in various biological roles in coding, decoding, regulation, and expression of genes.

symptom: A physical or mental indication of a disease or condition experienced by the patient.

syphilis: An infection caused by the bacterium *Treponema pallidum*. It is transmissible by sexual contact as well as from mother to child. Congenital syphilis occurs when the fetus is infected during pregnancy. Infectious syphilis is defined as infection of less than two years' duration. The main symptoms include a painless ulcer at the site of infection within the first few weeks of infection, followed by other symptoms (e.g. rash) a couple of months later. Often symptoms are not detected. In the absence of treatment, there will then be a period of several years without any symptoms, with a chance of a range of complications over decades that can involve the skin, bone, central nervous system and cardiovascular system. Infectious syphilis is fully curable with a single injection of long-acting penicillin.

virus: A very small microscopic infectious agent that multiplies inside living cells. Antibiotics are not effective against viral infections, so treatment requires antiviral drugs.

For more information on sexually transmissible infections see the *Australian STI management guidelines for use in primary care.*[14]

Acknowledgments

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- Clinic 275 Sexual Health, Adelaide; O'Brien Street General Practice, Adelaide; Rapido Testing Service, Shine SA, Adelaide; SA
- Hobart Sexual Health Service, Hobart; Launceston Sexual Health Service, Launceston; Devonport Sexual Health Service, Devonport; TAS
- Melbourne Sexual Health Centre, Melbourne; Barwon Reproductive and Sexual Health (BRASH) Clinic, Geelong; Centre Clinic, St Kilda; Frankston Health, Frankston; Cohealth (formerly known as North Yarra Community Health), Collingwood; North Richmond Community Health, Richmond; Bendigo Community Health Clinic, Bendigo; EACH Social and Community Health, Melbourne; Dandenong Superclinic, Dandenong; Prahran Market Clinic, Prahran; Northside Clinic, North Fitzroy; Family Planning Victoria, Melbourne; Clarinda Medical Centre, Clarinda; The Alfred Hospital, Melbourne; VIC
- Fremantle Hospital Sexual Health Clinic, Fremantle; M Clinic, Perth; GP on Beaufort, Mount Lawley; WA

Collaboration of Australian Needle and Syringe Programs

- Directions ACT, Canberra; ACT
- ACON Hunter; First Step Program Port Kembla; Hunter Harm Reduction Services, Newcastle; Kirketon Road Centre and Clinic 180, Kings Cross; Mid North Coast Harm Reduction, Coffs Harbour; NSW Users and AIDS Association, Surry Hills; Northern NSW Harm Reduction, Ballina, Byron Bay, Lismore, Nimbin, and Tweed Heads; Sydney Harm Minimisation, Redfern, Canterbury and RPA Hospital; South Court Primary Care NSP, Nepean; Western Sydney HIV/Hepatitis C Prevention Service, Blacktown, Mount Druitt and Parramatta; NSW
- Northern Territory AIDS and Hepatitis C Council, Alice Springs, Darwin and Palmerston; NT
- Biala Community Alcohol and Drug Services, Brisbane; Cairns ATODS NSP, Cairns; Queensland Injectors Health Network, Brisbane, Gold Coast and Sunshine Coast; Kobi House, Toowoomba; West Moreton Sexual Health Service, Ipswich; Townsville ATODS NSP; QLD
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- Anglicare NSP Service, Hobart and Glenorchy; Clarence Community Health Centre, Clarence; Burnie NSP Service, Burnie; TAS
- Barwon Health Drug and Alcohol Services, Geelong; Health Information Exchange, St Kilda; Health Works, Footscray; Inner Space, Collingwood; North Richmond NSP, North Richmond; Southern Hepatitis/HIV/AIDS Resource and Prevention Service, Melbourne: VIC.
- Hepatitis WA, Perth: WA AIDS Council Mobile Exchange, Perth; Western Australia Substance Users Association, Perth and South Coast; WA.
- St Vincent's Centre for Applied Medical Research and NSW State Reference Laboratory for HIV at St Vincent's Hospital, Sydney, NSW

Collaboration of National Prison Entrants' Bloodborne Virus Survey State and Territory Sites

- ACT Corrections Health; Alexander Maconochie Centre, ACT
- NT Department of Correctional Services; Prison Health Top End Health Services; Prison and Watch House Health Service Central Australia; Darwin Correctional Centre; Alice Springs Correctional Centre, NT
- QLD Corrective Services; QLD Department of Health; Prison Health Services, West Moreton Hospital and Health Service; Cairns & Hinterland Hospital and Health Service; Arthur Gorrie Correctional Centre, Wacol; Brisbane Correctional Centre; Brisbane Women's Correctional Centre; Lotus Glenn Correctional Centre, Mareeba, QLD
- SA Department of Correctional Services; SA Prison Health Services; Adelaide Remand Centre; Adelaide Women's Prison; City Watch House, Adelaide; Yatala Labour Prison; Port Augusta Prison, SA
- TAS Correctional Health Services; Hobart Reception Prison; Launceston Reception Prison; Risdon Prison Complex, Mary Hutchinson Women's Prison, TAS
- Corrections Victoria; Justice Health Victoria; Dame Phyllis Frost Centre, Ravenhall; Melbourne Assessment Prison; Melbourne Reception Prison, VIC
- Justice Health and Forensic Mental Health Network; Cessnock Correctional Centre; Metropolitan Remand and Reception Centre, Silverwater; Parklea Correctional Centre; Silverwater Women's Correctional Centre; South Coast Correctional Centre, Nowra; Tamworth Correctional Centre, NSW
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- Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine, Sydney, NSW
- Australasian Society for Infectious Diseases, Melbourne, VIC
- Australian Federation of AIDS Organisations, Sydney, NSW
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