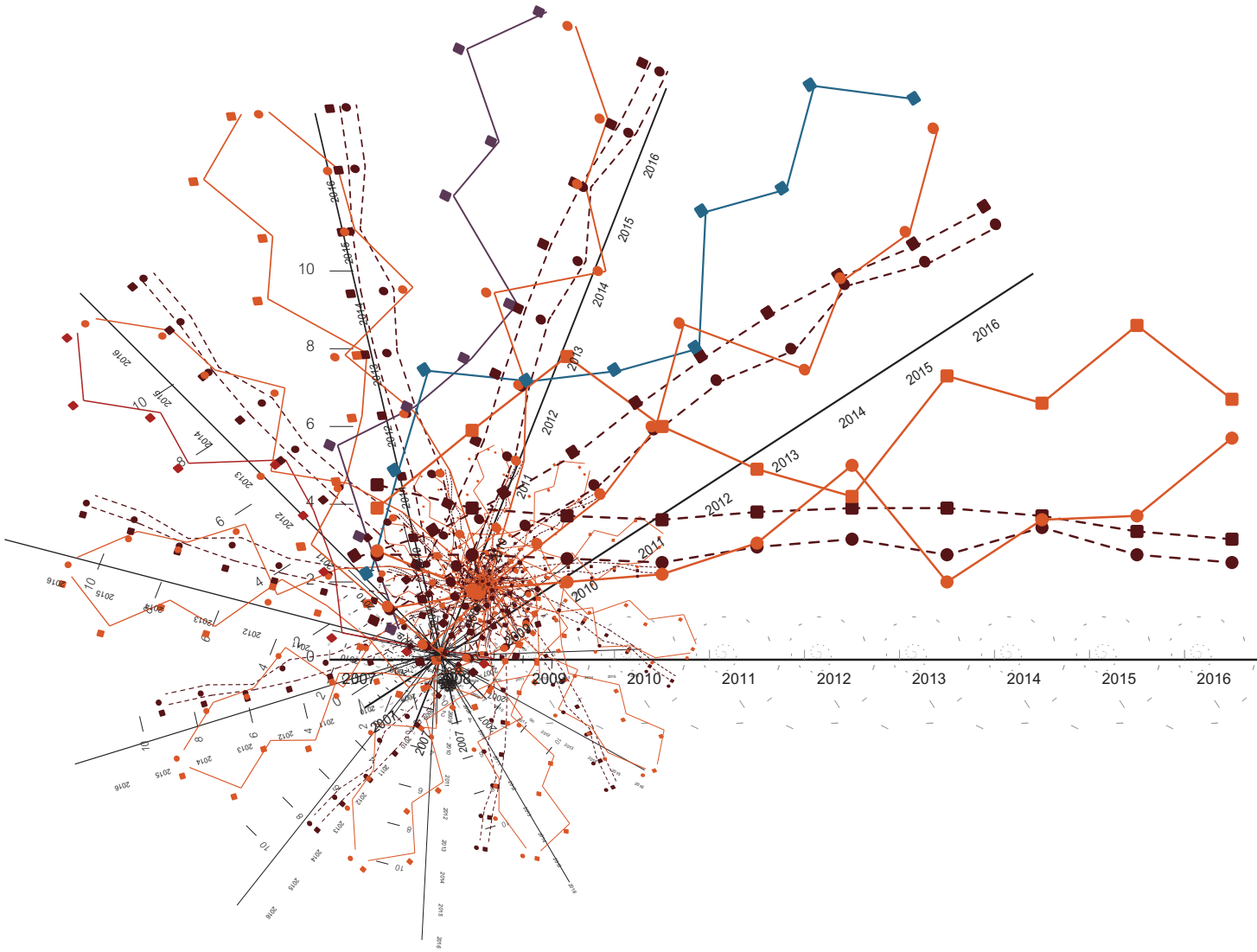
HIV, viral hepatitis and sexually transmissible infections in Australia

Annual Surveillance Report 2017



UNSW SYDNEY

Kirby Institute

ISSN 2206–1630 (Online)

This publication and associated data are available at internet address kirby.unsw.edu.au

Suggested citation:
Kirby Institute. HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2017. Sydney: Kirby Institute, UNSW Sydney; 2017.

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HIV, viral hepatitis and sexually transmissible infections in Australia
Annual Surveillance Report 2017

The Kirby Institute

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

The Kirby Institute is funded by the Australian Government Department of Health and is affiliated with the Faculty of Medicine, UNSW Sydney. The Surveillance, Evaluation and Research Program at the Kirby Institute is responsible for the public health monitoring and evaluation of patterns of transmission of bloodborne viral and sexually transmissible infections.

Contents

Preface

This report is the 21st annual review of available surveillance data pertaining to the occurrence of 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 2016 and reported by 31 March 2017.

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 2017* 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 internet address **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] 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 2012–2016*[3]*; Needle syringe program national minimum data collection national data report 2016*[4]*; 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*[5]*; and the 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.*[6]

Unless specifically stated otherwise, all data provided in the report are to the end of 2016, as reported by 31 March 2017. 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.

Abbreviations

ABS	Australian Bureau of Statistics
ACCESS	Australian Collaboration for Coordinated Enhanced Sentinel Surveillance
AIDS	acquired immunodeficiency syndrome
BBV	bloodborne virus
HBsAg	hepatitis B surface antigen
HIV	human immunodeficiency virus
HPV	human papillomavirus
PEP	post-exposure prophylaxis
PrEP	pre-exposure prophylaxis
STI	sexually transmissible infection
UNAIDS	Joint United Nations Programme on HIV/AIDS

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: An infection or other condition existing since the person's birth. Congenital conditions are not necessarily genetically inherited; some are infections that are transmitted between mother and fetus or newborn.

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.

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, from mother to child at birth, and in institutional settings. 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. 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 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) infection: HIV is transmissible by sexual and blood contact as well as from mother to child. If untreated, HIV infection can progress to AIDS. 'Newly diagnosed' HIV infection means that a person previously not known to have the infection has been tested and now found to have the infection. 'Newly acquired' HIV infection means the person has become infected within the past year. Primary HIV infection (or seroconversion illness) is a flu-like illness soon after infection with HIV.

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).

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.

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.

symptom: A physical or mental indication of a disease or condition experienced by the patient.

syphilis, infectious: 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*.[7]

Summary data

HIV

New HIV diagnoses

- The number of new HIV diagnoses in Australia has remained stable over the past five years, with 1066 diagnoses in 2012, 1030 in 2013, 1084 in 2014, 1027 in 2015, and 1013 in 2016.
- Male-to-male sex continues to be the major HIV risk exposure in Australia, reported for 712 (70%) HIV diagnoses in 2016, with heterosexual sex reported for 209 (21%) diagnoses, both male-to-male sex and injecting drug use for 51 (5%) diagnoses, and injecting drug use for 14 (1%) diagnoses.
- Of 209 HIV diagnoses in 2016 that were attributed to heterosexual sex, 17% were in people born in a high-prevalence country (recognised by UNAIDS as having 1% or higher adult national HIV prevalence), and a further 17% were in people who reported heterosexual contact with a person from a high-prevalence country.
- Based on the test for immune function (CD4+ cell count), a third (33%) of new HIV diagnoses in 2016 were classified as late diagnoses (CD4+ cell count of less than 350 cells/μL). 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 (2012–2016) the proportion with late diagnoses was higher in people born in Central America (45%), sub-Saharan Africa (43%) and Southeast Asia (43%). The proportion with late diagnoses was also higher in people with heterosexual sex as their HIV risk exposure (47%), men with bisexual sex as their HIV risk exposure (40%), and men aged over 50 years with male-to-male sex as their HIV risk exposure (37%).
- In 2016, there were 46 new HIV diagnoses among Aboriginal and Torres Strait Islander people. The age-standardised rate of HIV notifications among Aboriginal and Torres Strait Islander people increased by 33% from 4.8 per 100 000 in 2012 to 6.4 per 100 000 in 2016, compared to a 22% decline in the Australian-born non-Indigenous population; in 2016 the notification rate was 2.2 times as high as in the Australian-born non-Indigenous population (2.9 per 100 000).
- Over the years 2012–2016, a higher proportion of HIV notifications in the Aboriginal and Torres Strait Islander population were attributed to heterosexual sex (20%) and injecting drug use (14%) than in the Australian-born non-Indigenous population (15% and 3%, respectively).
- In 2012–2016, among 223 babies born to women with HIV in Australia, 2% of newborns were diagnosed with HIV, compared to 28% in 1992–1996.

HIV incidence

- Among gay and bisexual men attending sexual health clinics in the ACCESS network, HIV incidence over the five years 2012–2016 fluctuated between 0.58 and 0.85 per 100 person-years (0.85 per 100 person-years in 2016).
- HIV incidence among female sex workers remained at or below 0.11 per 100 person-years in the past five years (2012–2016), and was 0.07 per 100 person-years in 2016.

HIV prevalence

- In 2016 HIV prevalence, or the proportion of all people in Australia who are living with HIV, was 0.13%, which is low compared to other high-income countries and to countries in the Asia-Pacific region.
- The self-reported HIV prevalence among gay and bisexual men participating in the Gay Community Periodic Surveys was 7.3% in 2016.
- HIV prevalence among people who inject drugs attending needle and syringe programs was 1.4% in 2016, and 0.7% if gay and bisexual men are excluded.

Testing and care

- There were an estimated 26 444 people living with HIV in Australia in 2016. Of those, an estimated 23 648 (89%) were diagnosed, 22 465 (95% of those diagnosed) were retained in care (having had a viral load or CD4+ cell count in the past year), 20 440 (86% of those diagnosed) were receiving antiretroviral therapy, and 19 013 (93% of those on antiretroviral therapy) had suppressed viral load (less than 200 HIV-1 RNA copies/mL). This corresponds to 72% of all people living with HIV having suppressed viral load in 2016.
- There were an estimated 2796 (11%) people living with HIV in Australia in 2016 who were unaware of their HIV status (undiagnosed). Compared to overall, the proportion with undiagnosed HIV was higher in people with heterosexual sex (17%) and injecting drug use (17%) as their HIV risk exposure and lower in men with male-to-male sex as their HIV risk exposure (9%). The proportion with undiagnosed HIV was also higher among people born in Southeast Asia (27%), Aboriginal and Torres Strait Islander people (20%) 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 six months of a previous test has risen by 35% within the past five years, from 37% in 2012 to 50% in 2016.
- During 2016, pre-exposure prophylaxis (PrEP) implementation projects commenced in New South Wales, Queensland and Victoria. By the end of 2016, a total of 7266 gay and bisexual men at high risk of HIV were enrolled in PrEP implementation projects in these jurisdictions, which is equivalent to 6% of the estimated number of HIV-negative gay and bisexual men in Australia.

Sexual behaviour

- In 2016, according to the Gay Community Periodic Surveys, 44% of gay and bisexual men who had casual partners in the past six months reported any condomless anal intercourse with casual partners, an increase from 38% in 2012.

Interpretation:

HIV diagnoses have remained stable in Australia during the past five years, and the epidemic remains concentrated among gay and bisexual men. The initiatives to promote and improve access to testing have led to higher levels of testing coverage and repeat testing among gay and bisexual men. However, some groups are still more likely to be diagnosed late. Treatment coverage among people diagnosed with HIV has increased considerably, with a corresponding increase in the proportion of people on treatment with suppressed viral load, which reduces the risk of onward transmission to zero.

State-funded programs have provided PrEP to a low proportion of the gay and bisexual men at higher risk of HIV in Australia, with variations in coverage across jurisdictions; it is too early for these programs to have had an impact on HIV transmission nationally.

Consistent condom use with casual partners among gay and bisexual men has been declining over the past five years. However, this should be viewed in the context of gay and bisexual men using non-condom-based strategies to reduce the risk of HIV transmission, such as serosorting, strategic positioning, undetectable (suppressed) viral load and in the past few years PrEP.

Harm reduction strategies to minimise HIV transmission among people who inject drugs have been highly successful and must be sustained. Extremely low rates of 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 which must also be sustained.

The trend in HIV notifications among Aboriginal and Torres Strait Islander people is very different from that in non-Indigenous people, with a steady increase in the annual HIV notification rate in Aboriginal and Torres Strait Islander people over the past five years, as compared to a declining rate in the Australian-born non-Indigenous population.

Overall, these data highlight the need to maintain and strengthen strategies of health promotion, testing, treatment and risk reduction, but also to expand PrEP access to people who could benefit from this prevention strategy and strengthen the focus on prevention in the Aboriginal and Torres Strait Islander population.

Hepatitis C

New hepatitis C diagnoses

- In 2016 there were 11 949 new hepatitis C diagnoses. About two-thirds (67%, 7972) of new hepatitis C diagnoses in 2016 were in males.
- The overall notification rate of hepatitis C in Australia has remained stable between 2012 and 2015, but increased by 12% from 45 per 100 000 in 2015 to 50 per 100 000 in 2016.
- The age-standardised rate of hepatitis C notification in the Aboriginal and Torres Strait Islander population in the Northern Territory, Queensland, South Australia, Tasmania and Western Australia increased by 25% over the five past years, from 138 per 100 000 in 2012 to 173 per 100 000 in 2016, compared to a stable notification rate in the non-Indigenous population (43 per 100 000 in 2012 to 45 per 100 000 in 2016). The hepatitis C notification rate in the Aboriginal and Torres Strait Islander population was 3.8 times as high as in the non-Indigenous population in 2016.

Incidence, prevalence and morbidity

- Among people aged under 25 years (likely to have acquired hepatitis C more recently), the rate of notifications has been stable during the past five years (16 per 100 000 in 2012 to 15 per 100 000 in 2016). The notification rate of newly acquired hepatitis C (evidence of hepatitis C acquisition in the two years prior to diagnosis) also remained stable in this age group during the past five years.
- In Aboriginal and Torres Strait Islander people aged under 25, the rate of hepatitis C notification was 6.3 times as high as in non-Indigenous people in 2016 (89 vs 14 per 100 000), and increased by 50% from 59 per 100 000 in 2012, compared to a 14% decrease in non-Indigenous people.
- The prevalence of hepatitis C among people who inject drugs attending needle and syringe programs was 51% in 2016, with stable annual rates (51%–57%) in the past five years (2012–2016).
- Between 2007 and 2015, there was a 61% increase in the estimated number of people living with chronic hepatitis C with severe fibrosis and a 79% increase in the estimated number of people with hepatitis C-related cirrhosis, but from 2015 to 2016, there was a 10% decline in the number of people living with severe fibrosis (29 162 to 26 270) and a 38% decline in hepatitis C-related cirrhosis (17 085 to 10 502), representing the first ever declines since 2007.
- The number of people receiving liver transplants due to chronic hepatitis C or hepatitis C-related hepatocellular carcinoma has remained stable between 2012 (73, 41% of all transplants) and 2016 (73, 31% of all transplants). The proportion of hepatitis C-related transplants accounted for by hepatocellular carcinoma has increased from 18% in 2012 to 45% in 2016.
- The estimated number of deaths in people living with chronic hepatitis C increased by 89% from 439 in 2007 to 829 in 2015, then declined by 27% between 2015 and 2016 (605).

Testing and care

- An estimated 30 434 people were cured of hepatitis C in 2016 following the introduction of new direct-acting antiviral treatment through the Pharmaceutical Benefits Scheme.
- At the start of 2016, there were an estimated 227 306 people living with chronic hepatitis C infection in Australia, reducing to an estimated 199 412 at the end of 2016.
- Of the 199 412 people living with chronic hepatitis C at the end of 2016, an estimated 161 509 (81%) had been diagnosed and 75 909 (47% of those diagnosed) had had a hepatitis C RNA test to confirm their chronic hepatitis C infection.
- Of the estimated 227 306 people living with chronic hepatitis C at the start of 2016, 32 550 (14%) received hepatitis C treatment during 2016 and 30 434 (93% of those treated) were cured during 2016.
- Access to new highly effective hepatitis C treatments led to a 12-fold increase in the number of people receiving treatment between 2012 and 2016, 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%).
- Among Australian Needle and Syringe Program Survey respondents in 2016 who self-reported chronic hepatitis C, 22% had received treatment in the past 12 months, representing an 11-fold increase from 2015, with a similar increase in Aboriginal and Torres Strait Islander respondents. According to the National Prison Entrants' Bloodborne Virus Survey, 14% of respondents reported ever receiving hepatitis C treatment in 2016, increasing from 0.6% in 2007, with increases in both males and females.

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 19% in 2016. Receptive syringe sharing was higher among Aboriginal and Torres Strait Islander survey respondents (28%) than among non-Indigenous respondents (17%).

Interpretation:

The increase in the rate of notification of hepatitis C diagnoses between 2015 and 2016, following stable rates between 2012 and 2015, is likely to relate to increased testing in the context of new hepatitis C treatments. The notification rate of newly acquired hepatitis C in people under 25 years has remained stable since 2012, suggesting hepatitis C transmission is 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.

The number of people receiving hepatitis C treatment increased dramatically in 2016, including among people who inject drugs who participated in the Australian Needle and Syringe Program Survey. This change reflects people accessing new direct-acting antiviral regimens subsidised by the Pharmaceutical Benefits Scheme from March 2016. Based on mathematical modelling estimates, the number of people living with hepatitis C who had severe fibrosis and hepatitis C-related cirrhosis fell for the first time in 10 years, in line with the rise in treatment uptake particularly among people with more advanced liver disease (hepatitis C-related cirrhosis). However, in 2016, 31% (73) of all liver transplants were attributable to chronic hepatitis C or hepatitis C related hepatocellular carcinoma and there were an estimated 605 deaths in people living with chronic hepatitis C, highlighting the importance of maintaining or increasing the current levels of treatment to virtually eliminate hepatitis C by 2030.

Trends in hepatitis C notifications among Aboriginal and Torres Strait Islander people are very different from those among non-Indigenous people. There has been a 50% increase in the notification rate in Aboriginal and Torres Strait Islander people aged under 25 over the past five years, but a decrease in the rate in non-Indigenous people in this age group. 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 2016. 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. 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 diagnoses

- There were a total of 6555 new hepatitis B diagnoses in Australia in 2016, with almost equal distribution among males (3539, 54%) and females (2989, 46%).
- The notification rate of hepatitis B in 2016 was highest in the 30–39 year age group (61 per 100 000) and 25–29 year age group (48 per 100 000).
- Over the five years 2012 to 2016, the annual notification rate of hepatitis B has remained stable in Australia (28 per 100 000 in 2012 and 27 per 100 000 in 2016). The hepatitis B notification rate has declined in younger age groups over the past five years (16% decline in people aged 15–19 years, 31% decline in those aged 20–24 and 25% decline in those aged 25–29), in contrast to increases in older age groups (5% increase in those aged 30–39, and a 9% increase in people 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 (75% decline in those aged 15–19 years, 80% decline in those aged 20–24, and a 59% decline in those aged 25–29).
- The notification rate of hepatitis B among the Aboriginal and Torres Strait Islander population in the Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia declined by 50% between 2012 and 2016 (from 62 to 31 per 100 000). Similar to the overall trend in Australia, the greatest declines were observed in the younger age groups. In 2016, the notification rate of hepatitis B in the Aboriginal and Torres Strait Islander population was 1.4 times as high as in the non-Indigenous population (31 per 100 000 compared to 23 per 100 000).

Prevalence and morbidity

- There were an estimated 233 034 people living with chronic hepatitis B in Australia in 2016, of whom an estimated 49 696 (22%) were born in Northeast Asia, 39 482 (18%) were born in Southeast Asia, and 24 287 (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 people who inject drugs, 3.7% in Aboriginal and Torres Strait Islander people, and 3.0% in gay and bisexual men, with overlaps in some of these categories.
- An estimated 412 deaths attributable to chronic hepatitis B infection occurred in 2016.

Testing and care

- In 2016 an estimated 63% of the estimated number of people living with chronic hepatitis B in Australia had been diagnosed.
- Treatment for hepatitis B is recommended for people with elevated hepatitis B viral load, 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 2016 only 7% of people living with chronic hepatitis B were estimated to be receiving antiviral therapy.

Prevention

- In 2016 coverage of infant hepatitis B vaccination at 12 months of age was 94% in the non-Indigenous population and 92% in the Aboriginal and Torres Strait Islander population, reaching 96% and 97% respectively by 24 months.
- Of 21 529 people attending sexual health clinics in 2016 for whom vaccination documentation or pathology details were available, 22% were susceptible to hepatitis B. The proportion susceptible was highest in people aged 55 years or more (30%), 29% in those aged 50–54, and 20%–26% in people aged under 40.

Interpretation:

Hepatitis B in adolescents and adults in Australia is transmitted through a variety of pathways, including injecting drug use and sexual contact, unlike hepatitis C which is strongly associated with injecting risk behaviour. 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 in when school-based vaccination programs were introduced by jurisdiction). Maternal screening and vaccination of infants born to women with hepatitis B are also likely to have contributed to this decline. However, 22% of people attending sexual health clinics remain susceptible to hepatitis B acquisition, highlighting the need for increased vaccination coverage in people at risk of hepatitis B.

Overall, an estimated 63% of people living with chronic hepatitis B in Australia were diagnosed in 2016. Of those, an estimated 17% were receiving care and 7% were receiving treatment. These data suggest an ongoing gap in both the uptake of testing to diagnose chronic hepatitis B, and the uptake of treatment and monitoring to prevent morbidity and mortality, and there is a need to strengthen strategies to bridge these gaps.

Sexually transmissible infections other than HIV

Chlamydia

New chlamydia diagnoses

- Chlamydia was the most frequently notified sexually transmissible infection (STI) in Australia, with a total of 71 751 notifications in 2016. Three-quarters (75%) of these notifications were among people aged 15–29 years.
- Chlamydia notifications from Victoria in 2015 and 2016 were incomplete and have been excluded from the report. Victorian notifications on average account for about a quarter (23%) of notifications nationally.
- The annual rate of chlamydia notifications remained stable between 2012 and 2015, and then increased by 8% between 2015 and 2016 from 378 to 409 per 100 000. There was a larger increase in men (14%) than in women (4%) between 2015 and 2016, although the rate in women was higher than in men in 2016 (458 vs 364 per 100 000).
- In 2016, chlamydia notification rates were highest in the age groups 20–24 years (1970 per 100 000), 15–19 (1285 per 100 000) and 25–29 (1116 per 100 000). Over the past five years, there was a decline in the annual chlamydia notification rate among people aged 15–19 year (15% decline).
- The annual rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population in the Northern Territory, Queensland, South Australia and Western Australia was 2.8 times that in the non-Indigenous population in 2016 (1194 per 100 000 compared to 419 per 100 000).

Incidence

- In 2016, chlamydia incidence in HIV-positive gay and bisexual men (38 per 100 person-years) was 1.9 times as high as in HIV-negative gay and bisexual men (20 per 100 person-years), with a 17% increase in HIV-positive gay and bisexual men and 6% increase in HIV-negative gay and bisexual men since 2012.
- In female sex workers, chlamydia incidence increased by 35% between 2012 and 2016 (from 7.8 to 10.5 per 100 person-years).

Testing and care

- In 2016, there were an estimated 258 139 (154 007 in men, 104 132 in women) new chlamydia infections in people aged 15–29 years. Of those, 28% were diagnosed (19% of men, 42% of women), 93% of those diagnosed received treatment (93% for both men and women) and 35% of those treated had a retest within six months (39% of men, 32% of women).
- Between 2012 and 2016, the ratio of chlamydia notifications to Medicare-rebated chlamydia tests decreased by 15% from 8.1 in 2012 to 6.9 in 2016, with a decline in both males (14% decline) and females (18% decline). The ratio was higher in males (10.2 in 2016) in each of the past five years than in females (5.4 in 2016).
- Between 2012 and 2016, there was a 16% increase in the proportion of people aged 15–29 attending general practices who had a Medicare-rebated chlamydia test, but the overall proportion tested remained low in 2016 (15%). The proportion tested in 2016 was higher in women (20%) than in men (9%).

Gonorrhoea

New gonorrhoea diagnoses

- There were 23 887 new diagnoses of gonorrhoea in 2016, with about three quarters of all diagnoses in males (17 325, 73%).
- Between 2012 and 2016, gonorrhoea notification rates increased by 63% (62 to 101 per 100 000), with an increase in both males (72%) and females (43%). The gonorrhoea notification rate in 2016 was higher in males (146 per 100 000) than in females (56 per 100 000).
- In males, the highest gonorrhoea notification rates were in the age groups 25–29 (438 per 100 000) and 20–24 years (383 per 100 000), and in females in the age groups 20–24 (199 per 100 000) and 15–19 years (177 per 100 000).
- Over the past five years (2012–2016), gonorrhoea notification rates increased in major cities (99% increase) and regional areas (15% increase) but declined in remote areas (8% decline).
- The rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population was 6.9 times that in the non-Indigenous population in 2016 (582 per 100 000 compared to 84 per 100 000). These data are from the Australian Capital Territory, the Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia. Over the past years 2012–2016, gonorrhoea annual notification rates decreased by 17% in the Aboriginal and Torres Strait Islander population.
- In 2016, 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 2016, almost a third (32%) of gonorrhoea notifications in Aboriginal and Torres Strait Islander people were in people aged 15–19 years, compared with 7% 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 the non-Indigenous population.

Incidence

- In 2016, gonorrhoea incidence was 34 per 100 person-years in HIV-positive gay and bisexual men, 1.5 times as high as in HIV-negative gay and bisexual men (23 per 100 person-years). In the past five years (2012–2016) gonorrhoea incidence increased in both HIV-positive (29% increase) and HIV-negative (30% increase) gay and bisexual men, but remained steady between 2015 and 2016.
- In female sex workers gonorrhoea incidence was 5.3 per 100 000 in 2016 but increased from 3.6 per 100 person-years in 2012.

Testing and care

- Between 2012 and 2015, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests remained stable (1.3 to 1.4), but increased by 64% between 2015 and 2016 (from 1.4 to 2.3), with increase in both males (59%) and females (50%). The ratio was higher in males (5.4 in 2016) in each of the past five years than in females (0.9 in 2016).
- Results from the Gay Community Periodic Surveys show comprehensive STI testing (at least four samples from separate sites collected for STI screening) in the past 12 months in gay and bisexual men increased from 37% in 2012 to 45% in 2016.

Syphilis

New syphilis diagnoses

- There were 3367 new notifications of infectious syphilis (infections of less than two years duration) in 2016, with the majority of notifications in males (2945, 87%).
- Over the past five years (2012–2016), the notification rate of infectious syphilis increased 107% from 6.9 per 100 000 in 2012 to 14.3 per 100 000 in 2016, with an increase in both males (103%) and females (157%). The notification rate was higher in males (25.0 per 100 000) than in females (3.6 per 100 000) in 2016.
- In 2016, infectious syphilis notification rates were highest in people aged 25–29 years (34 per 100 000), 30–39 (29 per 100 000) and 20–24 (25 per 100 000).
- In 2016, infectious syphilis notification rates were higher in remote and very remote areas (49 per 100 000) than in major cities (14 per 100 000) and regional areas (10 per 100 000). Over the past five years (2012–2016), notification rates increased in all areas, with the greatest increase in regional areas (209% increase) followed by remote areas (176% increase) and major cities (84% increase).
- The rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population (67 per 100 000) in 2016 was 5.4 times as high as in the non-Indigenous population (12 per 100 000). The rate of notification of infectious syphilis among the Aboriginal and Torres Strait Islander population increased by 193% from 23 per 100 000 in 2012 to 67 per 100 000 in 2016 compared to 100% increase in non-Indigenous population (from 6.2 to 12.4 per 100 000).
- In 2016, just over half (54%) of notifications of infectious syphilis 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 2016 was highest in remote and very remote areas (135 per 100 000), which was 50 times as high as in the non-Indigenous population.
- Over the last 10 years (2007–2016), more than half (24, 55%) of the 43 congenital syphilis notifications were in the Aboriginal and Torres Strait Islander population.

Incidence

- In 2016, the incidence of infectious syphilis incidence among HIV-positive gay and bisexual men attending sexual health clinics was 5.6 per 100 person-years, 2.2 times as high as the 2.5 per 100 person-years in HIV-negative gay and bisexual men. Between 2012 and 2016, infectious syphilis incidence fluctuated in both HIV-negative (between 2.5 and 3.8 per 100 person-years) and HIV-positive (between 5.6 and 8.3 per 100 person-years) gay and bisexual men.
- In 2016, infectious syphilis incidence in female sex workers was 0.4 per 100 person-years, and fluctuated between 0.2 and 0.5 per 100 person-years over the past five years (2012–2016).

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 15% from 1.3 in 2012 to 1.5 in 2016. In 2016, the average number of syphilis tests in HIV-positive gay and bisexual men was 1.8 compared with 1.4 in HIV-negative gay and bisexual men.

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 (79% in 2016) and boys (73% in 2016) 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 0.9%, a reduction of 92%.
- 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 0.6% in 2016, a reduction of 94%, with a 63% decline since 2013 when male vaccination was introduced.
- The rate of detection of high-grade histological abnormalities has fallen from 13.2 per 1000 women aged under 20 years undergoing cervical cancer screening (Pap screening) in 2006 to 4.1 per 1000 in 2015 (69% decline), and from 19.9 per 1000 to 11.8 per 1000 (41% decline) in women aged 20-24 years.

Interpretation:

Both testing and diagnoses 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 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, and 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 2015 and 2016 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 (7 times as high), infectious syphilis (5 times as high) and chlamydia (3 times as high). The resurgence of infectious syphilis in young Aboriginal people in remote communities after years of declining rates, along with cases of congenital syphilis, emphasises 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. Please see p. 4 for summary.

1.1 New HIV diagnoses

This section focuses on people diagnosed with HIV for the first time in Australia ('new diagnoses'). In 2016 there were a total of 1013 new HIV diagnoses in Australia: 920 (91%) in males, 669 (66%) in people aged 30 years and above, and 46 (0.5%) among people reported to be Aboriginal and/or Torres Strait Islander (Table 1.1.1). Over a third (36%) of all diagnoses in 2016 were classified as newly acquired (evidence of HIV acquisition in the 12 months prior to diagnosis) (Table 1.1.1).

A total of 37 225 diagnoses of HIV have been notified since 1984, of which 33 972 were among males and 2911 among females. The annual number of new HIV diagnoses has increased by 7% over the past 10 years, from 947 in 2007 to 1066 in 2012, and remained stable since then, with 1013 cases in 2016 (Figure 1.1.1). Over the same period the number of diagnoses has increased by 9% in males (from 841 in 2007 to 920 in 2016) but decreased by 16% in females (from 105 in 2007 to 88 in 2016) (Figure 1.1.1, Table 1.1.1).

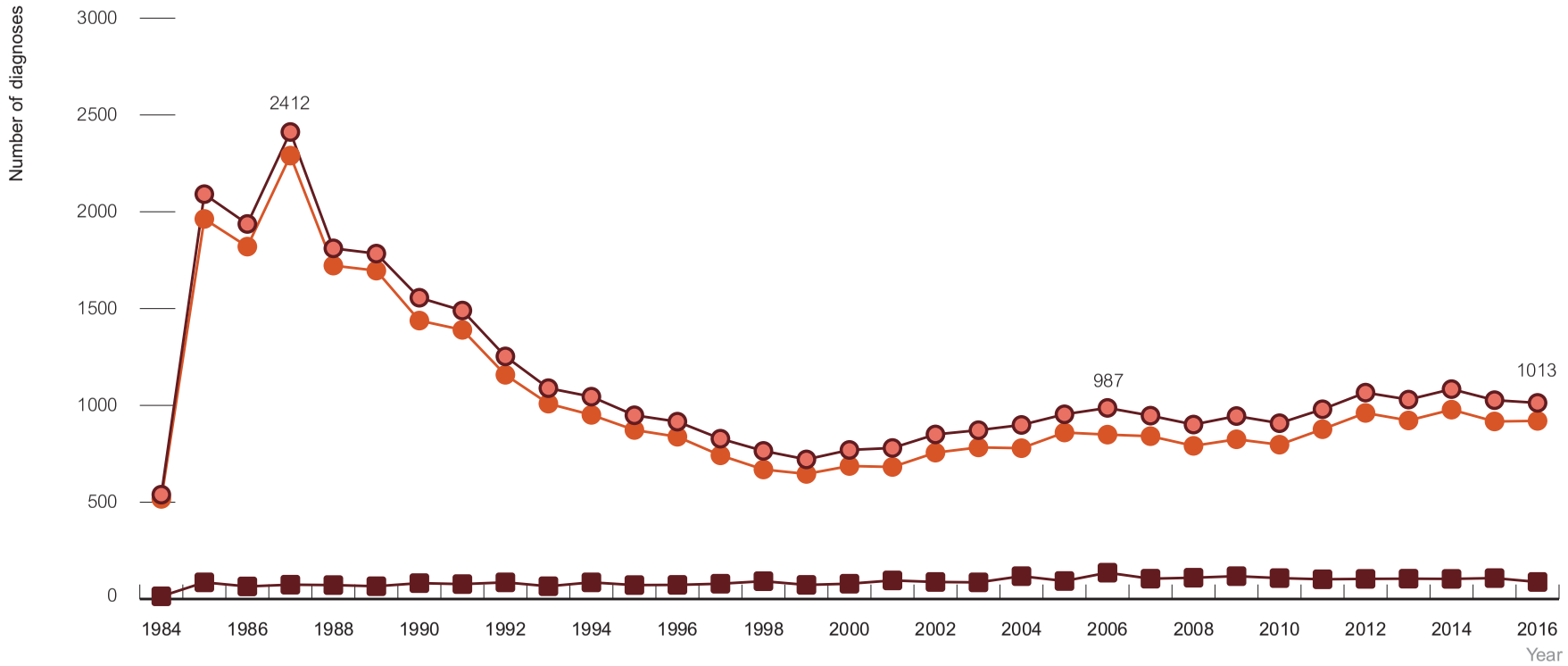
Table 1.1.1 Characteristics of cases of new HIV diagnoses, 2007–2016

	Year of HIV diagnosis										
Characteristic	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2007–2016[a]
Total[b]	947	901	945	908	980	1066	1030	1084	1027	1013	9901
Sex											
Male	841	791	825	797	877	961	922	978	917	920	8 829
Female	105	110	118	108	102	104	105	104	108	88	1 052
Median age in years											
Male	38	37	37	37	37	36	37	35	35	34	36
Female	32	31	32	31	32	31	34	35	36	34	33
Aboriginal and Torres Strait Islander status											
Non-Indigenous	919	868	911	875	952	1027	990	1036	970	961	9509
Aboriginal and Torres Strait Islander	19	19	24	22	24	33	26	33	39	46	285
Not reported	9	14	10	11	4	6	14	15	18	6	107
Age group in years											
0–14	7	7	10	6	8	1	6	3	3	5	56
15–19	9	13	13	13	17	22	23	18	29	14	171
20–29	215	240	253	231	263	319	270	328	308	325	2 752
30–39	320	296	305	286	305	322	291	337	292	305	3 059
40–49	248	219	220	230	237	225	244	216	205	193	2 236
50+	148	126	144	142	150	177	196	182	190	171	1 626
Language spoken at home[c]											
English	727	688	717	679	778	797	527	835	735	735	7 218
Other language	60	55	94	79	83	102	87	116	154	149	979
Not reported	160	158	134	150	119	167	416	133	138	129	1704
Newly acquired	278	284	301	305	371	395	346	425	398	365	3 468
(% of new diagnoses)	(29.4)	(31.5)	(31.9)	(33.6)	(37.9)	(37.1)	(33.6)	(39.2)	(38.8)	(36.0)	(35.0)
Late and advanced HIV status at HIV diagnosis[d]											
Late HIV diagnosis, %	31.8	31.6	35.0	35.0	28.9	31.5	32.1	28.5	29.0	32.7	31.5
Advanced HIV diagnosis, %	17.8	17.3	20.5	20	19.1	17.8	18.5	16.7	15.9	19.5	18.3
Median CD4+ cell count, cells/μL	430	430	408	400	429	430	420	440	440	420	428
State/Territory											
ACT	9	7	11	13	11	17	21	18	14	13	134
NSW	386	326	339	310	332	408	354	346	349	317	3 467
NT	6	10	12	5	9	20	13	9	9	23	116
QLD	167	174	182	209	196	208	181	246	203	195	1 961
SA	49	39	50	34	57	31	58	39	44	42	443
TAS	4	11	14	9	15	13	11	16	16	19	128
VIC	263	262	262	236	278	267	307	302	283	312	2 772
WA	63	72	75	92	82	102	85	108	109	92	880
HIV exposure risk category											
Male-to-male sex[e]	626	586	598	589	685	743	678	761	700	712	6 678
Male-to-male sex and injecting drug use	29	32	38	22	32	34	44	50	49	51	381
Injecting drug use	25	32	23	23	20	25	27	31	30	14	250
Heterosexual sex	200	207	231	208	192	207	218	201	206	209	2 079
Person from a high-prevalence country[f]	58	81	82	74	47	53	37	46	39	35	552
Partner from a high-prevalence country	24	13	20	24	28	24	28	33	35	35	264
Partner at high risk[g]	31	27	29	18	33	31	44	28	39	38	318
Not further specified	87	86	100	92	84	99	109	94	93	101	945
Receipt of blood/tissue[h]	1	0	1	0	0	4	3	0	8	1	18
Mother with/at risk of HIV	4	5	8	5	7	1	4	3	4	5	46
Other/undetermined	62	39	46	61	44	52	56	38	30	21	449

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 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.
e Includes men who had sex with both men and women.
f 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.
g A person who injects drugs, a bisexual male, a recipient of blood or tissue, or a person with haemophilia or clotting disorder.
h 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 New HIV diagnoses in Australia, 1984–2016, 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
Women	517	1963	1820	2290	1722	1696	1438	1390	1158	1009	951	873	838	742	669	646	687	682	756	783	779	860	849	841	791	825	797	877	961	922	978	917	920
Men	14	86	65	74	72	66	82	77	86	66	86	72	73	79	92	73	79	96	88	86	118	93	136	105	110	118	108	102	104	105	104	108	88
Total[a]	539	2091	1937	2412	1811	1784	1556	1490	1253	1089	1045	949	916	828	765	721	770	780	850	872	899	954	987	947	901	945	908	980	1066	1030	1084	1027	1013

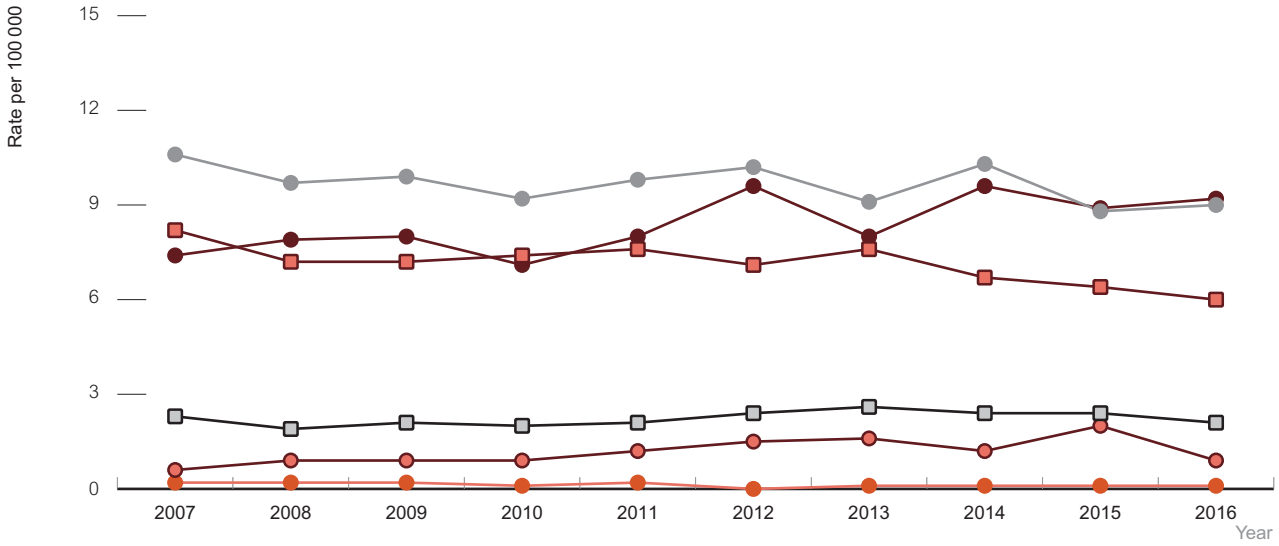
a Includes transgender people and people for whom data on sex was missing.

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

Demographics

In 2016 the largest number of notifications was in the age group 20–29 years (325), followed by those aged 30–39 (305) and 40–49 (193) (Figure 1.1.2, Table 1.1.1). Over the five years 2012–2016, the number of HIV diagnoses remained stable among those aged 20 years and over, except for the 40–49 age group, in whom there was a 14% decline. The number of diagnoses remained low in younger age groups, with 14 diagnoses in the 15–19 age group and five in the 0–14 age group in 2016; the number of diagnoses in both age groups fluctuated over the past five years.

Figure 1.1.2 New HIV diagnoses in Australia, 2007–2016, by age group



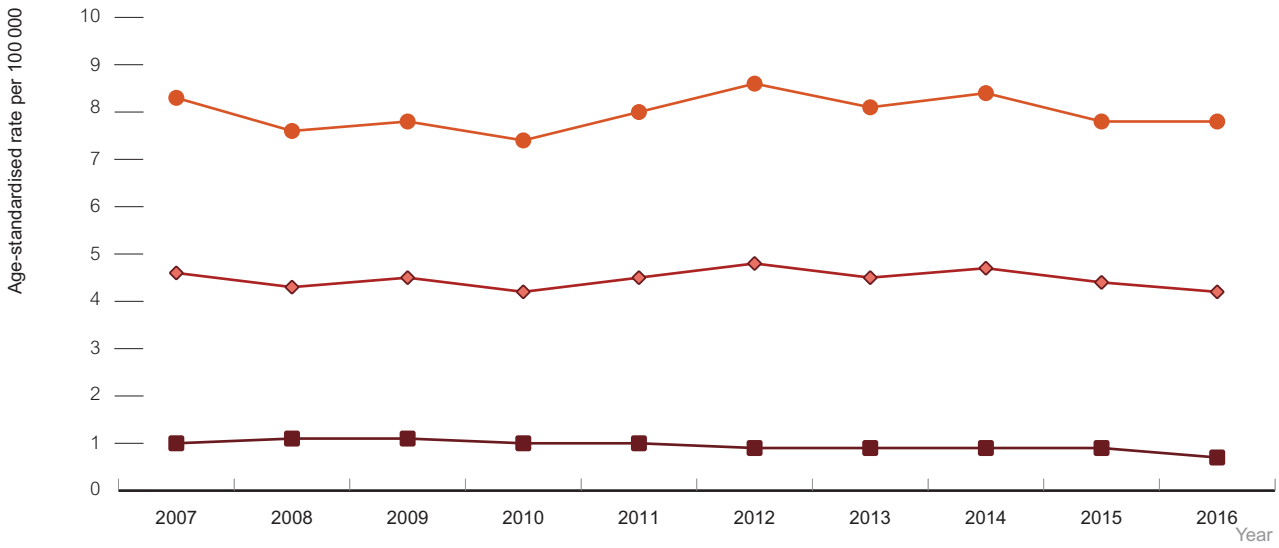
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	7	7	10	6	8	1	6	3	3	5
15–19	9	13	13	13	17	22	23	18	29	14
20–29	215	240	253	231	263	319	270	328	308	325
30–39	320	296	305	286	305	322	291	337	292	305
40–49	248	219	220	230	237	225	244	215	205	193
50+	148	126	144	142	150	177	196	182	190	171

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

HIV

The notification rate of HIV in 2016 was 4.2 per 100 000; this has been stable in the past 10 years (between 4.2 and 4.8 per 100 000) (Figure 1.1.3). Similarly, the notification rate of HIV in males has been stable in the past 10 years (between 7.4 and 8.6 per 100 000); it was 7.8 per 100 000 in 2016. The notification rate in females has also remained stable over the past 10 years (between 0.7 and 1.1 per 100 000), but is low compared to that in males (0.7 vs 7.8 per 100 000 in 2016).

Figure 1.1.3 New HIV diagnoses, rate per 100 000 population, 2007–2016, by sex

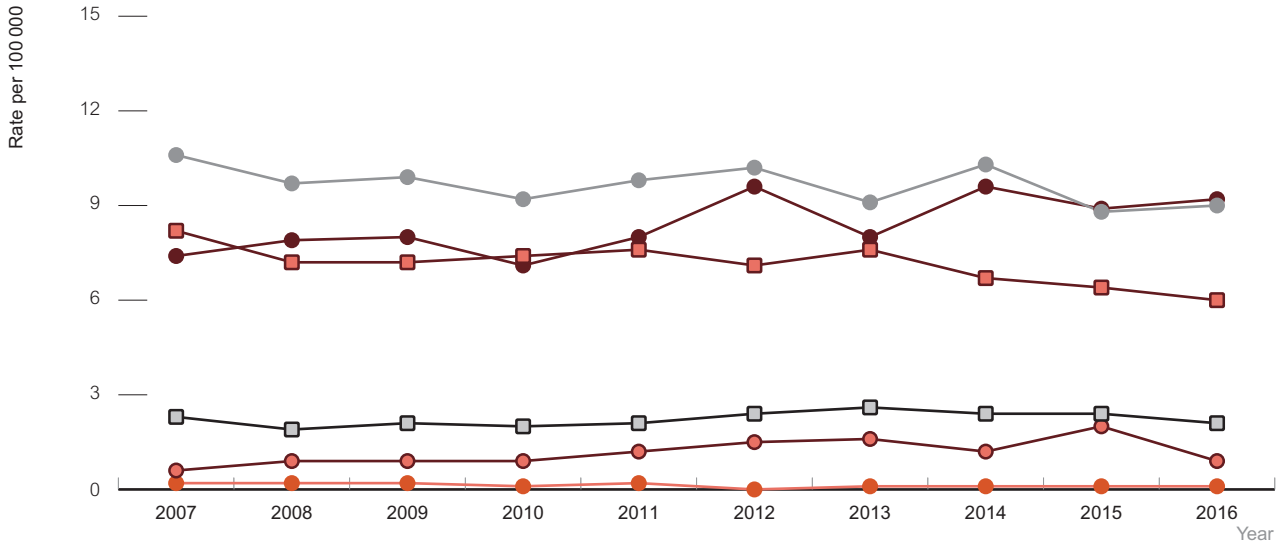


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women	1.0	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.7
Men	8.3	7.6	7.8	7.4	8.0	8.6	8.1	8.4	7.8	7.8
Total	4.6	4.3	4.5	4.2	4.5	4.8	4.5	4.7	4.4	4.2

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

In 2016 HIV notification rates were highest in the age group 20–29 years (9.2 per 100 000), followed by the 30–39 age group (9.0 per 100 000) and the 40–49 age group (6.0 per 100 000), with a 24% increase since 2007 in the 20–29 age group, but rates declined in the 30–39 and 40–49 age groups (Figure 1.1.4). Similar trends were observed for males (Figure 1.1.5). HIV notification rates among females were lower than in males in all age groups over the past 10 years (2007–2016) (Figure 1.1.6). In 2016, HIV notification rates were highest among women aged 30–39 years (1.9 per 100 000), followed by those aged 20–29 (1.3 per 100 000). Rates have declined by 46% in women aged 20–29 years since 2007 when the rate was 2.4 per 100 000.

Figure 1.1.4 HIV notification rate per 100 000 population, 2007–2016, by age group

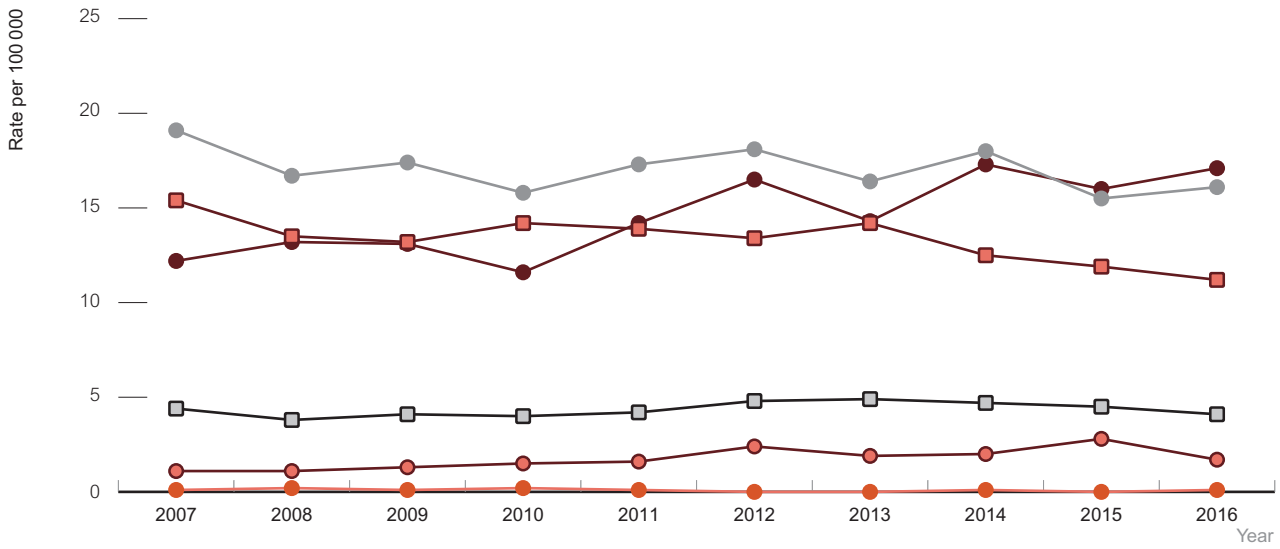


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	0.2	0.2	0.2	0.1	0.2	0.0	0.1	0.1	0.1	0.1
15–19	0.6	0.9	0.9	0.9	1.2	1.5	1.6	1.2	2.0	0.9
20–29	7.4	7.9	8.0	7.1	8.0	9.6	8.0	9.6	8.9	9.2
30–39	10.6	9.7	9.9	9.2	9.8	10.2	9.1	10.3	8.8	9.0
40–49	8.2	7.2	7.2	7.4	7.6	7.1	7.6	6.7	6.4	6.0
50+	2.3	1.9	2.1	2.0	2.1	2.4	2.6	2.4	2.4	2.1

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

HIV

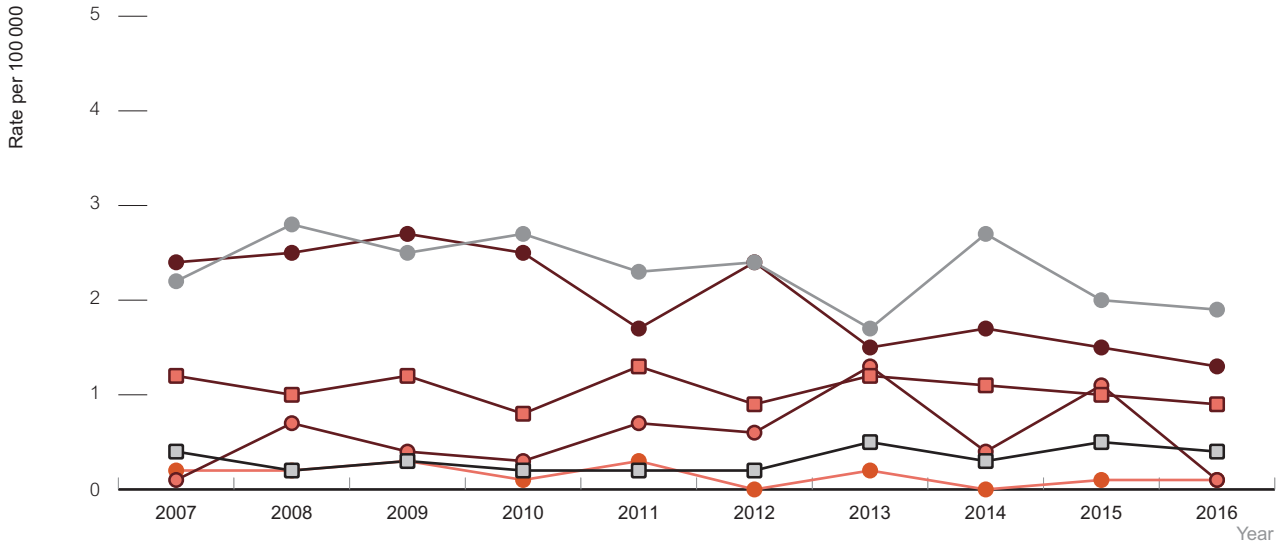
Figure 1.1.5 HIV notification rate per 100 000 population, 2007–2016, by age group, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.1
15–19	1.1	1.1	1.3	1.5	1.6	2.4	1.9	2.0	2.8	1.7
20–29	12.2	13.2	13.1	11.6	14.2	16.5	14.3	17.3	16.0	17.1
30–39	19.1	16.7	17.4	15.8	17.3	18.1	16.4	18.0	15.5	16.1
40–49	15.4	13.5	13.2	14.2	13.9	13.4	14.2	12.5	11.9	11.2
50+	4.4	3.8	4.1	4.0	4.2	4.8	4.9	4.7	4.5	4.1

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

Figure 1.1.6 HIV notification rate per 100 000 population, 2007–2016, by age group, females



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	0.2	0.2	0.3	0.1	0.3	0.0	0.2	0.0	0.1	0.1
15–19	0.1	0.7	0.4	0.3	0.7	0.6	1.3	0.4	1.1	0.1
20–29	2.4	2.5	2.7	2.5	1.7	2.4	1.5	1.7	1.5	1.3
30–39	2.2	2.8	2.5	2.7	2.3	2.4	1.7	2.7	2.0	1.9
40–49	1.2	1.0	1.2	0.8	1.3	0.9	1.2	1.1	1.0	0.9
50+	0.4	0.2	0.3	0.2	0.2	0.2	0.5	0.3	0.5	0.4

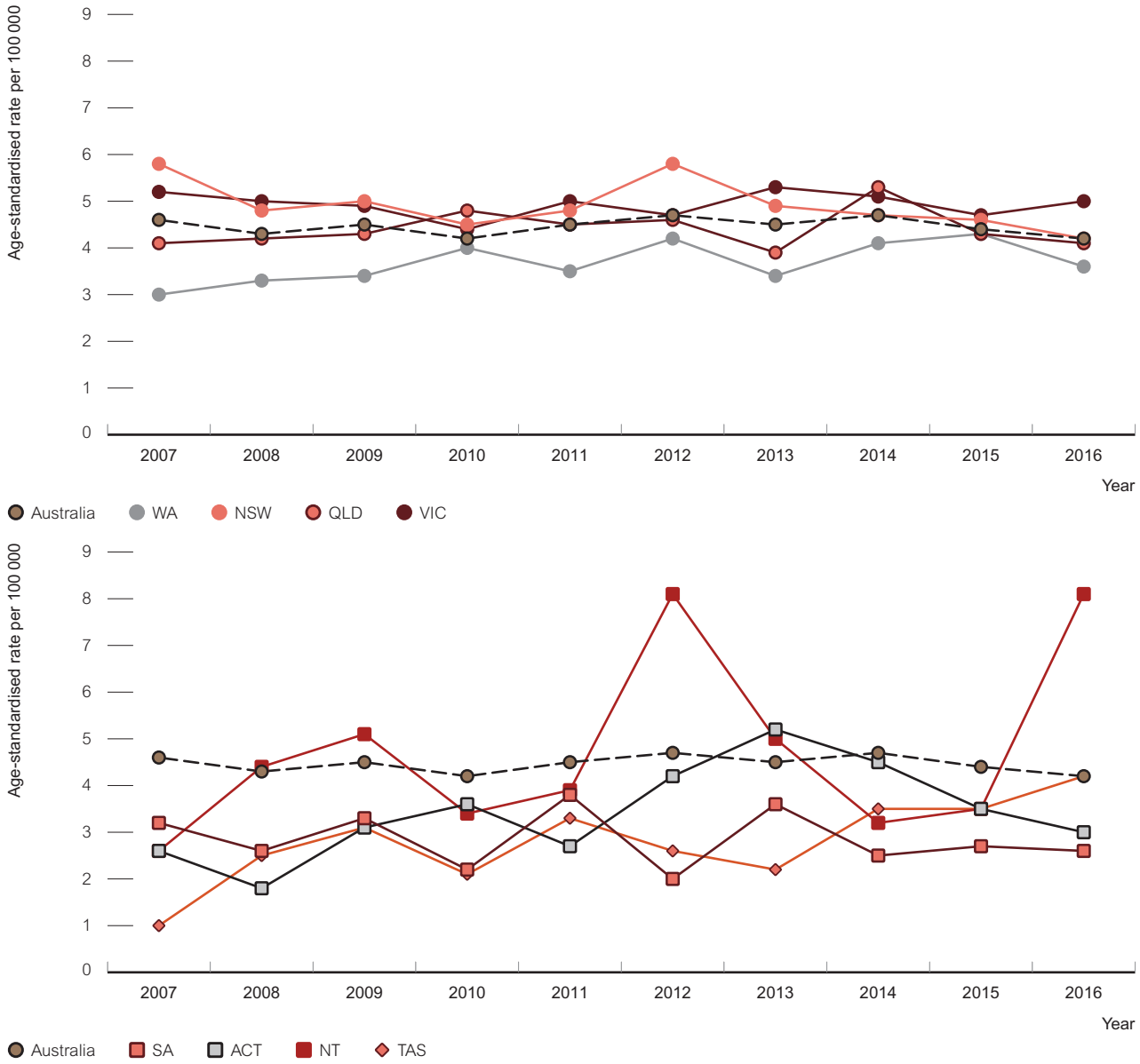
Source: State and territory health authorities; see Methodology for detail.

Recent trends in the population rate of newly diagnosed HIV have differed across jurisdictions in Australia. Overall, no jurisdiction has observed a long-term decline in its HIV notification rate (Figure 1.1.7, Table 1.1.2).

In Victoria, the rate of HIV notification has fluctuated between 4.4 and 5.3 per 100 000 over the past 10 years (2007–2016) and was 5.0 per 100 000 people in 2016. In New South Wales there was a decline between 2007 and 2010 (5.8 per 100 000 to 4.5 per 100 000), increasing to 5.8 per 100 000 in 2012, followed by a steady decline to 4.2 per 100 000 in 2016). In Queensland, the HIV notification rate fluctuated between 3.9 and 5.3 per 100 000 over the past 10 years and was 4.1 per 100 000 in 2016. 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 3.6 per 100 000 in 2016 (Figure 1.1.7, Table 1.1.2).

In the Australian Capital Territory, Tasmania and the Northern Territory the numbers of diagnoses each year are smaller (between 4 and 23 per year), 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 2016 to 3.0 per 100 000. The rates have fluctuated in Tasmania (1.0 per 100 000 to 4.2 per 100 000) and Northern Territory (2.6 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 New HIV diagnoses, notification rate per 100 000 population, 2007–2016, by state/territory



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

Table 1.1.2 New HIV diagnoses, rate per 100 000 population, 2007–2016, by state/territory

State/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australian Capital Territory	2.6	1.8	3.1	3.6	2.7	4.2	5.2	4.5	3.5	3.0
New South Wales	5.8	4.8	5.0	4.5	4.8	5.8	4.9	4.7	4.6	4.2
Northern Territory	2.6	4.4	5.1	3.4	3.9	8.1	5.0	3.2	3.5	8.1
Queensland	4.1	4.2	4.3	4.8	4.5	4.6	3.9	5.3	4.3	4.1
South Australia	3.2	2.6	3.3	2.2	3.8	2.0	3.6	2.5	2.7	2.6
Tasmania	1.0	2.5	3.1	2.1	3.3	2.6	2.2	3.5	3.5	4.2
Victoria	5.2	5.0	4.9	4.4	5.0	4.7	5.3	5.1	4.7	5.0
Western Australia	3.0	3.3	3.4	4.0	3.5	4.2	3.4	4.1	4.3	3.6
Australia	4.6	4.3	4.5	4.2	4.5	4.8	4.5	4.7	4.4	4.2

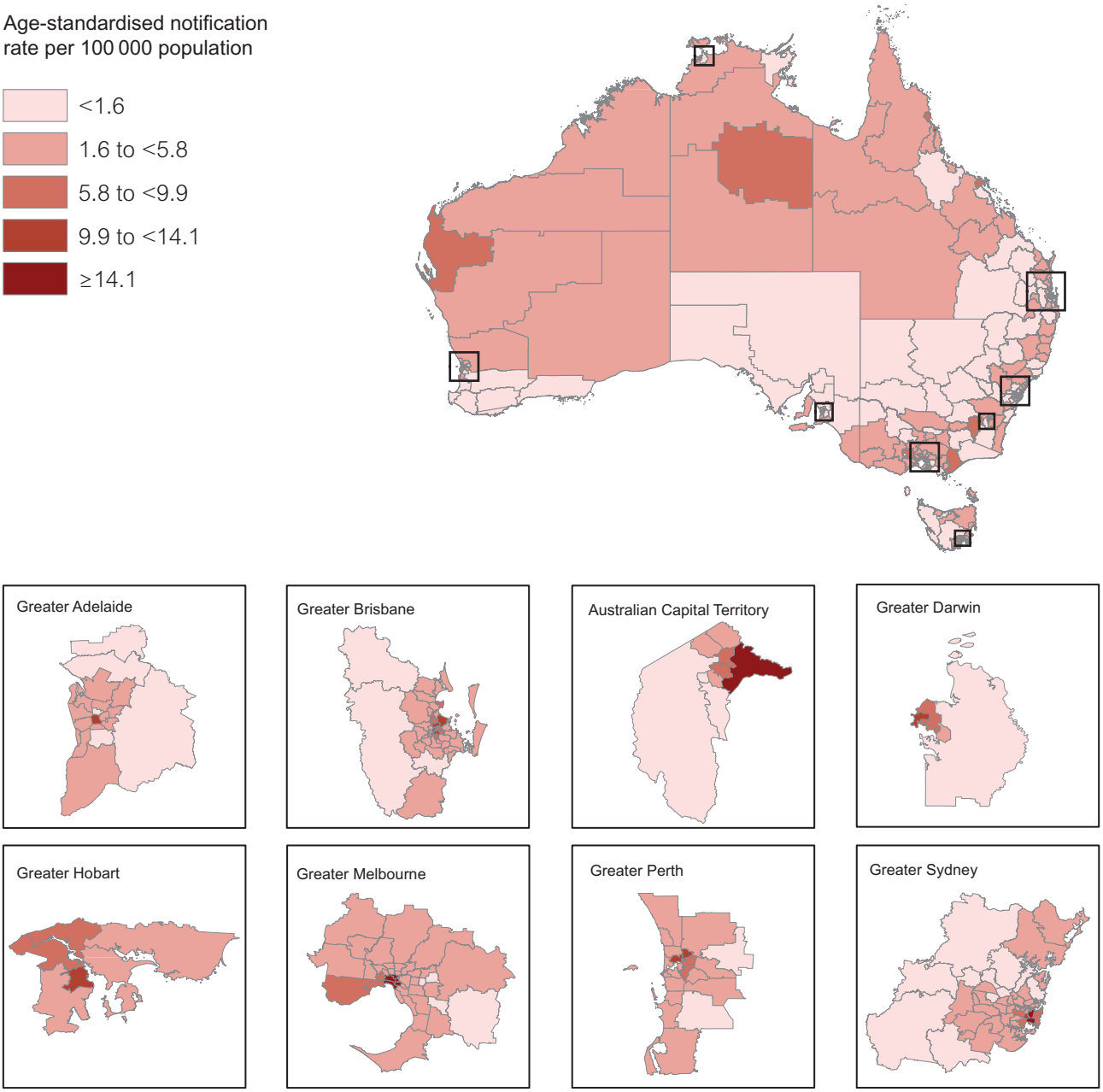
Source: State and territory health authorities; see Methodology for further detail.

HIV

This report includes age-standardised HIV 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 1.1.8).

Based on average HIV notification rates between 2014 and 2016, there were variations in HIV notification rates within states and territories as well as major cities. Higher HIV notification rates were predominantly in the inner city areas, and some regional areas in the Northern Territory, Queensland and Western Australia (Figure 1.1.8). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of HIV diagnoses, particularly in SA3s with smaller populations. In addition, HIV remains a highly concentrated epidemic geographically, with gay and bisexual men as the most affected population not being evenly represented among the general population across Australia. Caution should be taken in interpreting these rates.

Figure 1.1.8 Average age-standardised HIV notification rate per 100 000 population, by statistical area level 3, 2014–2016, Australia and major cities



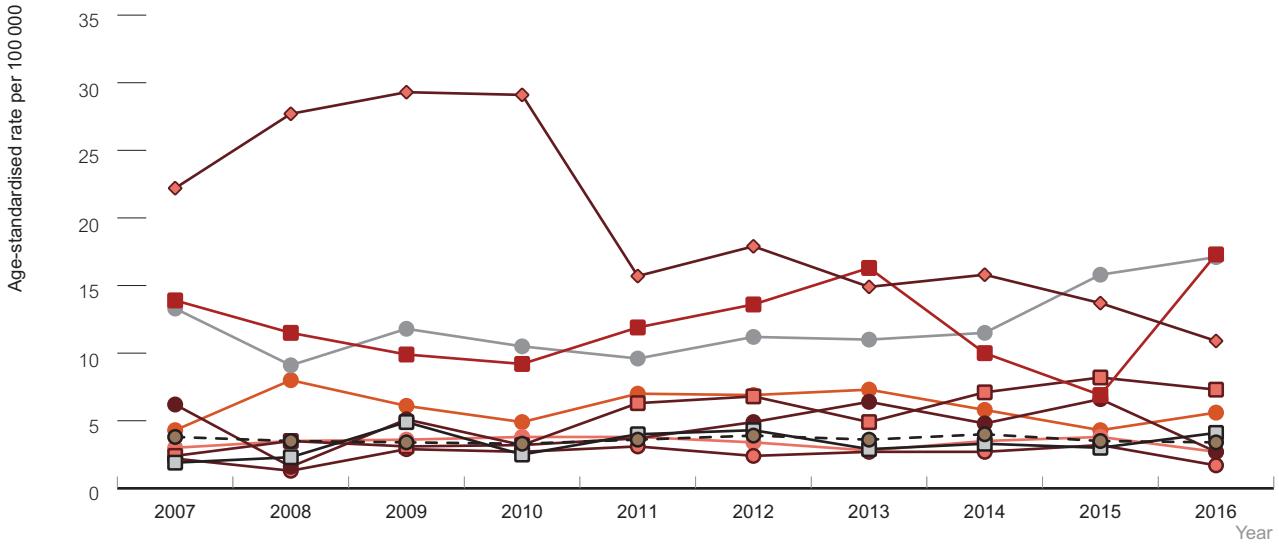
Note: Average HIV notification rates for the three-year period 2014–2016 were used to minimise the influence of fluctuation in the number of HIV diagnoses.

Source: State and territory health authorities.

HIV notification rates differed by region of birth. Among Australian-born people, the HIV notification rate was stable from 2007 to 2016 (between 3.3 and 4.0 per 100 000) (Figure 1.1.9). Among people born overseas, the highest HIV notification rates in 2016 were in people born in the Americas (North and South America) (17.3 per 100 000), Southeast Asia (17.1 per 100 000), and sub-Saharan Africa (10.9 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), and increased steadily in those born in Northeast Asia (from 2.4 per 100 000 in 2007 to 7.3 per 100 000 per 100 000 in 2016). Among those born in sub-Saharan Africa the rate of HIV notification has fallen by 51% since 2007 (from 22.2 to 10.9 per 100 000 in 2016) (Figure 1.1.9).

Figure 1.1.9 New HIV diagnoses, rate per 100 000 population, 2007–2016, by region of birth



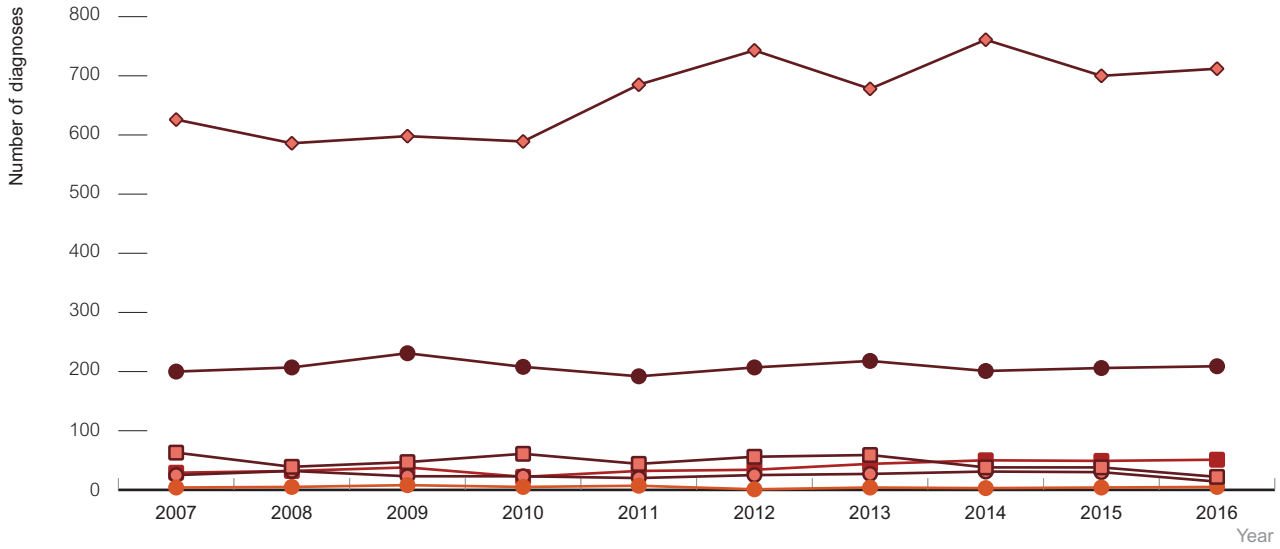
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australia	3.8	3.5	3.4	3.3	3.6	3.9	3.6	4.0	3.5	3.4
Oceania and Antarctica	4.3	8.0	6.1	4.9	7.0	6.9	7.3	5.8	4.3	5.6
Northwest Europe	3.0	3.5	3.6	3.8	3.8	3.4	2.8	3.5	3.8	2.7
Southern and Eastern Europe	2.2	1.3	2.9	2.7	3.1	2.4	2.7	2.7	3.2	1.7
North Africa and the Middle East	6.2	1.6	5.1	3.2	3.7	4.9	6.4	4.8	6.6	2.7
Southeast Asia	13.3	9.1	11.8	10.5	9.6	11.2	11.0	11.5	15.8	17.1
Northeast Asia	2.4	3.5	3.1	3.2	6.3	6.8	4.9	7.1	8.2	7.3
Southern and Central Asia	1.9	2.3	4.9	2.5	4.0	4.3	2.9	3.3	3.0	4.1
Americas	13.9	11.5	9.9	9.2	11.9	13.6	16.3	10.0	6.9	17.3
Sub-Saharan Africa	22.2	27.7	29.3	29.1	15.7	17.9	14.9	15.8	13.7	10.9

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 1.1.10, Table 1.1.1). Seventy per cent (712) of new HIV diagnoses were attributed to male-to-male sex in 2016. In 2016, other risk exposures were: heterosexual sex for 209 (21%) diagnoses, both male-to-male sex and injecting drug use for 51 (5%) diagnoses, and injecting drug use only for 14 (1%) diagnoses (Figure 1.1.10, Table 1.1.1).

Figure 1.1.10 Number of new HIV diagnoses, 2007–2016, by exposure category



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Male-to-male sex	626	586	598	589	685	743	678	761	700	712
Male-to-male sex and injecting drug use	29	32	38	22	32	34	44	50	49	51
Injecting drug use	25	32	23	23	20	25	27	31	30	14
Heterosexual sex	200	207	231	208	192	207	218	201	206	209
Mother with/at risk of HIV infection	4	5	8	5	7	1	4	3	4	5
Other/undetermined	63	39	47	61	44	56	59	38	38	22

Notes: The 'male-to-male sex' category includes men who had sex with both men and women. No diagnoses were attributed to occupational exposure in healthcare or other settings, or haemophilia/coagulation disorder in the 10 years 2007–2016.

Source: State and Territory health authorities, see Methodological Notes 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.

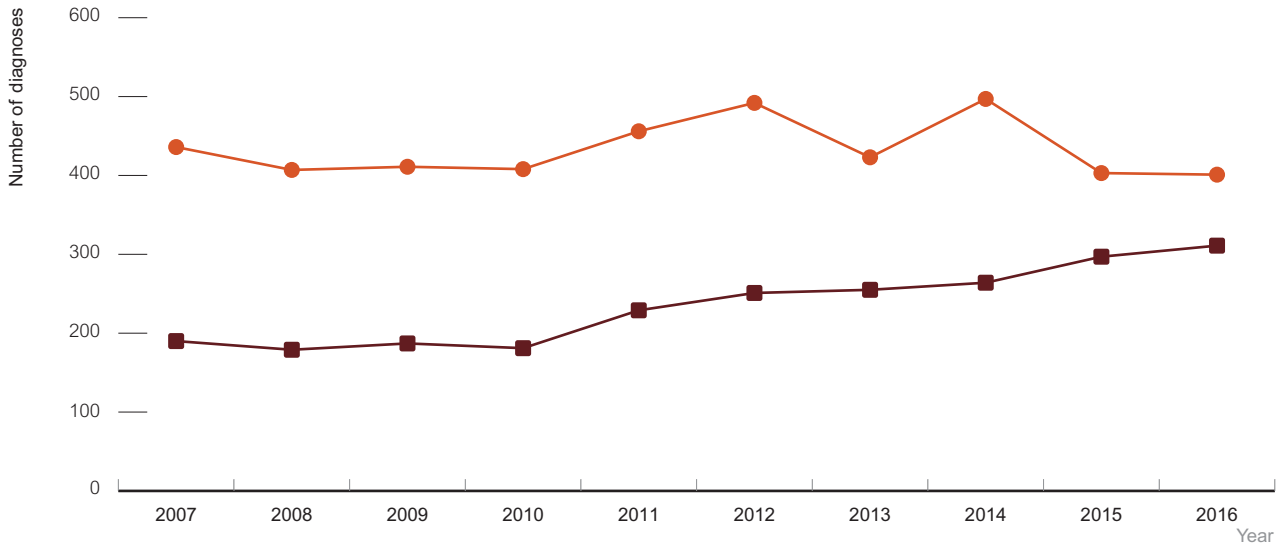
The median age at HIV diagnosis for men reporting male-to-male sex as HIV risk exposure has declined from 37 years in 2007 to 33 years in 2016 (data not shown). Of the 712 cases of HIV newly diagnosed in 2016 for whom exposure to HIV was attributed to male-to-male sex, 79 (11%) also reported sex with women. There were an additional 51 men for whom the HIV risk exposure was male-to-male sex and injecting drug use (Figure 1.1.10, Table 1.1.1).

Over the past 10 years the number of new HIV diagnoses in Australian-born men with male-to-male sex as an exposure risk has decreased from 436 in 2007 to 401 in 2016 (Figure 1.1.11). The number of HIV

diagnoses in overseas-born men remained stable between 2007 and 2010 (range 179–190) but has since increased to 311 diagnoses in 2016 (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 30% in 2007 to 58% in 2016 (Figure 1.1.12).

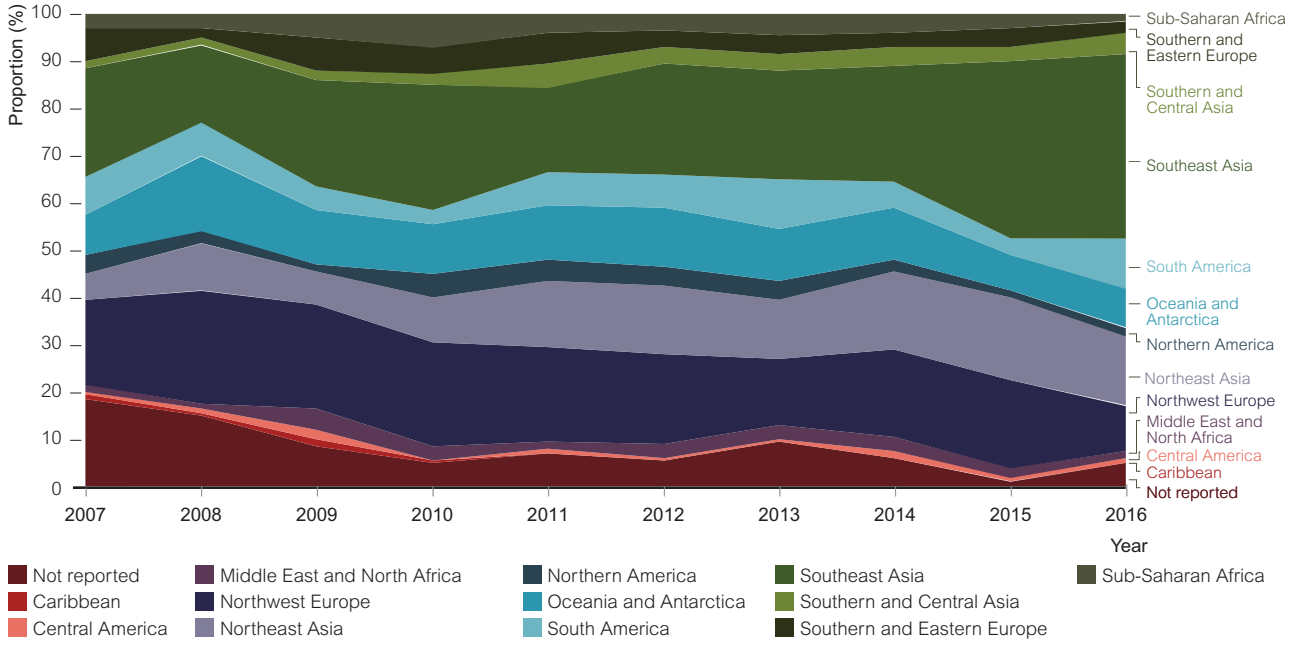
Figure 1.1.11 New HIV diagnoses in men who reported male-to-male sex as an exposure risk, 2007–2016, by region of birth



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Born overseas	190	179	187	181	229	251	255	264	297	311
Born in Australia	436	407	411	408	456	492	423	497	403	401

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

Figure 1.1.12 Proportion of HIV diagnoses in non-Australian-born men with male-to-male sex as risk exposure, 2007–2016, by region of birth



Source: State and territory health authorities.

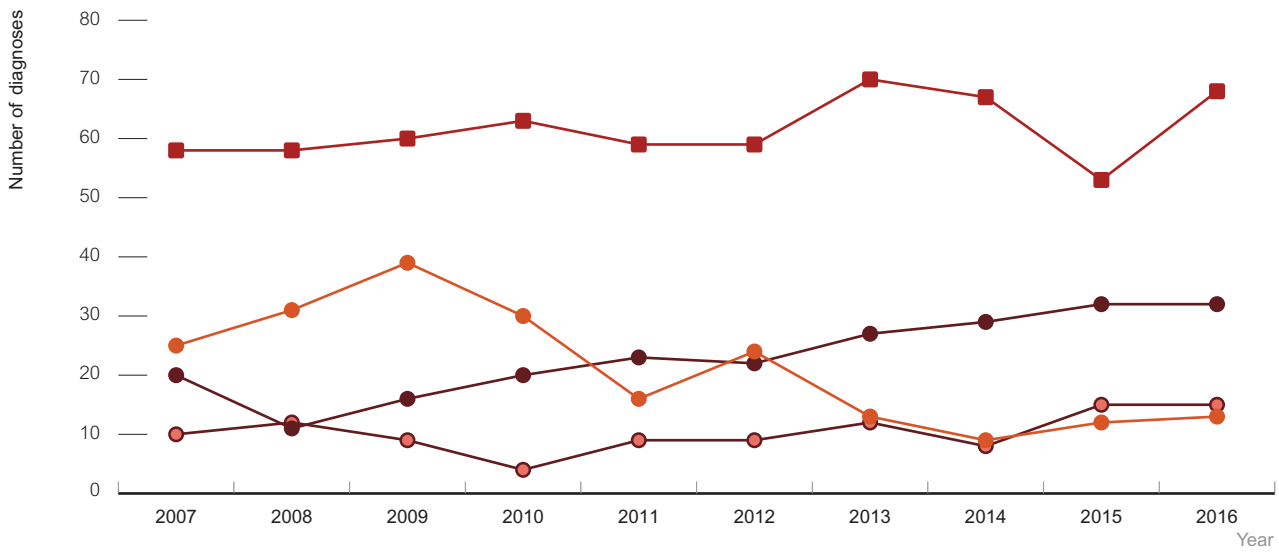
HIV

Heterosexuals: Of 209 new HIV diagnoses in 2016 for which exposure to HIV was attributed to heterosexual sex, 128 were in men and 80 in women. In men, 12% (15) were reported as having a sexual partner at high risk of HIV, 10% (13) were born in a high-prevalence country, and 25% (32) had sex with a person from a high-prevalence country; for 53% (68 men) the sexual contact risk was not further specified (Figure 1.1.13). Of men in the 'heterosexual contact risk not further specified' category, about half (52%) were born in Australia (data not shown).

In women, 28% (22) were reported as having a sexual partner at high risk of HIV, 28% (22) were born in a high-prevalence country, and 4% (3) had sex with a person from a high-prevalence country; for 41% (33) sexual contact risk was not further specified (Figure 1.1.14). Of women in the 'heterosexual contact risk not further specified' category, about a third (37%) 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 bisexually active or has other known risk factors for HIV (see Methodology for details).

Figure 1.1.13 Number of new HIV diagnoses in men with exposure risk other than male-to-male sex, 2007–2016, by risk exposure category

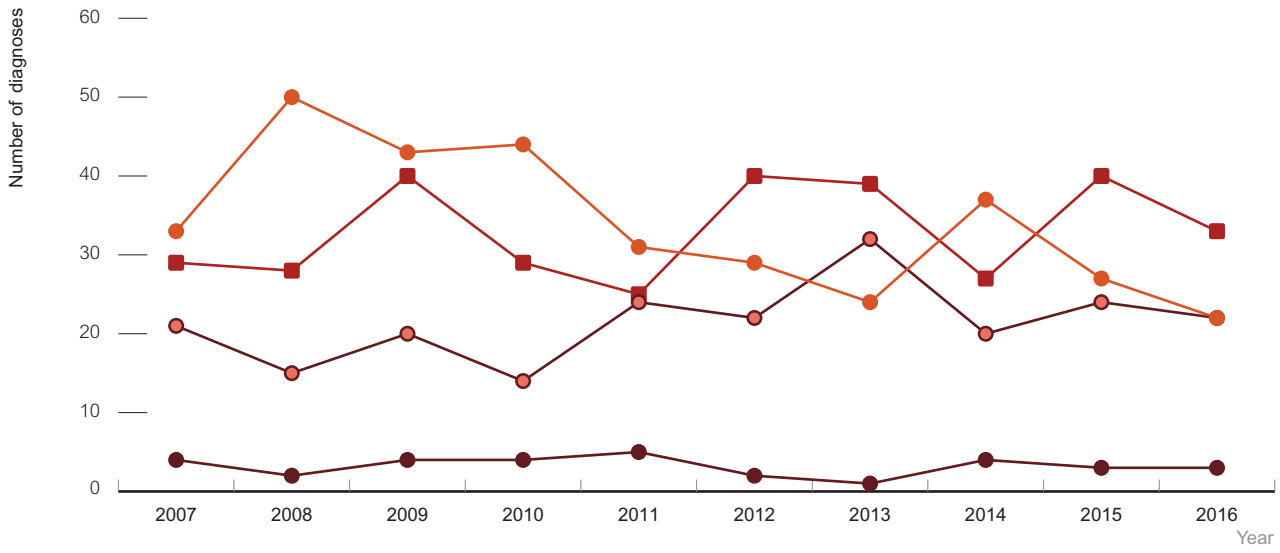


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Partner at high risk of HIV[a]	10	12	9	4	9	9	12	8	15	15
Person from a high-prevalence country	25	31	39	30	16	24	13	9	12	13
Partner from a high-prevalence country	20	11	16	20	23	22	27	29	32	32
Heterosexual contact risk not further specified	58	58	60	63	59	59	70	67	53	68

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 1.1.14 Number of new HIV diagnoses in women, 2007–2016, by risk exposure category



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Partner at high risk of HIV[a]	21	15	20	14	24	22	32	20	24	22
Person from a high-prevalence country	33	50	43	44	31	29	24	37	27	22
Partner from a high-prevalence country	4	2	4	4	5	2	1	4	3	3
Heterosexual contact risk not further specified	29	28	40	29	25	40	39	27	40	33

a Includes sex with a person 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.

HIV

Aboriginal and Torres Strait Islander people: In 2016, 46 new HIV diagnoses were in the Aboriginal and Torres Strait Islander population (5% of total 1013 diagnoses). The majority of Aboriginal and Torres Strait Islander notifications in 2016 were in males (89%, 41) and the median age at diagnosis was 30 years (Table 1.1.3). 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 was done to exclude HIV diagnoses 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 2007 and 2008, after which they started diverging; in 2016 rates were 2.2 times as high among the Aboriginal and Torres Strait Islander population (6.4 per 100 000 compared to 2.9 per 100 000 in the Australian-born non-Indigenous population) (Figure 1.1.15). 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 Table 1.1.3 for the number of notifications by jurisdiction and the *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017*[1] for further detail).

In the five years 2012–2016, a greater proportion of HIV diagnoses in Aboriginal and Torres Strait Islander people were attributed to heterosexual sex (20%) or injecting drug use (14%) than in the Australian-born non-Indigenous population (15% and 3%, respectively) (Figure 1.1.16).

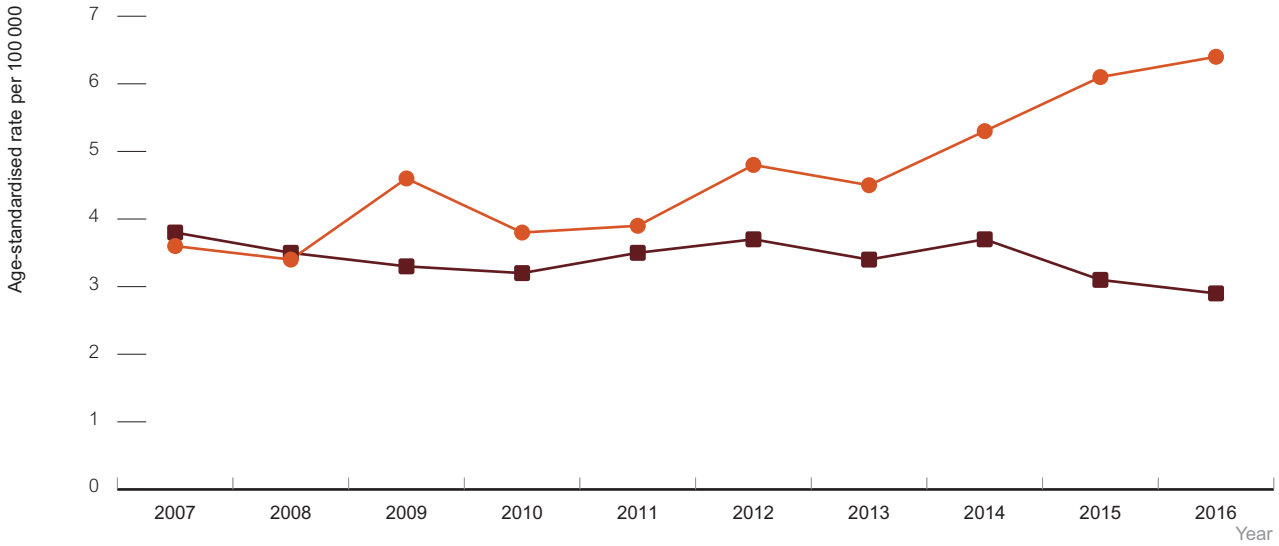
Table 1.1.3 Characteristics of cases of newly diagnosed HIV infection in Aboriginal and Torres Strait Islander people, 2007–2016.

	Year of HIV diagnosis										
Characteristic	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2007–2016[a]
Total cases[b]	19	19	24	22	24	33	26	33	39	46	285
Sex											
Male	16	15	20	15	18	27	22	25	35	41	234
Female	3	4	3	7	6	6	4	7	4	4	48
Median age in years	33	36	37	35	32	27	36	34	37	30	33
Newly acquired HIV[c] (% of new diagnoses)	5 (26.3)	6 (31.6)	7 (29.2)	5 (22.7)	5 (20.8)	10 (30.3)	9 (34.6)	8 (24.2)	12 (30.8)	15 (32.6)	82 (28.8)
Late and advanced HIV status at HIV diagnosis[d]											
Late HIV diagnosis, %	40.0	33.3	40.9	25.0	34.8	37.5	40.0	30.0	29.4	26.2	32.7
Advanced HIV diagnosis, %	13.3	20.0	31.8	10.0	30.4	29.2	25.0	20.0	14.7	14.3	20.4
State/Territory											
Australian Capital Territory	0	0	0	0	0	0	0	0	0	0	0
New South Wales	8	8	9	7	6	11	8	7	7	10	81
Northern Territory	0	1	0	1	2	2	1	1	1	5	14
Queensland	5	2	8	8	8	14	9	14	13	20	101
South Australia	1	4	2	1	1	1	2	0	2	2	16
Tasmania	0	0	1	0	1	0	2	2	2	0	8
Victoria	3	0	1	3	1	5	4	6	7	5	33
Western Australia	2	4	3	2	5	0	0	3	7	4	30
HIV exposure category, %											
Male-to-male sex[e]	47.4	47.4	41.7	54.6	62.5	69.7	23.1	39.4	53.9	58.7	50.9
Male-to-male sex and injecting drug use	15.8	5.3	12.5	4.6	0.0	6.1	19.2	9.1	10.3	15.2	10.2
Injecting drug use	15.8	36.8	8.3	18.2	4.2	6.1	23.1	27.3	15.4	4.4	14.7
Heterosexual sex	21.1	10.5	16.7	13.6	25.0	18.2	30.8	15.2	18.0	19.6	19.0
Mother with/at risk of HIV infection	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.4
Other/undetermined exposure	0.0	0.0	20.8	9.1	4.2	0.0	3.9	9.1	2.6	2.2	4.9

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 1.1.15 Newly diagnosed HIV notification rate per 100 000 Australian-born population, 2007–2016, by Aboriginal and Torres Strait Islander status

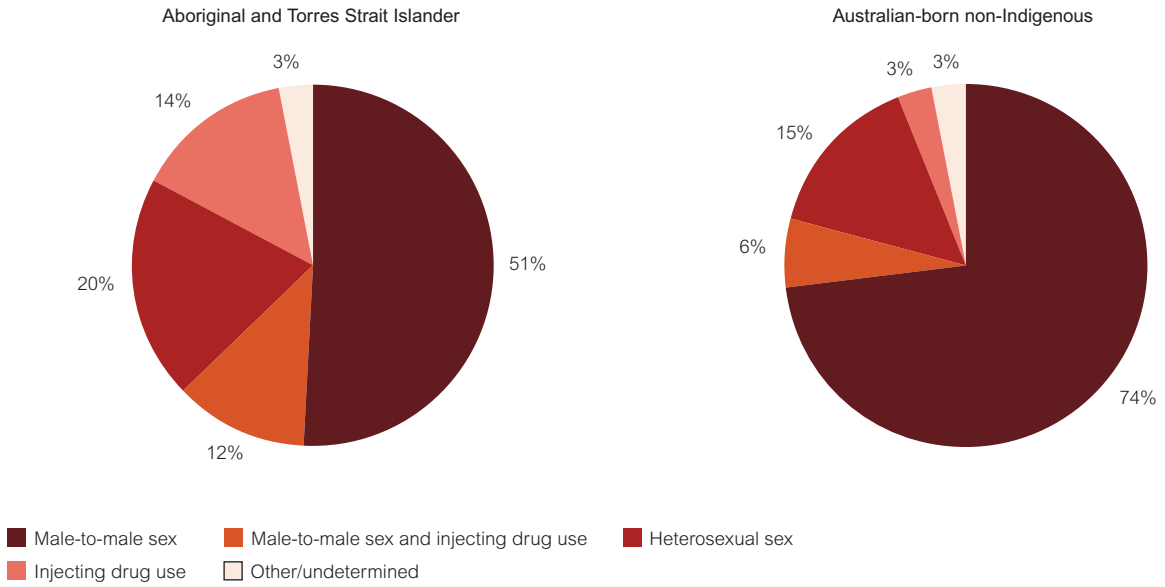


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australian-born non-Indigenous	3.8	3.5	3.3	3.2	3.5	3.7	3.4	3.7	3.1	2.9
Aboriginal and Torres Strait Islander	3.6	3.4	4.6	3.8	3.9	4.8	4.5	5.3	6.1	6.4

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

HIV

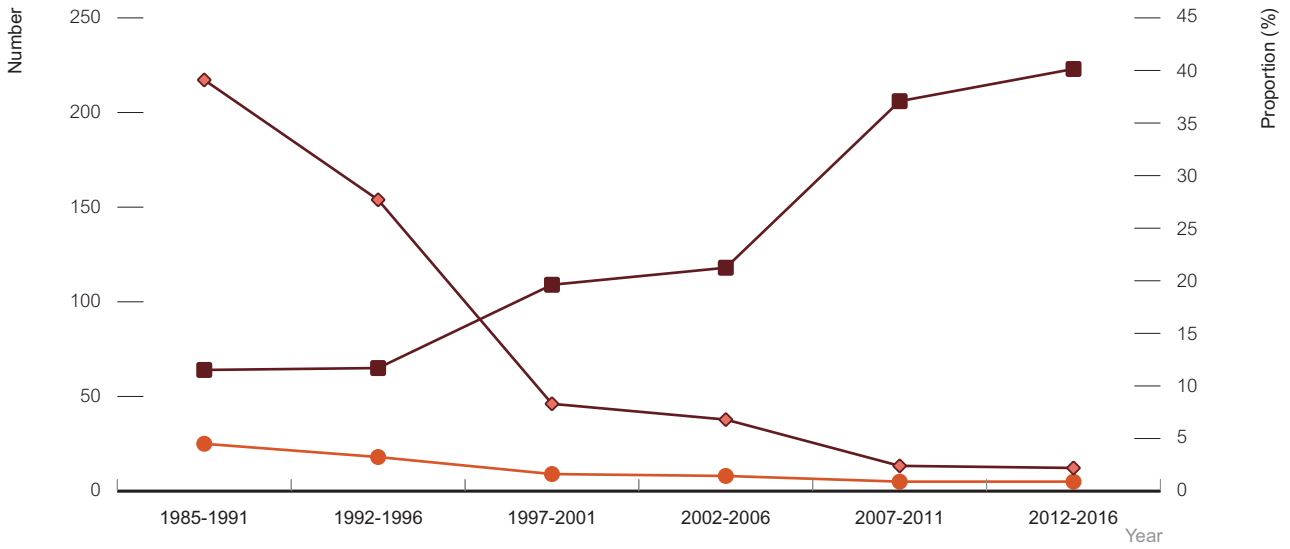
Figure 1.1.16 Newly diagnosed HIV and HIV exposure category, 2012–2016, by Aboriginal and Torres Strait Islander status



Source: State and Territory health authorities.

Pregnant women: Since 1984 there have been a total of 785 reported cases of perinatal HIV exposure among children born in Australia. Among 223 women with HIV who gave birth in the five-year period 2012–2016, the transmission rate to newborns was 2%, compared to 39% in the period 1985–1991 and 28% in 1992–1996 (Figure 1.1.17). In the past 10 years, the transmission rate has dropped from 9% in 2007 to 0% in 2016 (Figure 1.1.18).

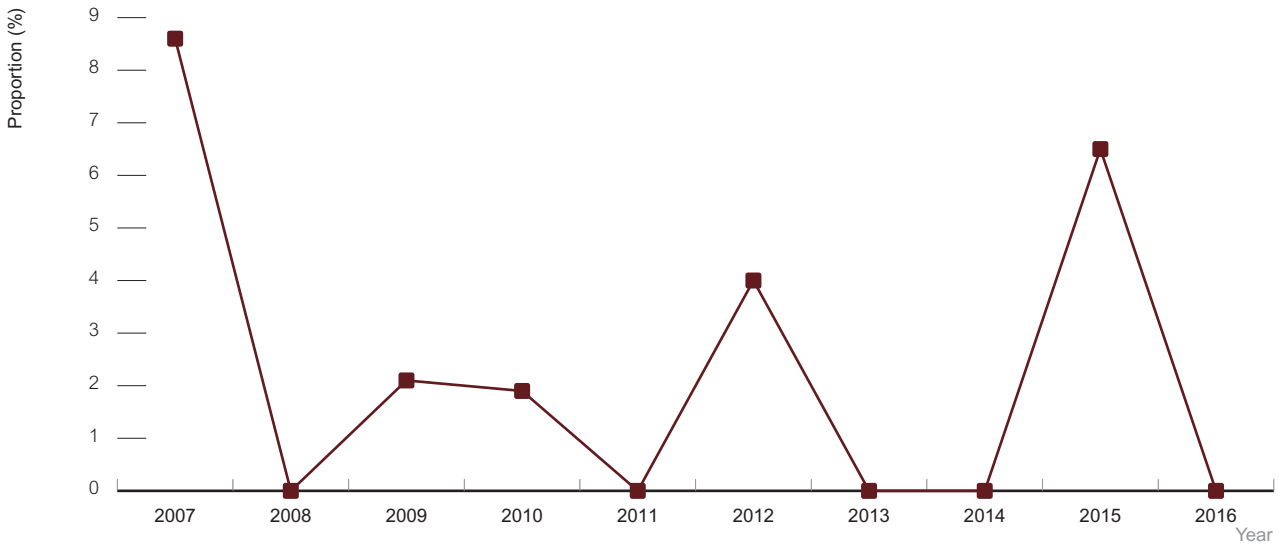
Figure 1.1.17 Number of Australian-born children perinatally exposed to HIV and proportion HIV-positive, 1985–2016, by year of birth



	1985-1991	1992-1996	1997-2001	2002-2006	2007-2011	2012-2016
Perinatally exposed	64	65	109	118	206	223
HIV-positive (n)	25	18	9	8	5	5
HIV-positive (%)	39.1	27.7	8.3	6.8	2.4	2.2

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

Figure 1.1.18 Proportion of Australian-born perinatally exposed infants who were HIV-positive, 2007–2016, by year of birth



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
HIV-positive (%)	8.6	0.0	2.1	1.9	0.0	4.0	0.0	0.0	6.5	0.0

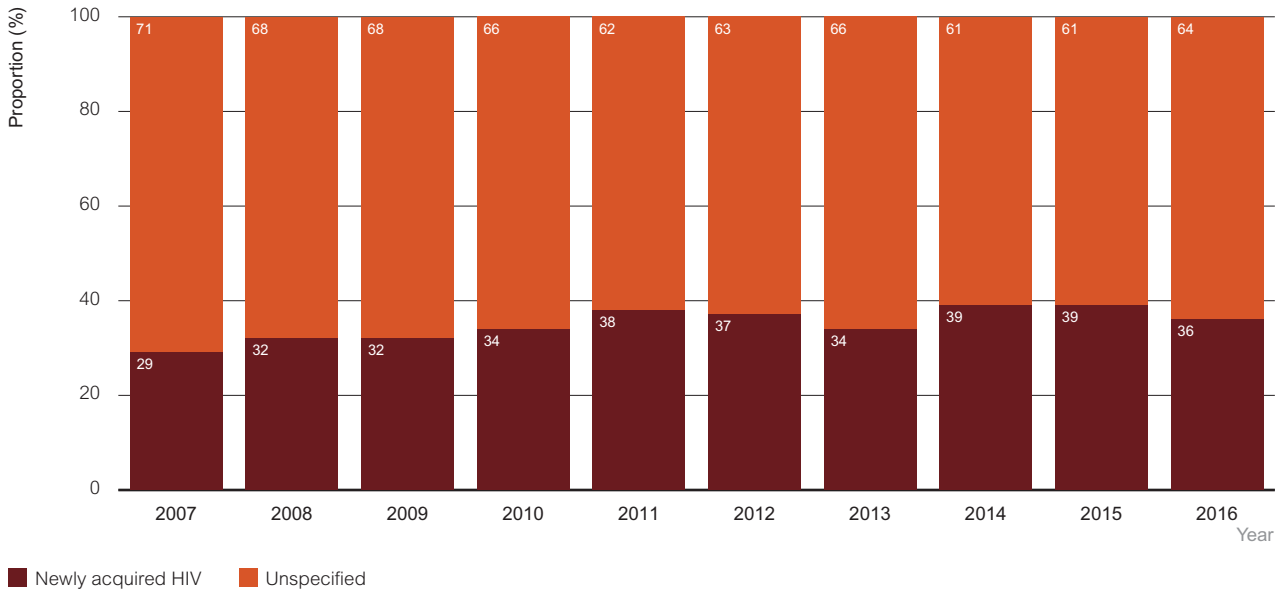
Source: Australian Paediatric Surveillance Unit; see Methodology for detail.

New HIV diagnoses 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 diagnoses that were reported to be newly acquired increased from 29% in 2007 to 38% in 2011 and has been relatively stable since then; it was 36% in 2016 (Table 1.1.1, Figure 1.1.19). Trends in the proportion of HIV notifications classified as newly acquired need to be interpreted cautiously as they could reflect increases in regular testing (allowing determination of recent infection) rather than an actual increase in newly acquired infections.

The rate of newly acquired in 2016 by jurisdiction was highest in the Northern Territory (3.7 per 100 000), New South Wales (1.9 per 100 000), Victoria (1.7 per 100 000) and Tasmania (1.7 per 100 000) (Figure 1.1.20). In the Australian Capital Territory, Tasmania and the Northern Territory the numbers of diagnoses each year are smaller, so trends need to be interpreted with caution.

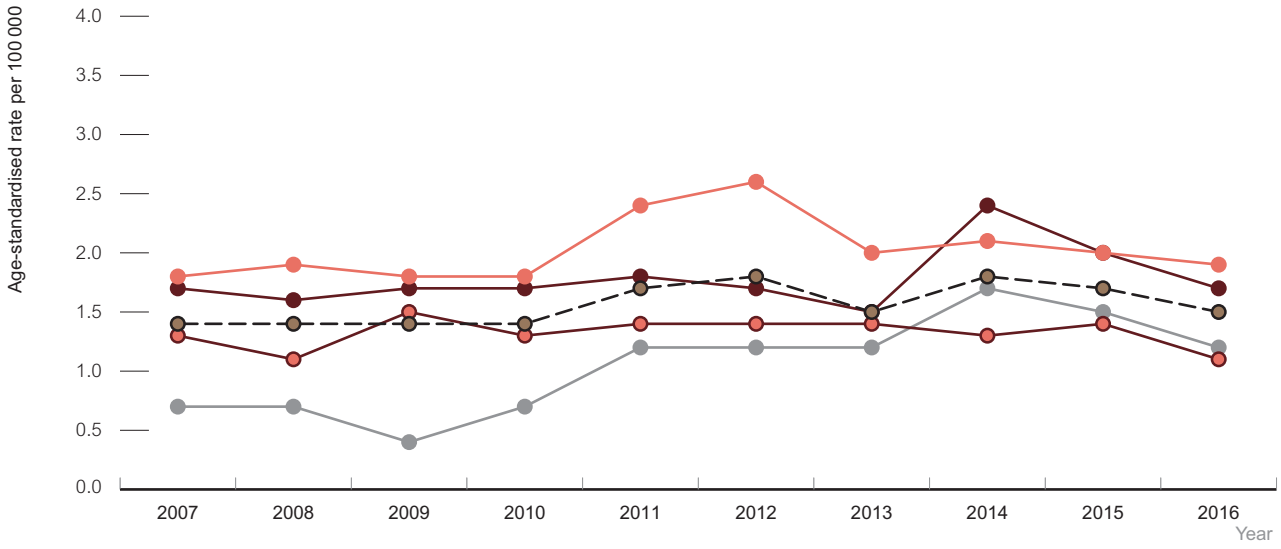
Figure 1.1.19 Newly diagnosed HIV in Australia, 2007–2016, by newly acquired HIV status and year



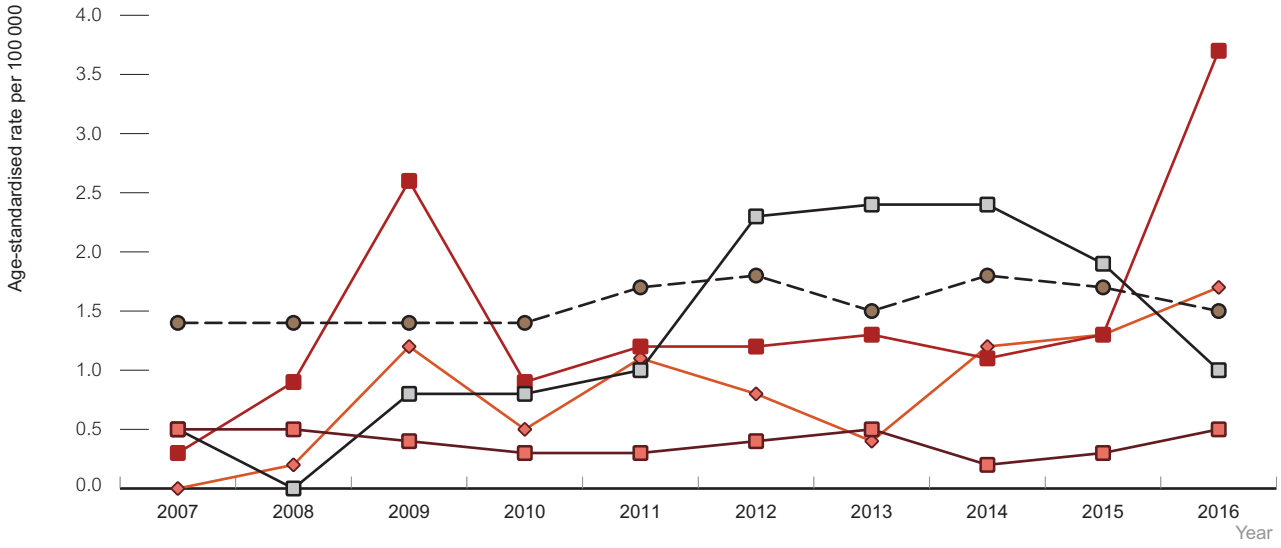
Note: Newly acquired HIV was defined as newly diagnosed infection with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis. Unspecified diagnoses are all diagnoses that do not meet the definition for newly acquired HIV.

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

Figure 1.1.20 Newly acquired HIV notification rate per 100 000 population, 2007–2016, by state/territory



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NSW	1.8	1.9	1.8	1.8	2.4	2.6	2.0	2.1	2.0	1.9
QLD	1.3	1.1	1.5	1.3	1.4	1.4	1.4	1.3	1.4	1.1
VIC	1.7	1.6	1.7	1.7	1.8	1.7	1.5	2.4	2.0	1.7
WA	0.7	0.7	0.4	0.7	1.2	1.2	1.2	1.7	1.5	1.2
Australia	1.4	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7	1.5

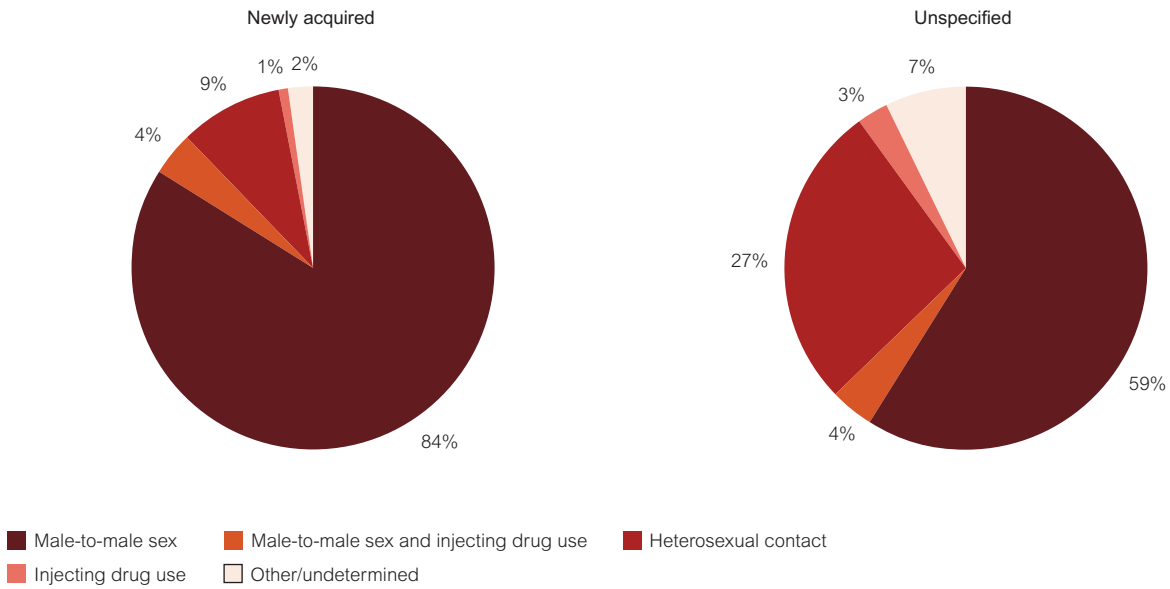


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ACT	0.5	0.0	0.8	0.8	1.0	2.3	2.4	2.4	1.9	1.0
NT	0.3	0.9	2.6	0.9	1.2	1.2	1.3	1.1	1.3	3.7
SA	0.5	0.5	0.4	0.3	0.3	0.4	0.5	0.2	0.3	0.5
TAS	0.0	0.2	1.2	0.5	1.1	0.8	0.4	1.2	1.3	1.7
Australia	1.4	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7	1.5

Source: State and Territory health authorities

Over the past 10 years (2007–2016) men with male-to-male sex as their HIV risk exposure accounted for 84% of newly acquired HIV diagnoses, compared to 59% of unspecified HIV diagnoses (not classified as newly acquired) (Figure 1.1.21), probably reflecting more frequent testing in this population (see page 86 for further details of repeat HIV testing among gay and bisexual men). Over the past 10 years, the number of newly acquired HIV notifications in homosexually active men peaked at 365 in 2014 and then decreased by 19% to 297 in 2016, representing an overall increase of 29% between 2007 and 2016 (Figure 1.1.22).

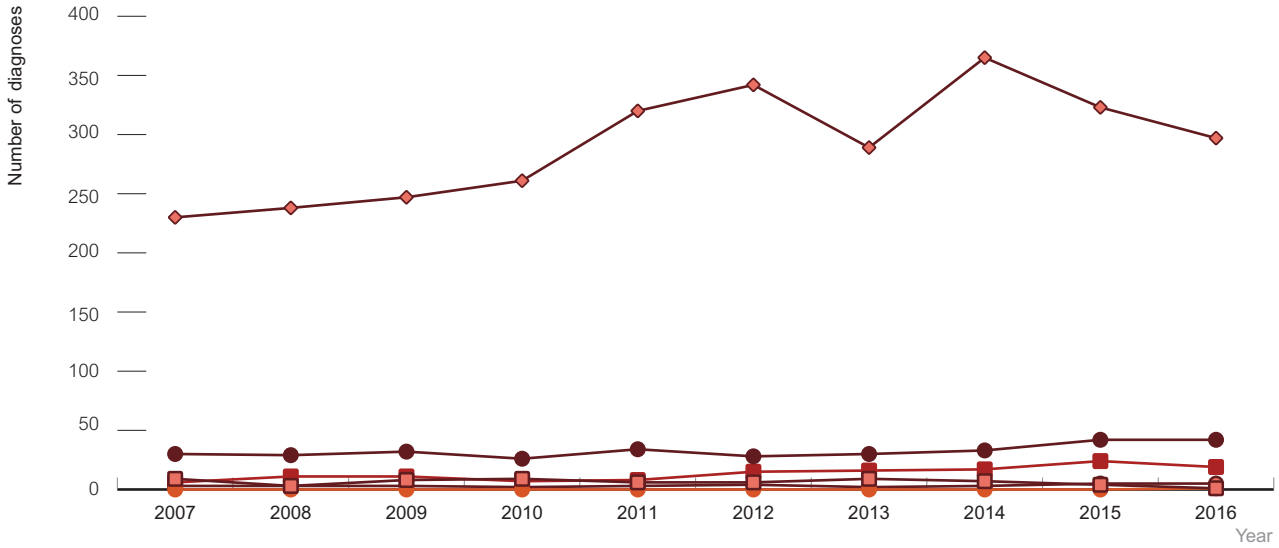
Figure 1.1.21 New HIV diagnoses classified as newly acquired or unspecified, 2007–2016, by HIV exposure category



Note: Newly acquired HIV was defined as newly diagnosed HIV with a negative or indeterminate HIV antibody test result, or a diagnosis of primary HIV within one year before HIV diagnosis. 'Unspecified' included all other newly diagnosed HIV that did not meet the criteria for newly acquired HIV

Source: State and Territory health authorities

Figure 1.1.22 Number of new HIV diagnoses classified as newly acquired, 2007–2016, by exposure risk category



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Male-to-male sex	230	238	247	261	320	342	289	365	323	297
Male-to-male sex and injecting drug use	6	11	11	7	8	15	16	17	24	19
Injecting drug use	3	3	3	2	3	4	2	3	5	5
Heterosexual sex	30	29	32	26	34	28	30	33	42	42
Mother with/at risk of HIV infection	0	0	0	0	0	0	0	0	0	1
Other/undetermined	9	3	8	9	6	6	9	7	4	1

Source: State and territory health authorities.

Clinical and immunological markers of timing of HIV diagnoses

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 diagnoses acquired before arriving in Australia.

Likely place of HIV acquisition

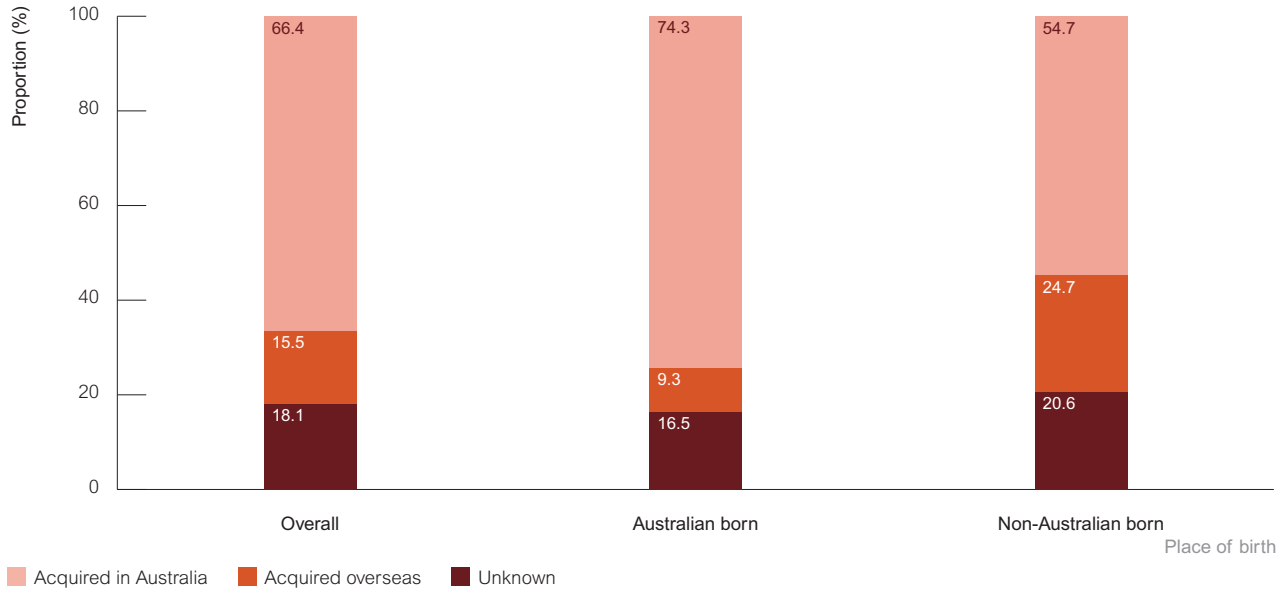
Between 2014 and 2016, notifications of new HIV diagnoses included likely place of HIV acquisition reported by the clinician, i.e. acquired in Australia, acquired overseas or place of acquisition unknown (see Methodology for further details).

Of new HIV diagnoses among Australian-born men with male-to-male sex as HIV exposure risk, three-quarters (74%) were likely to have acquired HIV in Australia, compared with just over half (55%) among men born outside Australia. Among Australian-born men a further 9% of newly diagnosed men were likely to have acquired HIV overseas, compared with 25% among men born overseas (Figure 1.1.23).

Of new HIV diagnoses among Australian-born people with heterosexual sex as HIV exposure risk, just under half (42%) were likely to have been acquired in Australia compared with 19% in people born outside Australia. A further 38% of newly diagnosed infections were likely to have been acquired overseas among Australian-born people compared with 51% in non-Australian-born people (Figure 1.1.24).

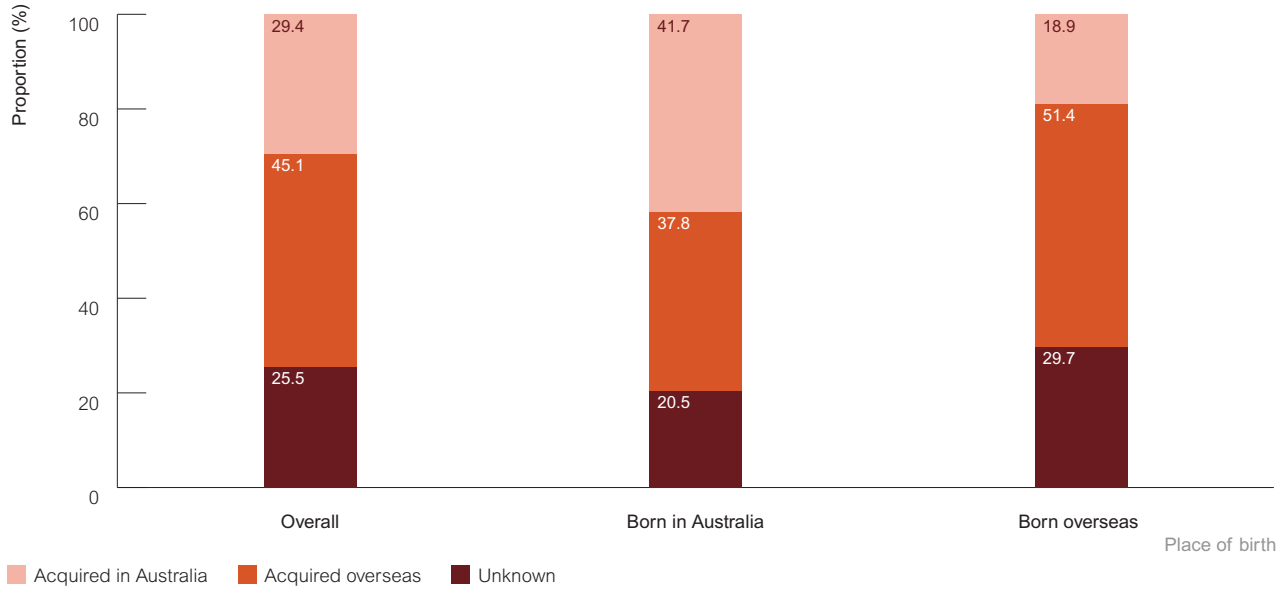
The above proportions may be an underestimate as the likely place of acquisition was reported as unknown for between 17% and 30% of new diagnoses, depending on country of birth and HIV risk exposure.

Figure 1.1.23 Likely place of HIV acquisition in newly diagnosed HIV notifications in men who reported male-to-male sex as an exposure risk, 2014–2016, by country of birth



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

Figure 1.1.24 Likely place of HIV acquisition in newly diagnosed HIV notifications in people who reported heterosexual sex as exposure risk, 2014–2016, by country of birth



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

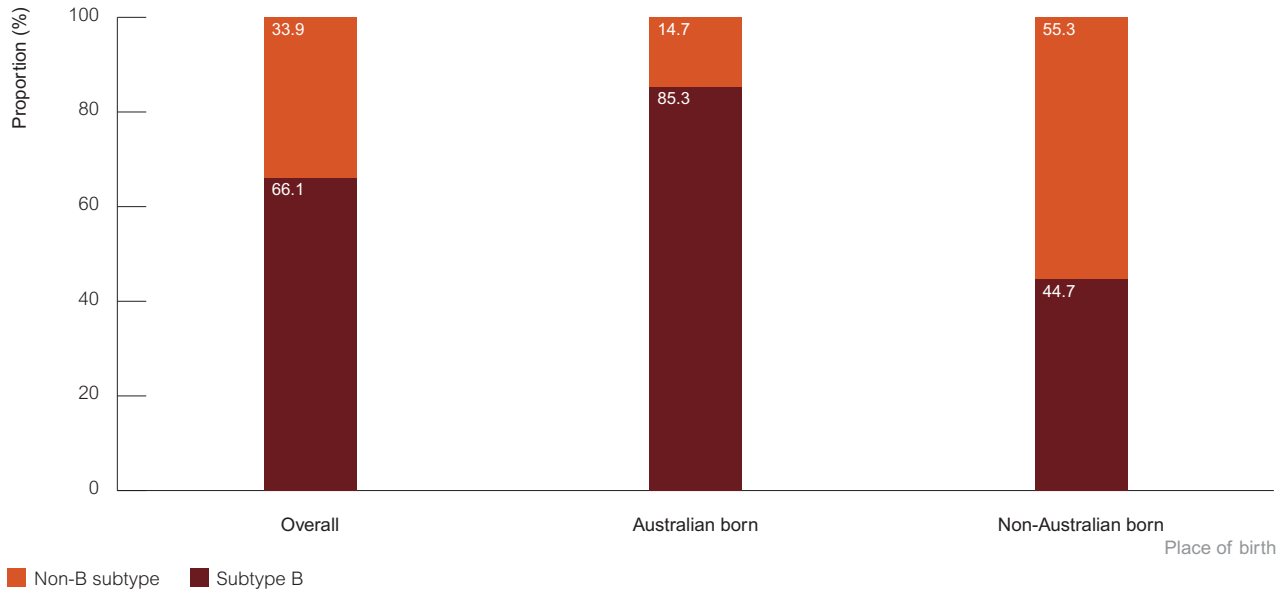
HIV subtype

HIV subtype has been included in this report for the first 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 new HIV diagnoses in Australia. In this report we have included HIV subtype based on new HIV diagnoses that were tested for subtype in New South Wales and South Australia in 2015. These data may not be nationally representative but provide information about subtype pattern in these states. Future reports will aim to include data from all jurisdictions (see Methodology for further details).

In 2015, in Australian-born men with male-to-male sex as HIV exposure risk, the majority (85%) of new HIV diagnoses were subtype B, compared with just under half (45%) of diagnoses in non-Australian-born men (Figure 1.1.25). In contrast, among people with heterosexual sex as their exposure risk, non-B subtypes were more prevalent being reported for three-quarters (73%) of diagnoses in Australian-born people and 81% of people born outside Australia (Figure 1.1.26).

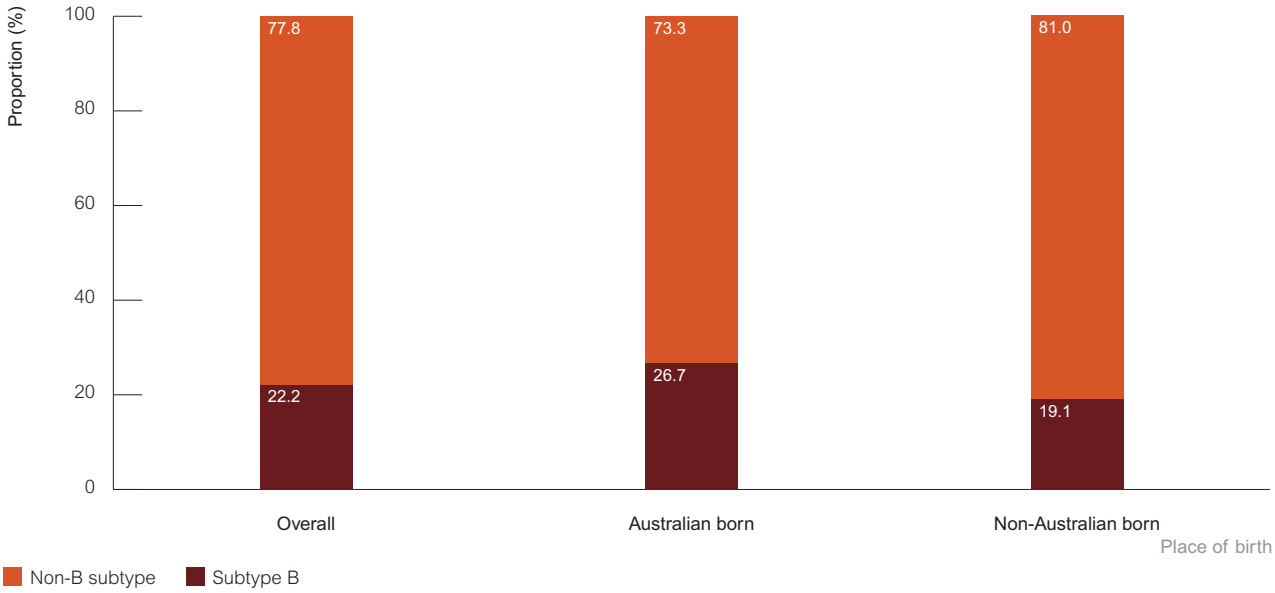
Figure 1.1.25 HIV subtype distribution in new HIV diagnoses in men who reported male-to-male sex as their exposure risk, 2015, by country of birth



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 1.1.26 HIV subtype distribution in newly diagnosed HIV notifications in people who reported heterosexual sex as exposure risk, 2015, 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).

The proportion of newly diagnosed HIV cases with a late diagnosis has remained stable over the past 10 years and was 33% in 2016 (Table 1.1.1). Among people reporting heterosexual sex as their exposure risk 43% were diagnosed late in 2016, compared with 29% in those reporting male-to-male sex.

Over the past five years (2012–2016) the proportion of HIV notifications with late diagnosis was highest in people born in Central America (45%), sub-Saharan Africa (43%) and Southeast Asia (43%) (data not shown).

Late diagnosis and year of arrival

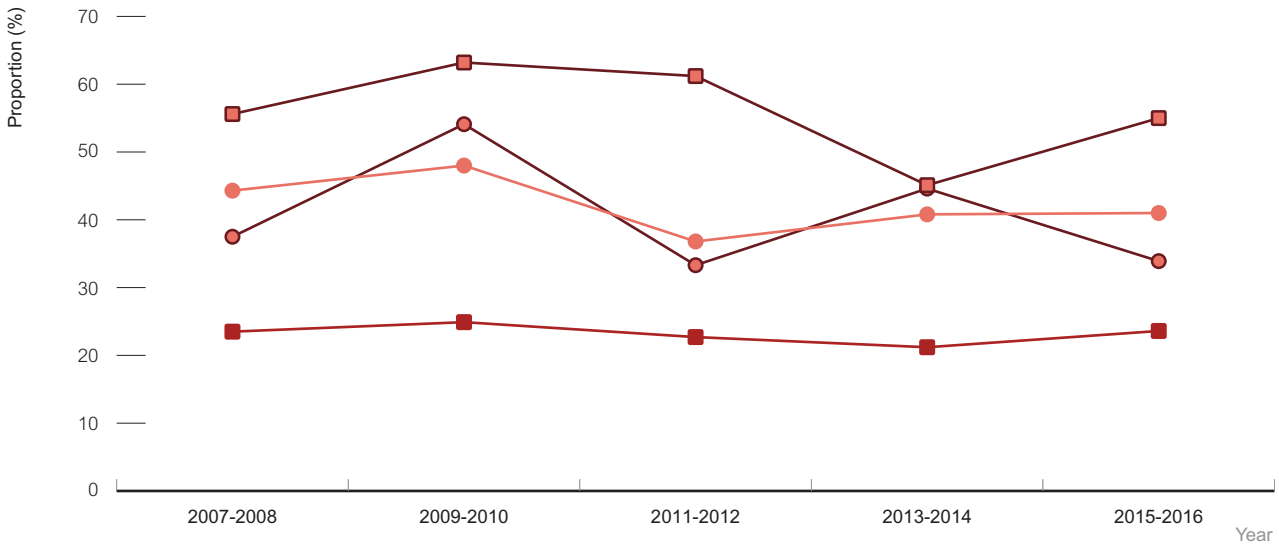
Of the late diagnoses in 2016 among people born in Southeast Asia and sub-Saharan Africa, almost two-thirds (63%) arrived in Australia less than five years before diagnosis, indicating that they probably acquired HIV before arriving in Australia (data not shown).

Late HIV diagnosis by key characteristics and exposure category

Over the past 10 years (2007–2016), there has been no major trend in the proportion of late diagnoses in any HIV exposure group. The proportion fluctuated and remained highest among people born in countries with high HIV prevalence (1% or higher) (45% to 63%), men reporting sex with both men and women (37% to 48%), and people with a partner from a high-prevalence country (45% to 63%), but was lower among people reporting only male-to-male sex, or male-to-male sex and injecting drug use (21% to 25%) (Figure 1.1.27).

Among HIV diagnoses attributed to male-to-male sex, late diagnosis was more common (over 33%) among men born in Southeast Asia, older men (over 50 years), men living in regional areas, men reporting sex with both men and women, and men reporting injecting drug use as well as sex with both men and women (Table 1.1.4, Figure 1.1.28). In this period, over half (56%) 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 1.1.27 Proportion of late HIV diagnoses, 2007–2016, by selected exposure category



	2007-2008	2009-2010	2011-2012	2013-2014	2015-2016
Male-to-male sex and male-to-male sex and injecting drug use	23.5	24.9	22.7	21.2	23.6
Men reporting sex with both men and women	44.3	48.0	36.8	40.8	41.0
From a high-prevalence country	55.6	63.2	61.2	45.1	55.0
Partner from a high-prevalence country	37.5	54.1	33.3	44.6	33.9

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

HIV

Table 1.1.4 Late HIV diagnoses[a] in men reporting an exposure category that included male-to-male sex, 2012–2016, by key characteristics

Category		Number diagnosed[b]	Number with late diagnosis	% with late diagnosis
Exposure	Total	3 289	808	24.6
Male-to-male-sex	Male-to-male-sex	2 805	643	22.9
	Male-to-male-sex and injecting drug use	153	32	20.9
	Men reporting sex with both men and women	284	114	40.1
	Men reporting sex with men and women and injecting drug use	47	19	40.4
Region of birth	Australia	2 069	460	22.2
	sub-Saharan Africa	40	9	22.5
	East Asia[c]	537	200	37.2
	Other/not reported	643	139	21.6
Aboriginal and Torres Strait Islander status[d]	Aboriginal and Torres Strait Islander	94	21	22.3
	Australian-born non-Indigenous	1 948	436	22.4
Age group (years)	<30	1 033	187	18.1
	30–39	994	199	20.0
	40–49	722	177	24.5
	50+	511	190	37.2
Place of residence[e]	Urban	2 815	660	23.5
	Regional	384	125	32.6
	Remote	19	5	26.3
State	New South Wales	1 358	314	23.1
	Victoria	708	167	23.6
	Queensland	696	179	25.7
	South Australia	119	57	47.9
	Western Australia	266	50	18.8
	Australian Capital Territory	62	15	24.2
	Tasmania	47	15	31.9
	Northern Territory	33	11	33.3

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.

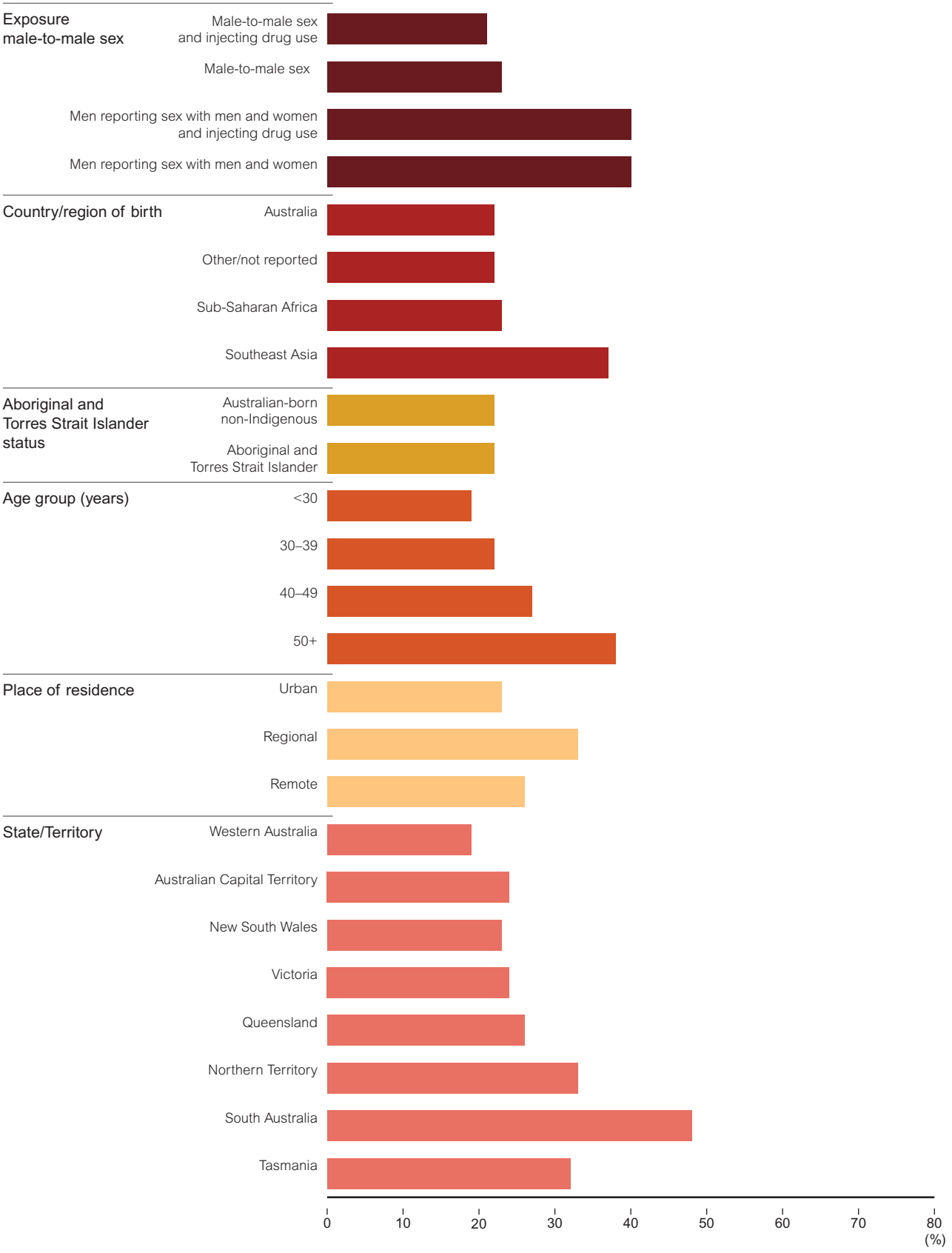
c Includes ABS regions Southeast Asia and Northeast Asia.

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 1.1.28 The proportion of late HIV diagnoses in men reporting an exposure category that included male-to-male sex, 2012–2016, by subcategory (*n* = 3289)



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.

A high proportion of late diagnoses were reported in people with heterosexual sex as an exposure risk (47% overall, 50% in men, and 45% in women), with variation by key demographic characteristics and HIV risk exposure (Table 1.1.5, Figures 1.1.29 and 1.1.30).

Table 1.1.5 Late HIV diagnoses[a] in people reporting heterosexual sex as their exposure category, 2012–2016, by key characteristics

		Heterosexual sex – men			Heterosexual sex – women		
Category		Number diagnosed[b]	Number with late diagnosis	% with late diagnosis	Number diagnosed[b]	Number with late diagnosis	% with late diagnosis
Exposure heterosexual sex	Total	497	246	49.5	386	172	44.6
	From high-prevalence country	54	28	51.9	121	63	52.1
	Partner from high-prevalence country	131	49	37.4	11	4	36.4
	Partner at high HIV risk	51	22	43.1	102	35	31.4
	Heterosexual contact risk not further specified	261	147	56.3	152	73	49.3
Region of birth	Australia	268	128	47.8	130	38	29.2
	Sub-Saharan Africa	52	25	48.1	93	45	48.4
	East Asia[c]	38	25	65.8	84	53	63.1
	Other/not reported	139	68	48.9	79	36	45.6
Aboriginal and Torres Strait Islander status	Aboriginal and Torres Strait Islander	17	9	52.9	17	6	35.3
	Australian-born non-Indigenous	251	119	47.4	113	32	28.3
Age group in years	<30	70	22	31.4	128	37	28.9
	30–39	111	48	43.2	128	68	53.1
	40–49	140	77	55.0	71	30	42.3
	50+	176	99	56.3	59	37	62.7
Place of residence	Urban	360	180	50.0	278	126	45.3
	Regional	110	56	50.9	92	42	45.7
	Remote	14	6	42.9	10	2	20.0
State	New South Wales	140	70	50.0	123	55	44.7
	Victoria	78	47	60.3	58	25	43.1
	Queensland	110	42	38.2	80	33	41.3
	South Australia	32	19	59.4	33	15	45.5
	Western Australia	101	49	48.5	62	26	41.9
	Australian Capital Territory	6	3	50.0	10	6	60.0
	Tasmania	14	8	57.1	6	4	66.7
	Northern Territory	16	8	50.0	14	8	57.1

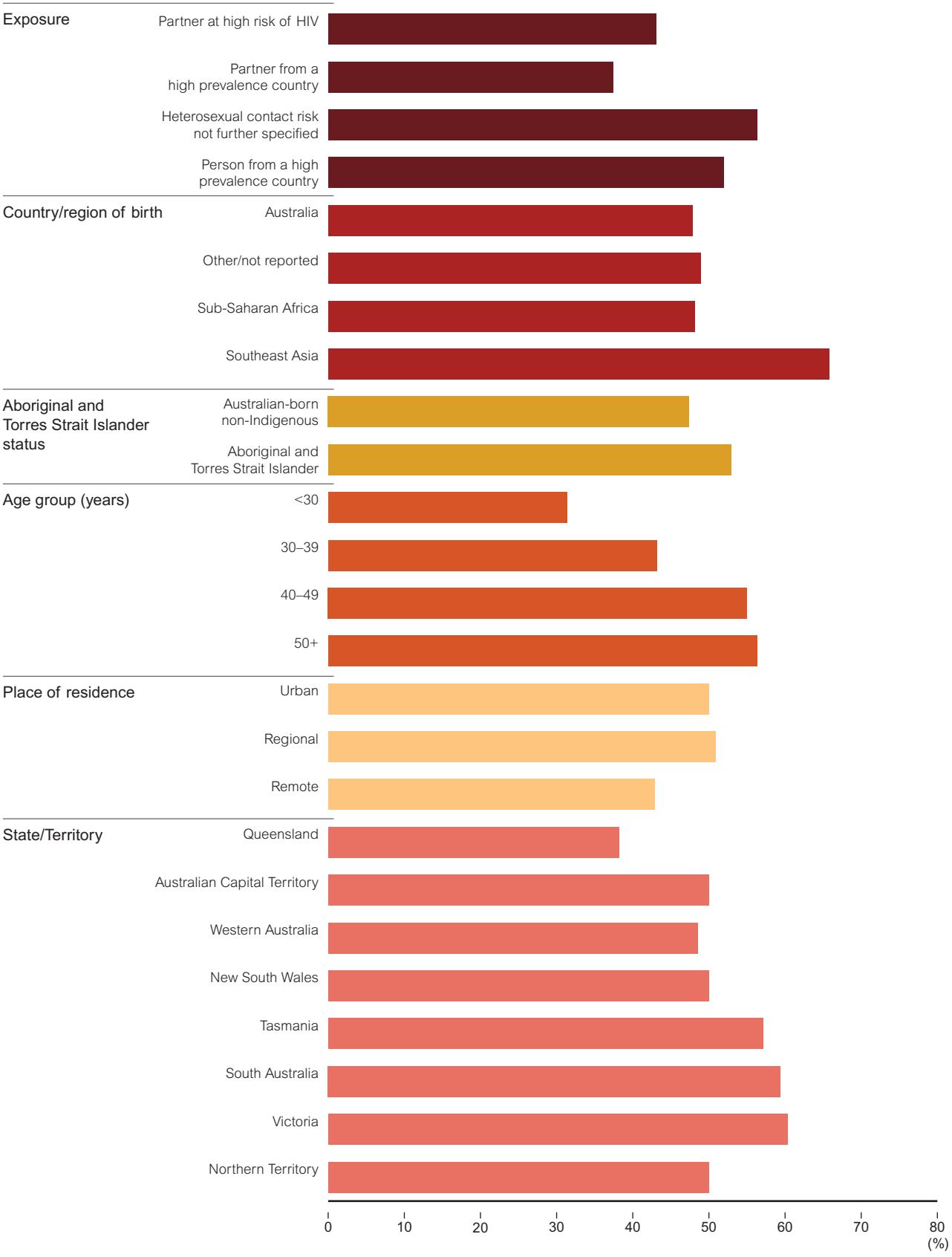
a Late HIV diagnosis was defined as new HIV diagnoses with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

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

c Includes ABS regions Southeast Asia and Northeast Asia.

Source: State and territory health authorities.

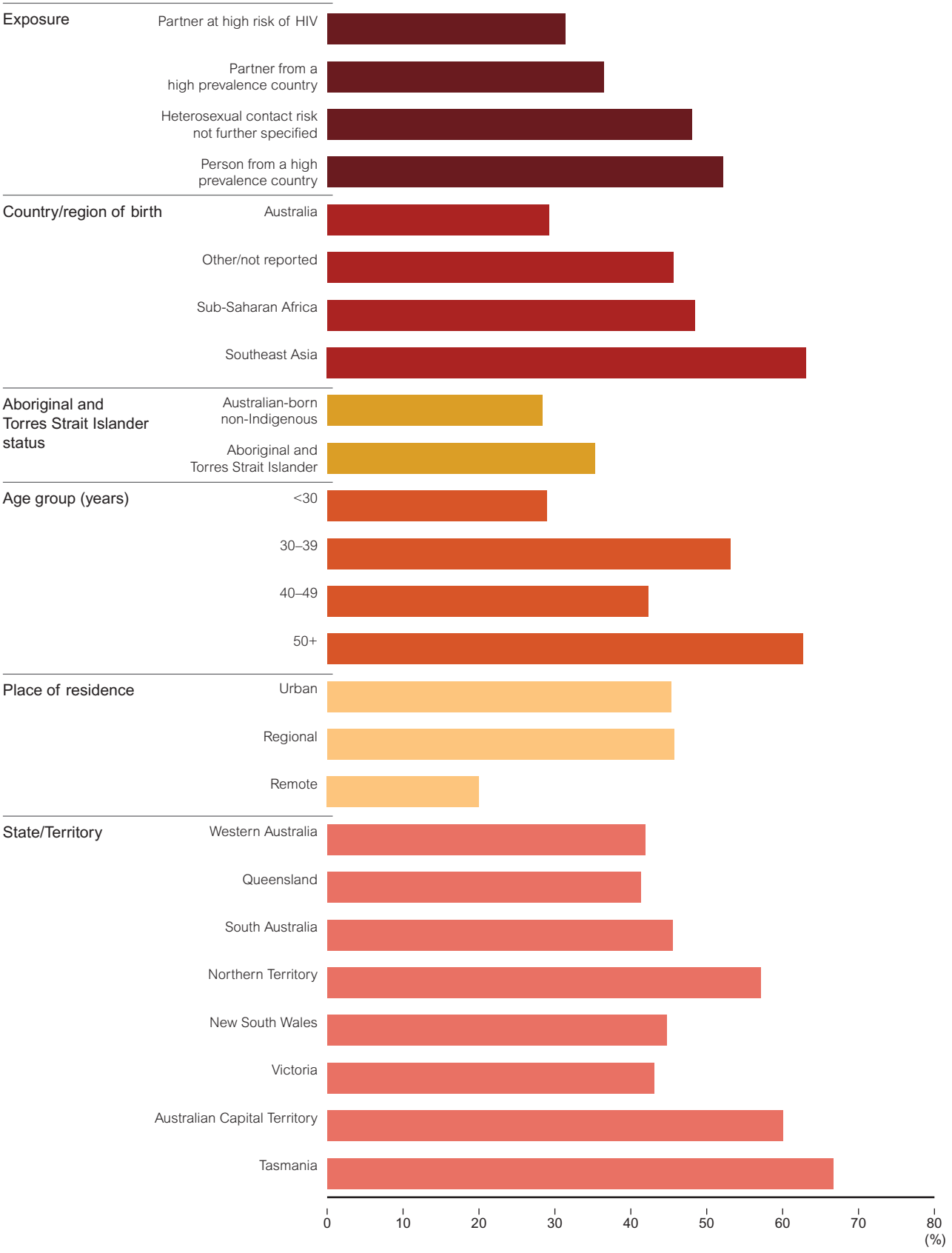
Figure 1.1.29 The proportion of late HIV diagnoses in males who reported heterosexual sex as an exposure risk, 2012–2016, by subcategory (*n* = 497)



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.

Figure 1.1.30 The proportion of late HIV diagnoses in women who reported heterosexual sex as an exposure risk, 2012–2016, by subcategory (*n* = 386)



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

1.2 HIV incidence

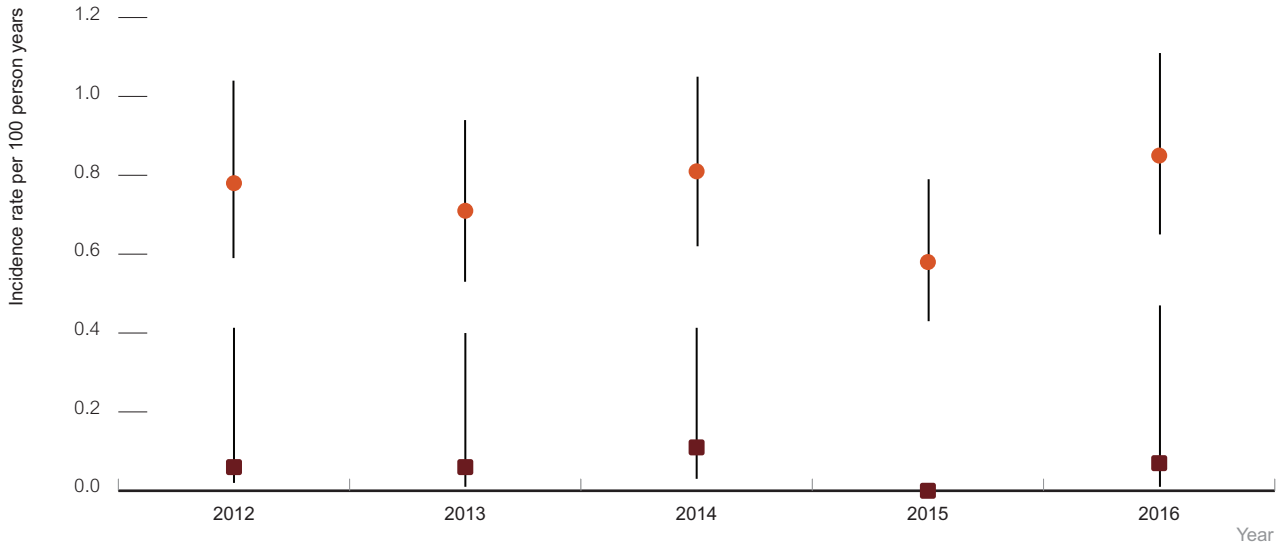
HIV incidence is the best indicator of changes in transmission in a population. HIV incidence is calculated from the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) project by dividing the number of seroconversions among people undergoing repeat HIV testing at sexual 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.

Over the past five years (2012–2016) among gay and bisexual men attending sexual health services who had at least one repeat HIV test (24 640), there were 302 seroconversions during 39 822 person-years at risk, equating to an overall HIV incidence of 0.76 per 100 person-years (95% confidence internal (CI) 0.68–0.85). HIV incidence fluctuated between 0.58 and 0.85 per 100 person-years (0.85 per 100 person-years in 2016 (Figure 1.2.1). It is important to note that the confidence intervals between these estimates overlap, meaning the differences observed each year are not statistically significant, and caution should be taken in interpretation.

Among female sex workers attending sexual health services who had at least one repeat HIV test (7005), there were only two seroconversions during 11 196 person-years at risk, equating to an overall HIV incidence of 0.07 per 100 person-years (95% CI 0.02–0.011). The HIV incidence remained at or under 0.11 per 100 person-years over the past five years (Figure 1.2.1).

These incidence estimates represent populations attending sexual health clinics and may not be generalised to broader priority populations. Future reports will aim to include data from primary care clinics also through the ACCESS network.

Figure 1.2.1 HIV incidence rate per 100 person-years in gay and bisexual men and female sex workers attending sexual health clinics, 2012–2016



	2012	2013	2014	2015	2016
Gay and bisexual men	0.78	0.71	0.81	0.58	0.85
Female sex workers	0.06	0.06	0.11	0.00	0.07

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

1.3 Number of people living with HIV and prevalence

Number of people living with HIV

At the end of 2016, among the 26 444 people estimated to be living with HIV in Australia, an estimated 19 855 infections were attributable to male-to-male sex exposure, 5692 to heterosexual sex, 558 to injecting drug use and, 153 to 'other' exposures (mother-to-child transmission, blood/tissue recipient, healthcare setting, haemophilia/coagulation disorder) (Table 1.3.1).

There were an estimated 574 people living in with HIV Australia at the end of 2016 who identified as Aboriginal and Torres Strait Islander at the time of HIV diagnosis. After adjusting for missing country of birth data, there were 2787 people living with HIV born in Southeast Asia and 1698 born in sub-Saharan Africa (Table 1.3.1).

Table 1.3.1 Estimated number of people living with HIV and HIV prevalence, 2016, 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)
Demographics						
Exposure risk category						
Male-to-male sex	19 855 (17 365 to 22 687)	18 074 (15 952 to 20 240)	1 781 (1 413 to 2 448)	9.0%	–	–
Heterosexual sex	5 692 (5 019 to 6 385)	4 756 (4 325 to 5 175)	937 (694 to 1 210)	16.5%	–	–
Injecting drug use	558 (439 to 710)	466 (412 to 520)	93 (28 to 190)	16.7%	–	–
Other	153 (137 to 170)	137 (123 to150)	16 (13 to 20)	10.5%	–	–
Subpopulation						
Males	23 230 (20 372 to 26422)	20 833 (18 452 to 23250)	2 397 (1 921 to 3172)	10.3%	0.24% (0.21 to 0.28)	9 514 995
Females	3 162 (2802 to 3539)	2 758 (2 532 to 2 980)	404 (271 to 559)	12.8%	0.03% (0.03 to 0.04)	9 832 743
Australian-born non-Indigenous people	15 240 (13 213 to 17 384)	14 082 (12 392 to 15 810)	1 158 (821 to 1 574)	7.0%	0.11% (0.09 to 0.13)	13 855 986
Aboriginal and Torres Strait Islander people	574 (470 to 726)	463 (419 to 497)	111 (51 to 229)	19.5%	0.11% (0.09 to 0.14)	507 178
Born in sub-Saharan Africa	1 698 (1 507 to 1 914)	1 524 (1 386 to 1 658)	174 (121 to 256)	10.6%	0.59% (0.52 to 0.67)	291 086
Born in Southeast Asia	2 787 (2 381 to 3 266	2 037 (1 864 to 2 204)	750 (517 to 1 062)	26.7%	0.34% (0.29 to 0.40)	817 915
Other country of birth	6 138 (5 323 to 7 011)	5 477(4 903 to 6 057)	661 (520 to 954)	10.7%	0.13% (0.11 to 0.15)	4 674 121
Total[a]	**26 444 (23 325 to 29 831)**	**23 648 (21 035 to 26 291)**	**2 796 (2 290 to 3 540)**	**10.6%**	**0.13% (0.09 to 0.11)**	**20 146 286**

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.

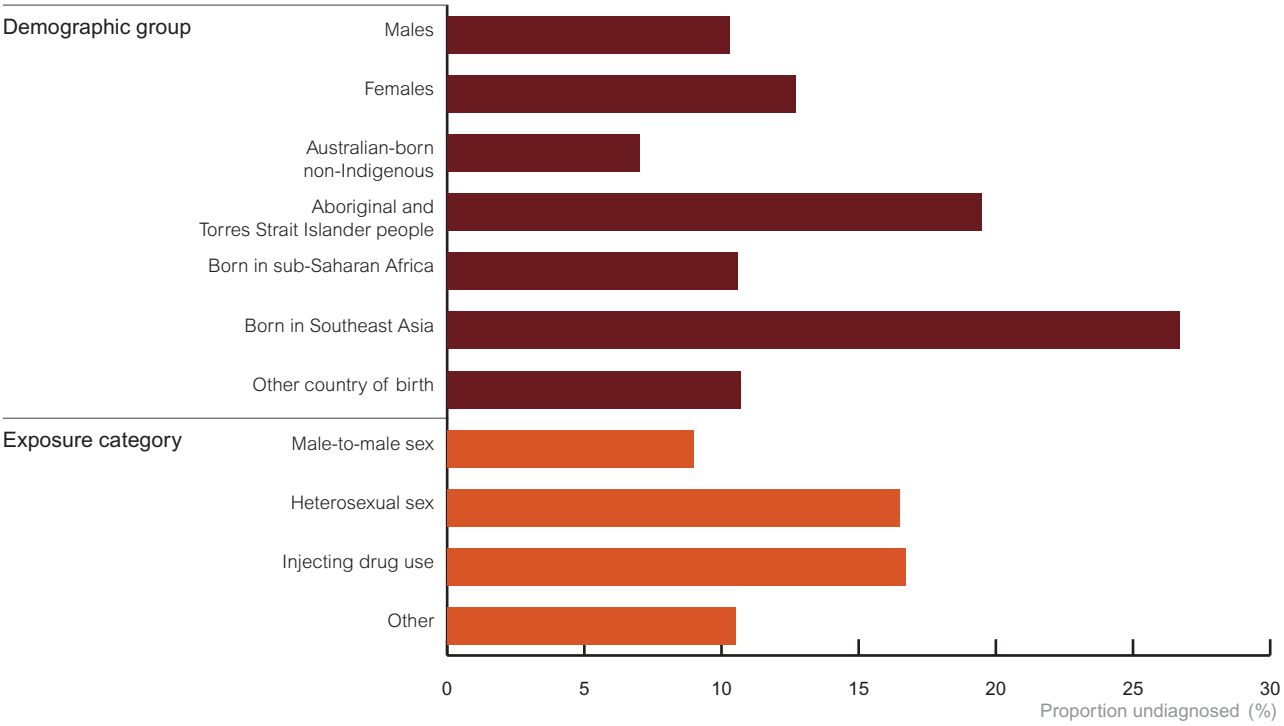
Source: See Methodology for details of mathematical modelling used to generate estimates.

Undiagnosed HIV infection

In 2016, there were an estimated 2796 (11% of all people living with HIV) people 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 (20%) than in the Australian-born non-Indigenous population (7%). People born in Southeast Asia had the highest proportion with undiagnosed HIV (27%), compared with people born in sub-Saharan Africa (11%) and other countries (11%) (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 (17%) (Figure 1.3.1, Table 1.3.1).

Figure 1.3.1 Estimated proportion of people living with HIV who are undiagnosed, 2016, by demographic group and exposure

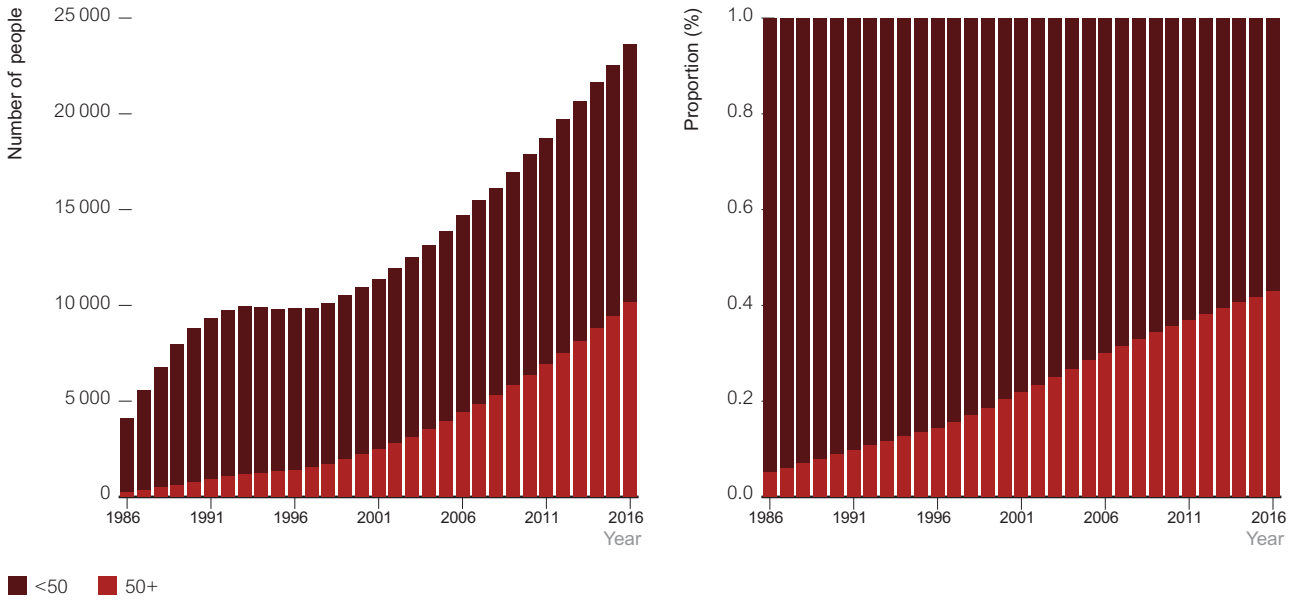


Source: See Methodology for details of mathematical modelling used to generate estimates.

Age of people living with HIV and diagnosed

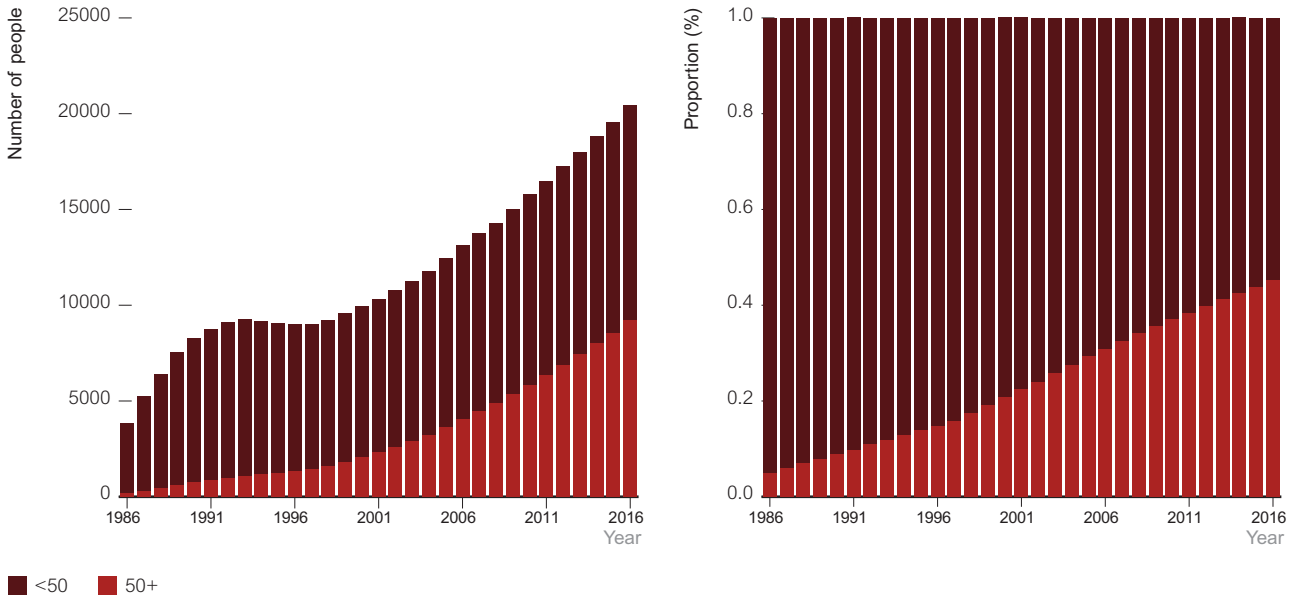
Since 1986 the number of people diagnosed with HIV has increased almost sixfold (4110 in 1986 to 23 648 in 2016). The age of the HIV-positive population has increased quite dramatically since 1986 due to the emergence of antiretroviral therapy in the mid-1990s, resulting in vastly improved survival in people with HIV, largely through reductions in AIDS-related complications. Of diagnosed people living with HIV in 1986, 5% were aged over 50 years compared with 43% aged over 50 years in 2016 (Figure 1.3.2). In men the pattern was similar, whereas in women the proportion aged over 50 years in 2016 was 26% compared with 17% in 1986 (Figures 1.3.3 and 1.3.4, Table 1.3.2).

Figure 1.3.2 Number and proportion of people living with HIV and diagnosed, 1986–2016



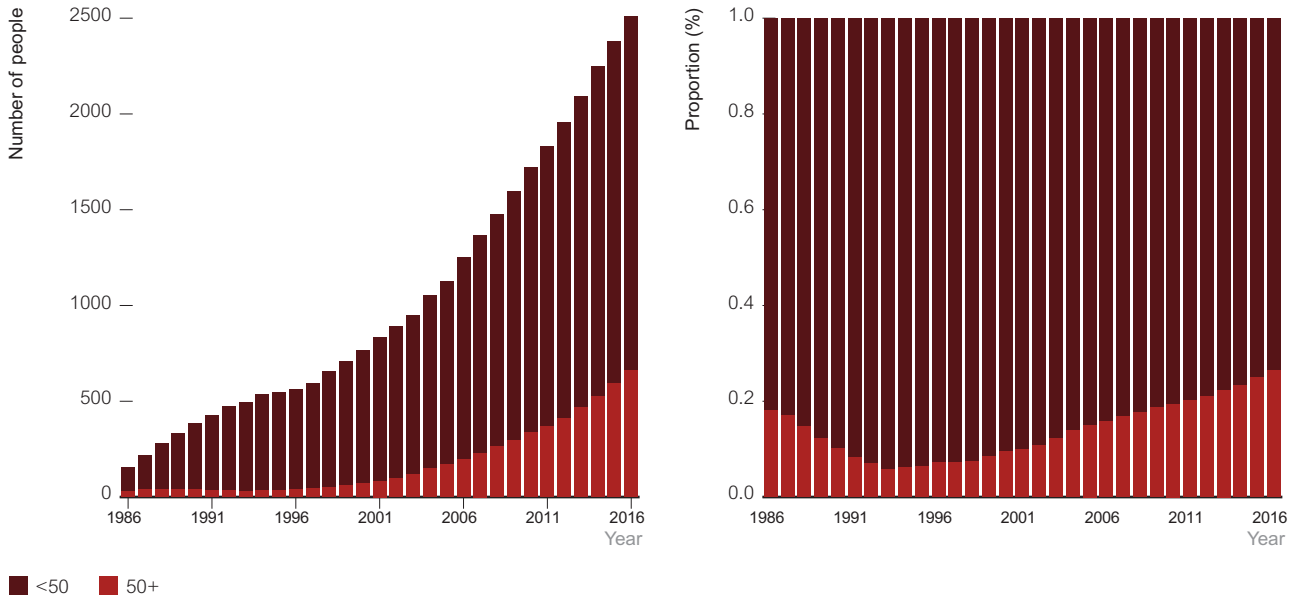
Source: See Methodology for details of mathematical modelling used to generate estimates.

Figure 1.3.3 Number and proportion of people living with HIV and diagnosed, 1986–2016, 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, 1986–2016, 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, 2007–2016, by sex and age group

Age (years)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total										
<50	10 617	10 819	11 152	11 502	11 846	12 219	12 492	12 838	13 138	13 479
50+	4 853	5 300	5 816	6 369	6 909	7 507	8 140	8 807	9 418	10 147
Males										
<50	9 308	9 432	9 675	9 936	9 158	9 349	9 490	9 697	9 849	10 020
50+	4 471	4 875	5 342	5 849	6 339	6 872	7 426	8 016	8 545	9 250
Females										
<50	1 133	1 215	1 297	1 387	1 466	1 546	1 624	1 723	1 787	1 844
50+	231	262	296	335	369	410	468	523	593	667

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

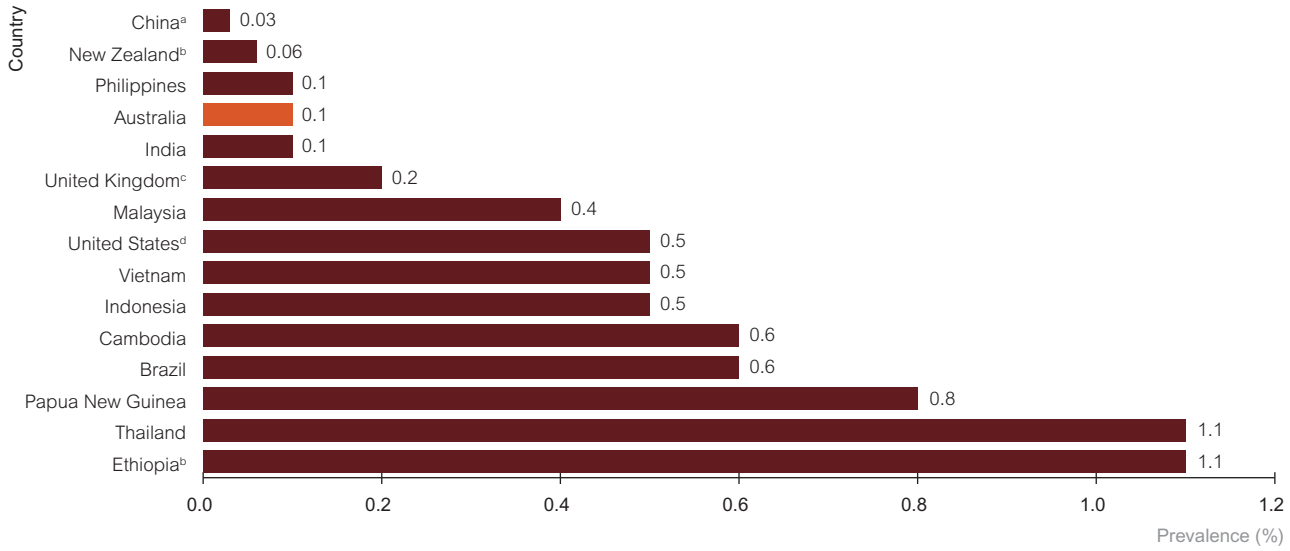
HIV

HIV prevalence

The estimated HIV prevalence in Australia (the proportion of people who are living with HIV) in 2016 was 0.13% among adults aged older than15 years (Table 1.3.1). The prevalence in Australia is low compared to that reported to UNAIDS by other high-income countries including the United Kingdom (0.2% in 2014), the United States (0.5% in 2012) 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 2016 (Table 1.3.1).

For every 100 people living and diagnosed with HIV in Australia, there were 5.1 new HIV diagnoses in 2007, declining by 24% to 3.9 in 2016 (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.

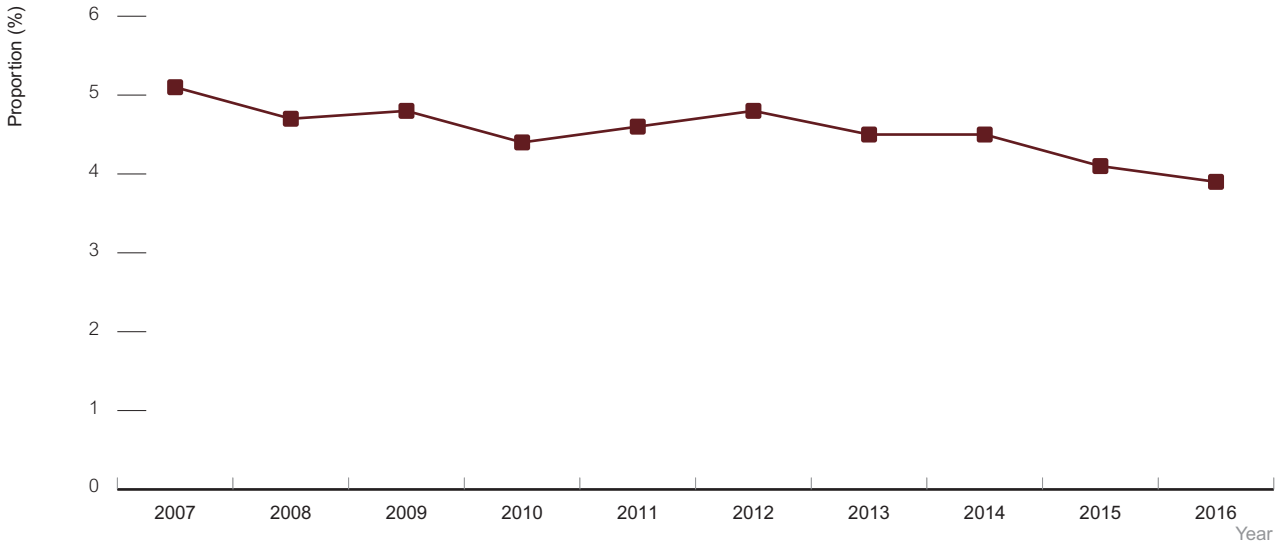
Figure 1.3.5 Estimated HIV prevalence in selected countries, 2016



a 2013 prevalence
b 2015 prevalence
c 2014 prevalence
d 2012 prevalence

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

Figure 1.3.6 Annual new HIV diagnoses as a proportion of the estimated number of people living with HIV and diagnosed, 2007–2016



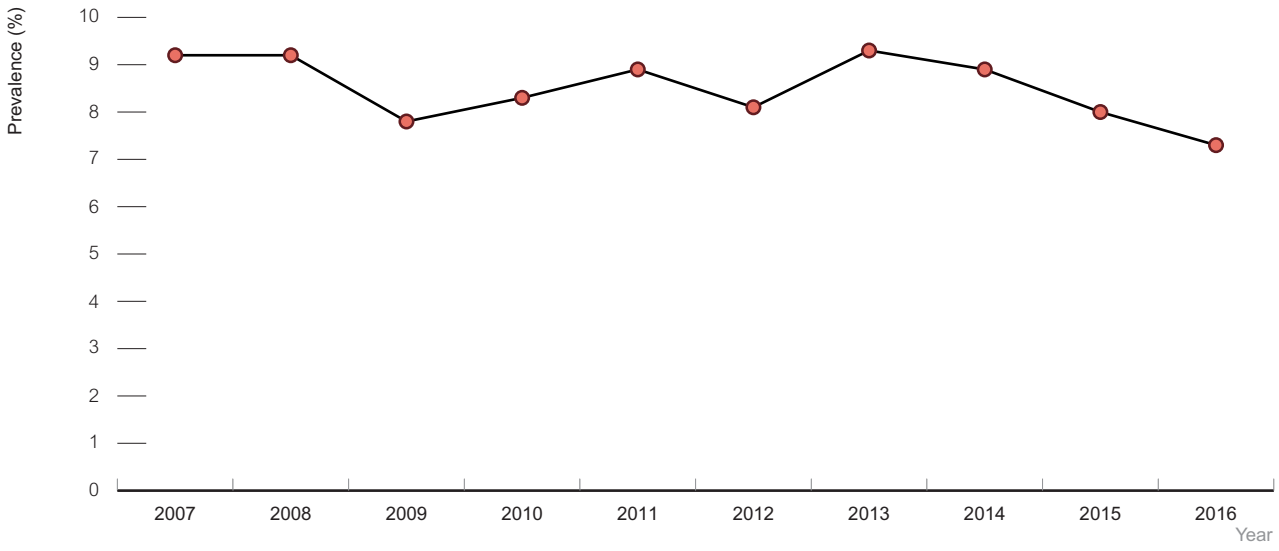
Proportion (%)									
5.1	4.7	4.8	4.4	4.6	4.8	4.5	4.5	4.1	3.9

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

HIV

Australia has a concentrated epidemic among gay and bisexual men. According to the Gay Community Periodic Surveys, the unadjusted prevalence of HIV among gay men decreased by 21% over the past 10 years from 9.2% in 2007 to 7.3% in 2016 (Figure 1.3.7). These data reflect community-attached gay and bisexual men and are based on self-reported HIV status; they therefore need to be interpreted with caution.

Figure 1.3.7 Self-reported HIV prevalence among gay men participating in the Gay Community Periodic Surveys, 2007–2016

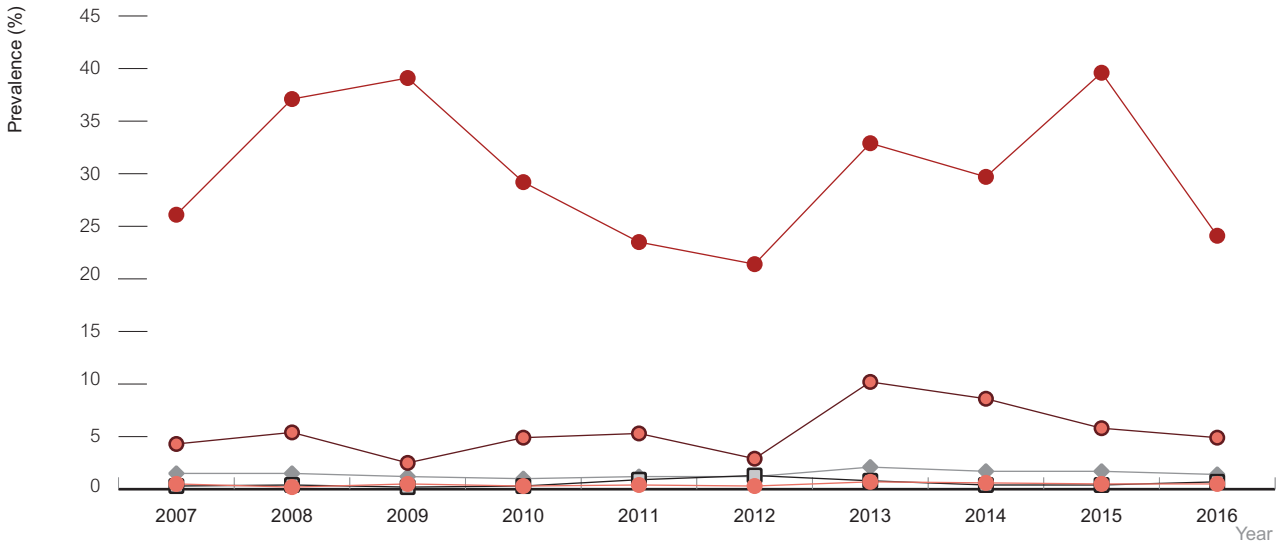


HIV prevalence (%)									
9.2	9.2	7.8	8.3	8.9	8.1	9.3	8.9	8	7.3

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 1.7% among people attending needle and syringe programs in the past 10 years (1.4% in 2016), 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, 2007–2016, by gender and sexual identity



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women (%)	0.3	0.4	0.2	0.3	0.9	1.3	0.8	0.4	0.4	0.7
Male homosexual (%)	26.1	37.1	39.1	29.2	23.5	21.4	32.9	29.7	39.6	24.1
Male bisexual (%)	4.3	5.4	2.5	4.9	5.3	2.9	10.2	8.6	5.8	4.9
Male heterosexual (%)	0.5	0.2	0.5	0.3	0.4	0.3	0.7	0.6	0.5	0.5
Total (%)	1.5	1.5	1.2	1	1.2	1.2	2.1	1.7	1.7	1.4

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

1.4 HIV testing and care

The HIV diagnosis and care cascade

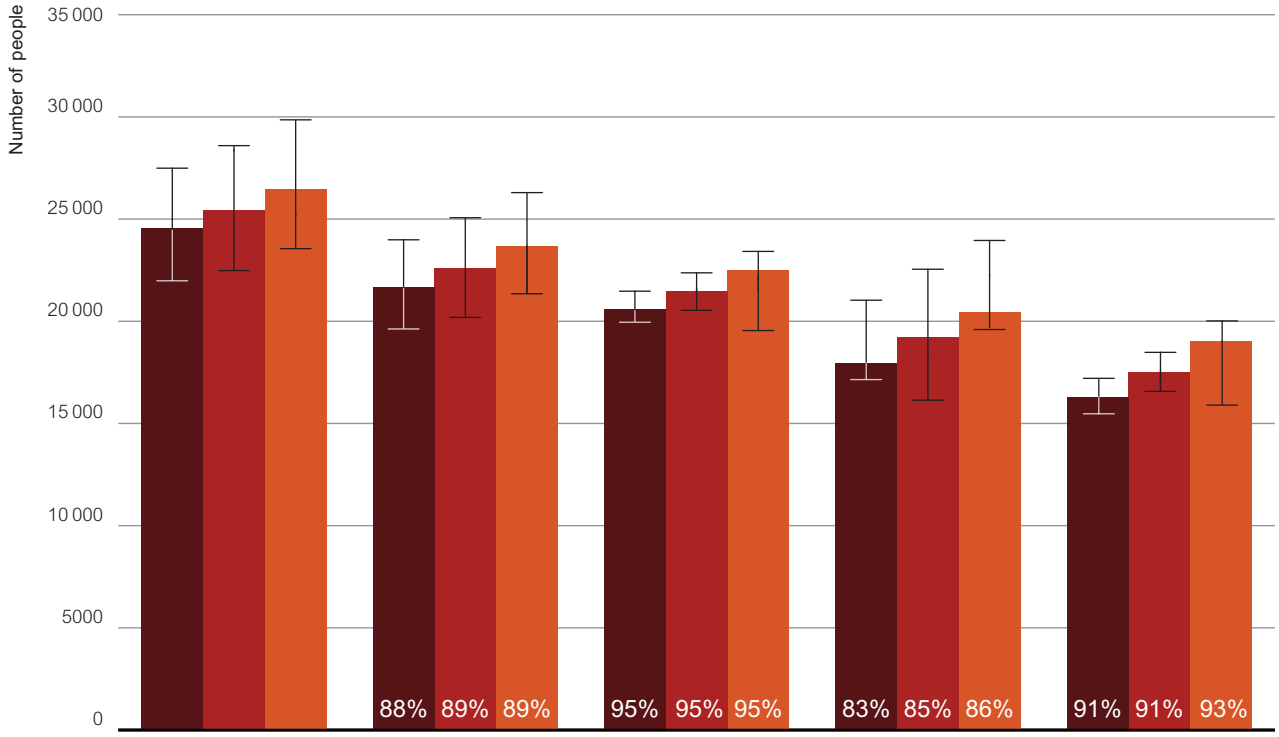
This report includes the 'HIV diagnosis and care cascade', which estimates the number of people living with HIV in Australia, and the number and proportion of people with HIV who are diagnosed, receiving antiretroviral treatment, retained in care (having had a viral load or CD4+ cell count in the past 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 were 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.

In 2016, it was estimated that there were 26 444 people living with HIV in Australia. Of these an estimated 23 648 (89%) had been diagnosed, 22 465 (95% of those diagnosed) were retained in care, 20 440 (86% of those diagnosed) were receiving antiretroviral therapy, and 19 013 (93% of those on antiretroviral therapy) had suppressed viral load (Figure 1.4.1). This corresponds to 72% of people living with HIV with suppressed viral load in 2016.

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.

Focusing on the 95% targets, Australia is tracking towards the achievement of the first two targets, and is close to the third target (95% of all people receiving antiretroviral therapy with suppressed viral load). The cascade also shows the gaps at the end of 2016. An estimated 7431 (28%) of all people living with HIV did not have suppressed viral load. Of these, 32% were undiagnosed, 17% were diagnosed but not in care, 30% were in care but not on antiretroviral therapy, and 21% 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, 2014–2016



	Living with HIV	Living with HIV and diagnosed	Retained in care	Receiving antiretroviral therapy	Supressed viral load
2014	24 531	21 665	20 582	17 939	16 279
2015	25 404	22 577	21 448	19 189	17 517
2016	26 444	23 648	22 465	20 440	19 013

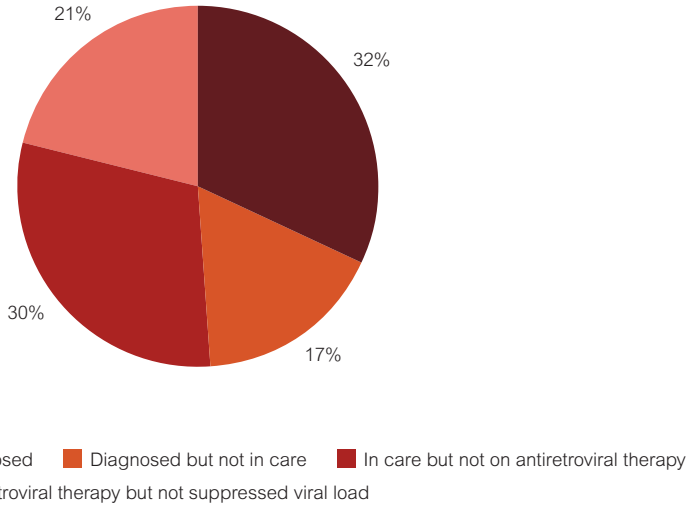
Source: See Methodology for details of mathematical modelling used to generate estimates.

Table 1.4.1 The HIV diagnosis and care cascade estimates, 2014–2016

Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2014	24 531 (21 390 to 26 844)	21 665 (19 379 to 23 982)	20 582 (17 713 to 23 694)	17 939 (17 057 to 18 825)	16 279 (15 368 to 17 205)
2015	25 404 (22 484 to 28 589)	22 577 (20 126 to 25 061)	21 448 (18 395 to 24 760)	19 189 (18 276 to 20 107)	17 517 (16 566 to 18 484)
2016	26 444 (23 325 to 29 831)	23 648 (21 035 to 26 291)	22 465 (19 226 to 25 975)	20 440 (19 495 to 21 389)	19 013 (18 019 to 20 022)

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, 2016



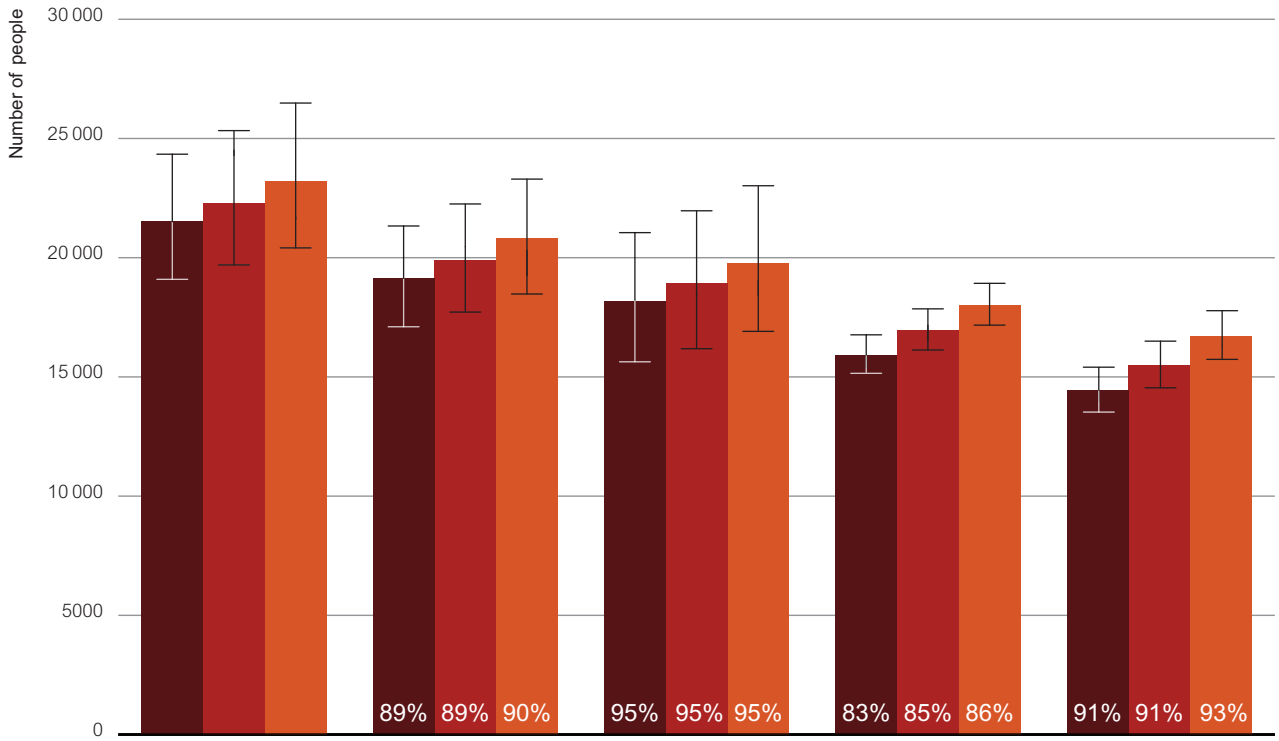
Source: See Methodology for details of mathematical modelling used to generate estimates.

HIV

The HIV diagnosis and care cascade for males

It was estimated that there were 23 230 males living with HIV in Australia in 2016. Of these an estimated 20 833 (90%) were diagnosed, 19 791 (95% of those diagnosed) were retained in care, 18 009 (86% of those diagnosed) were receiving antiretroviral therapy, and 16 724 (93% of those on antiretroviral therapy) had suppressed viral load (Figure 1.4.3, Table 1.4.2). This corresponds to 72% of all males living with HIV with suppressed viral load in 2016.

Figure 1.4.3 The HIV diagnosis and care cascade, 2014–2016, males



	Living with HIV	Living with HIV and diagnosed	Retained in care	Receiving antiretroviral therapy	Supressed viral load
2014	21 541	19 154	18 197	15 917	14 441
2015	22 306	19 919	18 923	16 948	15 482
2016	23 230	20 833	19 791	18 009	16 724

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

Table 1.4.2 The HIV diagnosis and care cascade estimates, 2014–2016, males

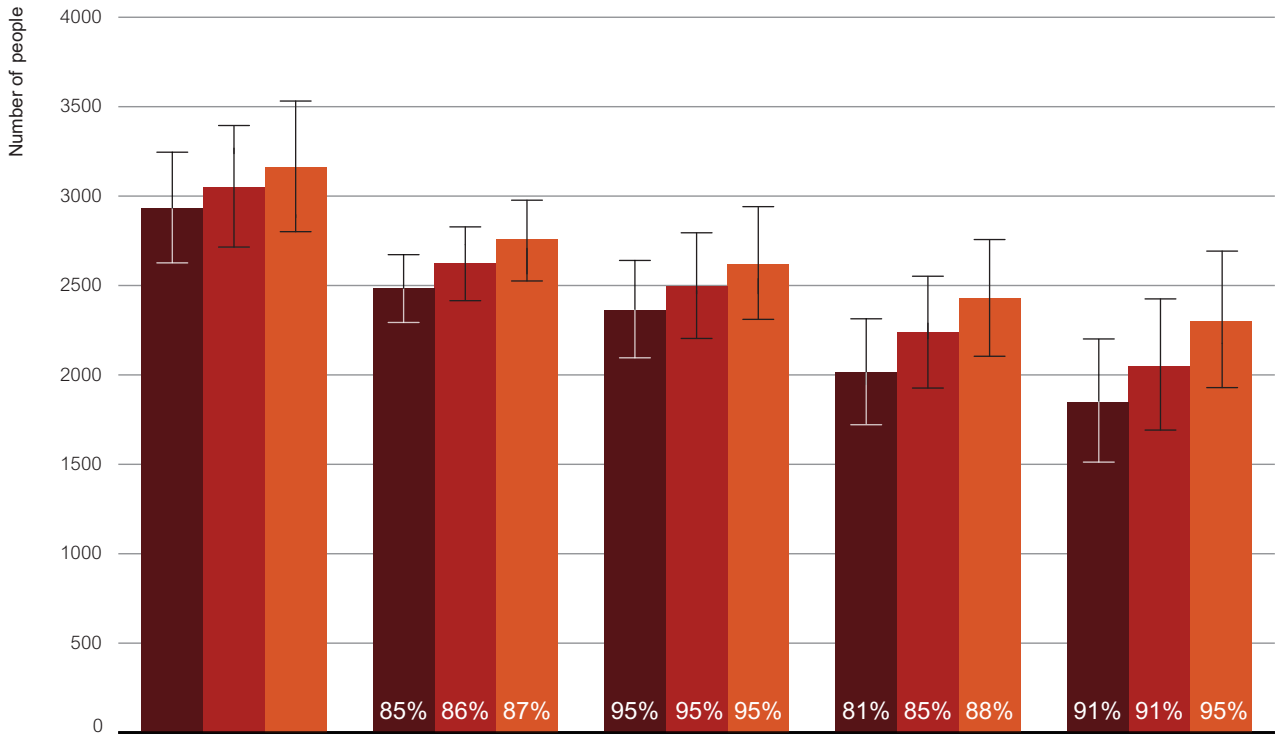
Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2014	21 541 (19 077 to 24 303)	19 154 (17 062 to 21 282)	18 197 (15 595 to 21 027)	15 917 (15 096 to 16 740)	14 441 (13 517 to 15 388)
2015	22 306 (19 653 to 25 280)	19 919 (17 681 to 22 195)	18 923 (16 161 to 21 929)	16 948 (16 100 to 17 799)	15 482 (14 518 to 16 468)
2016	23 230 (20 372 to 26 422)	20 833 (18 452 to 23 250)	19 791 (16 865 to 22 971)	18 009 (17 134 to 18 888)	16 724 (15 723 to 17 748)

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 3162 females living with HIV in Australia in 2016. Compared to males, a lower proportion were estimated to be diagnosed (87%) but a higher proportion (88% of those diagnosed) were receiving antiretroviral therapy, and had suppressed viral load (95% of those on antiretroviral therapy) (Figure 1.4.4, Table 1.4.3). This corresponds to 73% of all females living with HIV with suppressed viral load in 2016.

Figure 1.4.4 The HIV diagnosis and care cascade, 2014–2016, females



	Living with HIV	Living with HIV and diagnosed	Retained in care	Receiving antiretroviral therapy	Supressed viral load
2014	2934	2487	2362	2018	1846
2015	3053	2626	2495	2240	2048
2016	3162	2758	2620	2431	2302

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

HIV

Table 1.4.3 The HIV diagnosis and care cascade estimates, 2014–2016, females

Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2014	2 934 (2 628 to 3 248)	2 487 (2 296 to 2 675)	2 362 (2 098 to 2 643)	2 018 (1 723 to 2 317)	1 846 (1 514 to 2 202)
2015	3 053 (2 717 to 3 399)	2 626 (2 417 to 2 832)	2 495 (2 210 to 2 798)	2 240 (1 928 to 2 556)	2 048 (1 693 to 2 428)
2016	3 162 (2 802 to 3 539)	2 758 (2 532 to 2 980)	2 620 (2 314 to 2 944)	2 431 (2 105 to 2 579)	2 302 (1 933 to 2694)

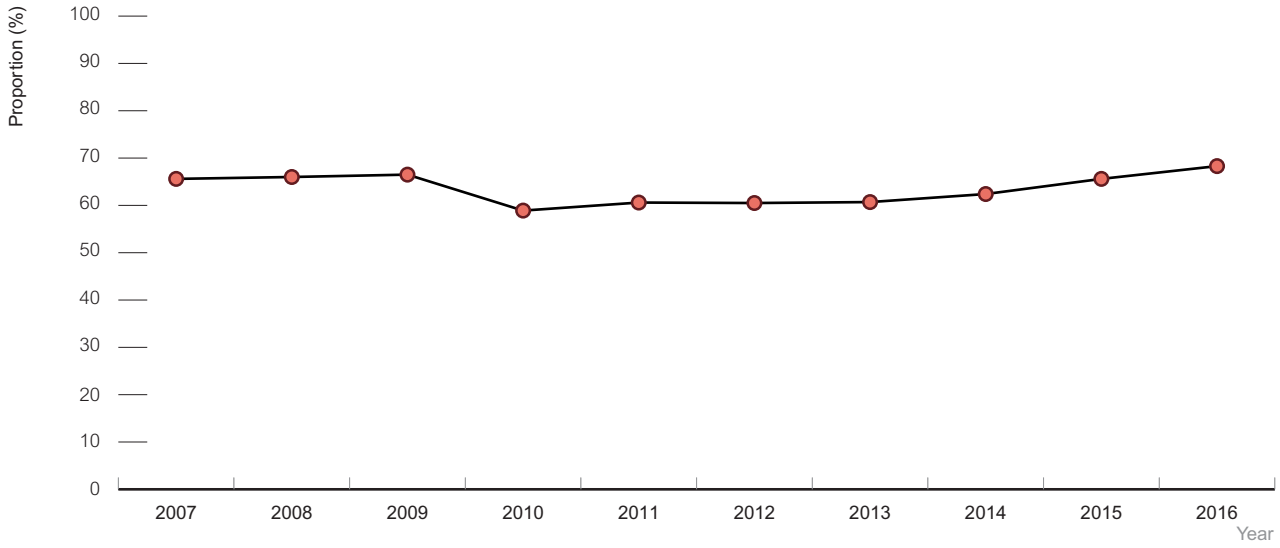
Source: see Methodology for details of mathematical modelling used to generate estimates

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.[7] 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.[11]

Behavioural surveys show the proportion tested in a year in Australia in selected priority populations. In the Gay Community Periodic Surveys 68% of non-HIV-positive gay men in 2016 self-reported having had an HIV test in the 12 months prior to the survey, a proportion which has increased from 61% in 2012 (Figure 1.4.5). According to the Australian Needle and Syringe Program Survey, in 2016 half of people (51%) 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).

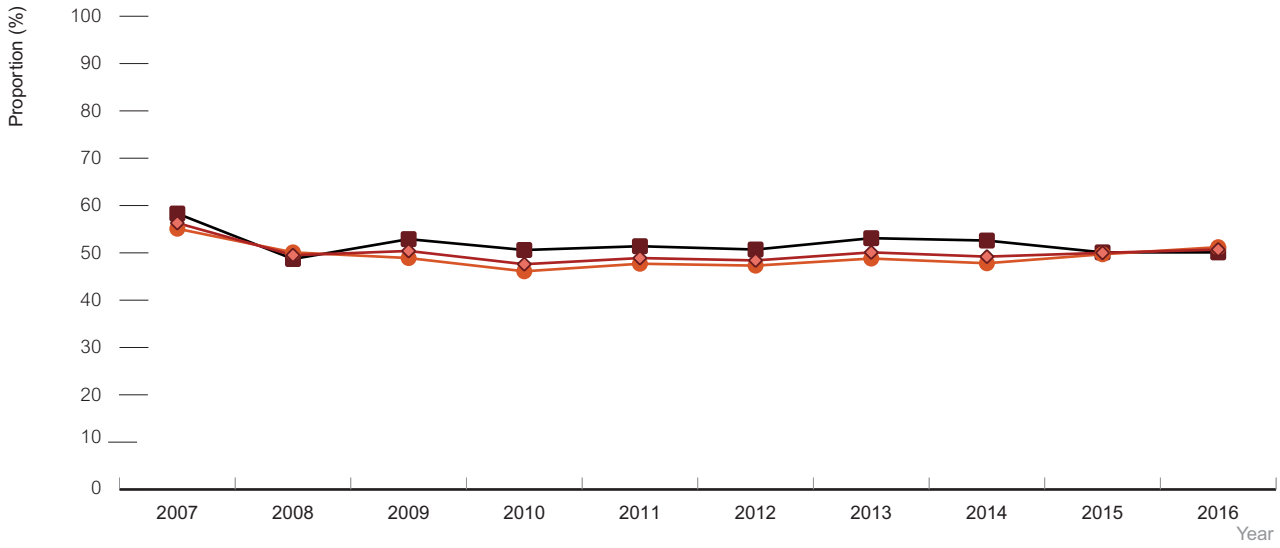
Figure 1.4.5 Proportion of non-HIV-positive gay and bisexual men tested for HIV in the 12 months prior to completing the survey, 2007–2016



Proportion (%)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	65.6	66.0	66.5	58.9	60.6	60.5	60.7	62.4	65.6	68.3

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

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, 2007–2016, by sex



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Men (%)	55.1	50.1	48.9	46.1	47.7	47.3	48.8	47.8	49.7	51.2
Women (%)	58.3	48.7	52.9	50.6	51.4	50.7	53.1	52.6	50.1	50.1
Total (%)	56.3	49.5	50.4	47.6	48.9	48.4	50.1	49.2	50.0	50.7

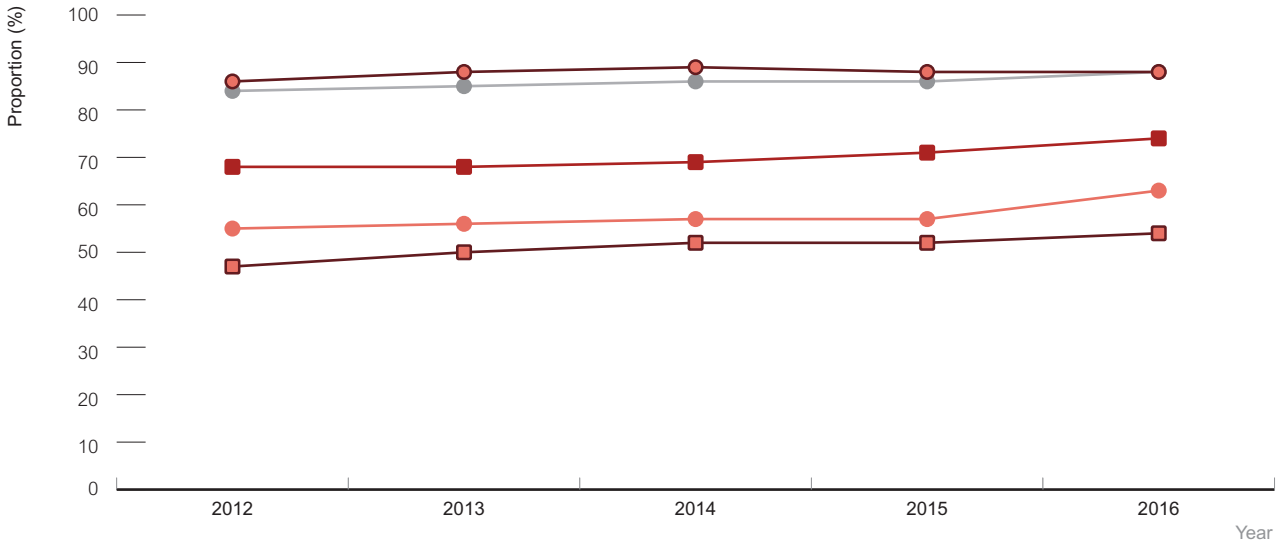
Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

According to the Gay Community Periodic Surveys, the most common locations for HIV testing among non-HIV-positive gay and bisexual men in 2016 were a general practice (40%) and a sexual health clinic (31%). Data from these clinical services therefore provide further information about HIV testing patterns.

At the 43 sentinel sexual health clinics across Australia participating in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network (see Methodology for further detail), between 2012 and 2016 the proportion of gay and bisexual men who were tested for HIV at least once in a year increased from 86% in 2012 to 88% in 2016 (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 2012 to 63% in 2016 (Figure 1.4.7). There was a 24% 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 51% in 2012 to 63% in 2016, and a 35% increase in the proportion of men who had a repeat HIV test within seven months, from 37% in 2012 to 50% in 2016, 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 88% in 2016 (Figure 1.4.7). Among people attending sexual health clinics who were recorded as currently injecting drugs, 74% received an HIV test in 2016. Further, among young heterosexuals attending sexual health clinics, 54% received an HIV test in 2016 (Figure 1.4.8).

Figure 1.4.7 Proportion of sexual health and high-caseload general practice clinic attendees tested for HIV in a year, 2012–2016, by priority population

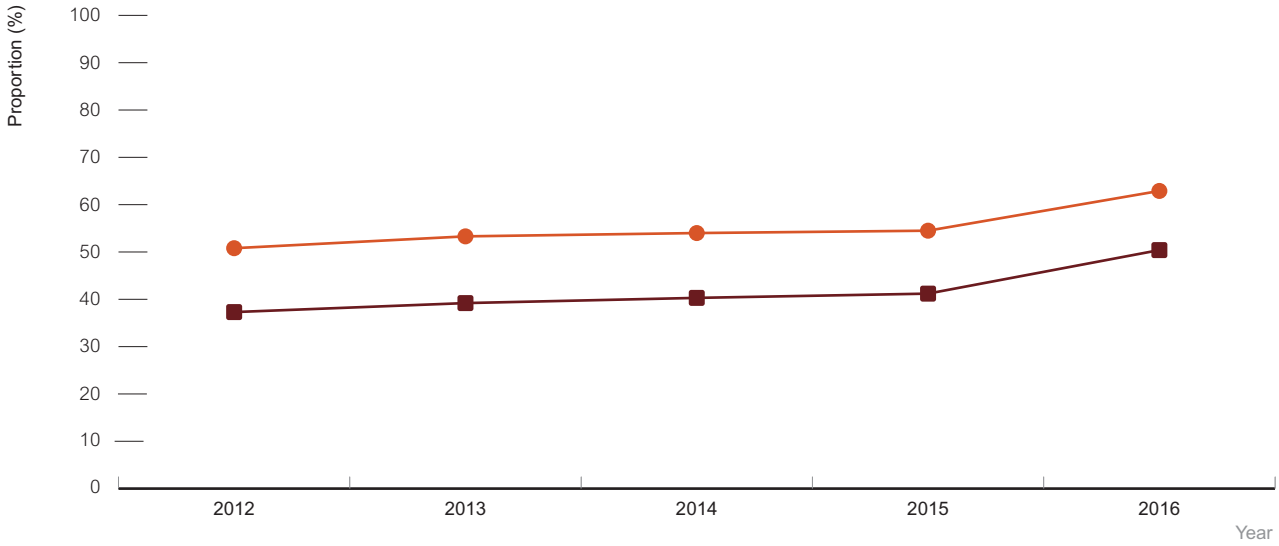


	2012	2013	2014	2015	2016
Heterosexuals aged 16–29y, sexual health clinic (%)	47	50	52	52	54
Women sex workers, sexual health clinic (%)	84	85	86	86	88
People who inject drugs, sexual health clinic (%)	68	68	69	71	74
Gay and bisexual men, sexual health clinic (%)	86	88	89	88	88
Gay and bisexual men, general practice clinic (%)	55	56	57	57	63

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, 2012–2016



	2012	2013	2014	2015	2016
Re-tested at 1–7 months (%)	37.3	39.2	40.3	41.2	50.4
Re-tested at 1–13 months (%)	50.8	53.3	54.0	54.5	62.9

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

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).

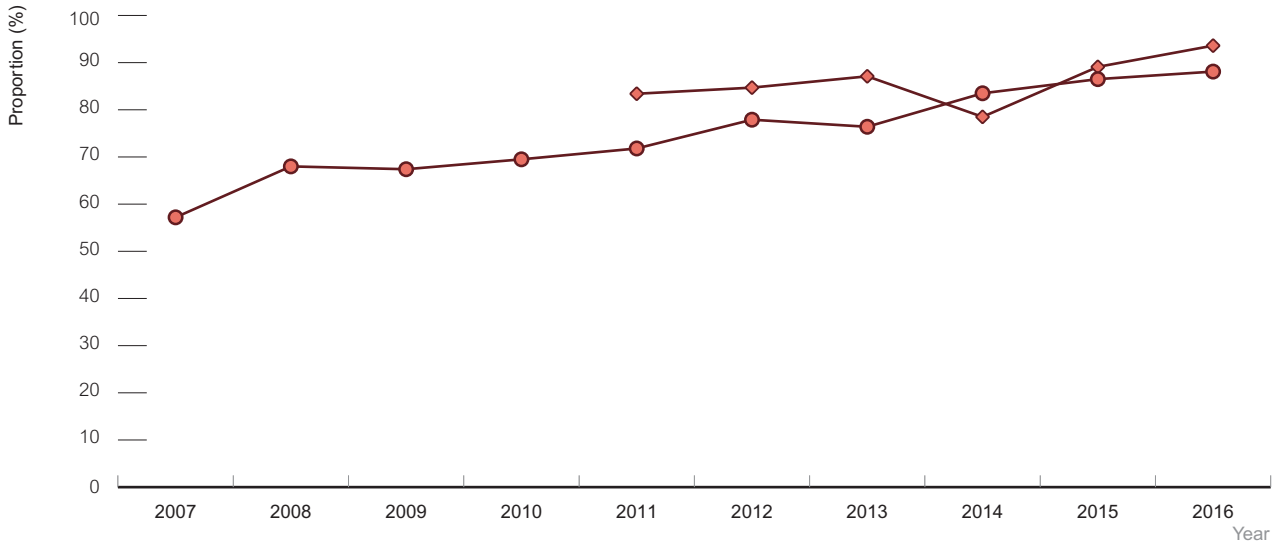
The estimated treatment coverage among people diagnosed with HIV in Australia is presented in the diagnosis and care cascades (Figures 1.4.1, 1.4.3 and 1.4.4): 86% of people with diagnosed HIV were receiving antiretroviral therapy overall in 2016, 86% in males and 88% in females.

Information on treatment coverage is also available for subpopulations. According to the Gay Community Periodic Surveys, the proportion of gay men diagnosed with HIV who reported receiving antiretroviral treatment increased from 57% in 2007 to 78% in 2012 and 88% in 2016. Among gay and bisexual men attending the 43 sexual health clinics participating in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network, the proportion receiving antiretroviral treatment increased from 85% in 2012 to 94% in 2016 (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 2016 and reimbursed by the Pharmaceutical Benefits Scheme, abacavir/dolutegravir/lamivudine (Triumeq) was the most commonly prescribed fixed-dose combination triple regimen (4690 people) followed by efavirenz/emtricitabine/tenofovir (Atripla; 2620 people). Tenofovir/emtricitabine (Truvada) was the most common dual nucleoside/nucleotide reverse transcriptase inhibitor (N(t)RTI) fixed-dose combination (5380 people), followed by abacavir/lamivudine (Kivexa; 1710 people). Raltegravir (Isentress) was the most common third agent (2610 persons); it is generally combined with a fixed-dose combination N(t)RTI agent (Table 1.4.4).

HIV

Figure 1.4.9 Proportion of HIV-positive men receiving antiretroviral treatment, 2007–2016



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ACCESS Sexual health clinics (%)					83.4	84.7	87.1	78.5	89.1	93.6
Gay Community Periodic Survey (%)	57.2	68.0	67.4	69.5	71.8	77.9	76.4	83.5	86.5	88.1

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

Table 1.4.4 Number of people with HIV receiving antiretroviral treatment, 2016, by type of treatment (drug class)

Drug class	Antiretroviral agent	Number of unique patients who received the antiretroviral agent in 2016
Nucleoside analogue reverse transcriptase inhibitors		
	abacavir (Ziagen)	330
	lamivudine/zidovudine (Combivir)	300
	didanosine (Videx EC)	≤30
	emtricitabine (Emtriva)	110
	abacavir/lamivudine (Kivexa)	1710
	Lamivudine (Zeffix)	610
	stavudine (Zerit)	≤30
	tenofovir (Viread)	590
	abacavir/lamivudine/zidovudine (Trizivir)	40
	emtricitabine/tenofovir (Truvada)	5380
	zidovudine (Retrovir)	≤30
Non-nucleoside analogue reverse transcriptase inhibitors		
	efavirenz (Stocrin)	420
	etravirine (Intelence)	510
	Nevirapine (Viramune)	2140
	rilpivirine (Edurant)	260
Protease inhibitors		
	atazanavir (Reyataz)	1660
	darunavir (Prezista, Prezcobix)	2130
	indinavir (Crixivan)	≤30
	lopinavir/ritonavir (Kaletra)	380
	nelfinavir (Viracept)	0
	ritonavir (Telzir, Norvir)	3230
	saquinavir (Invirase)	≤30
	tipranavir (Aptivus)	≤30
	atazanavir/cobicistat (Evotaz)	100
Entry inhibitors		
	enfuvirtide (Fuzeon)	0
	maraviroc (Celsentri)	290
Integrase inhibitors		
	Dolutegravir (Tivicay)	2380
	raltegravir (Isentress)	2610
Combination class agents		
	efavirenz/emtricitabine/tenofovir (Atripla)	2620
	rilpivirine/emtricitabine/tenofovir (Evipler)	2300
	elvitegravir/cobicistat/tenofovir/emtricitabine (Stribild)	1,800
	abacavir/dolutegravir/lamivudine (Triumeq)	4690
Total patients		**19 440**

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 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 new HIV diagnoses, as recommended by the World Health Organization, using data from New South Wales and South Australia for 2015 (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 2015, 11% of new HIV diagnoses 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, 6% for nucleoside reverse transcriptase inhibitors, and 4% for non-nucleoside reverse transcriptase inhibitors (Table 1.4.5). There was only one surveillance drug resistance mutation in 2015 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 new HIV diagnoses with surveillance drug resistance mutations, 2015, overall and in male-to-male sex exposure category

HIV exposure category, *n* (%)	Individuals tested	Protease inhibitor	Nucleoside reverse transcriptase inhibitor	Non-nucleoside reverse transcriptase inhibitor	Any surveillance drug resistance mutation
Male-to-male sex	179	5 (2.8)	12 (6.7)	6 (3.4)	21 (11.7)
Total	**235**	**5 (2.1)**	**13 (5.5)**	**9 (3.8)**	**25 (10.6)**

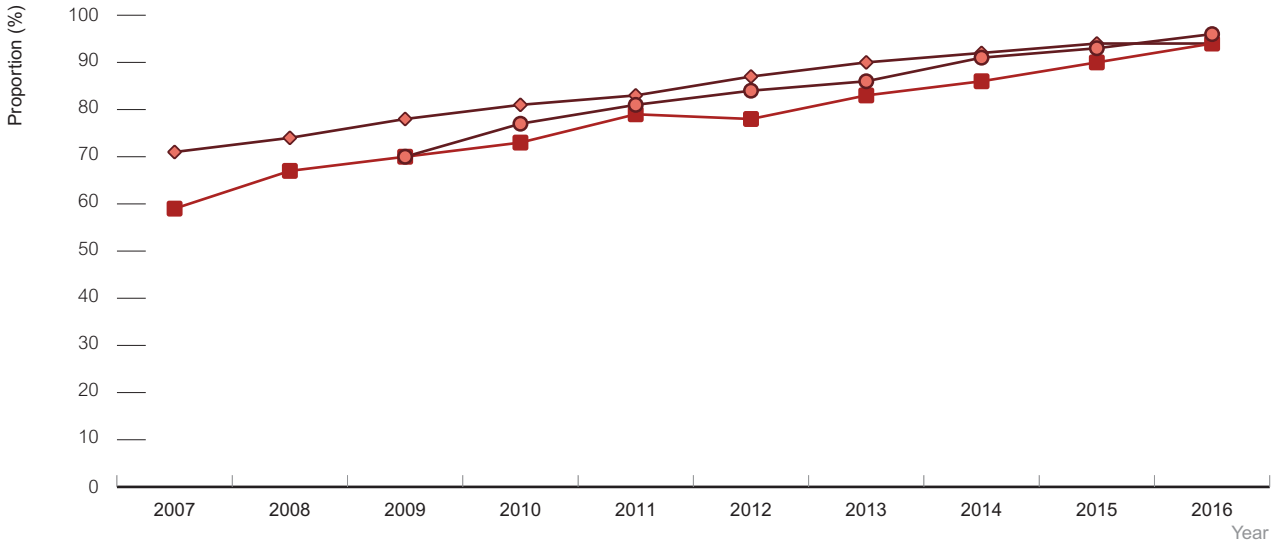
Note: New South Wales and South Australia. Excludes notifications where HIV subtype testing was not performed.

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

Suppressed HIV 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 taking combination antiretroviral treatment regularly sustains a suppressed viral load and reduces the likelihood of HIV transmission to zero.[12] 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 three difference data sources: from 87% in 2012 to 94% in 2016 in the Australian HIV Observational Database, from 78% in 2012 to 94% in 2016 at 43 sexual health clinics across Australia participating in the ACCESS network, and from 84% in 2012 to 96% in 2016 at seven primary care clinics with a high caseload of gay men in Victoria and New South Wales participating in the ACCESS network (Figure 1.4.10). See Methodology for further detail.

Figure 1.4.10 Proportion of patients with suppressed viral load from patients in the Australian HIV Observational Database, sexual health clinics and high-caseload general practice clinics, 2007–2016



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AHOD (%)	71	74	78	81	83	87	90	92	94	94
Sexual health clinic (%)	59	67	70	73	79	78	83	86	90	94
High-caseload general practice clinic (%)			70	77	81	84	86	91	93	96

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.

1.5 HIV prevention

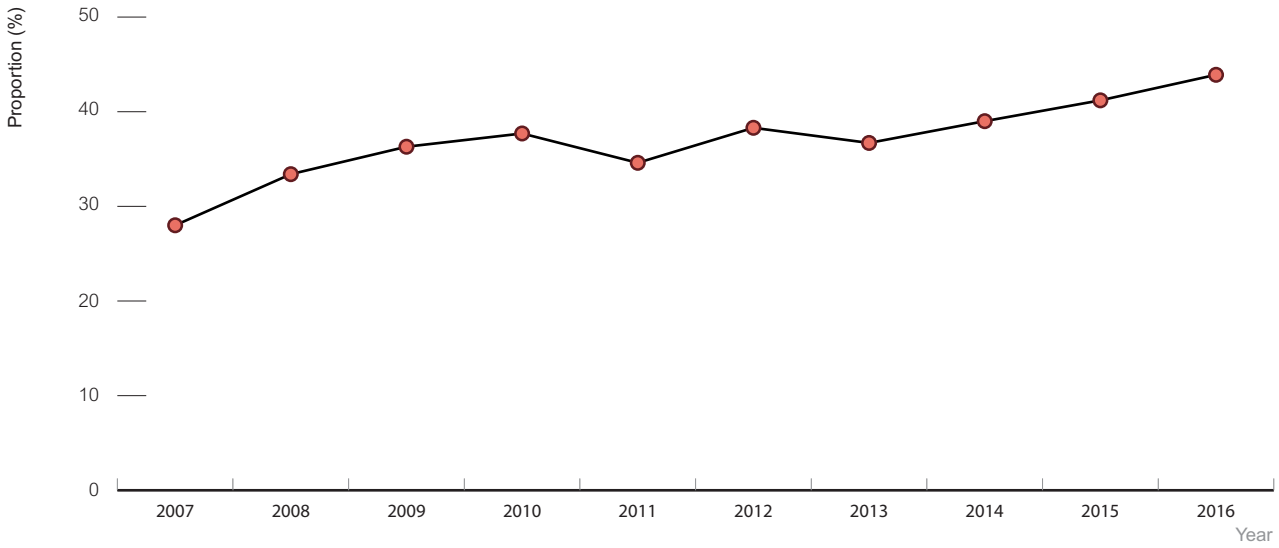
Primary prevention strategies aim to protect people from acquiring HIV. They include: condom use; harm reduction strategies such as needle and syringe programs, opioid substitution therapy and peer interventions to reduce injecting risk behaviour;[13,14] and biomedical prevention strategies such as post-exposure 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.

Condom use

According to the Gay Community Periodic Surveys, 44% of gay and bisexual men who had casual partners in the past six months reported any condomless anal intercourse with casual partners. The proportion has increased from 28% to 44% over the past 10 years (Figure 1.5.1). Conversely 58% of men with casual partners either use condoms consistently (40%) or do not have anal sex with these partners (18%) (data not shown). It is also important to note that gay and bisexual men engaging in condomless anal intercourse may be using other non-condom-based strategies to reduce the risk of HIV transmission, such as serosorting, strategic positioning, undetectable (suppressed) viral load and pre-exposure prophylaxis (PrEP). Further information regarding sexual risk behaviour appears in the *Annual reports of trends in behaviour*,[2] 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%) reported always using condoms with casual partners in the previous six months. Of men who had anal intercourse with casual male partners, 58% reported that they had always used condoms in the previous six months.[15]

Figure 1.5.1 Gay and bisexual men with casual partners who reported any condomless anal intercourse in the six months prior to the survey, 2007–2016



28	33.4	36.3	37.7	34.6	38.3	36.7	39	41.2	43.9

Source: Gay Community Periodic Survey, see Methodological Notes for detail

HIV

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.[13,14] Opioid substitution has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[16-18] 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 (see Figure 2.1.25 in the *Hepatitis C* section of the report).

Blood screening

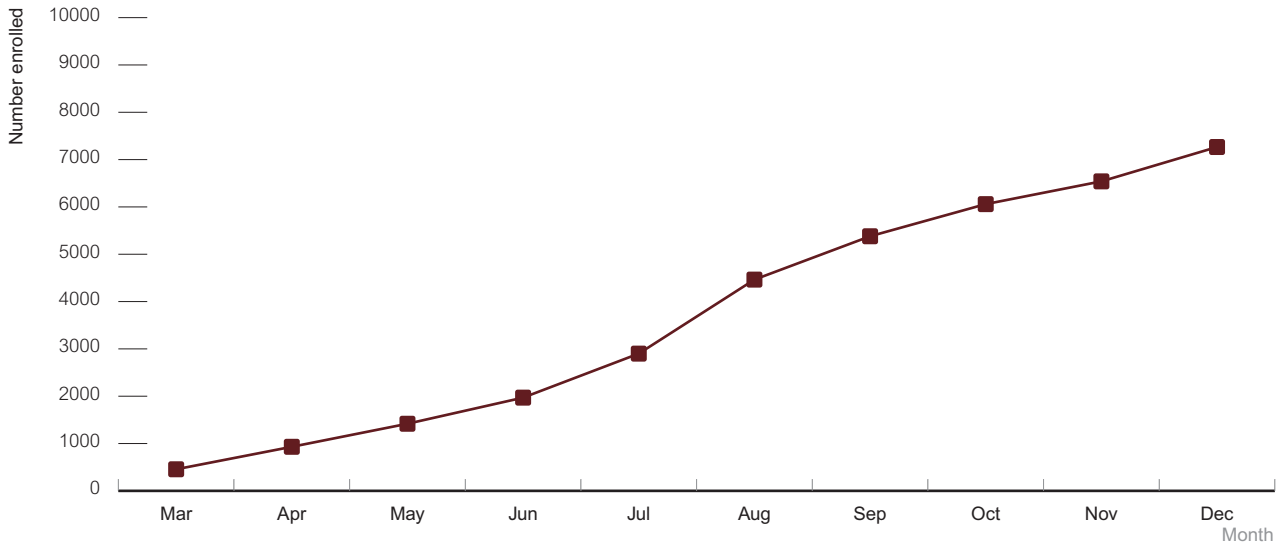
Since 1985, all blood donors have been screened for HIV to prevent onward transmission. There has been no known case of HIV acquisition through blood transfusion in Australia since the late 1990s. For further information, see *Transfusion-transmissible infections in Australia: 2016 surveillance report*, prepared by the Kirby Institute, UNSW Sydney and Australian Red Cross Blood Service.[19]

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). Enrolment data from these implementation projects show that 7266 gay men in Australia were taking PrEP to prevent HIV by the end of 2016 (Figure 1.5.2). This corresponds to 6% of the estimated 111 983 sexually active HIV-negative gay men aged 16–69 years, and 23% of all estimated gay men at high risk of HIV according to PrEP eligibility criteria, taking PrEP by the end of 2016 (see Methodolog for details). In addition, some people who are not included in these data are accessing PrEP by personally importing PrEP from overseas.

In the Gay Community Periodic Surveys, the proportion of non-HIV-positive gay and bisexual men who reported PrEP use in the past six months increased from 2% in 2013 to 5% in 2016, with a sharp increase between 2015 and 2016 corresponding with the implementation of the large state-funded PrEP implementation programs in 2016 (Figure 1.5.3). For further information regarding PrEP uptake in gay men see *Annual reports of trends in behaviour*,[2] prepared by the Centre for Social Research in Health.

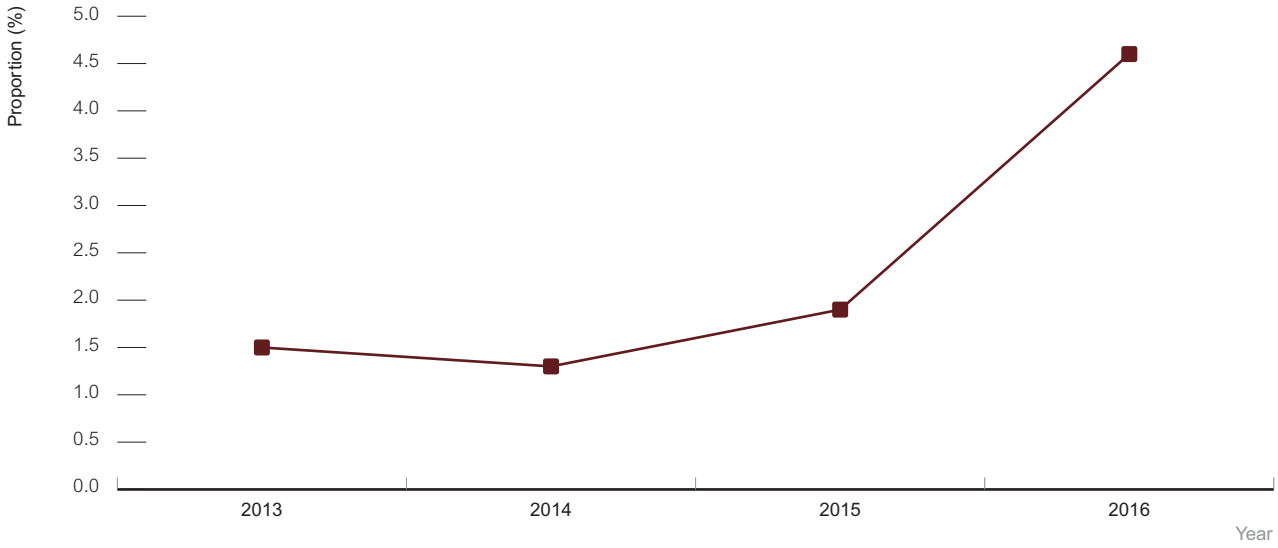
Figure 1.5.2 Cumulative number of gay men enrolled in PrEP implementation programs in New South Wales, Queensland and Victoria, 2016, by month



Gay men enrolled									
456	931	1418	1970	2900	4464	5380	6059	6540	7266

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

Figure 1.5.3 Proportion of non-HIV-positive gay and bisexual men in Gay Community Periodic Surveys who reported PrEP use in the past six months, 2013–2016



Gay and bisexual men reporting PrEP use (%)			
1.5	1.3	1.9	4.6

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

HIV

2 Viral hepatitis

2.1 Hepatitis C

New hepatitis C diagnoses

This section focuses on people newly diagnosed with hepatitis C in Australia, including newly acquired hepatitis C diagnoses (evidence of hepatitis C acquisition within two years before diagnosis).

A total of 11 949 newly hepatitis C diagnoses were reported in Australia in 2016, of which 1122 (9%) occurred among Aboriginal and Torres Strait Islander people and 4414 (37%) were among the non-Indigenous population; there were a further 6413 (54%) diagnoses 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 9% of all new hepatitis C diagnoses in 2016, reflecting a disproportionate burden of disease (Table 2.1.1).

In 2016, a majority of cases of newly diagnosed hepatitis C were in males (67%, 7972), 90% (10 763) were in people aged 25 years and above, and 60% (7228) were diagnosed in people residing in major cities. The majority of notifications in 2016 (94%, 11 232) were reported as unspecified and only 717 (6%) were reported as newly acquired infections (Table 2.1.1).

Table 2.1.1 Characteristics of new hepatitis C diagnoses, 2007–2016

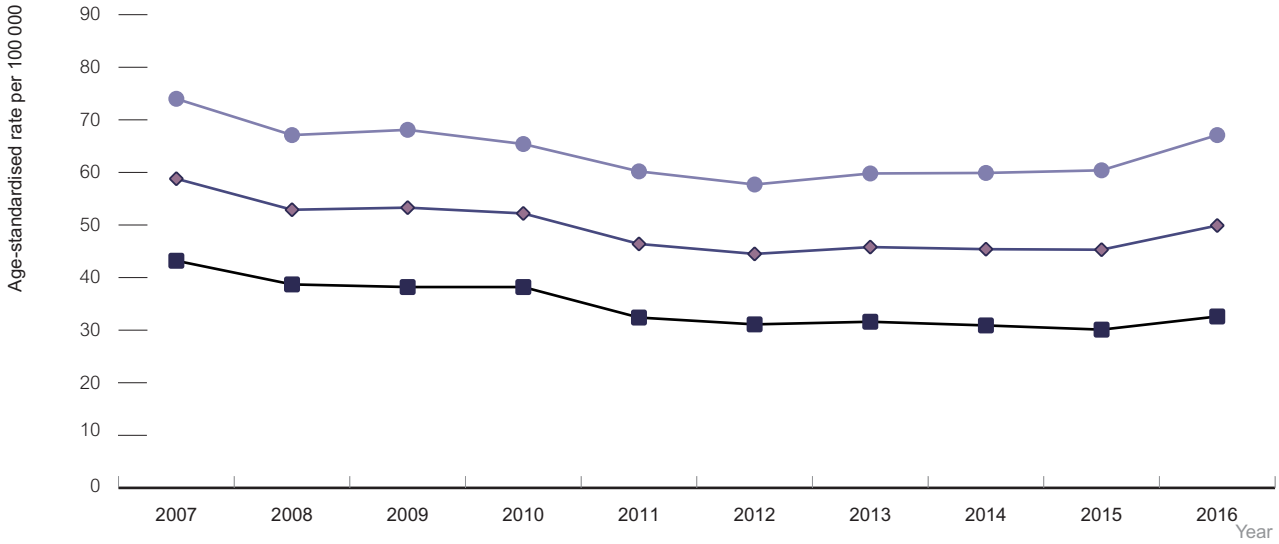
	Year of diagnosis									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Characteristic										
Total	12 046	11 082	11 419	11 362	10 232	10 005	10 496	10 564	10 705	11 949
Sex										
Female	4436	4060	4104	4154	3583	3498	3634	3613	3579	3949
Male	7558	6995	7256	7103	6611	6476	6838	6931	7095	7972
Missing	52	27	59	105	38	31	24	20	31	28
Age group										
0–14	48	36	49	43	30	32	23	36	24	24
15–24	1389	1354	1263	1200	1126	1165	1295	1131	1189	1156
25–39	5358	4716	4784	4833	4180	4067	4073	4127	4137	4419
40+	5240	4975	5300	5256	4877	4733	5090	5260	5339	6344
Missing	11	1	23	30	19	8	15	10	16	6
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	664	688	641	746	773	821	885	965	1000	1122
Non-Indigenous	4899	4704	4381	4323	3894	3845	3860	3733	3694	4414
Not reported	6483	5690	6397	6293	5565	5339	5751	5866	6011	6413
Newly acquired[a]	371	364	401	383	619	709	672	714	817	717
Area of residence										
Major cities	7878	6960	7271	7162	6473	6145	6614	6408	6458	7228
Inner regional	2364	2396	2248	2211	2034	2022	2085	2338	2333	2654
Outer regional	1144	1083	1019	1032	1004	1101	1147	1132	1209	1230
Remote	185	218	187	188	184	180	180	163	182	159
Very remote	77	74	67	66	63	82	80	71	59	81
Missing data	398	351	627	703	474	475	390	452	464	597
State/Territory										
ACT	199	200	163	223	188	145	184	175	188	184
NSW	4130	3423	4043	3953	3361	3275	3538	3573	3578	4239
NT	229	209	168	169	208	191	256	180	200	194
QLD	2669	2571	2623	2625	2386	2346	2446	2576	2535	2778
SA	604	576	545	526	516	512	525	492	501	535
TAS	273	349	281	267	229	262	229	231	261	257
VIC	2710	2402	2460	2541	2268	2206	2222	2202	2309	2543
WA	1232	1352	1136	1058	1076	1068	1096	1135	1133	1219

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.

Overall there has been a 15% decline in the hepatitis C notification rate in Australia over the past 10 years from 58.8 per 100 000 in 2007 to 49.9 per 100 000 in 2016 (Figure 2.1.1). However, since 2012, the rate has increased by 12% from 44.5 per 100 000 to 49.9 per 100 000 in 2016. The majority of this increase occurred between 2015 and 2016. This pattern is seen in both males and females (Figure 2.1.1). It is important to note that the recent increase in notification rates may reflect increased testing in response to availability of new direct-acting antiviral treatments.

Figure 2.1.1 Hepatitis C notification rate per 100 000 population, 2007–2016, by sex



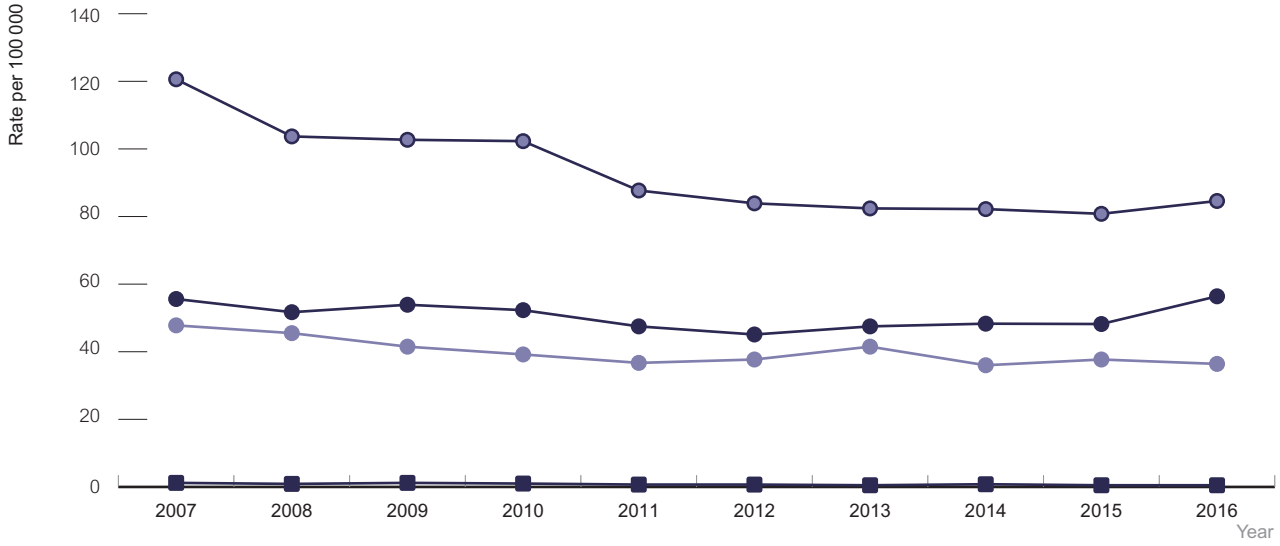
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women	43.2	38.7	38.2	38.2	32.4	31.1	31.6	30.9	30.1	32.6
Men	74.0	67.1	68.1	65.4	60.2	57.7	59.8	59.9	60.4	67.1
Total	58.8	52.9	53.3	52.2	46.4	44.5	45.8	45.4	45.3	49.9

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 (2007–2016), which was 84.6 per 100 000 in 2016, compared with 56.4 per 100 000 in the 40+ age group, and 36.4 per 100 000 in the 15–24 age group in 2016 (Figure 2.1.2). Over the past five years (2012–2016), the rate of notification of hepatitis C remained stable in those under 40 years, but increased by 25% in those 40 years and above from 45.1 per 100 000 in 2012 to 56.4 per 100 000 in 2016. The majority of the increase in the 40 and above age group occurred between 2015 and 2016 (from 48.2 to 56.0 per 100 000), which may reflect increased testing in this age group, who are more likely to have hepatitis C-related illnesses. A similar pattern by age group was observed among males and females (Figures 2.1.3 and 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 diagnoses in those under 25 years can be a proxy for the incidence of hepatitis C infection.[20] Among people aged under 25 years, there has been a 27% decrease in the rate of notification between 2007 and 2016, from 20.7 per 100 000 in 2007 to 15.2 per 100 000 in 2016, but the rate has remained stable in the past five years (Figure 2.1.5). The declines appear to have been more sustained among females, with a 46% decline from 19.8 per 100 000 in 2007 to 10.7 per 100 000 in 2016. In contrast, the rate of notification among males has fluctuated with an overall 8% decline from 21.4 per 100 000 in 2007 to 19.6 per 100 000 in 2016 (Figure 2.1.5).

Figure 2.1.2 Hepatitis C notification rate per 100 000 population, 2007–2016, by age group



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	1.2	0.9	1.2	1.0	0.7	0.7	0.5	0.8	0.5	0.5
15–24	47.8	45.5	41.5	39.2	36.7	37.7	41.5	36.0	37.7	36.4
25–39	120.6	103.7	102.7	102.3	87.7	83.9	82.4	82.2	80.8	84.6
40+	55.6	51.7	53.9	52.3	47.5	45.1	47.5	48.3	48.2	56.4

Source: Australian National Notifiable Diseases Surveillance System.

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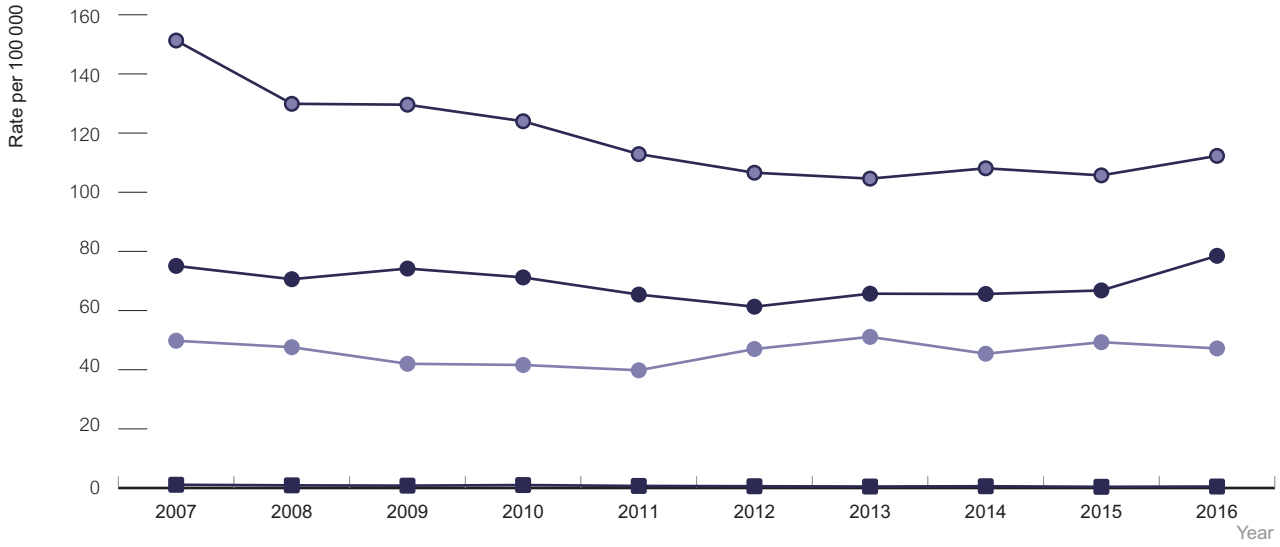
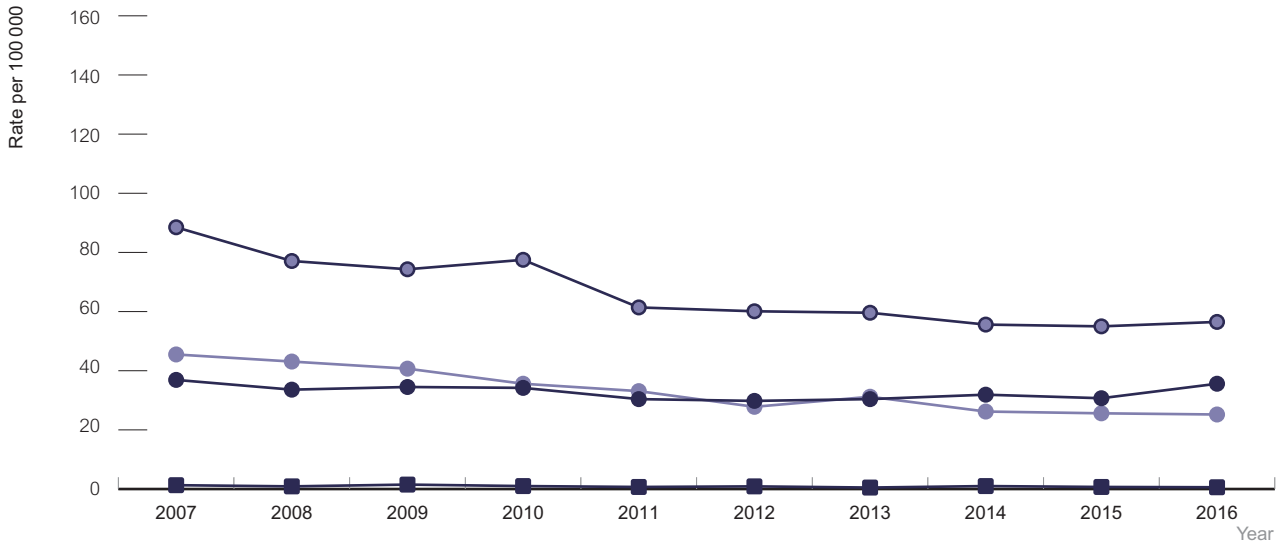
Figure 2.1.3 Hepatitis C notification rate per 100 000 population, 2007–2016, by age group, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	1.1	0.9	0.8	1.0	0.7	0.6	0.5	0.6	0.4	0.5
15–24	49.8	47.6	42.0	41.6	39.8	47.0	51.1	45.4	49.3	47.2
25–39	151.3	129.9	129.6	124.0	112.9	106.6	104.6	108.1	105.7	112.3
40+	75.1	70.6	74.2	71.2	65.4	61.3	65.7	65.6	66.8	78.5

Source: Australian National Notifiable Diseases Surveillance System.

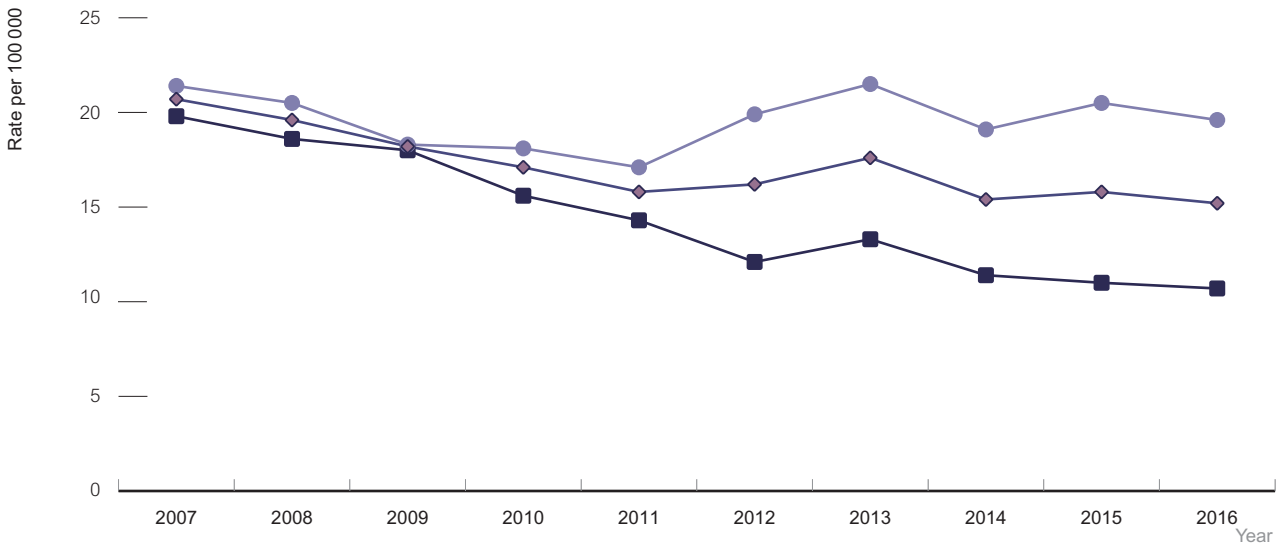
Figure 2.1.4 Hepatitis C notification rate per 100 000 population, 2007–2016, by age group, females



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	1.3	0.9	1.5	1.0	0.7	0.9	0.5	1.0	0.7	0.6
15–24	45.5	43.1	40.7	35.6	33.1	27.8	31.2	26.2	25.6	25.2
25–39	88.5	77.1	74.3	77.5	61.4	60.1	59.6	55.6	55.0	56.5
40+	36.9	33.6	34.5	34.2	30.4	29.8	30.4	31.9	30.7	35.6

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, 2007–2016, by sex



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women	19.8	18.6	18.0	15.6	14.3	12.1	13.3	11.4	11.0	10.7
Men	21.4	20.5	18.3	18.1	17.1	19.9	21.5	19.1	20.5	19.6
Total	20.7	19.6	18.2	17.1	15.8	16.2	17.6	15.4	15.8	15.2

Source: Australian National Notifiable Diseases Surveillance System.

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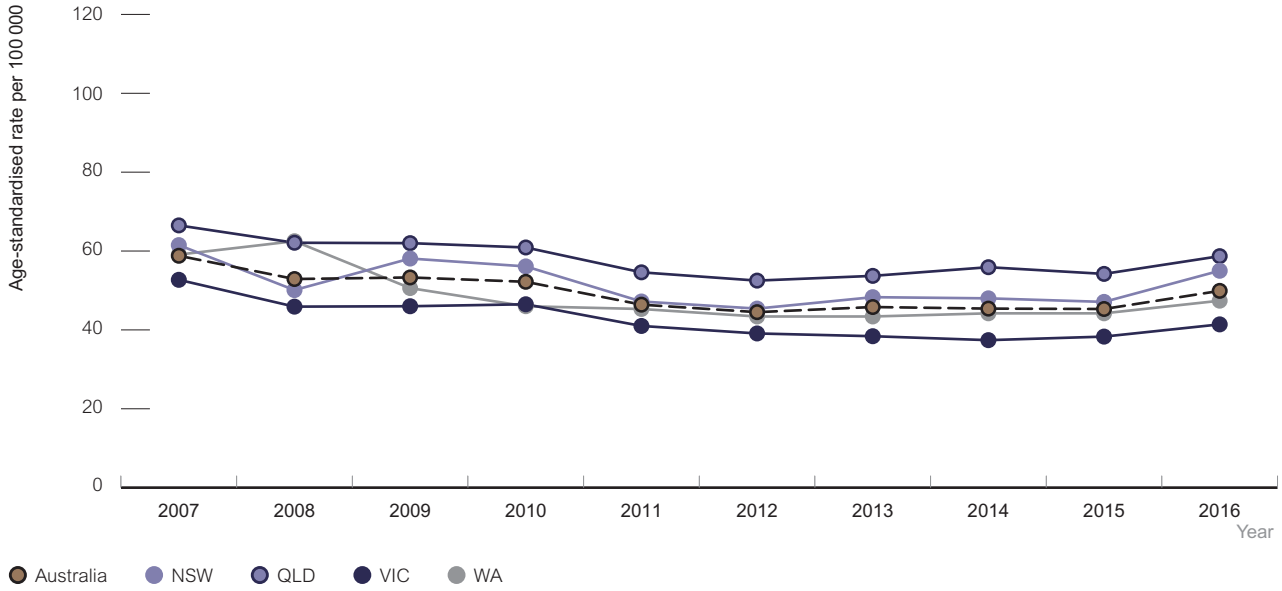
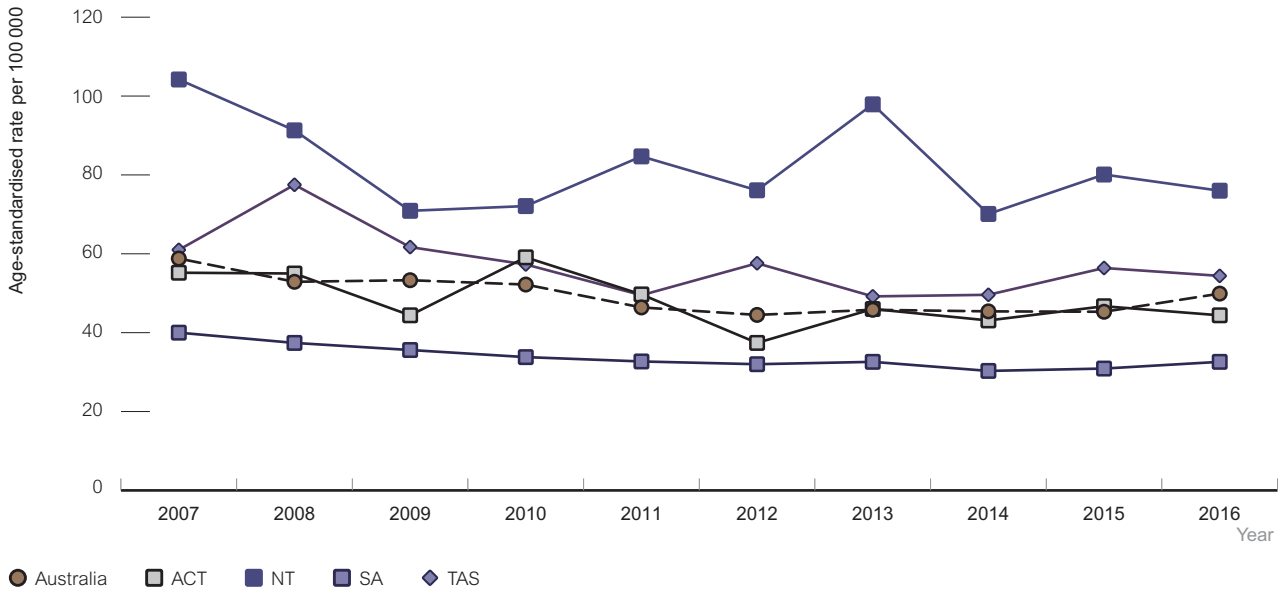
The notification rate of newly diagnosed hepatitis C in 2016 was highest in the Northern Territory (76.0 per 100 000), followed by Queensland (58.7 per 100 000), New South Wales (55.0 per 100 000), and Tasmania (54.4 per 100 000) (Figure 2.1.6, Table 2.1.2). Between 2007 and 2012, hepatitis C notification rates declined in all jurisdictions and have either remained stable or increased slightly between 2012 and 2016, though with some fluctuations, particularly in the Northern Territory. In New South Wales there was a 17% increase in notification rates between 2015 and 2016, from 47.1 to 55.0 per 100 000.

Among people under 25 years of age, hepatitis C notification rate over the past five years (2012–2016) varied, with stable rates in New South Wales, Western Australia and South Australia, decline in Victoria, Northern Territory and Tasmania, and fluctuating rates in Queensland and the Australian Capital Territory (Figure 2.1.7).

Figure 2.1.6 Hepatitis C notification rate per 100 000 population, 2007–2016, by state/territory





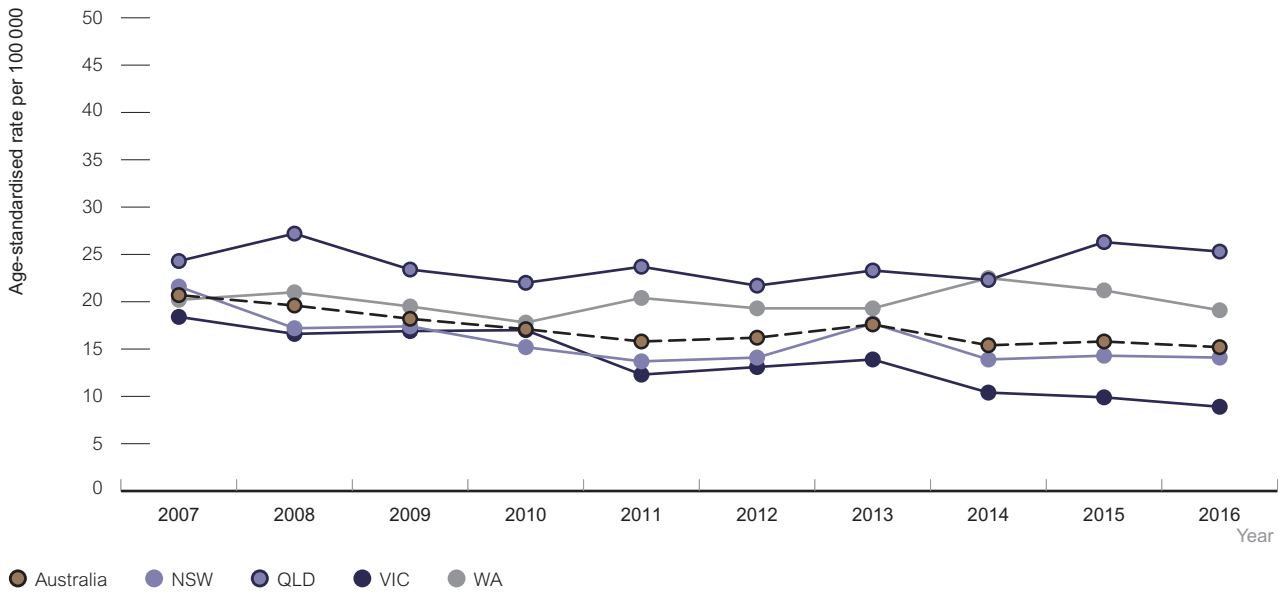
Source: Australian National Notifiable Diseases Surveillance System.

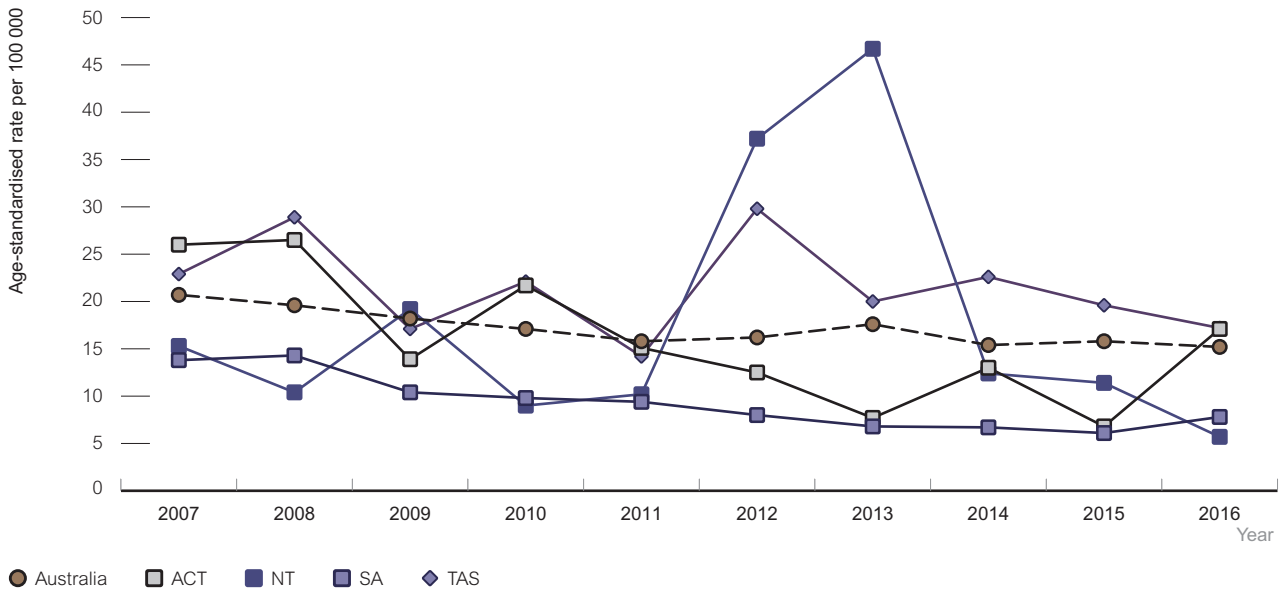
Table 2.1.2 Hepatitis C notification rate per 100 000 population, 2007–2016, by state/territory

State/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australian Capital Territory	55.2	55.0	44.4	59.1	49.7	37.4	46.0	43.1	46.7	44.4
New South Wales	61.5	50.1	58.1	56.1	47.2	45.4	48.3	48.0	47.1	55.0
Northern Territory	104.2	91.3	70.9	72.1	84.7	76.1	97.9	70.1	80.1	76.0
Queensland	66.5	62.1	62.0	60.9	54.6	52.5	53.7	55.9	54.2	58.7
South Australia	40.0	37.4	35.6	33.8	32.7	32.0	32.6	30.3	30.9	32.6
Tasmania	61.0	77.5	61.7	57.3	49.5	57.6	49.2	49.6	56.4	54.4
Victoria	52.7	45.9	46.0	46.5	41.0	39.1	38.4	37.4	38.3	41.4
Western Australia	59.1	62.5	50.6	46.0	45.3	43.4	43.4	44.2	44.2	47.4
Australia	58.8	52.9	53.3	52.2	46.4	44.5	45.8	45.4	45.3	49.9

Source: Australian National Notifiable Diseases Surveillance System

Figure 2.1.7 Hepatitis C notification rate per 100 000 population in people under 25 years of age, 2007–2016, by state/territory

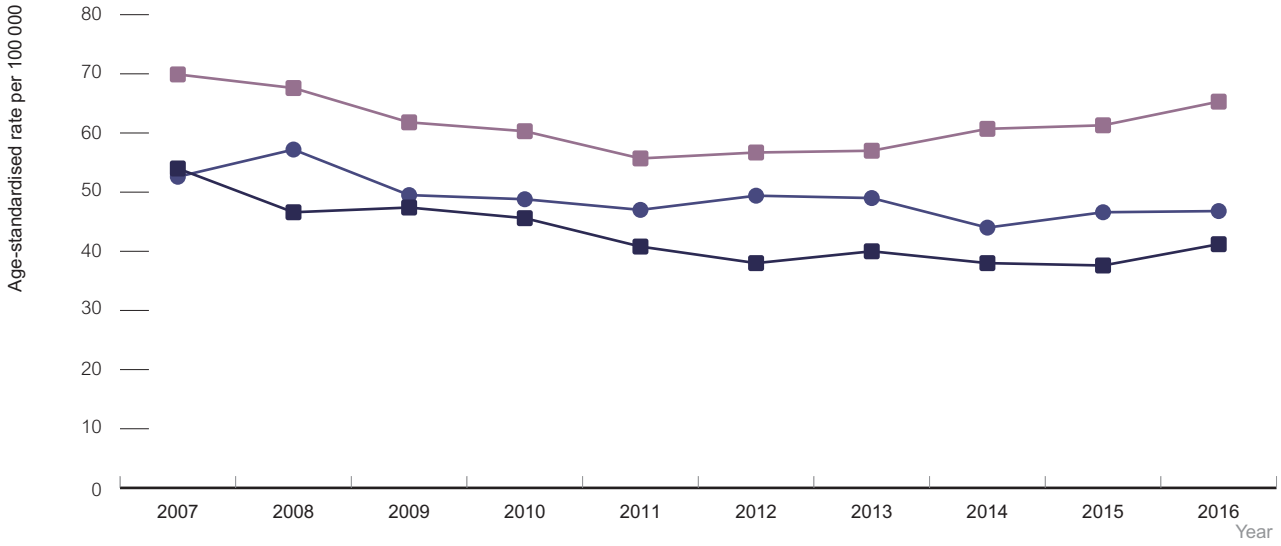




Source: Australian National Notifiable Diseases Surveillance System.

In 2016, rates of notification of hepatitis C were higher in inner and outer regional areas (65.3 per 100 000) than in remote and very remote areas (46.8 per 100 000) and major cities (41.2 per 100 000) (Figure 2.1.8). Notification rates declined in major cities and regional areas between 2007 and 2012 and since then have fluctuated in major cities and increased by 15% in regional areas between 2012 and 2016. In remote areas, notification rates declined by 5% between 2012 and 2016 (Figure 2.1.8).

Figure 2.1.8 Hepatitis C notification rate per 100 000 population, 2007–2016, by region of residence



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	54.0	46.6	47.4	45.6	40.8	38.0	40.0	38.0	37.6	41.2
Inner and outer regional	69.9	67.6	61.8	60.3	55.7	56.7	57.0	60.7	61.3	65.3
Remote and very remote	52.6	57.2	49.5	48.8	47.0	49.4	49.0	44.0	46.6	46.8

Source: Australian National Notifiable Diseases Surveillance System.

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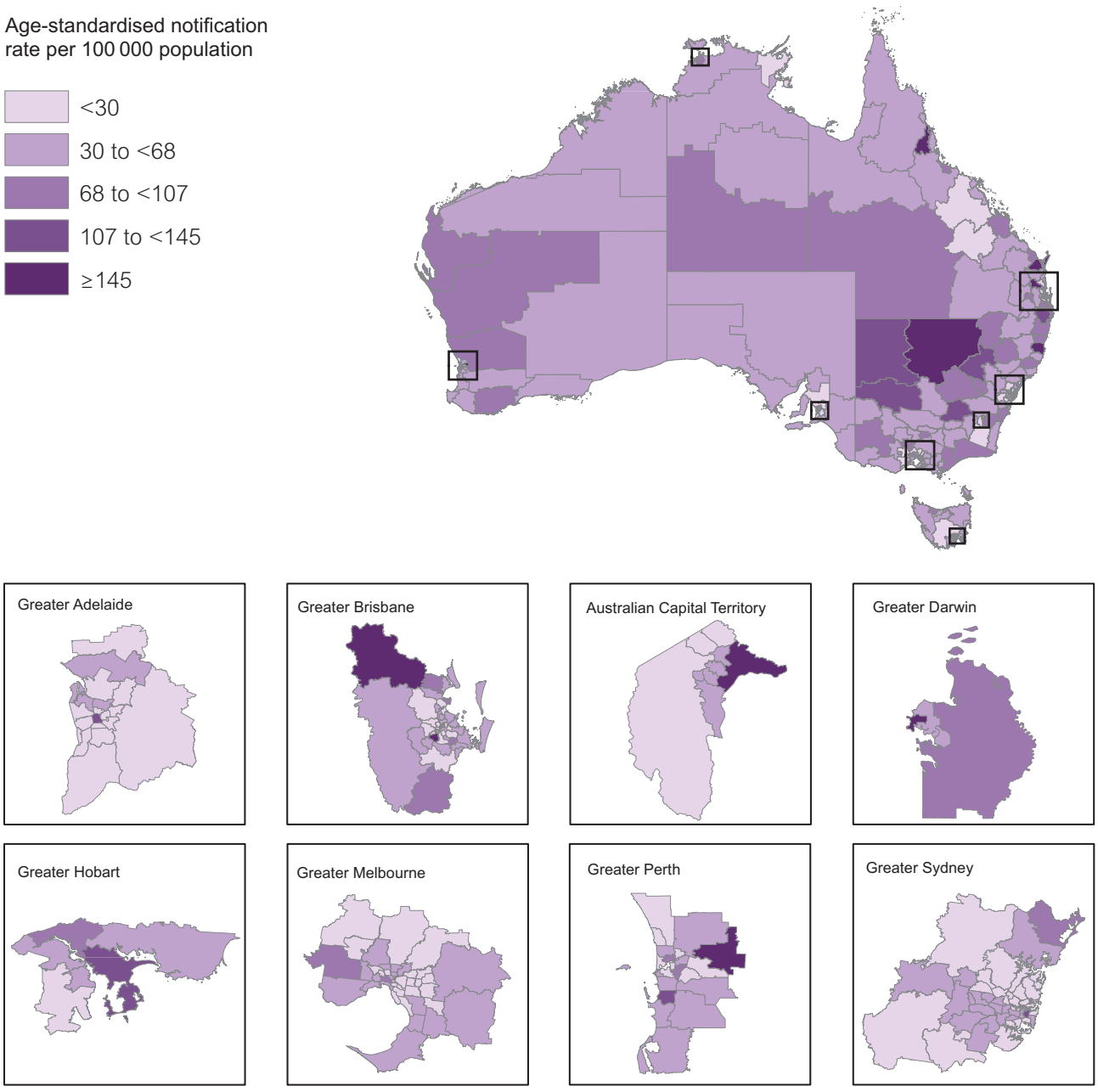
This report includes age-standardised hepatitis C notification rates by statistical area level 3 (SA3; population size generally between 30 000 and 130 000 persons; see Methodology for details) represented as geographical maps of Australia and major cities (Figure 2.1.9).

Based on average hepatitis C notification rates between 2014 and 2016, 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 2.1.9). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of hepatitis C diagnoses, 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 2.1.9 Average age-standardised hepatitis C notification rate per 100 000 population, by statistical area level 3, 2014–2016, Australia and major cities



Note: Average hepatitis C notification rates for the three-year period 2014–2016 were used to minimise the influence of fluctuation in the number of hepatitis C diagnoses.

Source: State and territory health authorities.

Data on Aboriginal and Torres Strait Islander status were at least 50% complete for each of the past five years (2012–2016) for the Northern Territory, Queensland, South Australia, Tasmania and Western Australia. Rates of hepatitis C in the Aboriginal and Torres Strait Islander population are reported for these jurisdictions only. 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 2016, age-standardised rates of hepatitis C notification in the Northern Territory, Queensland, South Australia, Tasmania and Western Australia were four times as high among the Aboriginal and Torres Strait Islander population (172.7 per 100 000) as in the non-Indigenous population (45.2 per 100 000). Rates of hepatitis C diagnosis among Aboriginal and Torres Strait Islander people have increased by 25%, from 138.1 per 100 000 in 2012 to 172.7 per 100 000 in 2016 (Figure 2.1.10). In people aged under 25, rate of hepatitis C diagnosis in 2016 among Aboriginal and Torres Strait Islander people was six times as high as in non-indigenous people (88.9 vs 14.2 per 100 000) and increased by 50% from 59.1 per 100 000 in 2012, compared to a 14% decrease in non-Indigenous people over the same time period. See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017* for further detail.[1]

In Queensland, South Australia and Western Australia, the age-standardised rate of hepatitis C notification was three to seven times as high in the Aboriginal and Torres Strait Islander population as in the non-Indigenous population in 2016, and since 2012 has increased in all three jurisdictions, with the greatest increase in Western Australia (31%) and Queensland (25%) (Figure 2.1.11). 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 2016 (56.9 vs 81.5 per 100 000), but has increased by 47% from 38.6 per 100 000 in 2012 to 56.9 per 100 000 in 2016. 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 2016 (61.8 vs 53.7 per 100 000), and the rates in Aboriginal and Torres Strait Islander people fluctuated over the past five years between 61.8 and 95.5 per 100 000 (Figure 2.1.11).

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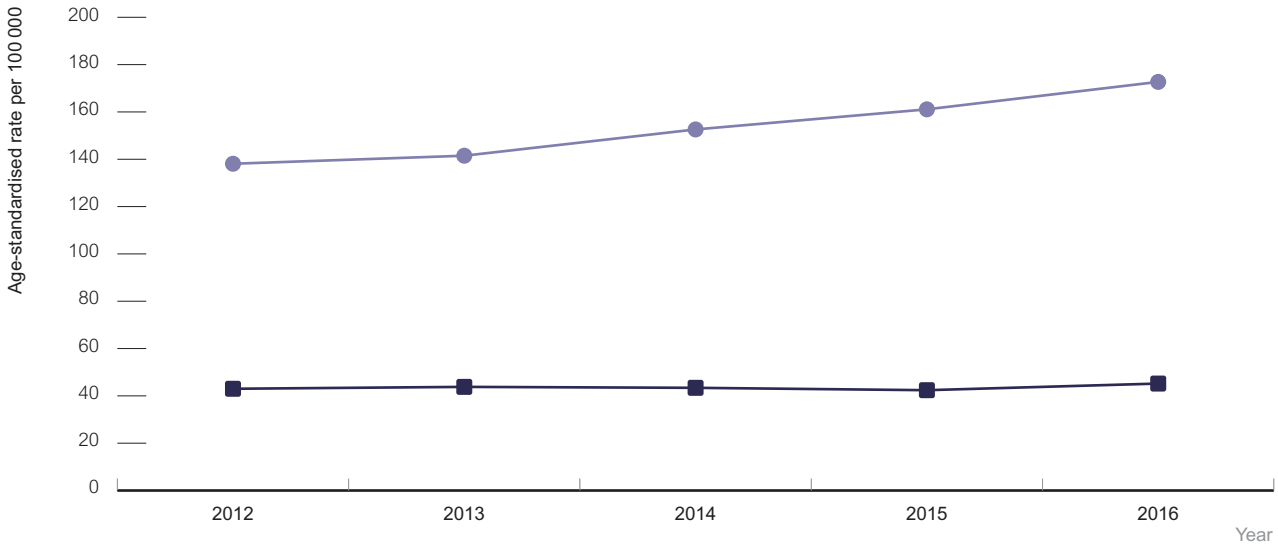
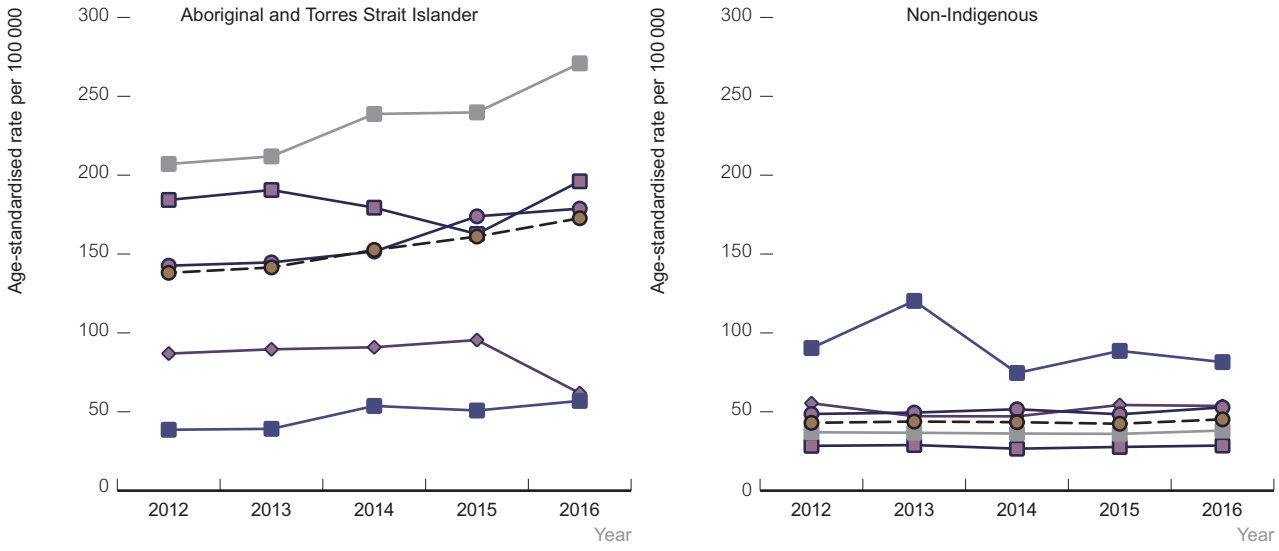
Figure 2.1.10 Hepatitis C notification rate per 100 000, 2012–2016, by Aboriginal and Torres Strait Islander status



	2012	2013	2014	2015	2016
Non-Indigenous	43.0	43.8	43.4	42.4	45.2
Aboriginal and Torres Strait Islander	138.1	141.5	152.6	161.1	172.7

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

Figure 2.1.11 Newly diagnosed hepatitis C notification rate per 100 000 people, 2012–2016, by Aboriginal and Torres Strait Islander status and state/territory



	Aboriginal and Torres Strait Islander					Non-Indigenous				
Australia	138.1	141.5	152.6	161.1	172.7	43.0	43.8	43.4	42.4	45.2
NT	38.6	39.2	53.7	50.8	56.9	90.4	120.3	74.6	88.6	81.5
TAS	86.9	89.6	90.9	95.5	61.8	55.4	47.2	47.1	54.3	53.7
WA	207.1	211.9	238.8	239.8	270.9	37.0	36.7	36.2	36.0	38.1
SA	184.3	190.6	179.4	162.7	196.1	28.4	28.9	26.6	27.7	28.6
QLD	142.6	144.7	151.6	173.9	178.8	48.6	49.5	51.6	48.4	52.8

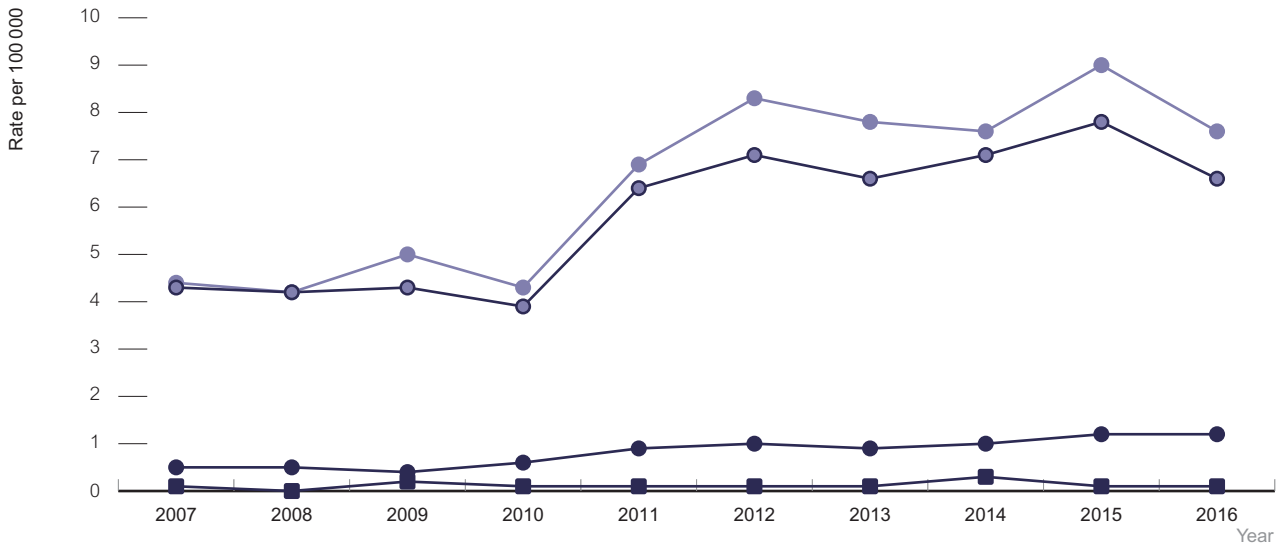
Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of diagnoses for each year (Northern Territory, Queensland, South Australia, Tasmania and Western Australia).

Newly acquired hepatitis C

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 a number of 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 for the first time 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 (2007–2016) were in the age groups 15–24 and 25–39 years, with fluctuation between 2010 (when Queensland data were included) and 2016 (7.6 and 6.6 per 100 000 in 2016, respectively) (Figure 2.1.12).

Figure 2.1.12 Newly acquired hepatitis C notification rate per 100 000 population, 2007–2016, by age group



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.3	0.1	0.1
15–24	4.4	4.2	5.0	4.3	6.9	8.3	7.8	7.6	9.0	7.6
25–39	4.3	4.2	4.3	3.9	6.4	7.1	6.6	7.1	7.8	6.6
40+	0.5	0.5	0.4	0.6	0.9	1.0	0.9	1.0	1.2	1.2

Source: Australian National Notifiable Diseases Surveillance System.

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Hepatitis C incidence

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

Hepatitis C incidence can be estimated from repeat testing data from the Australian Needle and Syringe Program Survey by dividing the number of seroconversions (hepatitis C antibody negative to positive) observed among serologically confirmed hepatitis C-negative participants by the person-time at risk (time between repeat hepatitis C tests in the survey). These incidence estimates are from participants in the Australian Needle and Syringe Program Survey, so may not necessarily be reflective of trends in the broader population. Further details about the methods used can be found in Methodology.

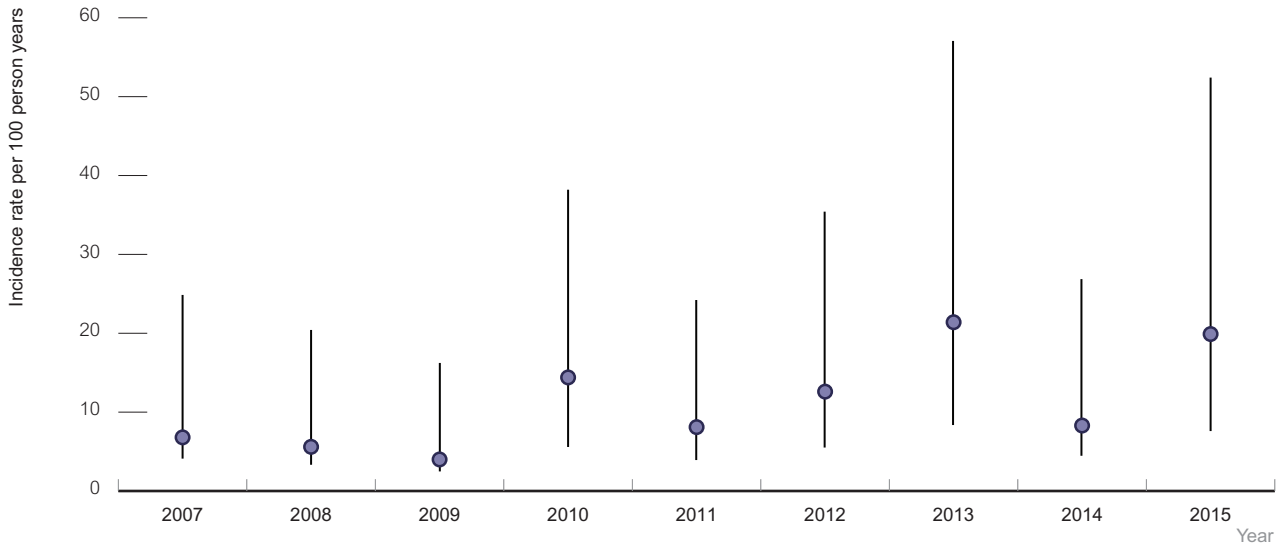
Over a nine-year period (2007–2015) among people who inject drugs participating in the Australian Needle and Syringe Program Survey on more than one occasion, there were 82 seroconversions, yielding a pooled hepatitis C incidence of 19.9 per 100 person-years (95% confidence interval 12.2–32.5). Hepatitis C incidence declined from 6.8 per 100 person-years in 2007 to 4.0 per 100 person-years in 2009, and has since remained high, fluctuating between 8.1 and 21.4 per 100 person-years (Figure 2.1.13). The incidence rate for 2016 is not available due to the method of calculation (see Methodology for further detail).

Among people attending the Kirketon Road Centre in Sydney on more than one occasion, hepatitis C incidence over a period of five years (2012–2016) fluctuated between 2.2 and 13.8 per 100 person-years, being lowest in 2016 at 2.2 (Figure 2.1.14).

Prospective cohort studies can also provide estimates of hepatitis C incidence. In a cohort of young (aged 18–30 years) largely out-of-treatment people who inject drugs in Melbourne (MIX: Melbourne injecting drug user cohort study),[21] estimated hepatitis C incidence fluctuated between 2.1 and 10.4 per 100 person-years between 2010 and 2016, and was 4.5 per 100 person-years (Figure 2.1.15).

The confidence intervals for the incidence estimates based on all three data sources 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.

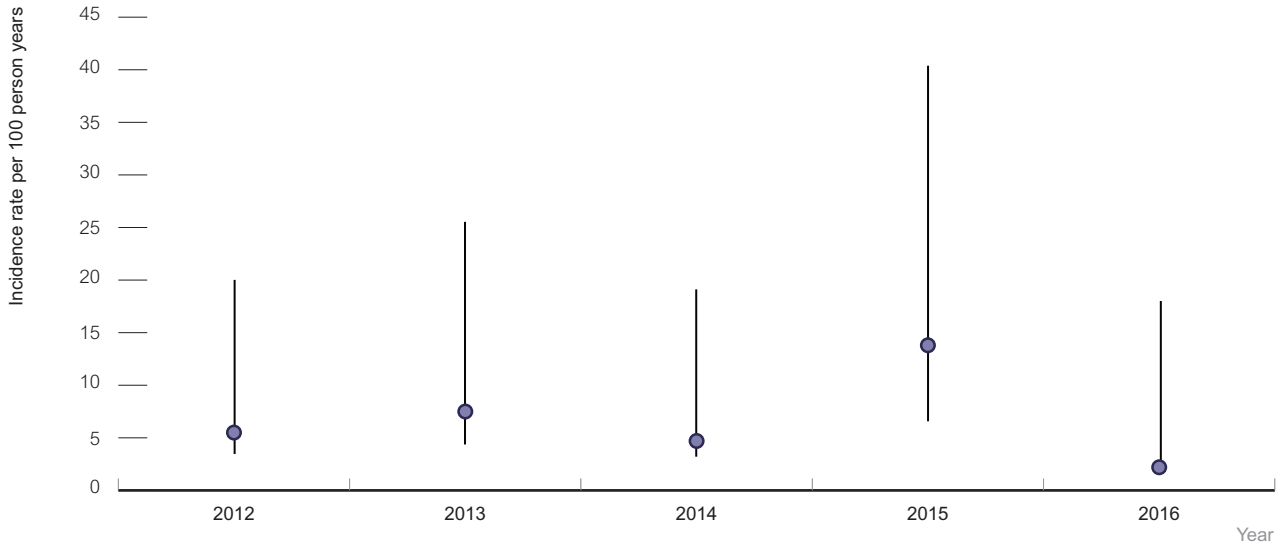
Figure 2.1.13 Estimated annual incidence of hepatitis C among people who inject drugs seen at needle and syringe programs, 2007–2015



Incidence estimate								
6.8	5.6	4.0	14.4	8.1	12.6	21.4	8.3	19.9

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

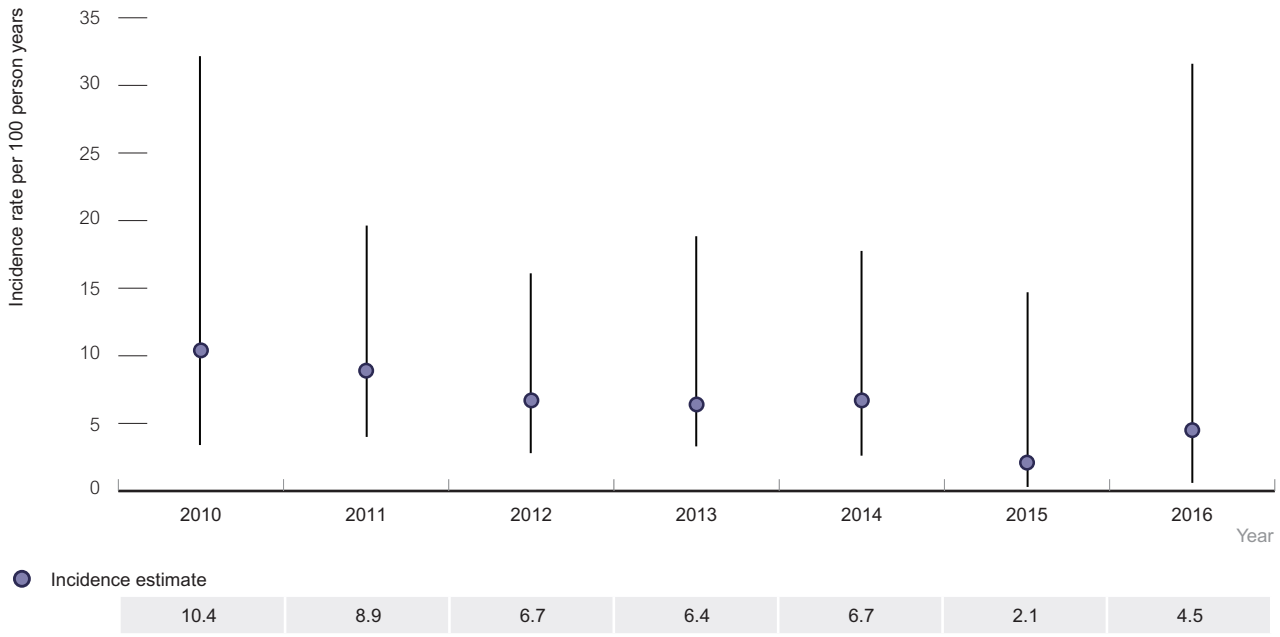
Figure 2.1.14 Estimated annual incidence of hepatitis C among people who inject drugs seen at Kirketon Road Centre Sydney, 2012–2016



Incidence estimate				
5.5	7.5	4.7	13.8	2.2

Source: Kirketon Road Centre; see Methodology for detail.

Figure 2.1.15 Estimated annual incidence of hepatitis C in a cohort of people who inject drugs in Melbourne, 2010–2016



Source: MIX: Melbourne injecting drug user cohort study;[21] see Methodology for detail.

Number of people living with hepatitis C and prevalence

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Number of people living with chronic hepatitis C

At the end of 2016, an estimated 199 412 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 (70 893, 36%), Victoria (48 077, 24%) and Queensland (41 758, 21%), followed by other states and territories (Table 2.1.3).

Table 2.1.3 Estimated number of people living with chronic hepatitis C at the end of 2016, by state/territory

State/Territory	Estimated number of people living with chronic hepatitis C at the end of 2016	Range	Proportion of all people living with chronic hepatitis C at the end of 2016
Australian Capital Territory	2 917	(1 987 to 2 985)	1%
New South Wales	70 893	(51 523 to 73 685)	36%
Northern Territory	3 302	(2 486 to 3 4501)	2%
Queensland	41 758	(30 770 to 44 174)	21%
South Australia	10 00	(7 081 to 10 232)	5%
Tasmania	3 90	(2 827 to 4 100)	2%
Victoria	48 077	(34 955 to 49 899)	24%
Western Australia	18 577	(13 995 to 19 793)	9%
Australia	199 412	(145 585 to 210 403)	100%

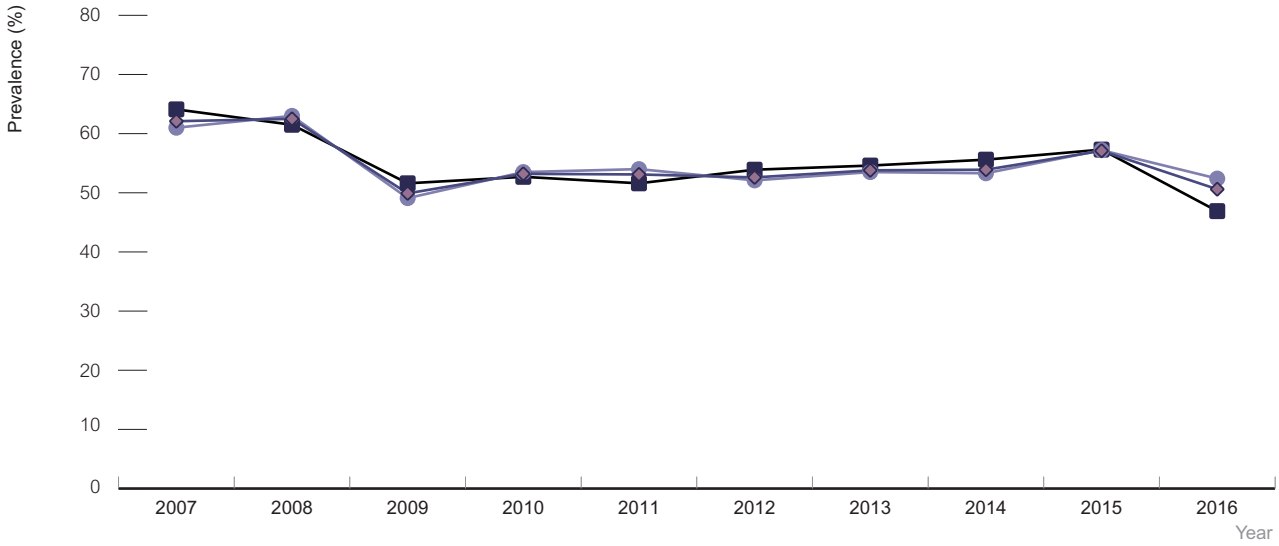
Source: See Methodology for detail.

Hepatitis C prevalence

Australia has a concentrated chronic hepatitis C epidemic among key populations including people who inject drugs, prisoners with a history of injecting drug use, people from high-prevalence countries (where the prevalence of hepatitis C is higher than 3.5%) and HIV-positive gay and bisexual men.

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 51% hepatitis C antibody prevalence in 2016 (52% among men, 47% among women) (Figure 2.1.16). Prevalence of hepatitis C antibody decreased among both men and women from 61% and 64% in 2007 to 49% and 52% in 2009 respectively, and has remained stable since then (Figure 2.1.16). Hepatitis C 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 2.1.17).

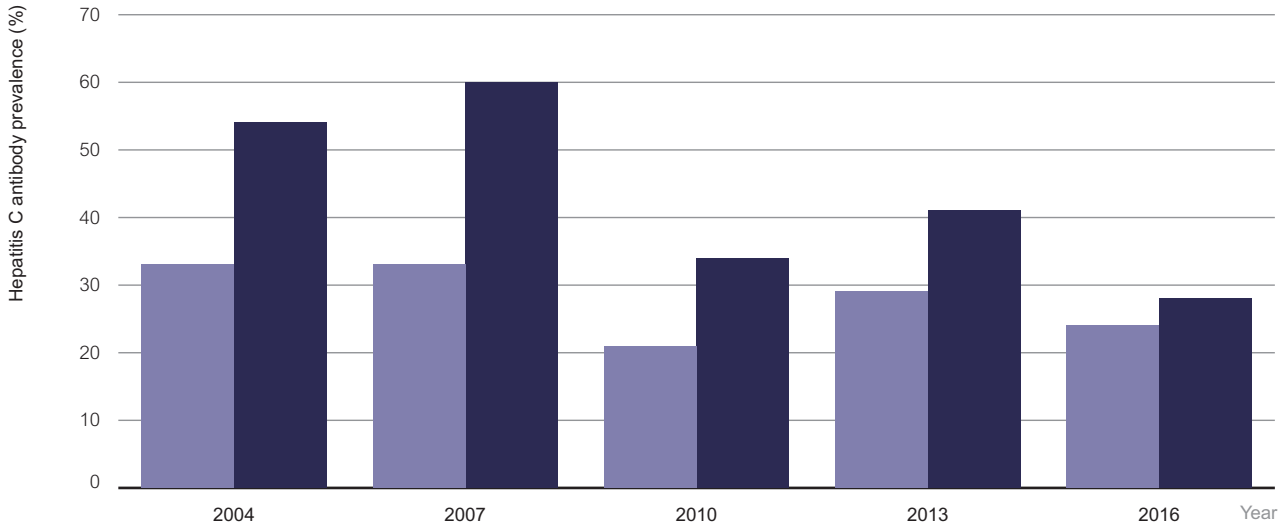
Figure 2.1.16 Hepatitis C prevalence among survey respondents at needle and syringe programs, 2007–2016, by sex



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women	64.1	61.5	51.6	52.7	51.6	53.9	54.6	55.6	57.3	46.9
Men	61.0	63.0	49.1	53.5	54.0	52.1	53.5	53.3	57.2	52.4
Total	62.1	62.5	49.9	53.2	53.1	52.6	53.8	53.9	57.1	50.6

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

Figure 2.1.17 Hepatitis C prevalence among prison entrants, by year



	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 2004, 2007, 2010, 2013 and 2016; see Methodology for detail.

Hepatitis C morbidity

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The following estimates are based on mathematical modelling, incorporating the impact of hepatitis C treatment. By the end of 2016, an estimated 160 492 people living with chronic hepatitis C had early to moderate fibrosis (stage F0–F2), 26 270 had severe fibrosis (stage F3), 15 502 had hepatitis C-related cirrhosis (stage F4), and 1829 had decompensated cirrhosis/hepatocellular carcinoma, with variations by state and territory (Table 2.1.4).

Table 2.1.4 Hepatitis C-related morbidity estimates, 2016, by state/territory

State/Territory	Early to moderate fibrosis[a]	Severe fibrosis[b]	Cirrhosis[c]	Decompensated cirrhosis or hepatocellular carcinoma
Australian Capital Territory	2 365	365	152	29
New South Wales	57 060	9 374	3 707	654
Northern Territory	2 690	409	170	26
Queensland	33 428	5 538	2 320	384
South Australia	8 103	1 301	492	92
Tasmania	3 146	514	200	35
Victoria	39 346	5 967	2 278	425
Western Australia	14 740	2 483	1 134	174
Australia	160 492	26 270	15 502	1 829

a Stages F0, F1 and F2.
b Stage F3.
c Stage F4.

Source: See Methodology for detail.

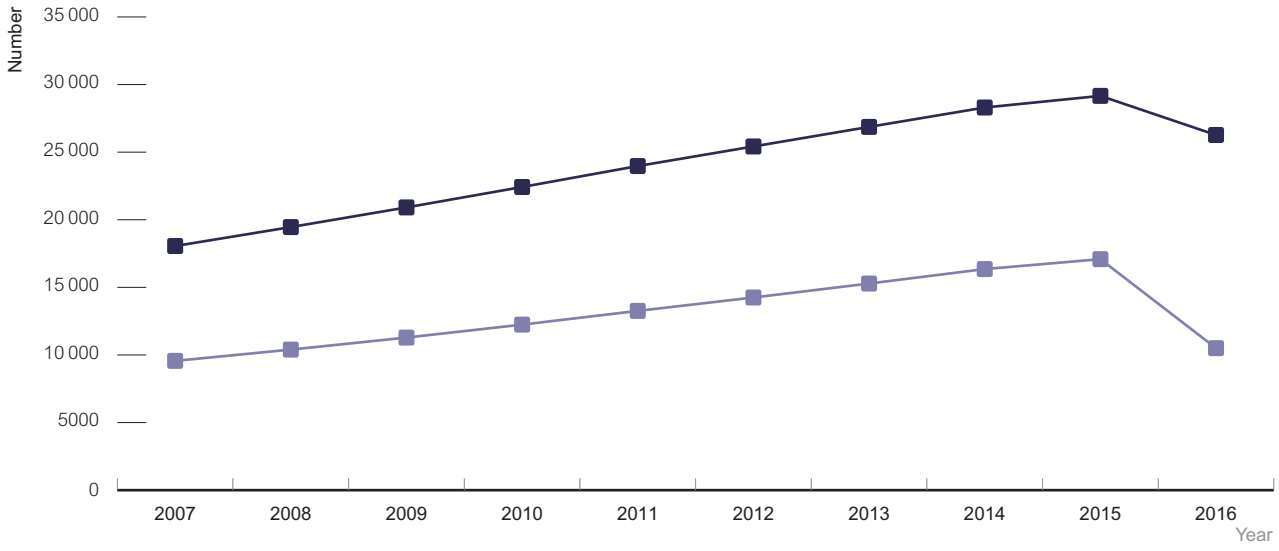
The estimated number of people living with chronic hepatitis C who had severe fibrosis increased by 61% from 18 057 in 2007 to 29 162 in 2015, then declined by 10% between 2015 and 2016 (26 270). Similarly, the estimated number of people living with chronic hepatitis C who had hepatitis C-related cirrhosis increased by 79% from 9 563 in 2007 to 17 085 in 2015, then declined by 38% between 2015 and 2016 (10 502) (Figure 2.1.18).

Among people living with chronic hepatitis C and those who have been cured of chronic hepatitis C, between 2007 and 2016, the estimated number with severe fibrosis increased by 82% (18 357 to 33 442) and the estimated number with hepatitis C-related cirrhosis increased by 108% (9 744 to 20 254) (Figure 2.1.19).

Among people living with chronic hepatitis C, the estimated number of new or incident cases of hepatitis C-related decompensated cirrhosis increased by 98% from 754 in 2007 to 1497 in 2015, then declined by 27% between 2015 and 2016 (to 1098). The estimated number of new or incident cases of hepatocellular carcinoma in people living with chronic hepatitis C increased by 94% from 393 in 2007 to 761 in 2015, then declined by 4% between 2015 and 2016 (731). The estimated number of deaths in people living with chronic hepatitis C increased by 89% from 439 in 2007 to 829 in 2015, then declined by 27% between 2015 and 2016 (605) (Figure 2.1.20).

Among people living with chronic hepatitis C and those who have been cured of chronic hepatitis C, the estimated number of new or incident cases of hepatitis C-related decompensated cirrhosis increased by 100% from 755 in 2007 to 1513 in 2015, then declined by 2% between 2015 and 2016 (1477). The estimated number of new or incident cases of hepatitis C-related hepatocellular carcinoma increased by 96% from 394 in 2007 to 774 in 2015, then declined by 3% between 2015 and 2016 (to 749). The estimated number of hepatitis C-related deaths increased by 91% from 440 in 2007 to 840 in 2015, then declined by 26% between 2015 and 2016 (621) (Figure 2.1.21).

Figure 2.1.18 Estimated number of people living with hepatitis C with severe fibrosis and hepatitis C-related cirrhosis, 2007–2016

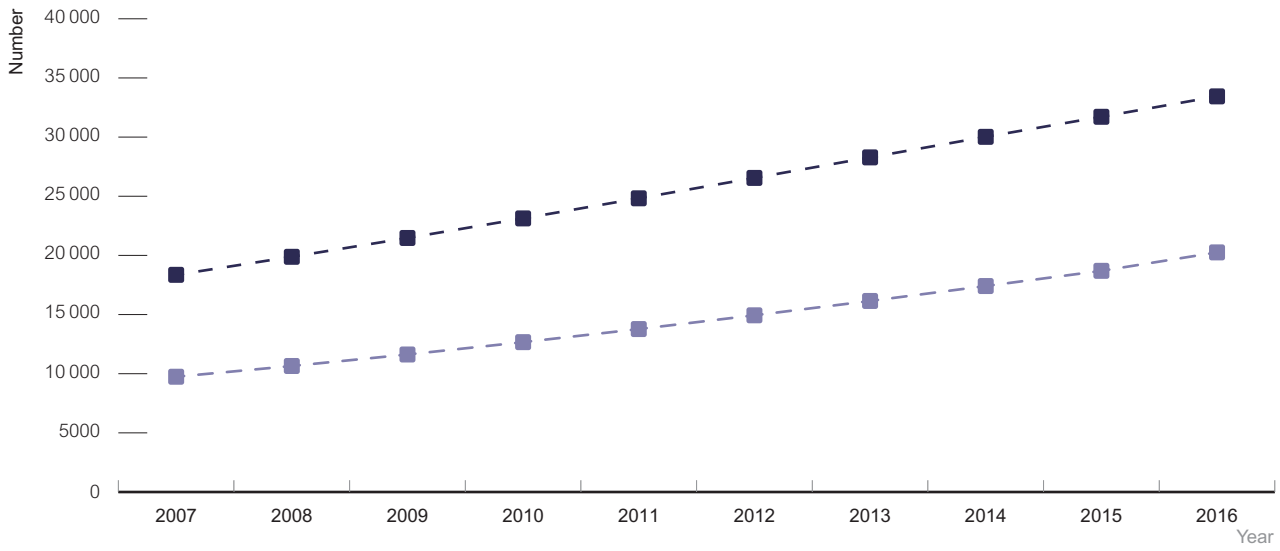


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Severe fibrosis	18 057	19 458	20 912	22 423	23 972	25 421	26 868	28 301	29 162	26 270
Cirrhosis	9563	10 397	11 286	12 244	13 260	14 250	15 282	16 352	17 085	10 502

Note: Only includes people with chronic hepatitis C infection.

Source: See Methodology for detail.

Figure 2.1.19 Estimated number of people with hepatitis C-related severe fibrosis and cirrhosis, 2007–2016



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Severe fibrosis	18357	19881	21473	23127	24826	26549	28285	30021	31716	33442
Cirrhosis	9744	10652	11624	12668	13774	14936	16149	17410	18695	20254

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.

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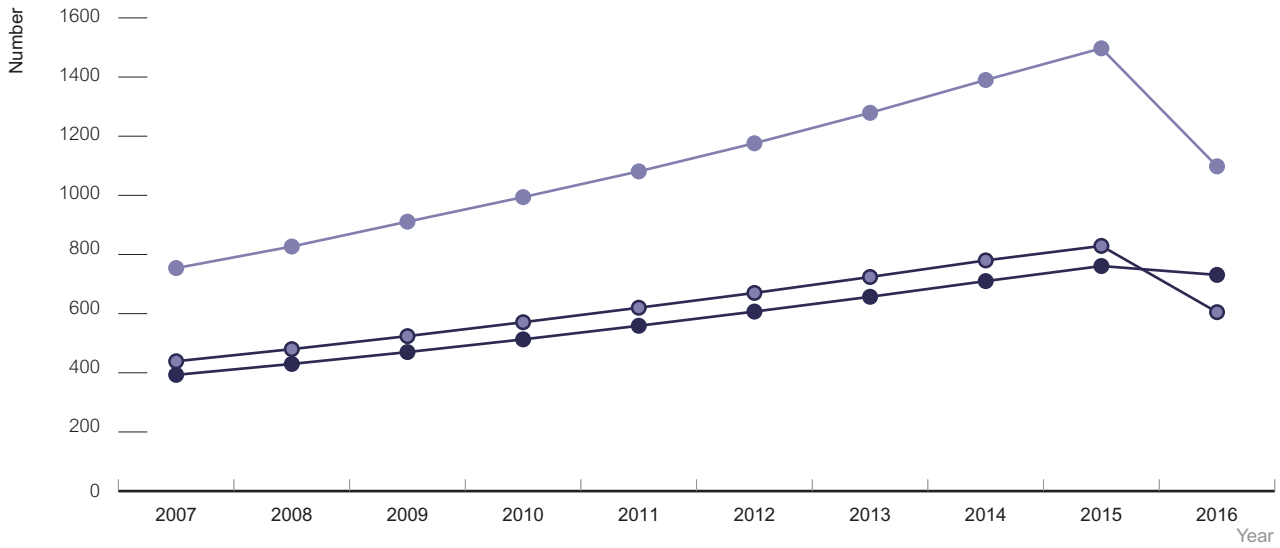
Figure 2.1.20 Estimated number of incident cases of hepatitis C-related decompensated cirrhosis, hepatocellular carcinoma and deaths in people living with chronic hepatitis C, 2007–2016

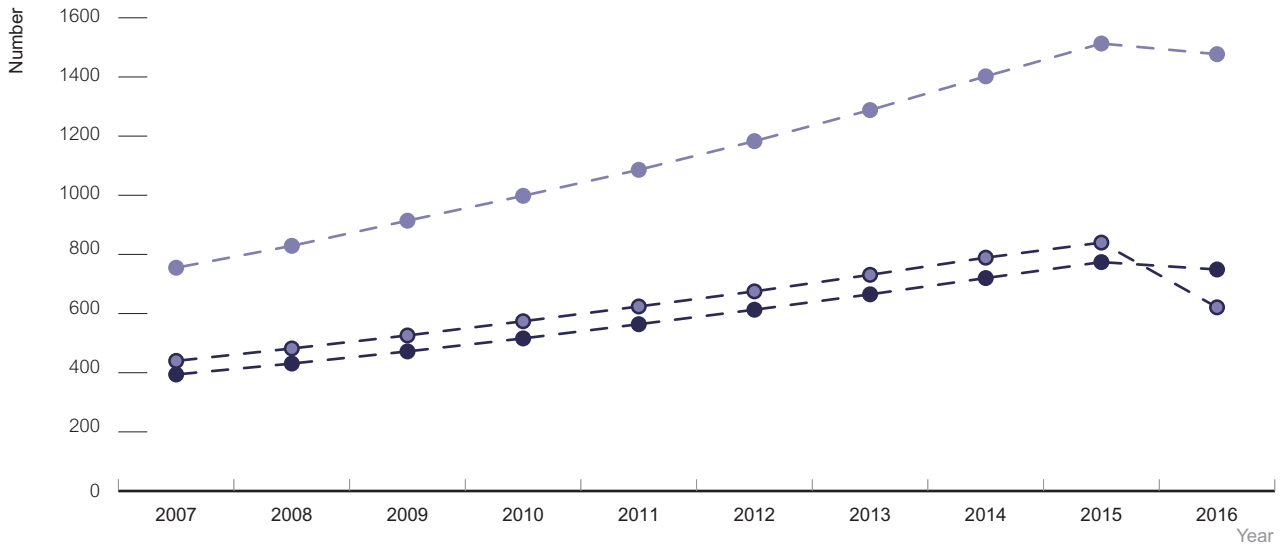


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Decompensated cirrhosis	754	827	911	994	1081	1176	1279	1390	1497	1098
Hepatocellular carcinoma	393	430	470	513	559	607	657	710	761	731
Deaths	439	480	524	571	620	670	724	780	829	605

Note: Only includes people with chronic hepatitis C infection.

Source: See Methodology for detail.

Figure 2.1.21 Estimated number of incident cases of hepatitis C-related decompensated cirrhosis, hepatocellular carcinoma and deaths, 2007–2016



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Decompensated cirrhosis	755	829	914	998	1086	1183	1288	1402	1513	1477
Hepatocellular carcinoma	394	431	472	516	564	613	665	720	774	749
Deaths	440	482	526	574	624	675	731	789	840	621

Note: Includes people with chronic hepatitis C infection and those who have been cured of infection but still experience hepatitis C-related morbidity and mortality.

Source: See Methodology for detail.

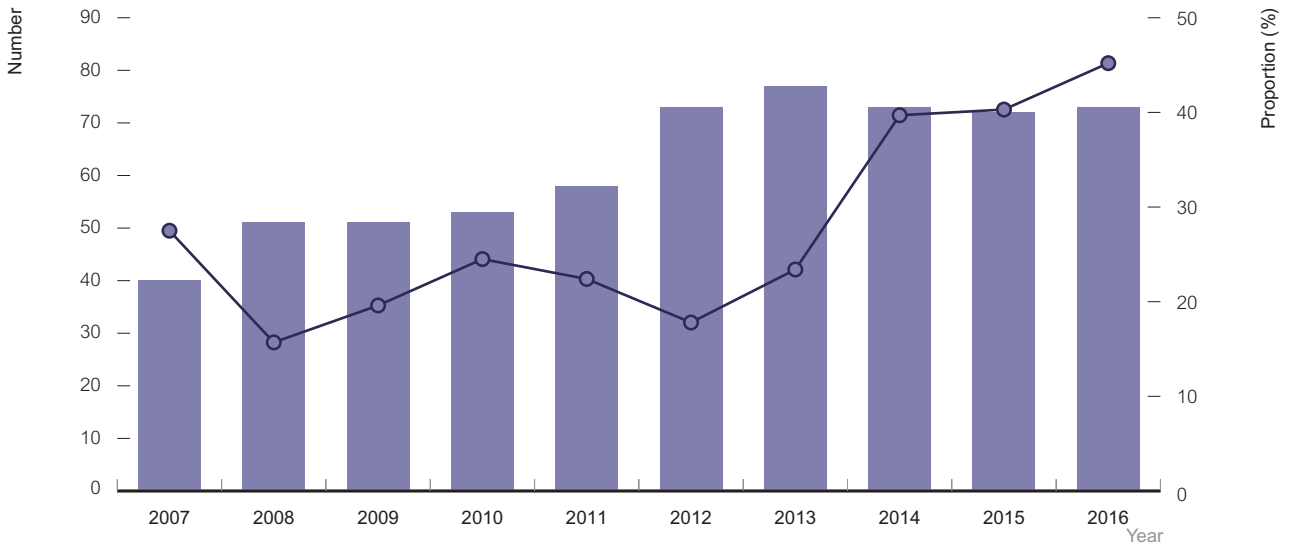
There is no comprehensive registry of advanced illness related to hepatitis C in Australia. One indicator of the extent of illness caused by hepatitis C is the number of liver transplants due to chronic infection. The number of people having liver transplants due to chronic hepatitis C or hepatitis C-related hepatocellular carcinoma has remained stable between 2012 (73) and 2016 (73), but the proportion of hepatitis C-related transplants accounted for by hepatocellular carcinoma has increased by 154% from 18% in 2012 to 45% in 2016 (Table 2.1.5, Figure 2.1.22).

Table 2.1.5 Number and proportion of liver transplants, 2007–2016, by primary diagnosis

	Year																			
	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Primary diagnosis																				
Chronic hepatitis B	3	2.5	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
Chronic hepatitis C	30	25.2	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
Chronic hepatitis B/C/D	2	1.7	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
Hepatocellular carcinoma	19	16.0	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
Hepatitis B-related hepatocellular carcinoma	*6*	*5.0*	*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*
Hepatitis C-related hepatocellular carcinoma	*11*	*9.2*	*11*	*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*
Hepatitis B/C/D-related hepatocellular carcinoma	*0*	*0.0*	*0*	*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*
Hepatitis negative	*2*	*1.7*	*2*	*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*
Other	65	54.6	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
Total	119	100	119	100	146	100	163	100	161	100	180	100	198	100	194	100	219	100	233	100.0

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

Figure 2.1.22 Number of hepatitis C-related liver transplants and proportion of hepatitis C-related transplants due to hepatocellular carcinoma, 2007–2016, by primary diagnosis



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hepatitis C-related liver transplants[a]	40	51	51	53	58	73	77	73	72	73
Proportion of hepatitis C-related transplants due to hepatocellular carcinoma (%)	27.5	15.7	19.6	24.5	22.4	17.8	23.4	39.7	40.3	45.2

a Includes liver transplants due to chronic hepatitis C and hepatitis C-related hepatocellular carcinoma.

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

Hepatitis C testing and care

The hepatitis C diagnosis and care cascade

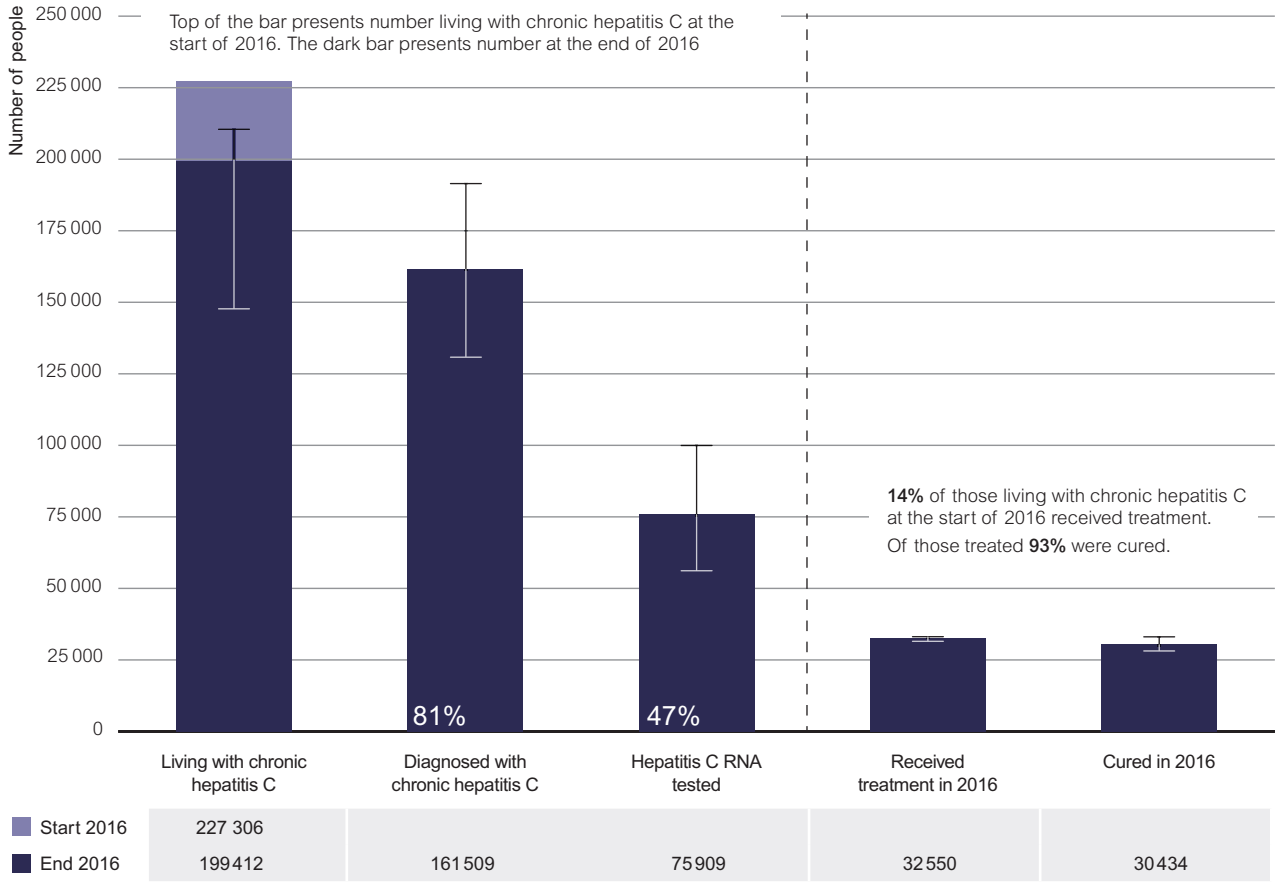
This section includes the hepatitis C diagnosis and care 'cascade', with estimates of the number of people living with chronic hepatitis C in Australia, and the number and proportion of people who have been diagnosed, had hepatitis C RNA testing done and received antiviral treatment. These estimates 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 2.1.23, Table 2.1.6).

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 start of 2016, an estimated 227 306 people were living with chronic hepatitis C in Australia, reducing to an estimated 199 412 living with chronic hepatitis C at the end of 2016 (Figure 2.1.23), due to the 30 434 cured during 2016 being much greater than the number of new hepatitis C infections. Of the 199 412 people living with chronic hepatitis C at the end of 2016, an estimated 161 509 (81%) were diagnosed and 75 909 (47% of those diagnosed) had a hepatitis C RNA test to confirm their chronic hepatitis C infection (Figure 2.1.23).

As people who are treated and cured during 2016 are no longer living with chronic hepatitis C at the end of 2016, treatment coverage was calculated using the estimated number living with chronic hepatitis C at the start of 2016. Of the estimated 227 306 people living with chronic hepatitis C at the start of 2016, 32 550 (14%) received hepatitis C treatment during the year and 30 434 (93% of those treated) were cured during 2016 (Figure 2.1.23). The World Health Organization has set targets of 90% of people living with chronic hepatitis C infection in 2015 to be diagnosed, with 80% treatment coverage by 2030.

Figure 2.1.23 The hepatitis C diagnosis and care cascade, 2016



Note: Due to updated modelling methods, estimates may be different to figures presented in previous years of reporting

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

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Table 2.1.6 The hepatitis C diagnosis and care cascade estimates, 2016

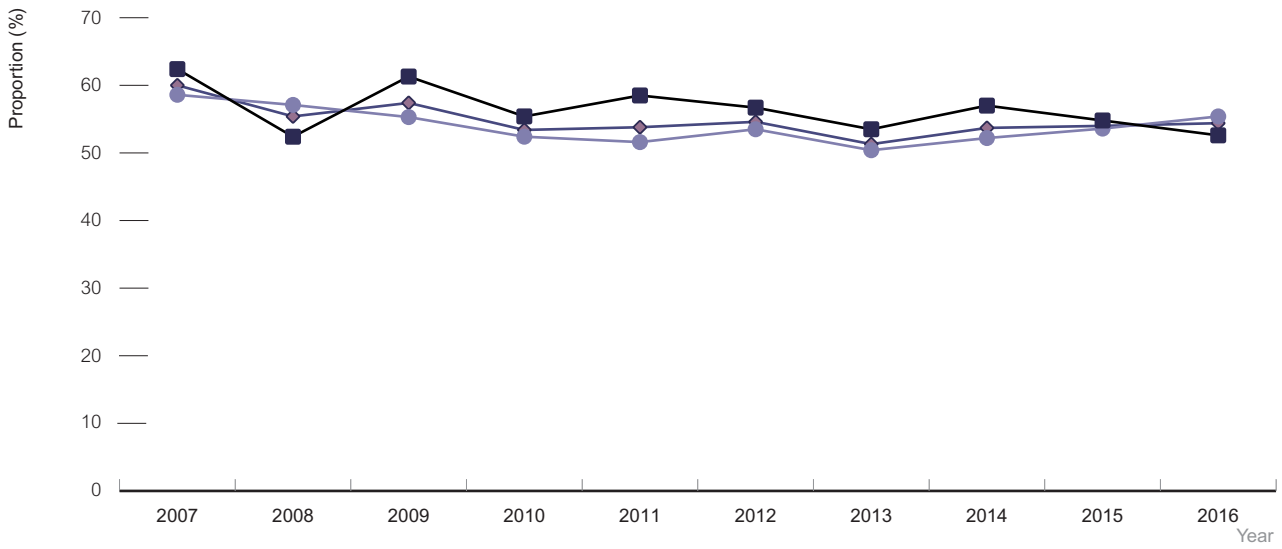
Cascade stage	Estimate to end of 2016	Range
Living with chronic hepatitis C	199 412	(147 585 to 210 403)
Diagnosed with chronic hepatitis C	161 509	(130 959 to 191 436)
Hepatitis C RNA tested	75 909	(56 312 to 99 547)
Received hepatitis C treatment in 2016	32 550	(31 433 to 33 667)
Cured of hepatitis C in 2016	30 434	(28 289 to 32 657)

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 2016, about half (54%) of survey respondents reported having had a hepatitis C antibody test in the 12 months before the survey (55% of men and 53% of women) (Figure 2.1.24). Over the past 10 years (2007–2016) the proportion reporting hepatitis C testing in the past 12 months fluctuated between 51% and 60%. 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 (61% vs 48% in 2016) (Figure 2.1.25).

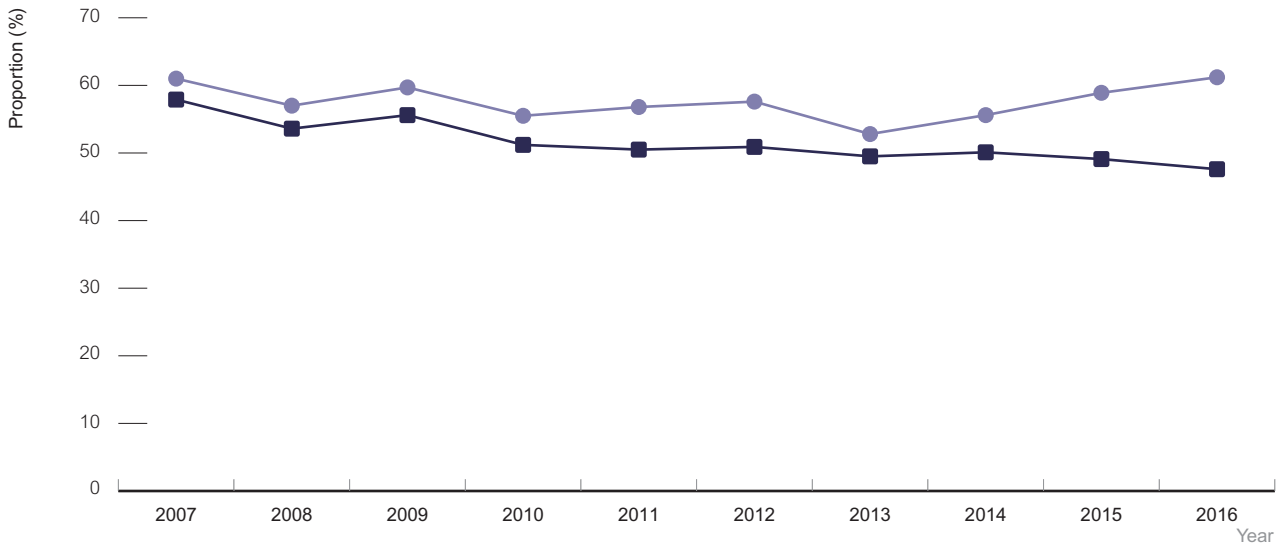
Figure 2.1.24 Proportion of people who inject drugs seen at needle and syringe programs who reported a hepatitis C antibody test in the past 12 months, 2007–2016, by sex



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women	62.4	52.4	61.3	55.4	58.5	56.7	53.5	57.0	54.8	52.6
Men	58.6	57.1	55.3	52.4	51.6	53.5	50.4	52.2	53.6	55.4
Total	60.0	55.4	57.4	53.4	53.8	54.6	51.3	53.7	54.0	54.4

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

Figure 2.1.25 Proportion of people who inject drugs seen at needle and syringe programs who reported a hepatitis C antibody test in the past 12 months, 2007–2016, by hepatitis C antibody status



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Antibody positive (%)	61.0	57.0	59.7	55.5	56.8	57.6	52.8	55.6	58.9	61.2
Antibody negative (%)	57.9	53.6	55.6	51.2	50.5	50.9	49.5	50.1	49.1	47.6

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

HCV

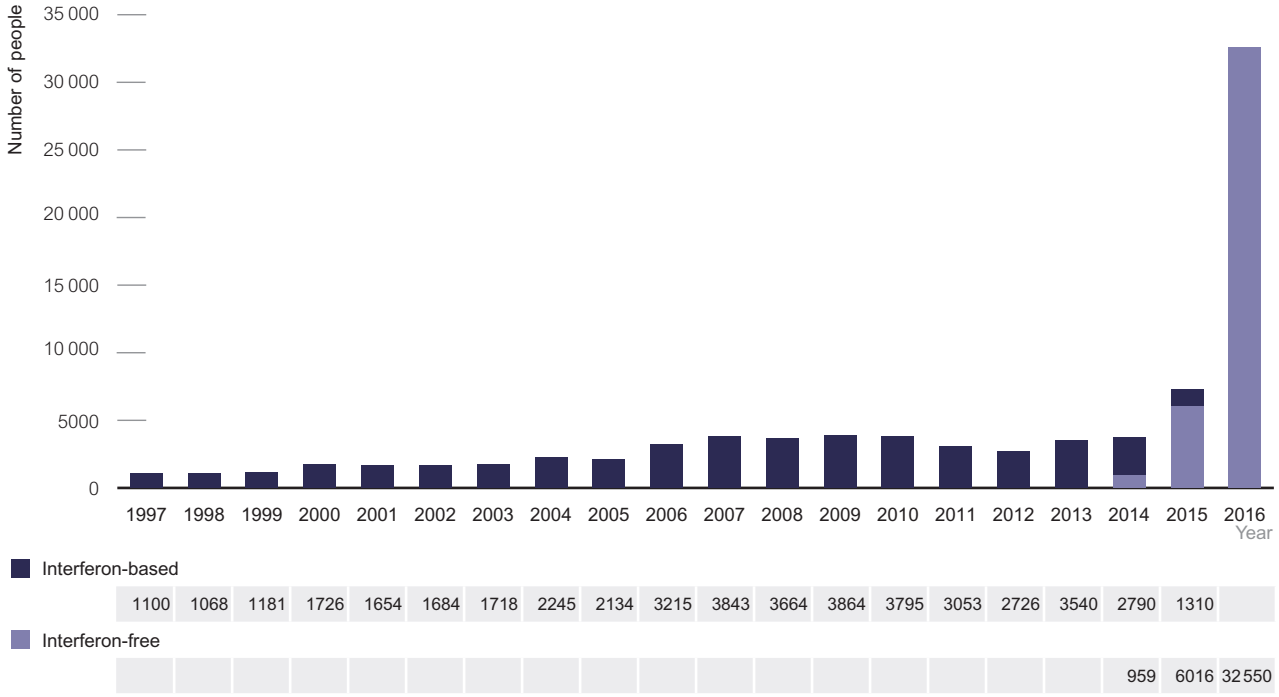
Hepatitis C treatment

An estimated 32 550 people received hepatitis C treatment in 2016, compared with 7326 in 2015 and 3749 in 2014 (Figure 2.1.26). 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 12-fold increase in the number of people receiving treatment between 2012 and 2016, with the greatest increase occurring between 2015 and 2016 (fourfold increase).

In 2016, 14% of all people estimated to be living with hepatitis C in Australia at the start of 2016 initiated direct-acting antiviral therapy, varying by jurisdiction between 10% and 24% (Table 2.1.7).

A higher proportion of people with hepatitis C-related cirrhosis (stage F4) at the start of 2016 were estimated to have received the treatment (49%) in 2016 compared with 10% with early-to-moderate fibrosis (stage F0-F2) and 17% with severe fibrosis (F3) (Figure 2.1.27).

Figure 2.1.26 The estimated number of people living with hepatitis C who received treatment, 1997–2016



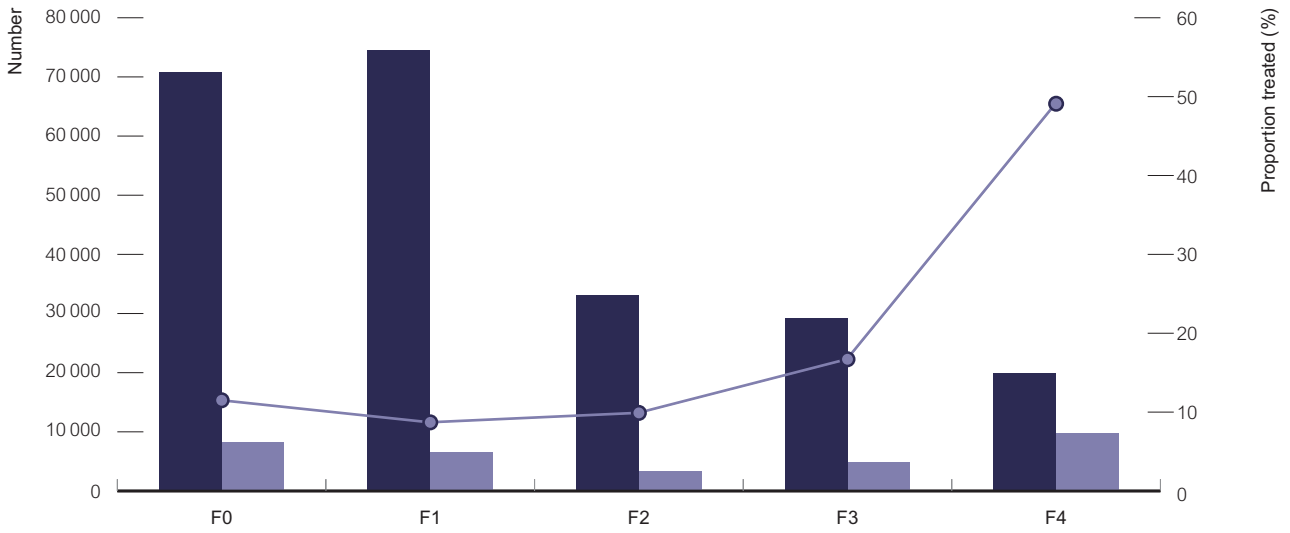
Source: Pharmdash, pharmaceutical companies.

Table 2.1.7 Number and proportion of people with chronic hepatitis C infection initiating direct-acting antiviral therapy, 2016, by state/territory

State/Territory	Number initiating direct-acting antiviral therapy in 2016	Estimated number of people living with chronic hepatitis C at the start of 2016	Proportion of people initiating direct-acting antiviral therapy in 2016
Australian Capital Territory	850	3 591	24%
New South Wales	11 450	80 700	14%
Northern Territory	370	3 606	10%
Queensland	6 540	47 356	14%
South Australia	2 020	11 682	17%
Tasmania	770	4 561	17%
Victoria	8 460	55 261	15%
Western Australia	2 330	20 549	11%
Australia	32 550	227 306	14%

Source: See Methodology for detail.

Figure 2.1.27 Number and proportion of people living with chronic hepatitis C at the start of 2016 who received treatment during 2016, by stage of disease



	F0	F1	F2	F3	F4
Living with chronic hepatitis C at the start of 2016	70 829	74 476	32 969	29 162	19 869
Treated in 2016	8138	6510	3255	4883	9765
Proportion treated (%)	11.5	8.7	9.9	16.7	49.1

Note: Stages F0–F2 early to moderate fibrosis; Stage F3 severe fibrosis; Stage F4 hepatitis-C related cirrhosis.

Source: See Methodology for detail.

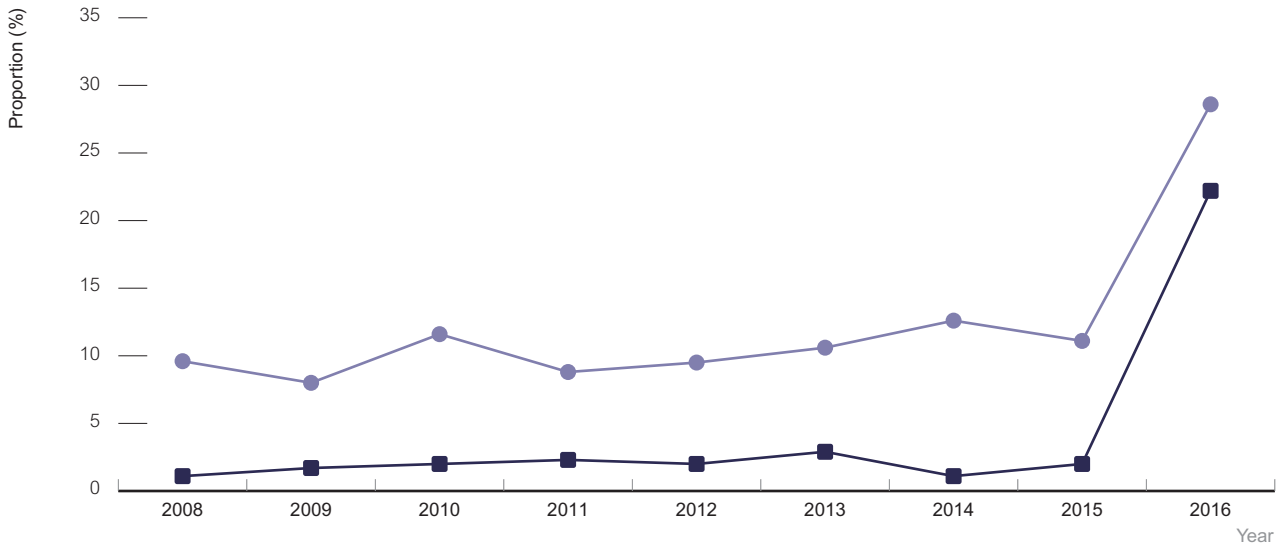
HCV

According to the Australian Needle and Syringe Program Survey in 2016, among respondents with self-reported chronic hepatitis C, 29% reported ever having received hepatitis C treatment, an increase from 11% in 2015 reporting that they had ever been treated. Also in 2016, 22% had received treatment in the past 12 months, an 11-fold increase from 2% in 2015 (Figure 2.1.28), 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 2016. Please refer to the *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017* 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. 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.

According to the National Prison Entrants' Bloodborne Virus Survey, 14% of respondents reported ever receiving hepatitis C treatment in 2016, increasing from 0.6% in 2007, with increases in both men and women (Figure 2.1.29).

Figure 2.1.28 Proportion of hepatitis C antibody positive people seen at needle and syringe programs with a history of hepatitis C treatment, 2008–2016



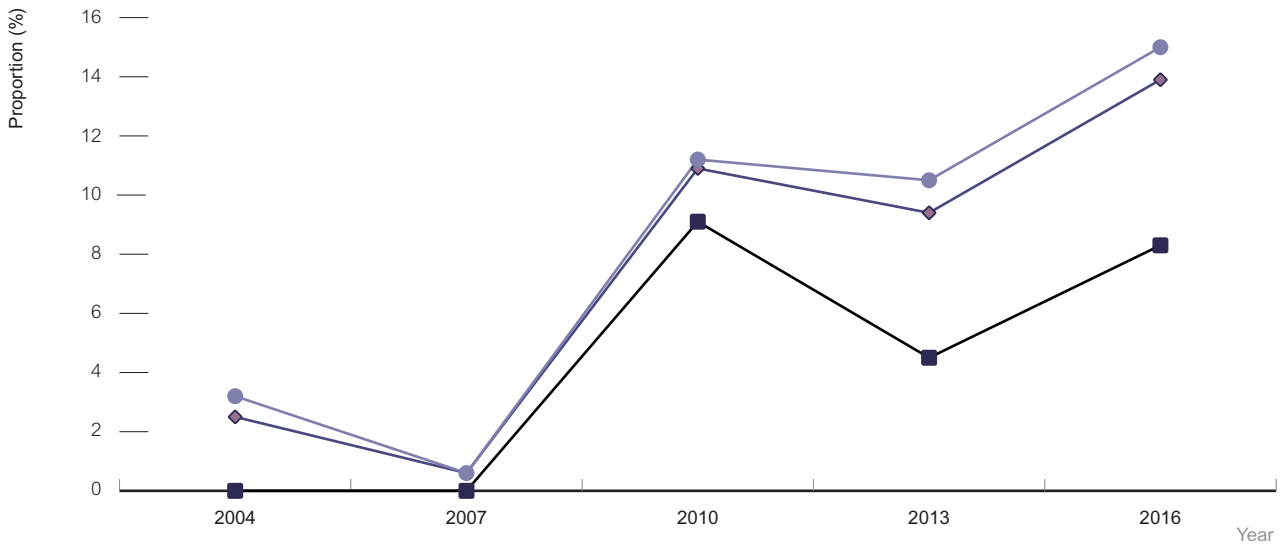
	2008	2009	2010	2011	2012	2013	2014	2015	2016
Lifetime history of treatment[a] (%)	9.6	8.0	11.6	8.8	9.5	10.6	12.6	11.1	28.6
Treatment in the last 12 months[b] (%)	1.1	1.7	2.0	2.3	2.0	2.9	1.1	2.0	22.2

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. Denominator for treatment in the last 12 months is restricted to people with hepatitis C antibody positive serology and excludes people who self-reported spontaneous or treatment-induced viral clearance.

b Prior to 2012 commenced treatment in the last 12 months was 'current treatment'.

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

Figure 2.1.29 Proportion of prison entrants who reported ever receiving hepatitis C treatment, by year of survey and sex



	2004	2007	2010	2013	2016
Men	3.2	0.6	11.2	10.5	15.0
Women	0.0	0.0	9.1	4.5	8.3
Total	2.5	0.6	10.9	9.4	13.9

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

Hepatitis C prevention

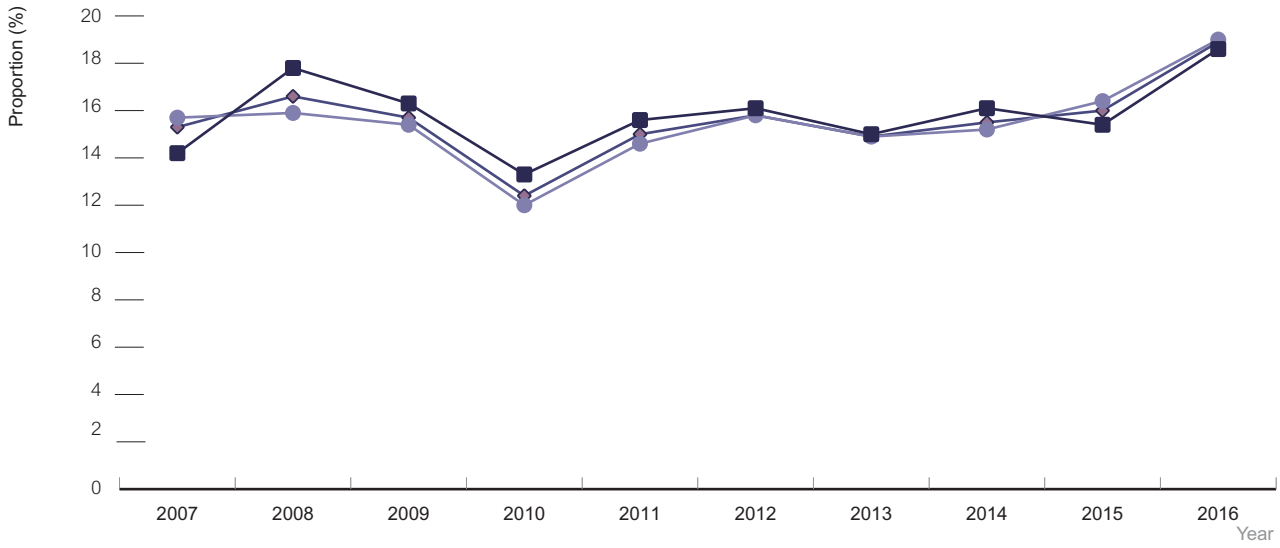
The reuse of needles and syringes that have been used by others (receptive syringe sharing) is the major risk factor for the transmission of HIV and hepatitis among people who inject drugs. Harm reduction strategies such as needle and syringe programs, opioid substitution therapy and peer interventions can reduce injecting risk behaviour.[13,14] Opioid substitution has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[16-18] Health promotion is important to enhance the effectiveness of these harm reduction strategies and to support people to inject 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).[22] Secondary prevention strategies to reduce the risk of progression to hepatocellular carcinoma include improving access to diagnosis and antiviral treatment.

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, with an increase between 2015 and 2016. In 2016, one in five (19%) of people who inject drugs attending needle and syringe programs reported receptive syringe sharing, with similar rates among men and women (Figure 2.1.30). Rates of receptive syringe sharing have consistently been higher in Aboriginal and Torres Strait Islander survey respondents, with 28% reporting this in 2016 compared to 17% 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 2017* for more information.[1]

Figure 2.1.30 Proportion of people seen at needle and syringe programs reporting receptive syringe sharing in the past month, 2007–2016, by sex



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Men	15.7	15.9	15.4	12.0	14.6	15.8	14.9	15.2	16.4	19.0
Women	14.2	17.8	16.3	13.3	15.6	16.1	15.0	16.1	15.4	18.6
Total	15.3	16.6	15.7	12.4	15.0	15.8	14.9	15.5	16.0	18.9

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

HCV

2.2 Hepatitis B

New hepatitis B diagnoses

This section focuses on people newly diagnosed with hepatitis B infection in Australia, including newly acquired hepatitis B diagnoses (evidence of hepatitis B acquisition within two years before diagnosis).

There were 6555 notifications of newly diagnosed hepatitis B infection in Australia in 2016. Of these, 176 (3%) were among the Aboriginal and Torres Strait Islander population, 2718 (41%) were among the non-Indigenous population, and there were a further 3661 (56%) notifications for which Indigenous status was not reported.

In 2016, over half (54%, 3539) of newly diagnosed hepatitis B infections were in males, 90% (5871) were in people aged 25 years and above, and 86% (5640) were in people residing in major cities. Of the 6555 new hepatitis B diagnoses in 2016, the vast majority (98%, 6401) were reported as unspecified, probably representing chronic hepatitis B infection, and only 154 (2%) were reported as newly acquired (Table 2.2.1).

Table 2.2.1 Characteristics of new hepatitis B diagnoses, 2007–2016

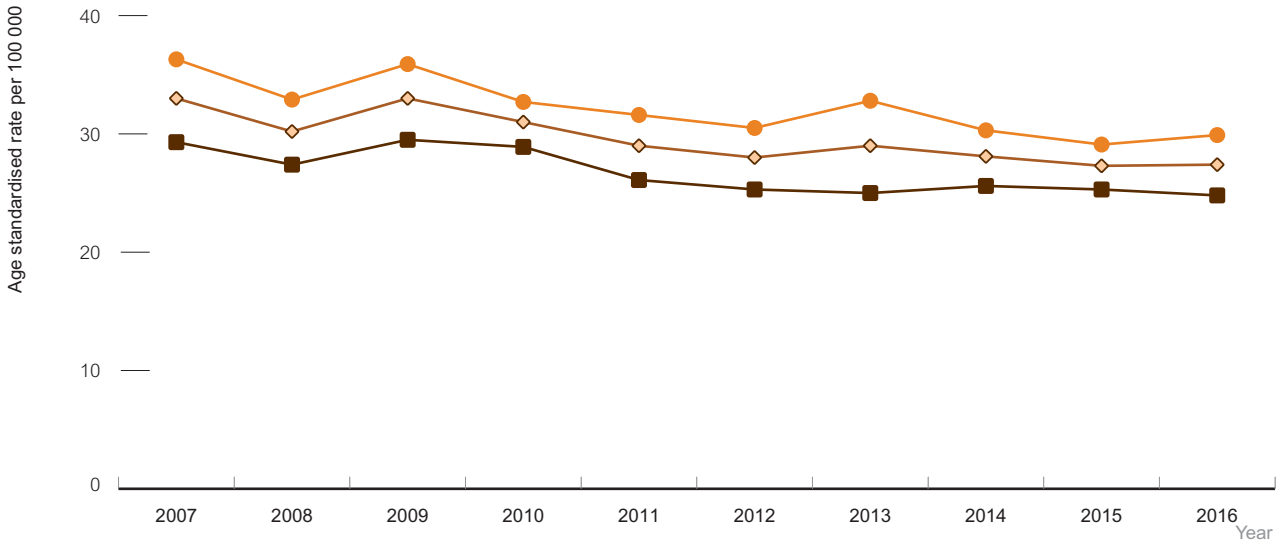
	Year of diagnosis									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Characteristic										
Total	6808	6375	7083	6775	6440	6315	6658	6533	6455	6555
Sex										
Male	3742	3460	3860	3565	3512	3436	3747	3504	3424	3539
Female	3013	2879	3162	3147	2885	2846	2884	3000	3010	2989
Missing	53	36	61	63	43	33	27	29	21	27
Age group										
0–14	156	164	137	127	89	87	91	76	70	81
15–24	1127	1022	1116	969	886	803	859	689	617	601
25–39	2984	2812	3121	3062	2920	2917	2995	3011	2923	2949
40+	2534	2367	2699	2610	2540	2506	2713	2754	2839	2922
Missing data	7	10	10	7	5	2	0	3	6	2
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	347	300	262	265	236	200	205	167	226	176
Non-Indigenous	2999	2719	2792	2382	2197	2373	2473	2421	2331	2718
Not reported	3462	3356	4029	4128	4007	3742	3980	3945	3898	3661
Newly acquired[a]	287	262	250	229	186	197	177	169	141	154
Area of residence										
Major cities	5679	5311	5970	5602	5445	5296	5454	5542	5457	5640
Inner regional	376	352	406	408	328	363	385	416	406	364
Outer regional	365	341	306	339	330	390	506	336	339	337
Remote	100	108	102	98	87	83	82	68	87	41
Very remote	142	117	104	101	97	83	95	60	54	52
Missing data	146	146	195	227	153	100	136	111	112	121
State/Territory										
ACT	69	58	108	95	94	107	111	97	81	89
NSW	2578	2275	2801	2587	2489	2313	2505	2520	2375	2391
NT	245	193	161	161	154	196	331	153	160	109
QLD	1003	840	988	1057	826	794	871	954	1041	1069
SA	327	282	305	286	311	347	293	328	344	306
TAS	43	67	84	55	51	71	58	60	42	40
VIC	1935	1934	1989	1923	1947	1891	1871	1787	1831	1883
WA	608	726	647	611	568	596	618	634	581	668

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 Disease Surveillance System

The notification rate of hepatitis B in Australia has declined by 17% in the past 10 years, from 33.0 per 100 000 in 2007 to 27.4 per 100 000 in 2016. Rates have been consistently higher among males than females, and were 29.9 and 24.8 per 100 000 in 2016, respectively (Figure 2.2.1).

Figure 2.2.1 Hepatitis B notification rate per 100 000 population, 2006–2016, by sex

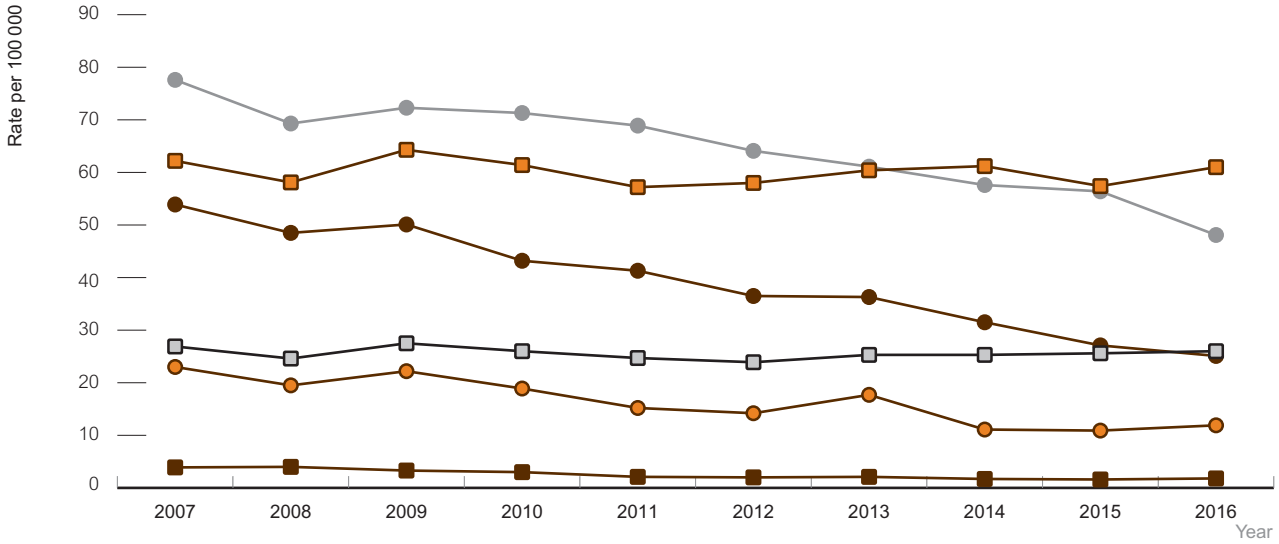


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Males	36.3	32.9	35.9	32.7	31.6	30.5	32.8	30.3	29.1	29.9
Females	29.3	27.4	29.5	28.9	26.1	25.3	25.0	25.6	25.3	24.8
Total	33.0	30.2	33.0	31.0	29.0	28.0	29.0	28.1	27.3	27.4

Source: Australian National Notifiable Diseases Surveillance System.

The rate of notification has declined between 2007 and 2016 in the younger age groups including 15–19 years (48%, 23.0 to 11.9 per 100 000), 20–24 years (53%, 53.9 to 25.1 per 100 000), and 25–29 years (38%, 77.6 to 48.1 per 100 000) (Figure 2.2.2). Overall the rates in those aged under 25 years have declined by 52%. In contrast, notification rates have remained stable in those aged 30–39 years (62.2 per 100 000 in 2007 to 61.0 per 100 000 in 2016) and 40 years and over (26.9 per 100 000 in 2007 to 26.0 per 100 000 in 2016) (Figure 2.2.2).

Figure 2.2.2 Hepatitis B notification rate per 100 000 population, 2007–2016, by age group



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	3.9	4.0	3.3	3.0	2.1	2.0	2.1	1.7	1.6	1.8
15–19	23.0	19.5	22.2	18.9	15.2	14.2	17.7	11.1	10.9	11.9
20–24	53.9	48.5	50.1	43.2	41.3	36.5	36.3	31.5	27.1	25.1
25–29	77.6	69.3	72.3	71.3	68.9	64.1	61.1	57.6	56.4	48.1
30–39	62.2	58.1	64.3	61.4	57.2	58.0	60.4	61.2	57.4	61.0
40+	26.9	24.6	27.5	26.0	24.7	23.9	25.3	25.3	25.6	26.0

Source: Australian National Notifiable Diseases Surveillance System.

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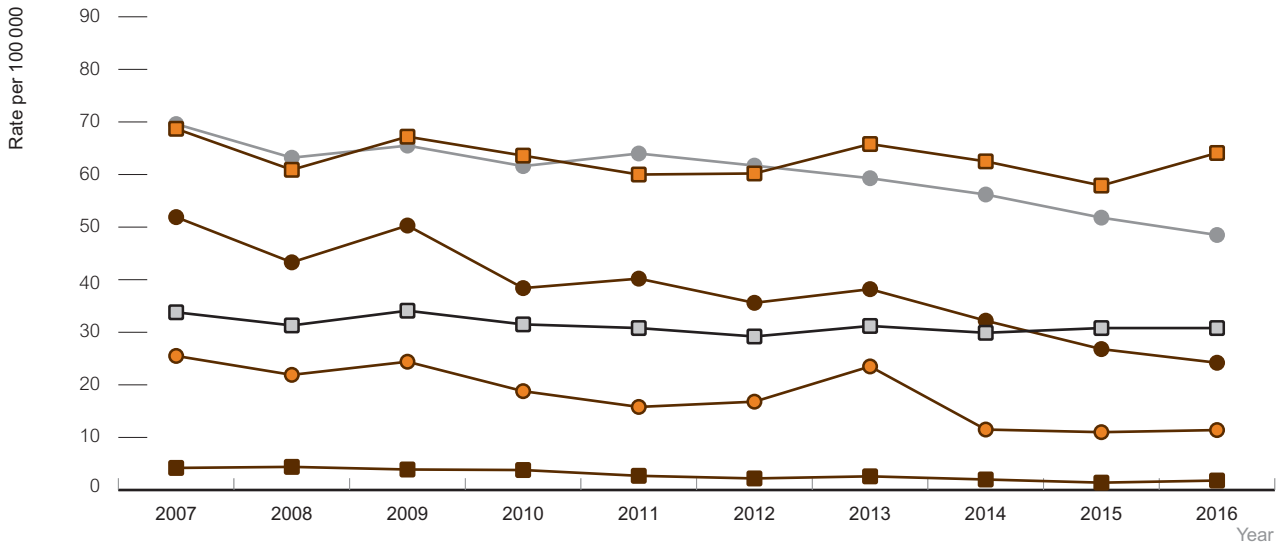
Among males, the highest hepatitis B notification rates in 2016 were in the age groups 30–39 years (64.1 per 100 000) and 25–29 years (48.5 per 100 000). The rates have been stable in the 30–39 age group over the past 10 years, but have decreased by 30% in the 25–29 age group from 69.6 per 100 000 in 2007 to 48.5 per 100 000 in 2016 (Figure 2.2.3). In the same period, rates also decreased in the 0–14, 15–19 and 20–24 age groups by 57%, 55% and 53% respectively (Figure 2.2.3).

In comparison, in females, the hepatitis B notification rate in 2016 was highest in the age group 30–39 years (57.0 per 100 000) followed by the 25–29 age group (47.0 per 100 000), but declined by 45% from 85.0 per 100 0000 in 2007 (Figure 2.2.4). The hepatitis B notification rates also decreased in the 0–14, 15–19 and 20–24 age groups by 50%, 38% and 54% respectively. Similar to males, rates in females have been stable in the 30–39 age group over the past 10 years (Figure 2.2.4).

In general, a similar pattern was seen nationally and in both males and females, with declines in rates over the past 10 years in the younger age groups but stable rates in the age groups 30–39 and 40 years and over.

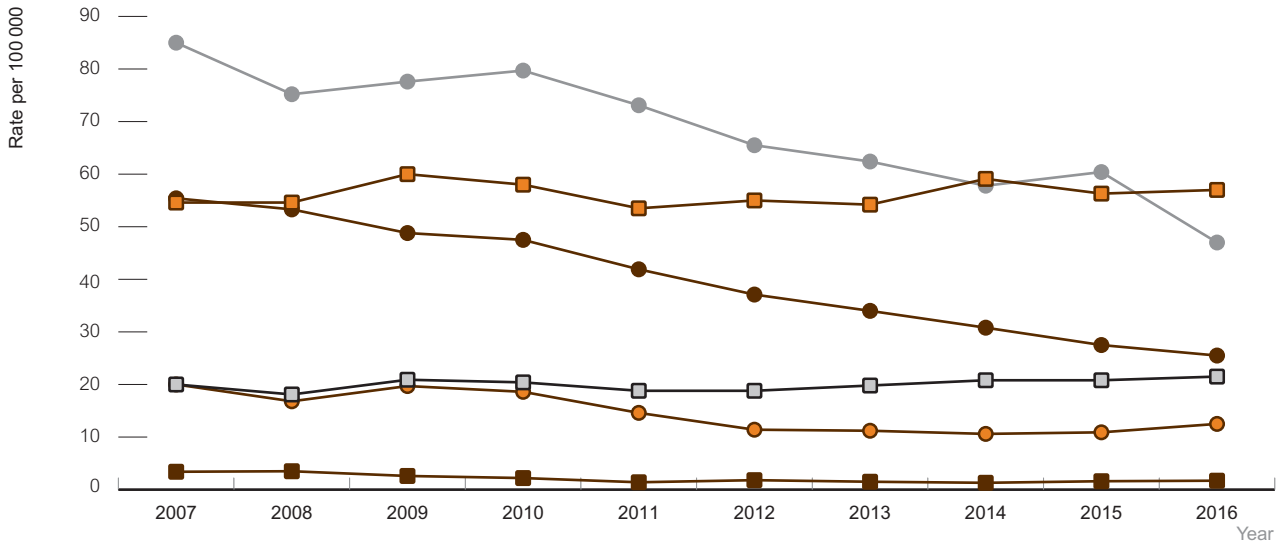
Figure 2.2.3 Hepatitis B notification rate per 100 000 population, 2007–2016, by age group, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	4.2	4.4	3.9	3.8	2.7	2.2	2.6	2.0	1.4	1.8
15–19	25.5	21.9	24.4	18.8	15.8	16.8	23.5	11.5	11.0	11.4
20–24	51.9	43.3	50.3	38.4	40.2	35.6	38.2	32.2	26.8	24.2
25–29	69.6	63.2	65.5	61.6	64.0	61.7	59.3	56.2	51.8	48.5
30–39	68.7	60.9	67.2	63.6	60.0	60.2	65.8	62.5	57.9	64.1
40+	33.8	31.3	34.1	31.5	30.8	29.2	31.2	29.9	30.8	30.8

Source: Australian National Notifiable Diseases Surveillance System.

Figure 2.2.4 Hepatitis B notification rate per 100 000 population, 2007–2016, by age group, females

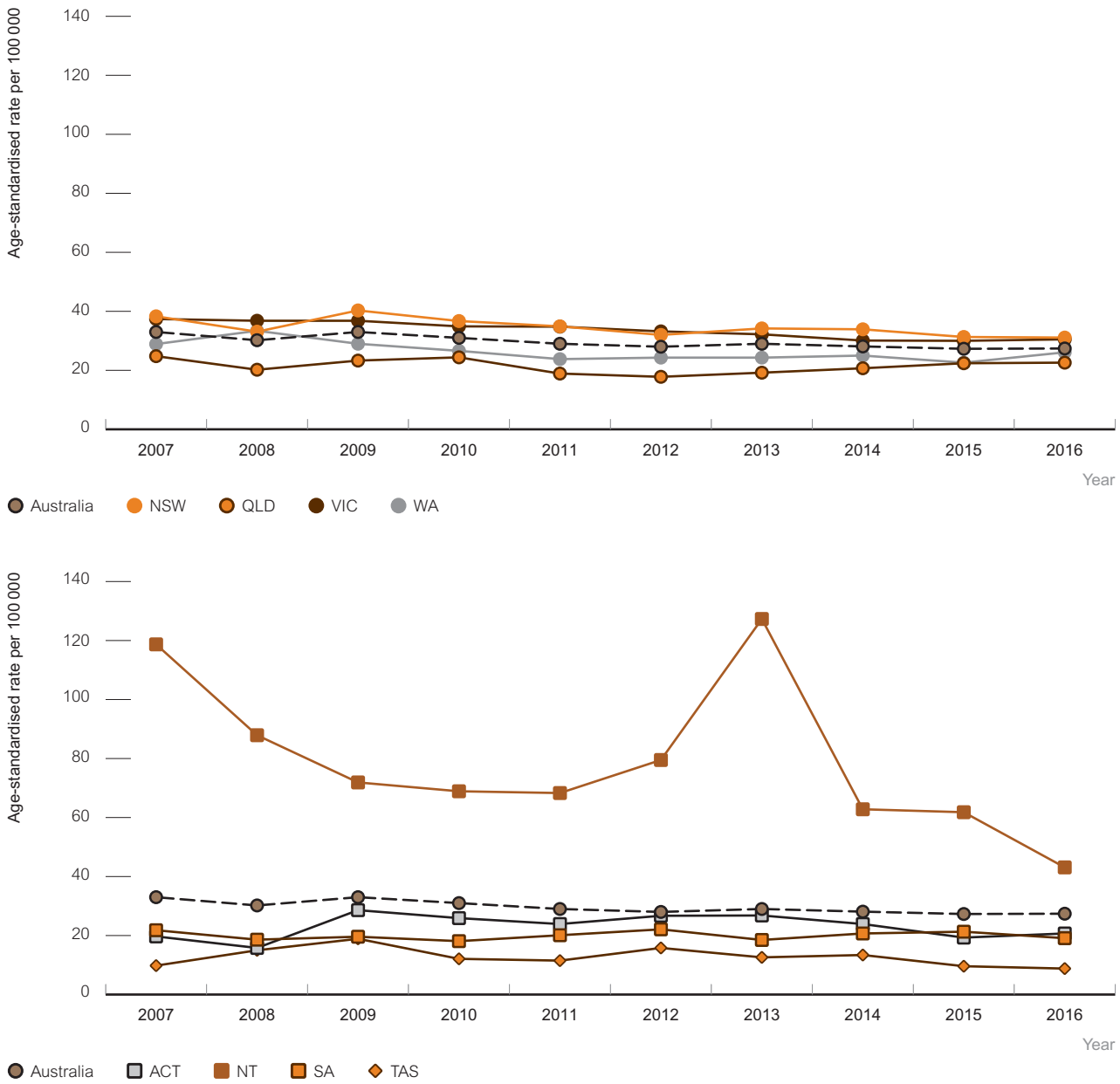


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	3.4	3.5	2.6	2.2	1.4	1.8	1.5	1.3	1.6	1.7
15–19	20.0	16.8	19.7	18.6	14.6	11.4	11.2	10.6	10.9	12.5
20–24	55.4	53.3	48.8	47.5	41.9	37.1	34.0	30.8	27.5	25.5
25–29	85.0	75.2	77.6	79.7	73.1	65.5	62.4	57.8	60.4	47.0
30–39	54.6	54.6	60.0	58.0	53.5	55.0	54.2	59.1	56.3	57.0
40+	20.0	18.1	20.9	20.4	18.8	18.8	19.8	20.8	20.8	21.5

Source: Australian National Notifiable Diseases Surveillance System; ABS Catalogues 3101051–3101058.

The notification rate of hepatitis B infection in Australia has consistently been highest in the Northern Territory, but has fallen by 64% over the past 10 years (from 118.7 per 100 000 in 2007 to 43.1 per 100 000 in 2016). In most other jurisdictions the rate of hepatitis B diagnosis has fluctuated over the past 10 years, with small declines in New South Wales (19%, 38.3 per 100 000 in 2007 to 31.1 per 100 000 in 2016), Victoria (18%, 37.4 per 100 000 in 2007 to 30.5 per 100 000 in 2016) and Western Australia (10%, 28.9 per 100 000 in 2007 to 26.1 per 100 000 in 2016) (Figure 2.2.5, Table 2.2.2).

Figure 2.2.5 Hepatitis B notification rate per 100 000 population, 2007–2016, by year and state/territory



Source: Australian National Notifiable Diseases Surveillance System

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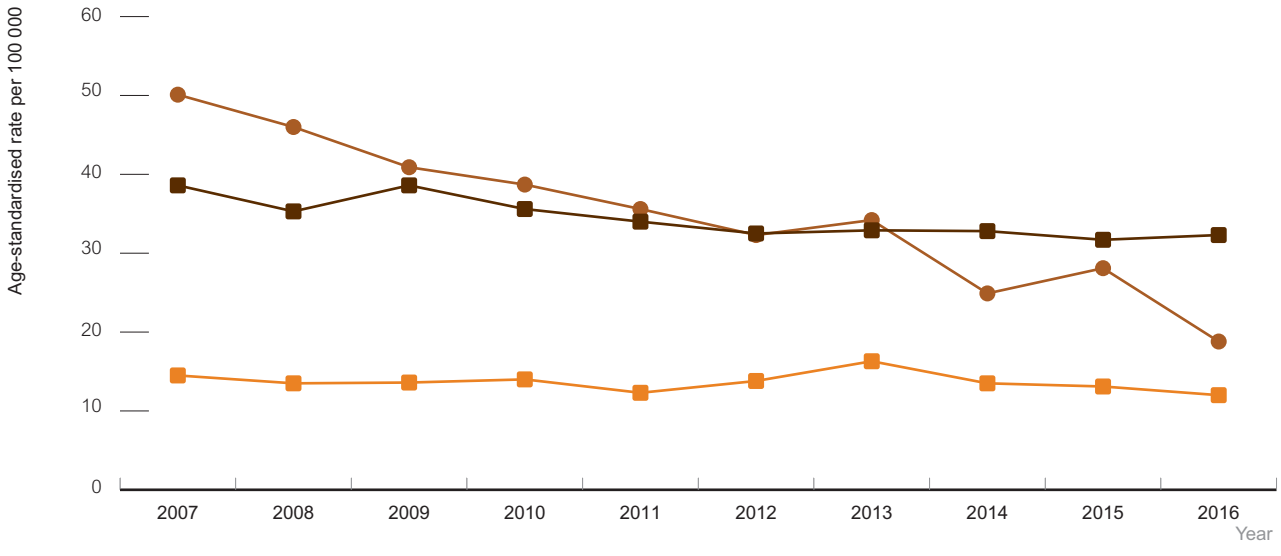
Table 2.2.2 Age-standardised rates of hepatitis B notification per 100 000 population, 2007–2016 by state/territory

State/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australian Capital Territory	19.7	15.8	28.6	25.9	23.9	26.7	26.8	23.9	19.3	20.7
New South Wales	38.3	33.1	40.3	36.7	34.9	32.0	34.2	33.9	31.3	31.1
Northern Territory	118.7	87.9	71.9	68.9	68.3	79.5	127.3	62.8	61.8	43.1
Queensland	24.8	20.2	23.3	24.4	18.9	17.8	19.2	20.7	22.4	22.6
South Australia	21.8	18.6	19.6	18.1	20.1	22.1	18.5	20.7	21.3	19.1
Tasmania	9.8	15.0	18.9	12.1	11.5	15.8	12.6	13.4	9.6	8.8
Victoria	37.4	36.8	36.8	34.9	34.8	33.2	32.2	30.1	30.0	30.5
Western Australia	28.9	33.4	29.0	26.6	23.8	24.3	24.3	25.0	22.6	26.1
Australia	33.0	30.2	33.0	31.0	29.0	28.0	29.0	28.1	27.3	27.4

Source: Australian National Notifiable Diseases Surveillance System.

Rates of hepatitis B notification were higher in 2016 in major cities (32.3 per 100 000) than in remote and very remote areas (18.8 per 100 000) and inner and outer regional areas (12.0 per 100 000). Rates over the past 10 years have remained stable in the regional areas, but declined in remote areas by 62% from 50.1 per 100 000 in 2007 to 18.8 per 100 000 in 2016). In major cities rates declined by 16% from 38.6 per 100 000 in 2007 to 32.3 per 100 000 in 2016) (Figure 2.2.6).

Figure 2.2.6 Hepatitis B notification rate per 100 000 population, 2007–2016, by region of residence



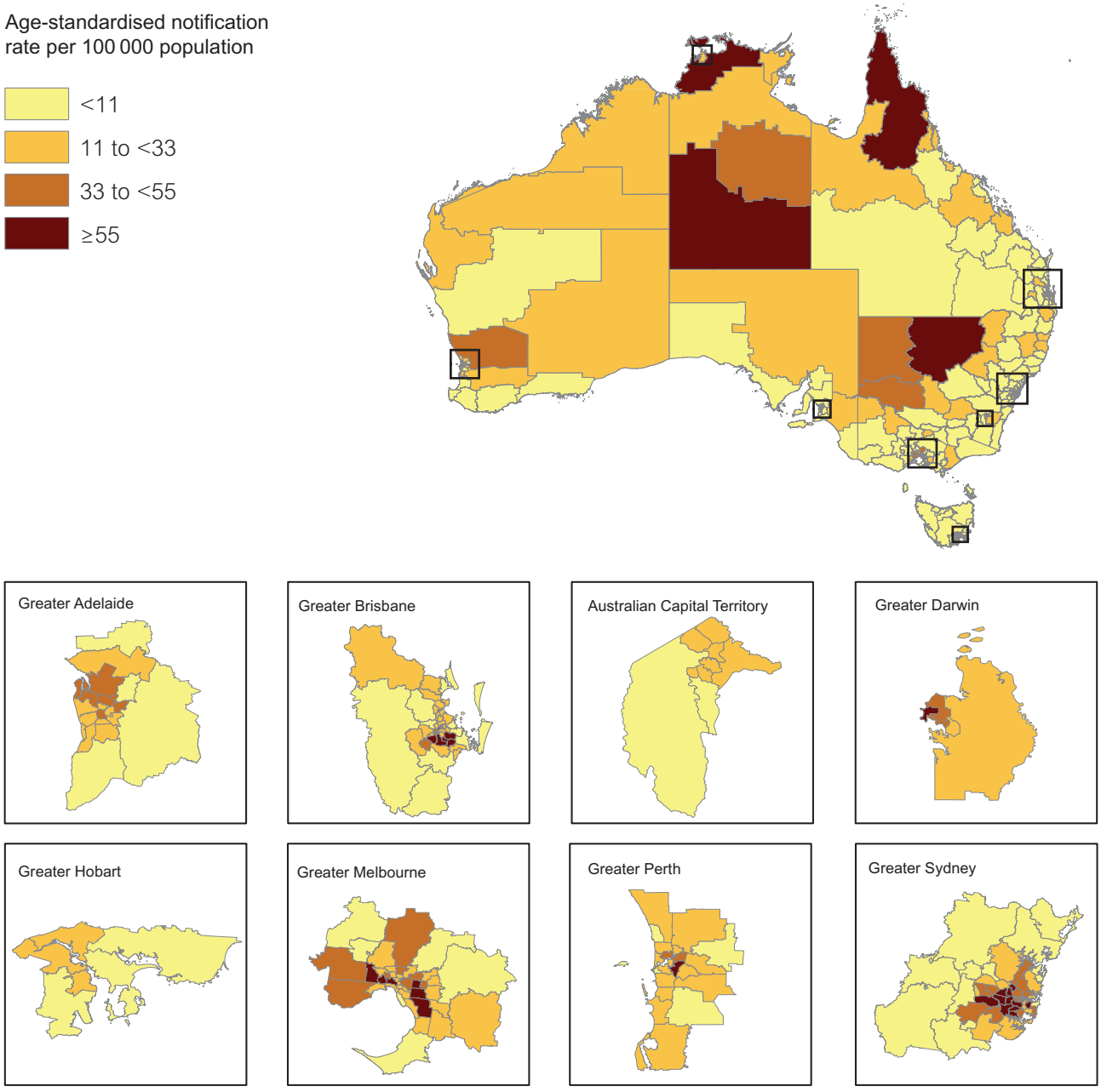
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	38.6	35.3	38.6	35.6	34.0	32.5	32.9	32.8	31.7	32.3
Inner and outer regional	14.5	13.5	13.6	14.0	12.3	13.8	16.3	13.5	13.1	12.0
Remote and very remote	50.1	46.0	40.9	38.7	35.6	32.3	34.2	24.9	28.1	18.8

Source: Australian 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 2.2.7).

Based on average hepatitis B notification rates between 2014 and 2016, 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 2.2.7). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of hepatitis B diagnoses, 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 2.2.7 Average age-standardised hepatitis B notification rate per 100 000 population, by statistical area level 3, 2014–2016, Australia and major cities



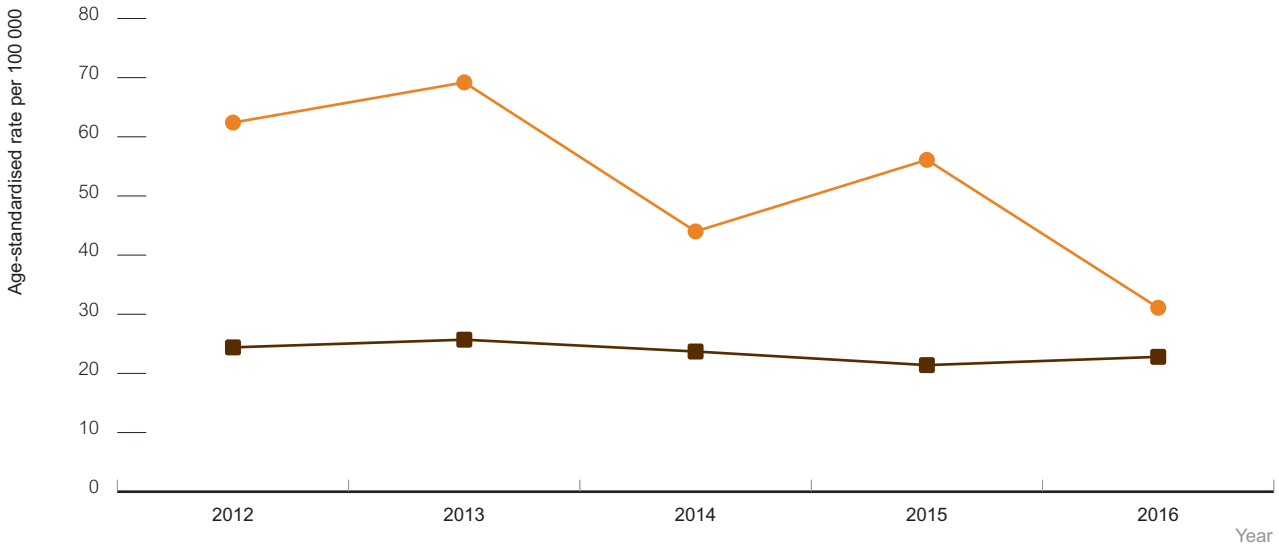
Note: Average hepatitis B notification rates for the three-year period 2014–2016 were used to minimise the influence of fluctuation in the number of hepatitis B diagnoses.

Source: State and territory health authorities.

Data on notifications in Aboriginal and Torres Strait Islander people are from the Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia, where reporting of Indigenous status is at least 50% complete in each of the past five years. It is important to note that incomplete Aboriginal and Torres Strait Islander status in other jurisdictions means that the data presented below may not be representative of national trends.

In 2016, the notification rate of newly diagnosed hepatitis B infection for the Aboriginal and Torres Strait Islander population in these jurisdictions was 36% higher than the non-Indigenous population (31.1 per 100 000 compared to 22.8 per 100 000) (Figure 2.2.8). In the Aboriginal and Torres Strait Islander population the rate decreased by 50% from 62.4 per 100 000 in 2012 to 31.1 per 100 000 in 2016, but in the non-Indigenous population it remained stable (24.4 per 100 000 in 2012 and 21.8 per 100 000 in 2016). The largest declines have been observed in younger age groups, which probably 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 2017*.[1]

Figure 2.2.8 Hepatitis B notification rate per 100 000 population, 2012–2016, by Aboriginal and Torres Strait Islander status

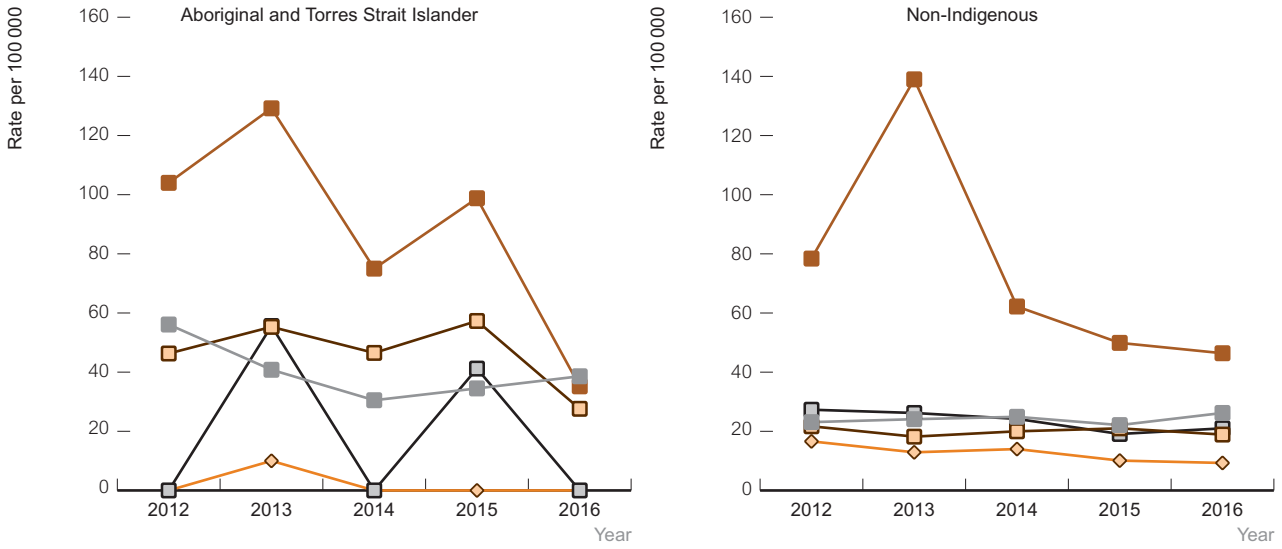


	2012	2013	2014	2015	2016
Non-Indigenous	24.4	25.7	23.7	21.4	22.8
Aboriginal and Torres Strait Islander	62.4	69.2	44.0	56.1	31.1

Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions in which Aboriginal and Torres Strait Islander status was reported for ≥50% of diagnoses 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 (2012–2016). In this period, hepatitis B notification rates declined by 31% in the Aboriginal and Torres Strait Islander population in Western Australia (13% increase in the non-Indigenous population) and declined by 40% in South Australia (13% decline 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 66% compared to 41% decline in the non-Indigenous population (Figure 2.2.9).

Figure 2.2.9 Hepatitis B notification rate per 100 000, 2012–2016, by state/territory and Aboriginal and Torres Strait Islander status



	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
ACT	0.0	55.6	0.0	41.2	0.0	27.3	26.2	24.2	19.1	21.0
NT	104.0	129.2	75.0	98.8	35.2	78.4	139.0	62.2	49.9	46.4
SA	46.3	55.3	46.5	57.3	27.6	21.7	18.2	20.0	21.0	18.9
TAS	0.0	10.0	0.0	0.0	0.0	16.6	12.9	14.0	10.1	9.3
WA	56.1	40.8	30.5	34.5	38.6	23.1	24.1	24.9	22.1	26.2

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

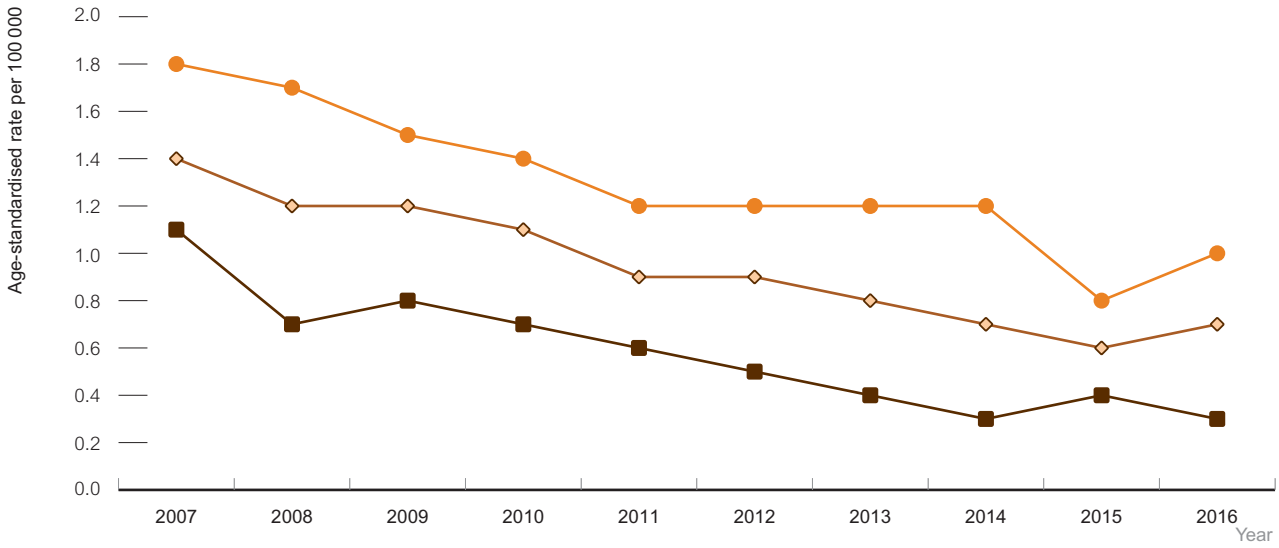
The higher rates of newly diagnosed hepatitis B in the Aboriginal and Torres Strait Islander population than in the non-Indigenous population reflect the higher prevalence of chronic hepatitis B among Aboriginal and Torres Strait Islander people. This relates to historical vertical and early childhood 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. 97.)

HBV

Newly acquired hepatitis B

For some newly diagnosed hepatitis B cases, 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 50% decline in the rate of newly acquired hepatitis B cases over the past 10 years, from 1.4 per 100 000 in 2007 to 0.7 per 100 000 in 2016, with decline in both males (44%) and females (73%). In 2016, the rate of newly acquired hepatitis B was 3.3 times as high in males as in females (1.0 vs 0.3 per 100 000) (Figure 2.2.10).

Figure 2.2.10 Newly acquired hepatitis B notification rate per 100 000 population, 2007–2016, by sex

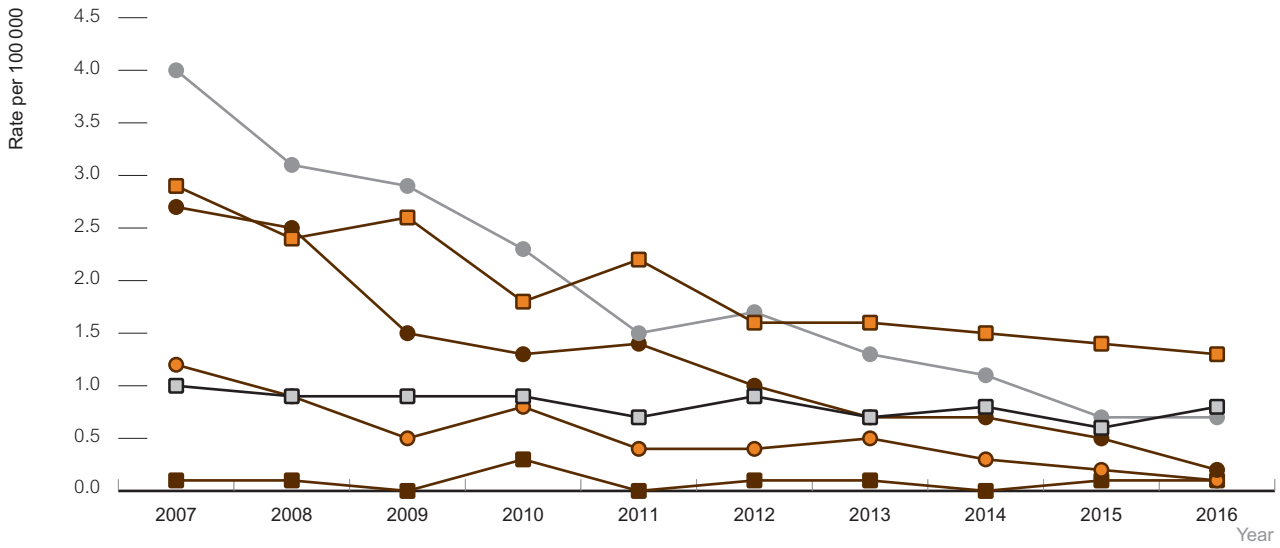


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Females	1.1	0.7	0.8	0.7	0.6	0.5	0.4	0.3	0.4	0.3
Males	1.8	1.7	1.5	1.4	1.2	1.2	1.2	1.2	0.8	1.0
Total	1.4	1.2	1.2	1.1	0.9	0.9	0.8	0.7	0.6	0.7

Source: Australian National Notifiable Diseases Surveillance System.

In 2016, hepatitis B notification rates were highest in the age groups 30–39 years (1.3 per 100 000), 40 years and over (0.8 per 100 000) and 25–29 years (0.7 per 100 000) (Figure 2.2.11). The rate of notification of newly acquired hepatitis B declined between 2007 and 2016 in the younger age groups aged 25–29 years (83%, 4.0 to 0.7 per 100 000), 20–24 years (93%, 2.7 to 0.2 per 100 000) and 15–19 years (92%, 1.2 to 0.1 per 100 000), with a smaller decline (55%) in those aged 30–39 years (2.9 per 100 000 in 2007 and 1.3 per 100 000 in 2016). In comparison, notification rates remained stable in those aged 40 years and over (1.0 per 100 000 in 2007 and 0.8 per 100 000 in 2016) (Figure 2.2.11).

Figure 2.2.11 Newly acquired hepatitis B notification rate per 100 000, 2007–2016, by age group



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–14	0.1	0.1	0.0	0.3	0.0	0.1	0.1	0.0	0.1	0.1
15–19	1.2	0.9	0.5	0.8	0.4	0.4	0.5	0.3	0.2	0.1
20–24	2.7	2.5	1.5	1.3	1.4	1.0	0.7	0.7	0.5	0.2
25–29	4.0	3.1	2.9	2.3	1.5	1.7	1.3	1.1	0.7	0.7
30–39	2.9	2.4	2.6	1.8	2.2	1.6	1.6	1.5	1.4	1.3
40+	1.0	0.9	0.9	0.9	0.7	0.9	0.7	0.8	0.6	0.8

Source: Australian National Notifiable Diseases Surveillance System.

HBV

Number of people living with Hepatitis B and prevalence

Number of people living with hepatitis B

At the end of 2016, there were an estimated 230 034 people living with chronic hepatitis B in Australia. Of those, an estimated 29 510 (13%) were Australian-born non-Indigenous people, 49 696 (22%) were born in Northeast Asia, 39 482 (17%) were born in Southeast Asia, and 24 287 (11%) were Aboriginal and Torres Strait Islander people (the estimates by subpopulation may overlap) (Table 2.2.3). People born in Southeast Asia and Northeast Asia, together with Aboriginal and Torres Strait Islander people, represent 3%, 4% and 3% of population in Australia,[23] 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 (13 260) and gay and bisexual men (10 371).The prevalence estimates in overseas-born Australians reflects the prevalence in the country of their birth, which is particularly high in the Asia-Pacific region (Figure 2.2.12).

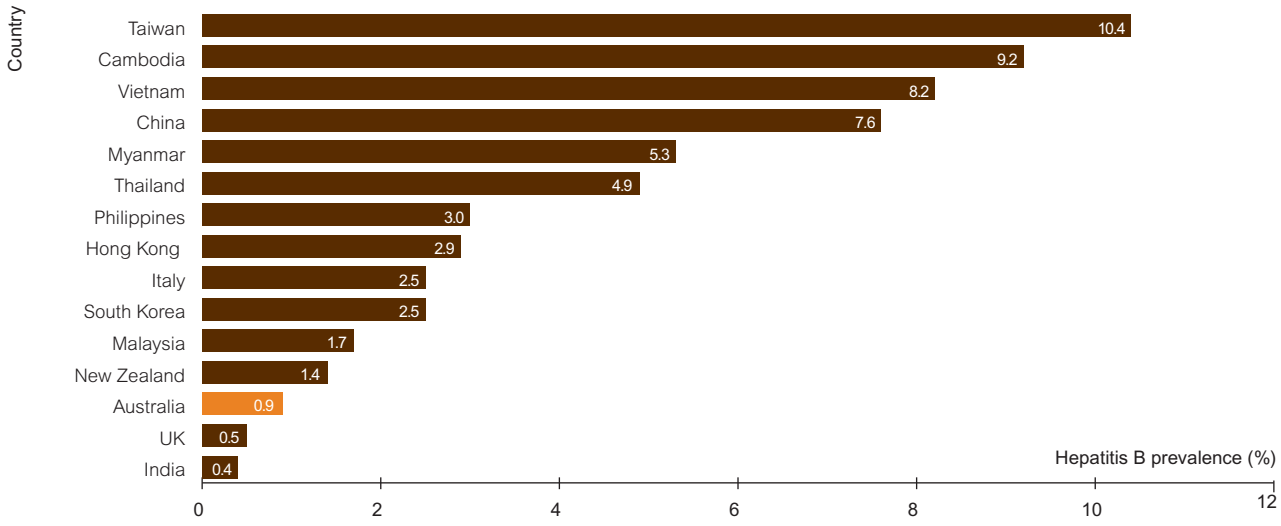
Table 2.2.3 Estimated number of people living with chronic hepatitis B and estimated prevalence, 2016, by subpopulation

Population	People living with chronic hepatitis B	Proportion of all people living with chronic hepatitis B	Hepatitis B prevalence
Total	230 034 (219 465 to 249 457)	100%	0.9%
Australian-born non-Indigenous	29 510	12.8%	0.2%
Born in Northeast Asia	49 696	21.6%	6.2%
Born in Southeast Asia	39 482	17.2%	4.5%
Born in sub-Saharan Africa	8 090	3.5%	2.7%
Aboriginal and Torres Strait Islander people	24 287	10.6%	3.7%
People who inject drugs	13 260	5.8%	4.0%
Gay and bisexual men	10 371	4.5%	3.0%

Note: Estimates by subpopulation may overlap.

Source: WHO Collaborating Centre for Viral Hepatitis, Doherty Institute.

Figure 2.2.12 Estimated prevalence of chronic hepatitis B infection in Australia and other countries, 2015

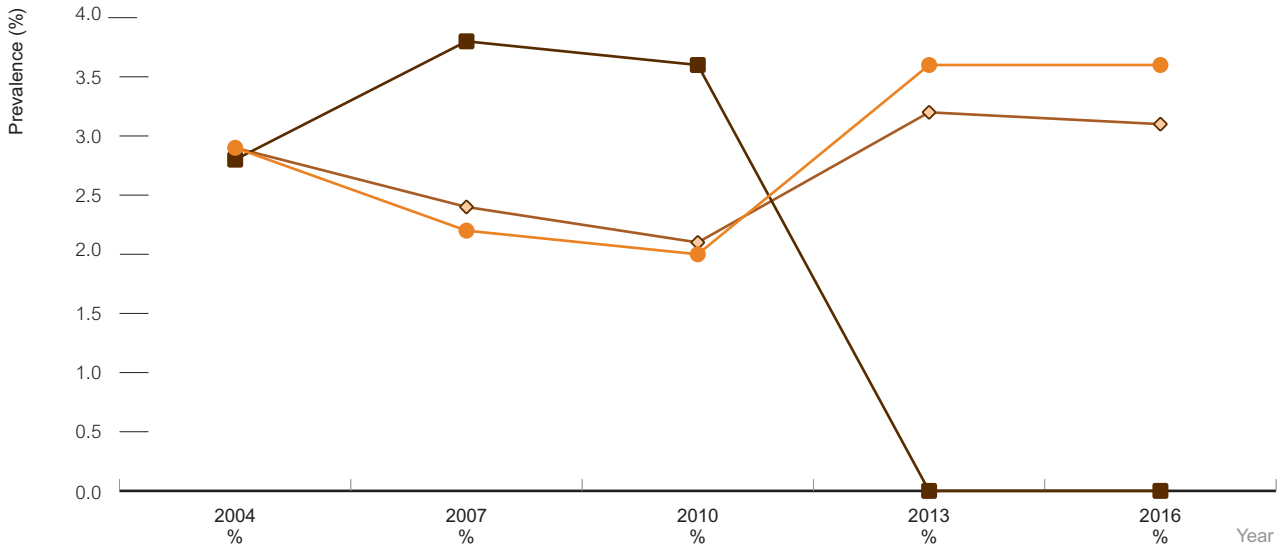


Source: Adjusted Australian antenatal prevalence data,[24] international population seroprevalence data,[25,26] WHO Collaborating Centre for Viral Hepatitis, Doherty Institute.

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 2.2.13). These data are from prisoners tested for hepatitis B on entry to Australian prisons (see Methodological Notes for further details). Note that as there are small numbers of female prisoners, these data should be interpreted with caution.

Figure 2.2.13 Chronic hepatitis B prevalence among prison entrants, by year of survey and sex



	2004 %	2007 %	2010 %	2013 %	2016 %
Women	2.8	3.8	3.6	0	0
Men	2.9	2.2	2	3.6	3.6
Total	2.9	2.4	2.1	3.2	3.1

Source: National Prison Entrants' Bloodborne Virus Survey.

HBV

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 233 people in 2016, seven (3%) were attributable to chronic hepatitis B infection (see *Hepatitis C* section, Table 2.1.5).

There were an estimated 412 (range 400 to 437) deaths attributable to hepatitis B in 2016, compared to 419 (range 323 to 683) in 2015. 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.

Hepatitis B testing and care

The hepatitis B diagnosis and care cascade

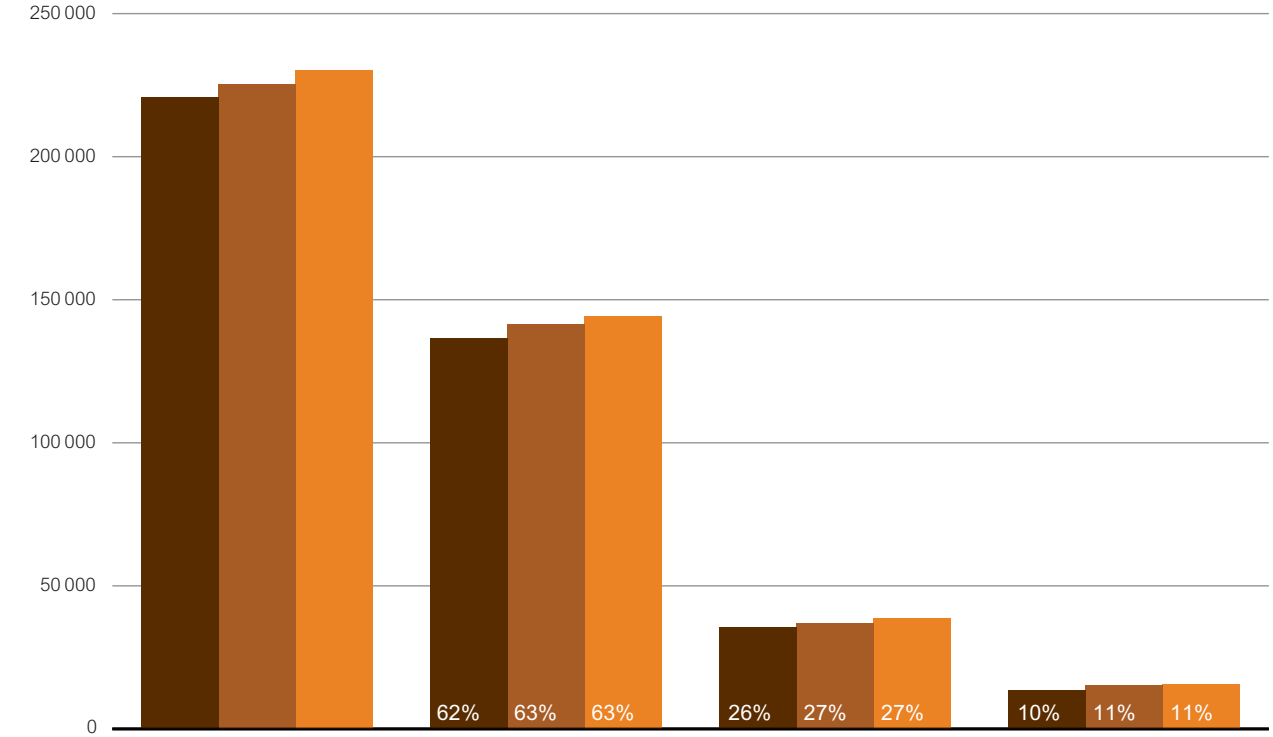
This section includes the hepatitis B diagnosis and care 'cascade', which estimates the number of people living with chronic hepatitis B infection in Australia, number diagnosed, number retained in care and number receiving antiviral treatment.

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 2016, an estimated 230 034 people were living with chronic hepatitis B in Australia. Of those, an estimated 144 231 (63%) were diagnosed, 38 731 (27% of those diagnosed) were receiving care (monitored or received antiviral therapy), and 15 577 (11% of those diagnosed) received antiviral therapy (Figure 2.2.14).

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.[27] In 2016, an estimated 7% of all people living with hepatitis B were receiving treatment in Australia.

Figure 2.2.14 The hepatitis B diagnosis and care cascade, 2014–2016



	Living with hepatitis B infection	Diagnosed with hepatitis B	Receiving care	Received treatment
2014	220 584	136 541	35 482	13 555
2015	225 384	141 316	36 957	15 059
2016	230 034	144 231	38 731	15 577

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.

Hepatitis B testing

An important strategy for the prevention of hepatitis B-related morbidity is targeted testing of priority populations. The national hepatitis B strategy (2014–2017) recommends hepatitis B testing of people from the culturally and linguistically diverse communities who bear the disproportionate burden of hepatitis B, including people born in the Asia-Pacific region and in sub-Saharan Africa, and Aboriginal and Torres Strait Islander people (see *Hepatitis B prevalence* section, p. 111).[27] Other priority populations include children born to mothers with chronic hepatitis B infection. The following people, if unvaccinated, are at higher risk of infection:

- men who have sex with men
- sex workers
- people who inject drugs
- partners and other household and intimate contacts of people who have acute or chronic hepatitis B infection
- people in custodial settings
- people with HIV and/or hepatitis C.

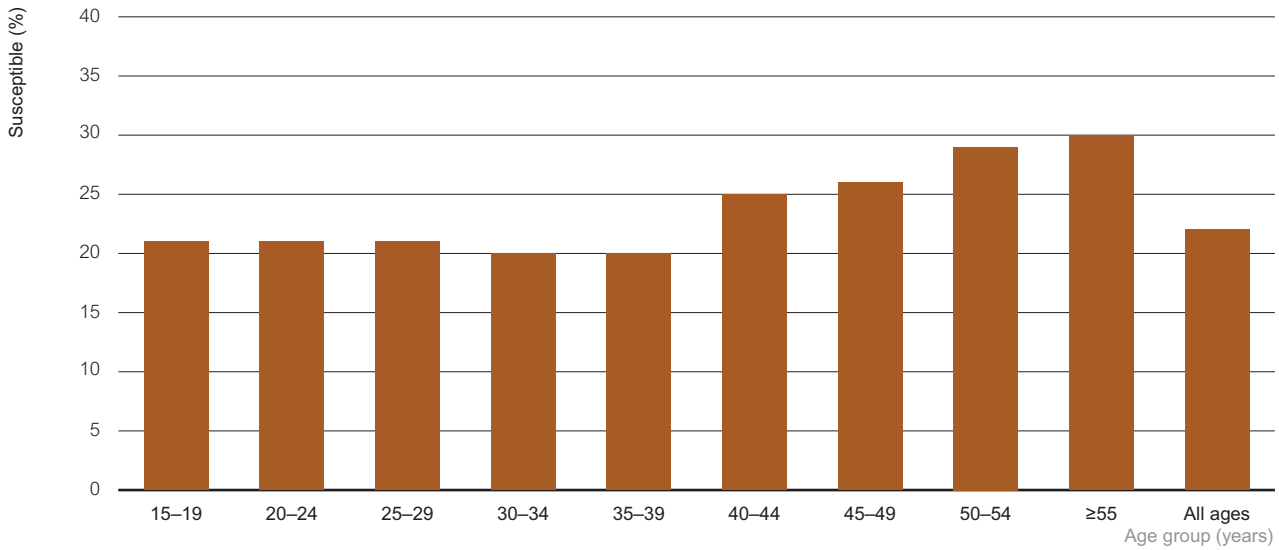
For any patients attending clinics who are at risk of hepatitis B acquisition and who have no or unknown prior vaccination record, national testing guidelines recommend that they be offered testing for hepatitis B infection and immunity, and if susceptible, offered vaccination.[28]

In 2016, there were 21 529 people attending sexual health clinics in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network for whom vaccination documentation or pathology results in patient records were available. Of these people, 22% were found to be susceptible to hepatitis B, i.e. they had no documented evidence of immunity (see Methodology for further details). The proportion susceptible was lower among those under 40 years of age (20% to 21%), increasing to 30% susceptible among those aged 55 years or more (Figure 2.2.15).

It is also important to note that a negative hepatitis B surface antibody result, as defined by a titre of <10 mIU/mL, does not necessarily indicate the absence of vaccination, as titres decline to below this level in up to 50% of people receiving a full course of vaccination after less than a decade. Protection appears to be durable following vaccination in healthy individuals who achieved an initial response to vaccine. Therefore, a proportion of the study sample defined serologically as 'susceptible' will still be immune to hepatitis B due to vaccination.

These data demonstrate that although a highly effective hepatitis B vaccine is available and has been offered universally to newborns in Australia since 2000, many of those born before universal vaccination may remain susceptible. The same is true of people born in countries with different or no vaccination programs, including young adults not reached by adolescent catch-up programs. As sexual health clinics see a high caseload of gay and bisexual men, female sex workers and young travellers, all with different demographic profiles, trends by age group should be interpreted with caution.

Figure 2.2.15 Proportion of people attending sexual health clinics who were susceptible to hepatitis B, 2016, by age group



Susceptible (%)	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	≥55	All ages
	21	21	21	20	20	25	26	29	30	22

Note: 'Susceptible' is defined as susceptible to hepatitis B infection or lacking immunity to hepatitis B through vaccination or past exposure based on vaccination documentation or pathology results in patient records. The denominator excludes patients for whom hepatitis B vaccination documentation or pathology results were not available.

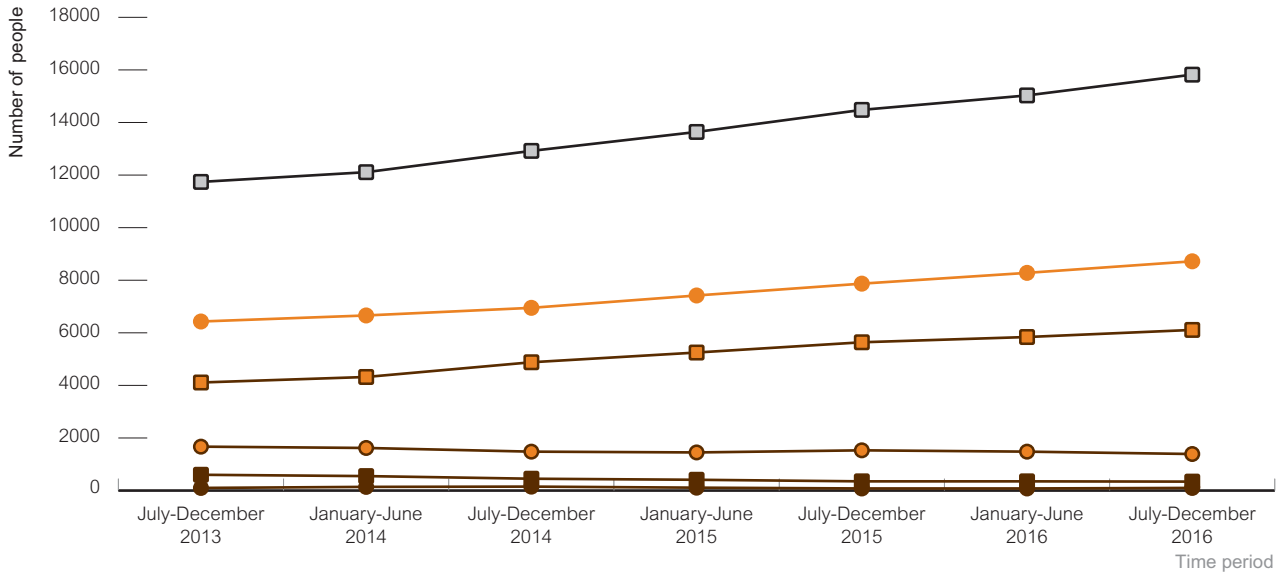
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance); see Methodology for details.

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 2016 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 15 820 between July and December 2016 (Figure 2.2.16). However, the population of people living with chronic hepatitis B has also grown in recent years (see *The hepatitis B diagnosis and care cascade*, p. 112). Of people who received hepatitis B antiviral treatments in July–December 2016, 55% received entecavir, and 39% tenofovir (Figure 2.2.16).

Figure 2.2.16 Estimated number of people dispensed antiviral drugs for hepatitis B, 2013–2016, by drug type



	July-December 2013	January-June 2014	July-December 2014	January-June 2015	July-December 2015	January-June 2016	July-December 2016
adefovir	600	550	450	410	350	350	340
entecavir	6430	6660	6950	7420	7870	8280	8720
lamivudine (hep B)	1670	1620	1480	1450	1530	1480	1390
pegasys	100	140	150	110	80	80	100
tenofovir	4110	4320	4880	5250	5640	5840	6110
any drug	11 740	12 110	12 920	13 640	14 480	15 030	15 820

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.

Hepatitis B prevention

Primary prevention strategies to protect people from acquiring hepatitis B infection include vaccination, 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.[29] 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 2.2.17).[30]

Over the past five years (2012–2016), hepatitis B vaccination coverage rates for children remained high in Australia (Figure 2.2.18). In 2016, hepatitis B vaccination coverage at 12 months was 92% in the Aboriginal and Torres Strait Islander children and 94% in non-Indigenous children, reaching 97% and 96% at 24 months respectively (Figure 2.2.18). 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 2.2.17 Roll-out of hepatitis B vaccination in Australia, by year

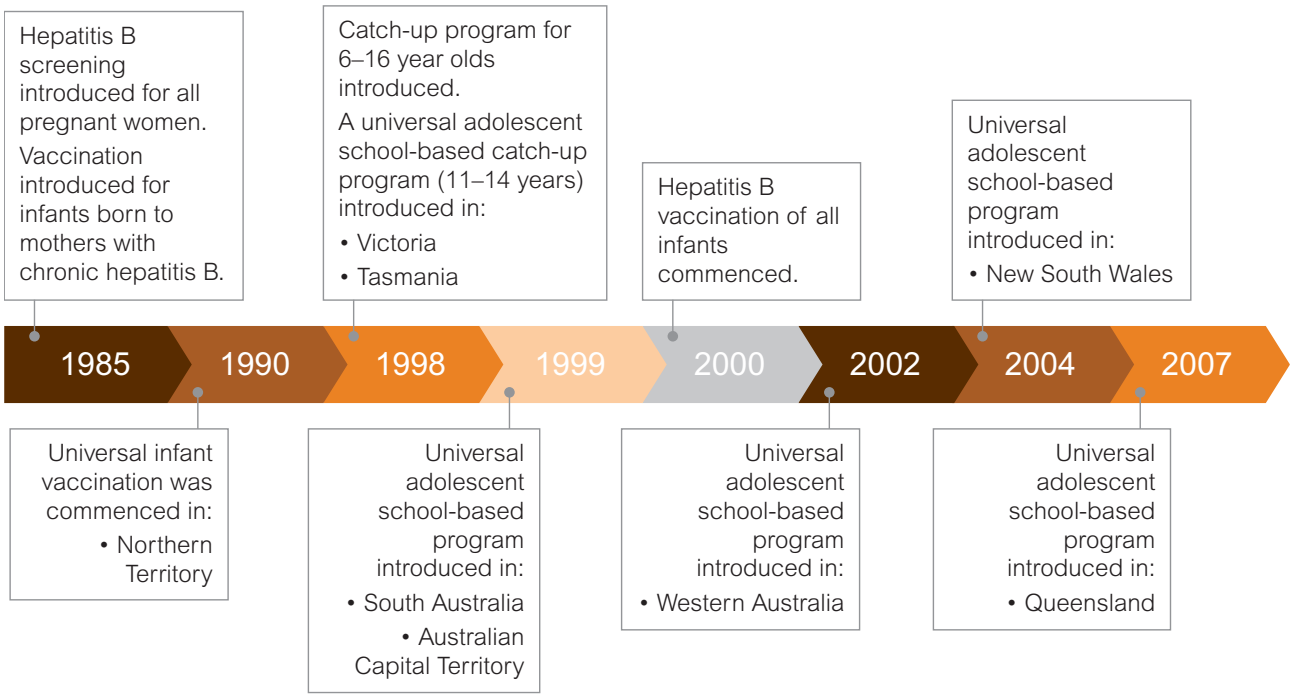
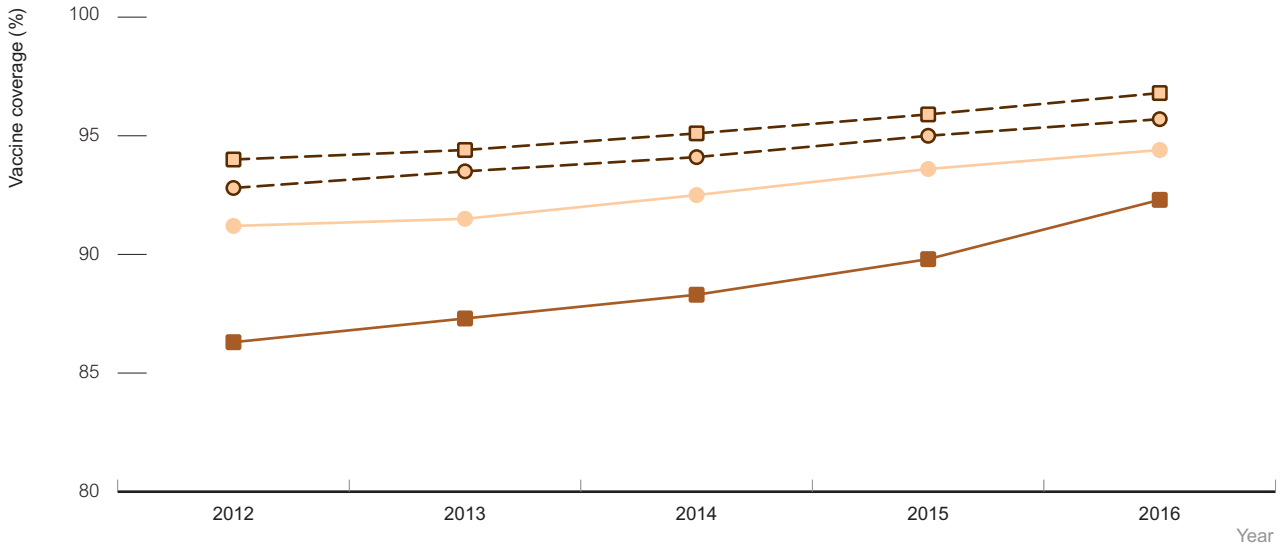


Figure 2.2.18 Hepatitis B vaccination coverage estimates at 12 and 24 months, 2012–2016, by Aboriginal and Torres Strait Islander status



	2012	2013	2014	2015	2016
Aboriginal and Torres Strait Islander 12 months (%)	86.3	87.3	88.3	89.8	92.3
Aboriginal and Torres Strait Islander 24 months (%)	94.0	94.4	95.1	95.9	96.8
Non-Indigenous 12 months (%)	91.2	91.5	92.5	93.6	94.4
Non-Indigenous 24 months (%)	92.8	93.5	94.1	95.0	95.7

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

HBV

3 Sexually transmissible infections
other than HIV

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

3.1 Chlamydia

See p. 10 for summary.

New chlamydia diagnoses

For 2015 and 2016 chlamydia notifications are incomplete for Victoria, but will be available for future reporting. Victoria is excluded in every year for national figures presented below. For jurisdictional figures, Victoria is only excluded from 2015 and 2016.

Chlamydia is the most frequently diagnosed sexually transmissible infection in Australia. In 2016, there were 71 751 notifications, 6925 (10%) of which were among the Aboriginal and Torres Strait Islander population, 29 094 (41%) were among the non-Indigenous population, and Indigenous status was not reported for 35 732 (50%) notifications (Table 3.1.1). In 2016, 39 315 (55%) of new chlamydia diagnoses were in females, 53 594 (75%) were in people aged 15–29 years, and 49 473 (69%) were in people residing in major cities (Table 3.1.1).

In 2016, the female-to-male sex ratio was 2.8:1 in the age group 15–19 years, 1.5:1 in those aged 20–24 and 0.9:1 in those aged 25–29 (data not shown). Age- and sex-specific patterns of notification may be influenced by differential testing rates.

Table 3.1.1 Characteristics of new chlamydia diagnoses, 2007–2016

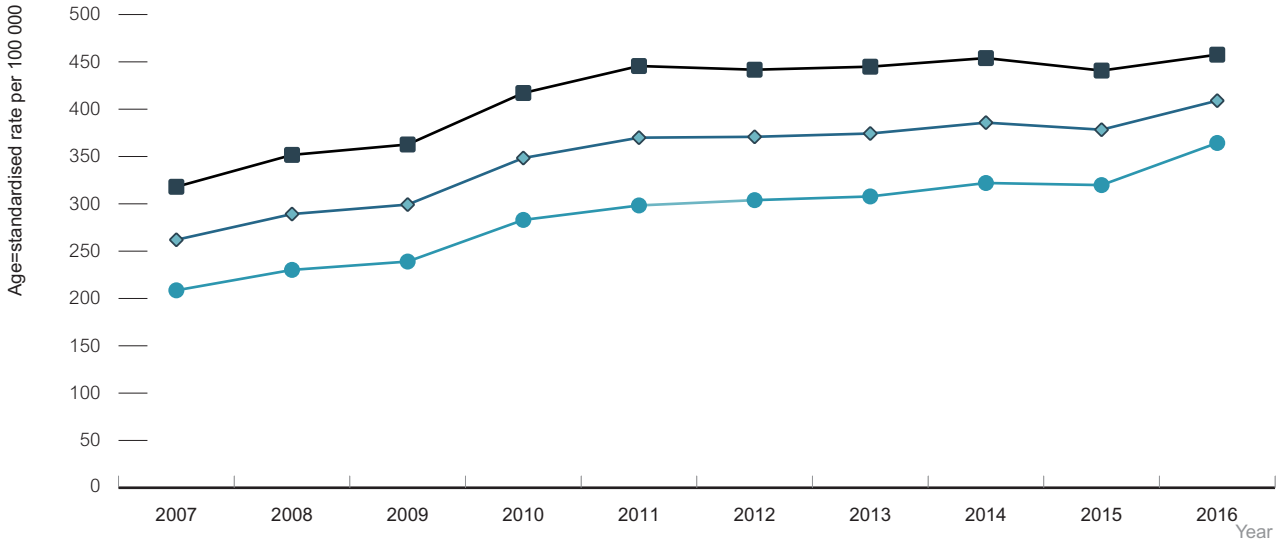
	Year of diagnosis									
	2007	2008	2009	2010	2011	2012	2013	2014	2015[a]	2016[a]
Characteristic										
Total	52 047	58 614	63 184	74 362	81 083	83 126	83 767	86 792	66 011	71 751
Sex										
Male	20 931	23 707	25 910	31 043	33 506	34 994	35 405	37 028	28 391	32 415
Female	31 012	34 814	37 178	43 132	47 454	48 029	48 329	49 722	37 612	39 315
Missing	104	93	96	187	123	103	33	42	8	21
Age group										
0–14	549	579	601	732	746	784	727	684	450	444
15–19	12 778	15 046	16 354	20 056	21 816	21 091	19 956	19 181	14 218	14 184
20–24	19 365	21 239	23 181	26 942	29 805	30 466	30 474	31 690	23 070	24 538
25–29	9374	10 634	11 384	13 020	14 243	14 812	15 962	17 129	13 330	14 872
30–39	6834	7405	7774	8866	9346	10 267	10 750	11 650	9750	11 510
40+	3115	3678	3816	4664	5021	5602	5874	6449	5188	6196
Missing data	32	33	74	82	106	104	24	9	5	7
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	5203	5645	5474	6820	7205	7129	7064	6809	6683	6925
Non-Indigenous	18 751	24 271	26 857	31 957	35 208	36 386	27 257	27 547	27 319	29 094
Not reported	28 093	28 698	30 853	35 585	38 670	39 611	49 446	52 436	32 009	35 732
Area of residence										
Major cities	33 830	38 337	41 869	48 777	53 640	55 552	56 093	58 887	44 138	49 473
Inner regional	7698	8839	9820	12 093	13 005	13 098	12 565	13 197	9320	9523
Outer regional	6166	6767	6926	8078	8934	9070	9123	8848	7936	8241
Remote	1564	1843	1733	2158	2190	2276	2227	2112	2090	2010
Very remote	1986	1977	1930	2216	2035	1902	2026	2064	1839	1835
Missing data	803	851	906	1040	1279	1228	1733	1684	688	669
State/Territory										
ACT	909	997	951	1161	1261	1283	1270	1197	1266	1362
NSW	12 430	14 000	14 951	18 234	20 582	21 317	20 836	22 928	22 603	26 041
NT	2179	2289	2445	2662	2629	2722	3004	2997	2737	2629
QLD	12 968	15 192	16 690	19 211	18 644	18 832	20 327	21 136	21 188	22 742
SA	3536	3708	3850	4401	5267	5066	5531	5494	5384	5485
TAS	1122	1472	1466	2008	1776	1781	1538	1776	1666	1687
VIC	11 189	12 313	14 011	16 532	19 270	20 357	19 542	19 927	_[a]	_[a]
WA	7714	8643	8820	10 153	11 654	11 768	11 719	11 337	11 167	11 805

a Excludes Victoria in 2015 and 2016, as data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

The notification rate of chlamydia increased steadily between 2007 and 2011, remained relatively stable between 2011 and 2015, and increased by 8% from 378.3 per 100 000 in 2015 to 409.0 per 100 000 in 2016, with a similar trend in both males and females (Figure 3.1.1). The notification rate has been higher in females than males in all years in the past 10 years and in 2016 was 457.6 per 100 000 in females and 364.3 per 100 000 in males.

Figure 3.1.1 Chlamydia notification rate per 100 000, 2007–2016, by sex



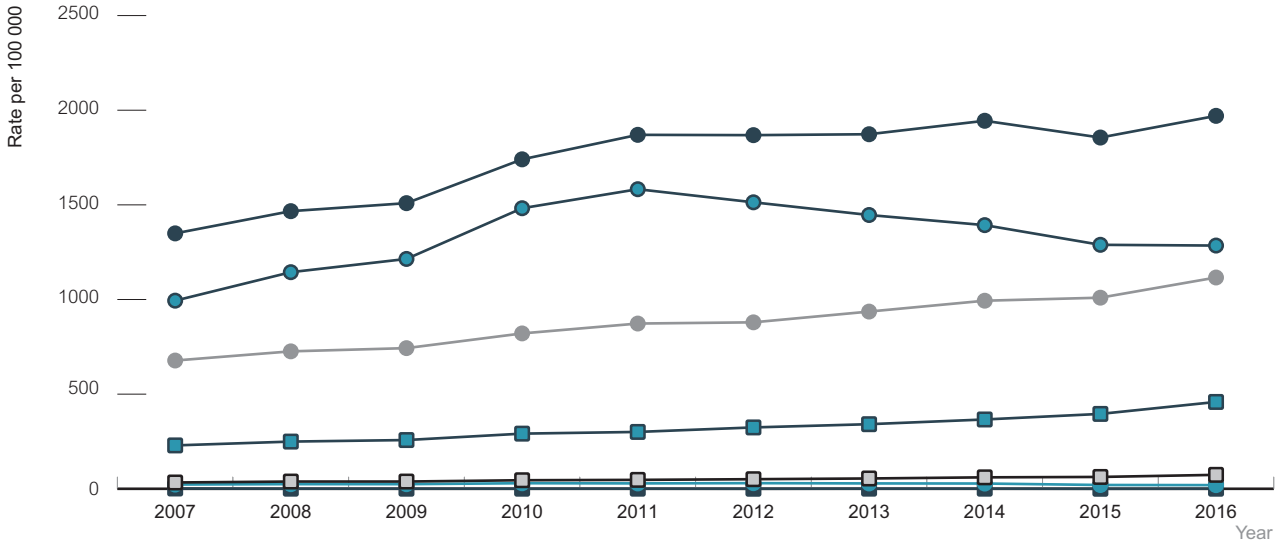
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Women	318.0	351.7	362.7	417.1	445.6	441.7	444.9	454.0	440.8	457.6
Men	208.6	230.2	239.0	283.0	298.3	303.9	307.8	322.0	319.8	364.3
Total	262.0	289.2	299.2	348.4	369.9	370.8	374.3	385.8	378.3	409.0

Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System

The trends in chlamydia notification rates varied by age group. Over the 10-year period 2007–2016, notification rates have been highest in the age groups 20–24, 15–19 and 25–29 years (1970.2, 1285.0 and 1116.2 per 100 000 in 2016, respectively). While notification rates in those aged 20–24 have remained stable in the last five years, rates in the 15–19 age group have declined by 15%, from 1513.5 per 100 000 in 2012 to 1285.0 per 100 000 in 2016 (Figure 3.1.2). This decline in notification rates from 2012 in those aged 15–19 was in both males and females (Figures 3.1.3 and 3.1.4). Notification rates of chlamydia in the 25–29 age group have increased steadily since 2007.

Figure 3.1.2 Chlamydia notification rate per 100 000, 2007–2016, by year and age group

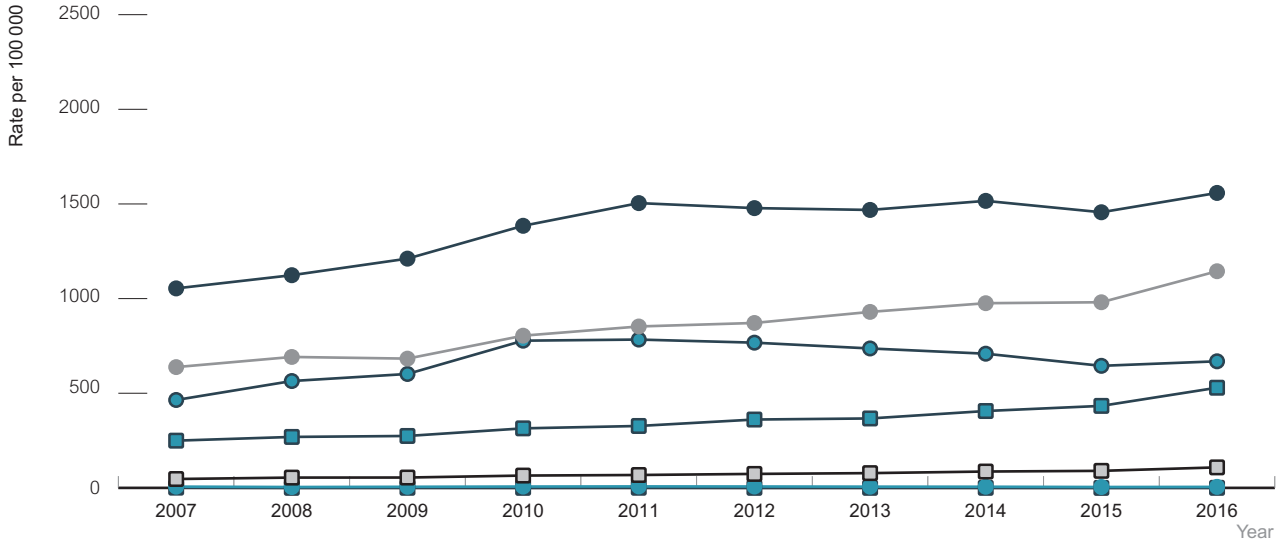


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	1.7	0.7	0.6	0.6	0.7	0.3	0.8	0.7	0.2	0.5
5–14	22.5	24.5	24.5	29.4	28.5	29.8	28.4	27.8	20.1	19.4
15–19	993.9	1144.3	1214.3	1482.2	1582.7	1513.5	1446.4	1392.9	1288.9	1285.0
20–24	1349.3	1466.7	1509	1740.5	1869.9	1868.3	1873.1	1944.2	1855.6	1970.2
25–29	677.6	726.1	743.1	820.8	873.0	879.4	936.2	993.6	1009.6	1116.2
30–39	229.2	249.4	257.5	291.4	300.4	324.2	341.3	366.2	395.6	458.8
40+	33.3	38.3	38.3	45.2	47.1	50.7	54.5	60.5	62.6	73.7

Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.1.3 Chlamydia notification rate per 100 000, 2007–2016, by year and age group, males

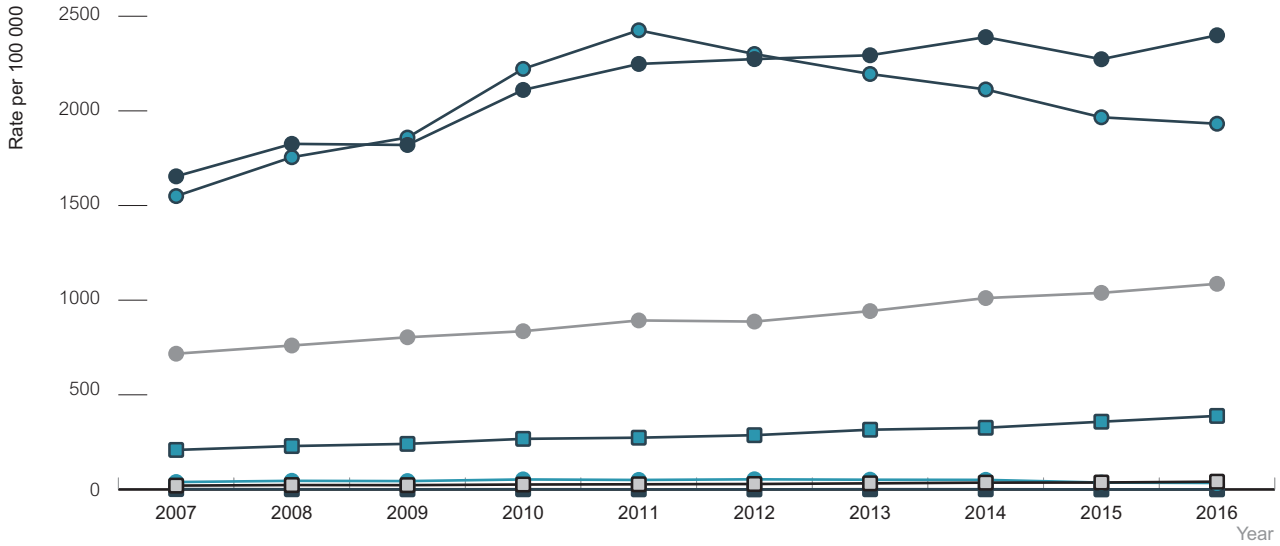


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	1.3	0.2	0.5	0.2	0.7	0.2	0.3	0.3	0	0.3
5–14	6.7	4.6	5.8	7.1	7.8	7.4	6.5	6.1	4.7	5.3
15–19	464.4	564.5	601.8	777.7	783.6	767.2	736.6	708.9	644.8	668.7
20–24	1053.9	1123.6	1211.1	1384.6	1504.5	1478	1468.4	1516.3	1456.1	1558.2
25–29	638.1	691.7	682.9	804.1	852.7	871.3	929.7	975.7	980.7	1144.6
30–39	249.5	269.2	274.3	314.5	327.1	361.1	366.8	406.1	433.2	529.2
40+	46.9	54.4	54.7	65.1	68.1	73.8	78	86.4	90	108.3

Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.1.4 Chlamydia notification rate per 100 000, 2007–2016, by year and age group, females



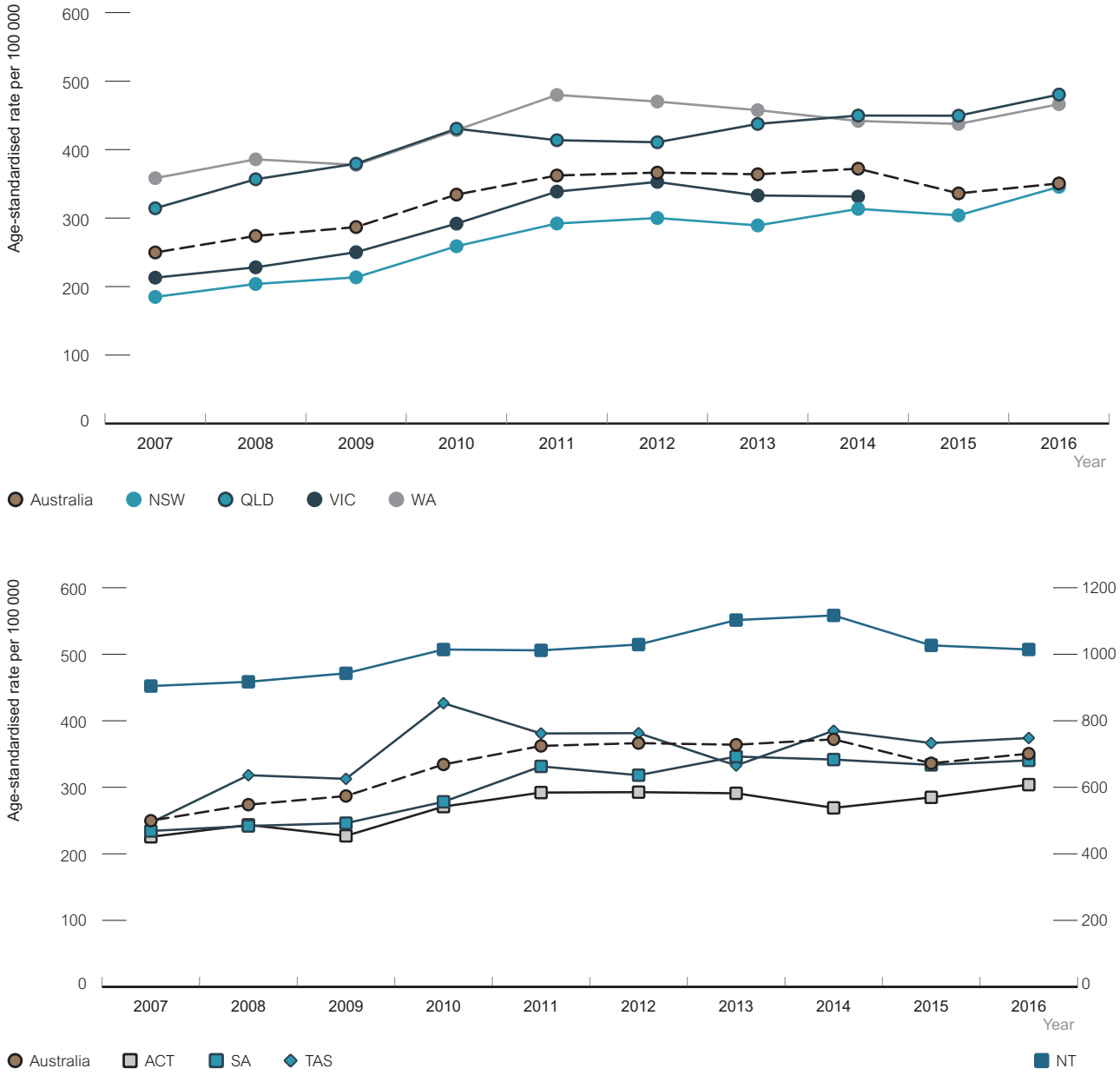
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	2.0	1.2	0.8	1.1	0.7	0.4	1.2	1.1	0.4	0.7
5–14	39.1	45.5	44.1	52.9	50.2	53.5	51.4	50.6	36.3	34.2
15–19	1549.9	1755.2	1859.0	2221.7	2425.8	2300.4	2194.9	2113.3	1966.1	1932.1
20–24	1654.1	1825.7	1819.9	2110.6	2248.0	2273.5	2293.8	2389.6	2272.8	2399.3
25–29	717.1	760.4	804.0	836.0	892.9	886.9	942.3	1011.1	1038.6	1086.3
30–39	208.8	229.3	240.8	267.3	273.5	286.7	315.6	326.0	357.9	388.5
40+	20.4	23.2	22.7	26.1	27.3	28.8	32.2	36.0	36.7	41.1

Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

After a steady increase in notifications between 2007 and 2011 in all jurisdictions, between 2012 and 2016 chlamydia notification rates were more stable, except in Queensland, where there was a steady increase from 410.7 to 480.4 per 100 000. Chlamydia notification rates rose between 2015 and 2016 in New South Wales (14%) and Western Australia (7%) (Figure 3.1.5, Table 3.1.2).

Figure 3.1.5 Chlamydia notification rate per 100 000 population, 2007–2016, by year and state/territory



Note: Excludes Victoria in 2015 and 2016 as data were unavailable at the time of reporting, but will be available in the future. The Northern Territory is displayed on the right-hand vertical axis.

Source: Australian National Notifiable Diseases Surveillance System.

Table 3.1.2 Age-standardised chlamydia notification rates per 100 000, 2007–2016, by state/territory

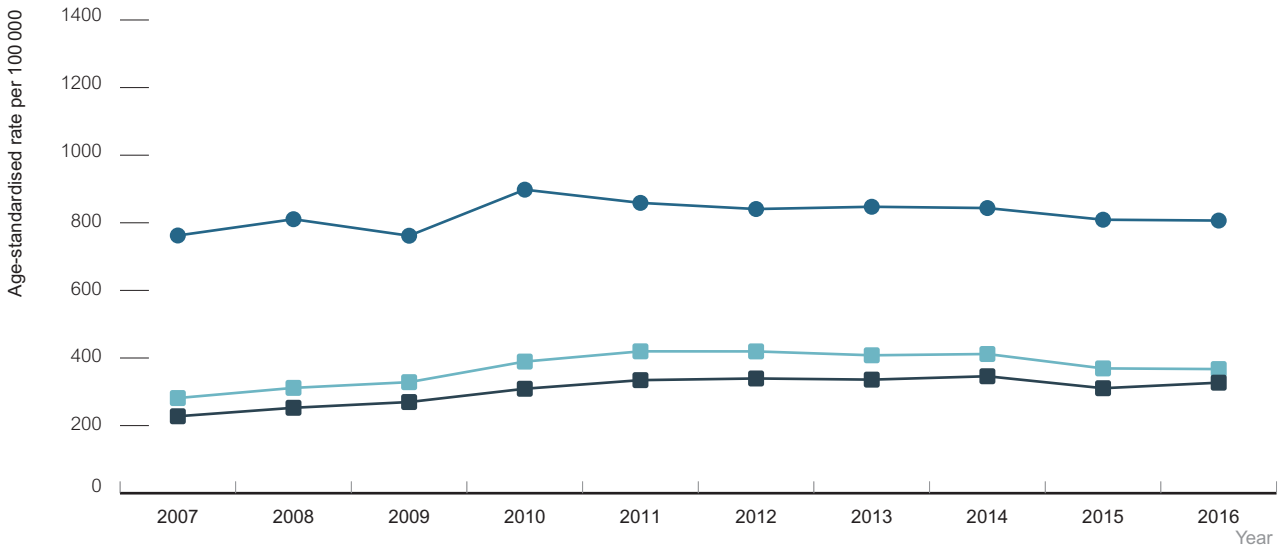
State/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ACT	225.6	243.5	227.0	271.0	292.1	292.7	291.0	269.1	284.9	304.0
NSW	184.9	203.8	213.5	258.9	292.1	300.1	289.3	313.4	304.0	345.6
NT	904.3	917.2	942.7	1014.2	1011.7	1029.1	1102.7	1116.7	1026.6	1014.3
QLD	314.3	356.7	379.4	430.5	413.7	410.7	437.5	449.7	449.5	480.4
SA	234.4	241.9	246.1	278.2	331.4	318.2	346.2	341.7	333.7	340.5
TAS	246.9	318.2	312.7	426.4	380.9	381.4	332.8	385.0	366.5	374.1
VIC	213.0	228.1	250.2	291.9	338.7	352.8	333.0	331.5	–	–
WA	358.3	385.8	377.6	428.4	479.8	470.1	457.6	441.8	437.5	466.3
Australia	249.8	273.9	286.9	334.3	362.2	366.4	364.0	372.1	378.3	409.0

Note: Excludes Victoria in 2015 and 2016 as data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

Notification rates of chlamydia have been highest and remained stable in remote and very remote regions between 2012 and 2016 (806.6 per 100 000 in 2016) (Figure 3.1.6). Notification rates also remained stable in major cities in the same period (327.0 per 100 000 in 2016), but declined by 13% in inner and outer regional areas (419.5 to 367.2 per 100 000) (Figure 3.1.6). A similar pattern was seen in both males and females, but in females there was a larger decline in inner and outer regional areas (16%), and the rates also declined (11%) in the major cities (Figures 3.1.7 and 3.1.8).

Figure 3.1.6 Chlamydia notification rate per 100 000 population, 2007–2016, by region of residence

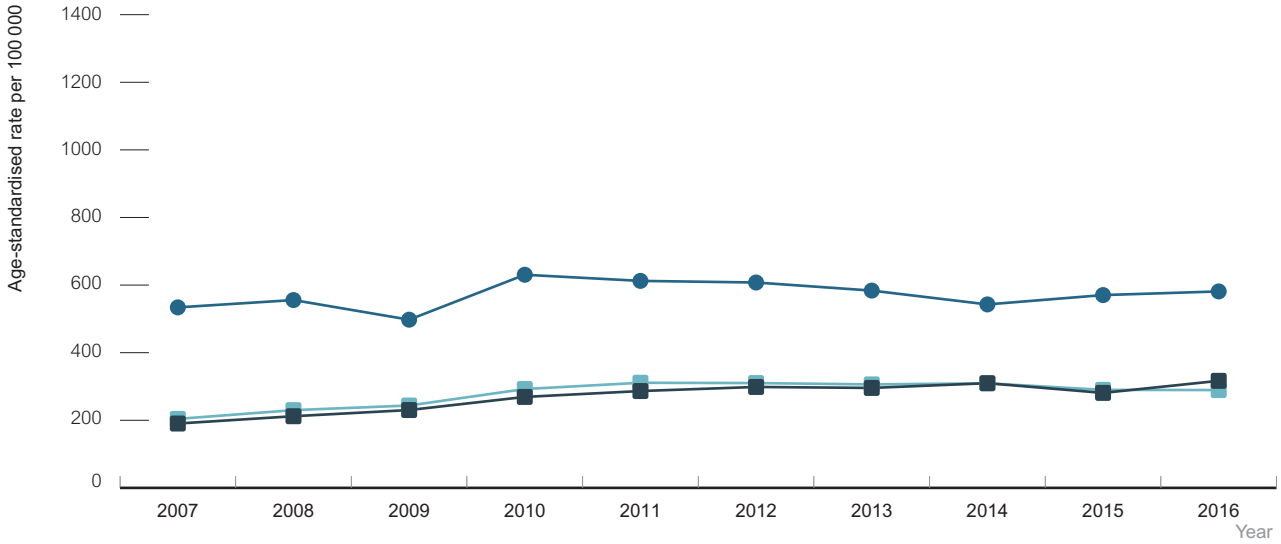


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	227.6	252.7	269.7	309.0	334.5	339.4	336.0	346.0	310.6	327.0
Inner and outer regional	281.5	311.6	328.5	389.4	419.7	419.5	408.0	411.8	369.2	367.2
Remote and very remote	762.4	810.6	761.7	898.0	858.9	840.7	847.4	843.6	809.1	806.6

Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.1.7 Chlamydia notification rate per 100 000, 2007–2016, by region of residence, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	190.4	212.0	230.3	269.1	286.5	298.6	295.7	309.7	281.0	316.7
Inner and outer regional	204.1	230.0	243.7	292.4	311.0	310.1	306.1	309.4	290.0	289.4
Remote and very remote	534.0	555.7	497.6	630.5	612.4	607.6	583.7	542.8	570.4	581.2

Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

Source: Australian National Notifiable Diseases Surveillance System.

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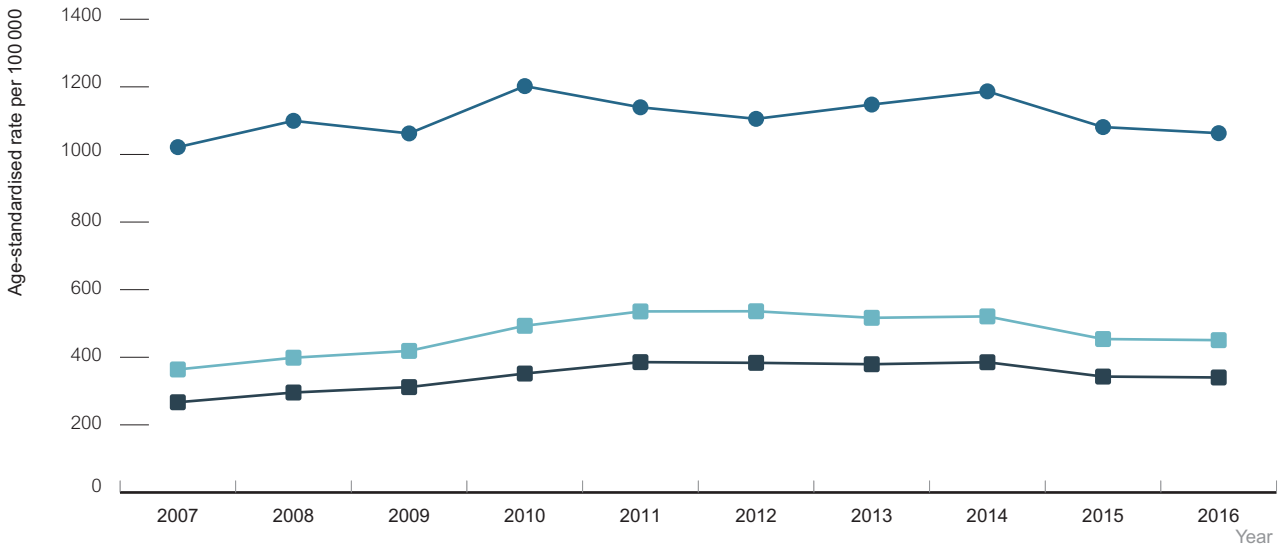
Figure 3.1.8 Chlamydia notification rate per 100 000, 2007–2016, by region of residence, females



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	266.9	295.7	311.7	351.8	385.6	383.5	379.4	385.3	342.9	340.2
Inner and outer regional	363.9	398.7	418.8	493.1	535.6	536.1	516.7	520.9	453.9	450.6
Remote and very remote	1021.7	1099.5	1062.2	1202.2	1139.5	1105.3	1147.6	1186.7	1081.0	1063.0

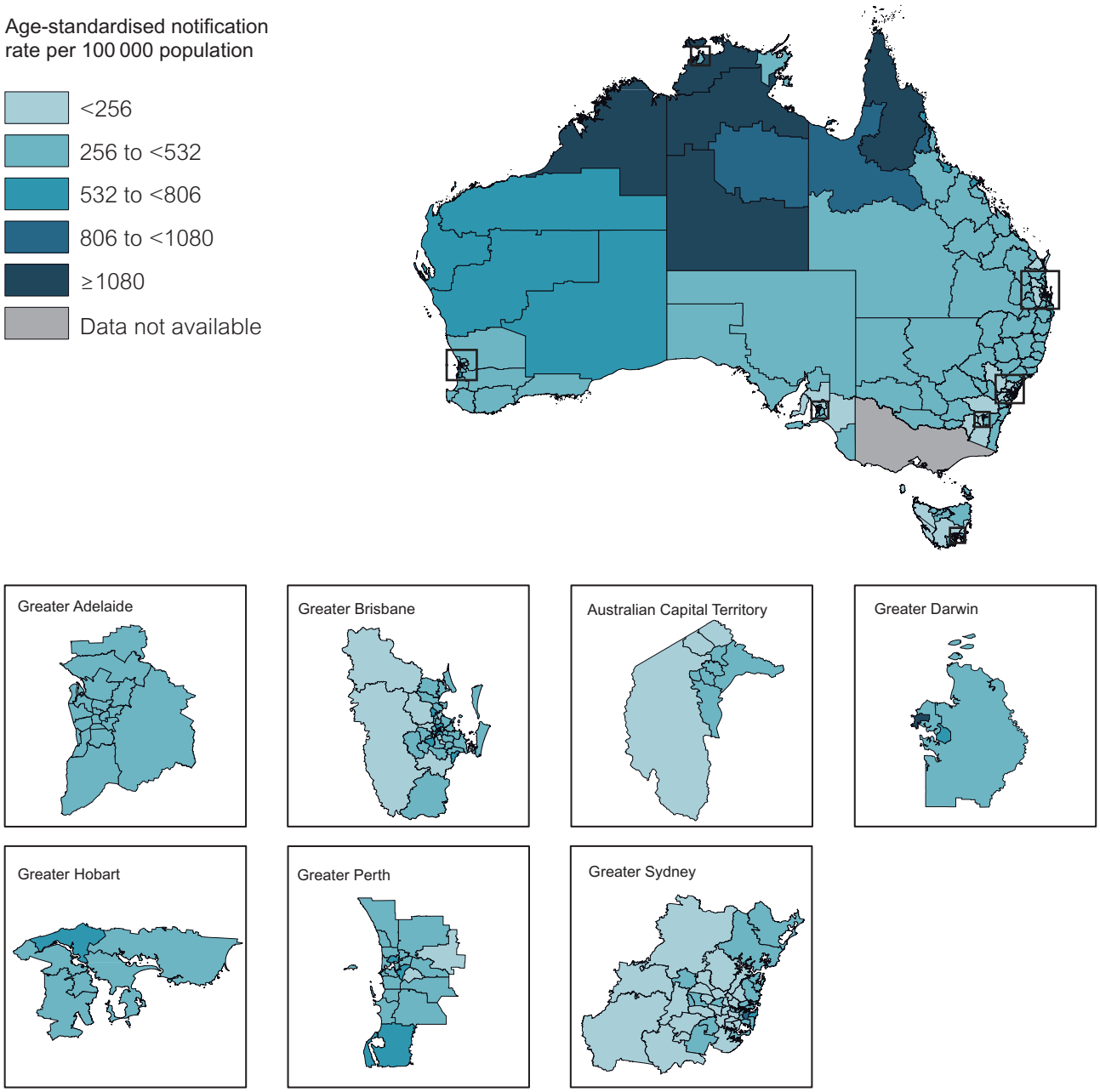
Note: Excludes Victoria in all years, as 2015 and 2016 data were unavailable at the time of reporting.

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 3.1.9).

Based on average chlamydia notification rates between 2014 and 2016, 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 (Figure 3.1.9). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of chlamydia diagnoses, 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 3.1.9 Average age-standardised chlamydia notification rate per 100 000 population, by statistical area level 3, 2014–2016, Australia and major cities

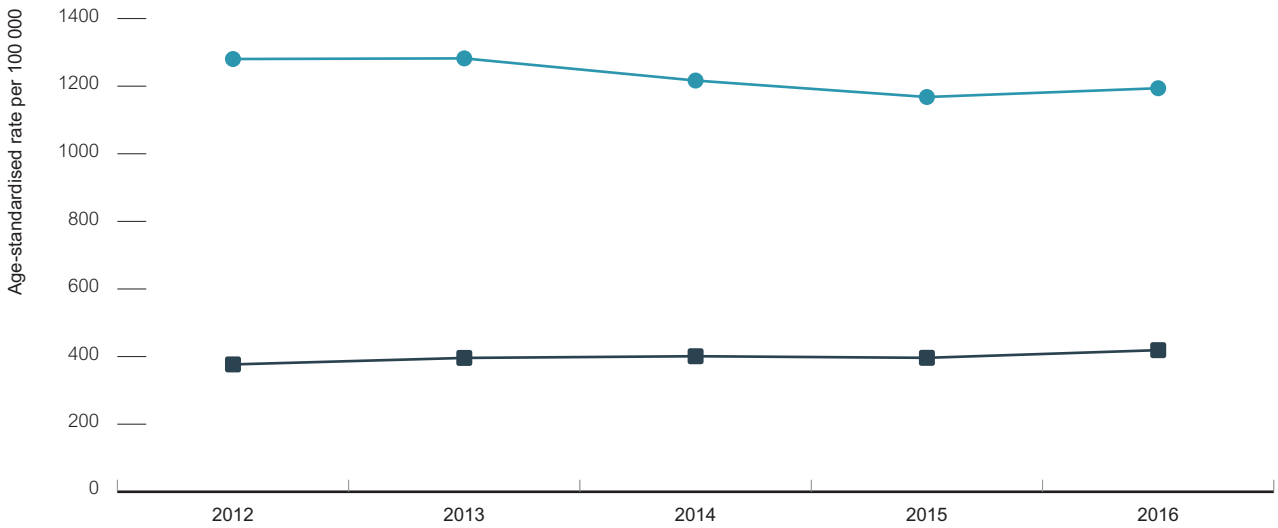


Note: Average chlamydia notification rates for the three-year period 2014–2016 were used to minimise the influence of fluctuation in the number of chlamydia diagnoses. Excludes Victoria as notifications data for 2015 and 2015 were not available at the time of reporting.

Source: State and territory health authorities.

The rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population declined by 7% between 2012 and 2016, but was three times as high as in the non-Indigenous population in 2016 (1193.9 vs 419.0 per 100 000) (Figure 3.1.10). These data are from the Northern Territory, Queensland, South Australia and Western Australia, where Aboriginal and Torres Strait Islander status was complete for at least 50% in each of the five years. It is important to recognise that the most populous states, New South Wales and Victoria, are not included and these data may not reflect national trends.

Figure 3.1.10 Chlamydia notification rate per 100 000, 2012–2016, by Aboriginal and Torres Strait Islander status

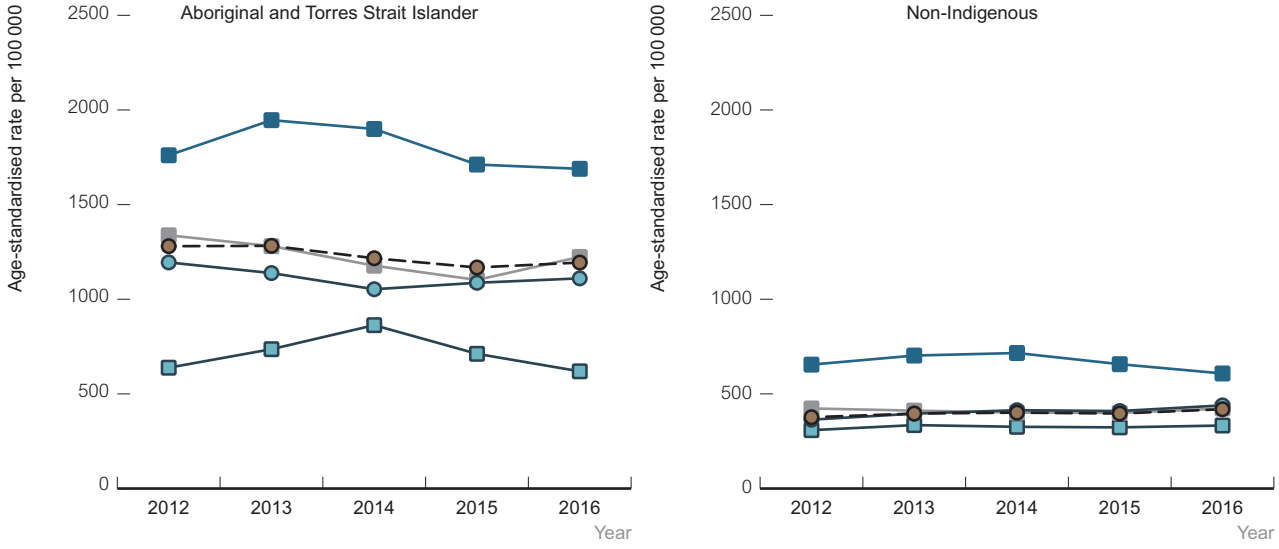


	2012	2013	2014	2015	2016
Non-Indigenous	376.8	396.0	401.0	396.3	419.0
Aboriginal and Torres Strait Islander	1280.3	1282.2	1216.6	1167.9	1193.9

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

Between 2012 and 2016, 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 3.1.11). In 2016, notification rates for the Aboriginal and Torres Strait Islander population were highest in the Northern Territory (1689.1 per 100 000), followed by Western Australia (1223.6 per 100 000) and Queensland (1110.4 per 100 000).

Figure 3.1.11 Chlamydia notification rate per 100 000, 2012–2016, by Aboriginal and Torres Strait Islander status and state/territory



	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Australia	1280.3	1282.2	1216.6	1167.9	1193.9	376.8	396.0	401.0	396.3	419.0
WA	1337.8	1280.5	1177.4	1102.0	1223.6	423.0	411.7	401.2	399.6	422.9
NT	1760.6	1946.2	1899.6	1711.6	1689.1	654.7	702.5	716.0	657.0	607.9
QLD	1194.6	1138.3	1052.9	1087.0	1110.4	363.9	395.6	413.9	409.4	439.3
SA	638.4	736.2	863.1	711.7	619.3	308.4	335.1	326.1	323.2	332.9

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

Chlamydia incidence

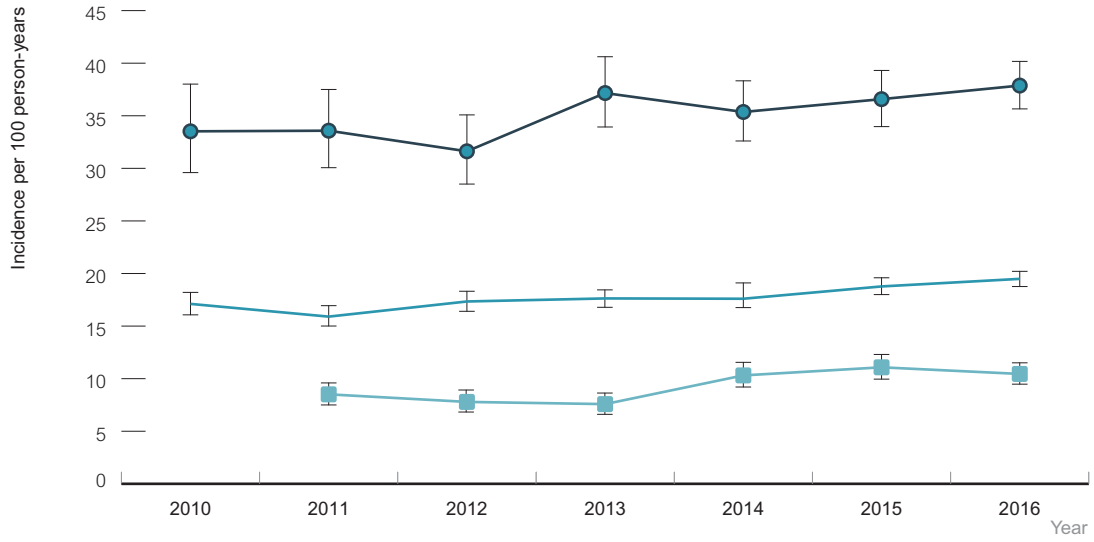
Incidence is the best indicator of changes in transmission in a population. Chlamydia incidence is available from the ACCESS network and is calculated by dividing the number of incident infections (negative test followed by a positive test) among people undergoing repeat chlamydia testing at sexual health 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 2016, chlamydia incidence in HIV-positive gay and bisexual men was 37.9 per 100 person-years, which was 1.9 times as high as in HIV-negative gay and bisexual men (19.5 per 100 person-years). There was a 20% increase in chlamydia incidence in HIV-positive gay and bisexual men since 2012 (from 31.6 per 100 person-years), and 13% increase in HIV-negative gay and bisexual men since 2012 (from 17.3 per 100 person-years) (Figure 3.1.12).

In female sex workers chlamydia incidence increased by 35% between 2012 and 2016 (from 7.8 to 10.5 per 100 person-years) (Figure 3.1.12).

Caution should be taken with interpretation as some confidence intervals overlap, indicating differences may not be statistically significant.

Figure 3.1.12 Chlamydia incidence in sexual health clinic attendees, 2010–2016, by population



	2010	2011	2012	2013	2014	2015	2016
HIV-negative gay and bisexual men	17.1	15.9	17.3	17.6	17.6	18.8	19.5
HIV-positive gay and bisexual men	33.5	33.6	31.6	37.2	35.4	36.6	37.9
Female sex workers		8.5	7.8	7.6	10.3	11.1	10.5

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

STIs

Chlamydia testing and care

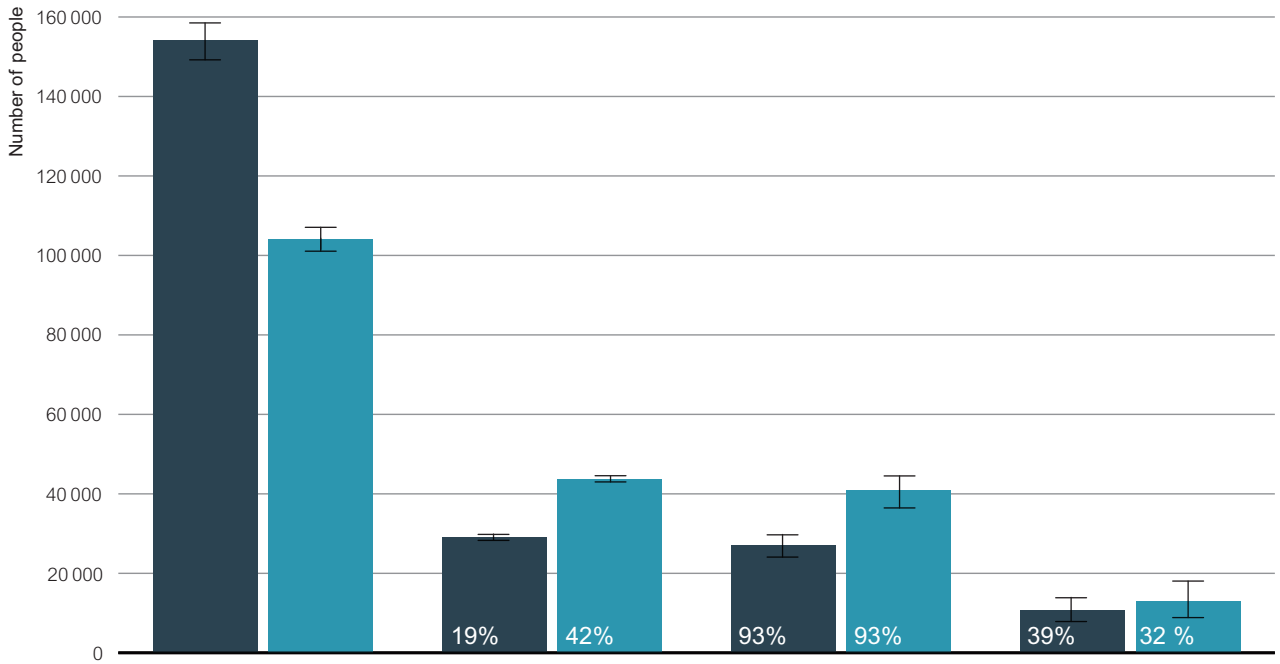
The chlamydia diagnosis and care cascade

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.[7] 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 3.1.13). 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 2016, there were an estimated 258 139 (154 007 men, 104 132 women) new chlamydia infections in the 15–29 age group, including reinfections. Of those, an estimated 72 785 (28%, 19% men, 42% women) were diagnosed, 67 933 (93% of those diagnosed, 93% for both men and women) received treatment, and 23 603 (35% of those treated, 39% men, 32% women) had a retest between six weeks and six months after diagnosis (Figure 3.1.13).

The cascade shows that there was a higher estimated number of new infections in men than women aged 15–29 years in 2016. 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.[31] However, it is estimated that a lower proportion of men than women are diagnosed (19% vs 42%). The proportion treated was similar for men and women, but the proportion who had a retest following treatment was higher in men than women (39% vs 32%). The greatest gaps in the cascade were therefore at the diagnosis and retesting steps.

Figure 3.1.13 The chlamydia diagnosis and care cascade in people aged 15–29 years, 2016, by sex



	New infections	Diagnosed	Received treatment	Retested in 6 months
Men	154 007	29 023	27 088	10 599
Women	104 132	43 762	40 845	13 004

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

Chlamydia testing

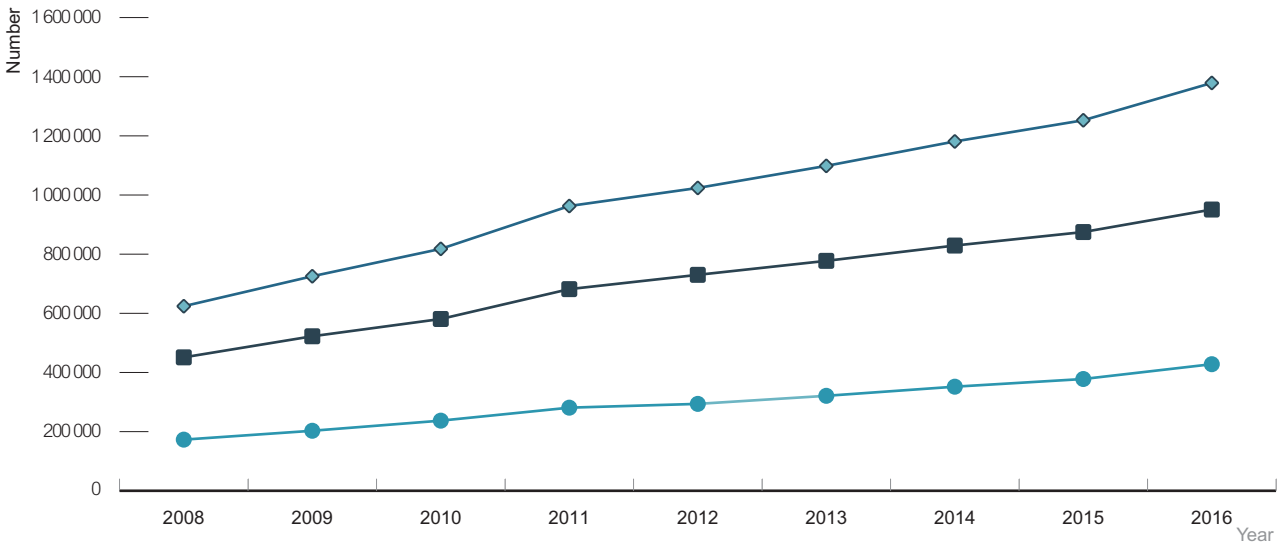
Clinical guidelines recommend the opportunistic offer of chlamydia screening to all young people at least annually, and regular testing for sex workers.[7] Annual testing is recommended for sexually active gay and bisexual men, and testing every three to six months for higher risk men based on behavioural criteria.[11] 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 35% from 1 023 921 in 2012 to 1 378 913, with increases in both males (46% increase) and females (30% increase) (Figure 3.1.14). The number of chlamydia tests conducted in females in 2016 was 2.2 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 2012 and 2016, there was a 16% increase in the proportion of people aged 15–29 years attending general practice who had a Medicare-rebated chlamydia test in a year (20% increase in men, 15% in women), but overall testing levels remained low (15% tested in 2016) (Figure 3.1.15). The proportion tested was higher among women than men in all years since 2008, and was 20% in women and 9% in men in 2016.

Figure 3.1.14 Number of Medicare-rebated chlamydia tests in Australia, 2008–2016, by sex

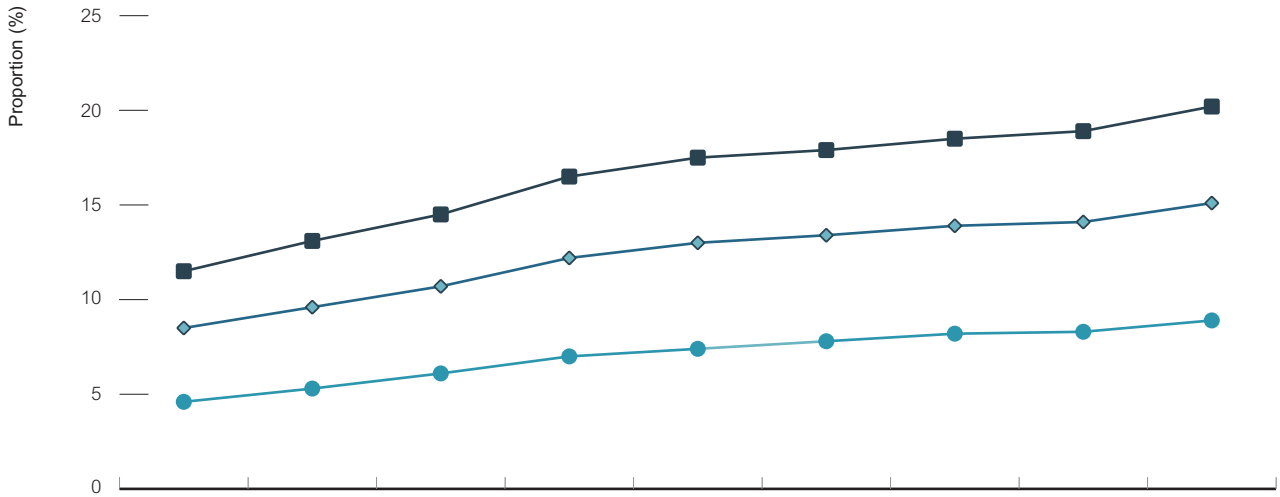


	2008	2009	2010	2011	2012	2013	2014	2015	2016
Men	172 930	202 921	237 096	281 009	293 810	321 080	351 938	377 919	427 985
Women	451 131	522 418	580 843	681 816	730 111	777 428	829 151	874 814	950 928
Total	624 061	725 339	817 939	962 825	1023 921	1098 508	1181 089	1252 733	1378 913

Source: Medicare.

STIs

Figure 3.1.15 Proportion of general practice attendees aged 15–29 years who had a Medicare-rebated chlamydia test in a year, 2008–2016, by sex



	2008 %	2009 %	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %	2016 %
Men	4.6	5.3	6.1	7.0	7.4	7.8	8.2	8.3	8.9
Women	11.5	13.1	14.5	16.5	17.5	17.9	18.5	18.9	20.2
Overall	8.5	9.6	10.7	12.2	13.0	13.4	13.9	14.1	15.1

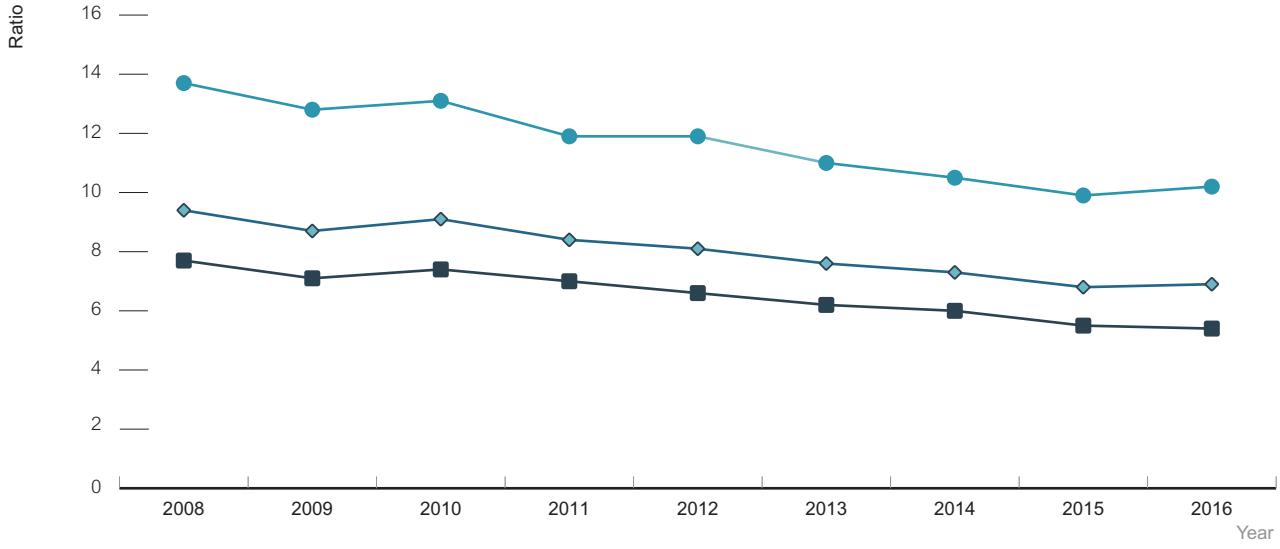
Source: Medicare.

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 2012 and 2016, the ratio of chlamydia notifications to Medicare-rebated chlamydia tests declined by 15% from 8.1 in 2012 to 6.9 in 2016, with declines in both males (14% decline) and females (18% decline) (Figure 3.1.16). The ratio was higher in males in each of the years since 2007 than in females (10.2 vs 5.4 in 2016).

Between 2012 and 2016, in males there were declines in the ratio of chlamydia notifications to Medicare-rebated chlamydia tests in younger age groups (18% decline in those aged 15–19 years, 13% decline in those aged 20–24) but remained stable in older age groups (Figure 3.1.17). Since 2007, the ratio has remained higher in younger men (20.2 in the 15–19 age group, 17.0 in the 20–24 age group and 12.6 in the 25–29 age group in 2016) (Figure 3.1.17). Between 2012 and 2016 there were also declines in younger women (17% decline in the 15–19 age group, 11% decline in the 20–24 age group), but the rates remained stable in other age groups (Figure 3.1.18). Since 2007, the ratio has remained higher in younger women (13.9 in the 15–19 age group, 8.4 in the 20–24 age group and 4.7 in the 25–29 age group in 2016) (Figure 3.1.18).

These data indicate that the increases observed in chlamydia notification rates have been influenced by testing. (See also under *New chlamydia diagnoses* section, p. 118.)

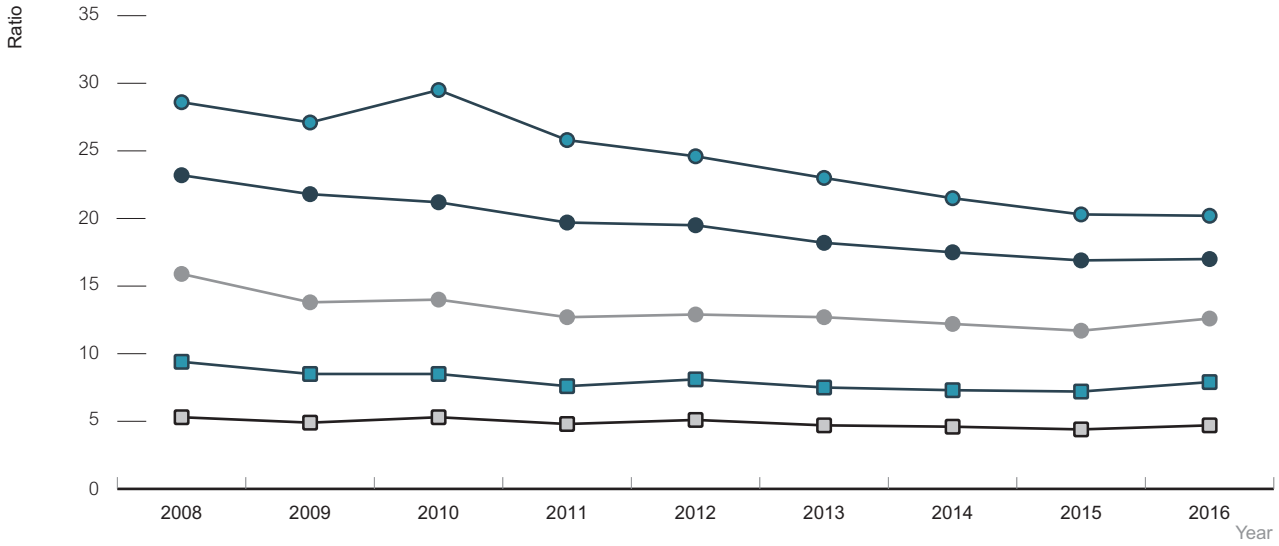
Figure 3.1.16 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008–2016, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016
Men	13.7	12.8	13.1	11.9	11.9	11.0	10.5	9.9	10.2
Women	7.7	7.1	7.4	7.0	6.6	6.2	6.0	5.5	5.4
Total	9.4	8.7	9.1	8.4	8.1	7.6	7.3	6.8	6.9

Source: Medicare; Australian National Notifiable Diseases Surveillance System.

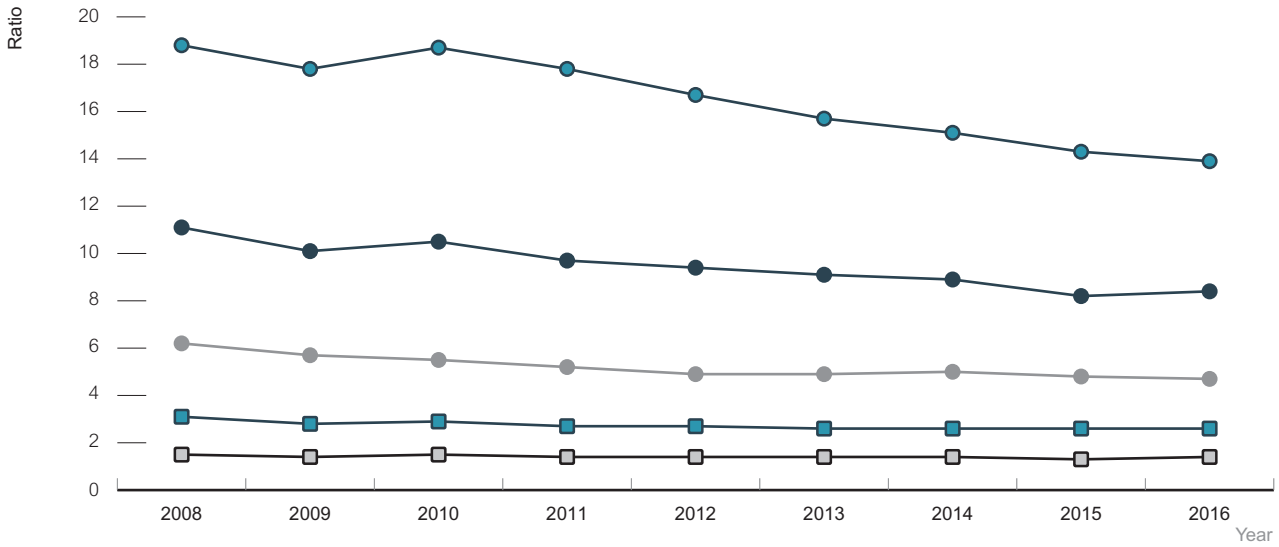
Figure 3.1.17 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008–2016, by age group, men



	2008	2009	2010	2011	2012	2013	2014	2015	2016
15–19	28.6	27.1	29.5	25.8	24.6	23.0	21.5	20.3	20.2
20–24	23.2	21.8	21.2	19.7	19.5	18.2	17.5	16.9	17.0
25–29	15.9	13.8	14.0	12.7	12.9	12.7	12.2	11.7	12.6
30–39	9.4	8.5	8.5	7.6	8.1	7.5	7.3	7.2	7.9
40+	5.3	4.9	5.3	4.8	5.1	4.7	4.6	4.4	4.7

Source: Medicare, Australian National Notifiable Diseases Surveillance System.

Figure 3.1.18 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008–2016, by age group, women



	2008	2009	2010	2011	2012	2013	2014	2015	2016
15–19	18.8	17.8	18.7	17.8	16.7	15.7	15.1	14.3	13.9
20–24	11.1	10.1	10.5	9.7	9.4	9.1	8.9	8.2	8.4
25–29	6.2	5.7	5.5	5.2	4.9	4.9	5.0	4.8	4.7
30–39	3.1	2.8	2.9	2.7	2.7	2.6	2.6	2.6	2.6
40+	1.5	1.4	1.5	1.4	1.4	1.4	1.4	1.3	1.4

Source: Medicare, Australian National Notifiable Diseases Surveillance System.

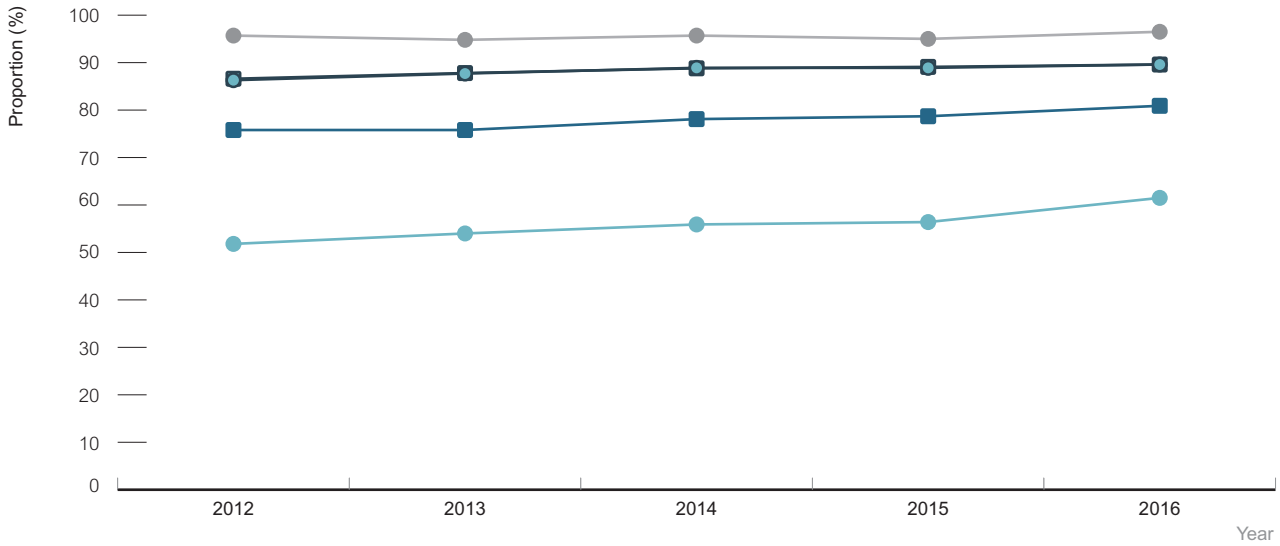
Testing at sentinel sexual health clinics

At 43 sexual health clinics participating in the ACCESS network (see Methodology for further detail), between 2012 and 2016 a high proportion of gay and bisexual men (86% to 90%), young heterosexuals aged 16–29 years (87% to 90%), people who inject drugs (76% to 81%) were tested for chlamydia in a year, and nearly all female sex workers were tested (95% to 97%) (Figure 3.1.19).

Testing at high-caseload sentinel general practice clinics

At seven general practice clinics with a high caseload of gay and bisexual men participating in the ACCESS network (see Methodology for further detail), between 52% and 62% of gay and bisexual men were tested for chlamydia each year between 2012 and 2016 (Figure 3.1.19). 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 3.1.19 Proportion of clinic attendees tested for chlamydia in a year, 2012–2016, by clinic type and population



	2012	2013	2014	2015	2016
Heterosexuals aged 16–29, sexual health clinic (%)	86.6	87.8	88.8	89.1	89.6
Female sex workers, sexual health clinic (%)	95.7	94.8	95.7	95.0	96.5
People who inject drugs, sexual health clinic (%)	75.8	75.8	78.1	78.7	80.9
Gay and bisexual men, sexual health clinic (%)	86.3	87.7	88.9	88.9	89.6
Gay and bisexual men, general practice clinic (%)	51.8	54.0	55.9	56.4	61.5

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).

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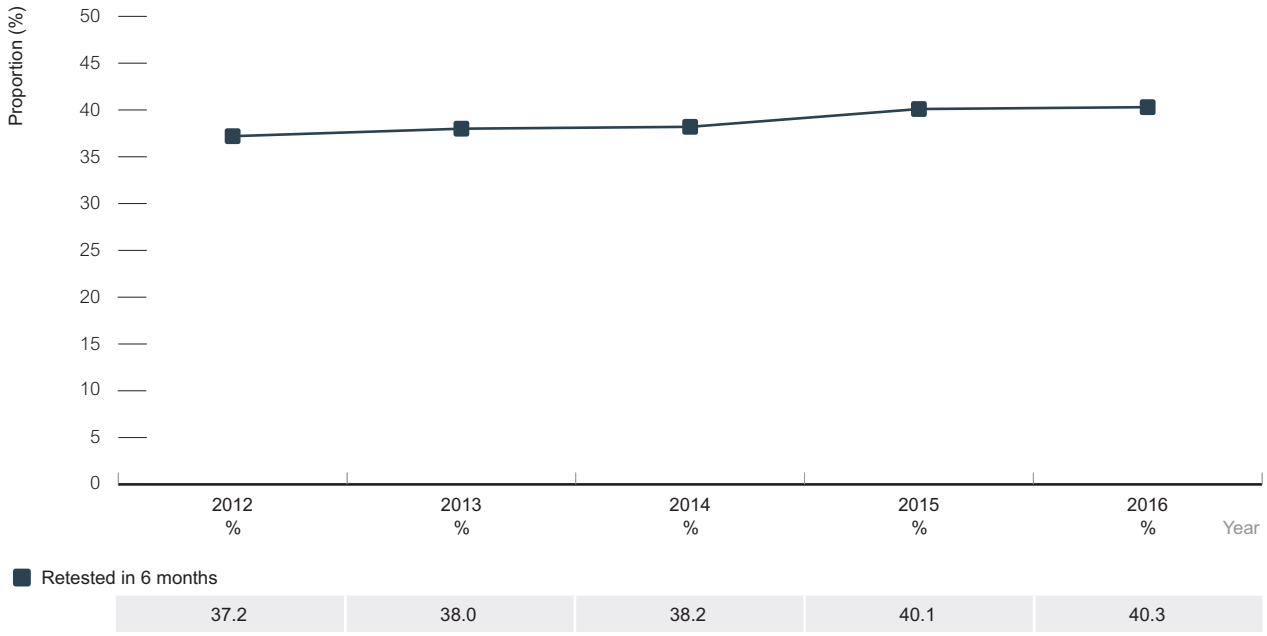
Repeat chlamydia testing

Clinical guidelines recommend retesting for chlamydia following diagnosis to detect re-infections.[7] At the 43 sexual health clinics participating in the ACCESS network, 40% of people diagnosed with chlamydia were retested between six weeks and six months following their diagnosis in 2016, as recommended in the guidelines (Figure 3.1.20).

Figure 3.1.20 Chlamydia retesting six weeks to six months following diagnosis at sexual health clinics, 2012–2016



Note: Includes diagnoses and testing at any anatomical site.

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

3.2 Gonorrhoea

See p. 11 for summary.

New gonorrhoea diagnoses

There were 23 887 gonorrhoea notifications in Australia in 2016, an increase of 29% from 18 511 notifications in 2015. Of these, 3779 (16%) were among the Aboriginal and Torres Strait Islander population, 11 658 (49%) were in the non-Indigenous population, and there were a further 8450 (35%) for which Aboriginal and Torres Strait Islander status was not reported (Table 3.2.1).

In 2016, about three-quarters of notifications were in males (17 325, 73%), resulting in a male-to-female ratio of 3:1. In 2016, 53% (12 684) of diagnoses were in people aged 15–29 years and 75% (17 814) were in people residing in major cities (Table 3.2.1).

In 2016, 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 2017*[1] for further details.)

Table 3.2.1 Characteristics of people with new gonorrhoea diagnoses, 2007–2016

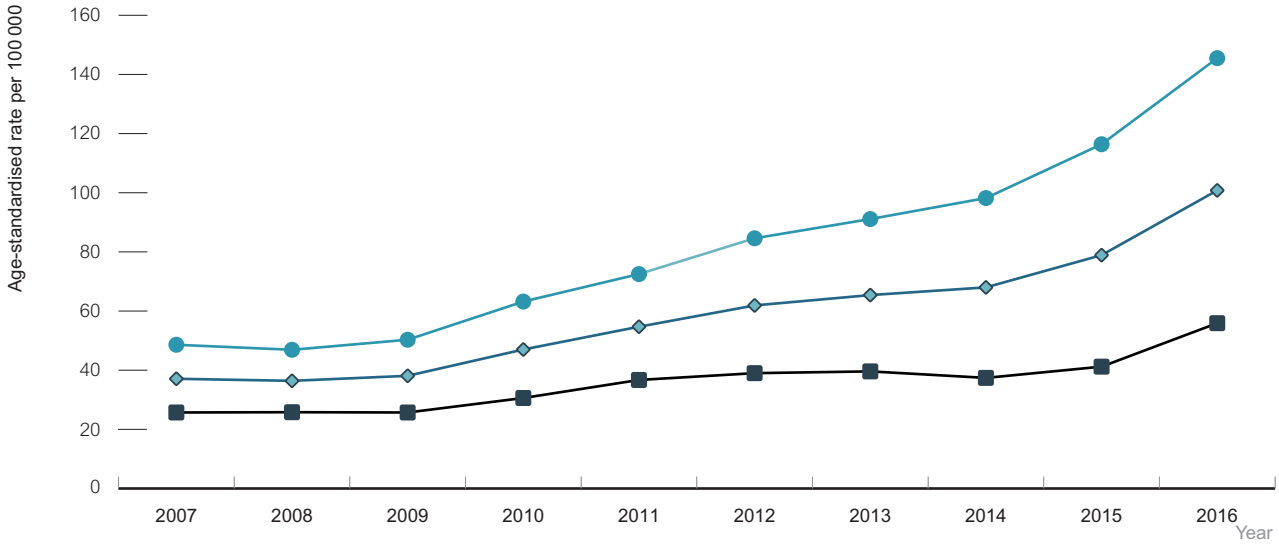
	Year of diagnosis									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Characteristic										
Total	7643	7670	8267	10 304	12 087	13 863	14 891	15 702	18 511	23 887
Sex										
Male	5032	4990	5507	7001	8090	9581	10 462	11 452	13 739	17 325
Female	2602	2671	2732	3282	3959	4274	4406	4204	4742	6501
Missing	9	9	28	21	38	8	23	46	30	61
Age group										
0–14	197	182	147	191	243	264	231	251	218	256
15–19	1554	1595	1639	1996	2314	2358	2241	2045	2013	2385
20–24	1794	1811	2113	2560	2842	3277	3423	3681	4124	4975
25–29	1291	1297	1479	1866	2200	2588	2969	3270	4054	5324
30–39	1635	1580	1664	2023	2369	2906	3305	3552	4562	6286
40+	1168	1202	1208	1650	2086	2450	2713	2892	3478	4606
Missing data	4	3	17	18	33	20	9	11	62	55
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	3580	3535	3222	3905	4574	4259	4201	3482	3432	3779
Non-Indigenous	2105	2241	2612	3405	4108	5408	6730	7468	9097	11 658
Not reported	1958	1894	2433	2994	3405	4196	3960	4752	5982	8450
Area of residence										
Major cities	3390	3492	4234	5421	6377	8252	9062	10 480	13 020	17 814
Inner regional	261	269	393	423	550	723	751	785	884	1223
Outer regional	999	1128	1035	1331	1764	1620	1492	1413	1406	1529
Remote	997	1033	917	1138	1223	1201	1177	1001	1047	1065
Very remote	1810	1578	1523	1724	1887	1664	1636	1394	1433	1466
Missing data	186	170	165	267	286	403	773	629	721	790
State/Territory										
ACT	45	21	55	56	128	92	114	120	141	201
NSW	1382	1330	1653	2301	2882	4129	4236	4858	5452	7004
NT	1601	1551	1551	1933	1952	1822	1955	1741	1829	1768
QLD	1369	1638	1787	2384	2949	2691	2728	2723	3036	4030
SA	458	486	368	470	440	543	807	736	794	1112
TAS	38	25	21	20	19	35	69	65	56	82
VIC	989	927	1491	1755	1885	2463	3033	3264	4898	6328
WA	1761	1692	1341	1385	1832	2088	1949	2195	2305	3362

Source: Australian National Notifiable Diseases Surveillance System.

Between 2012 and 2016, there was a 63% increase in notification rates from 61.9 per 100 000 in 2012 to 100.8 per 100 000 in 2016, with increases in both males (72%) and females (43%) in this period (Figure 3.2.1). The gonorrhoea notification rate has been higher in males than females in each of the years since 2007 and was 145.5 per 100 000 in males and 55.9 per 100 000 in females in 2016.

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.[32] 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 diagnoses in women prior to 2012, but not since then.

Figure 3.2.1 Gonorrhoea notification rate per 100 000 population, 2007–2016, by sex



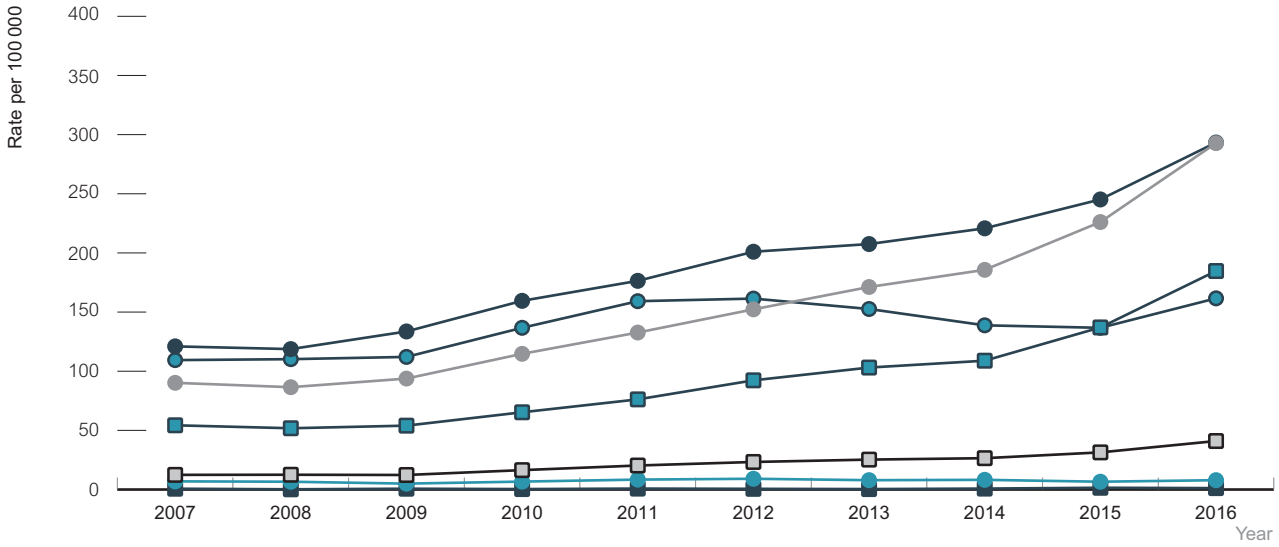
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Male	48.6	46.9	50.3	63.2	72.5	84.6	91.1	98.2	116.4	145.5
Female	25.7	25.8	25.7	30.6	36.7	39.0	39.6	37.4	41.2	55.9
Total	37.1	36.4	38.1	47.0	54.7	61.9	65.4	68.0	78.9	100.8

Source: Australian National Notifiable Diseases Surveillance System.

Between 2012 and 2016, the notification rate of gonorrhoea increased in all age groups 20 years and above (Figure 3.2.2). In the age group 15–19 years, rates fell from 161.4 per 100 000 in 2012 to 136.7 per 100 000 in 2015, then increased again to 161.6 per 100 000 in 2016 (Figure 3.2.2). A similar pattern was observed in both males and females, with the largest increases in those aged 30–39 years (102% men, 94% women), 25–29 years (93% in both men and women) and 20–24 years (49% men, 39% women) (Figures 3.2.1 and 3.2.4). Gonorrhoea notification rates in males were higher in all age groups in 2016 than in females, except in the 15–19 age group, in which women had a higher rate (146.7 vs 176.5 per 100 000).

Also almost a third (32%) of gonorrhoea notifications in Aboriginal and Torres Strait Islander people in 2016 were in people aged 15–19 years, compared with 7% in the non-Indigenous population. (See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017*[1] for further details.)

Figure 3.2.2 Gonorrhoea notification rate per 100 000 population, 2007–2016, by age group



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	0.7	0.2	0.7	0.4	0.8	0.6	0.4	0.8	1.5	1.2
5–14	6.9	6.6	5.0	6.7	8.4	9.1	7.9	8.2	6.6	7.9
15–19	109.4	110.2	112.1	136.7	159.2	161.4	152.6	138.8	136.7	161.6
20–24	121.0	118.7	133.6	159.5	176.4	201.0	207.5	220.8	245.2	293.3
25–29	90.2	86.5	93.8	114.7	132.7	152.3	171.2	185.7	226.1	292.8
30–39	54.3	51.8	54.0	65.3	76.2	92.3	103.1	108.9	137.0	184.7
40+	12.4	12.5	12.3	16.4	20.3	23.3	25.3	26.5	31.4	41.0

Source: Australian National Notifiable Diseases Surveillance System.

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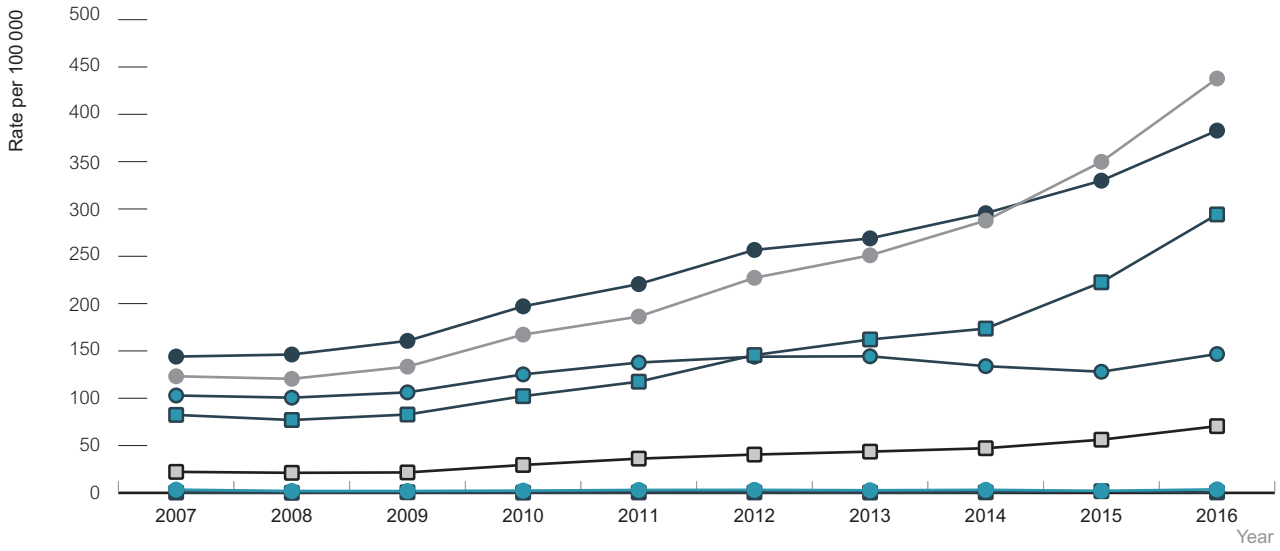
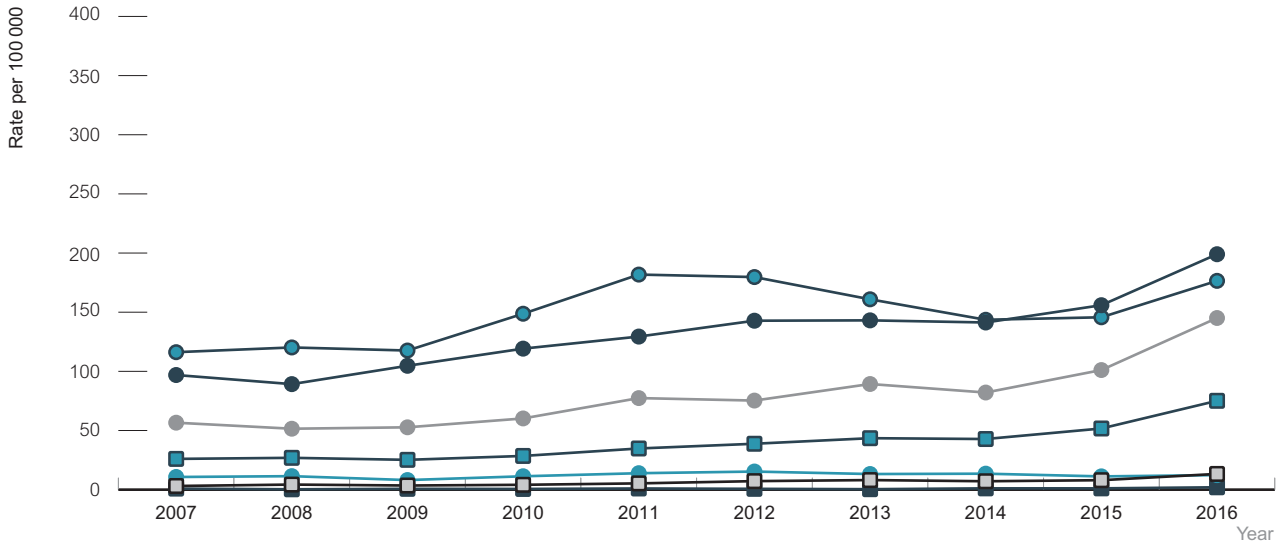
Figure 3.2.3 Gonorrhoea notification rate per 1000 000 population, 2007–2016, by age group, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	0.4	0.1	0.7	0.3	0.5	0.5	0.4	0.6	1.8	0.5
5–14	3.4	2.0	2.0	2.4	3.1	3.2	2.8	3.2	2.2	3.7
15–19	102.9	100.6	106.2	125.2	137.7	143.9	144.3	133.9	128.0	146.7
20–24	144.0	146.2	160.6	197.1	220.6	256.7	268.9	295.5	329.9	382.8
25–29	123.2	120.5	133.4	167.2	186.3	227.2	251.0	287.7	349.8	437.8
30–39	82.4	77.0	82.8	102.2	117.5	145.6	162.1	173.6	222.5	294.2
40+	22.2	21.2	21.6	29.5	36.2	40.5	43.6	47.2	56.2	70.5

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.2.4 Gonorrhoea notification rate per 100 000 population, 2007–2016 by age group, females

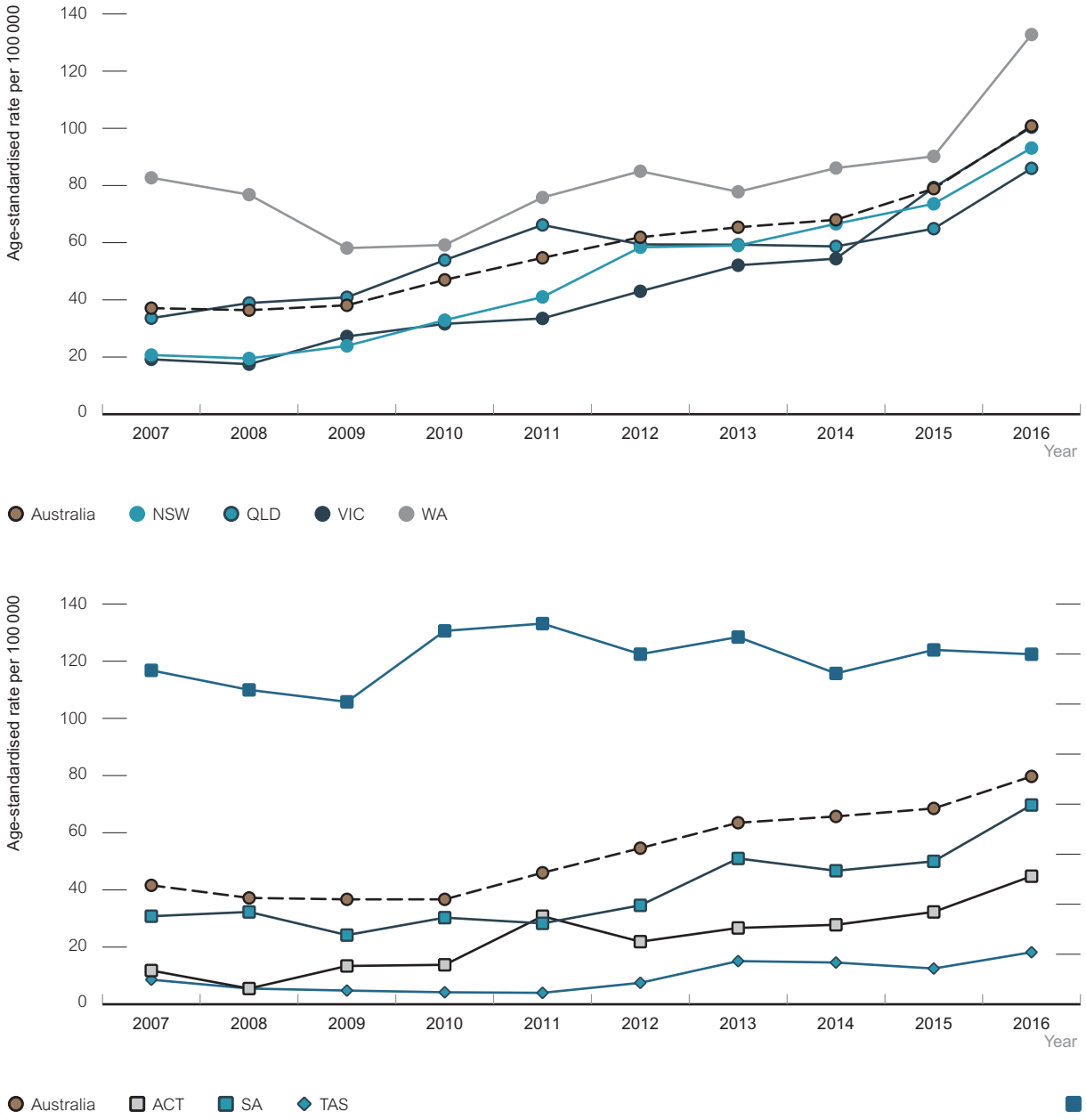


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	0.9	0.3	0.7	0.6	1.0	0.7	0.4	1.1	1.1	2.0
5–14	10.7	11.4	8.1	11.3	13.9	15.3	13.2	13.5	11.2	12.3
15–19	116.2	120.2	117.6	148.7	181.8	179.7	160.9	143.6	145.7	176.5
20–24	96.9	89.2	104.7	119.2	129.4	142.8	143.1	141.3	155.9	199.0
25–29	56.6	51.5	52.7	60.2	77.4	75.3	89.3	82.1	101.1	145.1
30–39	26.0	26.9	25.2	28.5	34.8	38.8	43.5	42.8	51.7	75.1
40+	3.1	4.3	3.5	4.1	5.3	7.2	8.1	7.1	8.0	13.3

Source: Australian National Notifiable Diseases Surveillance System.

Over the past 10 years (2007–2016), gonorrhoea notification rates increased in all jurisdictions except the Northern Territory, where rates fluctuated. In 2016, gonorrhoea notification rates were highest in the Northern Territory (699.6 per 100 000, followed by Western Australia (132.8 per 100 000) (Figure 3.2.5 and Table 3.2.2).

Figure 3.2.5 Gonorrhoea notification rate per 100 000 population, 2007–2016, by state/territory



Note: The Northern Territory is displayed on the right-hand vertical axis.

Source: Australian National Notifiable Diseases Surveillance System.

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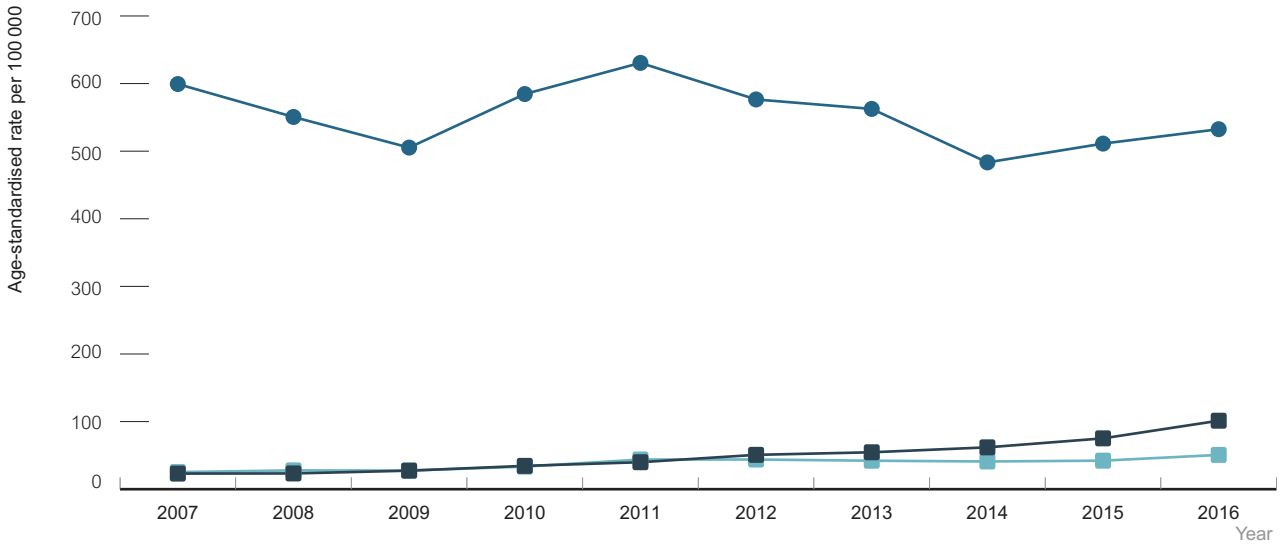
Table 3.2.2 Age-standardised gonorrhoea notifications rates per 100 000 population, 2007–2016, by state/territory

State/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australian Capital Territory	11.8	5.5	13.4	13.8	30.8	21.9	26.7	27.8	32.3	44.8
New South Wales	20.7	19.5	23.9	32.9	41.0	58.4	59.0	66.6	73.6	93.1
Northern Territory	667.4	628.4	604.5	746.3	760.9	699.8	734.0	661.3	708.3	699.6
Queensland	33.6	38.9	40.9	53.9	66.2	59.4	59.3	58.7	64.9	86.0
South Australia	30.8	32.3	24.2	30.3	28.3	34.6	51.0	46.7	50.0	69.7
Tasmania	8.6	5.5	4.8	4.2	4.0	7.5	15.1	14.6	12.5	18.2
Victoria	19.2	17.5	27.2	31.6	33.5	43.0	52.1	54.4	79.3	100.4
Western Australia	82.7	76.8	58.1	59.2	75.8	85.0	77.8	86.1	90.2	132.8
Australia	37.1	36.4	38.1	47.0	54.7	61.9	65.4	68.0	78.9	100.8

Source: Australian National Notifiable Diseases Surveillance System.

Between 2012 and 2016, gonorrhoea notification rates increased in major cities (99% increase) and inner and outer regional areas (15% increase) but declined in remote and very remote areas (8% decline) (Figure 3.2.6). In 2016, gonorrhoea notification rates were highest in remote areas (532.5 per 100 000), followed by major cities (101.3 per 100 000) and regional areas (50.7 per 100 000) (Figure 3.2.6). A similar trend was seen in both males and females, with rates in regional areas in females fluctuating, and there was a 63% increase in notification rates in major cities between 2015 and 2016 (27.5 to 44.8 per 100 000) (Figures 3.2.7 and 3.2.8).

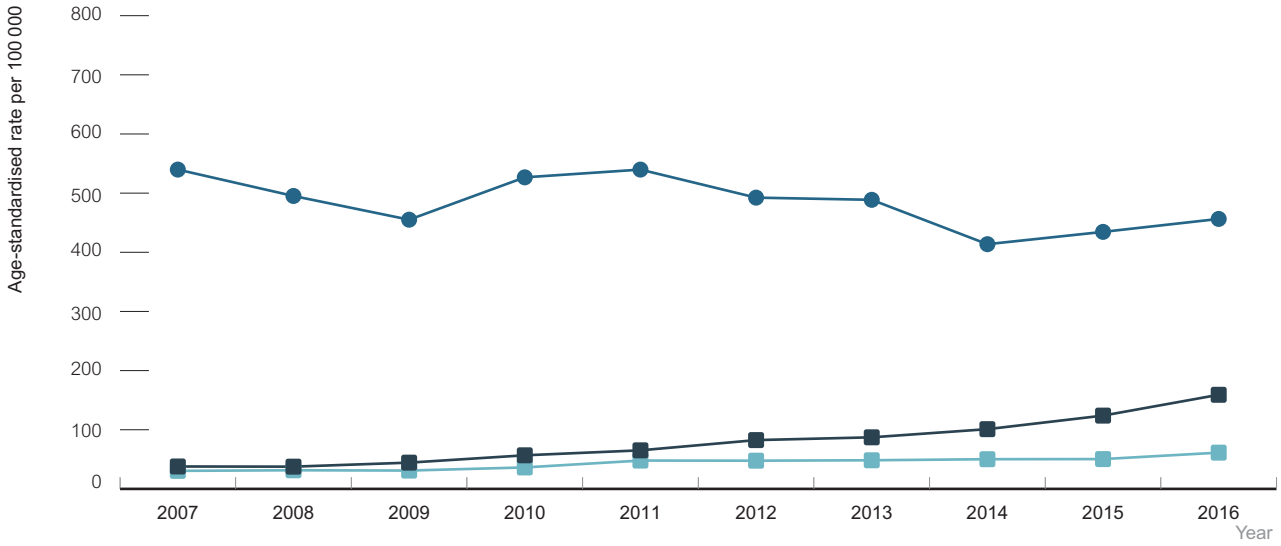
Figure 3.2.6 Gonorrhoea notification rate per 100 000, 2007–2016, by region of residence



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	23.1	23.3	27.4	34.5	39.9	50.8	54.6	61.9	75.2	101.3
Inner and outer regional	25.3	27.8	27.6	33.4	43.9	43.9	42.1	41.0	42.2	50.7
Remote and very remote	599.3	550.6	505.3	584.5	630.6	576.5	562.5	483.4	511.2	532.5

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.2.7 Gonorrhoea notification rate per 100 000 population, 2007–2016, by region of residence, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	37.9	37.6	44.4	56.8	65.2	82.5	87.2	101.0	123.9	159.1
Inner and outer regional	30.5	31.5	31.0	36.3	47.9	47.7	48.4	50.2	50.4	61.3
Remote and very remote	539.8	495.2	455.1	526.7	539.8	492.4	488.7	413.7	434.5	456.4

Source: Australian National Notifiable Diseases Surveillance System.

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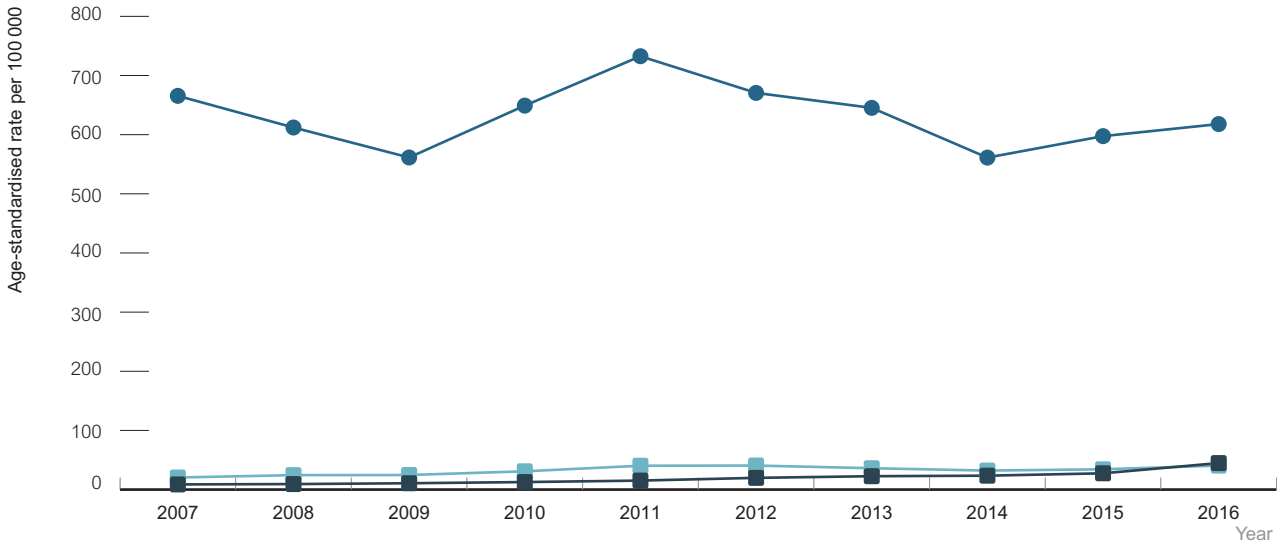
Figure 3.2.8 Gonorrhoea notification rate per 100 000 population, 2007–2016, by region of residence, females



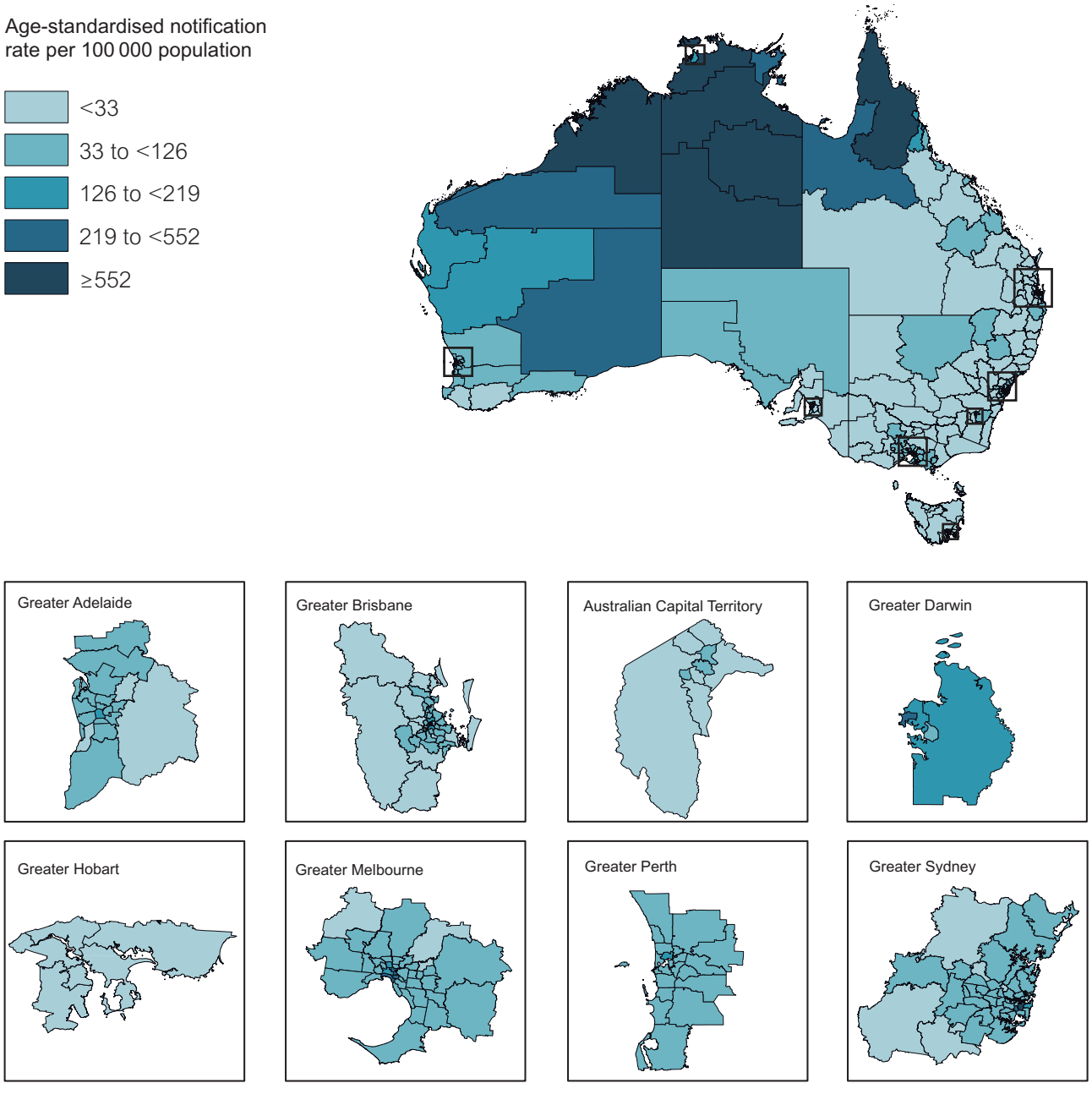
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	8.7	9.3	10.7	12.7	15.2	19.8	22.6	23.5	27.5	44.8
Inner and outer regional	20.4	24.4	24.6	30.9	40.3	40.6	36.1	32.1	34.3	40.5
Remote and very remote	665.6	612.1	561.4	649.1	732.6	670.6	645.3	561.2	597.5	617.9

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 3.2.9).

Based on average gonorrhoea notification rates between 2014 and 2016, 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 3.2.9). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of gonorrhoea diagnoses, 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 3.2.9 Average age-standardised gonorrhoea notification rate per 100 000 population, by statistical area level 3, 2014–2016, Australia and major cities

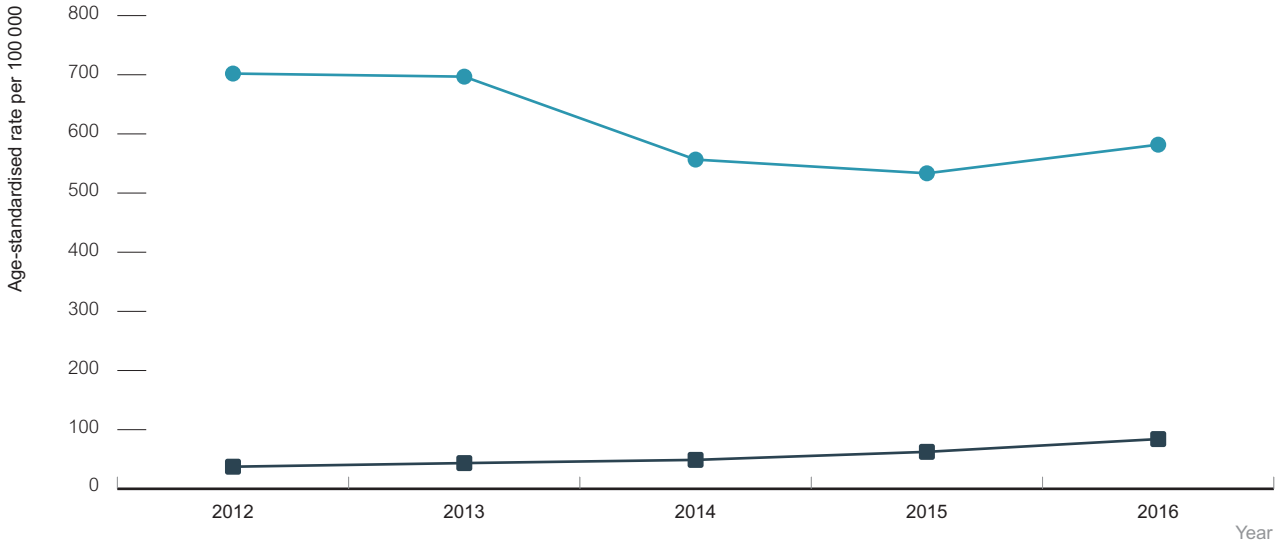


Note: Note: Average gonorrhoea notification rates for the three-year period 2014–2016 were used to minimise the influence of fluctuation in the number of gonorrhoea diagnoses.

Source: State and territory health authorities.

The data below include the Australian Capital Territory, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia, in which Aboriginal and Torres Strait Islander status was reported for at least 50% of notifications for each of the five years. It is important to note that incomplete Aboriginal and Torres Strait Islander status in other jurisdictions means that the data presented below may not be representative of national trends. The rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population fell by 17% from 702.0 per 100 000 in 2012 to 581.8 per 100 000 in 2016, compared with a 125% increase in the non-Indigenous population from 37.4 per 100 000 in 2012 to 84.1 per 100 000 in 2016 (Figure 3.2.10). Despite these trends, in 2016 the notification rate in the Aboriginal and Torres Strait Islander population was 6.9 times as high as in the non-Indigenous population (581.8 per 100 000 compared to 84.1 per 100 000).

Figure 3.2.10 Gonorrhoea notification rate per 100 000 population, 2012–2016, by Aboriginal and Torres Strait Islander status

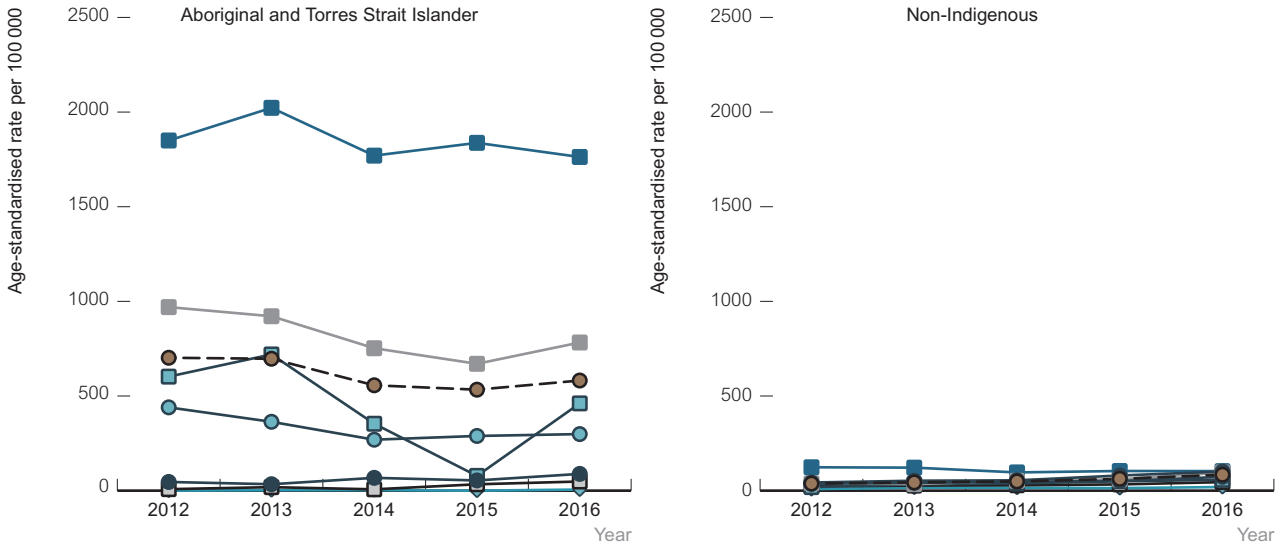


	2012	2013	2014	2015	2016
Non-Indigenous	37.4	43.5	48.9	62.5	84.1
Aboriginal and Torres Strait Islander	702.0	696.8	556.6	533.4	581.8

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 diagnoses for each year.

Between 2012 and 2016, the gonorrhoea notification rate in the Aboriginal and Torres Strait Islander population was highest in the Northern Territory (1762.8 per 100 000 in 2016), followed by Western Australia (782.6 per 100 000 in 2016) and South Australia (461.0 per 100 000 in 2016) (Figure 3.2.11). In 2016, 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 3.2.11). The gonorrhoea notification rate in the Aboriginal and Torres Strait Islander population in 2016 was highest in remote and very remote areas (1443.7 per 100 000), which was 30 times as high as the rate in the non-Indigenous population. (See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017*[1] for further details.)

Figure 3.2.11 Gonorrhoea notification rate per 100 000 population, 2012–2016, by state/territory and Aboriginal and Torres Strait Islander status



	Aboriginal and Torres Strait Islander					Non-Indigenous				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Australia	702.0	696.8	556.6	533.4	581.8	37.4	43.5	48.9	62.5	84.1
ACT	7.9	18.4	7.0	33.6	48.3	22.2	26.6	28.4	32.9	45.0
NT	1849.8	2022.4	1769.9	1837.4	1762.8	123.5	121.5	96.3	103.8	103.2
QLD	440.0	363.7	269.2	288.9	298.8	36.5	41.6	46.5	51.0	72.9
SA	602.4	719.6	353.5	78.0	461.0	18.7	33.2	38.1	49.5	57.2
TAS	0.0	2.4	2.7	0.0	5.8	8.0	16.0	15.4	13.5	19.1
VIC	45.9	33.9	67.6	53.9	88.5	43.0	52.4	54.5	79.9	101.0
WA	969.6	921.4	752.4	670.1	782.6	39.4	34.7	51.9	59.8	95.8

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 diagnoses for each year.

Gonorrhoea incidence

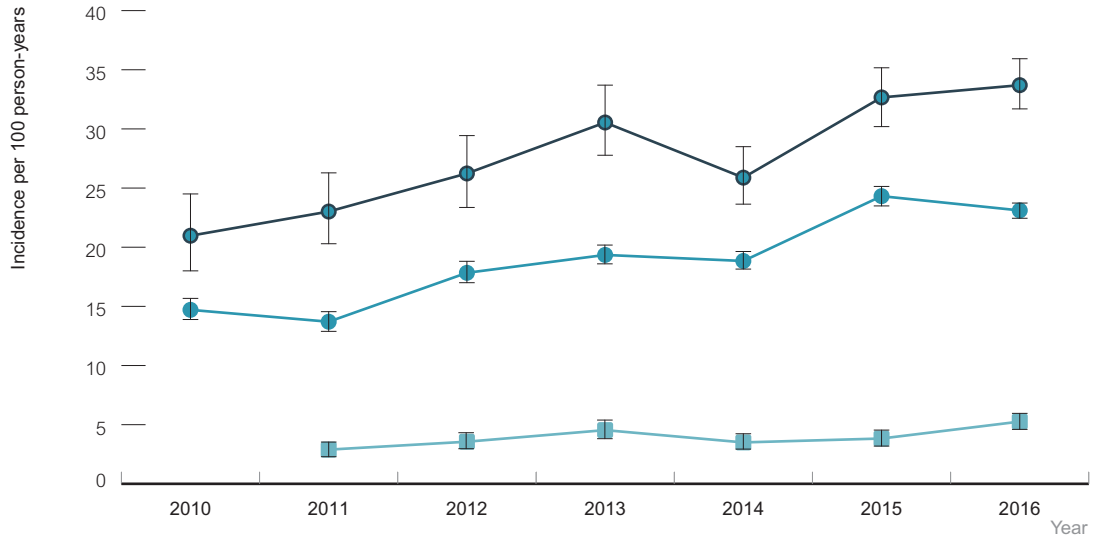
Incidence is the best indicator of changes in transmission in a population. Gonorrhoea incidence is available from the ACCESS network and is calculated by dividing the number of incident infections (negative test followed by a positive test) among people undergoing repeat gonorrhoea testing at sexual 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 2016, gonorrhoea incidence was 33.7 per 100 person-years in HIV-positive gay and bisexual men, 46% higher than in HIV-negative gay and bisexual men (23.1 per 100 person-years). In the past five years (2012–2016) gonorrhoea incidence has increased in both HIV-positive (29% increase) and HIV-negative (30% increase) gay and bisexual men, but remained steady between 2015 and 2016 (Figure 3.2.12).

In female sex workers gonorrhoea incidence was 5.3 per 100 person-years in 2016, increasing by 47% from 3.6 per 100 person-years in 2012 (Figure 3.2.12).

Caution should be taken with interpretation as confidence intervals overlap, indicating differences may not be statistically significant.

Figure 3.2.12 Gonorrhoea incidence in sexual health clinic attendees, 2010–2016, by population



	2010	2011	2012	2013	2014	2015	2016
HIV-negative gay and bisexual men	14.7	13.7	17.8	19.3	18.8	24.3	23.1
HIV-positive gay and bisexual men	21.0	23.0	26.2	30.5	25.9	32.7	33.7
Female sex workers		2.9	3.6	4.5	3.5	3.8	5.3

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

STIs

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.[7]

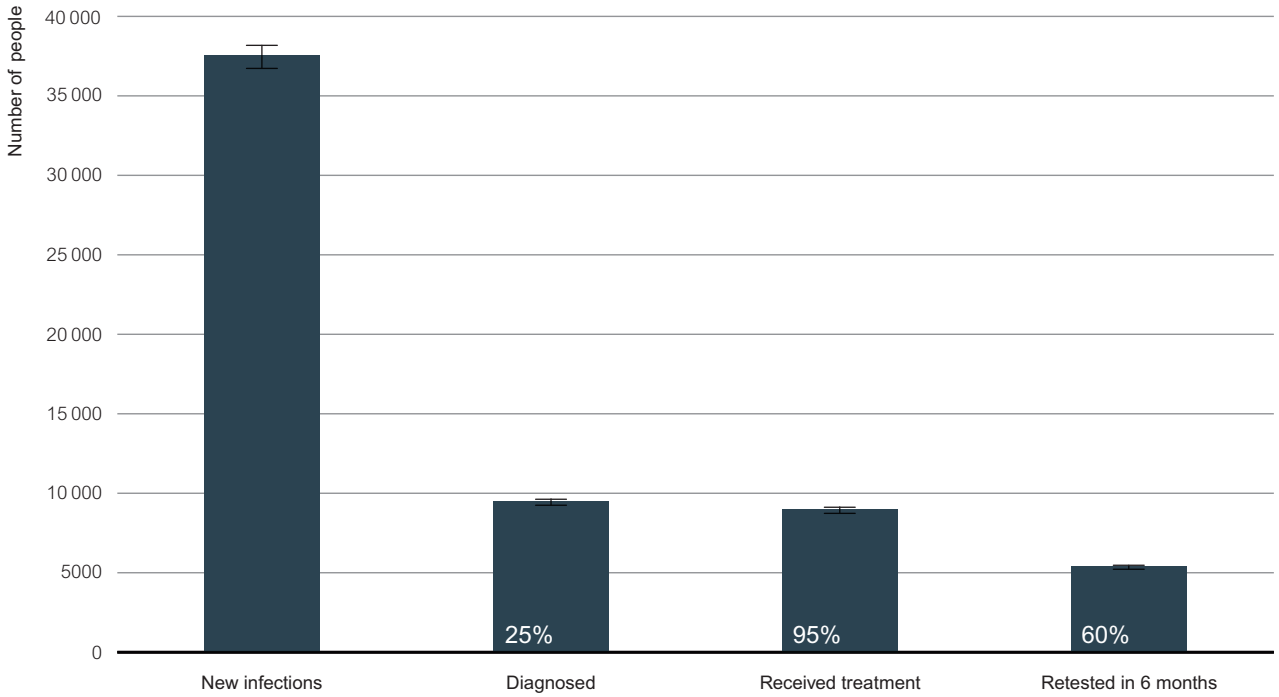
These estimates are used to support the improvement of the delivery of services to gay and bisexual men diagnosed with gonorrhoea across the entire continuum of care—from diagnosis of infection and uptake of treatment to management (retesting). As gonorrhoea is concentrated largely in gay and bisexual 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 in the next year.

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 3.2.13). 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 diagnoses occur in this group.

By the end of 2016, there were an estimated 37 537 new gonorrhoea infections in gay and bisexual men. Of those, an estimated 9482 (25%) were diagnosed, 9008 (95% of those diagnosed) received treatment, and 5405 (60% of those treated) had a retest between six weeks and six months after diagnosis (Figure 3.2.13).

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,[33] and may have had a test during 2016 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.[34] 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 3.2.13 The gonorrhoea diagnosis and care cascade in gay and bisexual men, 2016



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.[7] 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.[11] 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

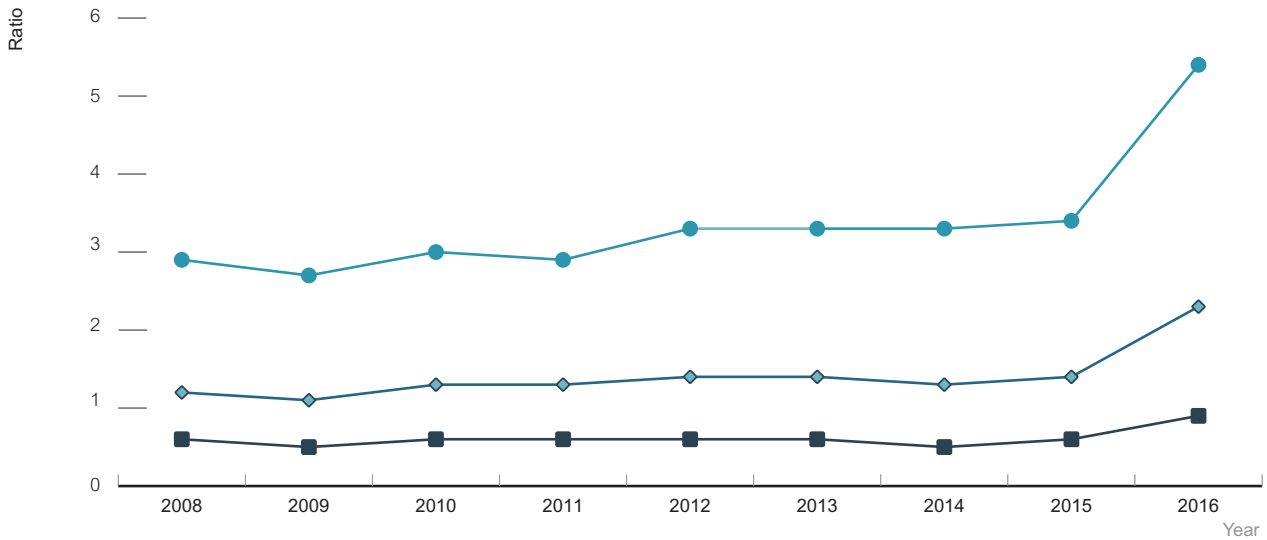
As most laboratories since 2012 have switched to using dual chlamydia and gonorrhoea tests (i.e., if one of the tests is ordered both tests are performed), Medicare-rebated chlamydia tests can be used to indicate the level of gonorrhoea testing.

Between 2012 and 2015, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests remained stable (1.3 to 1.4), but increased by 64% from 1.4 in 2015 to 2.3 in 2016, with an increase in both males (59%) and females (50%) between 2015 and 2016 (Figure 3.2.14). The ratio has been higher in males than females in each of the years since 2008 (5.4 vs 0.9 in 2016) (Figure 3.2.14).

In 2016, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests in men increased to over 4.0 in all age groups and was highest in the age group 25–29 years (6.6), followed by the 30–39 (6.0) and 15–19 (5.9) age groups (Figure 3.2.15). The ratio was lower in females than males in all age groups, with an increase in all age groups between 2015 and 2016 (Figure 3.2.16). In 2016, the highest ratio in females was in the age group 15–19 years (1.7), followed by the 20–24 and 25–29 age groups (0.9 each) in 2016 (Figure 3.2.16).

These trends suggest that the increase in notifications in 2015–2016 is related more to increased transmission and less to increased testing (see New gonorrhoea diagnoses, pp, 136).

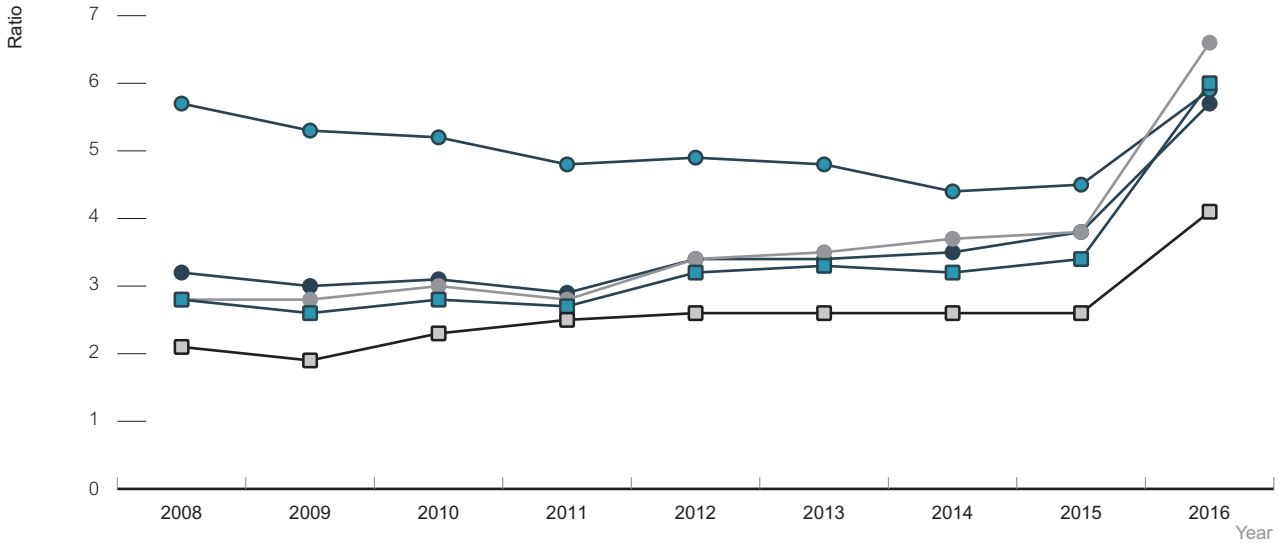
Figure 3.2.14 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012–2016, by sex



	2008	2009	2010	2011	2012	2013	2014	2015	2016
Male	2.9	2.7	3.0	2.9	3.3	3.3	3.3	3.4	5.4
Female	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.6	0.9
Total	1.2	1.1	1.3	1.3	1.4	1.4	1.3	1.4	2.3

Source: Australian National Notifiable Diseases Surveillance System; Medicare.

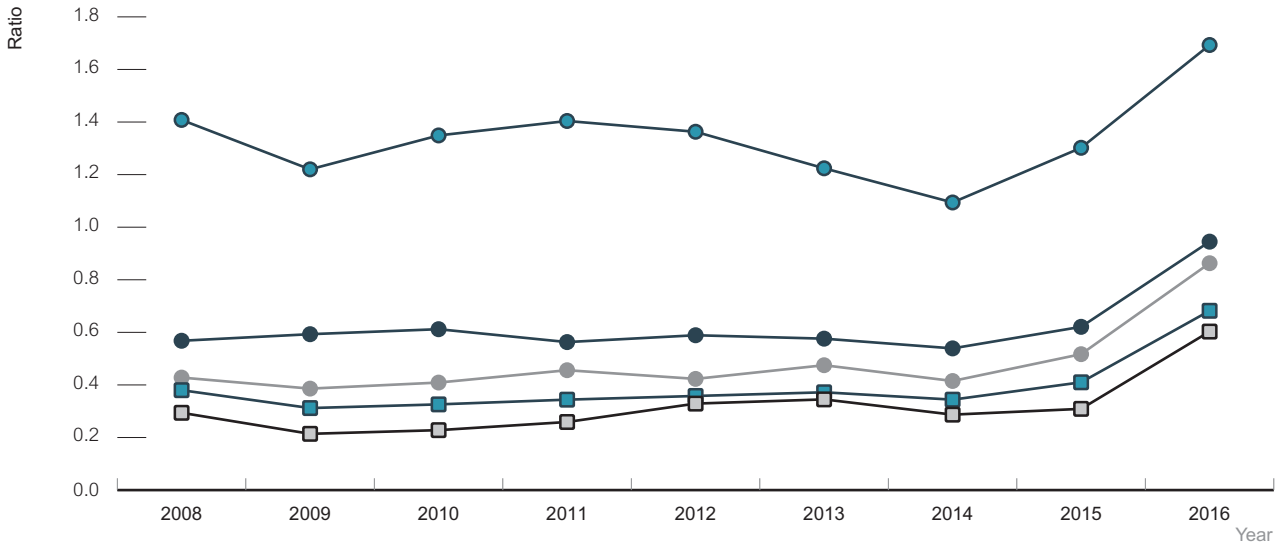
Figure 3.2.15 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012–2016, by age group, males



	2008	2009	2010	2011	2012	2013	2014	2015	2016
15–19	5.7	5.3	5.2	4.8	4.9	4.8	4.4	4.5	5.9
20–24	3.2	3.0	3.1	2.9	3.4	3.4	3.5	3.8	5.7
25–29	2.8	2.8	3.0	2.8	3.4	3.5	3.7	3.8	6.6
30–39	2.8	2.6	2.8	2.7	3.2	3.3	3.2	3.4	6.0
40+	2.1	1.9	2.3	2.5	2.6	2.6	2.6	2.6	4.1

Source: Australian National Notifiable Diseases Surveillance System; Medicare.

Figure 3.2.16 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012–2016, by age group, females



	2008	2009	2010	2011	2012	2013	2014	2015	2016
15–19	1.4	1.2	1.3	1.4	1.4	1.2	1.1	1.3	1.7
20–24	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.9
25–29	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.5	0.9
30–39	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.7
40+	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.6

Source: Australian National Notifiable Diseases Surveillance System; Medicare.

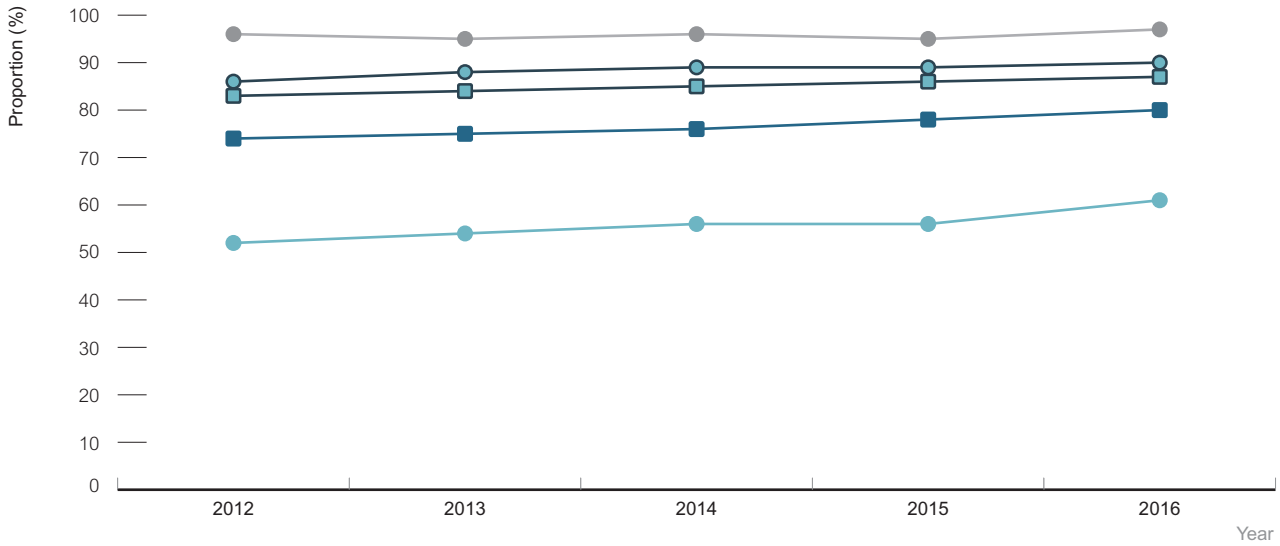
Testing at sentinel sexual health clinics

At 43 sexual health clinics participating in the ACCESS network (see Methodology for further detail), between 2012 and 2016 a high proportion of gay and bisexual men (86% to 90%), young heterosexuals aged 16–29 years (83% to 87%) and people who inject drugs (74% to 80%) were tested for gonorrhoea in a year, and nearly all female sex workers were tested (95% to 97%) (Figure 3.2.17).

Testing at high-caseload sentinel general practice clinics

At seven general practice clinics with a high caseload of gay and bisexual men participating in the ACCESS network (see Methodology for further detail), between 52% and 61% of gay and bisexual men were tested for gonorrhoea each year between 2012 and 2016 (Figure 3.2.17). 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 3.2.17 Proportion of clinic attendees tested for chlamydia in a year, 2012–2016, by clinic type and population



	2012	2013	2014	2015	2016
Heterosexuals aged 16–29, sexual health clinic (%)	83.0	84.0	85.0	86.0	87.0
Female sex workers, sexual health clinic (%)	96.0	95.0	96.0	95.0	97.0
People who inject drugs, sexual health clinic (%)	74.0	75.0	76.0	78.0	80.0
Gay and bisexual men, sexual health clinic (%)	86.0	88.0	89.0	89.0	90.0
Gay and bisexual men, general practice clinic (%)	52.0	54.0	56.0	56.0	61.0

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

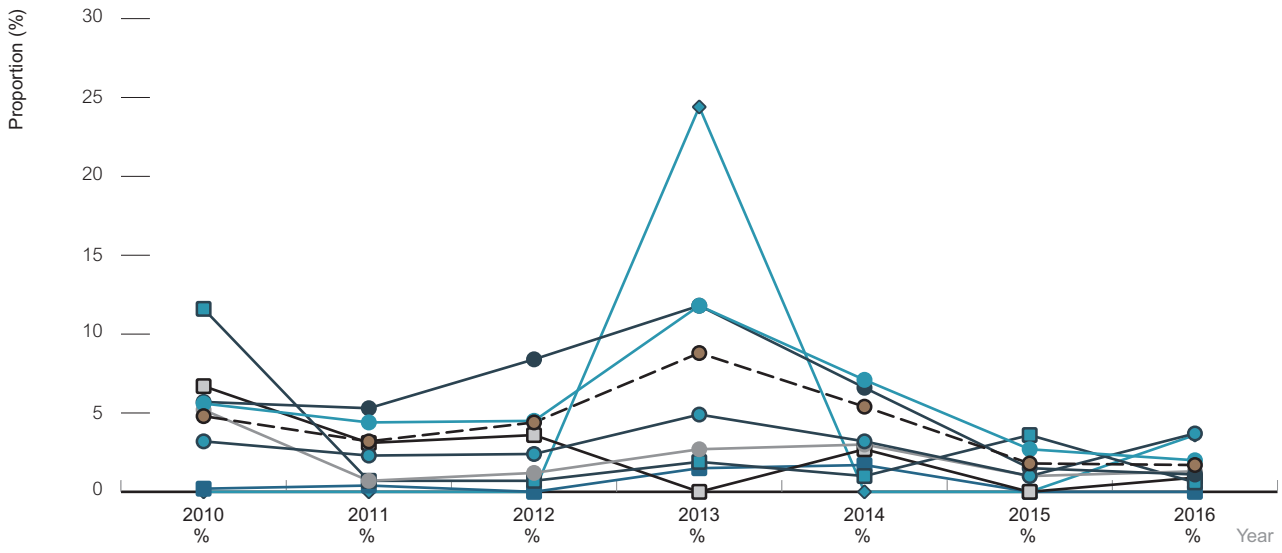
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

STIs

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.[7] Between 2012 and 2016, the proportion of gonococcal isolates tested for antimicrobial resistance with decreased susceptibility to ceftriaxone fluctuated between 1.7% and 4.4% (1.7% in 2016) (Figure 3.2.18). Reduced susceptibility was highest in Queensland (3.7%) and Tasmania (3.6%) in 2016 (Figure 3.2.18). In 2016, no gonococcal isolates showed resistance to ceftriaxone (data not shown).

Figure 3.2.18 Proportion of gonococcal isolates tested at the Australian Gonococcal Surveillance Programme with decreased susceptibility to ceftriaxone, 2010–2016, by state/territory



	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %	2016 %
ACT	6.7	3.1	3.6	0	2.7	0.0	0.9
NSW	5.6	4.4	4.5	11.8	7.1	2.7	2
NT	0.2	0.4	0	1.5	1.7	0.0	0
QLD	3.2	2.3	2.4	4.9	3.2	1.0	3.7
SA	11.6	0.7	0.7	1.9	1	3.6	0.6
TAS	0	0	0	24.4	0	0.0	3.6
VIC	5.7	5.3	8.4	11.8	6.6	1.5	1.1
WA	5.2	0.7	1.2	2.7	3	1.0	1.3
Australia	4.8	3.2	4.4	8.8	5.4	1.8	1.7

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.[35]

3.3 Syphilis

See summary on p. 12.

Infectious syphilis: new diagnoses

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.[36] 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 and 2016.

There were 3367 infectious syphilis notifications (infections of less than two years' duration) in Australia in 2016. In 2016, 530 (16%) notifications were among the Aboriginal and Torres Strait Islander population, 2502 (74%) were among the non-Indigenous population and 335 (10%) did not have Indigenous status reported (Table 3.3.1). In 2016, 87% (2945) of infectious syphilis notifications were in males, 36% (1215) were in people aged 15–29 years, and 70% (2367) were in people residing in major cities.

In 2016, over half (54%) of notifications of infectious syphilis in the Aboriginal and Torres Strait Islander population were among males compared with the majority (94%) 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 2017*[1] for further details.)

STIs

Table 3.3.1 Characteristics of new infectious syphilis diagnoses, 2007–2016

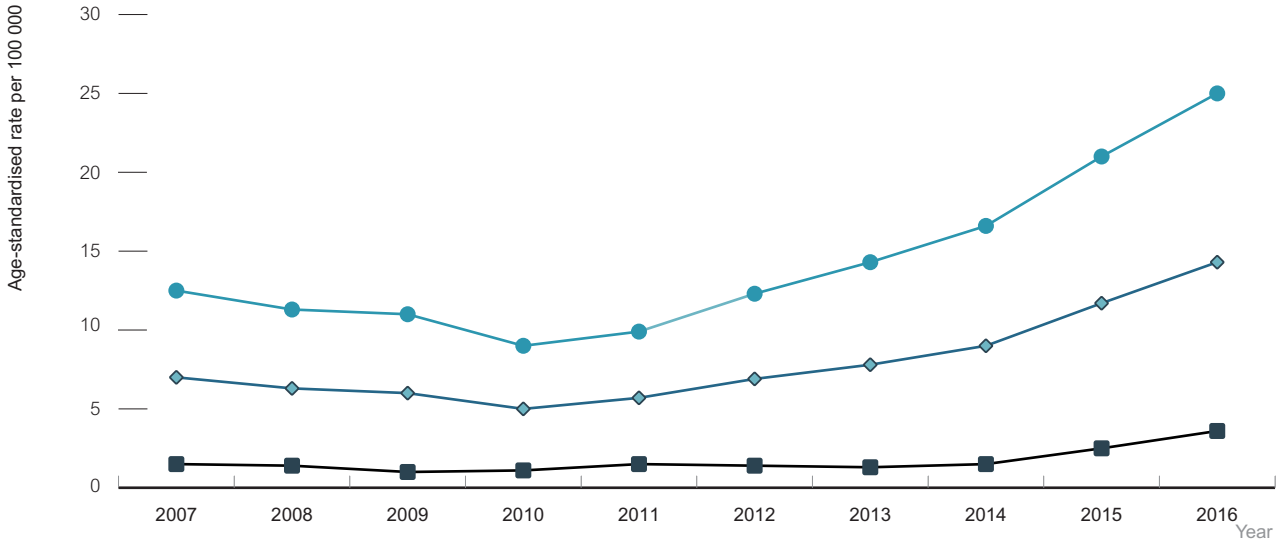
	Year of diagnosis									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Characteristic										
Total	1434	1320	1282	1099	1254	1539	1769	2070	2739	3367
Sex										
Male	1279	1174	1172	978	1089	1382	1620	1901	2445	2945
Female	154	146	106	114	162	154	148	168	290	412
Missing data[a]	1	0	4	7	3	3	1	1	4	10
Age group										
0–14	8	8	3		11	6	9	11	17	17
15–19	62	73	39	43	89	72	73	98	144	177
20–24	131	133	145	141	156	188	198	243	399	424
25–29	174	196	180	154	174	215	225	309	463	614
30–39	441	402	363	309	320	391	494	570	733	974
40+	617	508	548	447	501	666	770	839	983	1161
Missing data[a]	1	0	4	5	3	1	0	0	0	0
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	201	182	116	143	198	175	152	245	440	530
Non-Indigenous	1181	1104	1129	919	1008	1275	1488	1690	2088	2502
Not reported	52	34	37	37	48	89	129	135	211	335
Area of residence										
Major cities	1100	1002	1044	822	944	1191	1294	1572	1808	2367
Inner regional	73	61	77	51	73	99	132	97	147	159
Outer regional	53	82	60	96	60	78	77	134	214	393
Remote	29	46	26	41	52	41	35	54	142	140
Very remote	110	91	41	50	79	48	46	54	105	97
Missing data	69	38	34	39	46	82	185	159	323	211
State/Territory										
ACT	9	4	11	14	10	15	10	18	14	13
NSW	455	425	522	407	399	508	616	795	759	878
NT	118	83	38	43	30	14	23	72	205	229
QLD	260	199	193	228	337	390	336	397	575	680
SA	49	46	37	22	18	45	41	29	69	89
TAS	8	8	10	6	6	14	20	14	15	5
VIC	431	381	388	299	331	477	640	652	940	1138
WA	104	174	83	80	123	76	83	93	162	335

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 (2012–2016), the notification rate of infectious syphilis increased by 107% from 6.9 per 100 000 in 2012 to 14.3 per 100 000 in 2016, with increases in both males (103%) and females (157%). The notification rate has remained higher in males than females in each of the years since 2007, and was 25.0 per 100 000 in males and 3.6 per 100 000 in females in 2016 (Figure 3.3.1).

Figure 3.3.1 Infectious syphilis notification rate per 100 000 population, 2007–2016, by sex



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Male	12.5	11.3	11.0	9.0	9.9	12.3	14.3	16.6	21.0	25.0
Female	1.5	1.4	1.0	1.1	1.5	1.4	1.3	1.5	2.5	3.6
Total	7.0	6.3	6.0	5.0	5.7	6.9	7.8	9.0	11.7	14.3

Source: Australian National Notifiable Diseases Surveillance System.

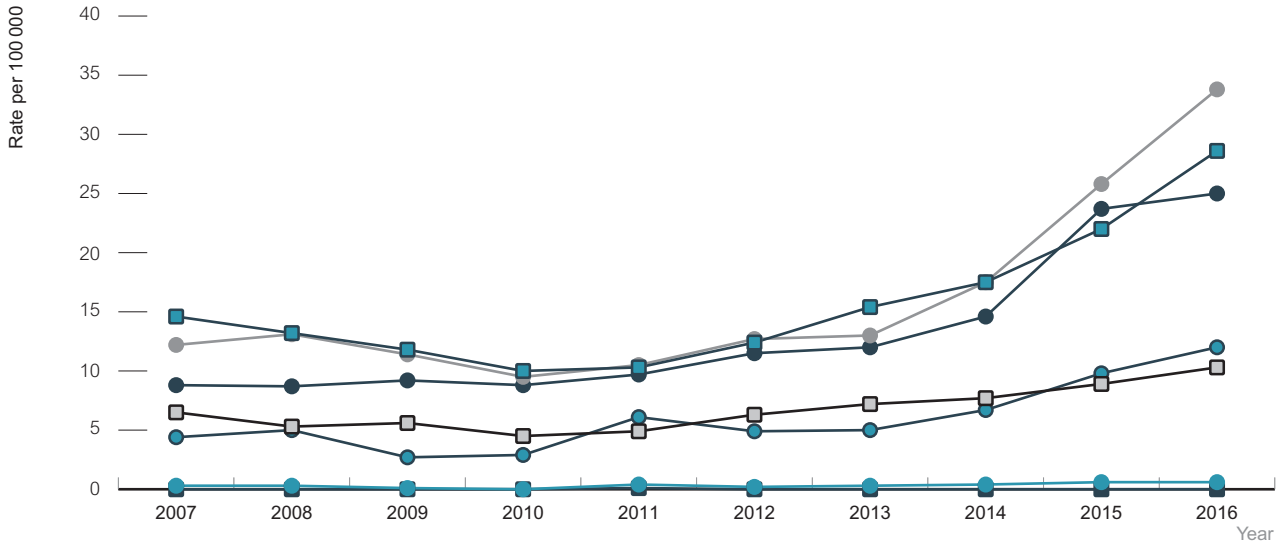
STIs

In 2016, the notification rate of diagnosis of infectious syphilis was highest in the age groups 25–29 years (33.8 per 100 000), 30–39 years (28.6 per 100 000) and 20–24 years (25.0 per 100 000) (Figure 3.3.2), with increases in these age groups between 2012 and 2016 (166%, 131% and 117% respectively) (Figure 3.3.2). There was also a 145% increase in the 15–19 age group from 4.9 per 100 000 in 2012 to 12.0 per 100 000 in 2016 (Figure 3.3.2).

In 2016 notification rates of infectious syphilis among males were highest in men aged 25–29 years (57.2 per 100 000), 30–39 years (52.3 per 100 000) and 20–24 years (39.7 per 100 000), with increases since 2012 in all age groups 15 years and above (Figure 3.3.3). In females the highest rates in 2016 were in the age groups 15–19 years (11.1 per 100 000), 25–29 years (9.9 per 100 000) and 20–24 years (9.5 per 100 000), with increases since 2012 in all age groups 15 years and above (Figure 3.3.4).

Also in 2016, 21% of 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. (See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017*[1] for further details.)

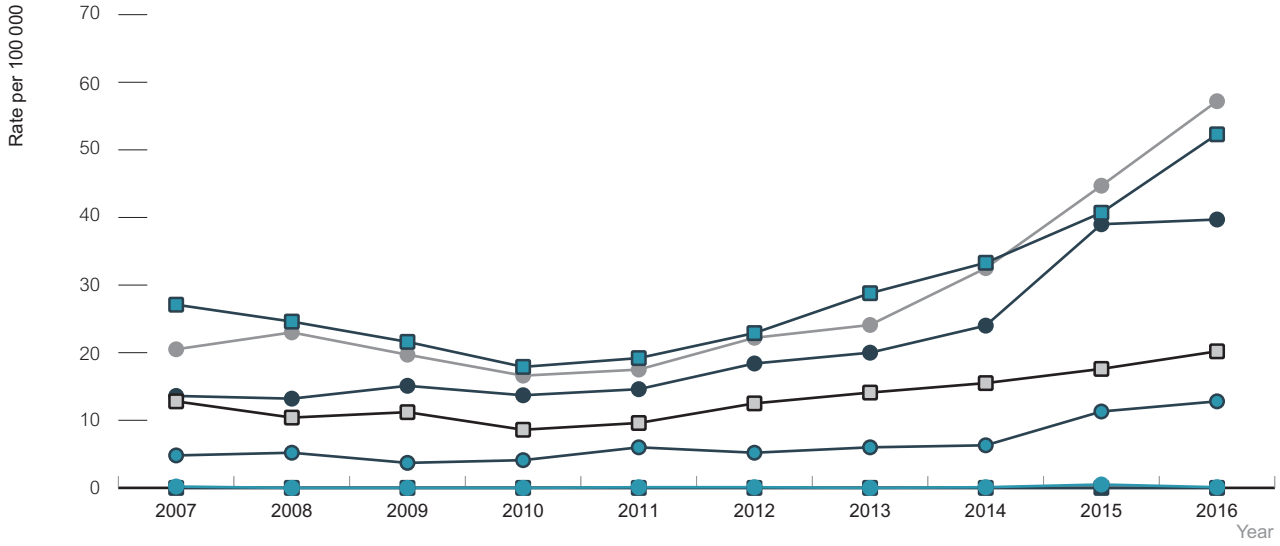
Figure 3.3.2 Infectious syphilis notification rate per 100 000, 2007–2016, by year and age group



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
5–14	0.3	0.3	0.1	0.0	0.4	0.2	0.3	0.4	0.6	0.6
15–19	4.4	5.0	2.7	2.9	6.1	4.9	5.0	6.7	9.8	12.0
20–24	8.8	8.7	9.2	8.8	9.7	11.5	12.0	14.6	23.7	25.0
25–29	12.2	13.1	11.4	9.5	10.5	12.7	13.0	17.5	25.8	33.8
30–39	14.6	13.2	11.8	10.0	10.3	12.4	15.4	17.5	22.0	28.6
40+	6.5	5.3	5.6	4.5	4.9	6.3	7.2	7.7	8.9	10.3

Source: Australian National Notifiable Diseases Surveillance System.

Figure 3.3.3 Infectious syphilis notification rate per 100 000, 2007–2016, by year and age group, males



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5–14	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.5	0.1
15–19	4.8	5.2	3.7	4.1	6.0	5.2	6.0	6.3	11.3	12.8
20–24	13.6	13.2	15.1	13.7	14.6	18.4	20.0	24.0	39.0	39.7
25–29	20.5	23.0	19.7	16.6	17.5	22.2	24.1	32.5	44.7	57.2
30–39	27.1	24.6	21.6	17.9	19.2	22.9	28.8	33.3	40.7	52.3
40+	12.8	10.4	11.2	8.6	9.6	12.5	14.1	15.5	17.6	20.2

Source: Australian National Notifiable Diseases Surveillance System.

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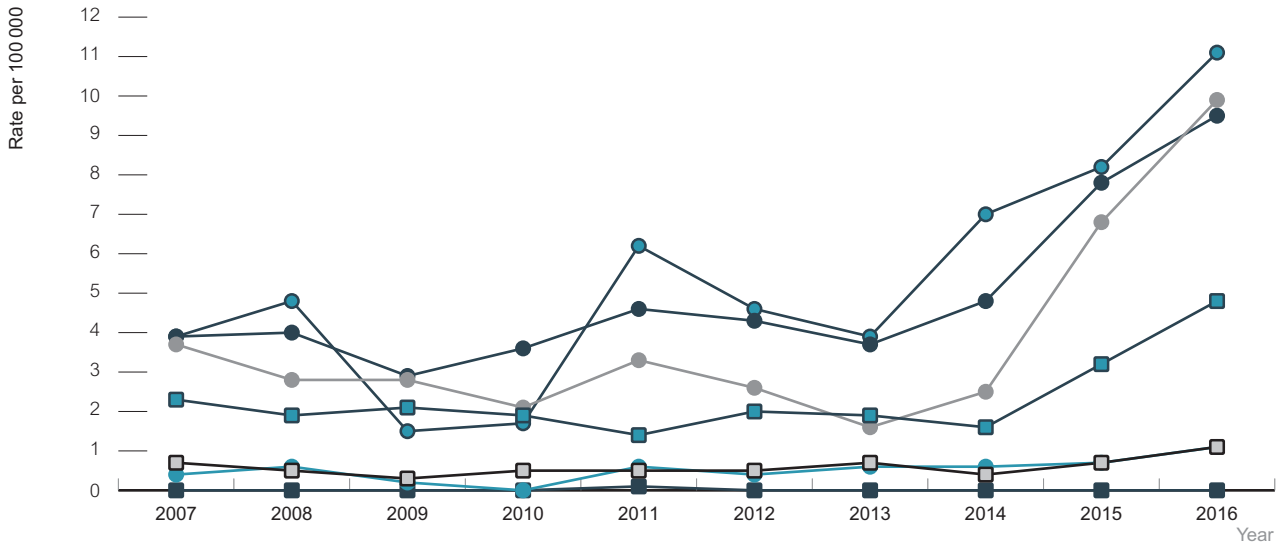
Figure 3.3.4 Infectious syphilis notification rate per 100 000, 2007–2016, by year and age group, females

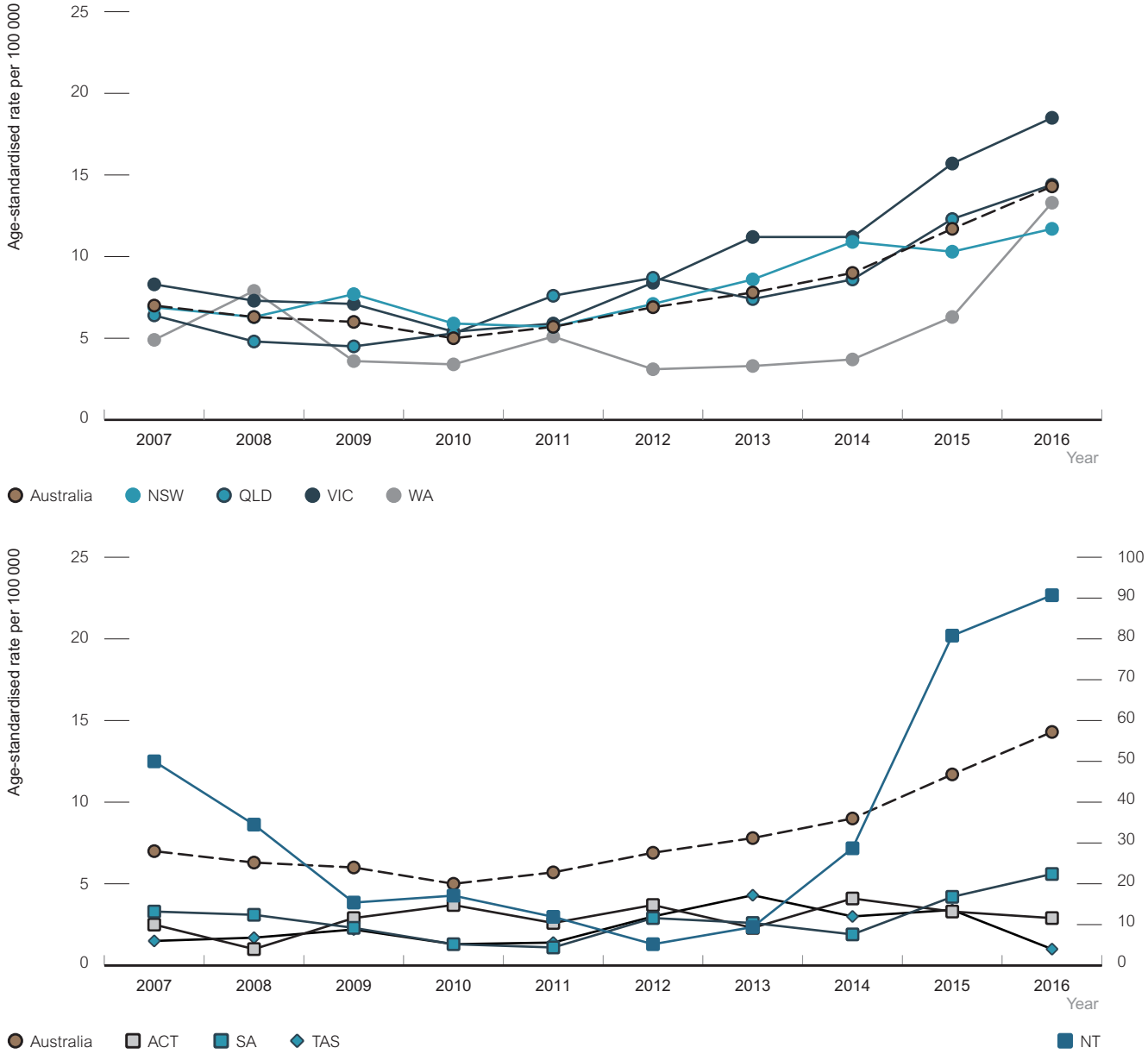


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0–4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
5–14	0.4	0.6	0.2	0.0	0.6	0.4	0.6	0.6	0.7	1.1
15–19	3.9	4.8	1.5	1.7	6.2	4.6	3.9	7.0	8.2	11.1
20–24	3.9	4.0	2.9	3.6	4.6	4.3	3.7	4.8	7.8	9.5
25–29	3.7	2.8	2.8	2.1	3.3	2.6	1.6	2.5	6.8	9.9
30–39	2.3	1.9	2.1	1.9	1.4	2.0	1.9	1.6	3.2	4.8
40+	0.7	0.5	0.3	0.5	0.5	0.5	0.7	0.4	0.7	1.1

Source: Australian National Notifiable Diseases Surveillance System.

Between 2012 and 2016, infectious syphilis notification rates increased in New South Wales (65%), Queensland (66%) and Victoria (120%) and rose to 4.3 times as high in Western Australia and 17.4 times as high in the Northern Territory. Rates fluctuated in the Australian Capital Territory (2.3 to 4.1 per 100 000), South Australia (1.9 to 5.6 per 100 000) and Tasmania (1.0 to 4.3 per 100 000) (Figure 3.3.5, Table 3.3.2). In 2016, the rates were highest in the Northern Territory (90.7 per 100 000), Victoria (18.5 per 100 000), Western Australia (13.3 per 100 000) and New South Wales (11.7 per 100 000) (Figure 3.3.5, Table 3.3.2).

Figure 3.3.5 Infectious syphilis notification rate per 100 000, 2007–2016, by state/territory



Note: The Northern Territory is displayed on the right-hand vertical axis.

Source: Australian National Notifiable Diseases Surveillance System.

Table 3.3.2 Age-standardised syphilis notification rates per 100 000, 2007–2016, by state/territory

State/Territory	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Australian Capital Territory	2.5	1.0	2.9	3.7	2.6	3.7	2.3	4.1	3.3	2.9
New South Wales	6.9	6.3	7.7	5.9	5.7	7.1	8.6	10.9	10.3	11.7
Northern Territory	50.0	34.5	15.4	17.1	11.9	5.2	9.4	28.7	80.8	90.7
Queensland	6.4	4.8	4.5	5.3	7.6	8.7	7.4	8.6	12.3	14.4
South Australia	3.3	3.1	2.3	1.3	1.1	2.9	2.6	1.9	4.2	5.6
Tasmania	1.5	1.7	2.2	1.3	1.4	3.0	4.3	3.0	3.4	1.0
Victoria	8.3	7.3	7.1	5.4	5.9	8.4	11.2	11.2	15.7	18.5
Western Australia	4.9	7.9	3.6	3.4	5.1	3.1	3.3	3.7	6.3	13.3
Australia	7.0	6.3	6.0	5.0	5.7	6.9	7.8	9.0	11.7	14.3

Source: Australian National Notifiable Diseases Surveillance System.

In 2016, infectious syphilis notification rates were higher in remote and very remote areas (49.4 per 100 000) than in major cities (13.6 per 100 000) and regional areas (9.9 per 100 000). Over the past five years (2012–2016), notification rates increased in all areas, with the greatest increase in regional areas (209% increase) followed by remote areas (176% increase) and major cities (84% increase) (Figure 3.3.6).

The infectious syphilis notification rate in the Aboriginal and Torres Strait Islander population in 2016 was highest in remote and very remote areas (135.4 per 100 000), which was 50.1 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 2017*[1] for further details.)

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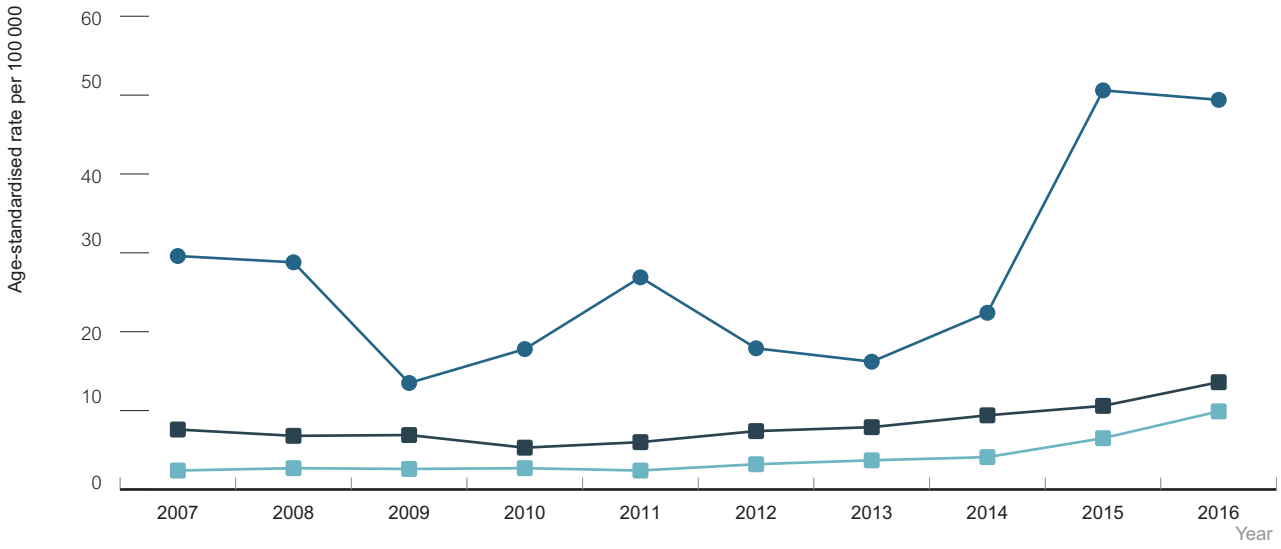
Figure 3.3.6 Infectious syphilis notifications per 100 000 population, 2007–2016, by region of residence



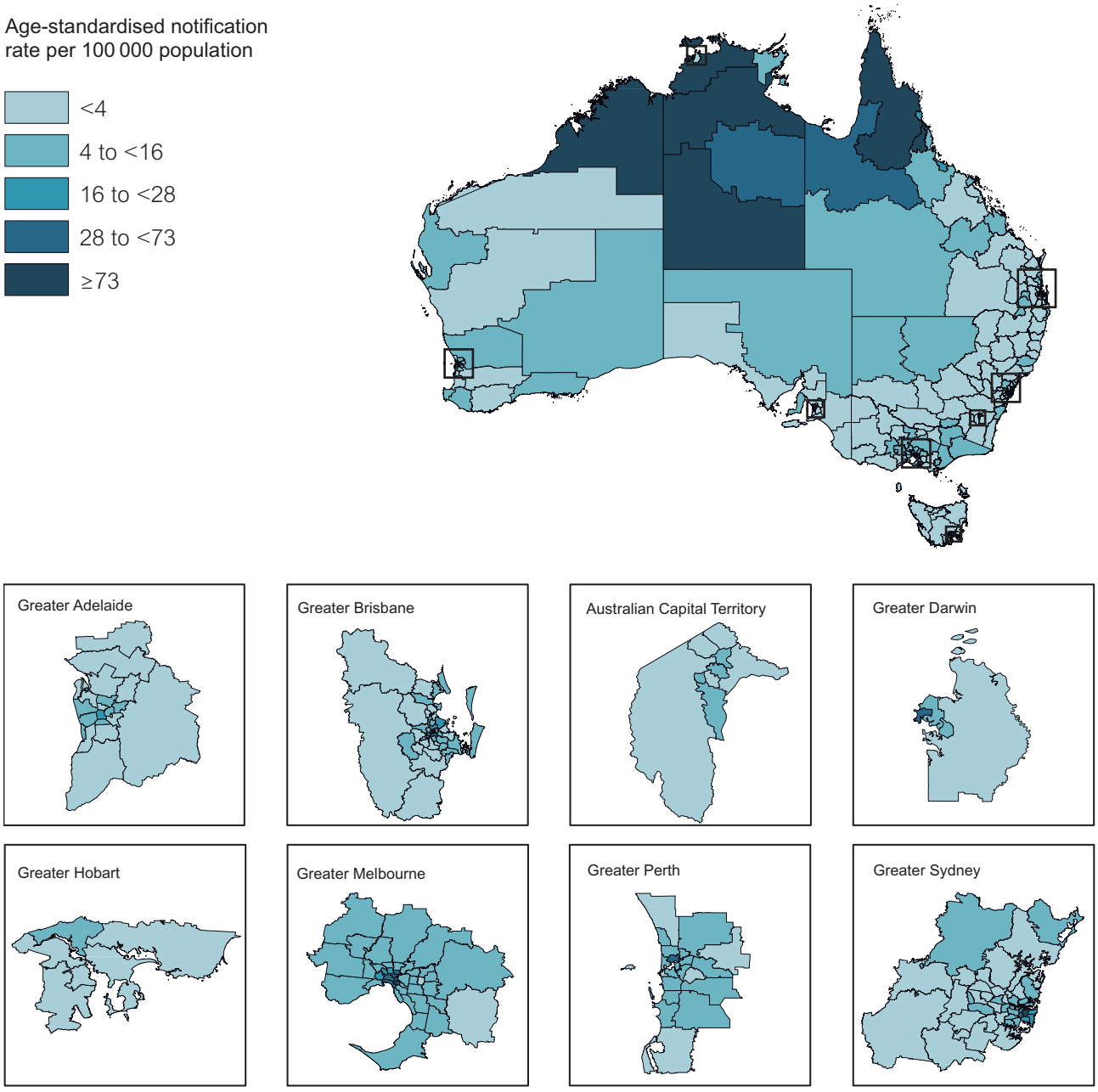
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Major cities	7.6	6.8	6.9	5.3	6.0	7.4	7.9	9.4	10.6	13.6
Inner and outer regional	2.4	2.7	2.6	2.7	2.4	3.2	3.7	4.1	6.5	9.9
Remote and very remote	29.6	28.8	13.5	17.8	26.9	17.9	16.2	22.4	50.6	49.4

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 3.3.7).

Based on average infectious syphilis notification rates between 2014 and 2016, 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 3.3.7). The average notification rates for the past three years were reported to minimise the influence of fluctuation in the number of infectious syphilis diagnoses, particularly in SA3s with smaller population sizes. Caution should be taken in interpreting these rates.

Figure 3.3.7 Average age-standardised infectious syphilis notification rate per 100 000 population, by statistical area level 3, 2014–2016, Australia and major cities

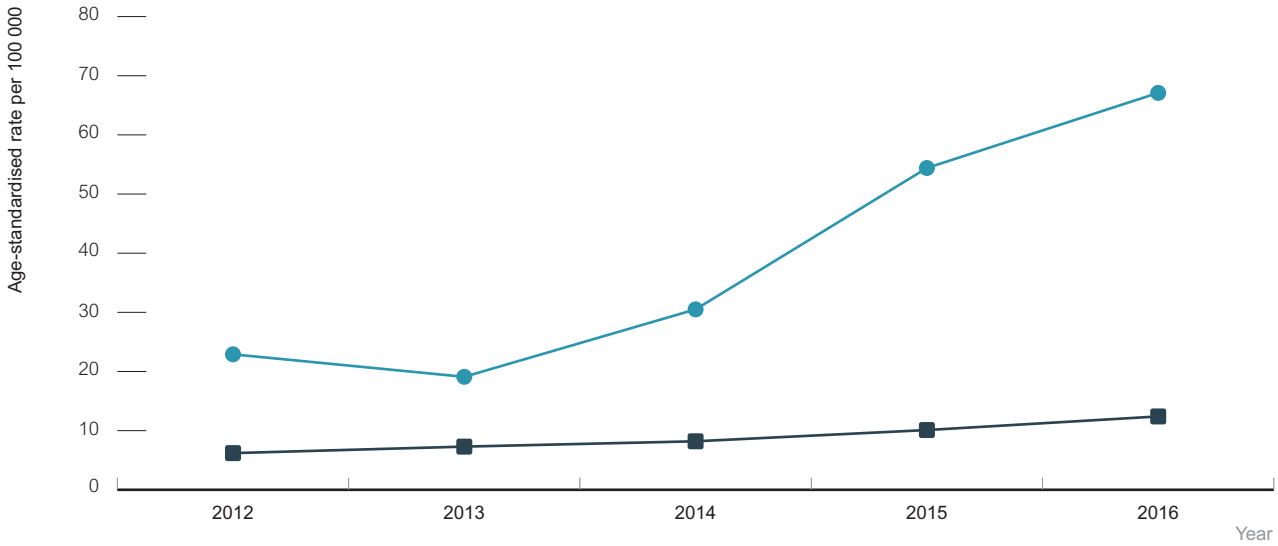


Note: Average infectious syphilis notification rates for the three-year period 2014–2016 were used to minimise the influence of fluctuation in the number of infectious syphilis diagnoses.

Source: State and territory health authorities.

On the basis of data from all jurisdictions, the rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population (67.1 per 100 000) in 2016 was 5.4 times as high as in the non-Indigenous population (12.4 per 100 000). The rate of notification of infectious syphilis among the Aboriginal and Torres Strait Islander population nearly tripled from 22.9 per 100 000 in 2012 to 67.1 per 100 000 in 2016, compared to a doubling in the non-Indigenous population (from 6.2 to 12.4 per 100 000) (Figure 3.3.8). In 2016, the notification rate of infectious syphilis among Aboriginal and Torres Strait Islander people was highest in the Northern Territory (229.6 per 100 000) and Queensland (99.3 per 100 000) (Figure 3.3.9), corresponding with regions in which there was an outbreak of infectious syphilis.[37]

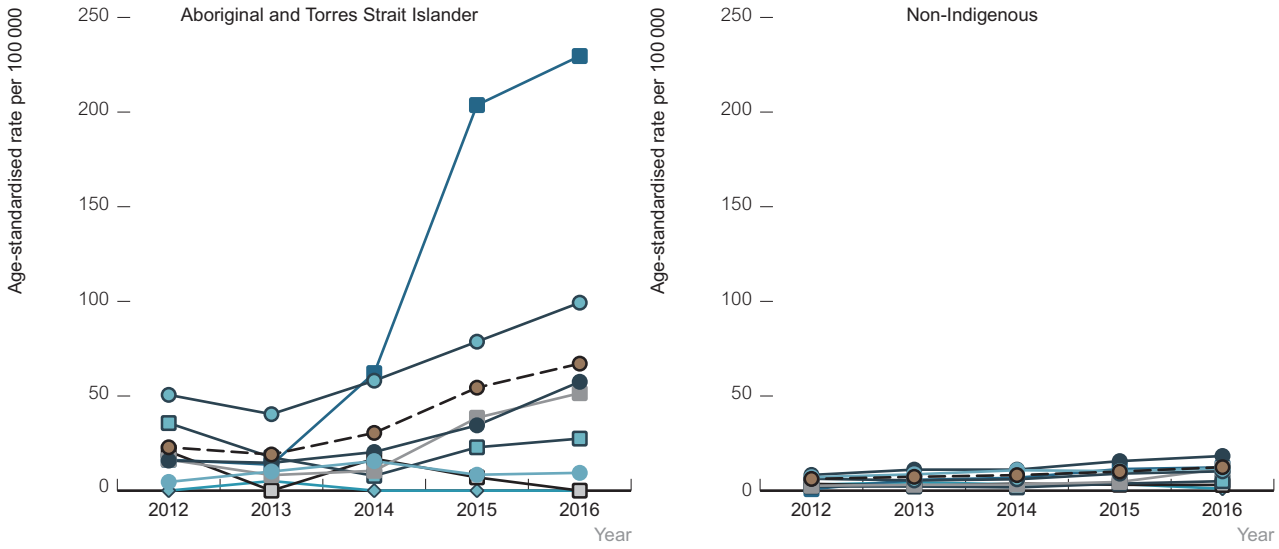
Figure 3.3.8 Infectious syphilis notification rate per 100 000, 2012–2016, Aboriginal and Torres Strait Islander status



	2012	2013	2014	2015	2016
Non-Indigenous	6.2	7.3	8.2	10.1	12.4
Aboriginal and Torres Strait Islander	22.9	19.1	30.5	54.4	67.1

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

Figure 3.3.9 Infectious syphilis notification rate per 100 000, 2011-2015, state/territory and Aboriginal and Torres Strait Islander status



	Aboriginal and Torres Strait Islander					Non-Indigenous				
Australia	22.9	19.1	30.5	54.4	67.1	6.2	7.3	8.2	10.1	12.4
ACT	20.7	0.0	16.9	7.0	0.0	3.6	2.4	3.7	3.1	3.0
NSW	4.6	10.1	15.6	8.4	9.4	7.1	8.6	10.8	10.3	11.8
NT	16.3	13.7	62.1	203.7	229.6	0.8	5.7	6.8	11.4	12.3
QLD	50.6	40.4	58.1	78.7	99.3	6.3	5.4	6.0	9.0	10.2
SA	35.7	17.6	7.8	22.9	27.5	2.2	2.2	1.7	3.7	5.0
TAS	0.0	5.1	0.0	0.0	0.0	3.2	4.4	3.3	3.5	1.0
VIC	15.9	14.7	20.4	34.5	57.5	8.3	11.1	11.1	15.6	18.3
WA	16.4	8.2	10.5	38.5	51.5	2.6	3.1	3.2	4.6	11.6

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

Infectious syphilis incidence

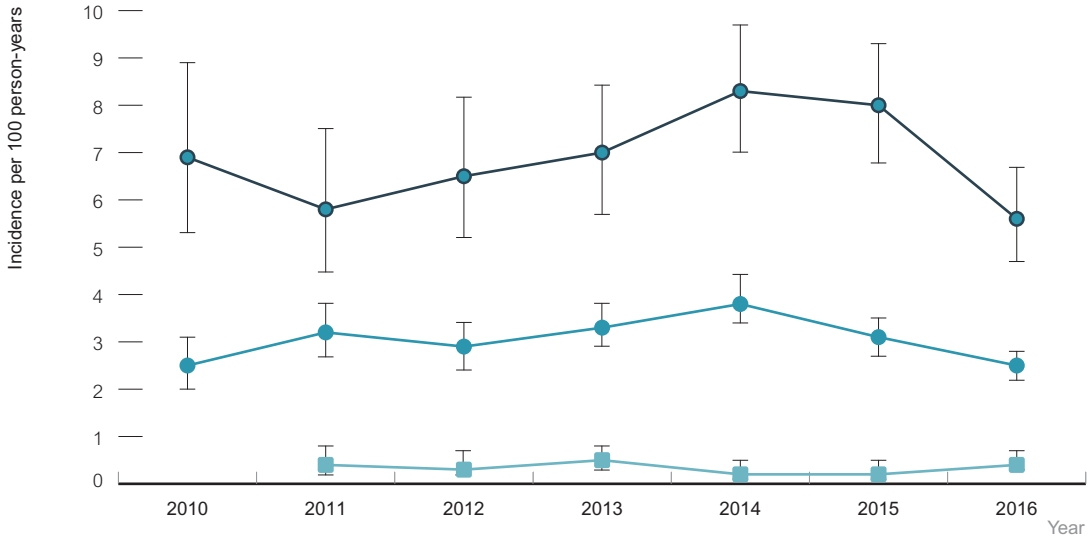
Incidence is the best indicator of changes in transmission in a population. Infectious syphilis incidence is available from the ACCESS network and is calculated by dividing the number of incident infections (negative test followed by a syphilis diagnosis) among people undergoing repeat syphilis testing 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 the broader priority populations. Further details about the methods used can be found in the Methodology.

In 2016, the incidence of infectious syphilis among HIV-positive gay and bisexual men attending sexual health clinics was 5.6 per 100 person-years, 2.2 times as high as the 2.5 per 100 person-years in HIV-negative gay and bisexual men. Between 2012 and 2016, infectious syphilis incidence fluctuated in both HIV-negative (between 2.5 and 3.8 per 100 person-years) and HIV-positive (between 5.6 and 8.3 per 100 person-years) gay and bisexual men (Figure 3.3.10).

In 2016, infectious syphilis incidence in female sex workers was 0.4 per 100 person-years, and fluctuated between 0.2 and 0.5 per 100 person-years over the past five years (2012–2016) (Figure 3.3.10).

Caution should be taken with interpretation as confidence intervals overlap, indicating differences may not be statistically significant.

Figure 3.3.10 Infectious syphilis incidence in sexual health clinic attendees, 2010–2016, by population



	2010	2011	2012	2013	2014	2015	2016
HIV-negative gay and bisexual men	2.5	3.2	2.9	3.3	3.8	3.1	2.5
HIV-positive gay and bisexual men	6.9	5.8	6.5	7.0	8.3	8.0	5.6
Female sex workers		0.4	0.3	0.5	0.2	0.2	0.4

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

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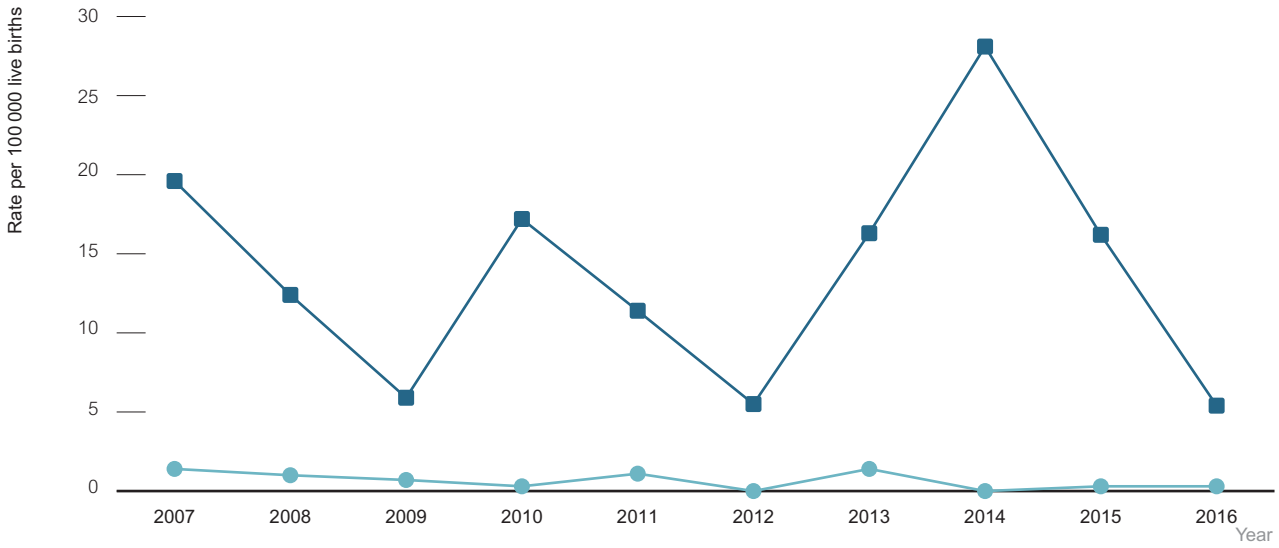
Congenital syphilis

In Australia, 27 cases of congenital syphilis were notified between 2007 and 2011 and 16 between 2012 and 2016. Of those, 52% (14 of 27) were in the Aboriginal and Torres Strait Islander population between 2007 and 2011 and 63% were in the Aboriginal and Torres Strait Islander population (10 of 16) between 2012 and 2016. In 2016, two cases of congenital syphilis were notified, one each in the Aboriginal and Torres Strait Islander and non-Indigenous populations. (See *Bloodborne viral and sexually transmissible infections in Aboriginal and Torres Strait Islander people: annual surveillance report 2017*[1] for further details.)

The notification rate of congenital syphilis in the Aboriginal and Torres Strait Islander population was 5.4 per 100 000 live births in 2016, which is 18 times as high as the non-Indigenous notification rate of 0.3 per 100 000 (Figure 3.3.11). Enhanced systems are being established to collect additional clinical information about mothers infected with syphilis and their children.

Figure 3.3.11 Congenital syphilis rate per 100 000 live births, 2007–2016, by Aboriginal and Torres Strait Islander status



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Aboriginal and Torres Strait Islander births	19.6	12.4	5.9	17.2	11.4	5.5	16.3	28.1	16.2	5.4
Non-Indigenous births	1.4	1.0	0.7	0.3	1.1	0.0	1.4	0.0	0.3	0.3

Note: 2016 rates were based on the number of live births in 2015, as 2016 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.[11] Syphilis testing data are included in this report from sexual health clinics and high-caseload general practice clinics.

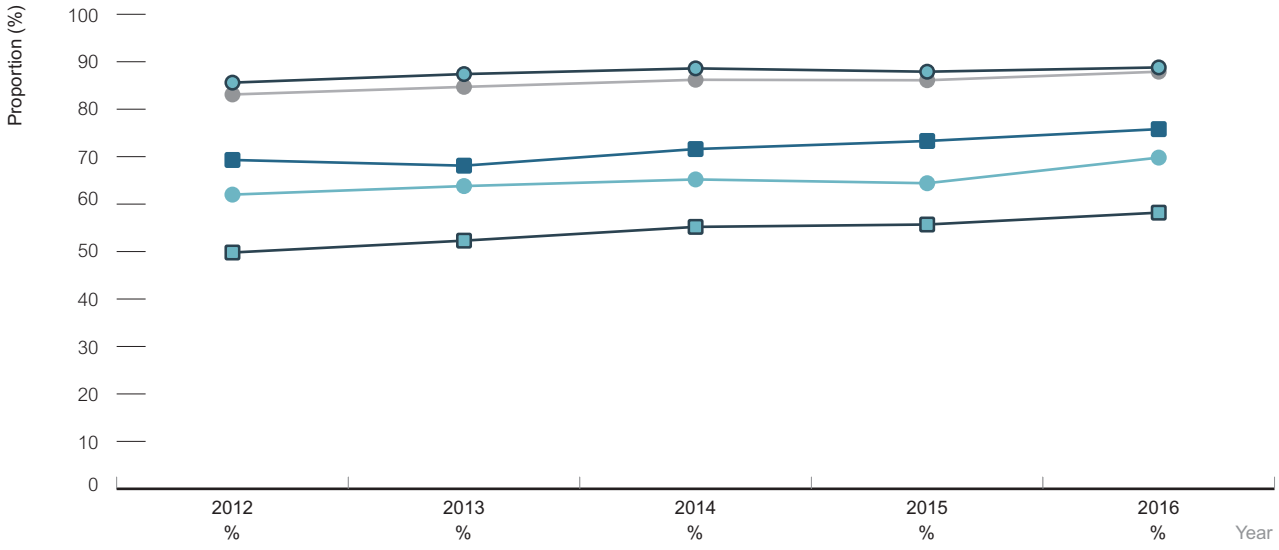
Testing at sentinel sexual health clinics

At 43 sexual health clinics participating in the ACCESS network (see Methodology for further detail), between 2012 and 2016 a high proportion of gay and bisexual men (86% to 89%) and female sex workers (83% to 88%) were tested were tested for syphilis in a year. The proportion tested was lower for young heterosexuals aged 16–29 years (50% to 58%) and people who inject drugs (68% to 76%), but the proportion tested rose in this period (Figure 3.3.12).

Testing at high-caseload sentinel general practice clinics

At seven general practice clinics with a high caseload of gay and bisexual men participating in the ACCESS network (see Methodology for further detail), between 62% and 70% of gay and bisexual men were tested for syphilis each year between 2012 and 2016 (Figure 3.3.12). The uptake of syphilis testing at general practices may reflect a high caseload of HIV-positive men, as syphilis testing is usually conducted concurrently with HIV management checks.

Figure 3.3.12 Proportion of clinic attendees tested for syphilis in a year, 2012–2016, by clinic type and population



	2012 %	2013 %	2014 %	2015 %	2016 %
Heterosexuals aged 16–29, sexual health clinic	49.8	52.3	55.2	55.7	58.2
Female sex workers, sexual health clinic	83.1	84.7	86.2	86.1	87.9
People who inject drugs, sexual health clinic	69.3	68.1	71.6	73.3	75.8
Gay and bisexual men, sexual health clinic	85.6	87.4	88.6	87.9	88.8
Gay and bisexual men, general practice clinic	62.0	63.8	65.2	64.4	69.8

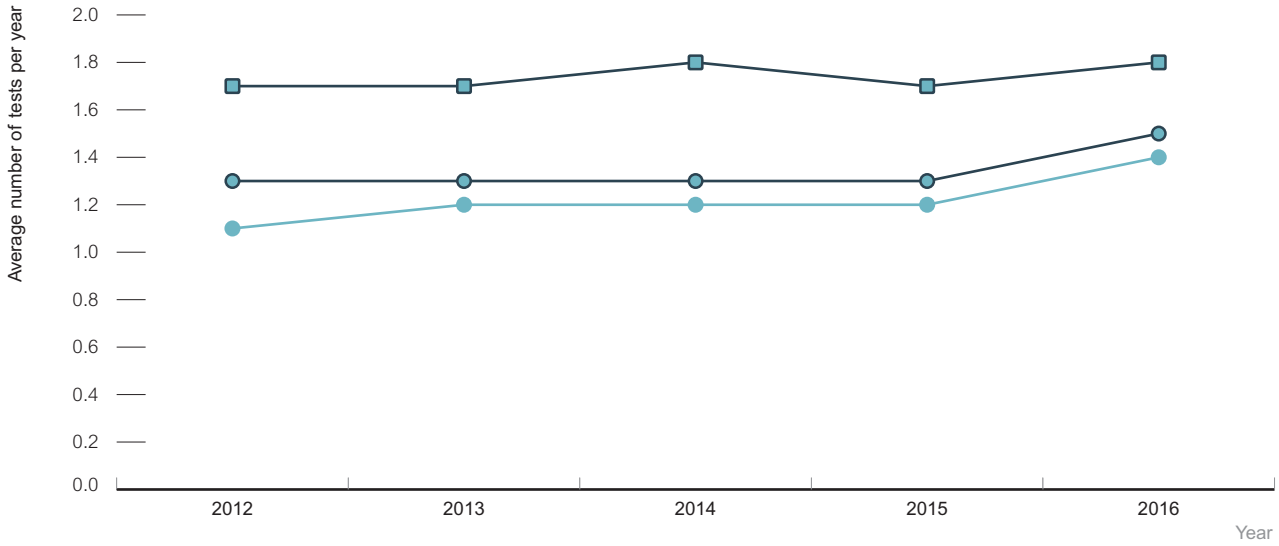
Note: General practice clinics include primary healthcare general practice clinics with a high-caseload of gay and bisexual men.

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

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.[11] 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 15% from 1.3 in 2012 to 1.5 in 2016, with a larger increase in HIV-negative gay and bisexual men (27%, 1.1 to 1.4) than in HIV-positive gay and bisexual men (6%, 1.7 to 1.8) (Figure 3.3.13). In 2016, the average number of syphilis tests was higher in HIV-positive gay and bisexual men (1.8) than in HIV-negative gay and bisexual men (1.4) (Figure 3.3.13).

Figure 3.3.13 Average number of syphilis tests per year in gay and bisexual men, 2012–2016, by HIV status



	2012	2013	2014	2015	2016
All gay and bisexual men	1.3	1.3	1.3	1.3	1.5
HIV-negative gay and bisexual men	1.1	1.2	1.2	1.2	1.4
HIV-positive gay and bisexual men	1.7	1.7	1.8	1.7	1.8

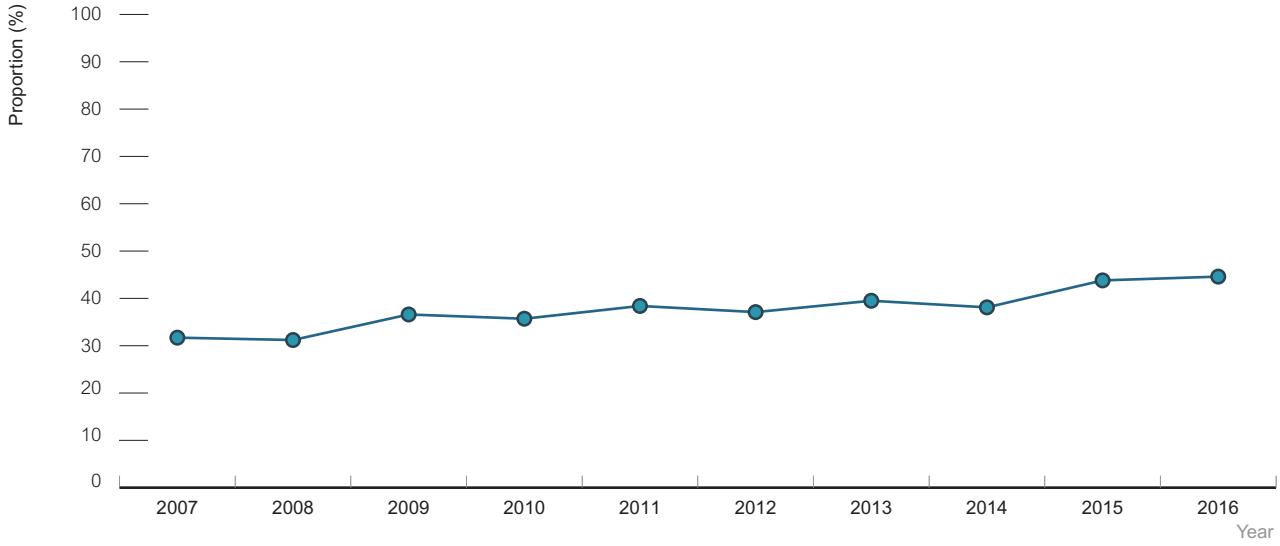
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

3.4 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.[11] 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.[7]

In 2016 in the Gay Community Periodic Surveys, 45% 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 32% in 2007 to 45% in 2016 (Figure 3.4.1). The change is largely attributed to increased collection of rectal and throat swabs. For more information, see *Annual reports of trends in behaviour*.[2]

Figure 3.4.1 Gay and bisexual men reporting comprehensive STI testing in the 12 months prior to the survey, 2007–2016



31.7	31.2	36.6	35.7	38.4	37.1	39.5	38.1	43.8	44.6

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.

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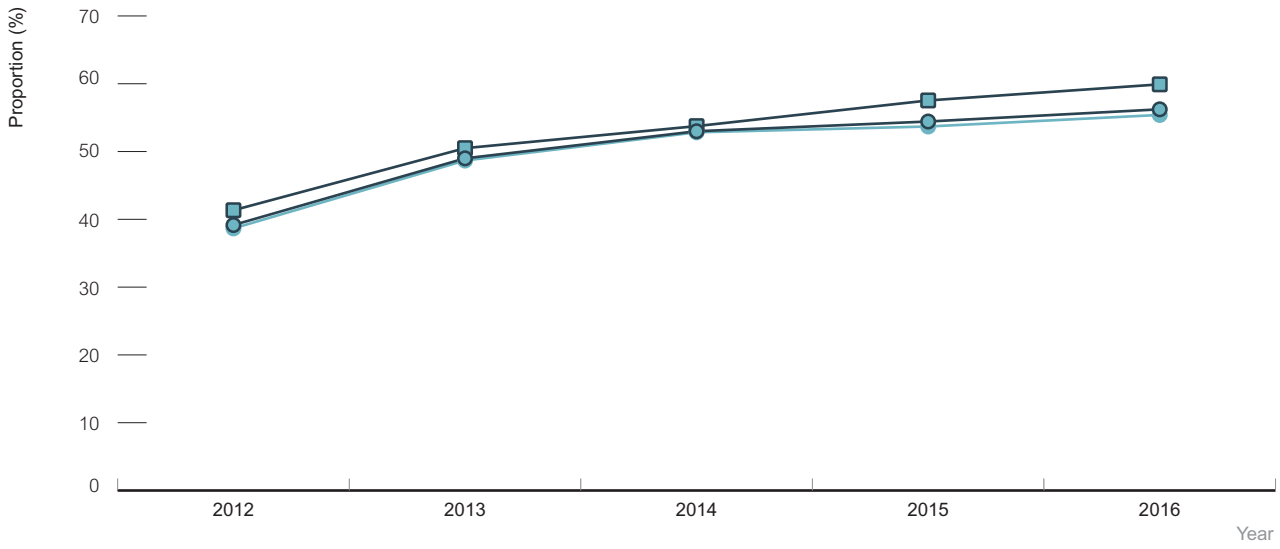
Repeat comprehensive testing

At 43 sexual health clinics in the ACCESS network, 56% of gay and bisexual men in 2016 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 39% in 2012 (Figure 3.4.2). The proportion with repeat comprehensive screen has been higher for HIV-positive gay and bisexual men (41% to 60%) than for HIV-negative gay and bisexual men (39% to 55%) since 2012, and was 60% and 55% in 2016 respectively (Figure 3.4.2). It is possible some of these men may have been tested at other clinics, so the proportion with repeat testing may be an underestimation. The ACCESS system will be enhanced in future years to capture testing at different clinics.

Figure 3.4.2 Repeat comprehensive STI screen within 13 months of a test among gay and bisexual men attending sexual health clinics, 2012–2016, by HIV status



	2012	2013	2014	2015	2016
All gay and bisexual men (%)	39	49	53	54	56
HIV-negative gay and bisexual men (%)	39	49	53	54	55
HIV-positive gay and bisexual men (%)	41	50	54	58	60

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 gay and bisexual men).

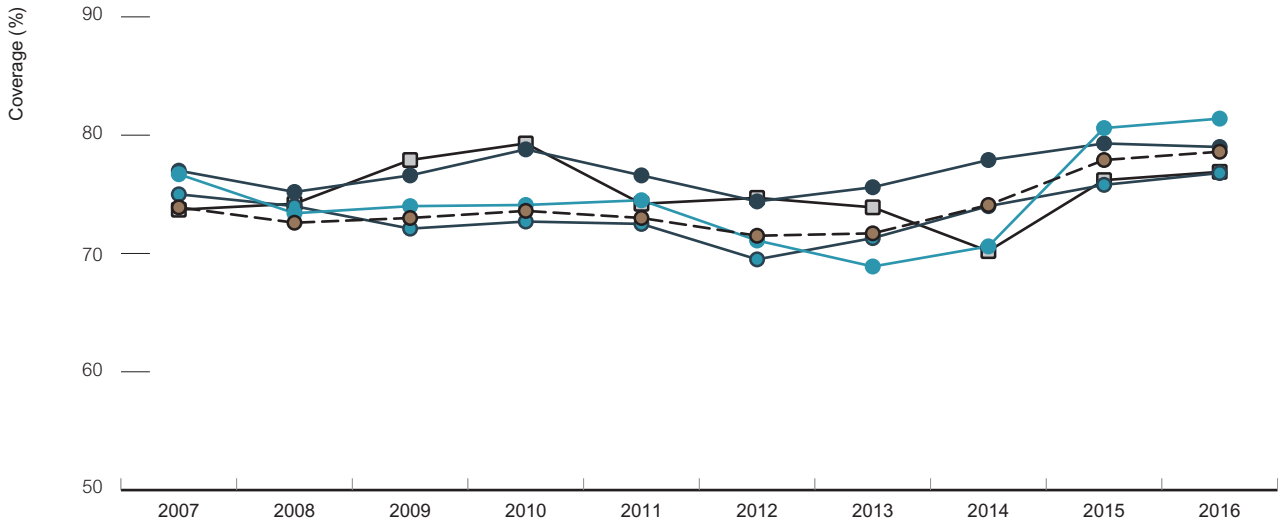
Source: ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance).

3.5 Human papillomavirus infection

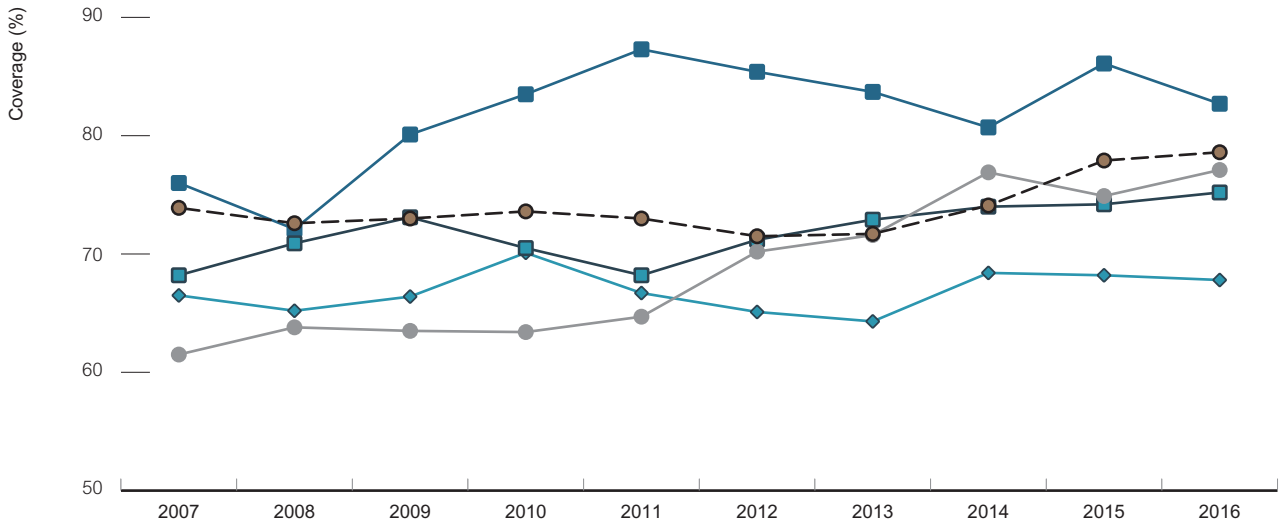
Human papillomavirus vaccination

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 2007, a high coverage with three vaccine doses has been achieved in girls turning 15 years of age in all states and territories (68% to 83% in 2016) (Figure 3.5.1). In boys turning 15 years of age, three-dose vaccination coverage was 70% and above in all states and territories in 2016, except Tasmania, where coverage was 61% (Figure 3.5.2).

Figure 3.5.1 Three-dose HPV vaccination coverage for girls turning 15 years of age, 2007–2016, by state/territory



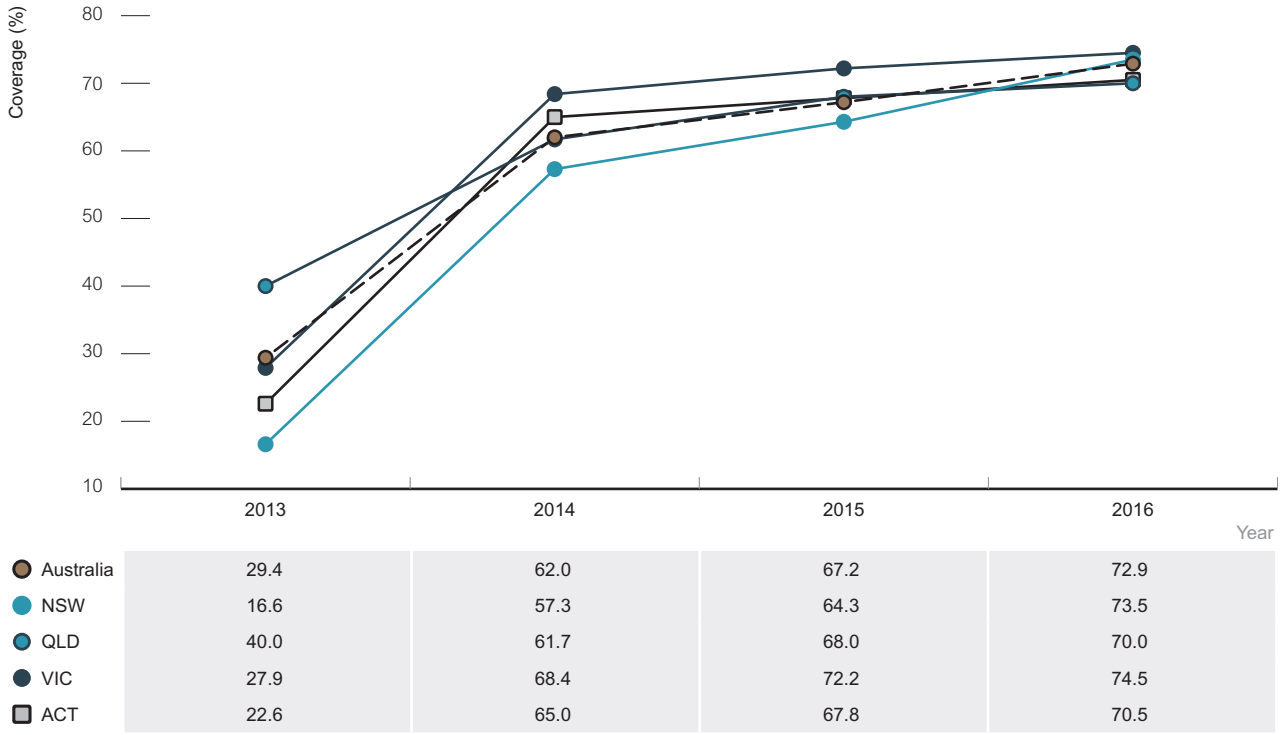
	2007 %	2008 %	2009 %	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %	2016 %
Australia	73.9	72.6	73.0	73.6	73.0	71.5	71.7	74.1	77.9	78.6
NSW	76.7	73.4	74.0	74.1	74.5	71.1	68.9	70.6	80.6	81.4
QLD	75.0	74.0	72.1	72.7	72.5	69.5	71.3	74.0	75.8	76.8
VIC	77.0	75.2	76.6	78.8	76.6	74.4	75.6	77.9	79.3	79.0
ACT	73.7	74.2	77.9	79.3	74.2	74.7	73.9	70.2	76.2	76.9



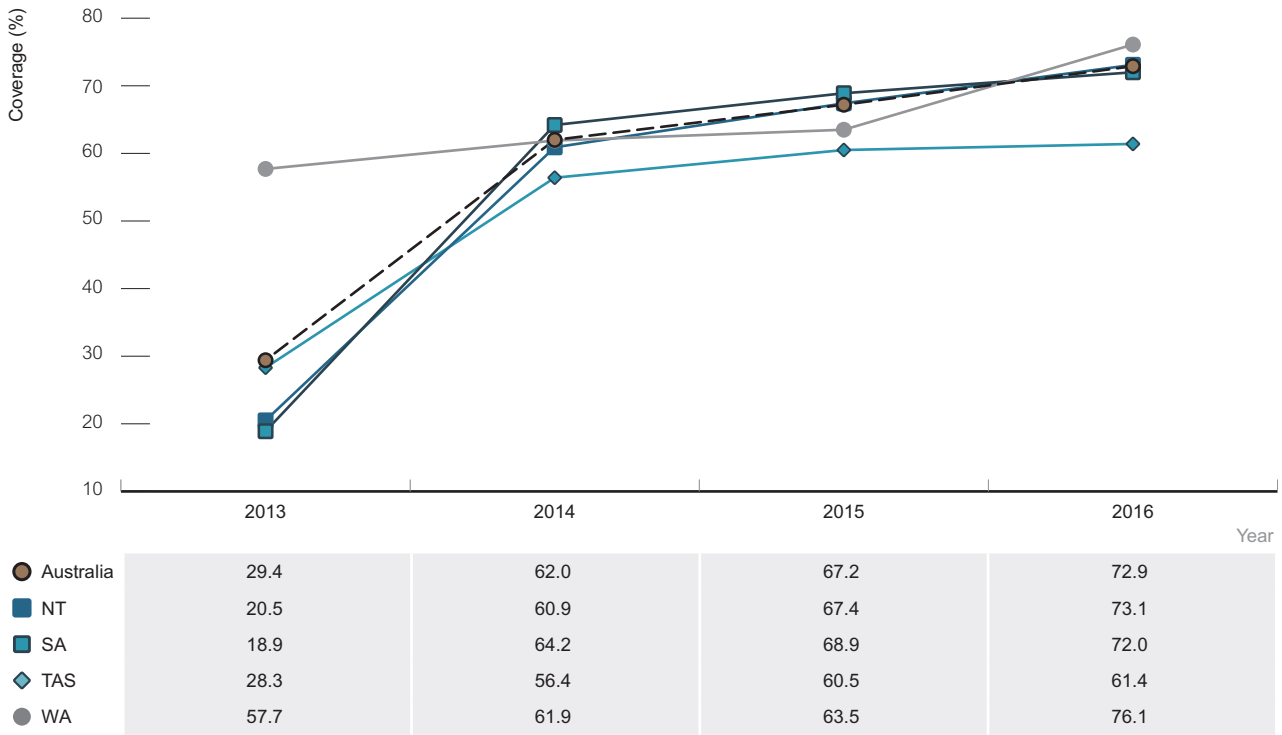
	2007 %	2008 %	2009 %	2010 %	2011 %	2012 %	2013 %	2014 %	2015 %	2016 %
Australia	73.9	72.6	73.0	73.6	73.0	71.5	71.7	74.1	77.9	78.6
NT	76.0	72.1	80.1	83.5	87.3	85.4	83.7	80.7	86.1	82.7
SA	68.2	70.9	73.1	70.5	68.2	71.2	72.9	74.0	74.2	75.2
TAS	66.5	65.2	66.4	70.1	66.7	65.1	64.3	68.4	68.2	67.8
WA	61.5	63.8	63.5	63.4	64.7	70.2	71.6	76.9	74.9	77.1

Source: National HPV Vaccination Program Register.

Figure 3.5.2 Three-dose HPV vaccination coverage for boys turning 15 years of age, 2013–2016, by state/territory



	2013	2014	2015	2016
Australia	29.4	62.0	67.2	72.9
NSW	16.6	57.3	64.3	73.5
QLD	40.0	61.7	68.0	70.0
VIC	27.9	68.4	72.2	74.5
ACT	22.6	65.0	67.8	70.5



	2013	2014	2015	2016
Australia	29.4	62.0	67.2	72.9
NT	20.5	60.9	67.4	73.1
SA	18.9	64.2	68.9	72.0
TAS	28.3	56.4	60.5	61.4
WA	57.7	61.9	63.5	76.1

Source: National HPV Vaccination Program Register.

Genital warts diagnoses

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

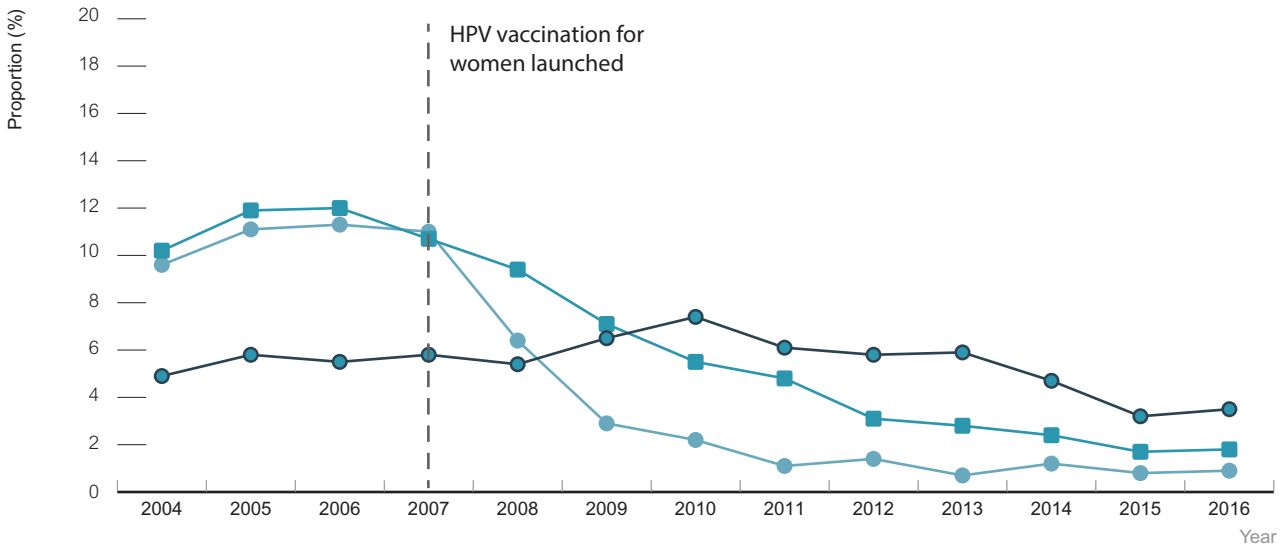
Information available from 43 sexual health clinics included in the Genital Warts Surveillance Network shows a 92% reduction in genital warts diagnoses at first visit among Australian-born women aged under 21 years from 11% in 2007 to 0.9% in 2016 (Figure 3.5.3). In women aged 21 to 30 years there was an 83% decline from 10.7% in 2007 to 1.8% in 2016, 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 3.5% in 2016 (Figure 3.5.3). In Australian-born heterosexual men aged under 21 years, there was a also a 94% reduction in genital warts diagnoses at first visit from 9.3% in 2007 to 0.6% in 2016 (63% reduction since 2013 when male vaccination was introduced) (Figure 3.5.4). In men aged 21–30 years, there was a 72% reduction from 16.6% in 2007 to 4.6% in 2016 (29% reduction since 2013 when male vaccination was introduced). The proportion of genital warts diagnoses in men older than 30 years fluctuated and was 6.4% in 2016 (Figure 3.5.4).

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 2016, with 0% prevalence of genital warts in both age groups in 2016 (Figure 3.5.5). The proportion of genital warts diagnoses in Aboriginal and Torres Strait Islander women older than 30 years fluctuated and was 1.7% in 2016 (Figure 3.5.5).

In Aboriginal and Torres Strait Islander males there was a large reduction in genital warts diagnoses at first visit in those aged under 21 (88%) and 21–29 years (72%) between 2007 and 2016, but the rate has fluctuated since 2013 when male vaccination was introduced (Figure 3.5.6). The proportion of genital warts diagnoses in Aboriginal and Torres Strait Islander men older than 30 years has fluctuated and was 3.2% in 2016 (Figure 3.5.6).

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 (60% in gay men, 40% in bisexual men) (Figure 3.5.7). The gradual decline is largely explained by the increasing denominator as asymptomatic men are attracted to the clinics for screening.

Figure 3.5.3 Proportion of Australian-born females diagnosed with genital warts at first visit at sexual health clinics, 2004–2016, by age group

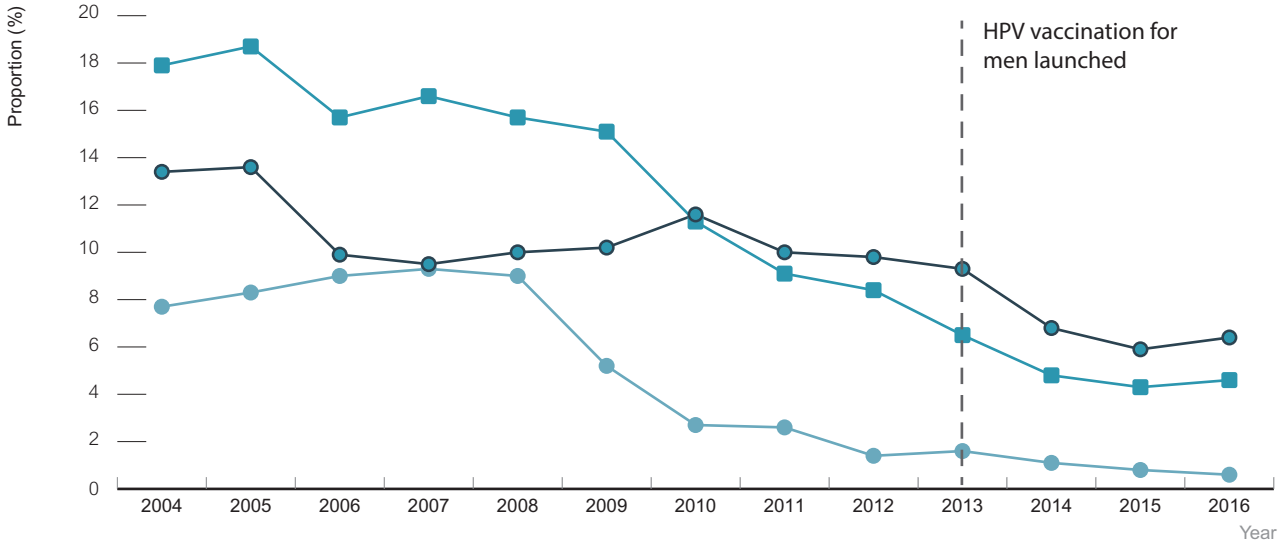


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<21 years (%)	9.6	11.1	11.3	11.0	6.4	2.9	2.2	1.1	1.4	0.7	1.2	0.8	0.9
21–30 years (%)	10.2	11.9	12.0	10.7	9.4	7.1	5.5	4.8	3.1	2.8	2.4	1.7	1.8
>30 years (%)	4.9	5.8	5.5	5.8	5.4	6.5	7.4	6.1	5.8	5.9	4.7	3.2	3.5

Note: Excludes Aboriginal and Torres Strait Islander females.

Source: Genital Wart Surveillance Network.

Figure 3.5.4 Proportion of Australian-born heterosexual males diagnosed with genital warts at first visit at sexual health clinics, 2004–2016, by age group

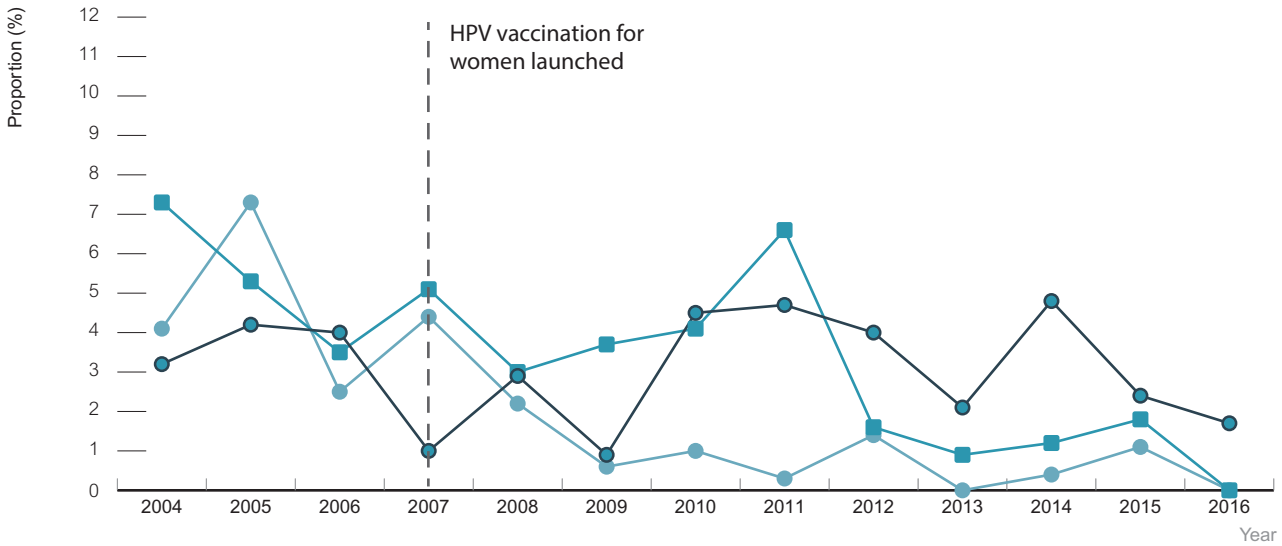


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<21 years (%)	7.7	8.3	9.0	9.3	9.0	5.2	2.7	2.6	1.4	1.6	1.1	0.8	0.6
21–30 years (%)	17.9	18.7	15.7	16.6	15.7	15.1	11.3	9.1	8.4	6.5	4.8	4.3	4.6
>30 years (%)	13.4	13.6	9.9	9.5	10.0	10.2	11.6	10.0	9.8	9.3	6.8	5.9	6.4

Note: Excludes Aboriginal and Torres Strait Islander males.

Source: Genital Wart Surveillance Network.

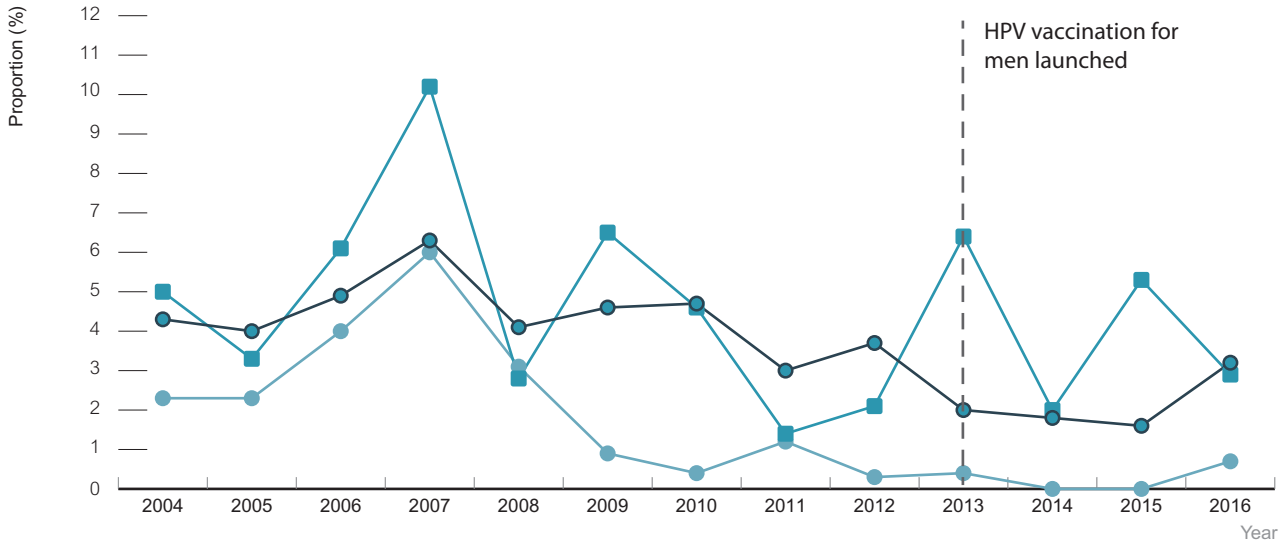
Figure 3.5.5 Proportion of Aboriginal and Torres Strait Islander females diagnosed with genital warts at first visit at sexual health clinics, 2004–2016, by age group



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<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
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
≥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

Source: Genital Wart Surveillance Network.

Figure 3.5.6 Proportion of Aboriginal and Torres Strait Islander males diagnosed with genital warts at first visit at sexual health clinics, 2004–2016, by age group

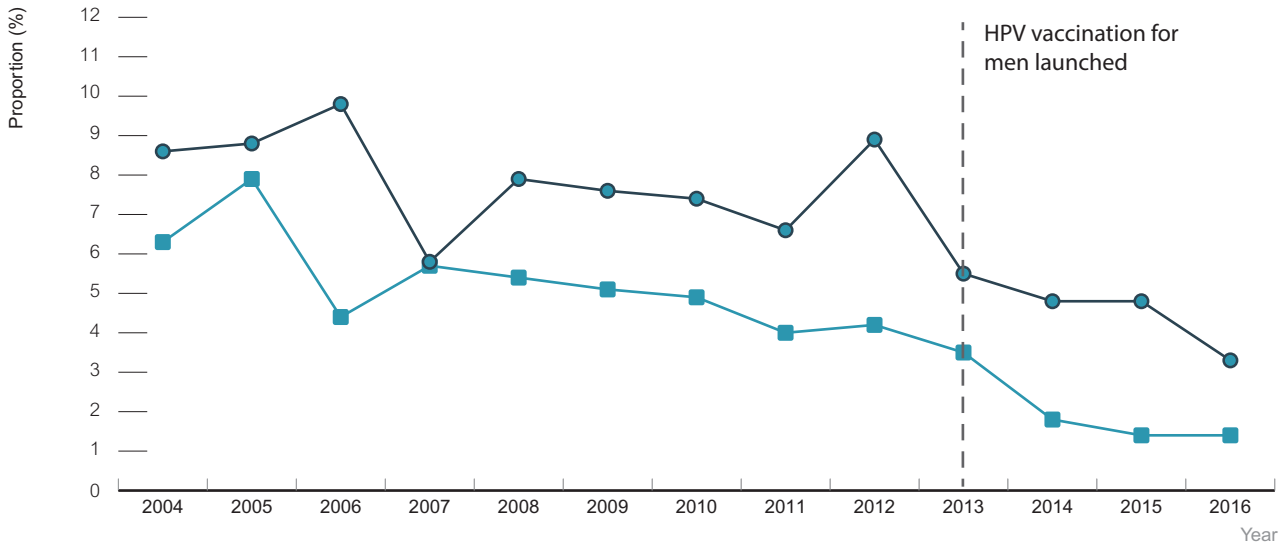


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<21 years (%)	2.3	2.3	4.0	6.0	3.1	0.9	0.4	1.2	0.3	0.4	0.0	0.0	0.7
21–29 years (%)	5.0	3.3	6.1	10.2	2.8	6.5	4.6	1.4	2.1	6.4	2.0	5.3	2.9
≥30 years (%)	4.3	4.0	4.9	6.3	4.1	4.6	4.7	3.0	3.7	2.0	1.8	1.6	3.2

Source: Genital Wart Surveillance Network.

STIs

Figure 3.5.7 Proportion of Australian-born gay or bisexual men diagnosed with genital warts at first visit at sexual health clinics, 2004–2016



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gay men (%)	6.3	7.9	4.4	5.7	5.4	5.1	4.9	4.0	4.2	3.5	1.8	1.4	1.4
Bisexual men (%)	8.6	8.8	9.8	5.8	7.9	7.6	7.4	6.6	8.9	5.5	4.8	4.8	3.3

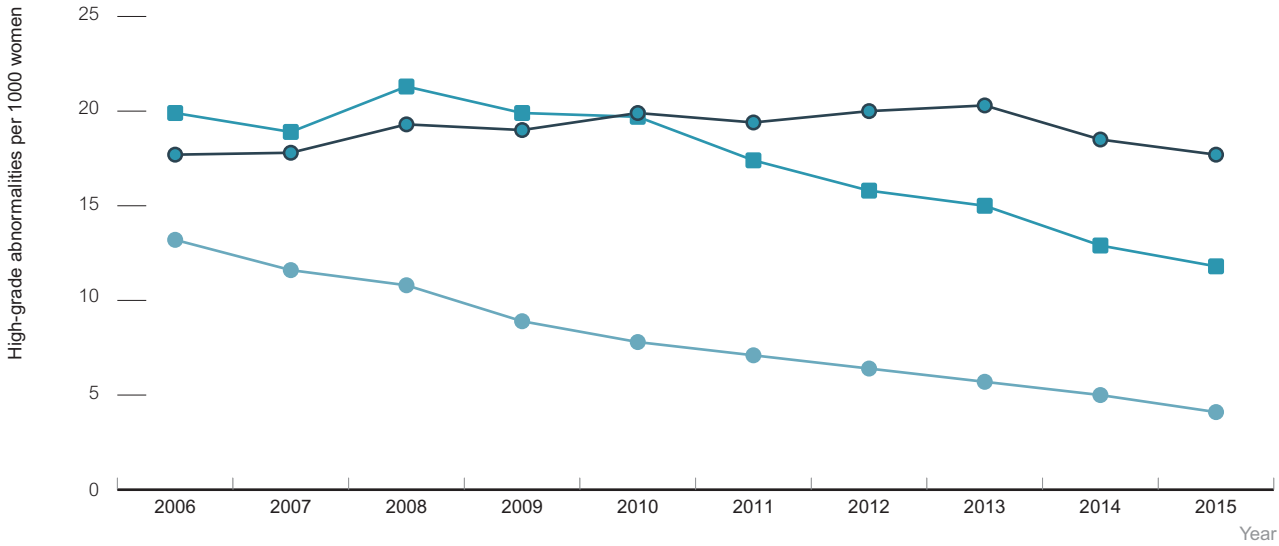
Note: Excludes Aboriginal and Torres Strait Islander men.

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 2006 and 2015 the detection rate of high-grade abnormalities per 1000 women undergoing Pap screening declined in women aged under 20 years (69% decline) and 20–24 years (41% decline), but a declining trend has not yet been seen in women aged 25–29 years (Figure 3.5.8).

Figure 3.5.8 Detection of high-grade abnormalities in women undergoing cervical cancer screening (Pap screening), 2006–2015, by age group



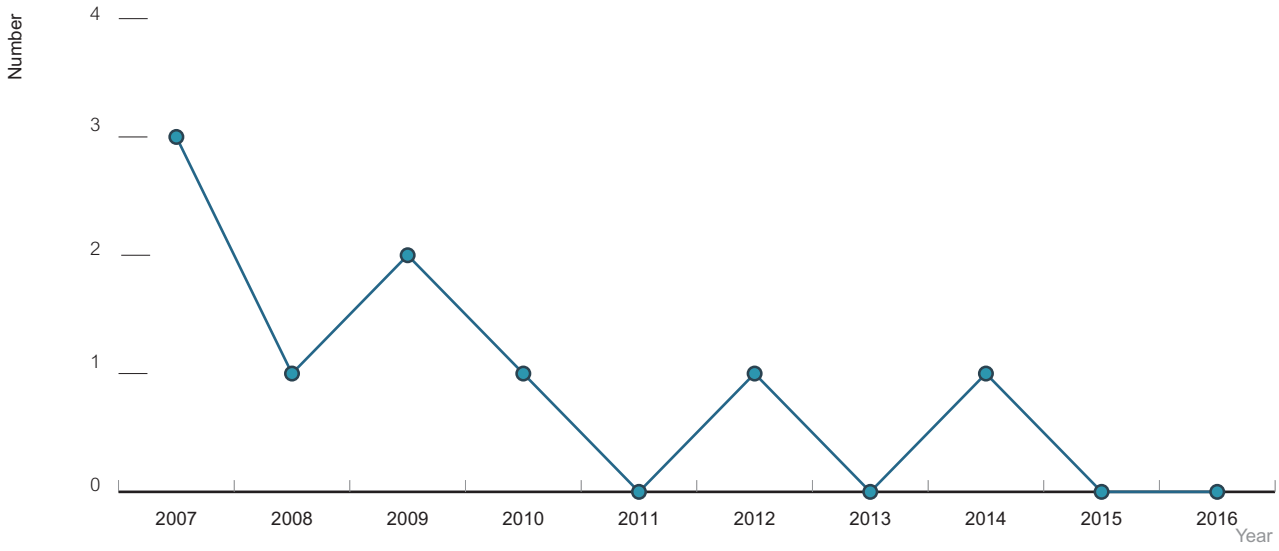
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<20 (%)	13.2	11.6	10.8	8.9	7.8	7.1	6.4	5.7	5.0	4.1
20–24 (%)	19.9	18.9	21.3	19.9	19.7	17.4	15.8	15.0	12.9	11.8
25–29 (%)	17.7	17.8	19.3	19.0	19.9	19.4	20.0	20.3	18.5	17.7

Source: Australian Institute of Health and Welfare, Cervical screening in Australia 2014–2015[38]; see Methodological notes for details.

3.6 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 3.6.1).

Figure 3.6.1 Donovanosis notifications, 2007–2016, by sex



3	1	2	1	0	1	0	1	0	0

Source: Australian National Notifiable Diseases Surveillance System.

STIs

Methodology

The National HIV Registry

National surveillance for newly diagnosed HIV

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 diagnoses 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, Victoria and Queensland 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 new HIV diagnoses 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. New HIV diagnoses 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 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 3238.0, 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 to Australian-born non-Indigenous populations unless otherwise stated. This was done to exclude HIV diagnoses in overseas-born people, in whom trends can fluctuate in response to immigration patterns, and to focus 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 were 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 this information 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.[39] 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 (2006–2015) were considered high-prevalence. The following countries were considered high-prevalence:

Angola
Bahamas
Barbados
Belize
Benin
Botswana
Burundi
Cambodia
Cameroon
Central African Republic
Chad
Congo
Côte d'Ivoire
Democratic Republic of the Congo
Djibouti
Equatorial Guinea
Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guyana
Haiti
Jamaica
Kenya
Lesotho
Liberia
Malawi
Mali
Mauritius
Mozambique
Namibia
Nigeria
Panama
Rwanda
Sierra Leone
Slovenia
South Africa
Suriname
Swaziland
Tanzania
Thailand
Togo
Trinidad
Uganda
Zambia
Zimbabwe

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.[40,41]

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 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 jurisdiction. Computerised deidentified unit records of notifications are supplied daily to the Australian Government Department of Health 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*.

NNDSS data were provided by the Office of Health Protection, Department of Health, on behalf of the Communicable Diseases Network Australia. 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 diagnoses 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 Australian Bureau of Statistics 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.[42] Data on newly acquired hepatitis B diagnoses were available from all health jurisdictions. Newly acquired hepatitis C diagnoses 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 has been 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 above, National surveillance for newly diagnosed HIV).

Age-standardised notification rates by statistical area level 3

The number of HIV diagnoses for 2014–2016 was obtained from the National HIV Registry (see above). The numbers of hepatitis C, hepatitis B, chlamydia, gonorrhoea and infectious syphilis diagnoses for 2014–2016 were obtained from 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 area or post office boxes) were excluded from this analysis.

Age-standardised notification rates were presented as geographical maps of Australia and Greater Capital City Statistical Area (GCCSA) by Statistical Area level 3 (SA3). Both geographical units (SA3 and GCCSA) belong to the hierarchies of regions defined by the ABS. SA3s generally have populations between 30 000 and 130 000 persons, with some exceptions for areas with particularly low or particularly high population density. The eight 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 ABS catalogue 1270.0.55.006—Australian Statistical Geography Standard (ASGS): Correspondences, July 2011. Only spatial SA3s were retained for geographical mapping, excluding non-spatial categories such as migratory offshore and special purpose SA3. There are 333 SA3 spatial units under the Australian Statistical Geography Standard 2011. Three spatial SA3s representing other territories, i.e. Christmas Island, Cocos (Keeling) Islands, and Jervis Bay were excluded from the analysis. Where a postcode was split into more than one SA3s, 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 2014–2016 by SA3. All crude rates were age-standardised using the ABS Standard Population Catalogue 31010DO003_201212. Geographical mapping of chlamydia notification rates excludes Victoria as notifications data for 2015 and 2016 were not available at the time of reporting. The average notification rates for the past three years (2014–2016) were calculated to minimise the influence of fluctuation in the number of diagnoses, particularly in SA3s with smaller populations and the ones with populations below the general ABS threshold of 30 000 persons. 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 and 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 diagnoses, 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 major Australian cities, so collectively SA3s in major cities 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 not being evenly represented among the general population across Australia. The notification rates of hepatitis B and C in some SA3s may be influenced by 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 cascades

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 were provided by Australia's National HIV Registry. Due to incomplete or inaccurate recording of name codes the registry contains multiple reports for some individuals. To estimate the number of duplicates we applied a statistical technique which has previously been applied to the Registry.[43] This calculation estimated the number of duplicate notifications annually, resulting in 8.1% duplicate notifications by 2016 with the majority of duplicates occurring early in the epidemic.

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.[43] This study calculated HIV- and AIDS-related deaths and also calculated standardised mortality ratios for people with HIV during different eras of antiretroviral therapy. The study 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, which meant that 19% of all deaths were missing from the registry. Due to the backdating of deaths in the 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 people living with diagnosed HIV prior to 2003. After 2003 we used annual mortality rates from the Australian HIV Observational Database (AHOD).[44] Between 2004 and 2016, 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 people living with diagnosed 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 people living with diagnosed HIV using data from the Australian Bureau of Statistics (ABS) and follow-up data of people recently diagnosed in New South Wales.[45] New South Wales Health has followed up all people diagnosed with HIV during 2013–2014 and reported that up to 4% of people move overseas soon after their diagnosis. As these data are for diagnoses in recent years we assume this is an upper-bound estimate and reduce the number of annual notifications by 2%, with a range of 0% to 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 since 1976 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. The permanent rate of departure is the lower-bound estimate of the overall rate at which Australian residents leave Australia for longer than 12 months. However, people living with HIV require ongoing care and treatment (which is not subsidised in many countries), so we assume that the permanent rate of departure is a reasonable estimate for the population of people living with diagnosed HIV. We adjusted this rate to reflect the difference in emigration rates for men and women over 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 living with diagnosed 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, sex, and Aboriginal and Torres Strait Islander status.

For exposure risk and region of birth subpopulation calculations we assumed the proportion of duplicates, overseas migration rate and HIV mortality rate for each population equalled the values for the overall population. For males and females, we calculated the proportion of duplicates separately, as there were fewer female diagnoses early in the epidemic when duplicates were more likely. 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 that no Indigenous people living with diagnosed HIV moved overseas.

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 Center for Disease Control (ECDC) HIV modelling tool to estimate the proportion of people with HIV who are undiagnosed.[46]

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 diagnoses 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 diagnoses. To run the model, notifications data are 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 living 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 CD4+ cell count at diagnosis data.

For validation we compared the model estimates for undiagnosed gay and bisexual men with empirical data from the COUNT study.[47] This study was conducted alongside routine behavioural surveillance surveys in which gay and homosexually active men from Sydney, Melbourne, Canberra and Perth recruited from a range of gay community sites in 2013 and 2014. In this study 8.9% of participants were reported to have undiagnosed 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% to 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. Due to running the ECDC model 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 received an annual CD4+ or viral load test. An issue with clinic data is 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 91.4% to 98.8% of HIV-positive patients were retained in care.[48] This estimate was obtained by cross-referencing 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 with diagnosed HIV retained in care, with a range equal to the range for percentage retained after follow-up.[48]

Estimating antiretroviral treatment coverage

We estimated the number of people receiving antiretroviral therapy using a 10% sample of Pharmaceutical Benefits Scheme (PBS) patient-level prescription claims data provided by the company Prospection. This is a randomised patient-level deidentified PBS script claims dataset from 2006 to the present. Currently the data has over 170 million script claims and over 3 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 at least one prescription in the 12 months to the end of December 2015 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 to 550) HIV-positive temporary residents living in Australia are on antiretroviral therapy.[49] We split this estimate into males and females on ART using the proportions of males and females from the Australian HIV Observational Database Temporary Access Study (ATRAS).[50]

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.

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 a national stakeholder reference group (see Acknowledgments for members of the reference group).

Number of people living with hepatitis C and associated morbidity

This estimate was derived nationally and for each state and territory 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 diagnoses in those aged under 30 years can be interpreted as 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 (SVR) rates reflecting treatment regimen, genotype and access to direct-acting antivirals (DAA) through compassionate access and clinical trials in 2014–2015, and generic supply in 2015. From 2016 the SVR rates were based on DAA 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 decompensated cirrhosis, and hepatocellular carcinoma.
- Estimates of the numbers of people living with chronic hepatitis C in 2016 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 2016 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 (1993–2015) was extrapolated to the total number of hepatitis C notifications in Australia.
- The estimated number of individuals with cure of hepatitis C 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 was given by the annual number of permanent departures for the general population divided by the estimated resident population as estimated by the Australian Bureau of Statistics (series 340102).

Number of people who have received a confirmatory RNA test

To estimate the number of people previously diagnosed with hepatitis C (with either antibody positive or RNA) who have received an RNA test (to confirm viraemic infection) we used published data from the 2015 Australian Needle and Syringe Program Survey.[51] Of all people who responded in the Survey in 2015 who self-reported a previous diagnosis of hepatitis C, 47% (95% CI 43% to 52%) self-reported a confirmatory hepatitis C RNA test. We assumed this estimate and range was 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 2013–2015, 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, we assumed all treated patients received direct-acting antiviral therapy following its listing on the PBS. We estimated the number of people receiving direct-acting antiviral treatment in 2016 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 at least one script in the 12 months prior to the end of December 2016 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 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 with chronic hepatitis C who have been cured were assumed to have lower rates of disease progression to decompensated cirrhosis (80% to 90% reduction) and hepatocellular carcinoma (70% reduction).
- 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.[52] 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 antiviral treatment in the F3–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 (SVR) reported in the literature (regimen-specific). We assumed the following:

- Australian data on the proportion with SVR 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% SVR rate (range: 90% to 97%) was used for direct-acting antiviral therapies in F0–F3 fibrosis stages and a 90% SVR rate was used in the F4 fibrosis stage (cirrhosis) and for people with decompensated cirrhosis and hepatocellular carcinoma.
- The total number cured was adjusted for annual mortality and overseas migration as for the diagnosed and treated stages.

The 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 (see Acknowledgments for members of the reference group).

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 2016 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 who have ever been diagnosed.

Monitoring

The number of people who received monitoring for chronic hepatitis B in 2014–2016 was determined using Department of Human Services data on the rebate 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.

Treatment

The number of people receiving treatment for chronic hepatitis B in 2014–2016 was derived using pharmaceutical dispensing data from the Department of Human Services Australia on 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[53] and in the methods of the National Hepatitis B Mapping Project Reports (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 are 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 in Australia was developed using a deterministic compartmental mathematical model of hepatitis B 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, 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 and the impact of vaccination were all incorporated. 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 2014–2016 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 (LHS).[54] The mathematical model described above was run using 2000 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.

Hepatitis B prevalence by population

The proportion of people living with chronic hepatitis B in each population group and the relative prevalence 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,[24,55] 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,[56] a study of hepatitis B prevalence in migrants to the United States,[25] and the most recent global seroprevalence study conducted as part of the Global Burden of Disease Project.[26] 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.[57]

Prevalence estimates for Aboriginal women giving birth are from two published studies. The New South Wales study[58] 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 the 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[59] 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 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 men and women aged 15–29 years in Australia from the National Notifiable Diseases Surveillance System (NNDSS).

Estimating new infections

New chlamydia infections were estimated using the modelling approach described elsewhere.[60] 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 people aged 16–29 years 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 the age groups 15–19, 20–24 and 25–29 years (male and female). 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 retesting

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 a number of service contexts.

From the NNDSS notifications data 69%, 25% and 5% of diagnoses in people aged 15–29 years occur across urban, regional and remote areas respectively. Based on a previous published study in 2013, 14% of these diagnoses occurred in sexual health clinics.[61] We divided the remainder of diagnoses into those made in general practice (81%) and other contexts (5%) using data from the first Australian Study of Health and Relationships data published in 2003.[62]

Treatment following diagnosis

Based on data from NSW sexual health clinics, almost all people diagnosed with chlamydia in urban and regional areas were treated (99% to 100% of those diagnosed) in 2013.[63] In NSW remote areas the percentage diagnosed is a little lower at 96%.[63] A published study in 2014 produced a lower estimate of 85% for remote areas in the Northern Territory.[64] Data from Western Australian general practices suggest a much lower rate of treatment, with 92% receiving a prescription for treatment after diagnosis.[65] Based on these data we assumed that 92% of patients attending urban and regional general practice clinics receive treatment and 99% of patients in other clinical settings receive 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 93.3% 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 men and women and multiplying by the number of notifications we estimated the number of men and women aged 15–29 years who received treatment after diagnosis.

Retesting after treatment

From the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network, 17% to 22% of people aged 15–29 diagnosed with chlamydia in urban and regional sexual health clinics nationally were retested for chlamydia between six weeks and six months after treatment. In urban and regional general practice the retesting rate is higher, ranging from 20% to 29%. In remote areas, 17% to 20% of men and women were retested six weeks to six months after treatment. Taking a weighted average by multiplying the notifications breakdown across regions by the diagnoses breakdown across contexts, we estimate 25.5% of people diagnosed with chlamydia are retested after treatment. We assumed a range from 17% to 29% (corresponding to the range in percentage retested across all estimates). Assuming the same retesting proportion and range for men and women and multiplying by the number of notifications we estimated the number of people aged 15–29 years who were retested 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 20.7 per 100 years, calculated from ACCESS data using methods described elsewhere,[66] to a population estimate of 181 426 (199 569 to 163 283) sexually active gay and bisexual men in Australia. The population estimate was derived by multiplying the ABS estimate for men aged 16–69 years (8 390 058) to estimates of the proportion of men who identified as gay or bisexual (3.2%) with same-sex experience in the last 12 months (68%) taken from the Second Australian Study of Health and Relationships.[67]

Notifications

We obtained the number of gonorrhoea notifications for gay and bisexual men in Australia by first calculating the proportion of 2016 notifications in men in major cities (66%) and other areas of residence (11%) attributable to male-to-male sex, in jurisdictions (Australian Capital Territory, New South Wales, South Australia, Tasmania, Victoria and Western Australia) 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 2016.

Treatment

Based on data from 43 sexual health clinics from the ACCESS network, it was estimated that 95% of all gay and bisexual men diagnosed with gonorrhoea in 2016 received treatment.

Retesting after treatment

Based on data from 43 sexual health clinics from the ACCESS network, it was estimated that 57% of all gay and bisexual men who received treatment for gonorrhoea in 2016 were retested within six weeks to six months after treatment.

PrEP enrolment data and associated estimates

The number of gay and bisexual men receiving PrEP was based on number enrolled in PrEP implementation prjoects in New South Wales (EPIC-NSW), Queensland (QPrEPd) and Victoria (PrEPX) by the end of 2016. The estimated number of HIV-negative gay and bisexual men aged 16–69 years in Australia was based on ABS population data and the proportion of men who identified as gay or bisexual in Australian Study of Health and Relationships (ASHR 2),[68] minus the number of gay and bisexual men living with HIV. The number of HIV-negative gay and bisexual men at higher risk of HIV eligible for PrEP was based on the proportion of gay and bisexual men participating in Gay Community Periodic Surveys who reported higher risk practices consistent with PrEP eligibility criteria in the guidelines.

The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS)

Briefly, the ACCESS project is a national sexual health surveillance network using routinely collected deidentified 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.[69] 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:

- The proportion of people attending high-caseload general practice clinics and/or sexual health clinics tested for HIV, bloodborne viruses and STIs, and where relevant retested.
- The result of the last viral load amongst HIV-positive patients seen at high-caseload general practice clinics and/or sexual health clinics.
- HIV incidence was estimated using methodology similar to that used previously.[70] 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 1 January for that year and first-ever negative HIV test if in that year until the earlier of seroconversion date, last-ever negative HIV test if not HIV-positive and 31 December for that year. HIV incidence and confidence intervals were calculated using the person-years method.
- Hepatitis B susceptibility in people attending sexual health clinics, with patients without past exposure, vaccination or chronic/acute disease categorised as susceptible. Classification of hepatitis B vaccination and susceptibility among sexual health service attendees drew upon pathology results for tests of hepatitis B surface antigens (HBsAg), core antibodies (HBcAb), and surface antibodies (HBsAb). The table below provides an overview of how these tests were used to organise patient status. Classification also drew upon clinical diagnoses of acute or chronic hepatitis B. Finally, vaccination status as recorded in a patient's file was also used to classify vaccination and susceptibility. Patients were only included in this analysis if one or more of these data were available and if they were identified as Australian-born.
- 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.

Table M2 Classification of patient status by hepatitis B marker

	Hepatitis B marker		
	HBsAg	HBcAb	HBsAb
Vaccinated	Negative	Negative	Positive
Past exposure	Negative	Positive	Negative
Susceptible[a]	Negative	Negative	Negative
Infected	Positive	Positive	Negative

a In some cases a negative HBsAg test was used as the sole test for HBV susceptibility among patients reporting no previous vaccination.

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 to 0.125 mg/L) were obtained from the AGSP.

The Australian HIV Observational Database (AHOD)

The Australian HIV Observational Database (AHOD) is a collaborative study, recording 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.[71]

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 2014, 31 participating clinical sites were enrolled with over 3900 people into AHOD.

AHOD data were used for the result of the last viral load test amongst 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.

This Cervical Screening Australia 2014–2015 is the latest in the Cervical screening in Australia series, which 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.[38]

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) and 2016 (50 sites) were asked to complete a brief, self-administered questionnaire and to provide a finger prick blood spot sample for HIV and hepatitis C antibody testing. The ANSPS methodology has been described in detail elsewhere.[72]

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.
- Proportion of self-reported 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.
- Incidence of hepatitis C was monitored among ANSPS respondents. 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, based on the assessment of risk behaviour for hepatitis C infection. 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.

The Australian and New Zealand Liver Transplant Registry (ANZLTR)

The 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 Australian Study of Health and Relationships 2 (ASHR2)

The ASHR2 methodology has been described in detail elsewhere.[73] Briefly, this was a telephone random survey of 20 000 people drawn from the Australian population aged 16–69 years from October 2012 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).[73,74]

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.[75]

Data from the Gay Community Periodic Surveys was used for the following indicators:

- Proportion of men reporting having at least four samples (anal swab, throat swab, penile swab, urine, blood test) collected for STI testing in the prior 12 months.
- Prevalence of gay men with casual partners reporting condomless anal intercourse in the prior 6 months.
- HIV prevalence in gay men using self-reported HIV-positive status.
- The proportion of non-HIV positive gay men having had self-reported test 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 re-tested following a negative test for hepatitis C antibody when first assessed at the Centre. Repeat hepatitis C antibody testing was carried out, based on the 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 provides high quality national health programs and services. 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).

Melbourne injecting drug user cohort study (MIX) Cohort

The detailed methodology of Melbourne injecting drug user cohort study (MIX) is described elsewhere.[21] Briefly, the MIX cohort study monitors changes in behaviour and disease transmission in younger, largely out of treatment people who inject drugs. Respondent driven sampling, traditional snowball sampling and street outreach methods were used to recruit heroin and amphetamine injectors from one outer-urban and two inner-urban regions of Melbourne, Australia. Information was collected on a range of behavioural characteristics and blood samples were collected for HIV, hepatitis C and hepatitis B testing. Participants are followed up on an annual basis. Hepatitis C incidence and confidence intervals were calculated using the person-years method

National Centre for Immunisation Research and Surveillance (NCIRS)

NCIRS' primary function 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 Commonwealth 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/). Percentage of 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 Western Australia or New South Wales in 2016. The 2016 NPEBBVS reports the findings for the 431 participants for whom sufficient pathology and questionnaire data were available. NPEBBVS methodology has been described in detail elsewhere.[6]

NEPBBVS 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 present. Currently the database has 170 million script claims and 3 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 (ART). The overall total number of people receiving ART 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 2016 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 ART 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 2016 multiplied by 10. Similarly estimates of patient numbers dispensed individual antiretroviral drug types were developed.
- Total number of patients receiving treatment for hepatitis B per quarter. Hepatitis B related dispensations for tenofovir excluded any patients with prior or concomitant HIV treatment dispensations and hence may exclude some HIV and hepatitis B virus co-infected patients.

Acknowledgments

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Australian HIV Observational Database

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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
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- 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.
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Collaboration of National Prison Entrants' Bloodborne Virus Survey State and Territory Sites

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- 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
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Genital Warts Surveillance Network

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- Associate Professor Stephen Lambert, Department of Health Queensland Government, Brisbane, QLD
- Clinical Associate Professor Lewis Marshall, Fremantle Hospital, Fremantle, WA
- Ms Belinda McEwan, Royal Hobart Hospital, Hobart, TAS
- Ms Rhonda Owen, Australian Government Department of Health, Canberra, ACT
- Mrs April Roberts-Witteveen, Australian Capital Territory Communicable Diseases Network Australia, Canberra, ACT
- Dr Nathan Ryder, Hunter New England Local Health District, Newcastle, NSW
- Dr Christine Selvey, Communicable Diseases Branch, Health Protection NSW, Sydney, NSW
- Ms Nicola Stephens, Victorian Department of Health and Human Services, Melbourne, VIC
- Ms Janet Strachan, University of Melbourne, Melbourne, VIC
- Mr Jiunn-Yih Su, Northern Territory Centre for Disease Control, Darwin, NT
- Dr Russell Waddell, Communicable Disease Control Branch, SA Health, Government of South Australia, Adelaide, SA
- Associate Professor David Whiley, Queensland Paediatric Infectious Diseases Laboratory, Royal Children's Hospital, Brisbane, QLD
- Dr James Wood, School of Public Health and Community Medicine, UNSW Sydney, Sydney, NSW

National Organisations

- Australasian Sexual Health Alliance, Sydney, NSW
- 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
- Australian Government Department of Health, Canberra, ACT
- Australian Injecting and Illicit Drug Users League, Canberra, ACT
- Australian Institute of Health and Welfare, Canberra, ACT
- Australian Paediatric Surveillance Unit, Westmead, NSW
- Australian Red Cross Blood Service, Melbourne, VIC
- Centre for Social Research in Health, UNSW Sydney, Sydney, NSW
- Communicable Diseases Network Australia, Canberra, ACT
- Hepatitis Australia, Canberra, ACT
- Macfarlane Burnet Institute for Medical Research and Public Health, Prahran, VIC
- National Aboriginal Community Controlled Health Organisation, Canberra, ACT
- National Association of People with HIV Australia, Sydney, NSW
- National Serology Reference Laboratory, Australia, Fitzroy, VIC
- Scarlet Alliance, Australian Sex Workers Association, Sydney, NSW
- WHO Regional Reference Laboratory for Hepatitis B, Victorian Infectious Diseases Reference Laboratory, The Doherty Institute, Melbourne, VIC

State/Territory Health Departments

- Communicable Disease Control Section, Health Protection Service, ACT Government, Canberra, ACT
- Communicable Diseases Branch, Health Protection NSW, NSW Health, NSW Government, North Sydney, NSW
- Sexual Health and Blood Borne Virus Unit, Centre for Disease Control, Northern Territory Department of Health, Northern Territory Government, Darwin, NT
- Communicable Diseases Branch, Queensland Department of Health, Queensland Government, Brisbane, QLD
- Communicable Disease Control Branch, SA Health, Government of South Australia, Adelaide SA
- Department of Health and Human Services, Tasmanian Government, Hobart, TAS
- Communicable Disease Epidemiology and Surveillance, Health Protection Branch, Department of Health and Human Services Victoria, State Government of Victoria, Melbourne, VIC
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