HIV, viral hepatitis and sexually transmissible infections in Australia

Annual Surveillance Report 2016

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The Kirby Institute

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 and is a research associate of the Australian Institute of Health and Welfare.

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Preface

This report is the twentieth annual review of available surveillance data pertaining to the occurrence of HIV, viral hepatitis and sexually transmissible infections in Australia. It is intended to be 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 and the Australian HIV Public Access Dataset, holding records of cases of HIV, diagnosed in Australia by 31 December 2015 and reported by 31 March 2016 are available through the website http://www.kirby.unsw.edu.au.

The main findings of the report are presented as text, supported by figures. The underlying data are available online in tables at http://www.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: Surveillance and Evaluation Report 2016* presents a detailed analysis of the occurrence of bloodborne viral and sexually transmissible infections in a format designed to be accessible for Aboriginal and Torres Strait Islander health services and communities. The report is available at Internet address http://www.kirby.unsw.edu.au.

Some of the information regarding risk behaviour which appears in this report is also published, along with further behavioural data, in the report *HIV/AIDS, Hepatitis C and Sexually Transmissible Infections in Australia Annual Report of Trends in Behaviour 2016,* edited by the Centre for Social Research in Health; and the following reports prepared by the Kirby Institute: *Australian NSP Survey 20 Year National Data Report 1995 – 2014; Prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees 2015; the Australian NSP Survey National Data Report 2011 – 2015;* and the *National Prison Entrants Bloodborne Virus and Risk Behaviour Survey Report 2004, 2007, 2010 and 2013 Prevalence of HIV, HBV, HCV, and risk behaviours among Australian prison entrants*.

Unless specifically stated otherwise, all data provided in the report are to the end of 2015, as reported by 31 March 2016. 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 of all collaborating organisations listed in the following section, to national surveillance for HIV, viral hepatitis and sexually transmissible infections is gratefully acknowledged.

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Summary

HIV

New HIV diagnoses

- The number of HIV notifications newly diagnosed in Australia has remained stable for the past four years, with 1 065 notifications in 2012, 1 030 in 2013, 1 082 in 2014 and 1 025 in 2015.
- Overall, no jurisdiction has observed a long-term decreasing trend in the past ten years.
- The main route of HIV transmission in Australia continues to be sexual contact between men, which accounted for 68% of notifications in 2015, a further 20% of cases were attributed to heterosexual sex, 5% to sexual contact between men and injecting drug use, and 3% to injecting drug use only.
- Among cases attributed to heterosexual sex, 19% were in people born in countries recognised by UNAIDS as having a national prevalence above 1% (high prevalence), and 17% in people with sexual partners born in high prevalence countries.
- Based on tests for immune function, over a quarter (29%) of the new HIV notifications in 2015 were determined to be late, in that they were in people likely to have had their infection for at least four years without being tested.
- Over the last five years the proportion with late diagnoses was highest in people born in South-East Asia (48%) and sub-Saharan Africa (46%). Over ten years, there was a decline in the proportion with late diagnoses among cases attributed to male-to-male sex or male-to-male sex and injecting drug use (27% to 20%).
- Based on 38 cases, the age standardised rate of HIV notification in 2015 among Aboriginal and Torres Strait Islander peoples was more than double the rate in the Australian-born non-Indigenous population (6.8 versus 3.1 per 100 000).
- In the most recent five year reporting period (2011 – 2015), a greater proportion of HIV notifications in the Aboriginal and Torres Strait Islander population were attributed to heterosexual sex (21%) or injecting drug use (16%), compared with the Australian-born non-Indigenous population (14% and 3% respectively).
- Among 205 children born to HIV-positive mothers in Australia in the five year period 2011 – 2015, the transmission rate to newborns was 1.5%, compared to 31.9% in the period 1991 – 1995, with zero transmissions from 2013 onwards.

Prevalence

- At 0.1%, the prevalence or overall proportion of people in Australia who are living with HIV is low compared to other high income countries, and countries in the region.
- The self-reported HIV prevalence among gay men participating in the Gay Community Periodic Survey was 18% in 2015. These data reflect community attached gay men and are based on self-reported HIV status.
- HIV prevalence remains very low among people who inject drugs, at 1.7% in 2015 (or under 0.5% if men with a history of male-to-male sex are excluded)

Testing and care

- It is estimated that there were 25 313 (range 22 513 – 28 281) people living with HIV in Australia in 2015. Of these an estimated 22 694 (90%) were diagnosed by the end of 2015, 21 560 (85%) were retained in care, 19 051 (75%) were receiving antiretroviral therapy, and 17 544 (69%) had achieved viral suppression.
- In the past five years, testing coverage has increased in gay and bisexual men, with 61% of gay men participating in the Gay Community Periodic Survey reporting a HIV test in the past 12 months, increasing by 8% to 66% in 2015.
- Also HIV testing frequency has increased by 27% in the past five years; with an average of 1.1 HIV tests in 2011 to 1.4 in 2015 among gay and bisexual men attending clinical services in a network called ACCESS.

Sexual behaviour

- Results from the 2015 Gay Community Periodic Survey indicate that 41% of gay men reported condomless anal intercourse with casual partners in the six months prior to the survey, an increase on the 33% reporting condomless anal intercourse in 2006.

HIV incidence

- In gay and bisexual men attending sexual health clinics in the ACCESS network, HIV incidence over a five year period (2011 – 2015) was highest in 2011 at 1.32 per 100 person years, declining to 0.65 in 2013 and remaining stable in 2014 and 2015.
- HIV incidence remains extremely low among female sex workers, with no HIV cases detected in the past 2 years.

Interpretation: Australia's HIV epidemic continues to be predominantly in men who have sex with men, with stable rates in the past 10 years. Overall, initiatives to promote and improve access to testing have achieved higher levels of testing coverage and frequency and reduced the proportion diagnosed late with HIV. Treatment coverage has increased considerably, and there has been a corresponding increase in the proportion of people with undetectable viral load, decreasing the chance of HIV transmission.

Harm reduction strategies to minimise HIV transmission among people who inject drugs have been highly successful and must be sustained. Extremely low rates of maternal transmission have been achieved through comprehensive medical interventions. The incidence of HIV among women involved in sex work is among the lowest in the world, due to highly successful HIV prevention for this priority population.

The trend in HIV notifications among Aboriginal and Torres Strait Islander peoples is very different, with a steady increase in the notification rate in Aboriginal and Torres Strait Islander males over the past five years, as compared a stable rate in Australian-born non-Indigenous males.

These data highlight the need to maintain and strengthen established strategies of health promotion, testing, and treatment, but also expand access to HIV pre-exposure prophylaxis to people who could benefit from this new technology, and strengthen these prevention strategies for Aboriginal and Torres Strait Islander people.

Hepatitis C

New hepatitis C diagnoses

- In 2015 there were 10 790 notifications of hepatitis C, with the highest rates in the 25 – 39 year age group.
- The overall notification rate of hepatitis C notification in Australia has remained stable in the last four years (2012 – 2015), following a 22% decline between 2006 and 2011. A similar trend has been seen in all age groups.
- In contrast, the age standardised rate of hepatitis C notification in the Aboriginal and Torres Strait Islander population in Australia (based on data from the Northern Territory, South Australia, Tasmania and Western Australia) increased by 43% in the past five years, from 115 per 100 000 in 2011 to 165 per 100 000 in 2015. The 2015 rate is 4 times greater than in the non-Indigenous population (40 per 100 000).

Prevalence and morbidity

- There were an estimated 227 306 (range: 167 623 – 249 707) people living with chronic hepatitis C infection in Australia in 2015.
- The prevalence of hepatitis C antibody in people who inject drugs attending needle and syringe programs in 2015 was 57%, with relatively stable rates in the last five years. At 70%, the prevalence was much higher among Aboriginal and Torres Strait Islander survey respondents in 2015 than non-Indigenous respondents (55%).
- At the end of 2015, an estimated 29 070 (range: 21 437 – 31 935) people had severe fibrosis, an increase of 73% since 2006, an estimated 17 149 (range: 12 647 – 18 840) people had hepatitis C related cirrhosis, an increase of 96% since 2006, and an estimated 818 (range: 603 – 899) deaths attributable to chronic hepatitis C infection occurred in 2015, an increase of 112% since 2006.

Testing and care

- Among the estimated 227 306 (range: 167 623 – 249 707) people living with chronic hepatitis C infection in Australia in 2015, 186 763 (82%) were diagnosed by the end of 2015, 50 172 (22%) had ever received antiviral therapy, 32 139 (14%) had ever successfully cured the infection through therapy.
- According to the Australian Needle and Syringe Program Survey, among people who inject drugs with prior exposure to hepatitis C, in 2015 12% reported ever receiving hepatitis C treatment and 2% had received treatment in the last 12 months.

Injecting risk behaviour

- The re-use of needles and syringes that have been used by others (receptive syringe sharing) is a major risk factor for the transmission of hepatitis C.
- The overall proportion of Australian Needle and Syringe Program Survey participants in 2015 who reported receptive needle and syringe sharing in the past year was 16%. Receptive syringe sharing was higher among Aboriginal and Torres Strait Islander respondents (24%) than among non-Indigenous respondents (14%).

Interpretation: The rate of notification of hepatitis C diagnoses has remained stable in the past four years, after declines between 2006 and 2011, including in those aged less than 25 years. The primary route of transmission is sharing injecting equipment, a practice that primarily starts in late adolescence or early adulthood.Trends in the rate of diagnoses in those aged under 25 years can be interpreted as a surrogate for the incidence of hepatitis C infection. Under this assumption, it appears that there has been no further reduction in hepatitis C transmission since 2011. There has also been no change in the rates of receptive needle and syringe sharing in the same period, highlighting the need for enhanced focus on prevention efforts.

The trends in hepatitis C notifications among Aboriginal and Torres Strait Islander peoples are very different to those of non-Indigenous people, with a steady increase in the notification rate in Aboriginal and Torres Strait Islander peoples over the past five years and in young people aged <25 years, as compared to no increase in young non-Indigenous people in the same time period. The difference in overall notification rates may reflect differences in injecting risk behaviours. The difference could also be accounted for by very high rates of incarceration and hepatitis C diagnosis in this setting and higher case detection among Aboriginal and Torres Strait Islander peoples. There is a need for increased coverage of appropriate harm reduction strategies targeting Aboriginal and Torres Strait Islander peoples in both community and prison settings.

Hepatitis B

New hepatitis B diagnoses

- There were a total of 6 502 notifications of newly diagnosed hepatitis B infection in Australia in 2015.
- Over the ten year period 2006 – 2015, the population rate of notification of hepatitis B infection has declined in Australia in younger age groups, reflecting the impact of the infant and adolescent vaccination programs, but remained high in the 25 – 29 and 30 – 39 year age groups. The declining trend in younger age groups was similar to that of notifications of newly acquired hepatitis B infection.
- Notification rates of hepatitis B infection in Australia (based on data from the Northern Territory, South Australia, Tasmania, Western Australia, and the Australian Capital Territory) were three times higher among the Aboriginal and Torres Strait Islander population than in the non-Indigenous population in 2015 (66 per 100 000 compared to 22 per 100 000). Similar to the non-Indigenous population, the greatest declines were observed in the younger age groups.

Prevalence and morbidity

- There were an estimated 232 600 (range 190 738 to 283 781) people living with chronic hepatitis B infection in Australia in 2015, of whom 88 621 (38%) were born in the Asia-Pacific and 21 632 (9.3%) were Aboriginal and Torres Strait Islander peoples.
- In 2015 the estimated chronic hepatitis B prevalence was 4.0% in people who inject drugs, 3.9% in Aboriginal and Torres Strait Islander peoples, 3.6% in people born in the Asia-Pacific, 3.5% in people born in Sub-Saharan Africa, and 3.0% in men who have sex with men, with potential overlaps in some of these categories.
- Of the 219 people who had a liver transplant in 2015, 17 (8%) had hepatitis B infection.
- An estimated 419 (323 – 683) deaths attributable to chronic hepatitis B infection occurred in 2015.

Testing and care

- In 2015 an estimated 62% of people with chronic hepatitis B in Australia have been diagnosed.
- Treatment for hepatitis B is considered in people with elevated hepatitis B viral load, abnormal liver function tests, or those who have advanced liver disease (cirrhosis). It is likely about 15% of people would benefit from treatment, yet only 6% (40% of the target) of people living with chronic hepatitis B were receiving antiviral therapy in 2015.
- Of 17 749 people attending sexual health clinics in 2015 for whom vaccination documentation or pathology details were available, 70% had documented evidence of immunity to hepatitis B, highest in the youngest age group 15 – 19 years (79%).

Prevention

- In 2015 coverage of infant hepatitis B vaccination at 24 months of age was 95% in the non-Indigenous population, and 96% in the Aboriginal and Torres Strait Islander population.

Interpretation: Unlike hepatitis C infection which is strongly associated with injecting risk behaviour in Australia, hepatitis B in adolescents and adults is transmitted through a variety of pathways, including both injecting drug use and sexual transmission. However, most Australians living with chronic hepatitis B acquired infection at birth or in early childhood. There is limited information on uptake of testing, so it is not possible to interpret the rate of notification as a surrogate for incidence, even in young people. However the trends in newly acquired infections in young people are similar to the trends in the overall diagnosis rates. Age specific analysis in both overall and newly acquired infections indicate a decline in precisely those age groups (<25 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 (variation by jurisdictions). Maternal screening and vaccination of infants born to mothers with chronic hepatitis B is also likely to have contributed to this decline. An estimated 62% of people with chronic hepatitis B in Australia have been diagnosed and of these, 16% were in care, and 6% of all people living with chronic hepatitis B were receiving treatment in 2015 based on Pharmaceutical Benefits Scheme reimbursements. These estimates indicate an ongoing gap in both the uptake of testing to diagnose chronic hepatitis B infection and uptake of effective monitoring and treatment to control viral replication.

Sexually transmissible infections other than HIV

Chlamydia

New diagnoses

- Chlamydia was the second most frequently reported notifiable condition in Australia in 2015, with a total of 66 033 notifications, and the majority (77%) of these notifications were among 15 – 29 year olds.
- Chlamydia notifications from Victoria in 2015 were incomplete and have been excluded from the report. Victorian notifications normally account for approximately 23% of notifications nationally.
- The rate of chlamydia notification has increased steadily between 2006 and 2011 (from 237 to 371 per 100 000) but since 2011 has remained relatively stable overall, with the same pattern seen in males and females.
- Among 15 – 19 year olds there has been a decline in the chlamydia notification rate by 19% since 2011, from 1 574 per 100 000 to 1 271 per 100 000 in 2015.
- The rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population in Australia (based on data from the Northern Territory, Queensland, South Australia, and Western Australia) was over three times that in the non-Indigenous population in 2015.

Testing and care

- By the end of 2015 of the 257 240 new chlamydia cases in 15 – 29 year olds, an estimated 28% were diagnosed (18% of males and 42% of females), 99% were treated, and an estimated 26% of those diagnosed completed follow up (between 6 weeks to 6 months).
- From 2008 to 2015 there was a 2-fold increase in chlamydia testing in 15 – 29 year olds attending general practice (from 9.3% to 15.7%) but overall levels remain low.

Incidence

- Of the gay and bisexual men attending sexual health clinics, 27% of HIV-positive men had a new chlamydia infection detected from anorectal swabs in 2015; compared with 12% of HIV-negative men, and in the past five years incidence has increased in both populations.
- In female sex workers attending sexual health clinics, 10% had a new chlamydia infection detected in 2015, increasing from 6% in 2013. Among females not involved in sex work, the incidence of chlamydia was higher but declined slightly over time (from 14% in 2011 to 12% in 2015).

Gonorrhoea

New diagnoses

- There were 18 588 cases of gonorrhoea notified in 2015
- Between 2006 and 2015, notification rates nearly doubled in both males (from 56.4 per 100 000 in 2006 to 117.3 per 100 000 in 2015) and females (from 26.8 per 100 000 in 2006 to 41.8 per 100 000 in 2015). Trends varied by jurisdiction.
- In 2015, gonorrhoea notification rates were highest among men aged 25 – 29 years (357 per 100 000) and 20 – 24 years (334 per 100 000).
- The rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population was 10 times that in the non-Indigenous population in 2015 (625.6 per 100 000 compared to 62.4 per 100 000). These data are from the Australian Capital Territory, the Northern Territory, Queensland, South Australia, Victoria, Western Australia and Tasmania.
- Over the five year period 2011 – 2015, the notification rate of gonorrhoea decreased by 22% in the Aboriginal and Torres Strait Islander population, compared with an 94% increase in the non-Indigenous population.

Testing and care

- Results from the Gay Community Periodic Survey show comprehensive STI testing (at least four samples collected for STI screening) in gay men increased from 26% in 2006, to 44% in 2015.

Incidence

- Of the gay and bisexual men attending sexual health clinics, 27% of HIV-positive men had a new gonorrhoea infection detected in rectal swabs in 2015; compared with 11% of HIV-negative men, and in the past five years incidence has increased in both populations.
- In female sex workers attending sexual health clinics, 2.3% had a new gonorrhoea infection detected in 2015, increasing from 0.9% in 2011. Among females not involved in sex work, the incidence of gonorrhoea was similar but stable over time (between 1.2% and 1.6% with new infections in each year).

Syphilis

New diagnoses

- The number of notifications of infectious syphilis (infections of less than two years duration) in 2015 was 2 736.
- An expanded national infectious syphilis case definition was implemented in July 2015 in all jurisdictions except New South Wales, to include a 'probable' category, with 233 probable cases notified in 2015.
- The notification rate of infectious syphilis among men has increased in the past ten years, from 6.5 per 100 000 in 2006 to 21.0 per 100 000 in 2015. Trends varied by jurisdiction. At 46 per 100 000, notification rates were highest among males aged 25 – 29 years.
- The notification rate of infectious syphilis among women has fluctuated and remained low between 2006 and 2014, and increased to 2.5 per 100 000 in 2015.
- At 60.5 per 100 000, the rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population in 2015 was 6 times higher than in the non-Indigenous population (10.2 per 100 000).
- The rate of notification of infectious syphilis among the Aboriginal and Torres Strait Islander population increased from 26.3 per 100 000 in 2011 to 60.5 per 100 000 in 2015.
- There were four notifications of congenital syphilis in 2015, declining from a high of 11 in 2006.

Testing and care

- Among gay and bisexual men attending sexual health clinics participating in ACCESS, the average number of syphilis tests per man increased from 1.2 in 2011 to 1.5 in 2015. In 2015, the average number of syphilis tests per man was higher in HIV positive men (1.8 per year), than HIV negative men (1.4 per year).

Incidence

- In 2015, of the gay and bisexual men attending sexual health clinics, 9.7% of HIV-positive men had a new diagnosis of syphilis infection compared with 3.7% of HIV-negative men, and in the past five years incidence increased by 42% in HIV-negative men and 38% in HIV-positive men.
- In the past five years (2011 – 2015) syphilis incidence in female sex workers was very low and relatively stable (with 0.2 – 0.4% of women with a new diagnosis of infectious syphilis per year).

Interpretation: After a decade of steady increases in both testing and diagnoses of chlamydia, there has been a levelling off in the number of chlamydia diagnoses, and even a decline in the youngest age group. However the vast majority of infections in young people remain undiagnosed and hence untreated.

Gonorrhoea and syphilis in Australia continues to be an infection primarily of men having male-to-male sex in urban settings, and of young heterosexual Aboriginal and Torres Strait Islander people in remote communities.

Gonorrhoea and syphilis have been diagnosed more frequently in men in the past five years. These increases may be due to increased testing and use of more sensitive gonorrhoea testing technology in some places. The rise may also relate to increases in condom-less sex among men who have sex with men, linked to the greater availability and awareness of highly effective HIV prevention strategies.

There has also been an increase in gonorrhoea notifications in women in Australia which may be due to most pathology laboratories in Australia adopting dual testing, whereby if a test for either chlamydia or gonorrhoea is ordered by a clinician, both are conducted. In females involved in sex work there has been a rise in chlamydia and gonorrhoea in the past three years.

In the Aboriginal and Torres Strait Islander population gonorrhoea rates have declined by 22% in the past five years, but remain 3-fold higher than the non-Indigenous population in remote areas, whereas syphilis has increased more than 2-fold in the past five years. A change in the national infectious syphilis case definition in 2015, resulted in additional cases being counted, however does not fully explain the increase observed. The resurgence of infection in young Aboriginal people in remote communities after years of declining rates, brings with it cases of congenital syphilis.

Overall, these data emphasise the need for enhanced health promotion and testing and treatment to be routinely offered to sexually active adolescents, young adults, and other priority populations.

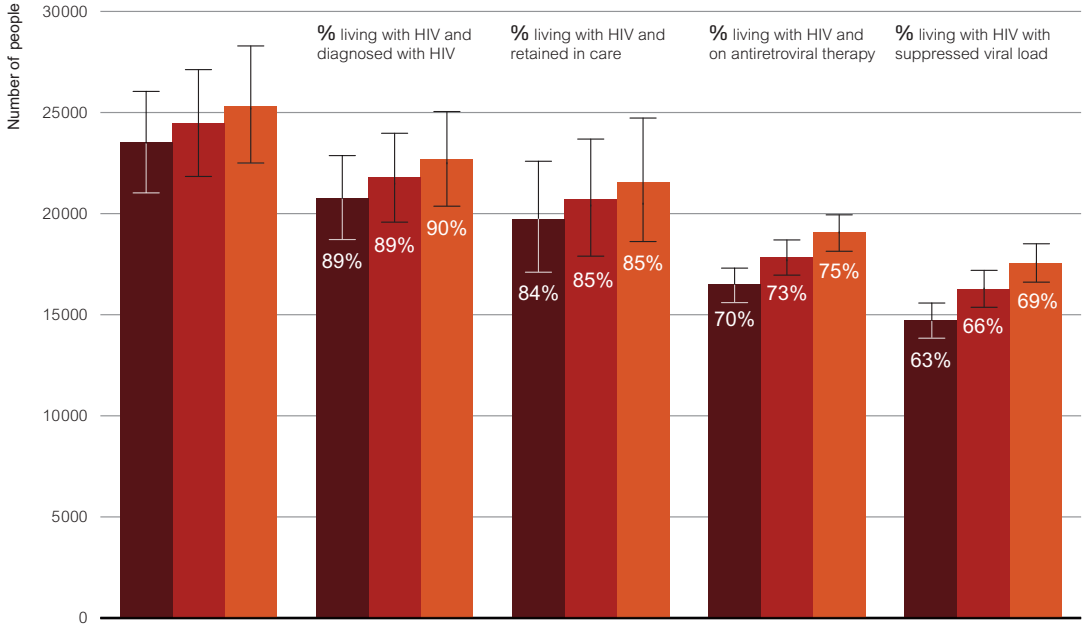
Success in the control of sexually transmissible infections

- Donovanosis, once a regularly diagnosed sexually transmissible infection among remote Aboriginal populations, is now close to elimination, with only two cases detected since 2011.
- Following the introduction of vaccination against human papilloma virus in 2007, high 3-dose coverage has been achieved in females (77% in 2015) and males (66% in 2015) turning 15 years of age. Indicators of the success of this program include:
    - The dramatic decline of genital warts in young women aged <21 years, with 11.7% of cases presenting to sexual health clinics at first visit in 2007, compared to 0.8% in 2015; and
    - The halving, from 13.2 per 1 000 in 2006 to 5.0 per 1 000 in 2014, in the rate of detection of high grade histological abnormality among young women undergoing cervical screening.

The diagnosis and care cascades

This report includes a 'diagnosis and care cascade', for HIV, hepatitis C, hepatitis B (all ages) and chlamydia (in 15 – 29 year olds). The cascades are used to support the improvement of the delivery of services to people living with these infections across the entire continuum of care—from diagnosis, and treatment to cure/attaining viral suppression. Using available data and accounting for uncertainties, the proportions of people in each stage of the cascade in Australia were estimated. Chlamydia was selected from the notifiable sexually transmissible infections (STIs) as it was the most common STI.

The HIV diagnosis and care cascade, 2013 – 2015

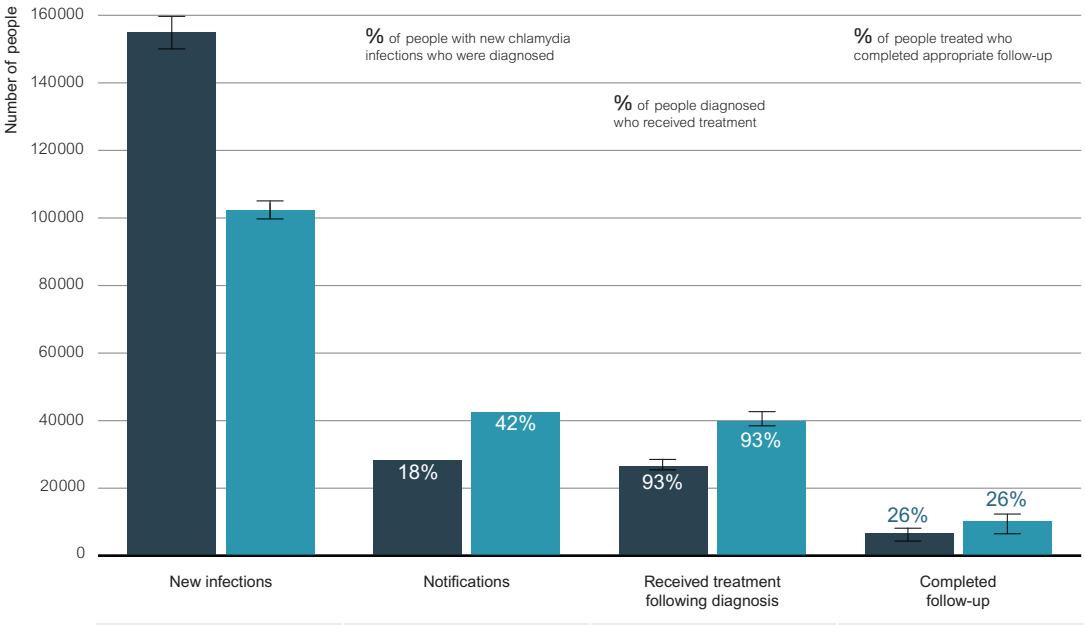


	Living with HIV	Living and diagnosed with HIV	Retained in care	Receiving antiretroviral therapy	Suppressed viral load
2013	23 507	20 768	19 729	16 471	14 696
2014	24 452	21 772	20 683	17 821	16 255
2015	25 313	22 694	21 560	19 051	17 544

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

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

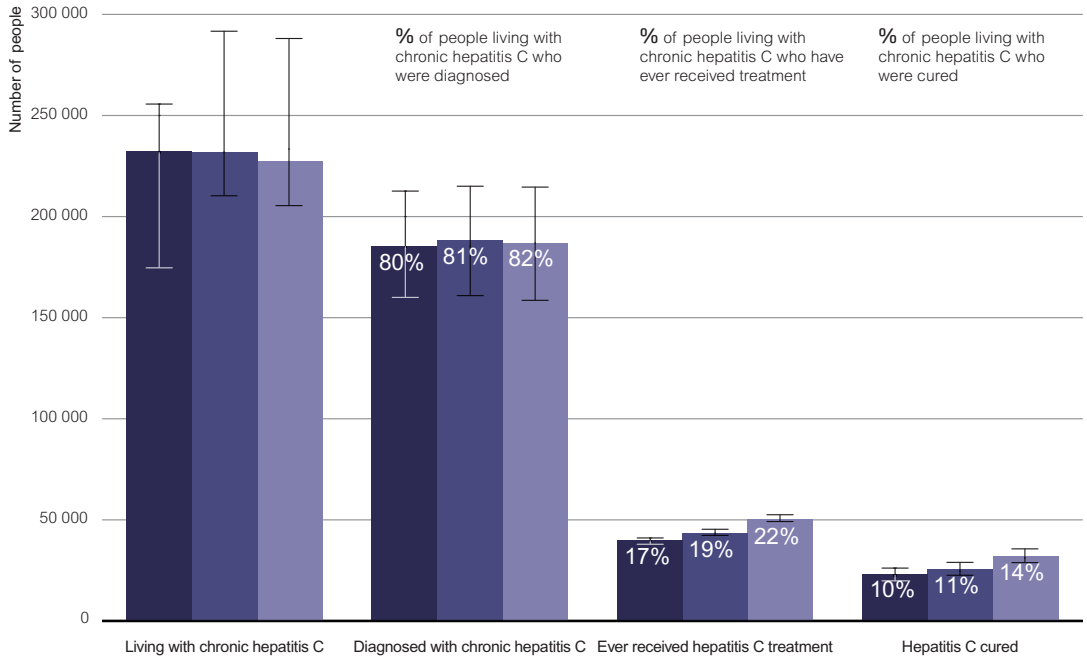
The 2015 chlamydia diagnosis and care cascade in 15 – 29 year olds, by sex



	New infections	Notifications	Received treatment following diagnosis	Completed follow-up
Males	154 923	28 414	26 518	6 775
Females	102 322	42 583	39 742	10 154

Source: See Methodological notes for further details of mathematical modelling used to generate estimates

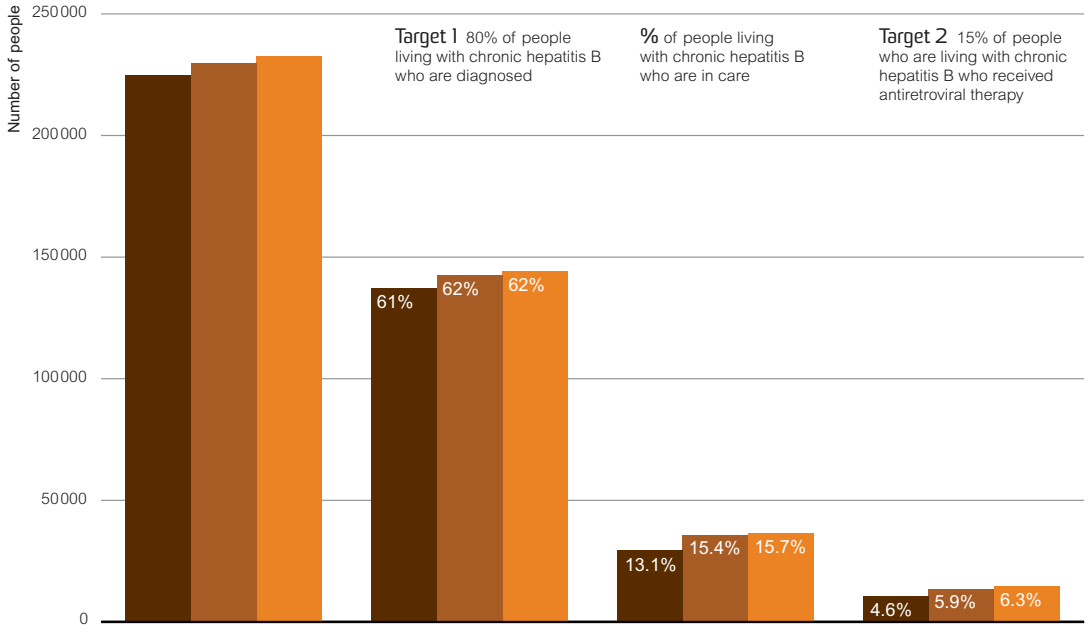
The hepatitis C diagnosis and care cascade, 2013 – 2015



	Living with chronic hepatitis C	Diagnosed with chronic hepatitis C	Ever received hepatitis C treatment	Hepatitis C cured
2013	232 300	185 359	39 849	22 850
2014	231 828	188 012	43 253	25 552
2015	227 306	186 763	50 172	32 139

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

The hepatitis B diagnosis and care cascade, 2013 – 2015



	Living with hepatitis B infection	Diagnosed with hepatitis B	In care	Received treatment
2013	224 903	137 191	29 403	10 316
2014	229 663	142 391	35 482	13 555
2015	232 600	144 216	36 534	14 636

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

Source: WHO Collaborating Centre for Viral Hepatitis, Victorian Infectious Diseases Reference Laboratory, Doherty Institute

Figures

Tables

Main Findings
HIV

New HIV diagnoses

- The number of HIV notifications newly diagnosed in Australia has remained stable for the past four years, with 1 065 notifications in 2012, 1 030 in 2013, 1 082 in 2014 and 1 025 in 2015.
- Overall, no jurisdiction has observed a long-term decreasing trend in the past ten years.
- The main route of HIV transmission in Australia continues to be sexual contact between men, which accounted for 68% of notifications in 2015, a further 20% of cases were attributed to heterosexual sex, 5% to sexual contact between men and injecting drug use, and 3% to injecting drug use only.
- Among cases attributed to heterosexual sex, 19% were in people born in countries recognised by UNAIDS as having a national prevalence above 1% (high prevalence), and 17% in people with sexual partners born in high prevalence countries.
- Based on tests for immune function, over a quarter (29%) of the new HIV notifications in 2015 were determined to be late, in that they were in people likely to have had their infection for at least four years without being tested.
- Over the last five years the proportion with late diagnoses was highest in people born in South-East Asia (48%) and sub-Saharan Africa (46%). Over ten years, there was a decline in the proportion with late diagnoses among cases attributed to male-to-male sex or male-to-male sex and injecting drug use (27% to 20%).
- Based on 38 cases, the age standardised rate of HIV notification in 2015 among Aboriginal and Torres Strait Islander peoples was more than double the rate in the Australian-born non-Indigenous population (6.8 versus 3.1 per 100 000).
- In the most recent five year reporting period (2011 – 2015), a greater proportion of HIV notifications in the Aboriginal and Torres Strait Islander population were attributed to heterosexual sex (21%) or injecting drug use (16%), compared with the Australian-born non-Indigenous population (14% and 3% respectively).
- Among 205 children born to HIV-positive mothers in Australia in the five year period 2011 – 2015, the transmission rate to newborns was 1.5%, compared to 31.9% in the period 1991 – 1995, with zero transmissions from 2013 onwards.

Prevalence

- At 0.1%, the prevalence or overall proportion of people in Australia who are living with HIV is low compared to other high income countries, and countries in the region.
- The self-reported HIV prevalence among gay men participating in the Gay Community Periodic Survey was 18% in 2015. These data reflect community attached gay men and are based on self-reported HIV status.
- HIV prevalence remains very low among people who inject drugs, at 1.7% in 2015 (or under 0.5% if men with a history of male-to-male sex are excluded)

Testing and care

- It is estimated that there were 25 313 (range 22 513 – 28 281) people living with HIV in Australia in 2015. Of these an estimated 22 694 (90%) were diagnosed by the end of 2015, 21 560 (85%) were retained in care, 19 051 (75%) were receiving antiretroviral therapy, and 17 544 (69%) had achieved viral suppression.
- In the past five years, testing coverage has increased in gay and bisexual men, with 61% of gay men participating in the Gay Community Periodic Survey reporting a HIV test in the past 12 months, increasing by 8% to 66% in 2015.
- Also HIV testing frequency has increased by 27% in the past five years; with an average of 1.1 HIV tests in 2011 to 1.4 in 2015 among gay and bisexual men attending clinical services in a network called ACCESS.

Sexual behaviour

- **Results from the 2015 Gay Community Periodic Survey indicate that 41% of gay men reported condomless anal intercourse with casual partners in the six months prior to the survey, an increase on the 33% reporting condomless anal intercourse in 2006.**

HIV incidence

- **In gay and bisexual men attending sexual health clinics in the ACCESS network, HIV incidence over a five year period (2011 – 2015) was highest in 2011 at 1.32 per 100 person years, declining to 0.65 in 2013 and remaining stable in 2014 and 2015.**
- **HIV incidence remains extremely low among female sex workers, with no HIV cases detected in the past 2 years.**

Interpretation:

Australia's HIV epidemic continues to be predominantly in men who have sex with men, with stable rates in the past 10 years. Overall, initiatives to promote and improve access to testing have achieved higher levels of testing coverage and frequency and reduced the proportion diagnosed late with HIV. Treatment coverage has increased considerably, and there has been a corresponding increase in the proportion of people with an undetectable viral load, decreasing the chance of HIV transmission.

Harm reduction strategies to minimise HIV transmission among people who inject drugs have been highly successful and must be sustained. Extremely low rates of maternal transmission have been achieved through comprehensive medical interventions. The incidence of HIV among women involved in sex work is among the lowest in the world, due to highly successful HIV prevention strategies for this priority population.

The trend in HIV notifications among Aboriginal and Torres Strait Islander peoples is very different, with a steady increase in the notification rate in Aboriginal and Torres Strait Islander males over the past five years, as compared a stable rate in Australian-born non-Indigenous males.

These data highlight the need to maintain and strengthen established strategies of health promotion, testing, and treatment, but also expand access to HIV pre-exposure prophylaxis to people who could benefit from this new technology, and strengthen these prevention strategies for the Aboriginal and Torres Strait Islander peoples.

New HIV diagnoses

This section focuses on people first diagnosed with HIV in Australia. A total of 1 025 cases of HIV were newly diagnosed in Australia in 2015, including 38 among people who were reported to be Aboriginal and Torres Strait Islander peoples. Prior to 2014, reports have included all diagnoses (first in Australia and first overseas) which means numbers of diagnoses in this report will be lower than reported in previous years. In 2015, most notifications of HIV diagnoses (89%, 915) were in males, 69% (707) were in people aged 30 years and above.

In 2015, 397 (39%) HIV notifications had a recent prior negative test or other laboratory and clinical markers to indicate the HIV was newly acquired (in the last year) (Table 2).

There were an additional 218 HIV cases previously diagnosed overseas with a confirmatory test conducted in Australia; 30% were in NSW, 30% in Victoria and 22% in Queensland (Table 1). These diagnoses are included in estimates of people diagnosed and living with HIV but excluded from further analyses in this section.

Table 1 Number of new cases of HIV in Australia in 2015, by State/Territory and whether HIV was first diagnosed in Australia or overseas

	Place of first diagnosis of HIV		
State/Territory	Australia	Overseas	Total cases
Australian Capital Territory	14	6	20
New South Wales	348	65	413
Northern Territory	9	1	10
Queensland	203	49	252
South Australia	44	14	58
Tasmania	16	0	16
Victoria	283	66	349
Western Australia	108	17	125
Total	**1 025**	**218**	**1 243**

Source: State and Territory Health authorities, see Methodological Notes for detail

A total of 36 171 cases of HIV have been notified since 1984, 33 011 among males and 2 823 among females. The annual number of new HIV diagnoses has increased slightly, by 4%, over the past 10 years, from 987 in 2006 to 1 065 cases in 2012 and stabilised since then, with 1 025 cases in 2015 (Figure 1). Over the same period the number of notifications in males has increased by 8% (from 848 in 2006 to 915 in 2015), but decreased in females by 21% (from 136 in 2006 to 108 in 2015) (Figure 1, Table 2).

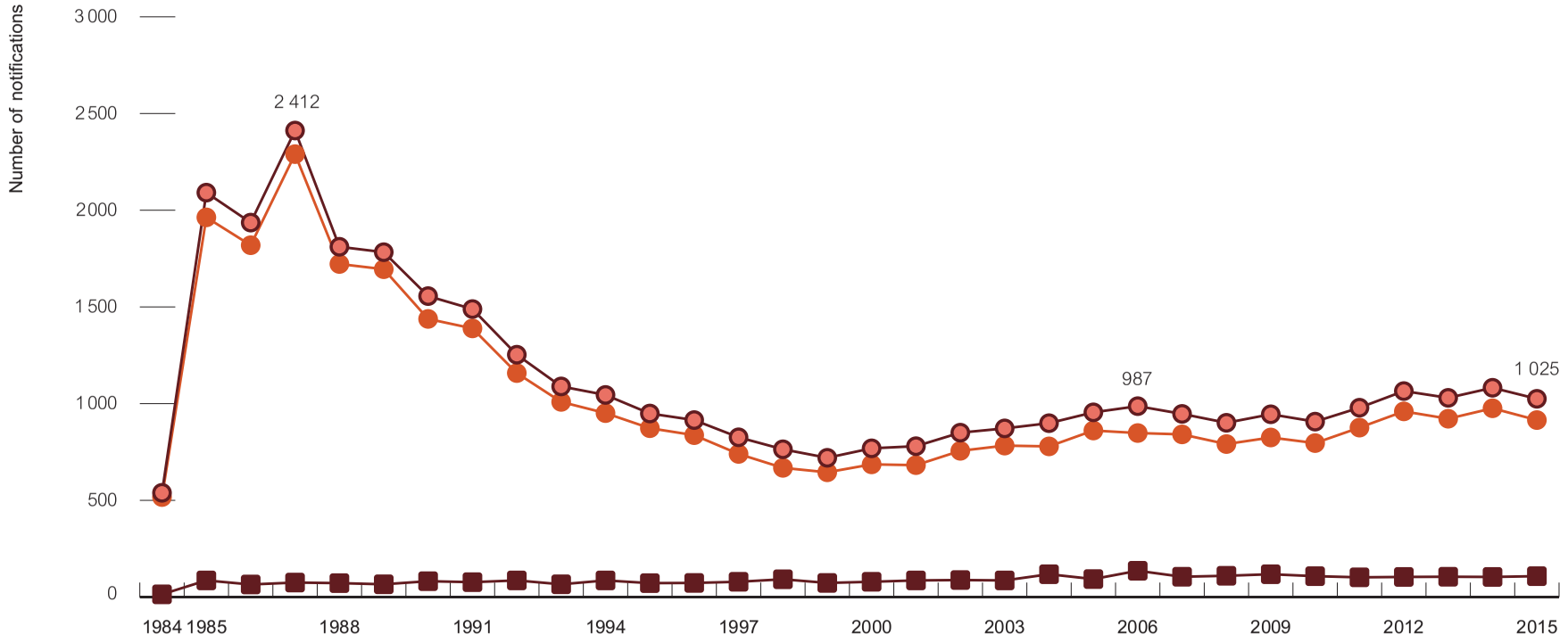
Table 2 Characteristics of cases of newly diagnosed HIV by year, where first ever diagnosis was in Australia, 2006 – 2015

	Year of HIV diagnosis										
	06	07	08	09	10	11	12	13	14	15	2006 – 2015[1]
Characteristic											
Total cases[2]	987	947	901	945	907	979	1 065	1 030	1 082	1 025	9 868
Sex											
Male	848	841	791	825	796	876	960	922	976	915	8 750
Female	136	105	110	118	108	102	104	105	104	108	1 100
Median age (years)											
Male	38	38	37	37	37	37	36	37	35	35	36
Female	31	32	31	32	31	32	31	34	35	36	34
Aboriginal and Torres Strait Islander status											
Non-Indigenous	959	919	868	911	874	951	1 026	990	1 023	976	9 496
Aboriginal and Torres Strait Islander	23	19	19	24	22	24	33	26	33	38	262
Not reported	5	9	14	10	11	4	6	14	26	11	110
Age group											
0 – 14	8	7	10	6	8	8	1	6	3	3	59
15 – 19	14	9	13	13	17	17	22	23	14	19	156
20 – 29	219	214	240	253	230	263	317	270	316	296	2 618
30 – 39	334	320	296	304	286	304	232	288	346	302	3 103
40+	412	397	346	365	372	387	402	443	403	405	3 932
Language spoken at home[3]											
English	648	728	687	717	678	778	796	527	834	734	7 127
Other language	68	59	55	94	79	83	102	87	115	154	896
Not reported	271	160	159	134	150	118	167	416	133	137	1 845
Newly acquired n (%)	308 (31.2)	278 (29.4)	284 (31.5)	301 (31.9)	305 (33.6)	370 (37.8)	395 (37.1)	346 (33.6)	423 (39.1)	397 (38.7)	3 407 (34.5)
Late and advanced HIV status at HIV diagnosis[4]											
Late HIV diagnosis (%)	35.6	31.8	31.6	35.0	35.0	28.9	31.5	32.1	28.6	29.1	31.8
Advanced HIV diagnosis (%)	21.7	17.8	17.3	20.5	20.0	19.1	17.8	18.5	16.7	16.0	18.5
Median CD4+ cell count (cells/μL)	410	430	430	408	400	429	430	420	440	440	425
State/Territory (n)											
Australian Capital Territory	6	9	7	11	13	11	17	21	18	14	127
New South Wales	397	386	326	339	309	331	407	354	345	348	3 542
Northern Territory	9	6	10	12	5	9	20	13	9	9	102
Queensland	157	167	174	182	209	196	208	181	246	203	1 923
South Australia	61	49	39	50	34	57	31	58	39	44	462
Tasmania	5	4	11	14	9	15	13	11	15	16	113
Victoria	277	263	262	262	236	278	267	307	302	283	2 737
Western Australia	75	63	72	75	92	82	102	85	108	108	862
HIV exposure category (n)											
Male-to-male sex	631	626	586	598	588	684	741	678	759	699	6 590
Male-to-male sex and injecting drug use	40	29	32	38	22	32	34	44	50	48	369
Injecting drug use[5]	27	25	32	23	23	20	25	27	31	30	263
Heterosexual sex	224	200	207	231	208	192	207	218	201	206	2 094
Person from a high prevalence country[6]	*79*	*58*	*81*	*82*	*74*	*47*	*53*	*37*	*46*	*39*	*596*
Partner from a high prevalence country	*19*	*24*	*13*	*20*	*24*	*28*	*24*	*28*	*33*	*35*	*248*
Partner high risk	*27*	*31*	*27*	*29*	*18*	*33*	*31*	*44*	*28*	*39*	*307*
Not further specified	*99*	*87*	*86*	*100*	*92*	*84*	*99*	*109*	*94*	*93*	*943*
Receipt of blood/tissue[7]	0	1	0	1	0	0	4	3	0	8	17
Mother with/at risk of HIV	6	4	5	8	5	7	1	4	3	4	47
Other/undetermined	59	62	39	46	61	44	53	56	38	30	488

1 Not adjusted for multiple reporting
2 Includes sex of 'Other' and 'Not reported'
3 Language spoken at home was sought among cases of HIV newly diagnosed from 1 January 2004.
4 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 cases excluded from late or advanced categorisation.
5 Excludes men who have sex with men
6 High prevalence countries include those with ≥1% estimated prevalence in at least one year of the ten year period 2006 – 2015
7 Includes receipt of blood/tissue overseas, so does not indicate transmission through blood products in Australia

Source: State and Territory health authorities

Figure 1 Newly diagnosed HIV notifications in Australia, 1984 – 2015, by sex



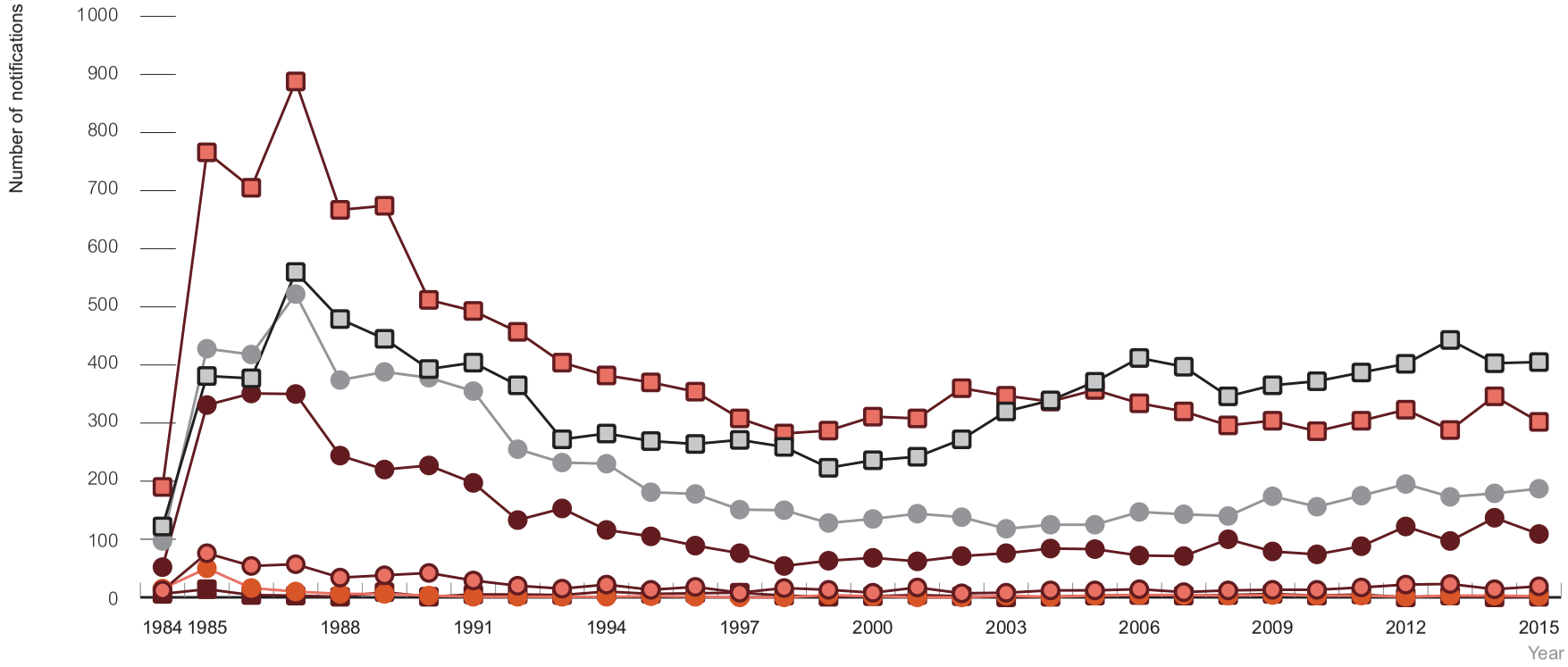
																																		Total
Females	14	86	65	75	72	66	82	77	86	66	86	72	73	79	92	73	79	86	88	86	118	93	136	105	110	118	108	102	104	105	104	108	2814
Males	517	1963	1819	2290	1722	1695	1438	1389	1158	1009	951	873	837	740	668	645	686	682	756	783	779	861	848	841	791	825	796	876	960	922	976	915	33011
Total	539	2091	1936	2412	1811	1783	1556	1489	1253	1089	1045	949	915	826	764	720	769	780	850	872	899	955	987	947	901	945	907	979	1065	1030	1082	1025	36171

* Total Includes transgender and missing

Source: State and Territory health authorities; see Methodological Notes for detail

In 2015 the largest number of notifications was in the 40+ age group, followed by the 30 – 39 year age group, and the 25 – 29 year age group (Figure 2, Table 2). The largest increase in this period has been in the 20 – 24 year age group, with 72 notifications in 2006, increasing to 109 in 2015 (51% increase) and in those aged 15 – 19 years, but based on smaller numbers, with 14 notifications in 2006, increasing to 19 in 2015 (36% increase), with a 10% decline in 30 – 39 year olds.

Figure 2 Newly diagnosed HIV notifications in Australia, 1984 – 2015, by age group



	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	Total
0 – 4	6	14	4	3	1	9	1	5	5	4	10	6	7	8	3	1	2	4	2	0	1	3	4	3	4	6	3	5	0	3	0	1	128
5 – 14	15	50	16	10	6	6	3	1	1	1	1	2	1	0	0	4	2	0	0	3	1	3	4	4	3	4	3	3	1	3	3	2	156
15 – 19	12	76	54	57	34	38	42	29	20	15	22	13	18	8	16	13	8	17	7	8	12	12	14	9	12	13	13	17	22	23	14	19	687
20 – 24	52	331	351	350	244	220	227	197	133	153	116	105	89	76	54	63	68	62	71	76	84	83	72	71	100	79	74	88	122	97	137	109	4154
25 – 29	97	428	418	522	374	388	378	355	255	232	230	181	178	151	150	128	135	144	138	118	125	125	147	143	140	174	156	175	195	173	179	187	6919
30 – 39	190	766	705	888	667	674	512	493	457	404	382	370	354	308	282	287	311	308	360	347	337	357	334	320	296	304	286	304	323	288	346	302	12862
40+	122	381	377	560	479	445	393	404	365	272	282	269	264	271	259	223	236	242	272	320	339	371	412	397	346	365	372	387	402	443	403	405	11078
Total	494	2046	1925	2390	1805	1780	1556	1484	1236	1081	1043	946	911	822	764	719	762	777	850	872	899	954	987	947	901	945	907	979	1065	1030	1082	1025	35984

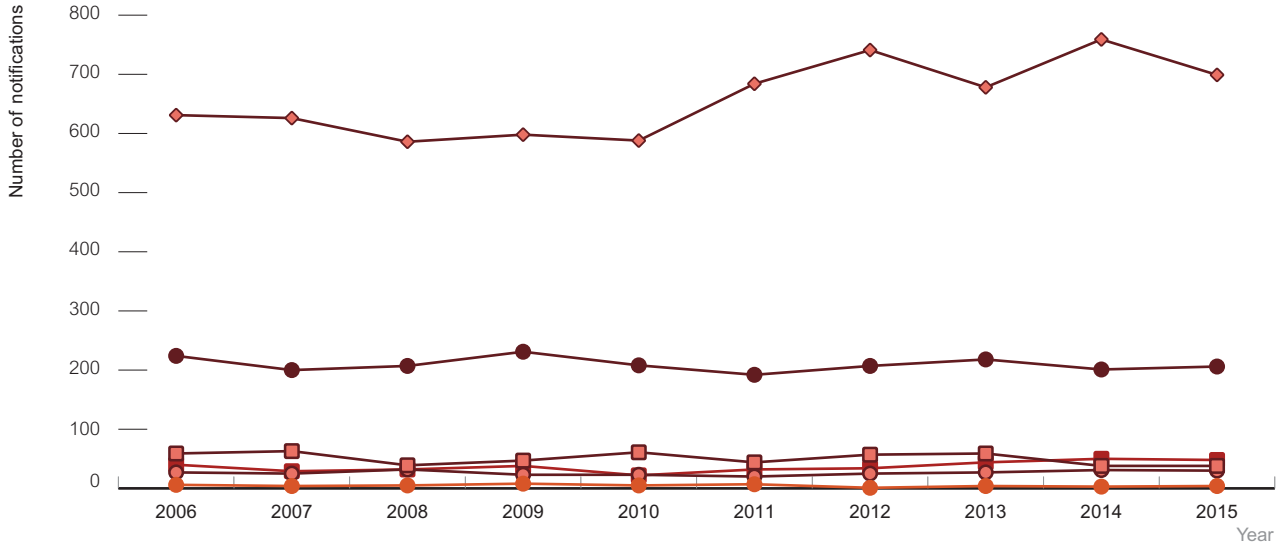
* Since 1984 a further 187 diagnoses have been notified without a date of birth, with 66% in the period 1984 – 1987, and zero cases with no date of birth since 2006

Source: State and Territory health authorities; see Methodological Notes for detail

HIV

Transmission of HIV in Australia continues to occur primarily through sexual contact between men (Figure 3, Table 2). In 2015, 68% of new HIV diagnoses were attributed to male-to-male sex, 5% were reported as male-to-male sex with injecting drug use, 20% were attributed to heterosexual sex, and 3% to injecting drug use (Figure 3, Table 2).

Figure 3 Newly diagnosed HIV notifications, 2006 – 2015, by exposure category

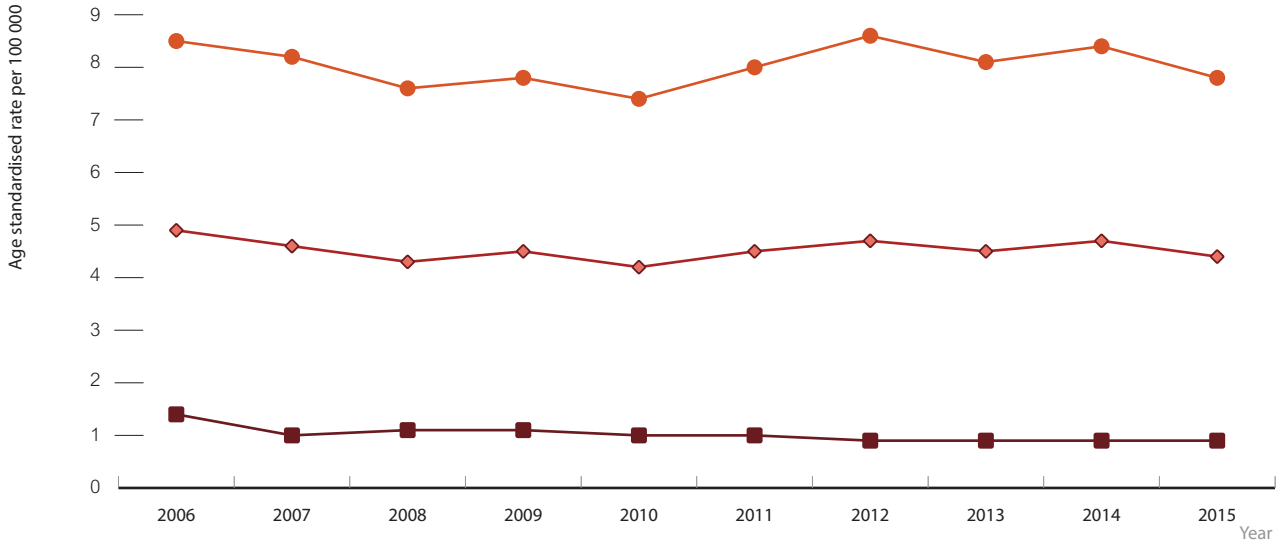


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Male-to-male sex	631	626	586	598	588	684	741	678	759	699
Male-to-male sex and injecting drug use	40	29	32	38	22	32	34	44	50	48
Injecting drug use	27	25	32	23	23	20	25	27	31	30
Heterosexual sex	224	200	207	231	208	192	207	218	201	206
Mother with/at risk of HIV infection	6	4	5	8	5	7	1	4	3	4
Other/undetermined	59	63	39	47	61	44	57	59	38	38

Source: State and Territory health authorities, see Methodological Notes for detail

The notification rate of HIV in 2015 was 4.4 per 100 000, and has been relatively stable in the last ten years (Figure 4). Similarly, notification rates of HIV in males have been relatively stable in the last ten years, and were 7.8 per 100 000 in 2015, and rates have remained low and stable in females, at 0.9 per 100 000 in each year of the last four years.

Figure 4 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by sex



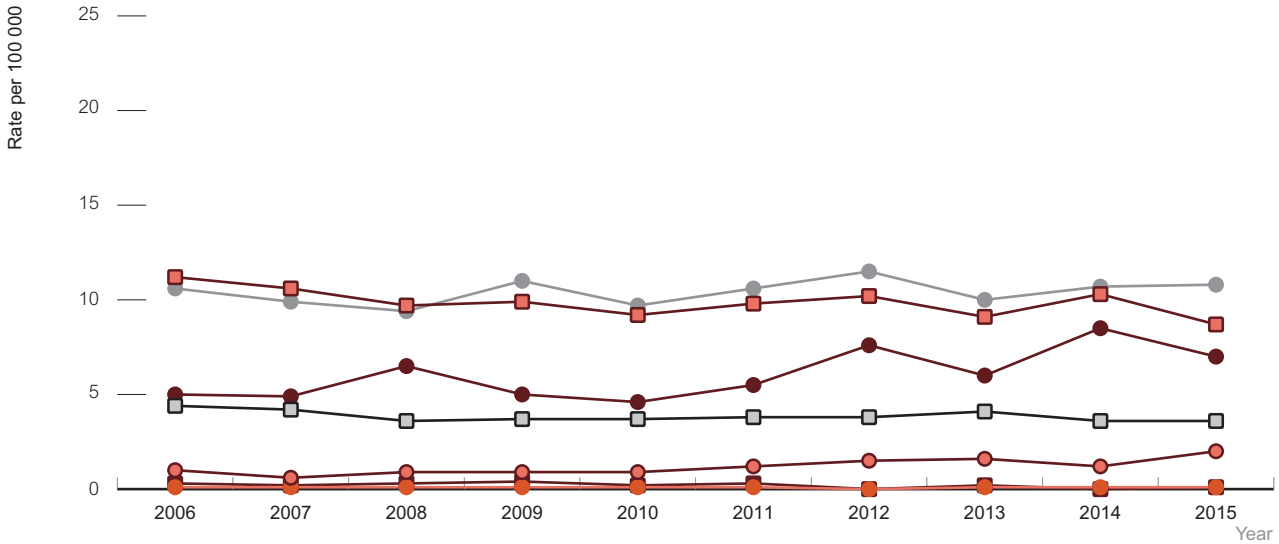
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	1.4	1.0	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9
Male	8.5	8.2	7.6	7.8	7.4	8.0	8.6	8.1	8.4	7.8
Total	4.9	4.6	4.3	4.5	4.2	4.5	4.7	4.5	4.7	4.4

Source: State and Territory Health authorities, see Methodological Notes for detail

In 2015 notification rates of newly diagnosed HIV were highest in the 25 – 29 year age group, at 10.8 per 100 000, followed by the 30 – 39 year age group (8.7 per 100 000), and the 20 – 24 year age group (7.0 per 100 000), with an increase since 2010 in the 20 – 24 year olds age group. (Figure 5).

HIV

Figure 5 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by age group

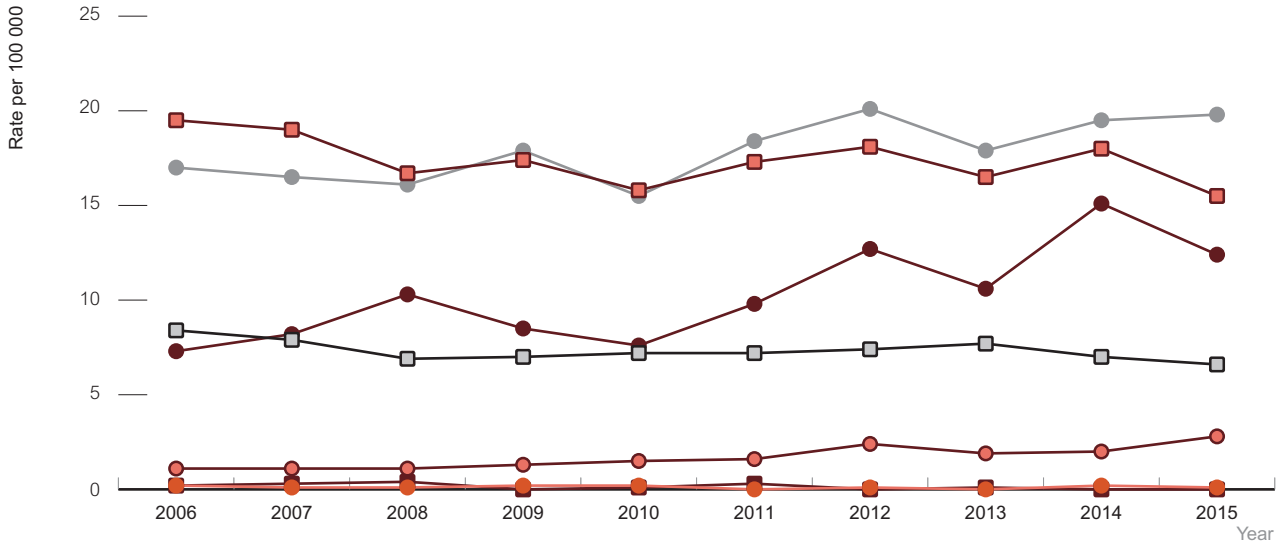


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.3	0.2	0.3	0.4	0.2	0.3	0.0	0.2	0.0	0.1
5 – 14	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
15 – 19	1.0	0.6	0.9	0.9	0.9	1.2	1.5	1.6	1.2	2.0
20 – 24	5.0	4.9	6.5	5.0	4.6	5.5	7.6	6.0	8.5	7.0
25 – 29	10.6	9.9	9.4	11.0	9.7	10.6	11.5	10.0	10.7	10.8
30 – 39	11.2	10.6	9.7	9.9	9.2	9.8	10.2	9.1	10.3	8.7
40+	4.4	4.2	3.6	3.7	3.7	3.8	3.8	4.1	3.6	3.6

Source: State and Territory Health authorities, see Methodological Notes for detail

Similar to overall HIV notification rates, the rates in males were highest in the 25 – 29 year age group, followed by the 30 – 39 year age group, and the 20 – 24 year age group. In the ten year period 2006 – 2015, the HIV notification rate has increased among 20 – 24 year old males by 70% from 7.3 per 100 000 in 2006 to 12.4 per 100 000 in 2015, and among 25 – 29 year old males by 16% from 17.0 per 100 000 in 2006 to 19.8 per 100 000 in 2015 (Figure 6).

Figure 6 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by age group, males

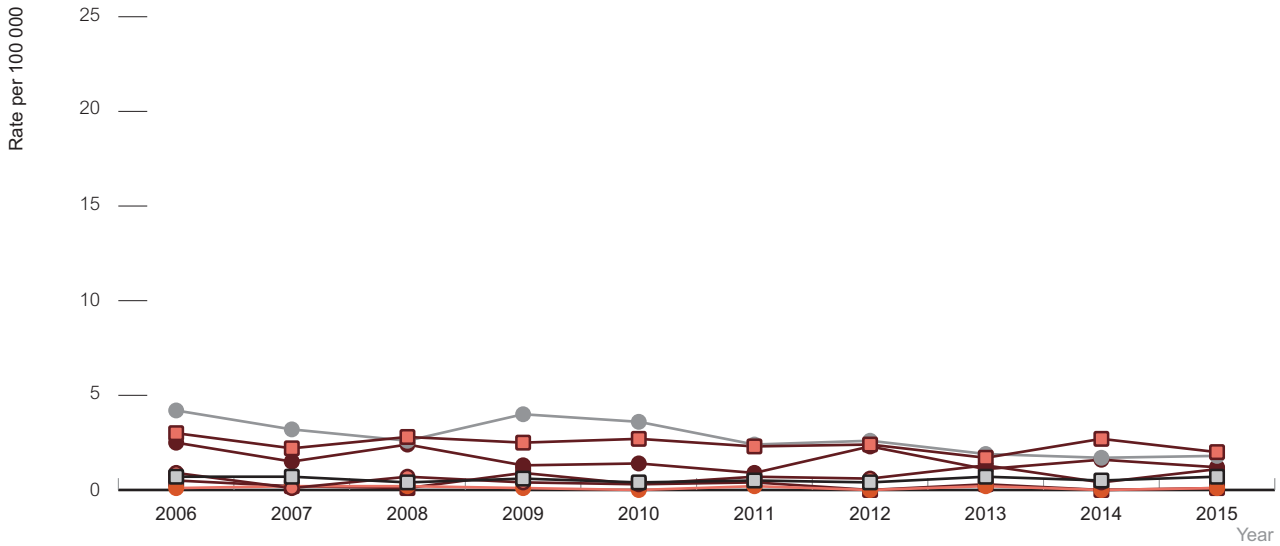


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.2	0.3	0.4	0.0	0.1	0.3	0.0	0.1	0.0	0.0
5 – 14	0.2	0.1	0.1	0.2	0.2	0.0	0.1	0.0	0.2	0.1
15 – 19	1.1	1.1	1.1	1.3	1.5	1.6	2.4	1.9	2.0	2.8
20 – 24	7.3	8.2	10.3	8.5	7.6	9.8	12.7	10.6	15.1	12.4
25 – 29	17.0	16.5	16.1	17.9	15.5	18.4	20.1	17.9	19.5	19.8
30 – 39	19.5	19.0	16.7	17.4	15.8	17.3	18.1	16.5	18.0	15.5
40+	8.4	7.9	6.9	7.0	7.2	7.2	7.4	7.7	7.0	6.6

Source: State and Territory Health authorities, see Methodological Notes for detail

HIV notification rates among females were generally low and stable in all age groups over the ten year period 2006 to 2015 (Figure 7). At 2.0 per 100 000, notification rates in 2015 were highest among females aged 30 – 39 years. Notification rates were second highest in 25 – 29 year olds (1.8 per 100 000), but have declined by 57% in this age group since 2006 (4.2 per 100 000).

Figure 7 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by age group, females



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.5	0.2	0.1	0.9	0.3	0.4	0.0	0.3	0.0	0.1
5 – 14	0.1	0.2	0.2	0.1	0.0	0.2	0.0	0.2	0.0	0.1
15 – 19	0.9	0.1	0.7	0.4	0.3	0.7	0.6	1.3	0.4	1.1
20 – 24	2.5	1.5	2.4	1.3	1.4	0.9	2.3	1.1	1.6	1.2
25 – 29	4.2	3.2	2.6	4.0	3.6	2.4	2.6	1.9	1.7	1.8
30 – 39	3.0	2.2	2.8	2.5	2.7	2.3	2.4	1.7	2.7	2.0
40+	0.7	0.7	0.4	0.6	0.4	0.5	0.4	0.7	0.5	0.7

Source: State and Territory Health authorities, see Methodological Notes for detail

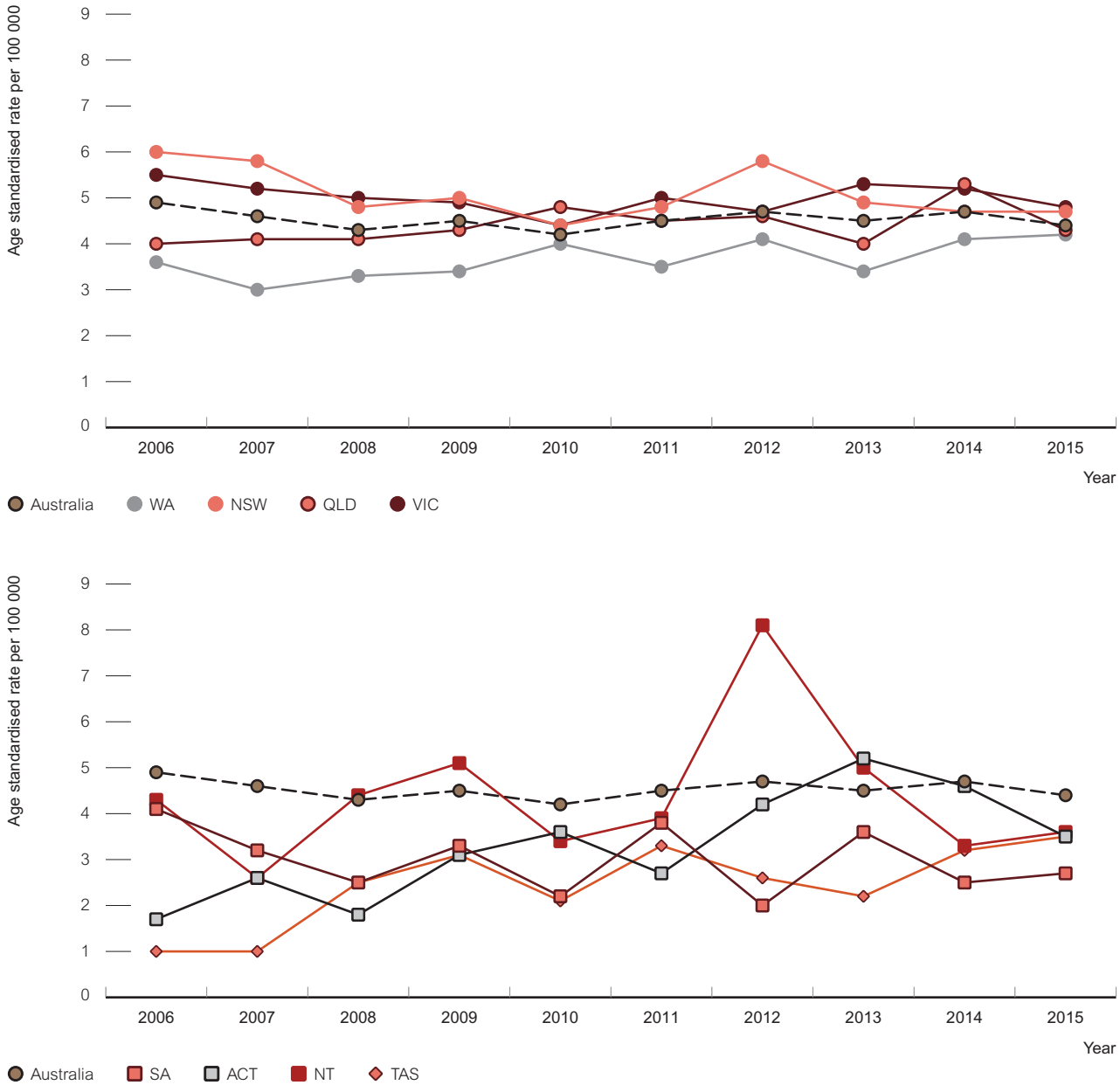
HIV

Recent trends in the population rate of newly diagnosed HIV have differed across Australia (Figure 8, Table 3). Overall, no jurisdiction has observed a long-term decreasing trend.

In Victoria, the rate of HIV notification has fluctuated over the ten year period 2006 – 2015 and was 4.8 per 100 000 population in 2015. In New South Wales there was a decline between 2006 and 2010 (6.0 per 100 000 to 4.4 per 100 000), increasing to 5.8 per 100 000 in 2012, followed by a decline in 2013 with rates steady thereafter (4.7 per 100 000 in 2015). In Queensland, since 2010 the rate of HIV notification remained relatively steady for three years, declined in 2013 and increased in 2014 to 5.3 per 100 000, declining again to 4.3 per 100 000 in 2015. Rates of HIV notification in Western Australia have fluctuated between 3.0 and 4.2 per 100 000 in the ten year period 2006 to 2015, and were 4.2 per 100 000 in 2015.

In the Australian Capital Territory, Tasmania and the Northern Territory the number of new diagnoses each year are smaller (between 4 and 21 per year) so trends need to be interpreted with caution. In the Australian Capital Territory in the past ten years, notification rates have increased and reached a similar level to NSW in 2014 (4.6 per 100 000 in 2014), declining again in 2015 to 3.5 per 100 000, and in Tasmania and Northern Territory rates have fluctuated (Figure 8, Table 3).

Figure 8 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by State/Territory



Source: State and Territory Health authorities, see Methodological Notes for detail

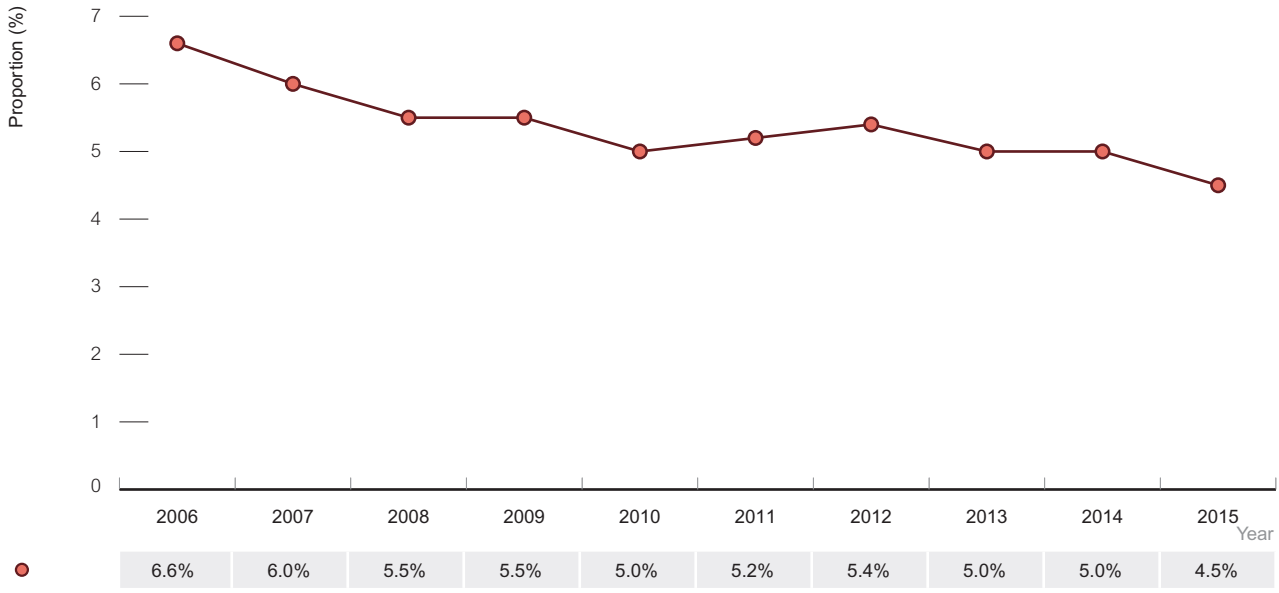
Table 3 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by State/Territory

State/Territory	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australia	4.9	4.6	4.3	4.5	4.2	4.5	4.7	4.5	4.7	4.4
New South Wales	6.0	5.8	4.8	5.0	4.4	4.8	5.8	4.9	4.7	4.7
Queensland	4.0	4.1	4.1	4.3	4.8	4.5	4.6	4.0	5.3	4.3
Victoria	5.5	5.2	5.0	4.9	4.4	5.0	4.7	5.3	5.2	4.8
Western Australia	3.6	3.0	3.3	3.4	4.0	3.5	4.1	3.4	4.1	4.2
South Australia	4.1	3.2	2.5	3.3	2.2	3.8	2.0	3.6	2.5	2.7
Australian Capital Territory	1.7	2.6	1.8	3.1	3.6	2.7	4.2	5.2	4.6	3.5
Northern Territory	4.3	2.6	4.4	5.1	3.4	3.9	8.1	5.0	3.3	3.6
Tasmania	1.0	1.0	2.5	3.1	2.1	3.3	2.6	2.2	3.2	3.5

Source: State and Territory Health authorities, see Methodological Notes for detail

Over the last ten years, HIV treatment coverage in people living with HIV has increased substantially in Australia with a corresponding reduction in viral load (see HIV care section). Studies have shown that taking combination HIV antiretroviral treatment regularly sustains an undetectable viral load and reduces the likelihood of transmission of HIV to zero. As shown in Figure 9, despite an increasing population of people living with HIV in Australia, there are fewer diagnoses being made proportionally over time. In 2015, for every 100 people living with diagnosed HIV, there were 4.5 new HIV diagnoses, which is 32% lower than the 6.6 in 2006.

Figure 9 Annual new HIV diagnoses as proportion of the estimated number of people diagnosed and living with HIV, 2006 – 2015

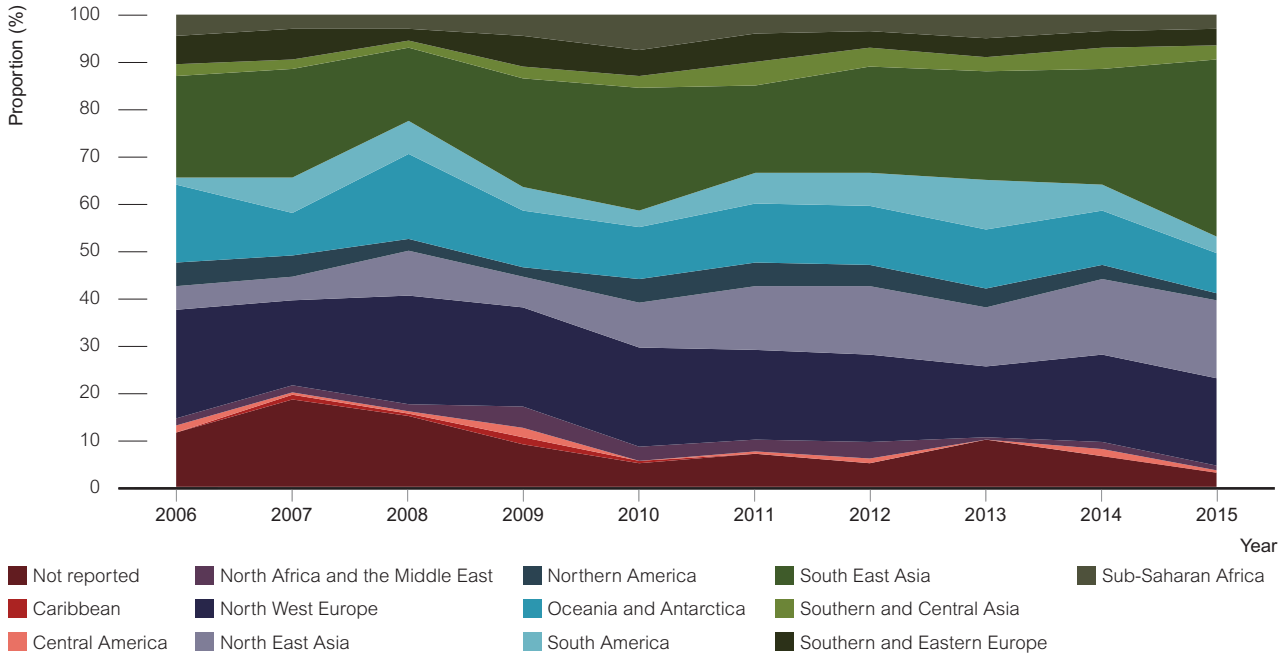


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
●	6.6%	6.0%	5.5%	5.5%	5.0%	5.2%	5.4%	5.0%	5.0%	4.5%

Source: State and Territory Health authorities, see Methodological Notes for detail on mathematical modelling for estimates of the number of people living with HIV

Men who have sex with men: The median age at HIV diagnosis for men reporting male-to-male sex as exposure risk has declined slightly over ten years and was 34 years in 2015 compared to 37 years in 2006. Of the 699 cases of HIV newly diagnosed in 2015 for which exposure to HIV was attributed to male-to-male sex, 73 (10%) of these also reported sex with women (bisexual). There were an additional 48 men for whom the likely exposure was male-to-male sex and injecting drug use (Figure 3). Over the past ten years the proportion of men diagnosed with HIV reporting male-to-male sex as exposure risk, who were born in Asia (South East, North and Southern) has increased, making up 57% of notifications in non-Australian-born men who have sex with men in 2015, compared to 30% in 2006 (Figure 10). Among Australian-born men, male-to-male sex has been the most common exposure for the last ten years, and diagnoses have been relatively stable, at between 74% and 82% each year of the past ten years.

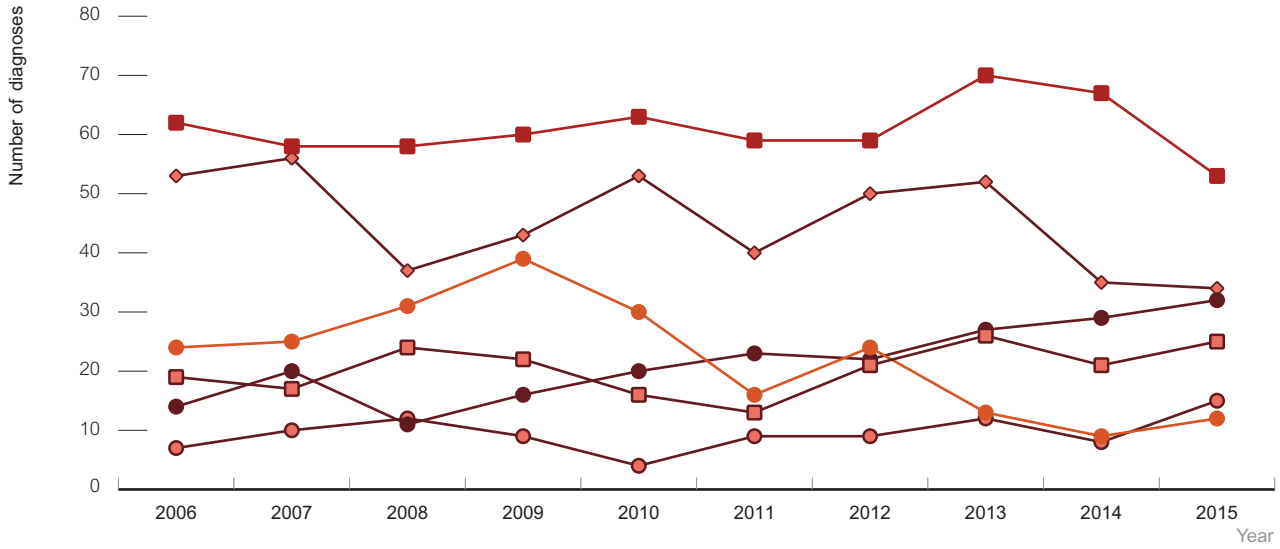
Figure 10 Proportion of HIV diagnoses by region of birth (non-Australian-born men), in men reporting male-to-male sex as risk exposure, 2006 – 2015



Source: State and Territory Health authorities

Heterosexuals: Of the 206 cases of newly diagnosed HIV in 2015 for which exposure to HIV was attributed to heterosexual sex, 36% were in people from high-prevalence countries (≥1% adult HIV prevalence in the last 10 years) or with partners from high prevalence countries. For both males and females for whom exposure to HIV was not attributed to male-to-male sex, the most common exposure category was heterosexual sex not further specified (Figures 11 and 12). The second most common exposure was being born in a high prevalence country, and for females having heterosexual contact with someone from a high prevalence country and partner at risk of HIV. Almost one third (32%, n=65) of people with newly diagnosed HIV attributed to heterosexual sex were aged 50 years or above in 2015.

Figure 11 Number of new HIV diagnoses in men (reporting an exposure risk other than male-to-male sex), 2006 – 2015, by risk exposure category

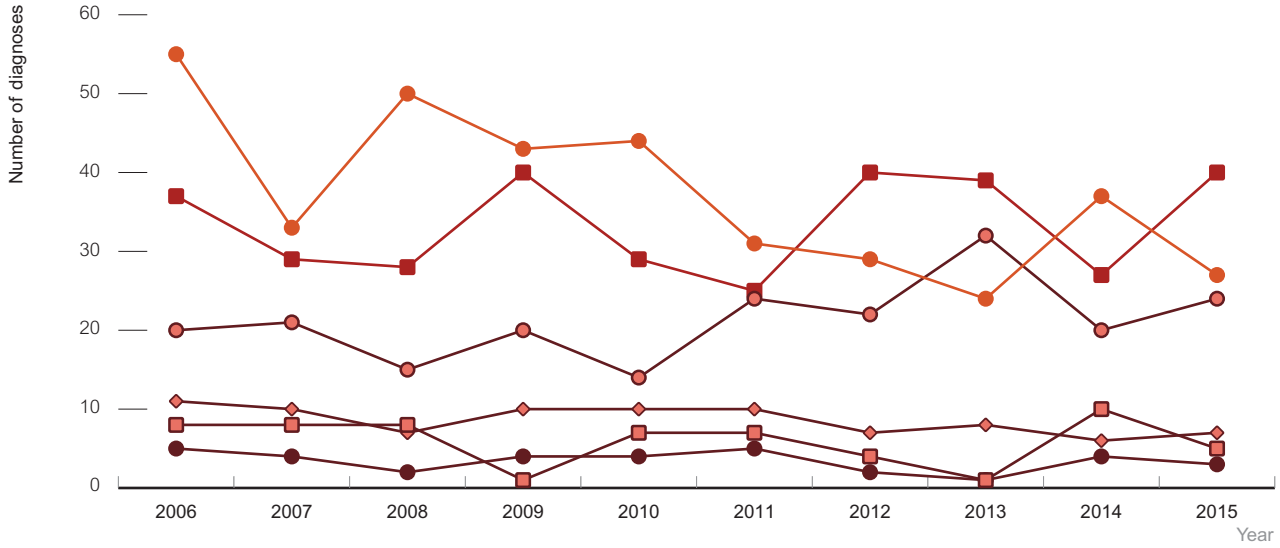


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Injecting drug use	19	17	24	22	16	13	21	26	21	25
Partner HIV risk*	7	10	12	9	4	9	9	12	8	15
Person from a high prevalence country	24	25	31	39	30	16	24	13	9	12
Partner from a high prevalence country	14	20	11	16	20	23	22	27	29	32
Heterosexual contact not further specified	62	58	58	60	63	59	59	70	67	53
Other/undetermined	53	56	37	43	53	40	50	52	35	34

* Includes sex with a person who injects drugs, bisexual male, someone who received blood/tissue, or a person with haemophilia/clotting disorder

Source: State and Territory health authorities

Figure 12 Number of new HIV diagnoses in women, 2006 – 2015, by risk exposure category



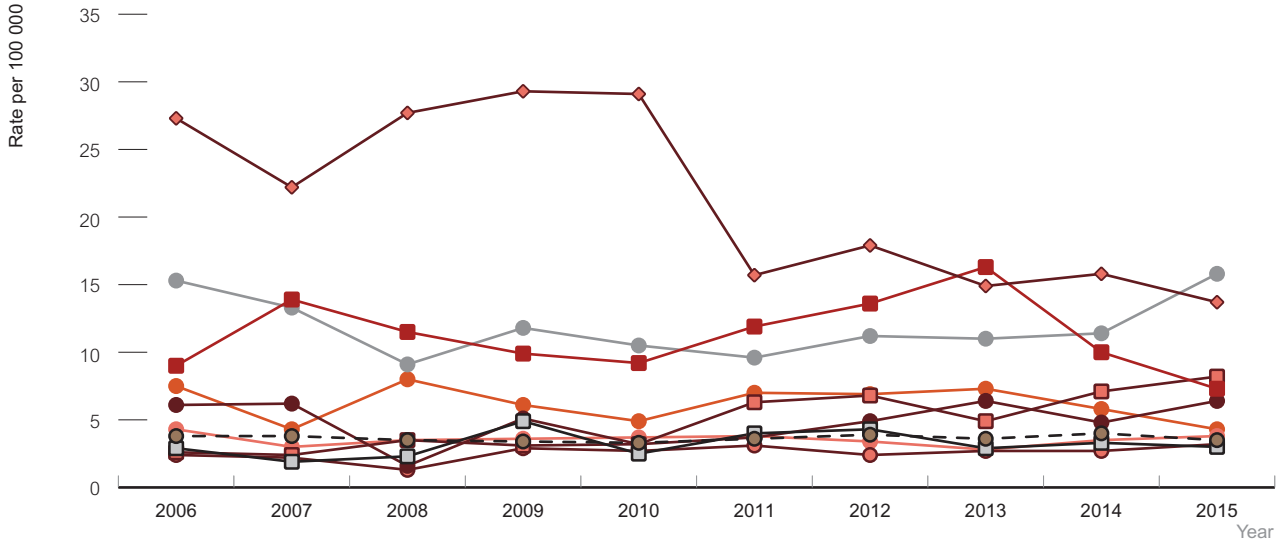
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Injecting drug use	8	8	8	1	7	7	4	1	10	5
Partner HIV risk*	20	21	15	20	14	24	22	32	20	24
Person from a high prevalence country	55	33	50	43	44	31	29	24	37	27
Partner from a high prevalence country	5	4	2	4	4	5	2	1	4	3
Heterosexual contact not further specified	37	29	28	40	29	25	40	39	27	40
Other/undetermined	11	10	7	10	10	10	7	8	6	7

* Includes sex with a person who injects drugs, bisexual male, someone who received blood/tissue, or a person with haemophilia/clotting disorder

Source: State and Territory health authorities

Among Australian-born cases, the rate of HIV notification was stable at around 3.5 per 100 000 from 2006 to 2015 (Figure 13). In overseas born populations, the highest HIV notification rates in 2015 were in people born in South-East Asia (15.8 per 100 000) and sub-Saharan Africa (13.7 per 100 000). In the sub-Saharan African born population the rate of HIV notification has decreased by 50% since 2006 (from 27.3 to 13.7 per 100 000 in 2015). The HIV notification rate for those born in South-East Asia fluctuated but increased sharply between 2014 and 2015 (from 11.4 per 100 000 in 2014 to 15.8 per 100 000 in 2015), and increased steadily in the North-East Asian born population (from 2.6 per 100 000 in 2006 to 8.2 per 100 000 per 100 000 in 2015). Rates of HIV among people born in the Americas (North and South America) have fluctuated over the ten year period with a peak of 16.3 per 100 000 in 2013, dropping to 7.3 per 100 000 in 2015.

Figure 13 Newly diagnosed HIV notification rate per 100 000 population, 2006 – 2015, by country/region of birth

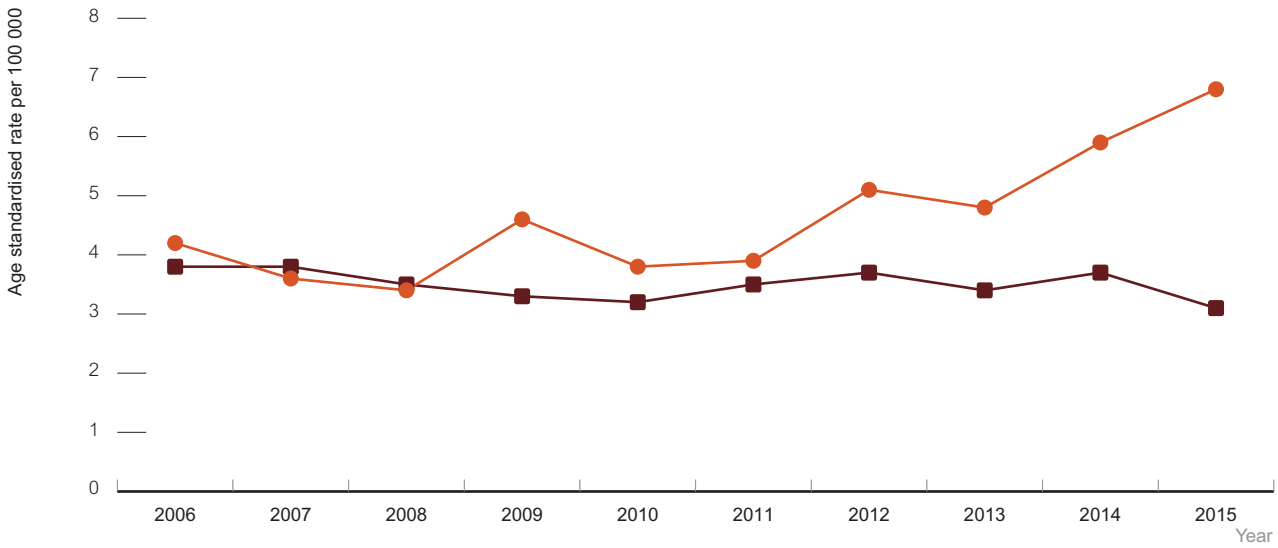


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australia	3.8	3.8	3.5	3.4	3.3	3.6	3.9	3.6	4.0	3.5
Oceania and Antarctica	7.5	4.3	8.0	6.1	4.9	7.0	6.9	7.3	5.8	4.3
North-West Europe	4.3	3.0	3.5	3.6	3.7	3.8	3.4	2.8	3.5	3.8
Southern and Eastern Europe	2.4	2.2	1.3	2.9	2.7	3.1	2.4	2.7	2.7	3.2
North Africa and the Middle East	6.1	6.2	1.6	5.1	3.2	3.7	4.9	6.4	4.8	6.4
South-East Asia	15.3	13.3	9.1	11.8	10.5	9.6	11.2	11.0	11.4	15.8
North-East Asia	2.6	2.4	3.5	3.1	3.2	6.3	6.8	4.9	7.1	8.2
Southern and Central Asia	2.9	1.9	2.3	4.9	2.5	4.0	4.3	2.9	3.3	3.0
Americas	9.0	13.9	11.5	9.9	9.2	11.9	13.6	16.3	10.0	7.3
Sub-Saharan Africa	27.3	22.2	27.7	29.3	29.1	15.7	17.9	14.9	15.8	13.7

Source: State and Territory health authorities, see Methodological Notes for details

Aboriginal and Torres Strait Islander peoples: In 2015, of the 1 025 notifications of newly diagnosed HIV, 38 were identified in the Aboriginal and Torres Strait Islander population. The majority of Aboriginal and Torres Strait Islander notifications in 2015 were in males (89%), an increase from 76% in 2014, and the median age at diagnosis was 38 years (Table 4). When comparing 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 (Figure 14). Age standardised rates of HIV notification among the Aboriginal and Torres Strait Islander population were similar to the Australian-born non-Indigenous population until 2009 when they diverged, and in 2015 were 2.2 times greater among the Aboriginal and Torres Strait Islander population (6.8 per 100 000) compared to the Australian-born non-Indigenous population (3.1 per 100 000). The recent trends in the rates of HIV notification in the Aboriginal and Torres Strait Islander population are based on small numbers and may reflect localised occurrences rather than national patterns (see Table 4 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 2016* for further detail).

Figure 14 Newly diagnosed HIV notification rate per 100 000 Australian-born population, 2006 – 2015, by Aboriginal and Torres Strait Islander status

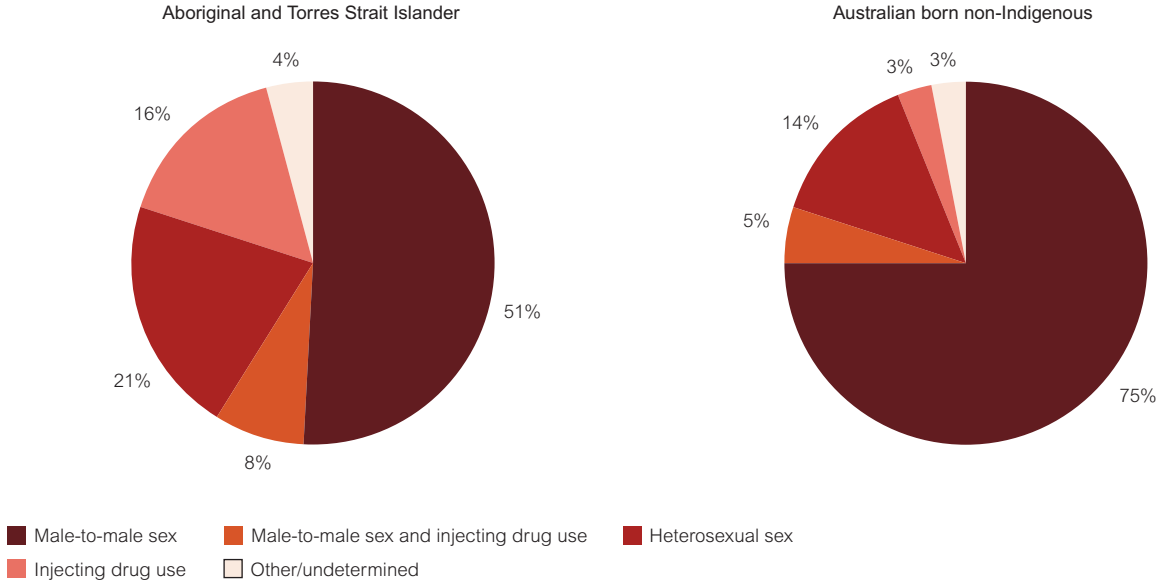


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australian-born Non-Indigenous	3.8	3.8	3.5	3.3	3.2	3.5	3.7	3.4	3.7	3.1
Aboriginal and Torres Strait Islander	4.2	3.6	3.4	4.6	3.8	3.9	5.1	4.8	5.9	6.8

Source: State and Territory health authorities; see Methodological Notes for detail

In the past five years, a greater proportion of HIV diagnoses in the Aboriginal and Torres Strait Islander population were attributed to heterosexual sex (21%) or injecting drug use (16%), compared with the Australian-born non-Indigenous population (14% and 3%, respectively) (Figure 15).

Figure 15 Newly diagnosed HIV and HIV exposure category, 2011 – 2015, by Aboriginal and Torres Strait Islander status



Source: State and Territory health authorities

HIV

Table 4 Characteristics of cases of newly diagnosed HIV in Aboriginal and/or Torres Strait Islander peoples, 2006 – 2015

	Year of HIV diagnosis										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2006 – 2015[1]
Characteristic											
Total cases[2]	23	19	19	24	22	24	33	26	33	38	261
Sex											
Male	17	16	15	20	15	18	27	22	25	34	209
Female	6	3	4	3	7	6	6	4	7	4	50
Median age (years)	31	33	36	37	35	32	27	36	34	38	34
Newly acquired HIV n (%)[3]	7 (30.4)	5 (26.3)	6 (31.6)	7 (29.2)	5 (22.7)	5 (20.8)	10 (30.3)	9 (34.6)	8 (24.2)	11 (29.0)	73 (27.9)
Late and advanced HIV status at HIV diagnosis (%)[4]											
Late HIV diagnosis	23.5	40.0	33.3	40.9	25.0	34.8	37.5	40.0	30.0	30.3	33.3
Advanced HIV diagnosis	11.8	13.3	20.0	31.8	10.0	30.4	29.2	25.0	20.0	15.2	21.0
State/Territory, n											
Australian Capital Territory	0	0	0	0	0	0	0	0	0	0	0
New South Wales	9	8	8	9	7	6	11	8	7	6	79
Northern Territory	0	0	1	0	1	2	2	1	1	1	9
Queensland	6	5	2	8	8	8	14	9	14	13	87
South Australia	0	1	4	2	1	1	1	2	0	2	14
Tasmania	0	0	0	1	0	1	2	2	2	2	8
Victoria	2	3	0	1	3	1	5	4	6	7	32
Western Australia	6	2	4	3	2	5	0	0	3	7	32
HIV exposure category, %											
Men who have sex with men	47.8	47.4	47.4	41.7	54.5	62.5	69.7	23.1	39.4	55.3	49.2
Men who have sex with men and injecting drug use	4.4	15.8	5.3	12.5	4.6	0.0	6.1	19.2	9.1	7.9	8.4
Injecting drug use[5]	21.7	15.8	36.8	8.3	18.2	4.2	6.1	23.1	27.3	15.8	17.2
Heterosexual sex	26.1	21.1	10.5	16.7	13.6	25.0	18.2	30.8	15.2	18.4	19.5
Mother with/at risk of HIV infection	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.4
Other/undetermined exposure	0.0	0.0	0.0	20.8	9.1	4.2	0.0	3.9	9.1	2.6	5.0

1 Not adjusted for multiple reporting

2 Includes 'Other/not reported'

3 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 of HIV diagnosis.

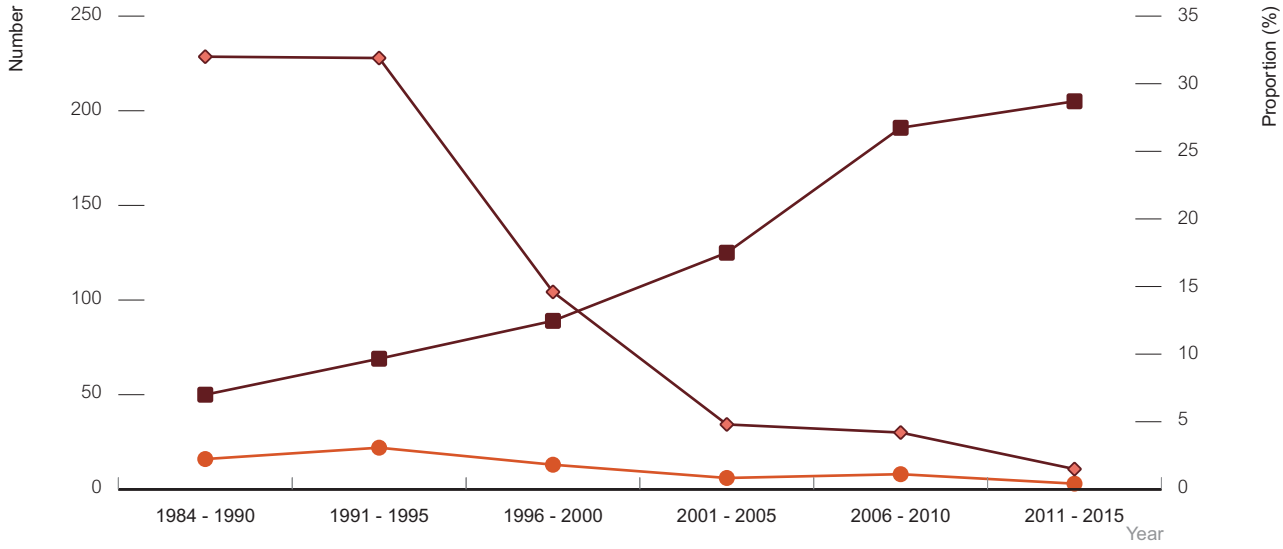
4 Late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/μL, and advanced HIV as newly diagnosed infection with a CD4+ cell count of less than 200 cells/μL. Excludes notifications with no CD4+ cell count available.

5 Excludes men who have sex with men

Source: State and Territory health departments

Pregnant women: Among 205 infants born to HIV-positive mothers in the five-year period 2011 – 2015, the transmission rate to newborns was 1.5%, compared to 32% in the period 1984 – 1990 and 1991 – 1995 (Figure 16). In the past ten years, the transmission rate has dropped from 13.0% in 2006, to 0.0% for the last three years (Figure 17).

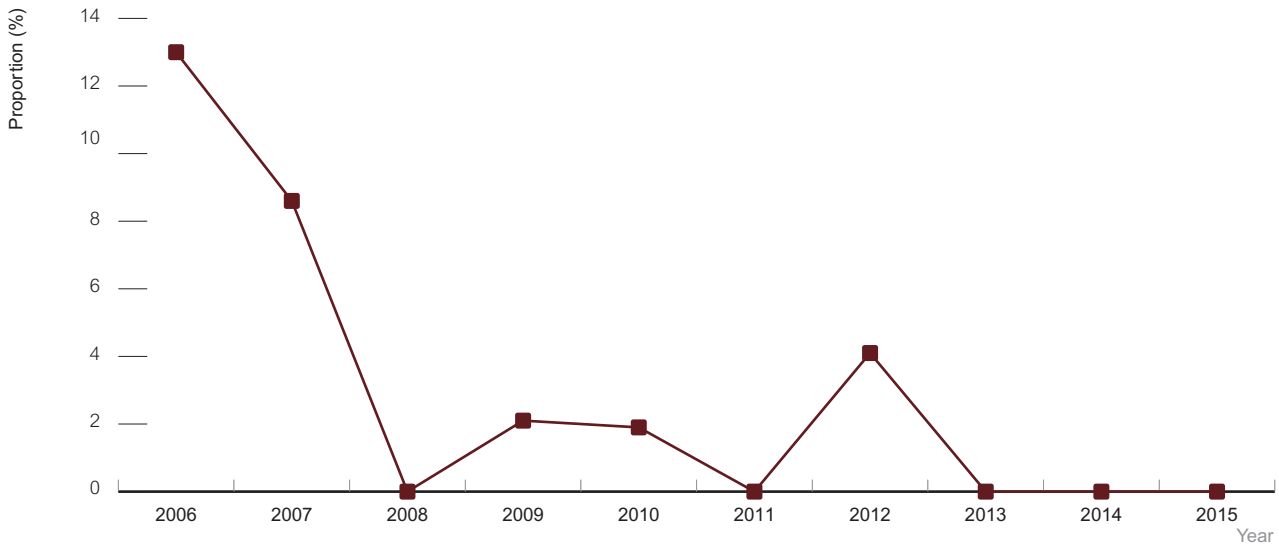
Figure 16 Number of Australian-born children perinatally exposed to HIV and HIV positive, 1984 – 2015, by year of birth



	1984 - 1990	1991 - 1995	1996 - 2000	2001 - 2005	2006 - 2010	2011 - 2015
Perinatally exposed	50	69	89	125	191	205
HIV positive (n)	16	22	13	6	8	3
HIV positive (%)	32.0%	31.9%	14.6%	4.8%	4.2%	1.5%

Source: Australian Paediatric Surveillance Unit, see Methodological Notes for detail

Figure 17 Proportion of Australian-born perinatally exposed infants who were HIV positive, 2006 – 2015, by year of birth



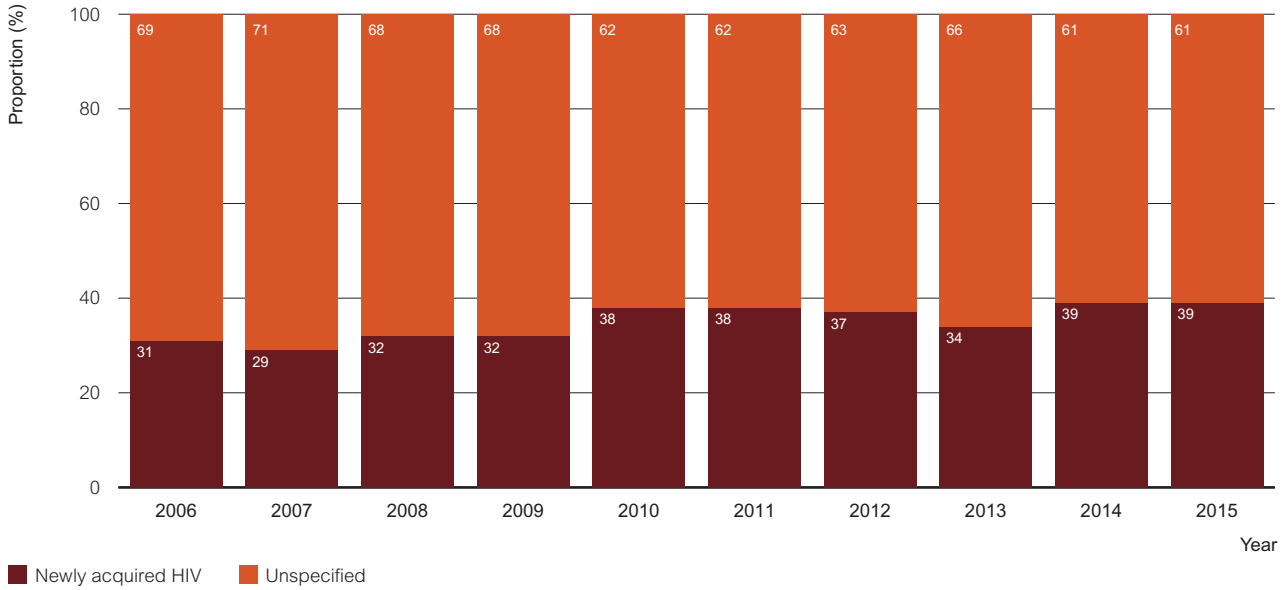
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
HIV positive (%)	13.0%	8.6%	0.0%	2.1%	1.9%	0.0%	4.1%	0.0%	0.0%	0.0%

Source: Australian Paediatric Surveillance Unit, see Methodological Notes for detail

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 test or other laboratory and clinical markers. The number of cases that had evidence of acquisition within twelve months

of diagnosis has been increasing over the last 10 years (Table 2), with 397 cases in 2015. The proportion of all notifications that are reported to be newly acquired increased from 31% in 2006 to 38% in 2010 and has been relatively stable since then, and was 39% in 2015 (Figure 18). 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. Men who have sex with men accounted for 84% of diagnoses of newly acquired HIV (where there is evidence of infection in the last 12 months) (Figure 19), likely reflecting more frequent testing in this population (see page 59 for further details of HIV testing frequency among gay and bisexual men). The rate of newly acquired infection in 2015 by jurisdiction was highest in New South Wales, Victoria and the Australian Capital Territory (Figure 20).

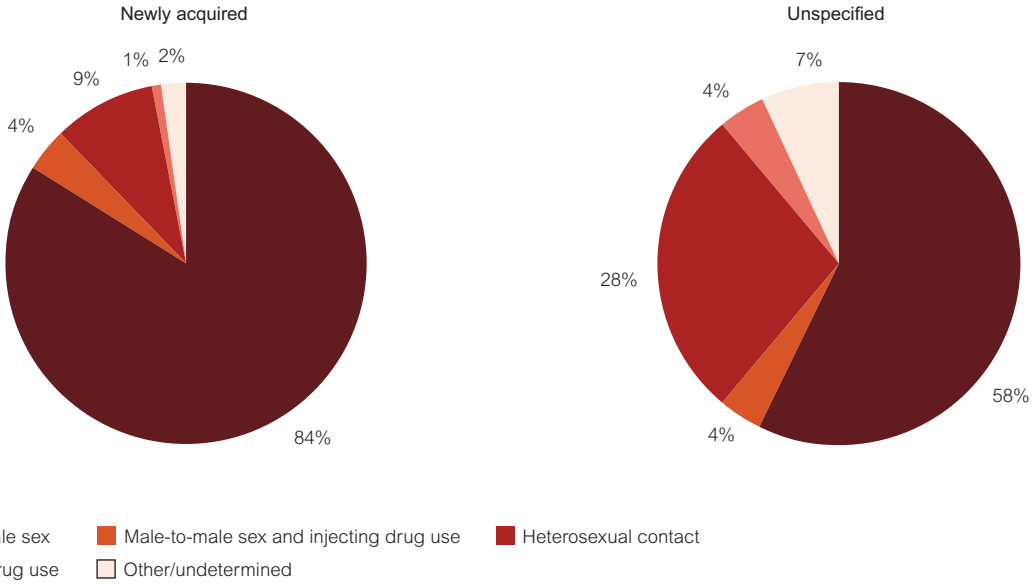
Figure 18 Newly diagnosed HIV in Australia, 2006 – 2015, by newly acquired[1] HIV status and year



1 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 of HIV diagnosis. Unspecified diagnoses are all diagnoses that do not meet the definition for newly acquired HIV.

Source: State and Territory health authorities, see Methodological Notes for detail

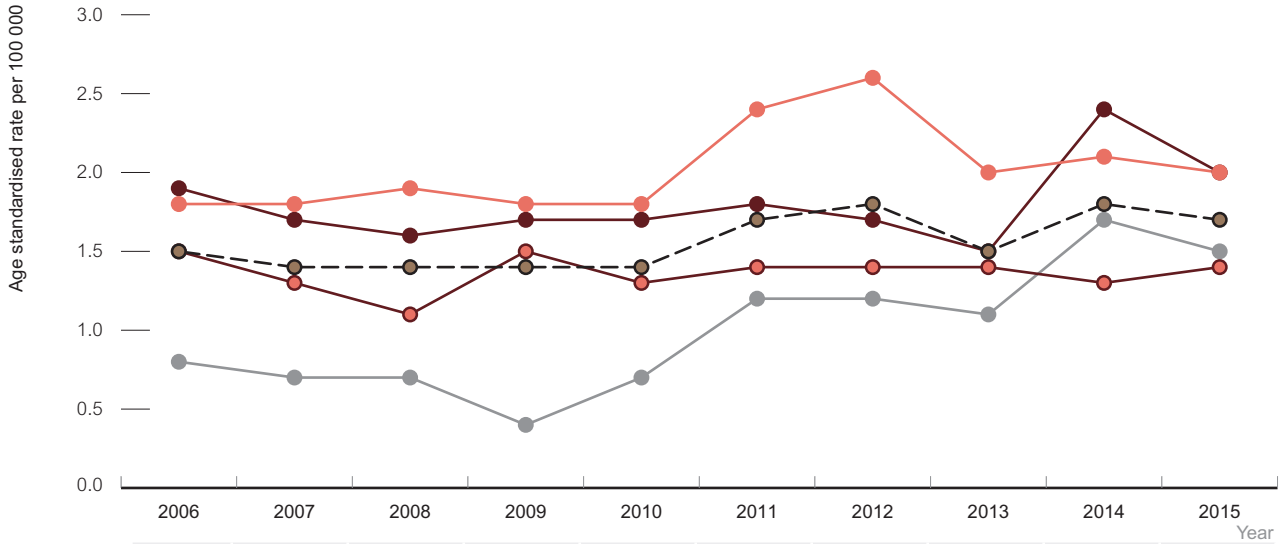
Figure 19 Exposure category of HIV diagnoses classified as newly acquired or unspecified[1] in Australia, 2006 – 2015



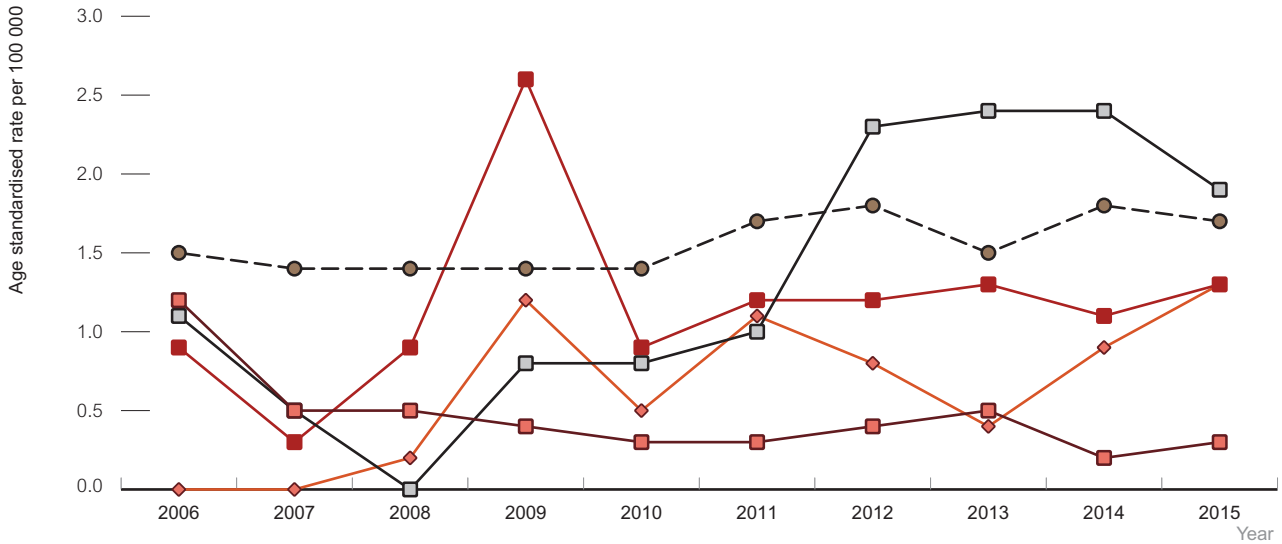
1 Newly acquired HIV was defined as newly diagnosed infection with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year of HIV diagnosis. Unspecified diagnoses are all diagnoses that do not meet the definition for newly acquired HIV.

Source: State and Territory health authorities

Figure 20 Newly acquired HIV notification rate per 100 000 population, 2006 – 2015, by State/Territory



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NSW	1.8	1.8	1.9	1.8	1.8	2.4	2.6	2.0	2.1	2.0
QLD	1.5	1.3	1.1	1.5	1.3	1.4	1.4	1.4	1.3	1.4
Vic	1.9	1.7	1.6	1.7	1.7	1.8	1.7	1.5	2.4	2.0
WA	0.8	0.7	0.7	0.4	0.7	1.2	1.2	1.1	1.7	1.5
Australia	1.5	1.4	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ACT	1.1	0.5	0.0	0.8	0.8	1.0	2.3	2.4	2.4	1.9
NT	0.9	0.3	0.9	2.6	0.9	1.2	1.2	1.3	1.1	1.3
SA	1.2	0.5	0.5	0.4	0.3	0.3	0.4	0.5	0.2	0.3
Tas	0.0	0.0	0.2	1.2	0.5	1.1	0.8	0.4	0.9	1.3
Australia	1.5	1.4	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7

Source: State and Territory health authorities

Late and advanced HIV diagnoses

An indicator of how long a person has had HIV is the CD4+ cell count per microlitre, which is above 500 in most people without HIV, and declines on average by 50 – 100 per year in people with HIV[1]. The proportion of newly diagnosed HIV cases with a late diagnosis, defined by a CD4+ cell count less than 350 cells/μL at diagnosis, has declined by 19% in the last ten years , from 36% in 2006 to 29% in 2015 (Table 2).

In 2015, the proportion of HIV notifications with late diagnosis was highest in those born in sub-Saharan Africa (43%) and South-East Asia (40%). Among people reporting heterosexual sex as an exposure risk 48% were diagnosed late in 2015, compared to 22% in those reporting male-to-male sex. In Aboriginal and Torres Strait Islander peoples the proportion with a late diagnosis was 30% in 2015, and 34% overall in the past 10 years.

Further investigation of late diagnoses in the past five years shows that among HIV diagnoses attributed to male-to-male sex, late diagnosis was more common (>30%) among men born in South-East Asia and sub-Saharan Africa, older men (>50 years), men living in regional areas and in men reporting bisexual sex (Table 5, Figure 21). However it is important to note that in the past five years, of all notifications, half (53%, n=712) of all late diagnoses were among men who have sex with men and 81% resided in urban areas.

Among male cases attributed to heterosexual sex, high levels of late diagnosis was observed across all categories, reaching 60% or more among people born in South-East Asia (Table 6, Figure 22). Similarly, among female cases attributed to heterosexual sex, high levels of late diagnosis were observed across all categories, reaching 60% or more among people born in South-East Asia and those older than 50 years (Table 6, Figure 23).

The known trajectory of CD4+ cell count per microlitre and time of arrival among those born overseas can also be used to estimate the proportion of infections acquired before arriving in Australia. Of the late diagnoses (CD4+ cell count less than 350 cells/μL) in 2015 among people born in South-East Asia, 60% arrived in Australia within five years, and among those from sub-Saharan Africa, 67% arrived in Australia within five years, suggesting most late diagnoses were in people who had acquired HIV before arriving in Australia.

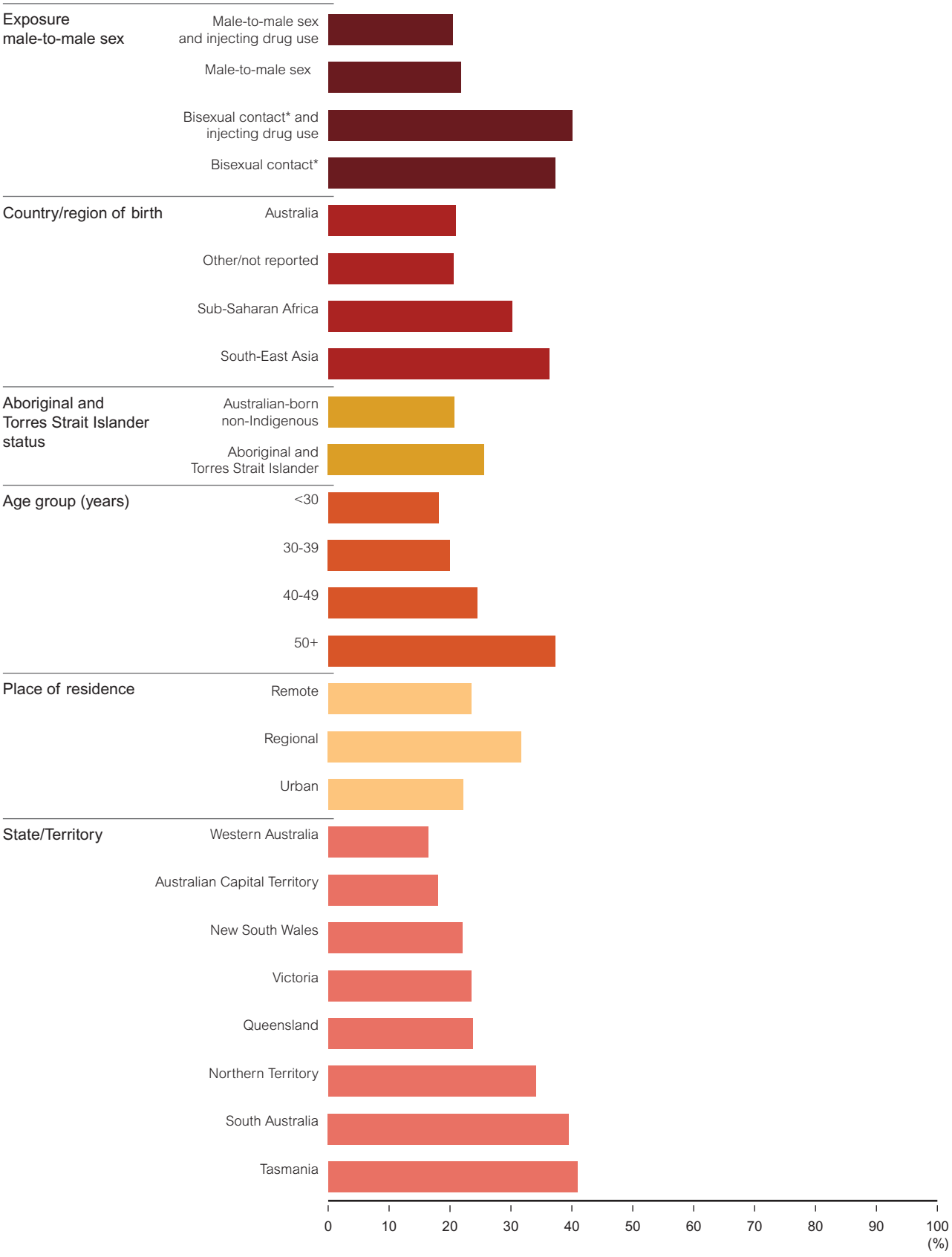
Table 5 Late HIV diagnoses[1] in people reporting an exposure category that included male-to-male sex, 2011 – 2015 by key characteristics (n=3 260)

Category		Number diagnosed[2]	Number with late diagnosis	% with late diagnosis
Exposure Male-to-male-sex	Male-to-male-sex	2 818	614	21.8
	Male-to-male-sex and injecting drug use	137	28	20.4
	Bisexual[3]	263	98	37.3
	Bisexual contact and injecting drug use	42	13	40.0
Country/region of birth	Australia	2 102	439	20.9
	Sub-Saharan Africa	43	13	30.2
	South-East Asia[4]	460	167	36.3
	Other/not reported	655	134	20.5
Aboriginal and Torres Strait Islander status[5]	Aboriginal and Torres Strait Islander	78	20	25.6
	Australian-born non-Indigenous	2 024	419	20.7
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[6]	Urban	2 835	625	22.1
	Regional	350	111	31.7
	Remote	17	4	23.5
State	New South Wales	1 369	301	22.0
	Victoria	723	170	23.5
	Queensland	683	162	23.7
	South Australia	114	45	39.5
	Western Australia	244	40	16.4
	Australian Capital Territory	61	11	18.0
	Tasmania	22	9	40.9
	Northern Territory	44	15	34.1

1 Late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/μl. Newly acquired HIV notifications excluded from late category. Notifications without a CD4+ cell count available were excluded.
2 Denominator only includes those for whom a CD4+ cell count was available
3 Men who reported male-to-male sex and sex with women
4 Includes ABS regions of birth South-East Asia and North East Asia to include China
5 Will not add total as only includes Australian-born non-Indigenous
6 Excludes notifications with no postcode provided

Source: State and Territory health authorities

Figure 21 The proportion of late diagnoses in men who reported sex with men as an exposure risk, 2011 – 2015, by sub-category (n=3 260)



* Men who reported male-to-male sex and also sex with women

Source: State and Territory health authorities

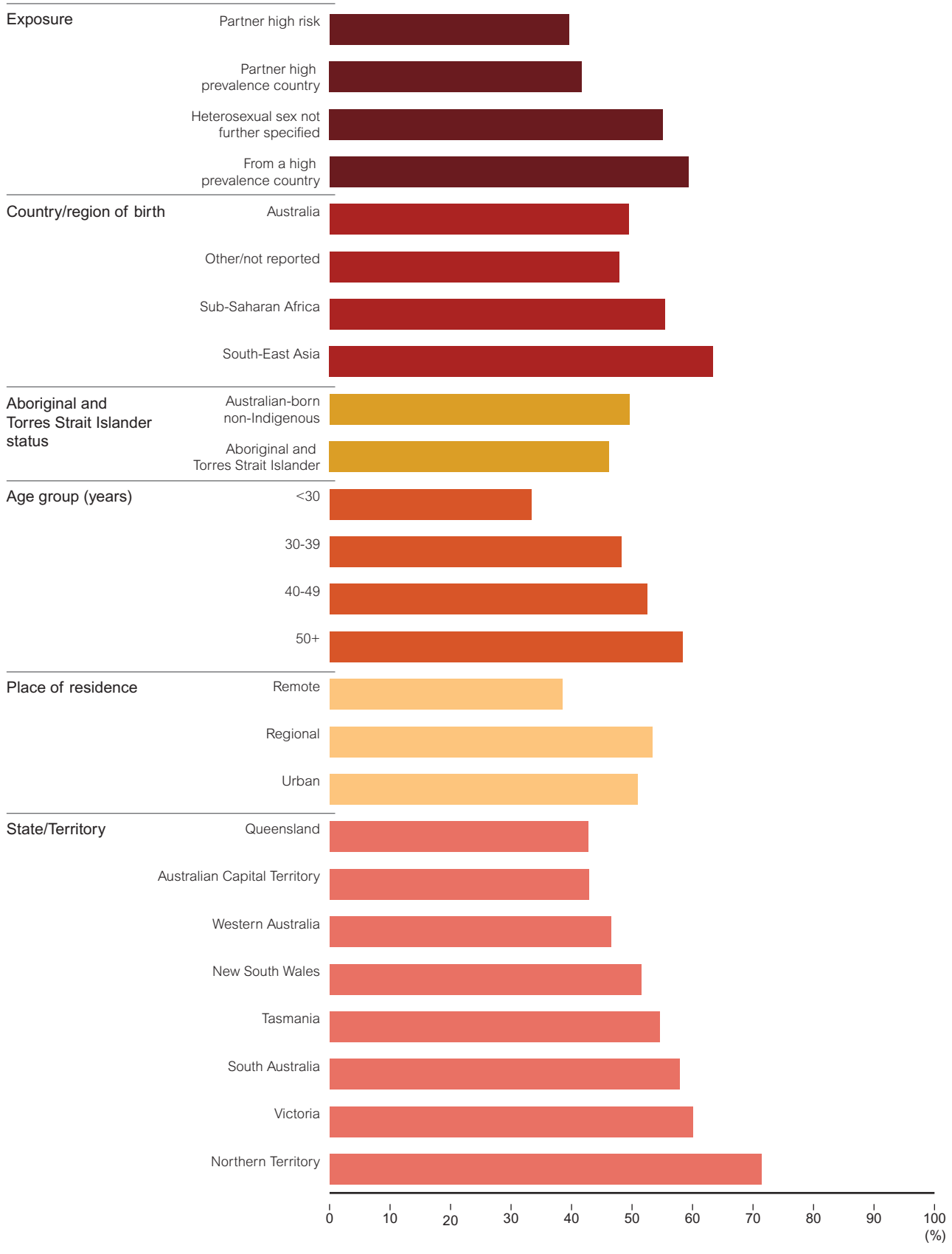
Table 6 Late HIV diagnoses[1] in people reporting an exposure category of heterosexual sex, 2011 – 2015 by key characteristics

		Heterosexual sex – males			Heterosexual sex - females		
		Number diagnosed[2]	Number with late diagnosis	% with late diagnosis	Number diagnosed[2]	Number with late diagnosis	% with late diagnosis
Category							
Exposure heterosexual sex	From high prevalence	59	35	59.3	132	71	53.8
	Partner high prevalence	120	50	41.7	14	4	28.6
	Partner HIV risk	48	19	39.6	103	35	34.0
	Heterosexual sex not further specified	263	145	55.1	148	73	49.3
Country birth	Australia	255	126	49.4	129	38	29.5
	Sub-Saharan Africa	56	31	55.4	99	47	47.5
	South-East Asia[3]	41	26	63.4	89	62	69.7
	Other/not reported	138	66	47.8	80	36	45.0
Aboriginal and Torres Strait Islander status	Aboriginal and Torres Strait Islander	13	6	46.2	17	7	41.2
	Australian-born non-Indigenous	242	120	49.6	112	31	27.7
Age group (years)	<30	69	23	33.3	136	45	33.1
	30 – 39	112	54	48.2	137	72	52.6
	40 – 49	141	74	52.5	69	31	44.9
	50+	168	98	58.3	55	35	63.6
Place of residence	Urban	375	191	50.9	293	138	47.1
	Regional	90	48	53.3	86	40	46.5
	Remote	13	5	38.5	10	2	20.0
State	New South Wales	136	70	51.5	119	57	47.9
	Victoria	75	45	60.0	64	31	48.4
	Queensland	110	47	42.7	75	32	42.7
	South Australia	38	22	57.9	38	17	44.7
	Western Australia	99	46	46.5	70	29	41.4
	Australian Capital Territory	7	3	42.9	10	5	50.0
	Tasmania	11	6	54.6	8	6	75.0
	Northern Territory	14	10	71.4	13	6	46.2

1 Late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/µl. Newly acquired HIV notifications excluded from late category.
2 Denominator only includes those for whom a CD4+ cell count was available
3 Includes ABS regions of birth South-East Asia and North-East Asia to include China

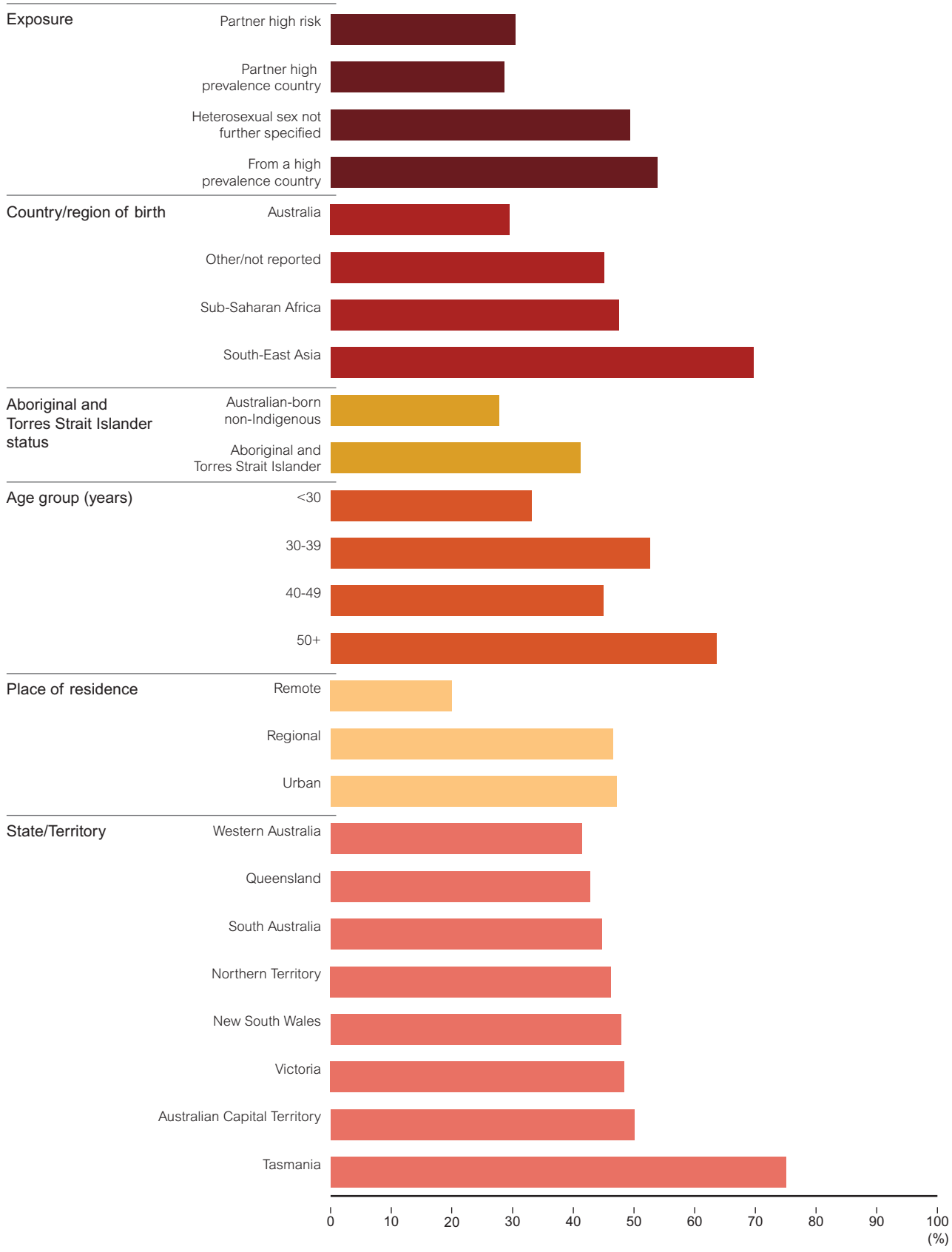
Source: State and Territory health authorities

Figure 22 The proportion of late diagnoses in people who reported heterosexual sex as an exposure risk, 2011 – 2015, by sub-category (n=490), males



Source: State and Territory health authorities

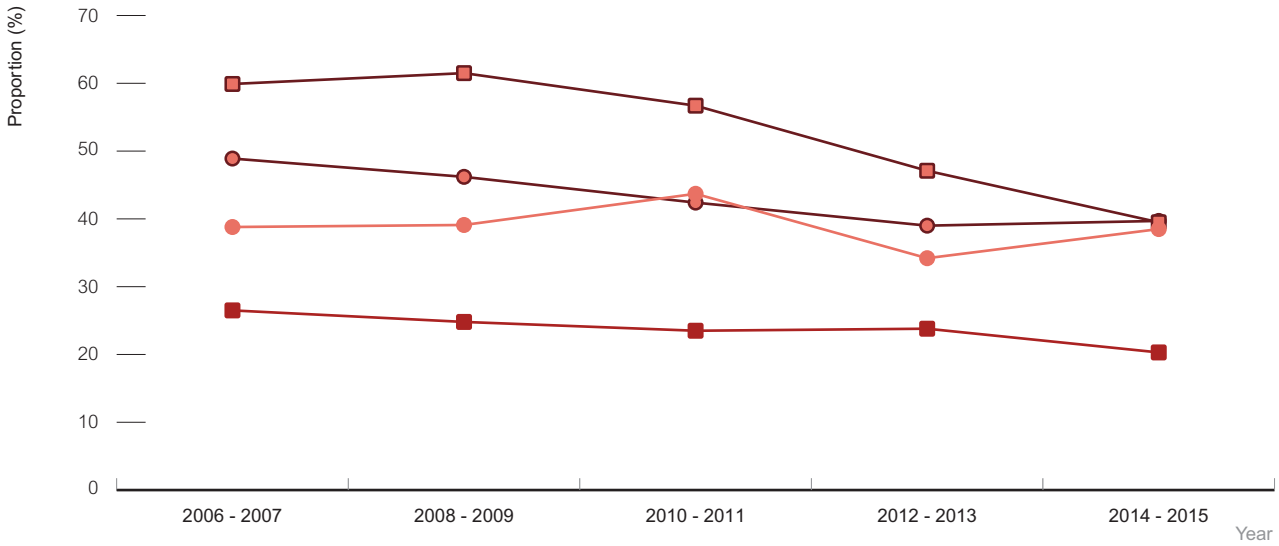
Figure 23 The proportion of late diagnoses in people who reported heterosexual sex as an exposure risk, 2011 – 2015, by sub-category (n=397), females



Source: State and Territory health authorities

Over the ten years from 2006 – 2015, the proportion of late diagnoses has been highest among people born in a high HIV prevalence country (≥1%), who also reported heterosexual sex with someone from a high prevalence country (between 40 and 60%) (Figure 24). The proportion of late diagnoses has declined among people reporting an exposure risk of male-to-male sex or male-to-male sex and injecting drug use, from 27% in 2006 – 2007 to 20% in 2014 – 2015 (Figure 24).

Figure 24 Proportion of late[1] HIV diagnoses, 2006 – 2015, by select exposure category



	2006 - 2007	2008 - 2009	2010 - 2011	2012 - 2013	2014 - 2015
Male-to-male sex and male-to-male sex and injecting drug use	26.5%	24.8%	23.5%	23.8%	20.3%
Bisexual	38.8%	39.1%	43.7%	34.2%	38.5%
From a high prevalence country	59.9%	61.5%	56.7%	47.1%	39.5%
Partner from a high prevalence country	48.9%	46.2%	42.4%	39.0%	39.7%

1 Late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/µl

Source: State and Territory health authorities

Prevalence and morbidity

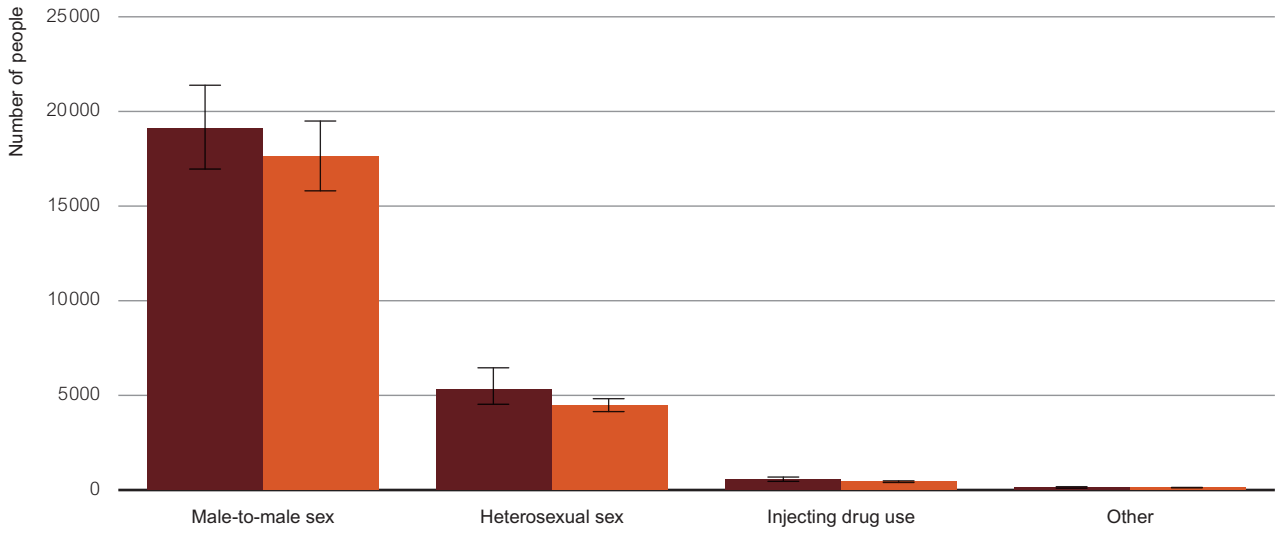
Number of people living with HIV

At the end of 2015, there were an estimated 19 097 (16 944 – 21 341) people living in Australia with HIV who had an exposure category of male-to-male sex at the time of diagnosis, 5 306 (4 499 – 6 470) heterosexual sex, 541 (448 – 675) injecting drug use and, 142 (127 – 156) 'other' exposures (mother-to-child transmission, blood/tissue–recipient, health care setting, haemophilia/coagulation disorder) (Figure 25).

There were an estimated 469 (423 – 511) people living in Australia with HIV who identified as Aboriginal and Torres Strait Islander at the time of HIV diagnosis. After adjusting for missing country of birth data, there were 2 360 (2 163 – 2 569) people living with HIV born in South-East Asia and 2 004 (1 701 – 2 443) born in sub-Saharan Africa (Table 7).

The CD4 back-calculation method provides an estimate of the number of people who remain undiagnosed with HIV. In 2015, there were 2 618 (10%) people living with HIV who were undiagnosed. Among men who have sex with men (MSM) living with HIV, 8% were undiagnosed (range: 0 – 17%), and among non-MSM, 18% were undiagnosed (range: 11 – 24%) (Figure 25).

Figure 25 Estimated number of people living with HIV by reported exposure category, Australia, 2015



	People living with HIV (range)	Number undiagnosed (range)
Exposure category		
Men who have sex with men	19 097 (16 944 – 21 341)	1 466 (0 – 3 276)
Heterosexuals	5 306 (4 499 – 6 470)	827 (476 – 1 175)
People who inject drugs	541 (448 – 675)	84 (37 – 130)
Other	142 (127 – 156)	15 (3 – 26)

Source: see Methodological Notes for details

HIV

Table 7 Estimated number of people living with HIV and HIV prevalence, 2015, Australia

	Total HIV (range)	Number undiagnosed (range)	HIV prevalence (range)	Population size (>15 years of age)
Demographics				
Australian-born non-Indigenous	14 675 (12 878 – 16 584)	1 518 (0 – 3 012)	0.11% (0.10 – 0.13)	12 995 040
Aboriginal and Torres Strait Islander people	469 (423 – 511)	61 (34 – 93)	0.10% (0.09 – 0.11)	481 328
Born in Sub-Saharan Africa	2 004 (1 701 – 2 443)	312 (180 – 442)	0.74% (0.63-0.90)	270 440
Born in South-East Asia	2 360 (2 163 – 2 569)	244 (85 – 401)	0.32% (0.29-0.34)	746 850
Other country of birth	5 938 (5 318 – 6 595)	615 (97 – 1 122)	0.12% (0.11-0.14)	4 816 072
Total[1]	**25 313 (22 513 – 28 281)**	**2 619 (267 – 4 924)**	**0.13% (0.12 – 0.15)**	**19 309 730**

Note: Sum of sub-populations will not add to the total estimated people living with HIV due to different death rate assumptions for Aboriginal and Torres Strait Islander populations

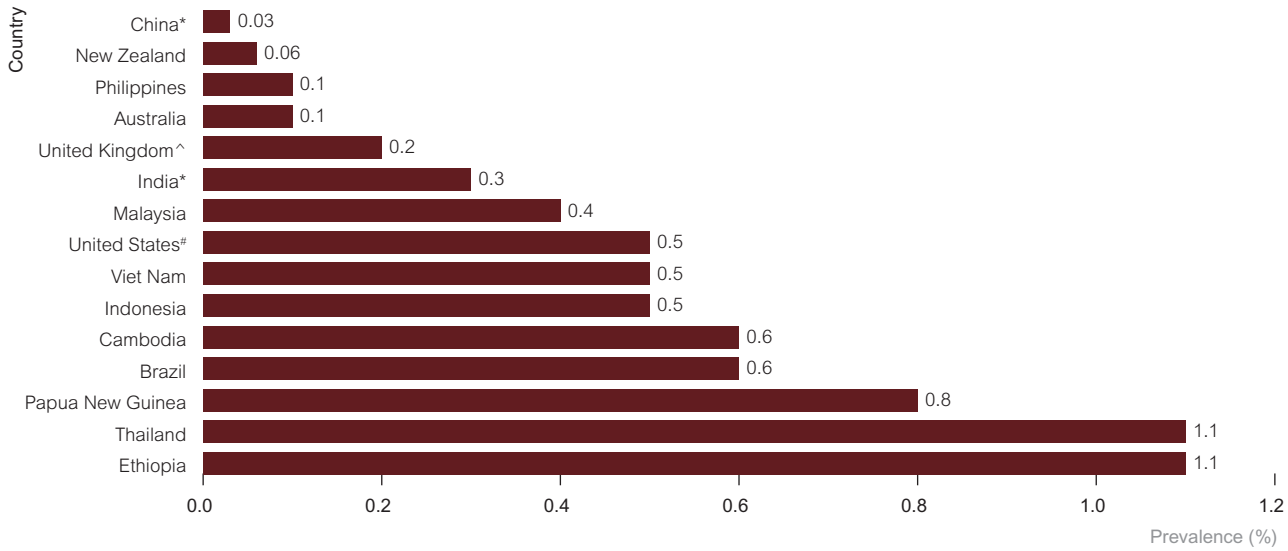
Source: see Methodological Notes for detail

HIV prevalence

In Australia, the estimated HIV prevalence among adults aged older than 15 years was 0.13% (0.12%-0.15%) in 2015 (Table 7). At 0.13%, the prevalence is low compared to that reported to UNAIDS by other high income countries, and countries in the region (Figure 26). The level of HIV in Australia is lower than in the United Kingdom in 2014 (0.2%) and the United States in 2012 (0.5%) (Figure 26). The crude HIV prevalence among Aboriginal and Torres Strait Islander people was estimated to be 0.10% in 2014 (Table 7).

Australia has a concentrated epidemic among men who have sex with men. The Gay Community Periodic Survey, report a prevalence of 14 – 18% among gay men in the past ten years (18% in 2015) (Figure 27) but these data reflect community attached gay men and are based on self-reported HIV status, and therefore need to be interpreted with caution. Due to the availability of needle and syringe programs in Australia since 1987, HIV is low among people who inject drugs with a prevalence of between 1.0 – 2.1% among people attending needle and syringe programs each year (1.7% in 2015), and <0.5% if gay and bisexual men are excluded from the sample (Figure 28).

Figure 26 Estimated HIV prevalence in selected countries, 2015

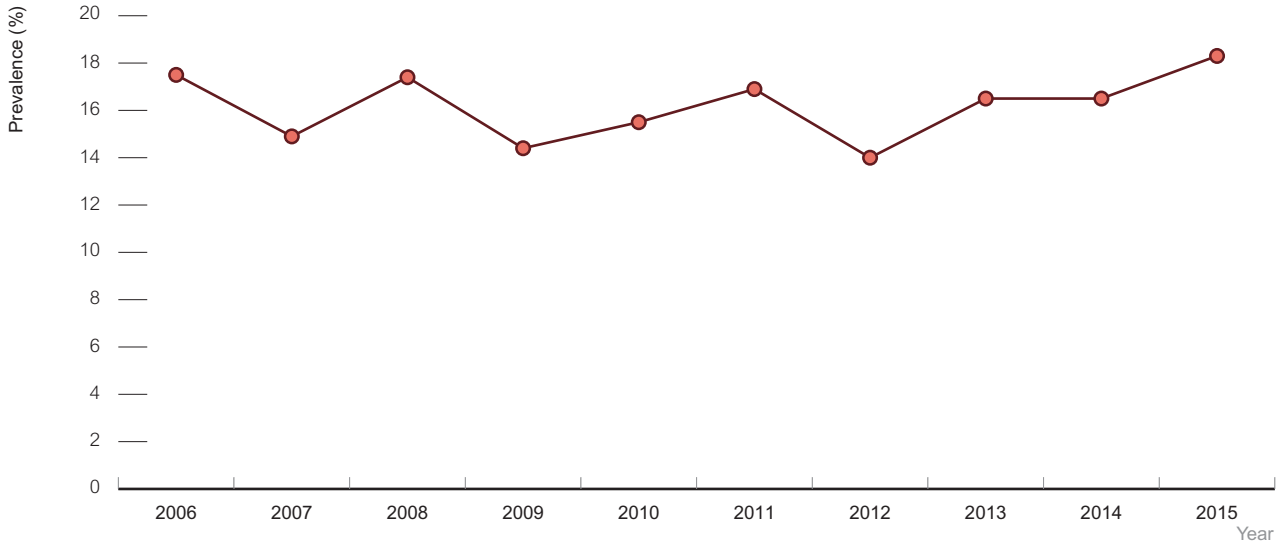


* 2013 prevalence, # 2012 prevalence, ^ 2014 prevalence

Note: Countries included reflect number of Australian notifications by country of birth and key geographic and political countries in the Australian context

Source: UNAIDS, HIV in the United Kingdom: 2014 Report

Figure 27 Self-reported HIV prevalence among gay men participating in the Gay Community Periodic Survey, 2006 – 2015

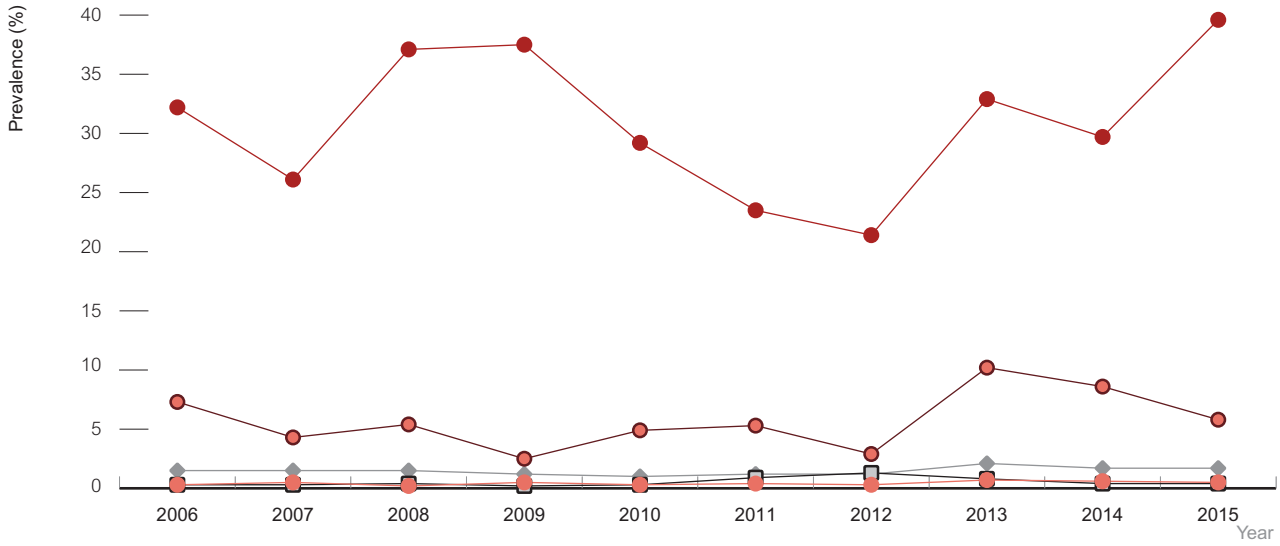


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
HIV prevalence (%)	17.5%	14.9%	17.4%	14.4%	15.5%	16.9%	14.0%	16.5%	16.5%	18.3%

Note: Age standardised by ABS populations and weighted by different recruitment type

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

Figure 28 HIV prevalence among people seen at needle and syringe programs, 2006 – 2015, by sexual identity



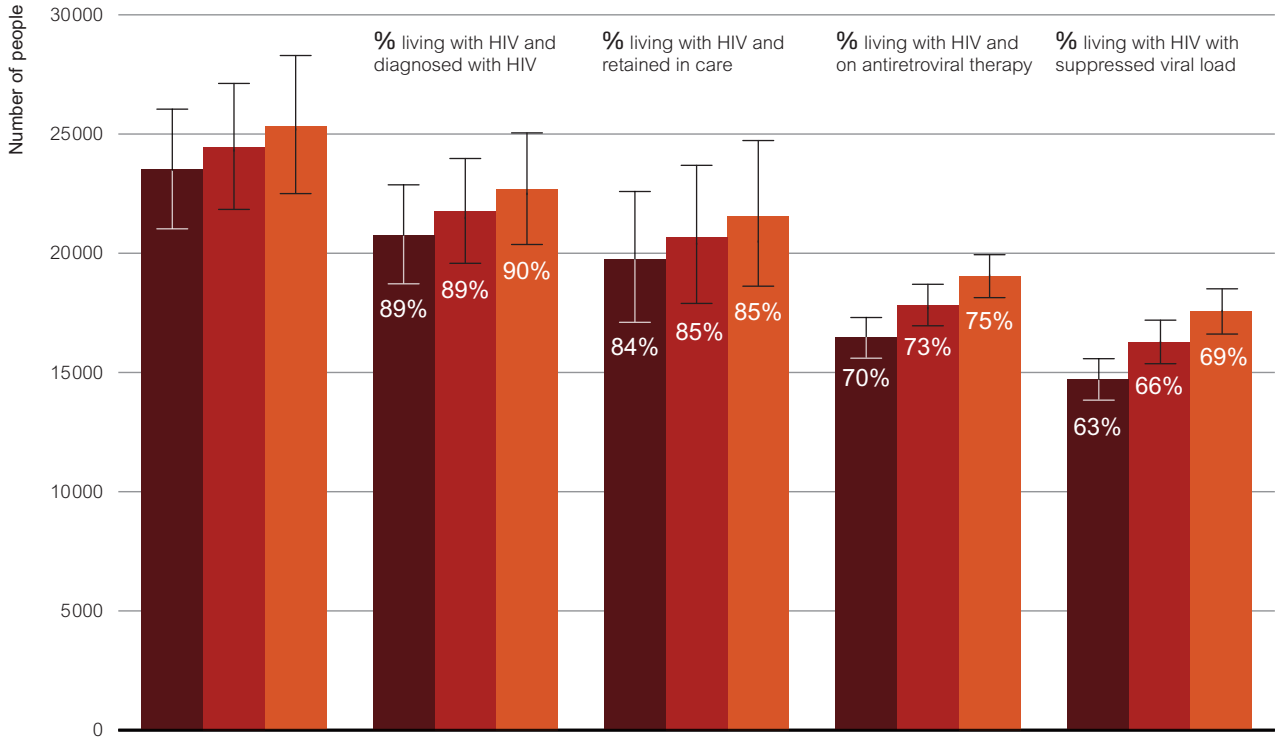
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	0.3%	0.3%	0.4%	0.2%	0.3%	0.9%	1.3%	0.8%	0.4%	0.4%
Male homosexual	32.2%	26.1%	37.1%	37.5%	29.2%	23.5%	21.4%	32.9%	29.7%	39.6%
Male bisexual	7.3%	4.3%	5.4%	2.5%	4.9%	5.3%	2.9%	10.2%	8.6%	5.8%
Male heterosexual	0.3%	0.5%	0.2%	0.5%	0.3%	0.4%	0.3%	0.7%	0.6%	0.5%
Total	1.5%	1.5%	1.5%	1.2%	1.0%	1.2%	1.2%	2.1%	1.7%	1.7%

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

The HIV diagnosis and care cascade

This report includes the 'HIV diagnosis and care cascade', which estimates the number and proportion of people with HIV who are diagnosed in Australia, receiving antiretroviral treatment, retained in care, and have undetectable levels of HIV. 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 proportions of people in each stage of the cascade in Australia were estimated (Figure 29, Table 8). Methods and the associated uncertainties are described in detail in the Methodological Notes. The approach and presentation was refined from last year based on recommendations from a national stakeholder reference group (see Acknowledgements section).

Figure 29 The HIV diagnosis and care cascade, 2013 – 2015



	Living with HIV	Living and diagnosed with HIV	Retained in care	Receiving antiretroviral therapy	Suppressed viral load
2013	23 507	20 768	19 729	16 471	14 696
2014	24 452	21 772	20 683	17 821	16 255
2015	25 313	22 694	21 560	19 051	17 544

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

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

Table 8 The HIV diagnosis and care cascade estimates, 2013 – 2015

Year	Living with HIV (range)	Living and diagnosed with HIV (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2013	23 507 (20 997 – 26 039)	20 768 (18 713 – 22 839)	19 729 (17 103 – 22 565)	16 471 (15 643 – 17 317)	14 696 (13 849 – 15 571)
2014	24 452 (21 834 – 27 143)	21 772 (19 591 – 23 984)	20 683 (17 906 – 23 696)	17 821 (16 961 – 18 699)	16 255 (15 360 – 17 177)
2015	25 313 (22 513 – 28 281)	22 694 (20 389 – 25 046)	21 560 (18 636 – 24 746)	19 051 (18 163 – 19 957)	17 544 (16 611 – 18 506)

Source: see Methodological Notes for details

It is estimated that there were 25 313 (range 22 513 – 28 281) people living with HIV in Australia in 2015. Of these an estimated 22 694 (90%) were diagnosed by the end of 2015, 21 560 (85%) were retained in care (having a viral load or CD4+ cell count in the past year), 19 051 (75%) were receiving antiretroviral therapy, and 17 544 (69%) had achieved viral suppression (Figure 29). UNAIDS has set an overall goal of 73% of all PLHIV with suppressed viral load.

Overall at the end of 2015, it is estimated that 7 769 (31%) of people living with HIV were not virally suppressed, and of these, 2 618 (34%) were undiagnosed, 1 135 (15%) were diagnosed but not in care, 2 509 (32%) were in care but not on antiretroviral treatment, and 1 507 (19%) were on antiretroviral treatment but not virally suppressed.

HIV testing

National testing guidelines recommend HIV testing in a number of contexts, including according to exposure risk, during antenatal care, for certain health care workers, and for particular priority populations.[2] Guidelines recommend all sexually active gay and other men who have sex with men should re-test every 12 months.

Among priority populations, the proportion tested in a year is generally high. In the Gay Community Periodic Surveys, in 2015 66% of non-HIV-positive gay male participants report having an HIV test in the 12 months prior to the survey, which has increased from 61% in 2011 (Figure 30). In 2015, half of people who inject drugs attending needle and syringe programs reported having an HIV test in the 12 months prior to the survey (Figure 33).

In Australia, about half of gay men report their last HIV test was at a sexual health service and half at a general practice clinic,[3,4] whereas for heterosexuals, most STI diagnosis are made in general practice.[5] Data from these clinical services therefore provide further information about HIV testing patterns.

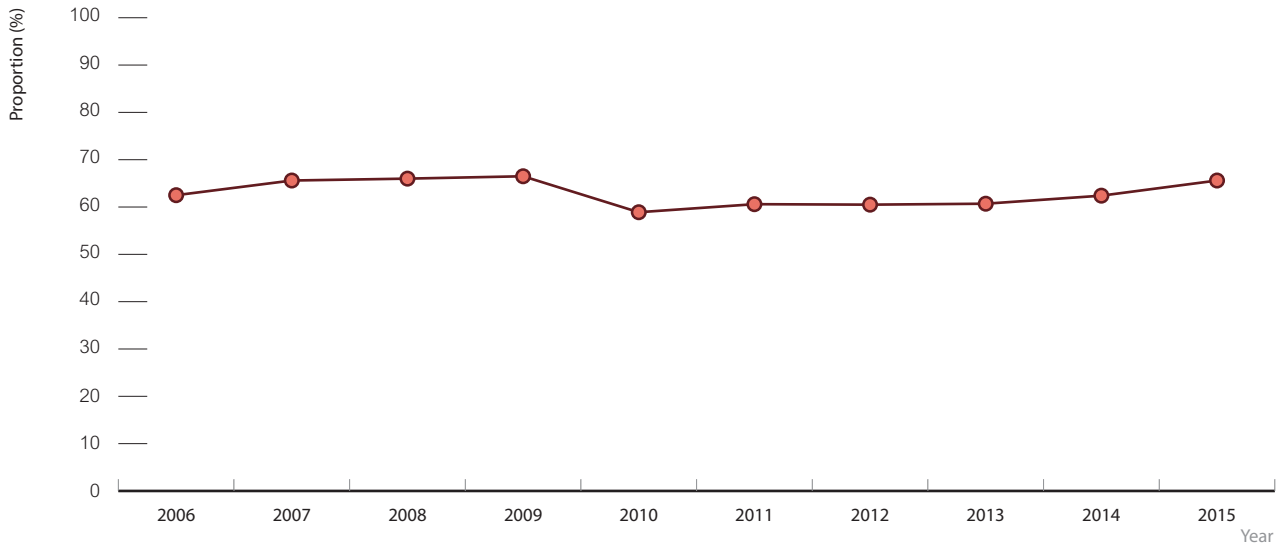
At 41 sentinel sexual health clinics across Australia participating in the ACCESS project (see Methodological notes for further detail), between 2011 and 2015 the proportion of gay and bisexual men who attended and had a HIV test in a year increased from 80 to 90% (Figure 31). Among other priority populations attending sexual health clinics participating in the ACCESS project, the proportion of female sex workers who had a HIV test in a year has remained over 80% per year since 2011, increasing to 89% in 2015 (Figure 31), and 71% of people attending who were recorded as currently injecting drugs received a HIV test in 2015 (Figure 31); analysis also shows that 47% of young heterosexuals attending received an HIV test in 2015.

For gay and bisexual men seen at sexual health services participating in ACCESS, the average number of HIV tests per year increased by 27% from 1.1 in 2011, to 1.4 in 2015 (Figure 32). Among more sexually active gay and bisexual men, the average number of HIV tests per year was 1.3 in 2011, increasing to 1.7 in 2015. More sexually active gay and bisexual men were defined as having >5 partners in three months, and an STI diagnosis in the past two years.

Among gay and bisexual men attending high case load general practice clinics, 72% received an HIV test in 2015 (Figure 31).

In addition to laboratory HIV tests, in some states/territories community-led rapid HIV testing services for gay men have opened in recent years.

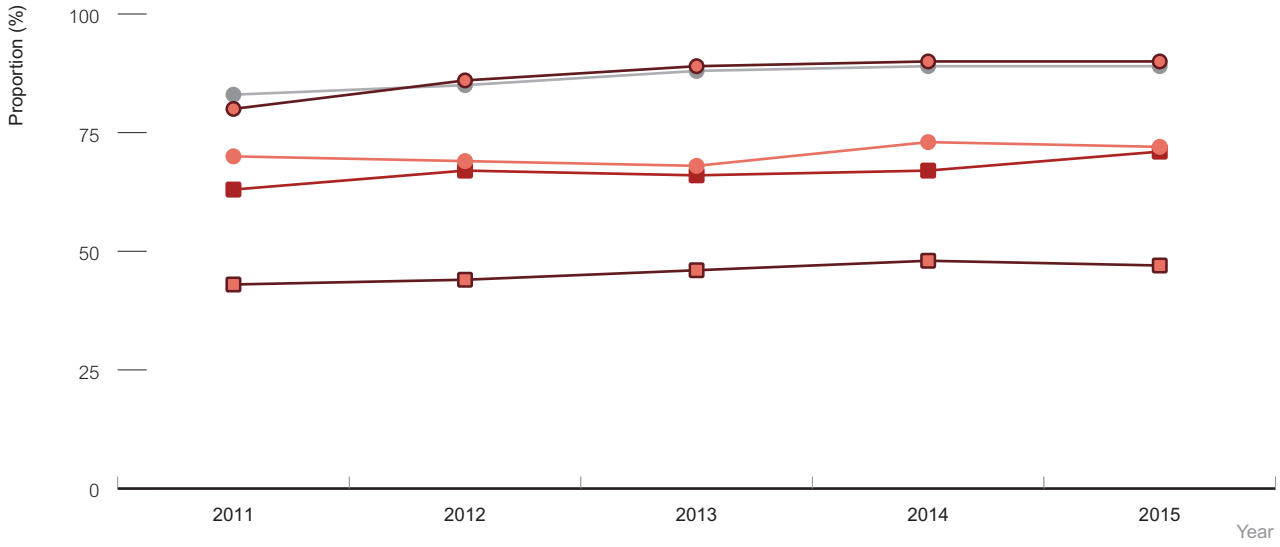
Figure 30 Proportion of non-HIV-positive men tested for HIV in the 12 months prior to completing the survey, 2006 – 2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Proportion	62.5%	65.6%	66.0%	66.5%	58.9%	60.6%	60.5%	60.7%	62.4%	65.6%

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

Figure 31 Proportion of sexual health and high case load clinic[1] attendees tested for HIV in a year, 2011 – 2015

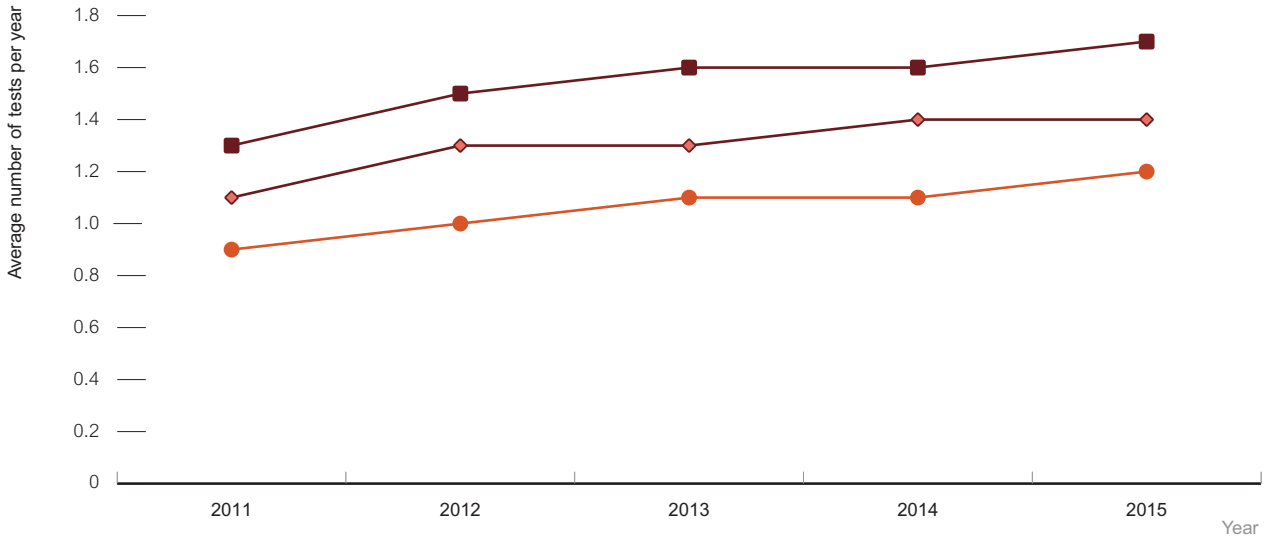


	2011	2012	2013	2014	2015
Sexual health clinics - young heterosexuals (16 – 29)	43%	44%	46%	48%	47%
Sexual health clinics - female sex workers	83%	85%	88%	89%	89%
Sexual health clinics - people who inject drugs	63%	67%	66%	67%	71%
Sexual health clinics - gay and bisexual men	80%	86%	89%	90%	90%
High case load clinics - gay and bisexual men	70%	69%	68%	73%	72%

1 Primary health care general practice clinics with a high case load of gay and bisexual men

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs), see Methodological Notes for detail.

Figure 32 Average number of HIV tests per year in gay and bisexual men attending sexual health clinics participating in ACCESS, 2011 – 2015

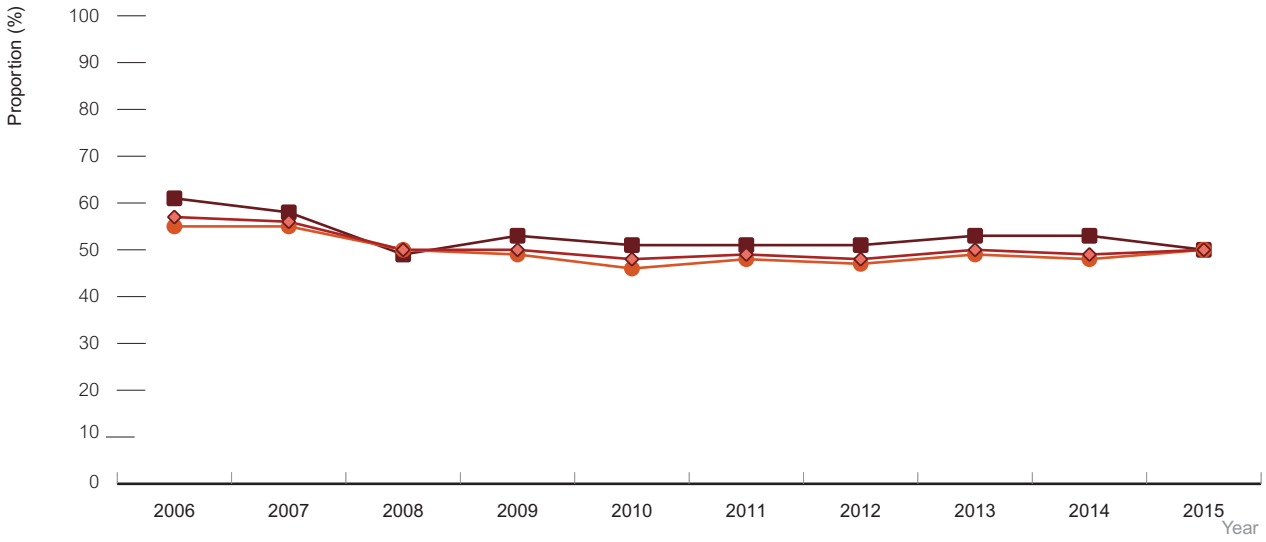


	2011	2012	2013	2014	2015
All gay and bisexual men	1.1	1.3	1.3	1.4	1.4
More sexually active gay and bisexual men	1.3	1.5	1.6	1.6	1.7
Other gay and bisexual men	0.9	1.0	1.1	1.1	1.2

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs), see Methodological Notes for detail. 2015 data not included to allow time for re-testing in the 2014 cohort.

HIV

Figure 33 Proportion of people who inject drugs who attended needle and syringe programs and reported an HIV test in the past twelve months, 2006 – 2015, by sex



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	61%	58%	49%	53%	51%	51%	51%	53%	53%	50%
Male	55%	55%	50%	49%	46%	48%	47%	49%	48%	50%
Total	57%	56%	50%	50%	48%	49%	48%	50%	49%	50%

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

HIV care

HIV treatment

A total of 22 694 people were estimated to be living with diagnosed HIV in 2015 increasing by 9% from the estimate of 20 768 in 2013.

Information from the HIV diagnosis and care cascade demonstrated that nationally, an estimated 21 560 (18 636 – 24 746, or 95%) of those diagnosed and living with HIV were retained in care by the end of 2015. Of those in care, an estimated 19 051 (18 163 – 19 957, or 88%) people received antiretroviral treatment by the end of 2015, compared with 83% in 2013 (Figure 29).

Information on treatment coverage is also available from other data sources. According to the Gay Community Periodic Surveys, the proportion of gay men diagnosed with HIV reporting receiving antiretroviral treatment increased from 60% in 2006 to 78% in 2011 and 87% of 2015. Among gay and bisexual men attending 41 sexual health clinics participating in the ACCESS project, the proportion receiving antiretroviral treatment was similar in 2011 at 80%, increasing to 90% in 2015 (Figure 34). A slightly lower proportion of men diagnosed with HIV attending high case load general practice clinics participating in ACCESS were receiving treatment, 78% in 2011, and 82% in 2015; however it is possible some of these men received treatment at other services.

Of HIV antiretroviral treatments dispensed in 2015 and reimbursed by the Pharmaceutical Benefits Scheme (PBS) efavirenz/tenofovir/emtricitabine (Atripla) was the most commonly prescribed fixed dose combination triple regimen (3 250 persons) followed by rilpivirine/tenofovir/emtricitabine (Eviplera; 2 550 persons). Tenofovir/emtricitabine (Truvada) was the most common dual nucleoside/nucleotide reverse transcriptase inhibitor (N(t)RTI) fixed dose combination backbone (5 890 persons), followed by abacavir/lamivudine (Kivexa; 3 350 persons). Raltegravir (Isentress) was the most common third agent (3 200 persons) which is generally combined with a fixed dose combination N(t)RTI agent (Table 9).

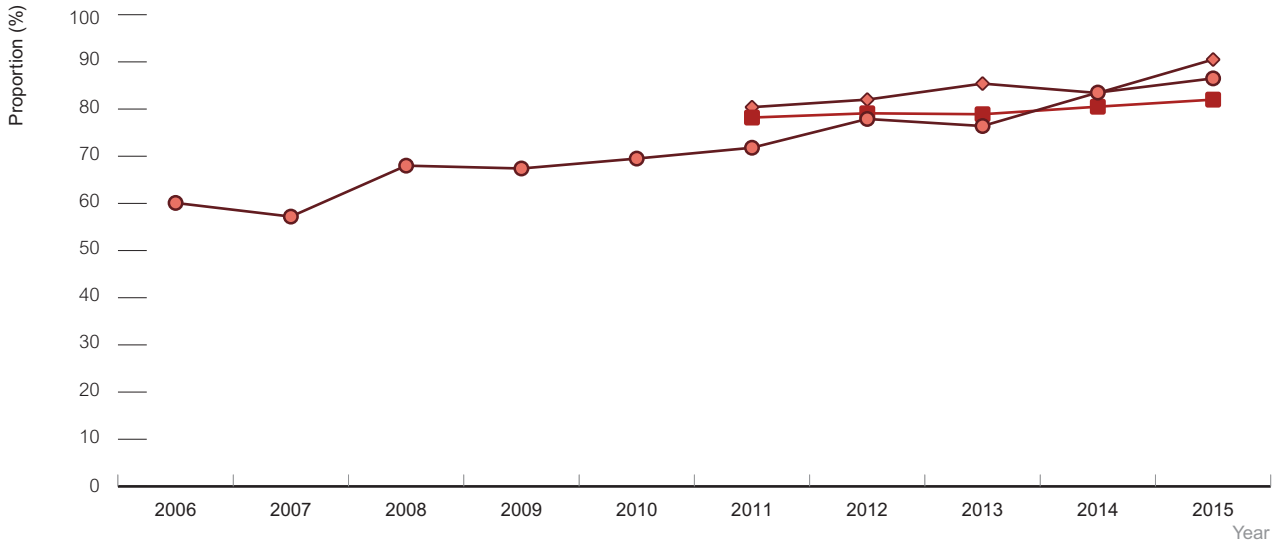
Table 9 Number of people with HIV on antiretroviral treatment, 2015, by type of treatment (class)

Class	Antiretroviral agent	Number of unique patients received the Antiretroviral agent in 2015[1]
Nucleoside analogue reverse transcriptase inhibitors		
	abacavir	440
	Lamivudine/zidovudine (Combivir)	370
	didanosine	80
	emtricitabine	120
	abacavir/lamivudine (Kivexa)	3 350
	lamivudine	710
	stavudine	40
	tenofovir	650
	abacavir/lamivudine/zidovudine (Trizivir)	60
	emtricitabine/tenofovir (Truvada)	5 890
	zidovudine	60
Non-Nucleoside analogue reverse transcriptase inhibitors		
	efavirenz	670
	etravirine	540
	nevirapine	2 550
	rilpivirine	240
Protease inhibitors		
	atazanavir	2 190
	darunavir	1 980
	indinavir	≤30
	kaletra	690
	nelfinavir	0
	ritonavir	3 840
	saquinavir	≤30
	tipranavir	≤30
	atazanavir/cobicistat (Evotaz)	≤30
Entry inhibitors		
	enfuvirtide	0
	maraviroc	250
Integrase inhibitors		
	dolutegravir	2 990
	raltegravir	3 200
Combination class agents		
	efavirenz/emtricitabine/tenofovir (Atripla)	3 250
	rilpivirine/emtricitabine/tenofovir (Evipler)	2 550
	elvitegravir/cobicistat/tenofovir/emtricitabine (Stribild)	1 690
	abacavir/dolutegravir/lamivudine (Triumeq)	2 840
Total patients		18 710

1 Number of unique patients dispensed drug in 2015

Source: Pharmaceutical Benefits Scheme 10% sample using Pharmdash. See Methodological Notes for detail.

Figure 34 Proportion of HIV-positive men on antiretroviral treatment in two data sources, 2006 – 2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ACCESS Sexual health clinics						80.4%	82.0%	85.4%	83.4%	90.5%
ACCESS High case load general practice clinics[1]						78.2%	79.1%	78.9%	80.5%	82.0%
Gay Community Periodic Survey	60.1%	57.2%	68.0%	67.4%	69.5%	71.8%	77.9%	76.4%	83.5%	86.5%

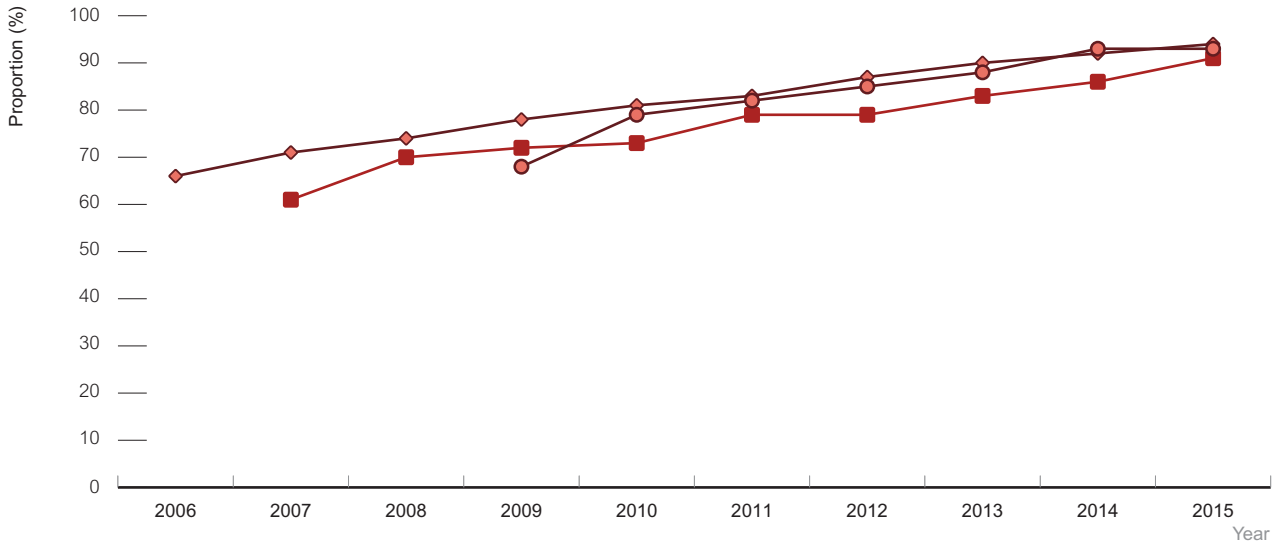
1 General practice clinics with a high case load of gay and bisexual men

Source: Gay Community Periodic Survey, The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs); see Methodological Notes for detail

Viral load suppression

HIV viral load represents the amount of HIV virus in a person's blood, with higher levels increasing the chance of HIV transmission during risk exposures. Studies have shown that taking combination HIV antiretroviral treatment regularly, sustains an undetectable viral load and reduces the likelihood of transmission of HIV to zero[6]. As treatment coverage has increased in Australia, there has been a corresponding increase in the proportion of people with an undetectable viral load (<200 copies/ml) observed in a range of data sources. This includes the Australian HIV Observational Database or AHOD (an observational cohort study of HIV infected individuals – see Methodological Notes for further detail) from 66% in 2006 to 94% in 2015, data from 41 sexual health clinics across Australia participating in the ACCESS project (61% in 2007 to 91% in 2015) and from 16 primary care clinics with a high case load of gay men in Victoria and NSW participating in the ACCESS project (68% in 2009 to 93% in 2015) (Figure 35).

Figure 35 Viral load suppression[1] from patients in the Australian HIV Observational Database, sexual health clinics and high case load general practice clinics 2006 – 2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
AHOD	66%	71%	74%	78%	81%	83%	87%	90%	92%	94%
Sexual health clinics		61%	70%	72%	73%	79%	79%	83%	86%	91%
High case load general practice				68%	79%	82%	85%	88%	93%	93%

1 Undetectable viral load equals 200 copies/ml or less

Source: Australian HIV Observational Database, ACCESS, see Methodological Notes for detail

HIV

HIV prevention

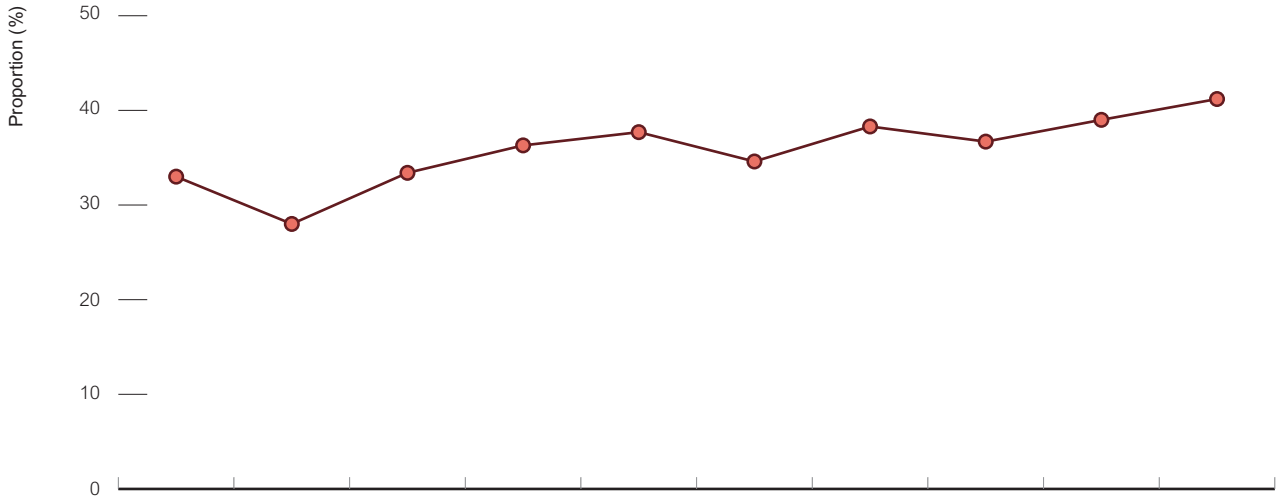
Primary prevention strategies aim to protect people from acquiring HIV and include; condom use, harm reduction strategies such as needle and syringe programs, opioid substitution therapy (OST) and peer interventions to reduce injecting risk behaviour[7, 8], and biomedical strategies such as post-exposure prophylaxis (PEP) and pre exposure prophylaxis (PrEP). Testing and treatment are secondary prevention as they prevent transmission to others due to behavioural change post diagnosis, or starting treatment and reducing viral load.

Condom use

According to the Gay Community Periodic Surveys, more than a third of gay men with casual partners report condomless anal intercourse in the previous six months. The proportion has increased from 33% to 41% over the past ten years (Figure 36). Conversely, this means up to two-thirds of men with casual partners use condoms consistently (about 45%), or to a lesser extent avoid anal sex entirely (about 20%). It is also important to note that many gay and bisexual men engaging in condomless anal intercourse are using other effective HIV prevention strategies. Further information regarding sexual risk behaviour appears in the *Annual Report of Trends in Behaviour 2016*, prepared by the Centre for Social Research in Health.

Findings from the Second Australian Study of Health and Relationships (ASHR2), a population-based survey conducted from October to November 2013, indicate about half of heterosexual men (48%) and women (47%) reported always using condoms with casual partners at last sexual intercourse.

Figure 36 Gay men with casual partners who reported any condomless anal intercourse in the six months prior to the survey, 2006 – 2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Proportion	33.0%	28.0%	33.4%	36.3%	37.7%	34.6%	38.3%	36.7%	39.0%	41.2%

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

Use of sterile needles and syringes

The re-use 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 (OST) and peer interventions can reduce injecting risk behaviour.[7, 8] OST has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[9–11] Education is important to enhance the effectiveness of these harm reduction strategies and to support people to inject safely. Each year about 15% of people who inject drugs and attend needle and syringe programs report receptive syringe sharing in the last month, similar in males and females, and this proportion has been stable over the last ten years (see Figure 55 in the *Hepatitis C* section of the report). 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)?'*.

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.

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 are adherent to the treatment. From 2014, a number of small-scale demonstration projects commenced in New South Wales and Victoria and in 2015 in Queensland. In early-mid 2016 two large state-funded PrEP implementation programs commenced in New South Wales and Victoria, with Queensland to commence in late 2016. People can also personally import PrEP from overseas. Systems are being established to monitor the uptake, adherence and effectiveness of PrEP. See the *Annual Report of Trends in Behaviour 2016* produced by the Centre for Social Research in Health for further information on PrEP use in gay men in Australia.

HIV incidence

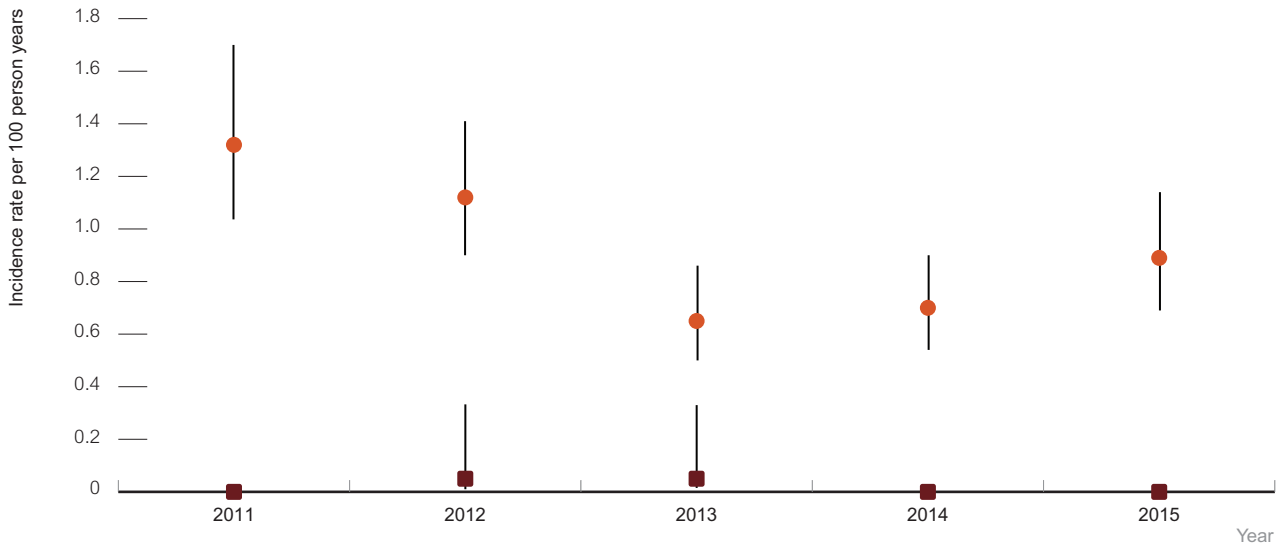
HIV incidence is the best indicator of changes in transmission in a population. HIV incidence is now available from the ACCESS project, and is calculated by dividing the number of seroconversions among people undergoing repeat HIV testing at sexual health services by the person's time at risk (determined by the time between repeat HIV tests). Further details about the methods used can be found in the Methodological Notes.

Over a five year study period (2011 – 2015) among gay and bisexual men attending sexual health services who had at least one repeat HIV test (16 850), there were 303 seroconversions in 33 997 person years at risk, equating to an overall HIV incidence of 0.89 per 100 person years (95% CI: 0.69-1.14). The HIV incidence was highest in 2011 at 1.32 per 100 person years (95% CI: 1.03-1.70), declining to 1.12 (95% CI: 0.90-1.41) in 2012, 0.65 (95% CI: 0.50-0.86) in 2013, with a slight increase to 0.70 (95% CI: 0.54-0.90) in 2014 and 0.89 (95% CI: 0.69-1.14) in 2015 (Figure 37). It is important to note that the confidence intervals between these estimates overlap.

Among female sex workers attending sexual health services who had at least one repeat HIV test (6 021), there were only two seroconversions in 14 454 person years at risk, equating to an overall HIV incidence of 0.03 per 100 person years (95%CI: 0.01-0.07). The HIV incidence was zero in 2011, 2014 and 2015.

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

Figure 37 HIV incidence rate per 100 person years in men who have sex with men and female sex workers attending sexual health clinics, 2011 – 2015



	2011	2012	2013	2014	2015
Gay and bisexual men	1.32	1.12	0.65	0.70	0.89
Female sex workers	0.00	0.05	0.05	0.00	0.00

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs); see Methodological Notes for detail

Main Findings
Hepatitis C infection

New hepatitis C diagnoses

- In 2015 there were 10 790 notifications of hepatitis C, with the highest rates in the 25 – 39 year age group.
- The overall notification rate of hepatitis C notification in Australia has remained stable in the last four years (2012 – 15), following a 22% decline between 2006 and 2011. A similar trend has been seen in all age groups.
- In contrast, the age standardised rate of hepatitis C notification in the Aboriginal and Torres Strait Islander population in Australia (based on data from the Northern Territory, South Australia, Tasmania and Western Australia) increased by 43% in the five past years, from 115 per 100 000 in 2011 to 165 per 100 000 in 2015. The 2015 rate is 4 times greater than in the non-Indigenous population (40 per 100 000).

Prevalence and morbidity

- There were an estimated 227 306 (range: 167 623 – 249 707) people living with chronic hepatitis C infection in Australia in 2015.
- The prevalence of hepatitis C antibody in people who inject drugs attending needle and syringe programs in 2015 was 57%, with relatively stable rates in the last five years. At 70%, the prevalence was much higher among Aboriginal and Torres Strait Islander survey respondents in 2015 than non-Indigenous respondents (55%).
- At the end of 2015, an estimated 29 070 (range: 21 437 – 31 935) people had severe fibrosis, an increase of 73% since 2006, an estimated 17 149 (range: 12 647 – 18 840) people had hepatitis C related cirrhosis, an increase of 96% since 2006, and an estimated 818 (range: 603 – 899) deaths attributable to chronic hepatitis C infection occurred in 2015, an increase of 112% since 2006.

Testing and care

- Among the estimated 227 306 (range: 167 623 – 249 707) people living with chronic hepatitis C infection in Australia in 2015, 186 763 (82%) were diagnosed by the end of 2015, 50 172 (22%) had ever received antiviral therapy, 32 139 (14%) had ever successfully cured the infection through therapy.
- According to the Australian Needle and Syringe Program Survey, in 2015, among people who inject drugs with prior exposure to hepatitis C, 12% reported ever receiving hepatitis C treatment and 2% had received treatment in the last 12 months.

Injecting risk behaviour

- **The re-use of needles and syringes that have been used by others (receptive syringe sharing) is a major risk factor for the transmission of hepatitis.**

- **The overall proportion of Australian Needle and Syringe Program Survey participants in 2015 who reported receptive needle and syringe sharing in the past year was 16%. Receptive syringe sharing was higher among Aboriginal and Torres Strait Islander respondents (24%) than among non-Indigenous respondents (14%)**

Interpretation:

The rate of notification of hepatitis C diagnoses has remained stable in the past four years, after declines between 2006 and 2011, including in those aged less than 25 years. The primary route of transmission is sharing injecting equipment, a practice that primarily starts in late adolescence or early adulthood, and as such trends in the rate of diagnoses in those aged under 25 years can be interpreted as a surrogate for the incidence of hepatitis C infection. Under this assumption, it appears that there has been no further reduction in hepatitis C transmission since 2011. There has also been no change in rates of receptive needle and syringe sharing in the same period, highlighting the need for an enhanced focus on prevention efforts.

The trends in hepatitis C notifications among Aboriginal and Torres Strait Islander peoples are very different to those of non-Indigenous people, with a steady increase in the notification rate in Aboriginal and Torres Strait Islander peoples over the past five years and in young people aged <25 years, as compared to no increase in young non-Indigenous people in the same time period. The difference in overall notification rates may reflect differences in injecting risk behaviours. The difference could also be accounted for by very high rates of incarceration and hepatitis C diagnosis in this setting and higher case detection among Aboriginal and Torres Strait Islander peoples. There is a need for increased coverage of appropriate harm reduction strategies targeting Aboriginal and Torres Strait Islander peoples in both community and prison settings.

New hepatitis C diagnoses

This section focuses on people newly diagnosed with hepatitis C in Australia (both newly acquired and unspecified cases).

A total of 10 790 cases of newly diagnosed hepatitis C infection were reported in Australia in 2015; 929 (9%) occurred among the Aboriginal and Torres Strait Islander population, 3 442 (32%) were among the non-Indigenous population, and there were a further 6 419 (59%) of notifications for which Indigenous status was not reported. Aboriginal and Torres Strait Islander peoples comprise 3% of the Australian population, yet accounted for at least 9% of all newly diagnosed hepatitis C cases in 2015, reflecting a disproportionate burden of disease.

In 2015, most cases (66%, 7 137) of newly diagnosed hepatitis C infection were in males, 77% (8 294) were in people aged 30 years and above, and 63% (6 794) were notified in people residing in major cities. The majority of notifications (96%) were reported as unspecified, with only 441 cases reported as newly acquired infections (Table 10).

Table 10 Characteristics of new hepatitis C diagnoses, 2006 – 2015

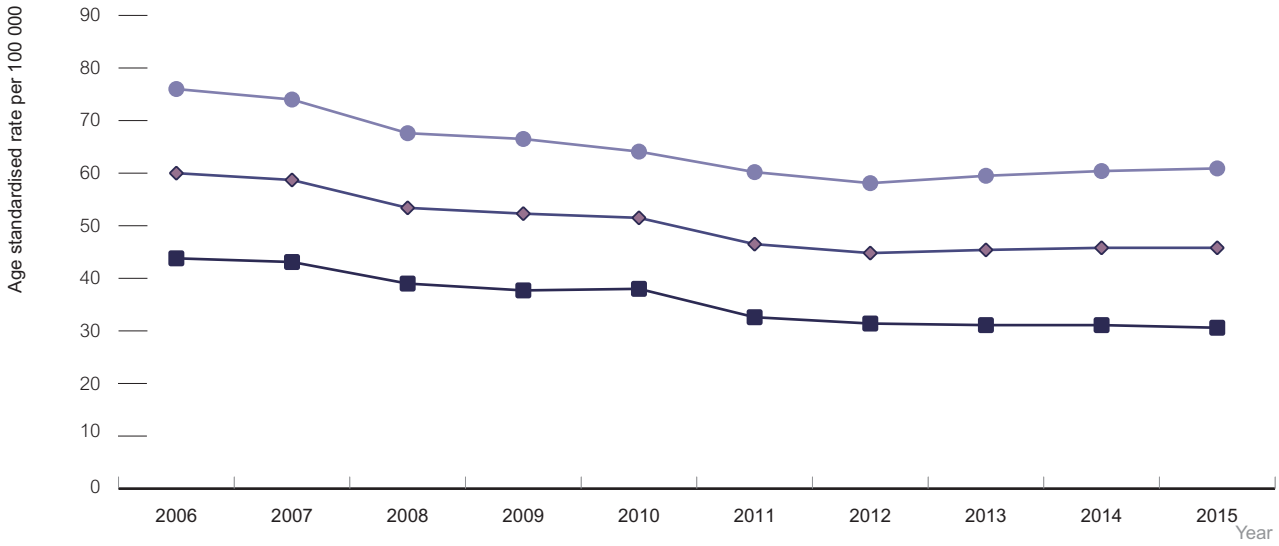
	Year of diagnosis									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Characteristic										
Total	12 132	12 023	11 180	11 201	11 212	10 269	10 083	10 403	10 619	10 790
Sex										
Female	4 444	4 424	4 097	4 055	4 139	3 612	3 531	3 572	3 621	3 622
Male	7 645	7 557	7 053	7 090	6 966	6 616	6 520	6 805	6 980	7 137
Missing	43	42	30	56	107	41	32	26	18	31
Age group										
0 – 14	56	47	39	47	45	31	32	31	35	35
15 – 19	344	293	295	273	246	238	242	292	227	225
20 – 29	3 083	2 884	2 650	2 468	2 435	2 222	2 227	2 183	2 172	2 218
30 – 39	3 455	3 541	3 185	3 151	3 223	2 871	2 790	2 817	2 894	2 930
40+	5 185	5 247	5 010	5 239	5 231	4 890	4 782	5 066	5 281	5 364
Missing	9	11	1	23	32	17	10	14	10	18
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	586	611	660	561	655	709	771	814	897	929
Non-Indigenous	4 562	4 706	4 578	4 103	4 018	3 734	3 665	3 597	3 545	3 442
Not reported	6 984	6 706	5 942	6 537	6 539	5 826	5 647	5 992	6 177	6 419
Newly acquired[1]	417	384	351	396	382	421	462	401	448	441
Area of residence										
Major Cities	8 165	8 046	7 126	7 527	7 508	6 770	6 497	6 811	6 724	6 794
Inner Regional	2 390	2 370	2 428	2 188	2 156	2 037	2 029	2 082	2 351	2 350
Outer Regional	1 111	1 137	1 104	1 004	1 022	1 014	1 109	1 139	1 140	1 209
Remote	162	186	221	185	185	180	186	180	168	178
Very Remote	50	75	72	68	65	64	81	81	68	62
Missing	254	209	229	229	276	204	181	110	168	197
State/Territory										
Australian Capital Territory	188	202	200	163	223	187	146	184	174	189
New South Wales	4 183	4 071	3 584	3 833	3 760	3 327	3 294	3 493	3 579	3 544
Northern Territory	264	225	212	167	167	208	193	254	180	200
Queensland	2 788	2 670	2 572	2 626	2 633	2 407	2 359	2 457	2 647	2 568
South Australia	667	603	576	545	524	515	512	524	492	501
Tasmania	271	273	349	281	267	229	262	237	223	260
Victoria	2 699	2 743	2 364	2 439	2 566	2 326	2 265	2 147	2 183	2 402
Western Australia	1 072	1 236	1 323	1 147	1 072	1 070	1 052	1 107	1 141	1 126

1 Newly acquired hepatitis C is defined as newly diagnosed hepatitis C infection with evidence of acquisition in the 24 months prior to diagnosis (laboratory or clinical evidence). Enhanced surveillance procedures related to hepatitis C vary by state/territory. Queensland does not provide data on newly acquired hepatitis C infections. The total number of cases reported here is likely to be an under-estimation of the true number of newly acquired infections.

Source: Australian National Notifiable Diseases Surveillance System

The notification rate of hepatitis C infection in 2015 was 45.8 per 100 000, which reflects stable rates in the last four years, following a 23% decline between 2006 and 2011, and a 24% decline over the ten-year period between 2006 (60.0 per 100 000) and 2015 (45.8 per 100 000) (Figure 38).This pattern is seen in both males and females (Figure 38). It is important to note that changes over time in notification rates may reflect responses to testing policies and programs, different diagnostic tests, and awareness campaigns.

Figure 38 Hepatitis C notification rate per 100 000 population, 2006 – 2015, by sex



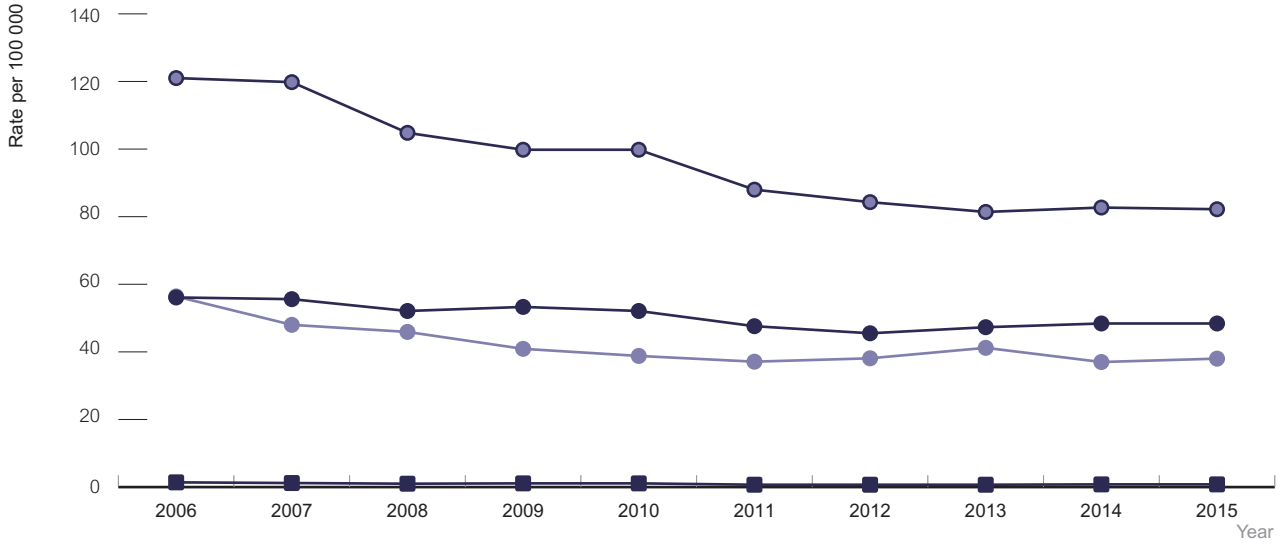
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	43.8	43.1	39.0	37.7	38.0	32.6	31.4	31.1	31.1	30.6
Males	76.0	74.0	67.6	66.5	64.1	60.2	58.1	59.5	60.4	60.9
Total	60.0	58.7	53.4	52.3	51.5	46.5	44.8	45.4	45.8	45.8

Source: Australian National Notifiable Diseases Surveillance System

Over the past ten years, the rate of notification of hepatitis C has followed a similar trend in all age groups, with declines between 2006 and 2011 but stable notification rates thereafter. The 25 – 39 year age group has had the highest rate of notification over the last ten years, and was 82 per 100 000 in 2015, compared to 48 per 100 000 in the 40+ year age group, and 38 per 100 000 in the 15 – 24 year age group in 2015 (Figure 39). A similar pattern by age group has been seen among males and females (Figures 40 and 41).

As the primary route of transmission of hepatitis C is sharing 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.[12] Among those aged under 25 years, there has been a 33% decrease in the rate of notification between 2006 and 2015, from 24 per 100 000 in 2006 to 16 per 100 000 in 2015 (not shown in figure).

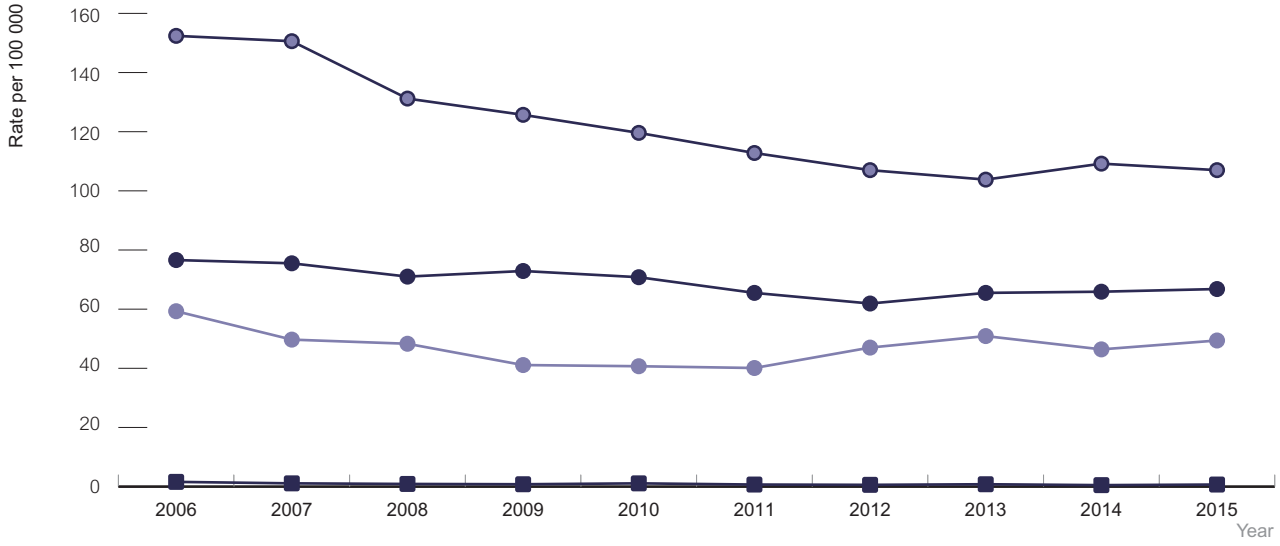
Figure 39 Hepatitis C notification rate per 100 000 population, 2006 – 2015, by year and age group



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	1.4	1.2	1.0	1.1	1.1	0.7	0.7	0.7	0.8	0.8
15 – 24	56.4	48.0	45.9	40.9	38.8	37.1	38.1	41.2	37.0	38.0
25 – 39	121.0	119.8	104.8	99.8	99.8	88.0	84.3	81.4	82.7	82.2
40+	56.1	55.6	52.1	53.3	52.1	47.6	45.5	47.3	48.4	48.4

Source: Australian National Notifiable Diseases Surveillance System

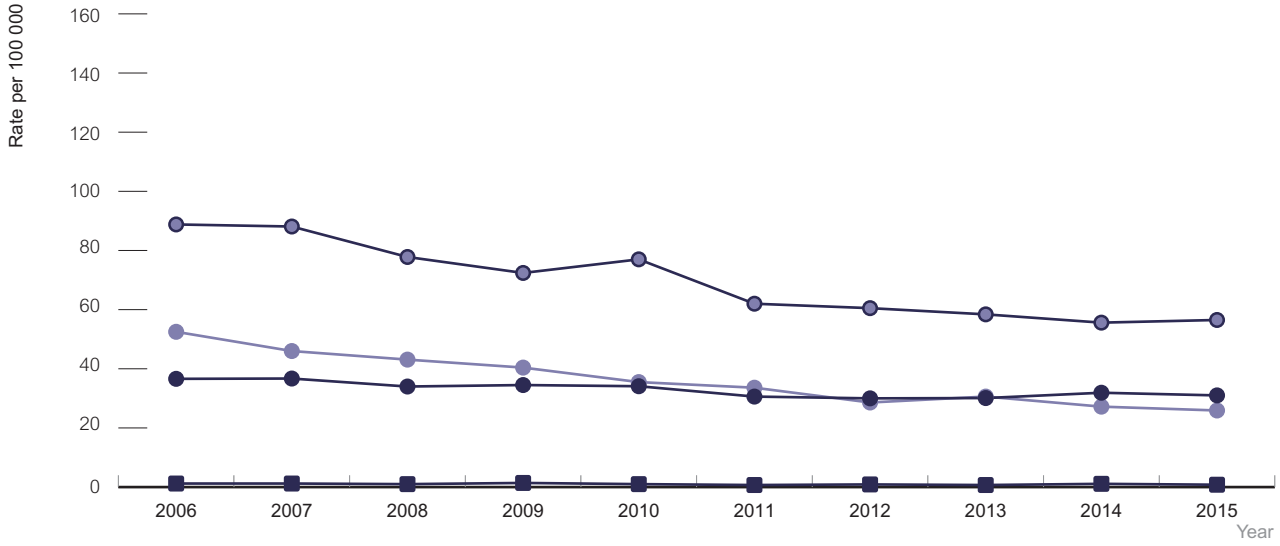
Figure 40 Hepatitis C notification rate per 100 000 population, 2006 – 2015, by age group, males



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	1.6	1.1	0.9	0.8	1.1	0.7	0.6	0.8	0.5	0.7
15 – 24	59.3	49.7	48.3	41.1	40.7	40.1	47.0	50.9	46.4	49.4
25 – 39	152.4	150.6	131.2	125.7	119.6	112.8	107.0	103.8	109.2	107.0
40+	76.6	75.5	71.0	72.9	70.8	65.5	61.9	65.5	65.9	66.8

Source: Australian National Notifiable Diseases Surveillance System

Figure 41 Hepatitis C notification rate per 100 000 population, 2006 – 2015, by age group, females

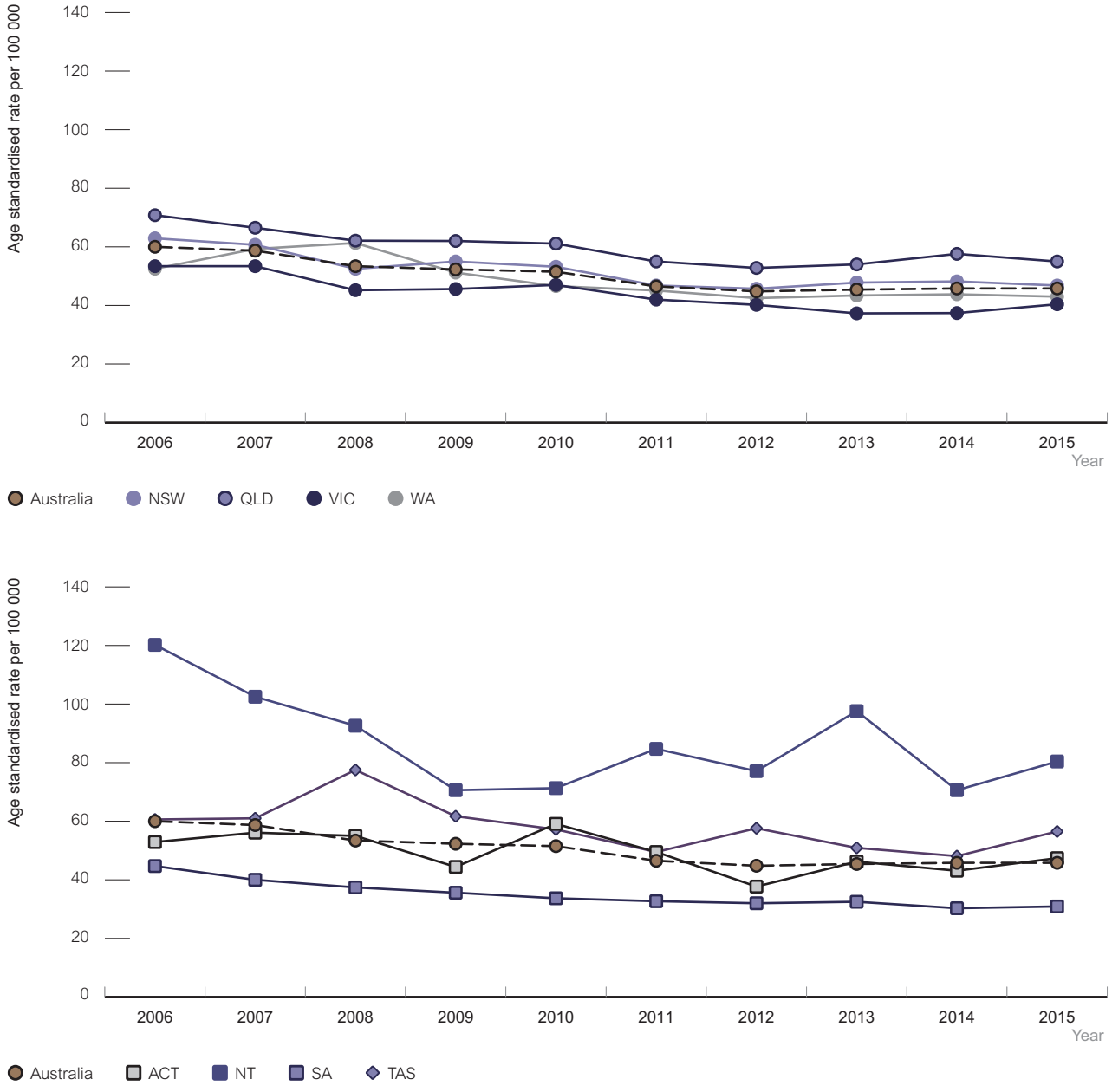


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	1.2	1.2	1.0	1.4	1.0	0.7	0.9	0.7	1.1	0.8
15 – 24	52.5	46.0	43.1	40.4	35.5	33.6	28.6	30.6	27.2	25.9
25 – 39	88.8	88.1	77.8	72.4	77.0	62.0	60.5	58.4	55.6	56.5
40+	36.6	36.7	34.0	34.5	34.1	30.6	30.0	30.1	31.9	31.0

Source: Australian National Notifiable Diseases Surveillance System

The notification rate of newly diagnosed hepatitis C infection in Australia in 2015 was highest in the Northern Territory (80 per 100 000) and Tasmania (57 per 100 000) (Figure 42, Table 11). Between 2006 and 2011, rates declined in all jurisdictions, with stable rates since then. While broadly declining rates have been seen in the Northern Territory and South Australia, these jurisdictions have also experienced some fluctuation in notification rates across the ten year period.

Figure 42 Hepatitis C notification rate per 100 000 population, 2006 – 2015, by State/Territory



Source: Australian National Notifiable Diseases Surveillance System

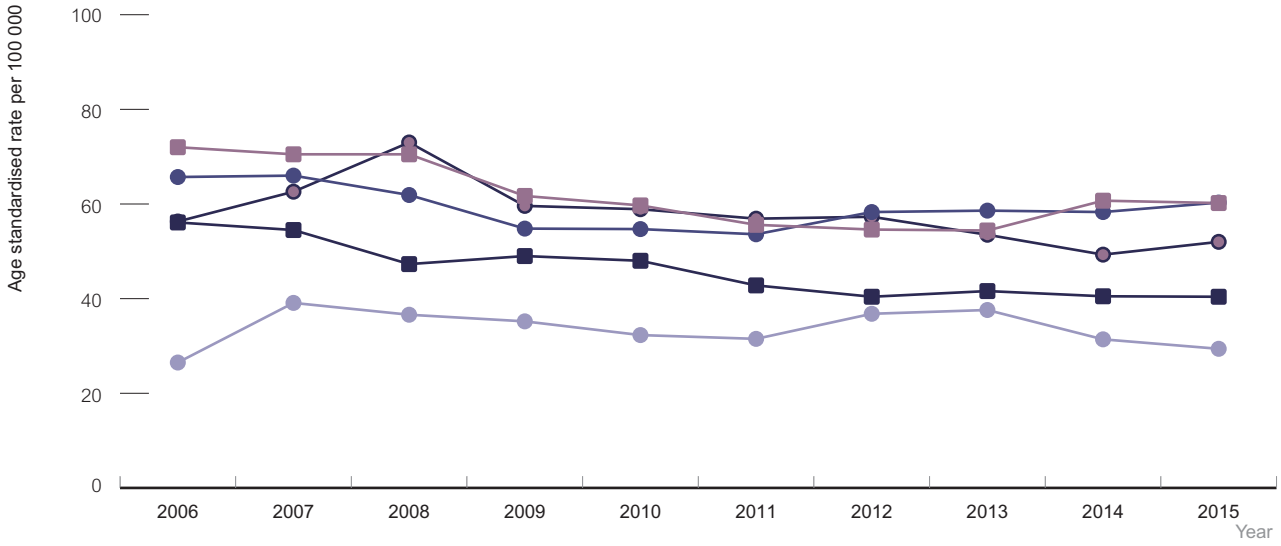
Table 11 Hepatitis C notification rate per 100 000 population, 2006 – 2015, by State/Territory

State/Territory	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australian Capital Territory	52.9	56.1	55.0	44.4	59.1	49.5	37.7	46.2	43.1	47.4
New South Wales	62.9	60.7	52.5	55.0	53.2	46.8	45.7	47.8	48.2	46.8
Northern Territory	120.2	102.5	92.6	70.6	71.3	84.7	77.1	97.6	70.6	80.4
Queensland	70.8	66.5	62.1	62.0	61.1	55.0	52.8	54.0	57.6	55.0
South Australia	44.7	40.0	37.4	35.6	33.7	32.7	32.0	32.5	30.3	30.9
Tasmania	60.6	61.0	77.5	61.7	57.2	49.5	57.6	50.9	48.1	56.5
Victoria	53.4	53.4	45.2	45.6	47.0	42.0	40.2	37.3	37.4	40.4
Western Australia	52.5	59.3	61.3	51.2	46.6	45.1	42.5	43.4	43.8	43.0
Australia	60.0	58.7	53.4	52.3	51.5	46.5	44.8	45.4	45.8	45.8

Source: Australian National Notifiable Diseases Surveillance System

Rates of notification of hepatitis C have been highest in inner regional, outer regional and remote areas (Figure 43).

Figure 43 Hepatitis C notification rate per 100 000 population, 2006 – 2015 by region of residence



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	56.1	54.5	47.3	49.0	48.0	42.8	40.4	41.6	40.5	40.4
Inner regional	72.0	70.5	70.5	61.7	59.7	55.6	54.6	54.4	60.7	60.2
Outer regional	65.7	66.0	61.9	54.8	54.7	53.6	58.3	58.6	58.3	60.3
Remote	56.3	62.6	73.0	59.6	58.9	56.9	57.3	53.5	49.3	52.0
Very remote	26.5	39.1	36.6	35.2	32.3	31.5	36.8	37.6	31.4	29.4

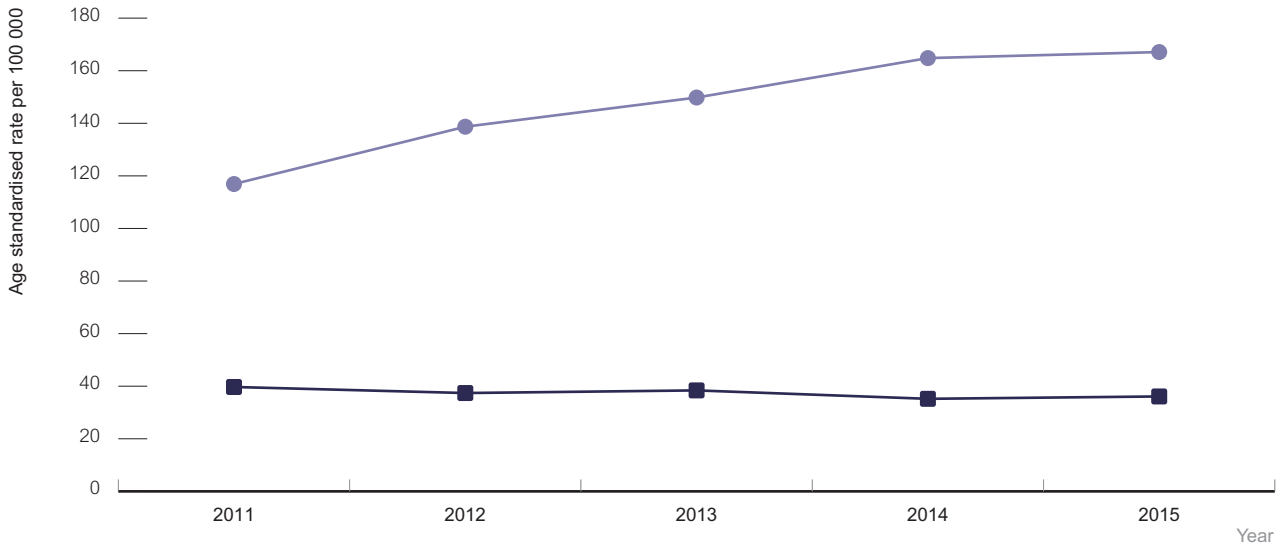
Source: Australian National Notifiable Diseases Surveillance System

Data on Aboriginal and Torres Strait Islander status was ≥50% complete for each of the five year reporting period only for the Northern Territory, 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 2015, age standardised rates of hepatitis C notification in Australia (data from the Northern Territory, Tasmania, South Australia and Western Australia) were 4.6 times greater among the Aboriginal and Torres Strait Islander population (167 per 100 000) compared to the non-Indigenous population (36 per 100 000). Rates of hepatitis C diagnosis among the Aboriginal and Torres Strait Islander population has increased by 43%, from 117 per 100 000 in 2011 to 167 per 100 000 in 2015 (Figure 44).

In Tasmania and Western Australia, the age standardised rate of hepatitis C notification was respectively 2 and 8 times greater in the Aboriginal and Torres Strait Islander population than in the non-Indigenous population in 2015 and since 2011 has increased in both jurisdictions (Figure 45). 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 2015 (58 vs. 86 per 100 000).

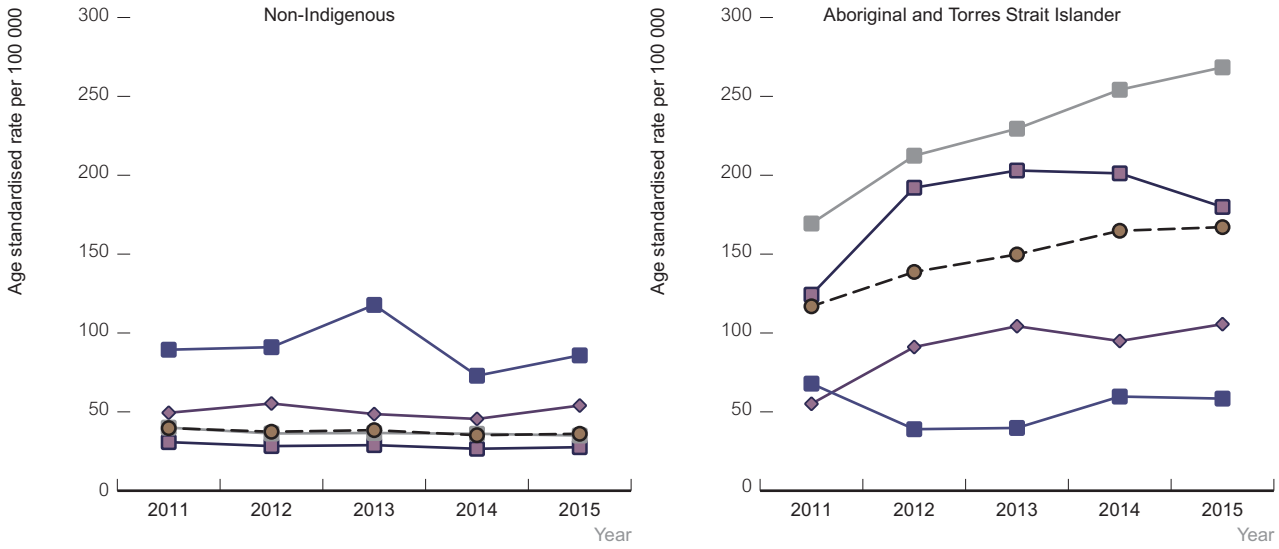
Figure 44 Hepatitis C notification rate per 100 000, 2011 – 2015, by Aboriginal and Torres Strait Islander status



	2011	2012	2013	2014	2015
Non-Indigenous	39.7	37.4	38.4	35.2	36.1
Aboriginal and Torres Strait Islander	116.9	138.7	149.8	164.8	167.1

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

Figure 45 Hepatitis C notification rate per 100 000, 2011 – 2015, by State/Territory and Aboriginal and Torres Strait Islander status



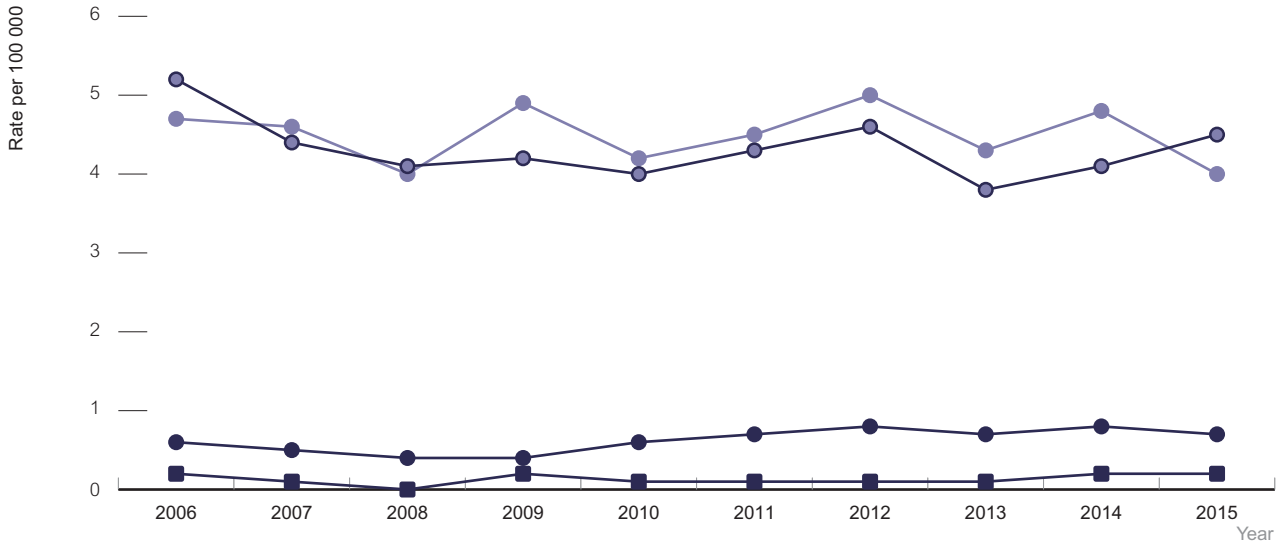
	Non-Indigenous					Aboriginal and Torres Strait Islander				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
National	39.7	37.4	38.4	35.2	36.1	116.9	138.7	149.8	164.8	167.1
NT	89.4	91.0	117.8	72.9	85.8	67.9	39.0	39.8	59.7	58.4
Tas	49.4	55.3	48.6	45.5	54.0	55.1	91.1	104.3	94.9	105.6
WA	40.0	36.3	36.6	36.1	35.0	169.4	212.4	229.5	254.2	268.4
SA	30.8	28.3	28.9	26.6	27.6	124.3	192.1	203.0	201.2	179.9

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

Newly acquired hepatitis C

For some newly diagnosed cases, it is possible to determine that they were acquired in the two years prior to diagnosis, on the basis of a prior negative test or clinical evidence. This information is only available for states/territories which conduct enhanced surveillance, with enhanced surveillance procedures varying between jurisdictions, so do not reflect the true number of newly acquired cases. The highest notification rates of newly acquired hepatitis C occur in the 15 – 24 and 25 – 39 year age groups (Figure 46).

Figure 46 Newly acquired hepatitis C notification rate per 100 000 population, 2006 – 2015, by age group



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	0.2	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.2	0.2
15 – 24	4.7	4.6	4.0	4.9	4.2	4.5	5.0	4.3	4.8	4.0
25 – 39	5.2	4.4	4.1	4.2	4.0	4.3	4.6	3.8	4.1	4.5
40+	0.6	0.5	0.4	0.4	0.6	0.7	0.8	0.7	0.8	0.7

Source: Australian National Notifiable Diseases Surveillance System

HCV

Prevalence and morbidity

Number of people living with hepatitis C infection

At the end of 2015, an estimated 227 306 (167 623 – 249 707) people had chronic hepatitis C infection. The greatest estimated proportions were in New South Wales (36%, 80 700), Victoria (24%, 55 261), and Queensland (21%, 47 356) followed by Western Australia (9% 20 549), South Australia (5%, 11 682), Tasmania (2%, 4 561), the Australian Capital Territory (2%, 3 591) and the Northern Territory (2%, 3 606) (Table 12).

Table 12 Estimated number of people living with hepatitis C, 2015, by State and Territory

State/Territory	Chronic hepatitis C infection (range)
Australian Capital Territory	3 591 (2 648 – 3 945)
New South Wales	80 700 (59 511 – 88 653)
Northern Territory	3 606 (2 659 – 3 962)
Queensland	47 356 (34 922 – 52 023)
South Australia	11 682 (8 614 – 12 833)
Tasmania	4 561 (3 363 – 5 010)
Victoria	55 261 (40 751 – 60 707)
Western Australia	20 549 (15 154 – 22 574)
Australia	227 306 (167 623 – 249 707)

Note: HCC = hepatocellular carcinoma

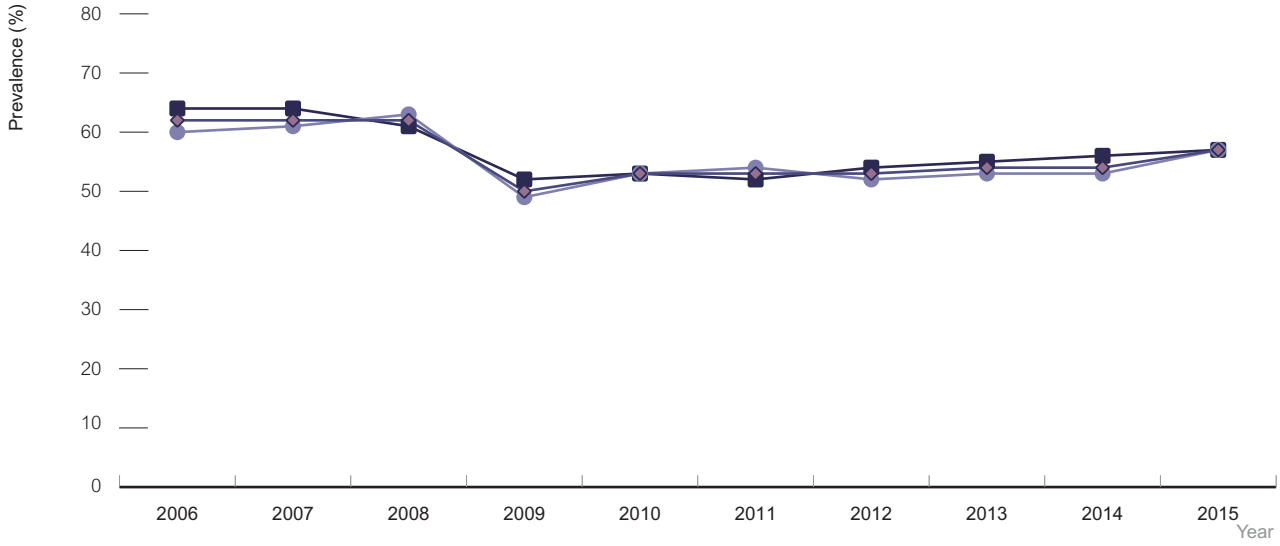
Source: See Methodological Notes for detail

Hepatitis C prevalence

Australia has a concentrated chronic hepatitis C epidemic among key populations; people who inject drugs, prisoners with a history of injecting drug use, people from high prevalence countries (>3.5%)[13] and HIV positive men who have sex with men.

Data routinely collected from the Australian Needle and Syringe Program Survey provide insights into the demographic characteristics, risk behaviour, and bloodborne virus prevalence among people who inject drugs who attend needle and syringe programs. Exposure to hepatitis C infection occurs at high levels among people who inject drugs, with a hepatitis C antibody prevalence of 57% in 2015 among Australian Needle and Syringe Program Survey participants (Figure 47). Prevalence of hepatitis C antibody decreased among both males and females from 62% in 2006 to approximately around 50% in 2009, and has remained stable since then (Figure 47). Hepatitis C prevalence is also high among prisoners at 29% in males and 41% in females in 2013, according to the National Prison Entrants' Bloodborne Virus Survey (Figure 48).

Figure 47 Hepatitis C prevalence* among people seen at needle and syringe programs, 2006 – 2015, by sex

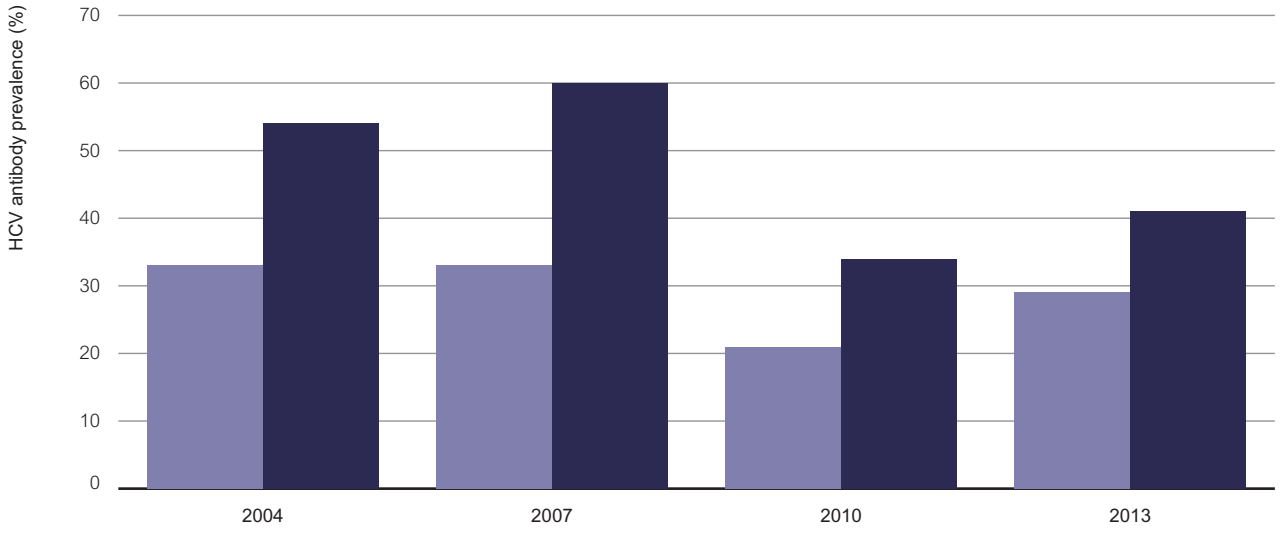


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	64%	64%	61%	52%	53%	52%	54%	55%	56%	57%
Males	60%	61%	63%	49%	53%	54%	52%	53%	53%	57%
Total	62%	62%	62%	50%	53%	53%	53%	54%	54%	57%

* Among respondents tested

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

Figure 48 Hepatitis C prevalence among prison entrants, 2004, 2007, 2010, 2013



	2004	2007	2010	2013
Females	54%	60%	34%	41%
Males	33%	33%	21%	29%

Source: National Prison Entrants' Bloodborne Virus Survey 2004, 2007, 2010, and 2013, see Methodological Notes for detail

HCV

Morbidity

By the end of 2015, an estimated 178 052 (131 302 – 195 600) people with chronic hepatitis C had early to moderate fibrosis (stage F0-2), 29 070 (21 437 – 31 935) had severe fibrosis (stage F3), 17 149 (12 647 – 18 840) had hepatitis C related cirrhosis (stage 4), and 3 034 (2 238 – 3 333) had decompensated cirrhosis/hepatocellular carcinoma (Table 13). The greatest burden of disease was in New South Wales, following by Victoria and Queensland (Table 13).

Table 13 Morbidity estimates by State/Territory, 2015

State/Territory	Early to moderate fibrosis	Severe fibrosis	Hepatitis C related cirrhosis	Decompensated cirrhosis/HCC
Australian Capital Territory	2 928	478	282	50
New South Wales	57 028	9 311	5 493	972
Northern Territory	1 826	298	176	31
Queensland	35 758	5 838	3 444	609
South Australia	12 938	2 112	1 246	220
Tasmania	3 969	648	382	68
Victoria	44 240	7 223	4 261	754
Western Australia	19 365	3 162	1 865	330
Australia	178 052	29 070	17 149	3 034

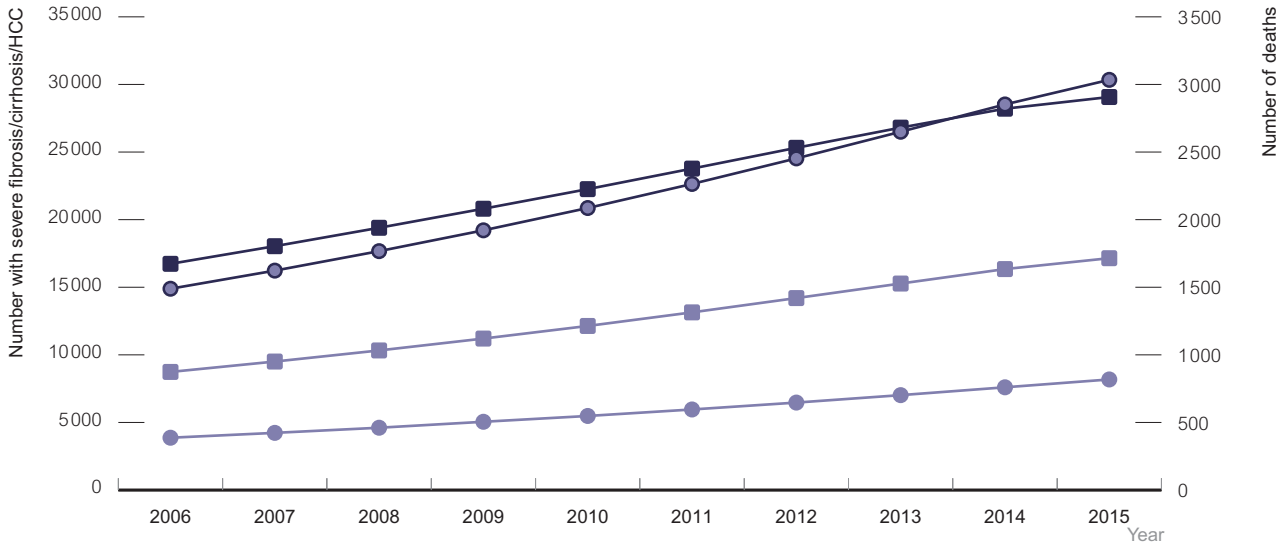
Note: HCC = hepatocellular carcinoma

Source: See Methodological Notes for detail

The estimated number of people with severe fibrosis has increased by 74% since 2006 (16 732), and the estimated number of people with hepatitis C related cirrhosis has increased by 96% since 2006 (8 737) (Figure 49).

An estimated 818 (603 – 899) deaths attributable to chronic hepatitis C infection occurred in 2015, an increase of 111% since 2006 where there was an estimated 387 (296 – 422) deaths (Figure 49).

Figure 49 Estimated number of people at different stages of hepatitis C related liver morbidity, and estimated number of deaths, 2006 – 2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Severe fibrosis	16 732	18 037	19 398	20 807	22 257	23 775	25 313	26 805	28 206	29 070
Hepatitis C related Cirrhosis	8 737	9 505	10 326	11 204	12 137	13 142	14 199	15 274	16 344	17 149
Decompensated cirrhosis/HCC	1 489	1 623	1 767	1 921	2 086	2 264	2 453	2 650	2 852	3 034
Deaths	387	423	461	505	548	596	647	702	760	818

Note: HCC = hepatocellular carcinoma
Source: See Methodological Notes 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. Of the 219 people who had a liver transplant in 2015, 72 (33%) had hepatitis C infection (Table 14).

HCV

Table 14 Number (percent) of liver transplants, 2006 – 2015, by year and primary cause of liver disease, and hepatitis status for cases where the primary diagnosis was hepatocellular carcinoma

	Year																					
	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		**Total**	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Diagnosis																						
Hepatitis B	3	2.3	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	41	2.5
Hepatitis C	31	23.8	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	436	26.8
Hepatitis B/C/D	2	1.5	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	21	1.3
Hepatocellular carcinoma	10	7.7	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	267	16.4
Hepatocellular carcinoma Hepatitis B	3	2.3	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	56	3.4
Hepatocellular carcinoma Hepatitis C	5	3.8	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	150	9.2
Hepatocellular carcinoma Hepatitis B/C/D	0	0.0	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	10	0.6
Hepatitis negative	2	1.5	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	57	3.5
Other	84	64.6	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	882	54.1
Total	130	100	119	100	119	100	146	100	163	100	161	100	180	100	198	100	194	100	219	100	1 629	100

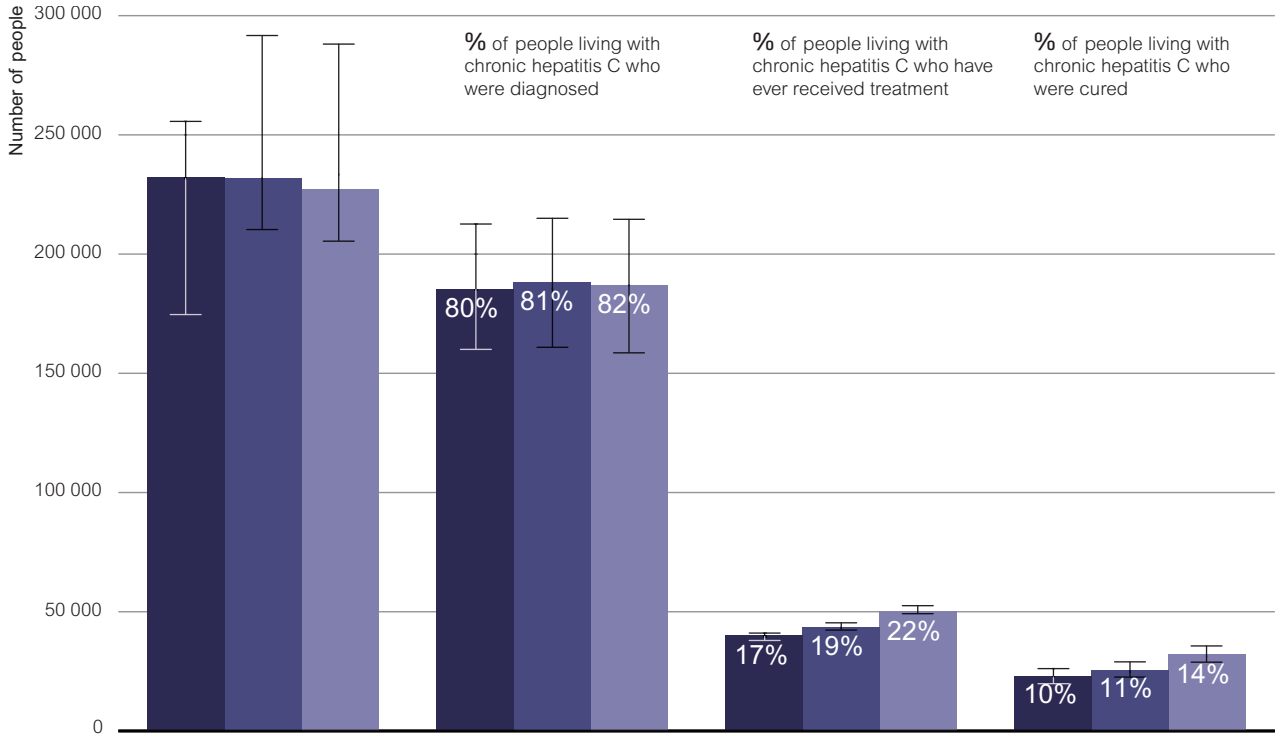
Source: Australian and New Zealand liver Transplant Registry

The 2015 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, the number and proportion who are diagnosed in Australia, and estimates of the number of people receiving 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, initiation of antiviral therapy to cure. Using available data and accounting for uncertainties, the proportions of people in each stage of the cascade in Australia were estimated (Figure 50, Table 15). Methods and the associated uncertainties are described in detail in the Methodological Notes.

The approach was informed by recommendations from a national stakeholder reference group (see Methodological Notes for further detail).

Figure 50 The hepatitis C diagnosis and care cascade, 2013 – 2015



	Living with chronic hepatitis C	Diagnosed with chronic hepatitis C	Ever received hepatitis C treatment	Hepatitis C cured
2013	232 300	185 359	39 849	22 850
2014	231 828	188 012	43 253	25 552
2015	227 306	186 763	50 172	32 139

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

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Table 15 The hepatitis C diagnosis and care cascade estimates, 2013 – 2015

Cascade stage	Estimate to end of 2013 (range)	Estimate to end of 2014 (range)	Estimate to end of 2015 (range)
Living with chronic hepatitis C infection*	232 300 (173 771 – 254 536)	231 828 (172 692 – 254 155)	227 306 (167 623 – 249 707)
Diagnosed with chronic hepatitis C infection	185 359 (160 170 – 212 027)	188 012 (161 836 – 215 743)	186 763 (159 578 – 215 595)
Ever received hepatitis C treatment	39 849 (38 234 – 40 678)	43 253 (41 342 – 44 189)	50 172 (47 929 – 51 227)
Hepatitis C cured	22 850 (18 293 – 25 466)	25 552 (20 756 – 28 041)	32 139 (27 067 – 34 492)

* Excludes those ever cured

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

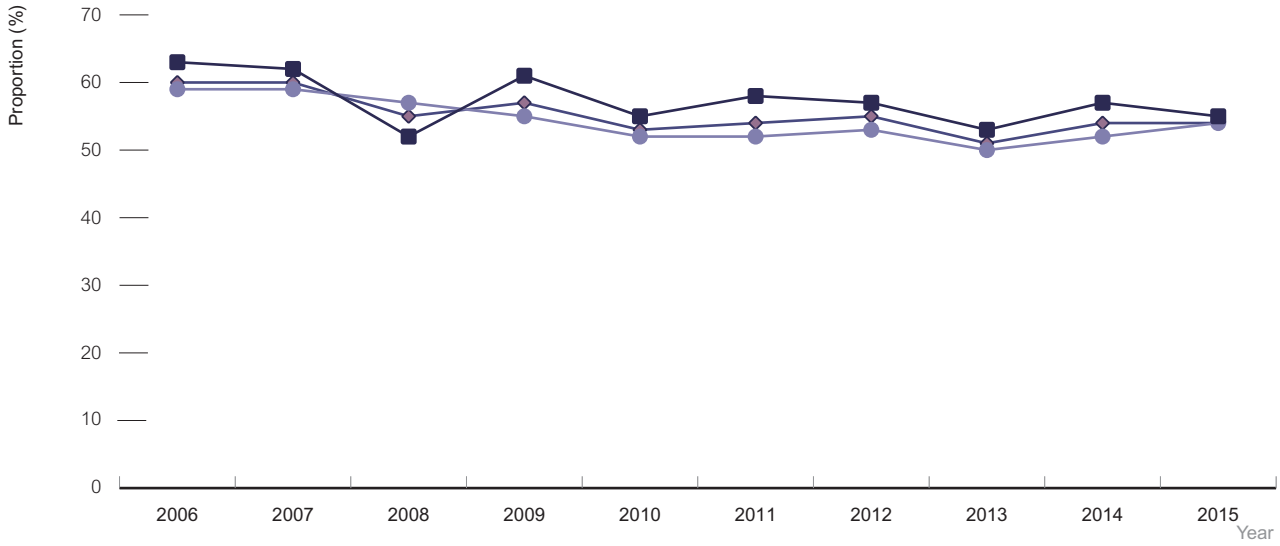
During 2015, an estimated 227 306 (167 623 – 249 707) people were living with chronic hepatitis C infection, an estimated 186 763 (159 578 – 215 595) were diagnosed with chronic hepatitis C, an estimated 50 172 (47 929 – 51 227) were ever on antiviral therapy, and an estimated 32 139 (27 067 – 34 492) were cured. This corresponds to 82% of all people with chronic hepatitis C being diagnosed, 22% of people living with chronic hepatitis C ever having been on antiviral therapy, and 14% of people living with chronic hepatitis C were cured. This compares to 81% diagnosed, 19% ever treated and 11% cured in 2014, and similar proportions in 2013.

Hepatitis C testing

Data from the Australian Needle and Syringe Program Survey show that in 2015, about half (55% of females and 54% of males) reported a hepatitis C antibody test in the 12 months prior to the survey (Figure 51). Over the last ten years the proportion reporting hepatitis C testing, has fluctuated between 51 and 60%.

Data from the ACCESS network indicate hepatitis C testing among priority populations has increased in the last ten years, among people who inject drugs from 17% in 2011 to 29% in 2015, and in HIV positive gay and bisexual men from 13% in 2011 to 29% in 2015 (Figure 52).

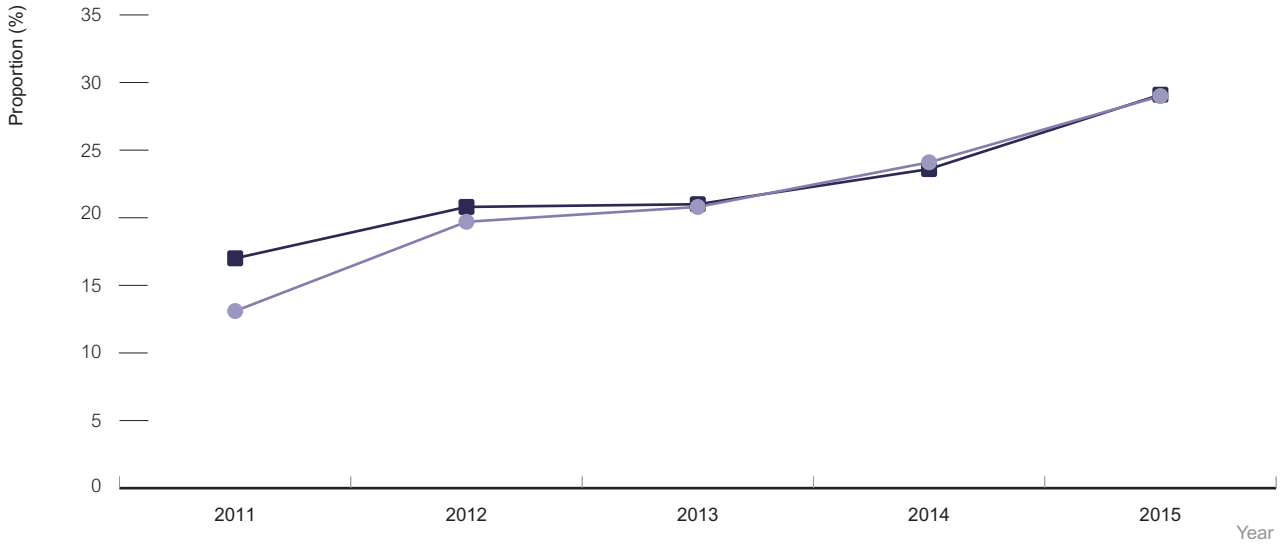
Figure 51 Proportion of people who inject drugs seen at needle and syringe programs who reported a hepatitis C antibody test in the past 12 months, 2006 – 2015, by sex



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	63%	62%	52%	61%	55%	58%	57%	53%	57%	55%
Males	59%	59%	57%	55%	52%	52%	53%	50%	52%	54%
Total	60%	60%	55%	57%	53%	54%	55%	51%	54%	54%

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

Figure 52 Proportion of sexual health attendees tested for hepatitis C in a year, by select population and year, 2011 – 2015



	2011	2012	2013	2014	2015
People who inject drugs	17.0%	20.8%	21.0%	23.6%	29.1%
HIV positive gay and bisexual men	13.1%	19.7%	20.8%	24.1%	29.0%

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

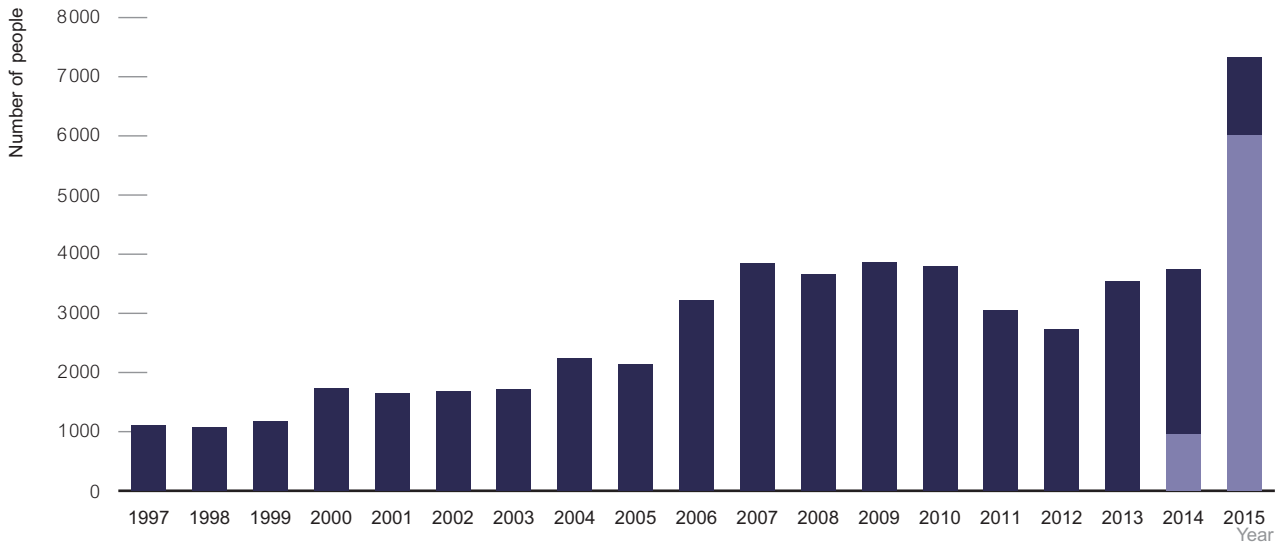
Hepatitis C treatment

An estimated 7 326 received hepatitis C treatment in the 12 months of 2015, compared with 3 540 in 2013 and 3 749 in 2014. The increase in 2015 reflects people accessing direct acting antivirals though personal importation and clinical trials, prior to the public funding through the Pharmaceutical Benefits Scheme (Figure 53). Between 1997 and 2015, there has been a 566% increase in the number of people receiving hepatitis C treatment, from 1 100 in 1997 to 7 326 in 2015. Subsidised interferon-free direct acting antiviral regimens became available in Australia in March 2016, and treatment data from March-July 2016 are reported in the '*Hepatitis B and C in Australia Annual Surveillance Report Supplement 2016*' report[14].

According to the Australian Needle and Syringe Program Survey, in 2015, among people who inject drugs with prior exposure to hepatitis C 12% reported ever receiving hepatitis C treatment and 2% had received treatment in the last 12 months similar to the 11% ever treated and 1% receiving treatment in the last 12 months in 2008 (Figure 54), with some fluctuation in the intervening years.

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.

Figure 53 The number of people receiving hepatitis C treatment, 1997 – 2015

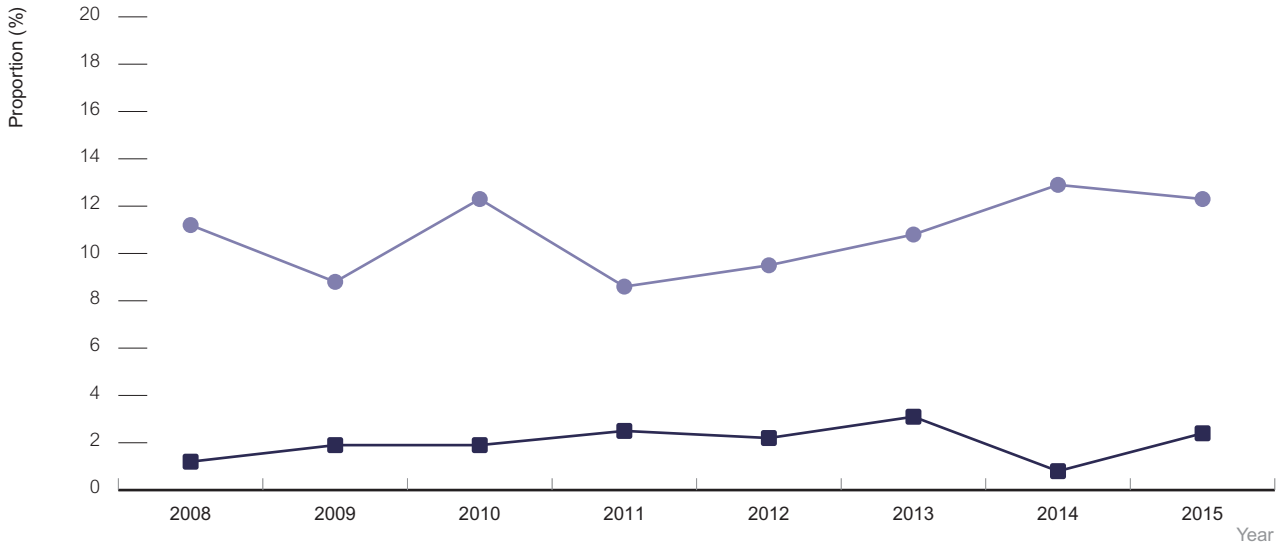


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
IFN-free																		959	6016
IFN-based	1100	1068	1181	1726	1654	1684	1718	2245	2134	3215	3843	3664	3864	3795	3053	2726	3540	2790	1310

Note: IFN = interferon

Source: PharmDash, Pharmaceutical companies, personal communication

Figure 54 Proportion of hepatitis C antibody positive people seen at needle and syringe programs with a history of hepatitis C treatment, 2008 – 2015



	2008	2009	2010	2011	2012	2013	2014	2015
Lifetime history of treatment[1]	11.2%	8.8%	12.3%	8.6%	9.5%	10.8%	12.9%	12.3%
Treatment in the last 12 months[1,2]	1.2%	1.9%	1.9%	2.5%	2.2%	3.1%	0.8%	2.4%

1. 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 twelve months is restricted to people with hepatitis C antibody positive serology and excludes people who self-reported spontaneous or treatment induced viral clearance
2. Prior to 2012 commenced treatment in the last twelve months was 'current treatment'

Source: Australian Needle and Syringe Program Survey, see Methological Notes for details

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Hepatitis C prevention

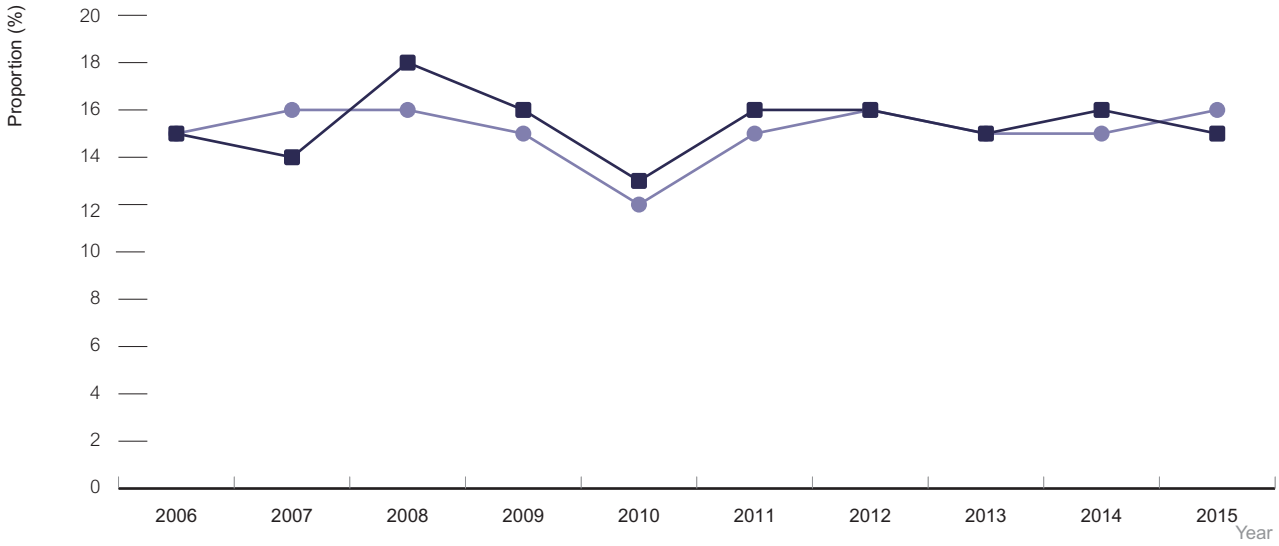
The re-use of needles and syringes that have been used by others (receptive syringe sharing) is the major risk factor for the transmission of HIV and hepatitis among people who inject drugs. Harm reduction strategies such as needle and syringe programs, opioid substitution therapy (OST), and peer interventions can reduce injecting risk behaviour.[7, 8] OST has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[9 – 11] Education is important to enhance the effectiveness of these harm reduction strategies and to support people to inject safely.

At a community level, modelling suggests achieving a high coverage of hepatitis C antiviral treatment can reduce the population prevalence of infection, and therefore lead to reduced incidence of infection (treatment as prevention).[15] 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 indicate that rates of receptive syringe sharing have remained stable over the last ten years, at around 15% among people who inject drugs attending needle and syringe programs, similar among males and females (Figure 55).

Figure 55 Proportion of people seen at Needle and Syringe Programs reporting receptive syringe sharing in the last month, 2006 – 2015, by sex



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	15%	14%	18%	16%	13%	16%	16%	15%	16%	15%
Males	15%	16%	16%	15%	12%	15%	16%	15%	15%	16%
Total	15%	15%	17%	16%	12%	15%	16%	15%	16%	16%

Source: Australian Needle and Syringe Program Survey see Methodological Notes for details

Hepatitis C incidence

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

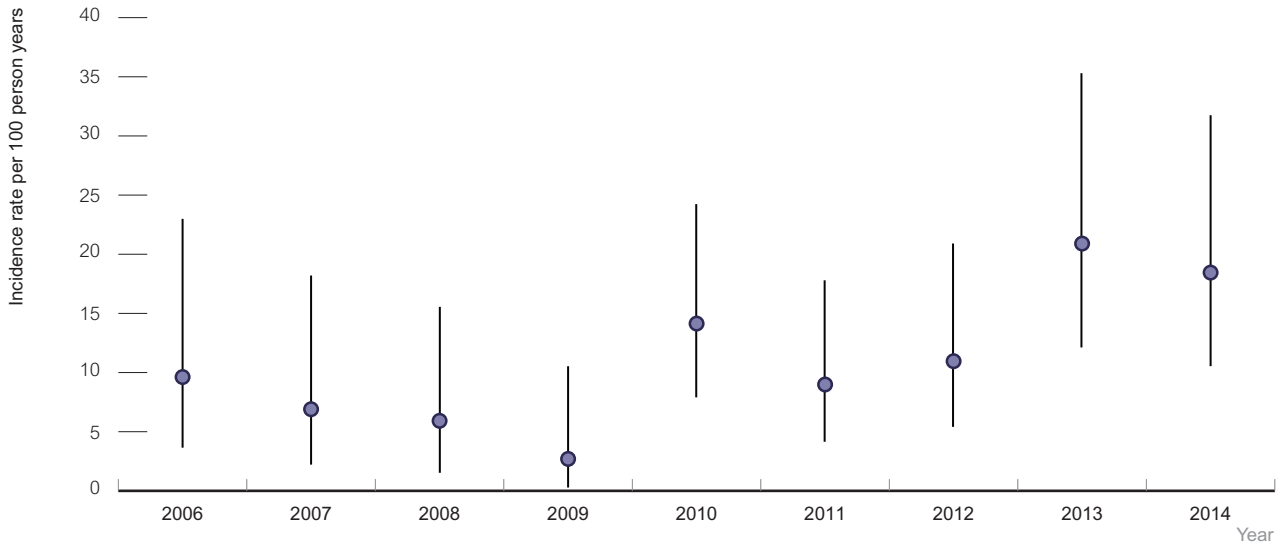
The incidence estimates below include data from participants in the Australian Needle and Syringe Program Survey, so are not necessarily reflective of trends in the broader population.

Trends in the rate of diagnoses in those aged under 25 years can be interpreted as a surrogate for the incidence of hepatitis C infection. As shown in the section on new hepatitis C diagnoses, there was a 33% decline in notification rates in those aged less than 25 years between 2006 and 2015.

Hepatitis C incidence can also be estimated from repeat testing data from the Australian Needle Syringe Program Survey by dividing the number of seroconversions (HCV antibody negative to positive) observed among serologically confirmed HCV negative participants by the person time at risk (time between repeat hepatitis C test in the survey). Further details about the methods used can be found in Methodological Notes.

Over a nine year study period (2006 – 2014) among people who inject drugs participating in the Australian Needle and Syringe Program Survey on more than one occasion, there were 78 seroconversions, yielding a pooled hepatitis C incidence of 11.2 per 100 person-years (95%CI: 8.9 – 14.0). Hepatitis C incidence declined from 9.6 in 2006 to 2.7 in 2009, and has remained high in the past five years, at between 9.0 and 20.9 (Figure 56). The confidence intervals between these estimates overlap, meaning the differences observed each year are not statistically significant, and caution should be taken in interpretation due to the small number of seroconversions per year. The incidence rate for 2015 is not available due to the method of calculation (see Methodological Notes for further detail). Incidence estimates are not available by Aboriginal and Torres Strait Islander status, due to the smaller number of participants in the Survey.

Figure 56 Estimated annual incidence of hepatitis C virus infection among people who inject drugs, seen at needle and syringe programs, 2006 – 2014

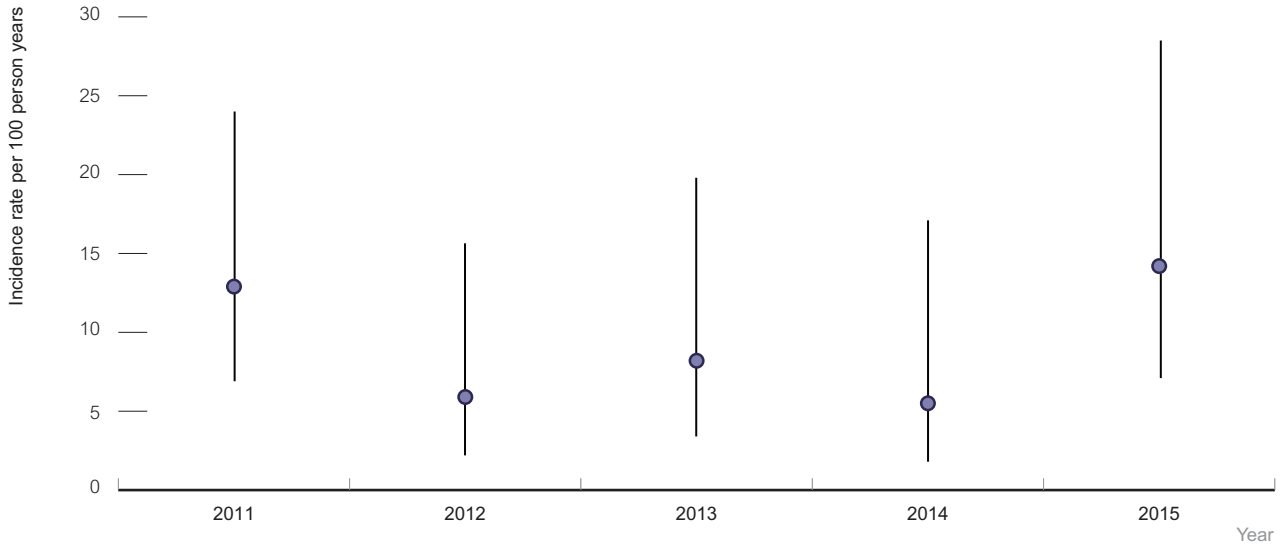


	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence estimate	9.6	6.9	5.9	2.7	14.1	9.0	11.0	20.9	18.5
Number of seroconversions per year	5	4	4	3	15	8	11	15	13

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

Over a five year study period (2011 – 2015) among people attending the Kirketon Road Centre in Sydney, NSW on more than one occasion, hepatitis C incidence was 12.9 per 100 person years in 2011, decreasing to 5.5 per 100 person years in 2014, and increasing again in 2015, to 14.2 per 100 person years (Figure 57). The confidence intervals between these estimates overlap, meaning the differences observed each year are not statistically significant, and caution should be taken in interpretation due to the small number of seroconversions per year.

Figure 57 Estimated annual incidence of hepatitis C virus infection among people who inject drugs seen at Kirketon Road Centre, Sydney NSW, 2011 – 2015



	2011	2012	2013	2014	2015
Incidence estimate	12.90	5.90	8.20	5.50	14.20
Number of seroconversions per year	10	4	5	3	8

Source: Kirketon Road Centre

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Main Findings
Hepatitis B infection

New hepatitis B diagnoses

- There were a total of 6 502 notifications of newly diagnosed hepatitis B infection in Australia in 2015.

- Over the ten year period 2006 – 2015, the population rate of notification of hepatitis B infection has declined in Australia in younger age groups, reflecting the impact of the infant and adolescent vaccination programs, but remained high in the 25 – 29 and 30 – 39 year age groups. The declining trend in younger age groups was similar to that of notifications of newly acquired hepatitis B infection.

- Notification rates of hepatitis B infection in Australia (based on data from the Northern Territory, South Australia, Tasmania, Western Australia, and the Australian Capital Territory) were three times higher among the Aboriginal and Torres Strait Islander population than in the non-Indigenous population in 2015 (66 per 100 000 compared to 22 per 100 000). Similar to the non-Indigenous population, the greatest declines were observed in the younger age groups.

Prevalence and morbidity

- There were an estimated 232 600 (range 190 738 to 283 781) people living with chronic hepatitis B infection in Australia in 2015, of whom 88 621 (38%) were born in the Asia-Pacific, and 21 632 (9.3%) were Aboriginal and Torres Strait Islander peoples.

- In 2015, the estimated chronic hepatitis B prevalence was 4.0% in people who inject drugs, 3.9% in Aboriginal and Torres Strait Islander peoples, 3.6% in people born in the Asia-Pacific, 3.5% in people born in Sub-Saharan Africa, and 3.0% in men who have sex with men, with potential overlaps in some of these categories.

- Of 219 people who had a liver transplant in 2015, 17 (8%) had hepatitis B infection.

- An estimated 419 (323 – 683) deaths attributable to chronic hepatitis B infection occurred in 2015.

Testing and care

- **In 2015 an estimated 62% of people with chronic hepatitis B in Australia have been diagnosed.**

- **Treatment for hepatitis B is considered in people with elevated hepatitis B viral load, abnormal liver function tests, or those who have advanced liver disease (cirrhosis). It is likely about 15% of people would benefit from treatment, yet only 6% (40% of the target) of people living with chronic hepatitis B were receiving antiviral therapy in 2015.**

- **Of 17 749 people attending sexual health clinics in 2015 for whom vaccination documentation or pathology details were available, 70% had documented evidence of immunity to hepatitis B, highest in the youngest age group 15 – 19 years (79%).**

Prevention

- **In 2015 coverage of infant hepatitis B vaccination at 24 months of age was 95% in the non-Indigenous population, and 96% in the Aboriginal and Torres Strait Islander population.**

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Interpretation:

Unlike hepatitis C infection which is strongly associated with injecting risk behaviour in Australia, hepatitis B in adolescents and adults is transmitted through a variety of pathways, including both injecting drug use and sexual transmission. However, most Australians living with chronic hepatitis B acquired infection at birth or in early childhood. There is limited information on uptake of testing, so it is not possible to interpret the rate of notification as a surrogate for incidence, even in young people. However the trends in newly acquired infections in young people are similar to the trends in the overall diagnosis rates. Age specific analysis in both overall and newly acquired infections indicate a decline in precisely those age groups (<25 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 variation by jurisdiction). Maternal screening and vaccination of infants born to mothers with chronic hepatitis B is also likely to have contributed to this decline. An estimated 62% of people with chronic hepatitis B in Australia have been diagnosed and of these, 16% were in care, and 6% of all people living with chronic hepatitis B were receiving treatment in 2015 based on Pharmaceutical Benefits Scheme reimbursements. These estimates indicate an ongoing gap in both the uptake of testing to diagnose chronic hepatitis B infection, and the uptake of effective monitoring and treatment to control viral replication.

New hepatitis B diagnoses

This section focuses on people newly diagnosed with hepatitis B virus infection in Australia (including people with newly acquired and unspecified duration of infection).

There were a total of 6 502 notifications of newly diagnosed hepatitis B infection in Australia in 2015, of these 221 (3%) were among the Aboriginal and Torres Strait Islander population, 2 211 (34%) were among the non-Indigenous population, and there were a further 4 070 (63%) notifications for which Indigenous status was not reported.

In 2015, over half (53%, 3 438) of newly diagnosed hepatitis B infections were in males, 74% (4 783) were in people aged 30 years and above, and 85% (5 530) were in people residing in major cities. Of the 6 502 new diagnoses, the vast majority (98%) were unspecified, likely representing chronic hepatitis B infection (Table 16).

Table 16 Characteristics of hepatitis B new diagnoses, 2006 – 2015

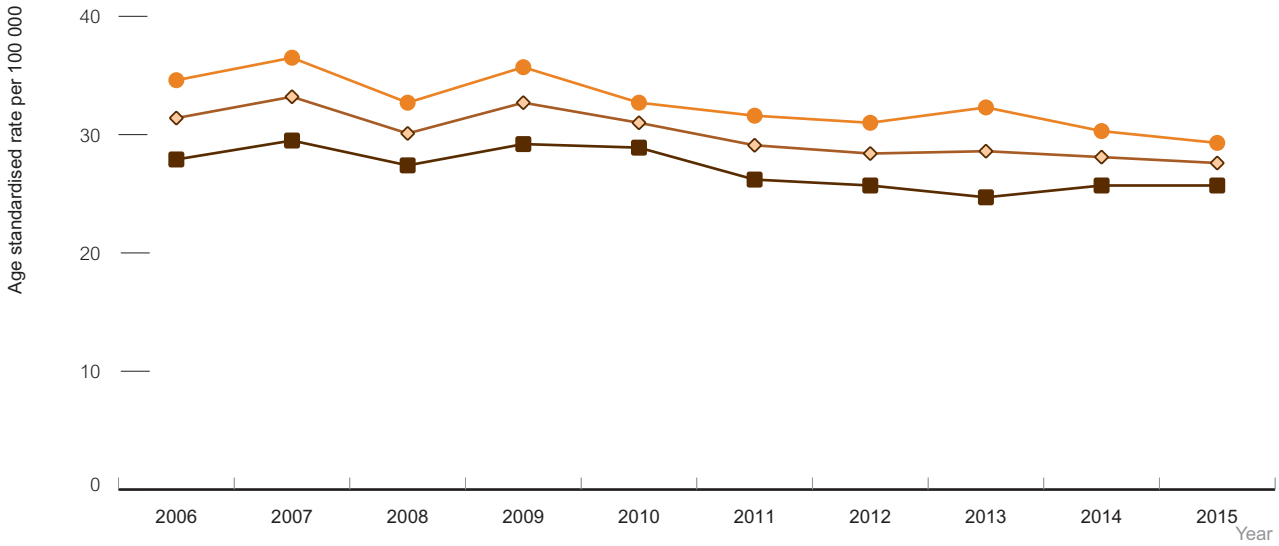
	Year of diagnosis									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Characteristic										
Total	6 363	6 853	6 355	7 025	6 783	6 462	6 407	6 565	6 533	6 502
Sex										
Female	2 825	3 035	2 871	3 120	3 153	2 898	2 887	2 845	3 000	3 041
Male	3 500	3 765	3 442	3 844	3 566	3 509	3 488	3 690	3 505	3 438
Missing	38	53	42	61	64	55	32	30	28	23
Age group (years)										
0 – 14	180	156	161	135	123	88	93	89	76	71
15 – 19	297	329	286	314	277	220	208	249	169	164
20 – 29	1 835	1 919	1 754	1 910	1 846	1 806	1 719	1 622	1 538	1 477
30 – 39	1 696	1 886	1 775	1 943	1 904	1 786	1 852	1 912	1 998	1 923
40+	2 351	2 555	2 369	2 713	2 625	2 558	2 533	2 693	2 748	2 860
Missing	4	8	10	10	8	4	2	0	4	7
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	381	335	302	245	252	226	194	196	163	221
Non-Indigenous	2 757	2 973	2 568	2 697	2 291	2 113	2 324	2 323	2 289	2 211
Not reported	3 225	3 545	3 485	4 083	4 240	4 123	3 889	4 046	4 081	4 070
Newly acquired[1]	287	300	257	252	232	187	194	178	171	139
Area of residence										
Major Cities of Australia	5 314	5 755	5 305	6 005	5 708	5 526	5 410	5 376	5 553	5 530
Inner Regional Australia	376	375	368	396	415	329	366	389	417	405
Outer Regional Australia	279	370	338	307	338	330	394	506	335	340
Remote Australia	119	101	108	98	97	85	82	85	71	86
Very Remote Australia	181	139	121	102	96	97	82	91	63	52
Missing	94	113	115	117	129	95	73	118	94	89
State/Territory[3]										
ACT	77	69	58	107	96	94	107	111	97	81
NSW	2 449	2 540	2 373	2 710	2 558	2 503	2 323	2 474	2 525	2 370
NT	245	244	200	154	162	154	200	326	155	158
QLD	984	1 033	874	1 054	1 103	832	807	879	961	1 041
SA	262	327	282	305	283	311	345	294	327	344
TAS	53	42	67	85	55	51	71	59	60	41
VIC	1 677	1 939	1 862	1 963	1 918	1 950	1 958	1 800	1 774	1 867
WA	616	659	639	647	608	567	596	622	634	600

1 Newly acquired hepatitis B is defined as newly diagnosed hepatitis B infection with evidence of acquisition in the 24 months prior to diagnosis (laboratory or clinical evidence). Enhanced surveillance procedures related to hepatitis B vary by state/territory. The total number of cases reported here is likely to be an under-estimation of the true number of newly acquired infections.

Source: Australian National Notifiable Diseases Surveillance System

The notification rate of hepatitis B virus infection in Australia has remained relatively steady in the past ten years, at 31 per 100 000 in 2006 and 28 per 100 000 in 2015. Rates have been consistently higher among males than females, and were 29 and 26 per 100 000 in 2015, respectively (Figure 58).

Figure 58 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by sex

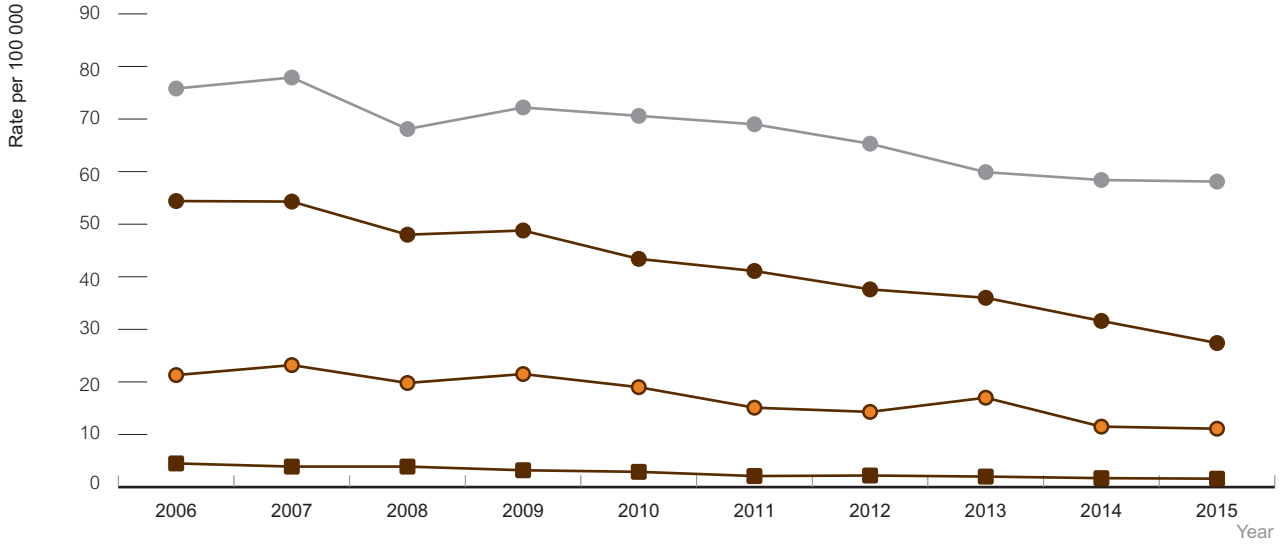


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	27.9	29.5	27.4	29.2	28.9	26.2	25.7	24.7	25.7	25.7
Males	34.6	36.5	32.7	35.7	32.7	31.6	31.0	32.3	30.3	29.3
Total	31.4	33.2	30.1	32.7	31.0	29.1	28.4	28.6	28.1	27.6

Source: Australian National Notifiable Diseases Surveillance System

The rate of notification has declined in younger age groups aged 25 – 29 years (from 76 to 58 per 100 000), 20 – 24 years (from 54 to 27 per 100 000), and 15 – 19 years (from 21 to 11 per 100 000) (Figure 59). Overall the rates in those aged less than 25 years have declined by 51%. In contrast, notification rates have showed little variation in those aged 30 – 39 years (57 per 100 000 in 2006 and 58 per 100 000 in 2015), and 40+ years (25 per 100 000 in 2006 and 26 per 100 000 in 2015) (Figure 60).

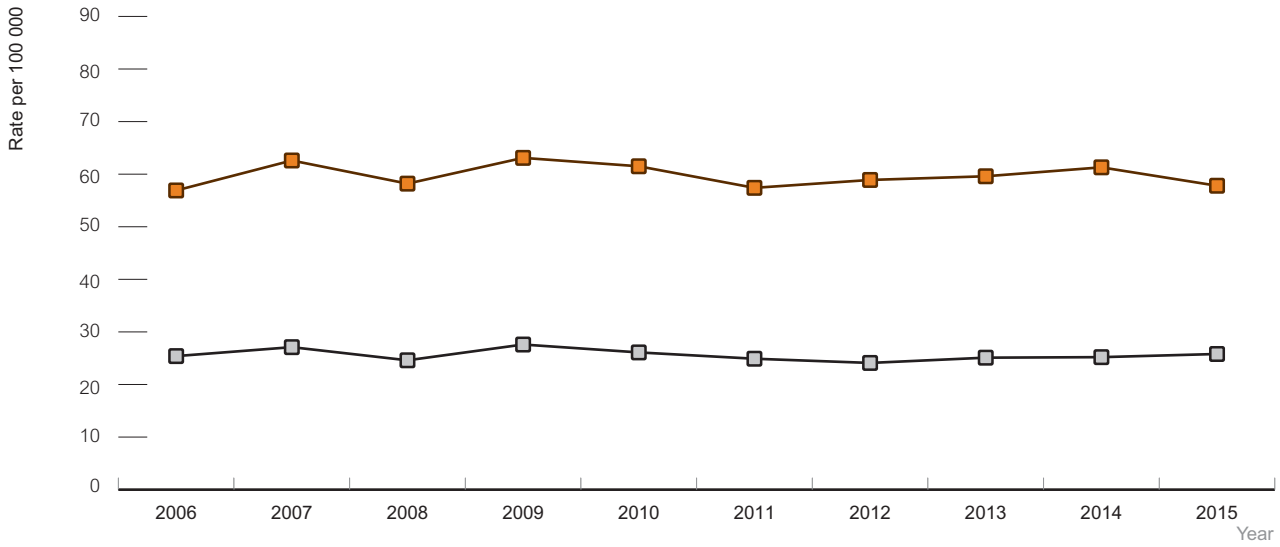
Figure 59 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by year and selected age group



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	4.5	3.9	3.9	3.2	2.9	2.1	2.2	2.0	1.7	1.6
15 – 19	21.3	23.2	19.8	21.5	19.0	15.1	14.3	17.0	11.5	11.1
20 – 24	54.4	54.3	48.0	48.8	43.4	41.1	37.6	36.0	31.6	27.4
25 – 29	75.8	77.9	68.1	72.2	70.6	69.0	65.3	59.9	58.4	58.1

Source: Australian National Notifiable Diseases Surveillance System

Figure 60 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by year and selected age group



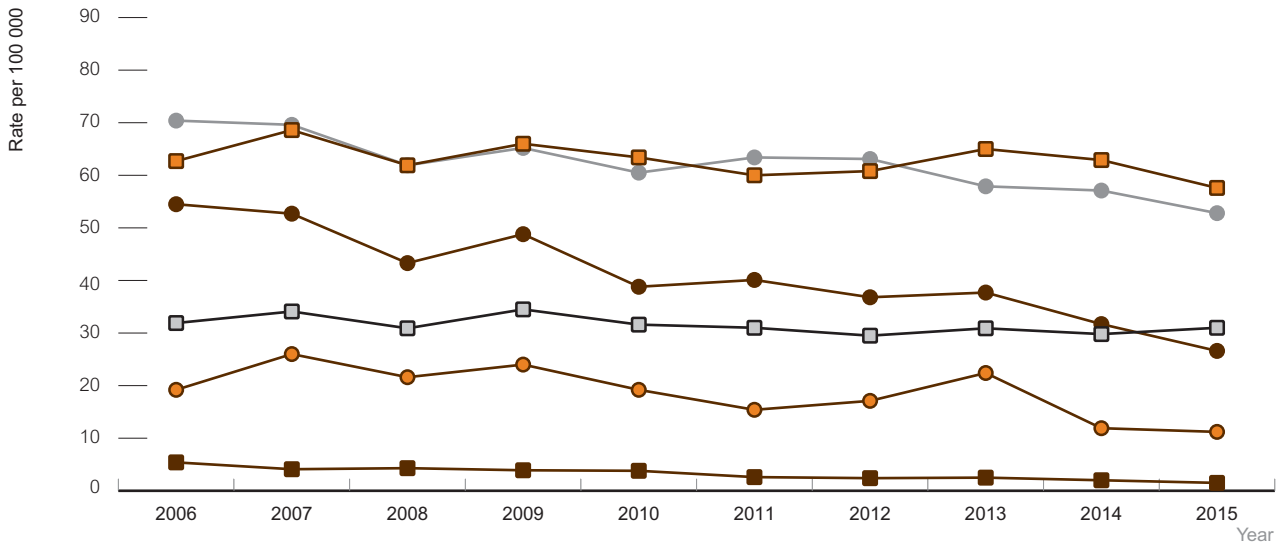
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
30 – 39	56.9	62.6	58.2	63.1	61.5	57.4	58.9	59.6	61.3	57.8
40+	25.4	27.1	24.6	27.6	26.1	24.9	24.1	25.1	25.2	25.8

Source: Australian National Notifiable Diseases Surveillance System

HBV

Among males, the highest hepatitis B notification rates were in the 30 – 39 and 25 – 29 year age group, at 58 and 53 per 100 000 in 2015, respectively. Rates have been similar between these two age groups over the last ten years (Figure 61). In comparison, in females, the hepatitis B notification rate was highest in the 25 – 29 age group each year except 2014, when the rate was higher in those aged 30 – 39 years (Figure 62). In general, the same pattern as seen nationally has been seen in both males and females, with declines in the younger age groups but broadly stable rates in the age groups 30 – 39 years and 40+ years.

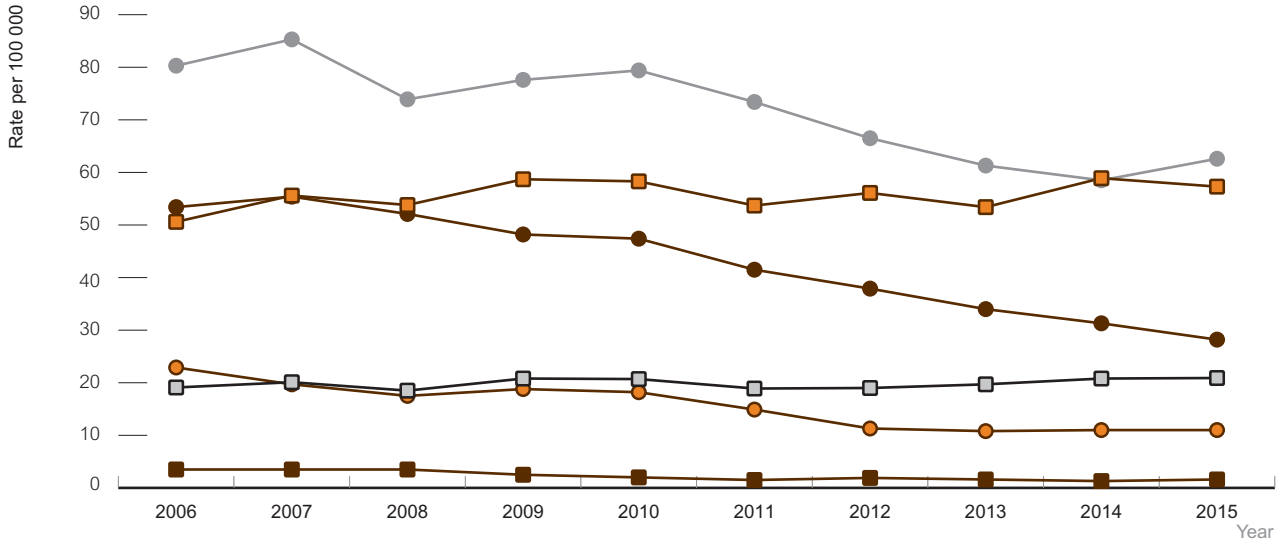
Figure 61 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by age group, males



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	5.4	4.1	4.3	3.9	3.8	2.6	2.4	2.5	2.0	1.5
15 – 19	19.2	26.0	21.6	24.0	19.2	15.4	17.1	22.4	11.9	11.2
20 – 24	54.5	52.7	43.3	48.8	38.8	40.1	36.8	37.7	31.7	26.6
25 – 29	70.4	69.6	61.9	65.2	60.5	63.4	63.1	57.9	57.1	52.8
30 – 39	62.7	68.6	61.9	66.0	63.4	60.0	60.8	65.0	62.9	57.6
40+	31.9	34.1	30.9	34.5	31.6	31.0	29.5	30.9	29.8	31.0

Source: Australian National Notifiable Diseases Surveillance System

Figure 62 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by age group, females

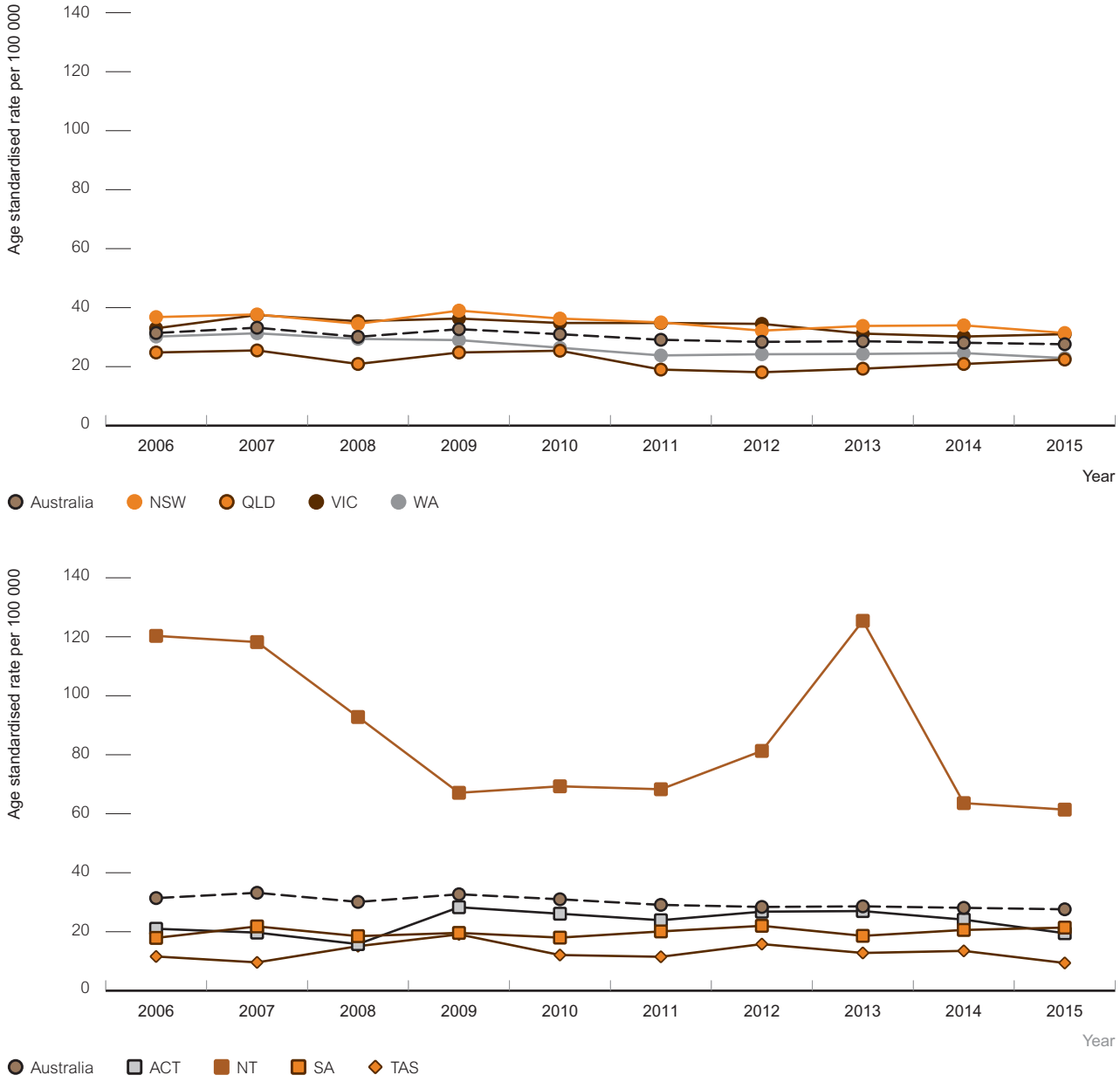


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	3.5	3.5	3.5	2.5	2.0	1.5	1.9	1.6	1.3	1.6
15 – 19	22.9	19.7	17.5	18.8	18.2	14.9	11.3	10.8	11.0	11.0
20 – 24	53.4	55.4	52.1	48.2	47.4	41.5	37.9	34.0	31.3	28.2
25 – 29	80.3	85.3	73.9	77.6	79.4	73.4	66.5	61.3	58.5	62.6
30 – 39	50.6	55.6	53.8	58.7	58.3	53.7	56.1	53.4	58.9	57.3
40+	19.1	20.1	18.5	20.8	20.7	18.9	19.0	19.7	20.8	20.9

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 halved over the past ten years (from 120 per 100 000 in 2006 to 61 per 100 000 in 2015). In most other jurisdictions the rate of hepatitis B diagnosis has fluctuated over the last ten years, with a small decline observed in New South Wales (37 in 2006 to 31 in 2015) and Victoria in recent years (38 in 2007 to 31 in 2015) (Figure 63, Table 17).

Figure 63 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by State/Territory



Source: Australian National Notifiable Diseases Surveillance System

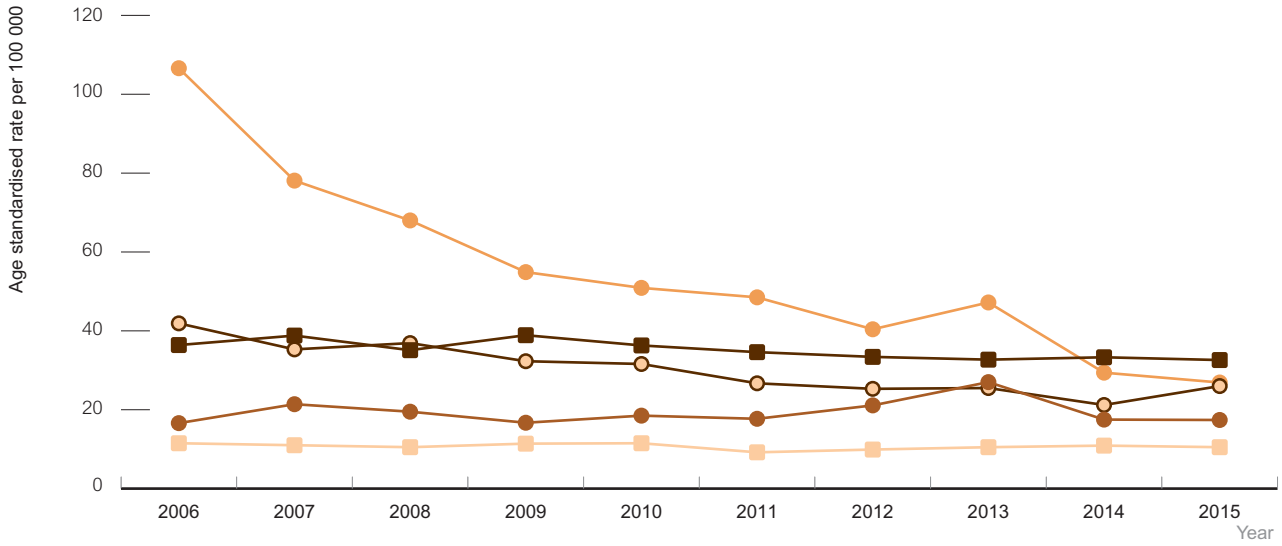
HBV

Table 17 Age standardised rates of hepatitis B notification per 100 000 population, 2006 – 2015, by State/Territory

State/Territory	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australian Capital Territory	21.0	19.7	15.8	28.3	26.1	23.9	26.8	27.0	24.1	19.5
New South Wales	36.8	37.7	34.5	39.0	36.3	35.0	32.2	33.8	34.0	31.4
Northern Territory	120.3	118.2	92.8	67.1	69.3	68.3	81.3	125.4	63.6	61.4
Queensland	24.8	25.5	20.9	24.8	25.4	19.0	18.1	19.3	20.9	22.4
South Australia	17.9	21.8	18.5	19.6	18.0	20.1	22.0	18.6	20.6	21.4
Tasmania	11.6	9.6	15.1	19.1	12.1	11.5	15.8	12.8	13.5	9.4
Victoria	33.0	37.5	35.4	36.3	34.8	34.8	34.5	31.2	30.2	31.0
Western Australia	30.2	31.3	29.4	29.0	26.4	23.8	24.2	24.3	24.6	22.9
National	31.4	33.2	30.1	32.7	31.0	29.1	28.4	28.6	28.1	27.6

Rates of hepatitis B notification were highest in very remote areas from 2006 to 2013, but were highest in major cities in 2014 and 2015 (Figure 64).

Figure 64 Hepatitis B notification rate per 100 000 population, 2006 – 2015, by region of residence



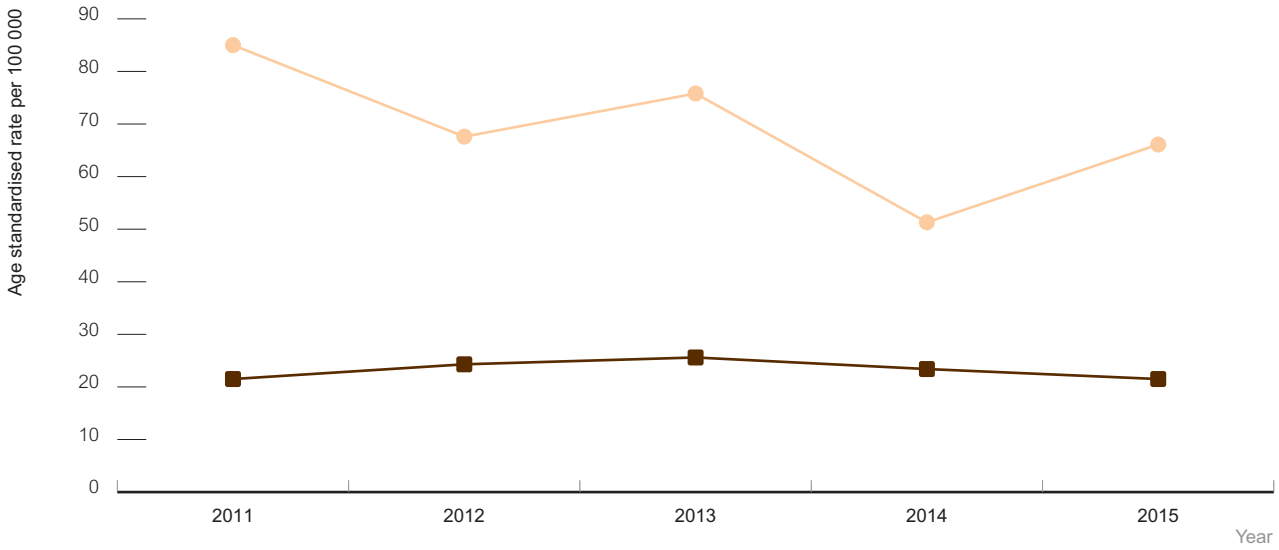
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	36.4	38.8	35.1	38.9	36.3	34.6	33.4	32.7	33.3	32.6
Inner regional	11.5	11.0	10.5	11.4	11.5	9.2	9.9	10.5	10.9	10.5
Outer regional	16.6	21.4	19.5	16.7	18.5	17.7	21.1	27.0	17.5	17.4
Remote	41.9	35.3	36.9	32.3	31.6	26.7	25.3	25.5	21.2	26.0
Very remote	106.6	78.1	68.0	54.9	50.9	48.5	40.4	47.2	29.4	26.9

Source: Australian National Notifiable Diseases Surveillance System

Data on notifications in Aboriginal and Torres Strait Islander peoples are from the Northern Territory, South Australia, Tasmania, Western Australia and the Australian Capital Territory where reporting of Indigenous status is ≥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 2015, the notification rate of newly diagnosed hepatitis B infection for the Aboriginal and Torres Strait Islander population in these jurisdictions was 3 times higher than the non-Indigenous population (66 per 100 000 compared to 22 per 100 000) (Figure 65). In the Aboriginal and Torres Strait Islander population the rate decreased from 85 per 100 000 in 2011 to 66 per 100 000 population in 2015, compared to the non-Indigenous population where it was stable at 22 per 100 000 in both 2011 and 2015. This likely reflects the Aboriginal and Torres Strait Islander population being eligible for childhood vaccination, whereas non-Indigenous notifications also include people born overseas where vaccination programs vary considerably. Higher testing rates among Aboriginal and Torres Strait Islander people in previous years may have also contributed to this decline.

Age standardised rates of hepatitis B notification were higher in the Aboriginal and Torres Strait Islander population than the non-Indigenous population in most years in the Northern Territory, South Australia, and Western Australia (Figure 66). Despite an increase in 2015, the decline in hepatitis B rates was greatest in the Aboriginal and Torres Strait Islander population in the Northern Territory (from 142 per 100 000 in 2006 to 114 per 100 000 in 2015).

Figure 65 Hepatitis B notification rate per 100 000 population, 2011 – 2015, by Aboriginal and Torres Strait Islander status

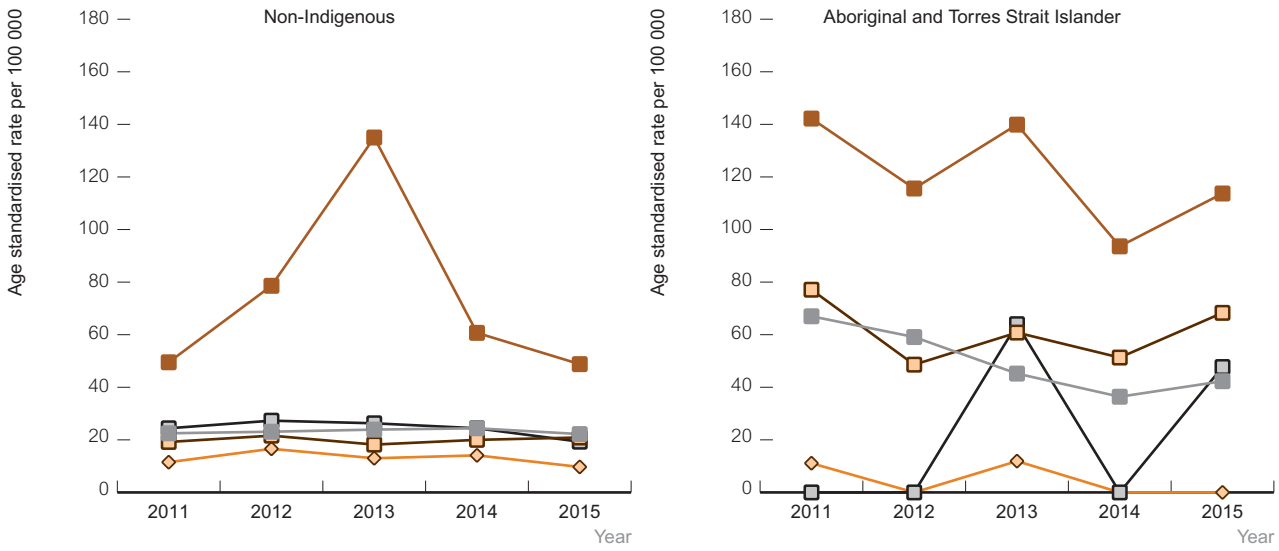


	2011	2012	2013	2014	2015
Non-Indigenous	21.5	24.3	25.6	23.4	21.5
Aboriginal and Torres Strait Islander	85.0	67.6	75.8	51.3	66.1

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

HBV

Figure 66 Hepatitis B notification rate per 100 000, 2011 – 2015, by State/Territory and Aboriginal and Torres Strait Islander status



	Non-Indigenous					Aboriginal and Torres Strait Islander				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
ACT	24.4	27.3	26.3	24.4	19.3	0.0	0.0	64.0	0.0	47.7
NT	49.5	78.6	135.0	60.7	48.8	142.2	115.6	139.9	93.6	113.7
SA	19.2	21.6	18.2	20.0	20.9	77.1	48.6	60.8	51.3	68.3
Tas	11.5	16.6	13.0	14.1	9.7	11.1	0.0	11.9	0.0	0.0
WA	22.5	23.1	23.9	24.4	22.2	67.0	59.1	45.2	36.4	42.3

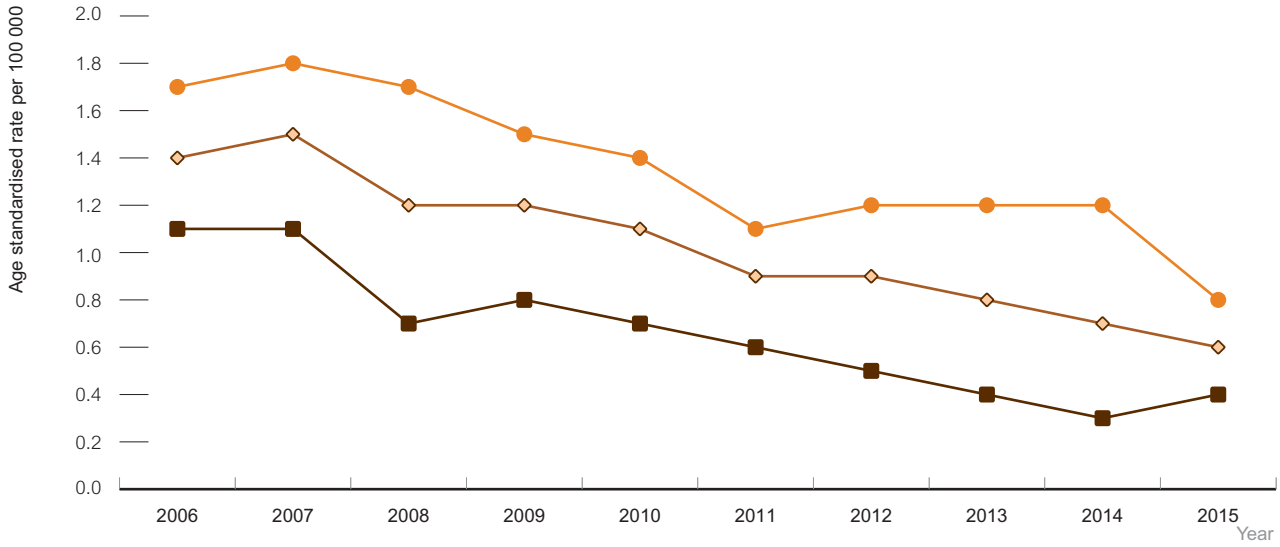
Source: Australian National Notifiable Diseases Surveillance System. Includes jurisdictions (Australian Capital Territory, Northern Territory, South Australia, Tasmania, Western Australia) in which Aboriginal and Torres Strait Islander status was reported for more than 50% of diagnoses for each year.

The higher rates of newly diagnosed hepatitis B in the Aboriginal and Torres Strait Islander population compared to the non-Indigenous population reflect the higher prevalence of chronic hepatitis B infection among the Aboriginal and Torres Strait Islander peoples. This relates to historical vertical and early childhood transmission, particularly in the pre-vaccine era, with some additional infections through sex and blood contact in adolescence and adulthood. Aboriginal and Torres Strait Islander peoples also have higher rates of risk factors for adult hepatitis B acquisition, including receptive syringe sharing among people who inject drugs.

Newly acquired hepatitis B

For some newly diagnosed cases, it is possible to determine that they were acquired in the two years prior to diagnosis, on the basis of a prior negative test or other serological factors. There has been a 57% decline in the rate of newly acquired hepatitis B cases (acquired in the past two years) over the past ten years, from 1.4 per 100 000 in 2006 to 0.6 per 100 000 in 2015. In 2015, the rate of newly acquired hepatitis B was two times greater in males than in females (0.8 vs 0.4 per 100,000) (Figure 67).

Figure 67 Newly acquired hepatitis B notification rate per 100 000 population, 2006 – 2015, by sex

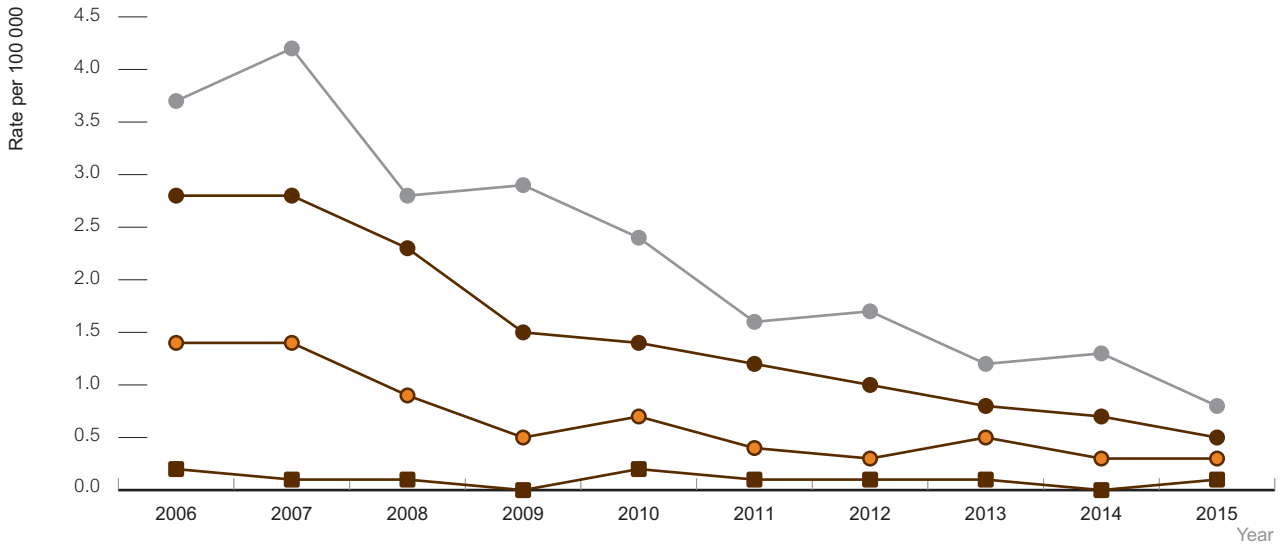


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Females	1.1	1.1	0.7	0.8	0.7	0.6	0.5	0.4	0.3	0.4
Males	1.7	1.8	1.7	1.5	1.4	1.1	1.2	1.2	1.2	0.8
Total	1.4	1.5	1.2	1.2	1.1	0.9	0.9	0.8	0.7	0.6

Source: Australian National Notifiable Diseases Surveillance System

The rate of notification of newly acquired hepatitis B has declined in younger age groups aged 25 – 29 years (from 3.7 to 0.8 per 100 000), 20 – 24 years (from 2.8 to 0.5 per 100 000), and 15 – 19 years (from 1.4 to 0.3 per 100 000), with a smaller decline in those aged 30 – 39 years (2.9 per 100 000 in 2006 and 1.4 per 100 000 in 2015) (Figure 68 and 69). In contrast, notification rates have declined slightly in those aged 40+ years (0.9 per 100 000 in 2006 and 0.6 per 100 000 in 2015) (Figure 69).

Figure 68 Newly acquired hepatitis B notification rate per 100 000 population, 2006 – 2015, by year and selected age group

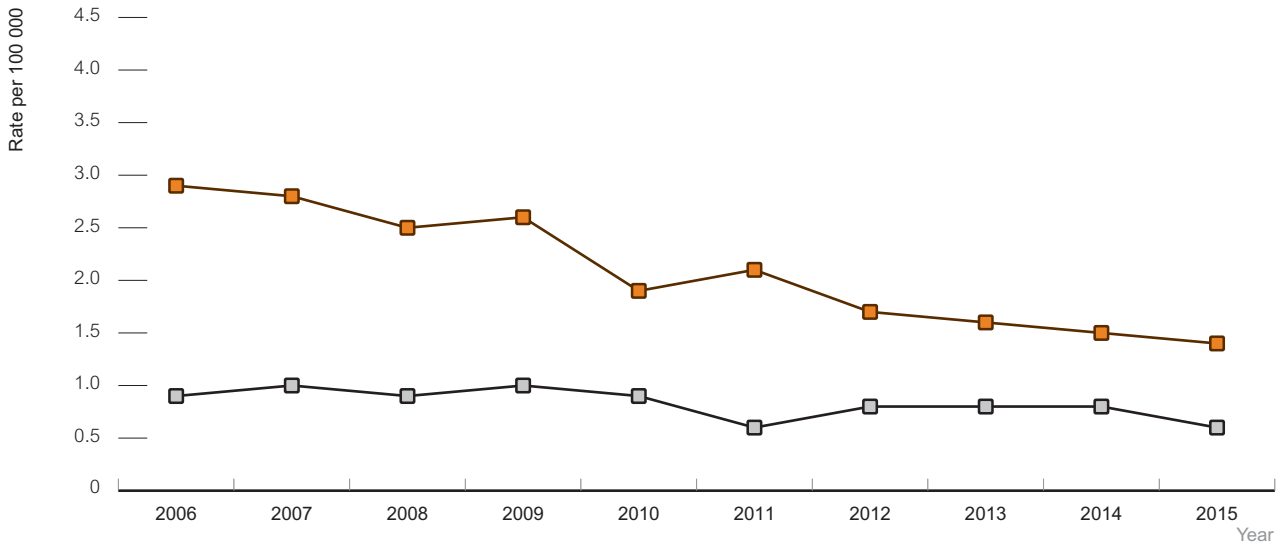


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 14	0.2	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.0	0.1
15 – 19	1.4	1.4	0.9	0.5	0.7	0.4	0.3	0.5	0.3	0.3
20 – 24	2.8	2.8	2.3	1.5	1.4	1.2	1.0	0.8	0.7	0.5
25 – 29	3.7	4.2	2.8	2.9	2.4	1.6	1.7	1.2	1.3	0.8

Source: Australian National Notifiable Diseases Surveillance System

HBV

Figure 69 Newly acquired hepatitis B notification rate per 100 000 population, 2006 – 2015, by year and selected age group



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
30 – 39	2.9	2.8	2.5	2.6	1.9	2.1	1.7	1.6	1.5	1.4
40+	0.9	1.0	0.9	1.0	0.9	0.6	0.8	0.8	0.8	0.6

Source: Australian National Notifiable Diseases Surveillance System

People living with hepatitis B infection

During 2015, an estimated 232 607 (190 738 to 283 781) people were living with chronic hepatitis B.

At the end of 2015, there were an estimated 88 621 (38%) people with chronic hepatitis B born in the Asia-Pacific, 21 632 (9%) Aboriginal and Torres Strait Islander peoples, 13 258 (6%) people who inject drugs, 10 234 (4%) men who have sex with men and 10 002 (4%) born in Sub-Saharan Africa (Table 18).

People from the Asia-Pacific represent 10% of the Australian population and accounted for an estimated 38% of those living with chronic hepatitis B infection in 2015. People from sub-Saharan Africa represent 1% of the Australian population but accounted for an estimated 4% of those living with chronic hepatitis B infection. Aboriginal and Torres Strait Islander peoples represent 3% of the Australian population but account for an estimated 9% of those living with chronic hepatitis B infection.

Table 18 Estimated number of people living with chronic hepatitis B, and estimated prevalence, Australia, 2015

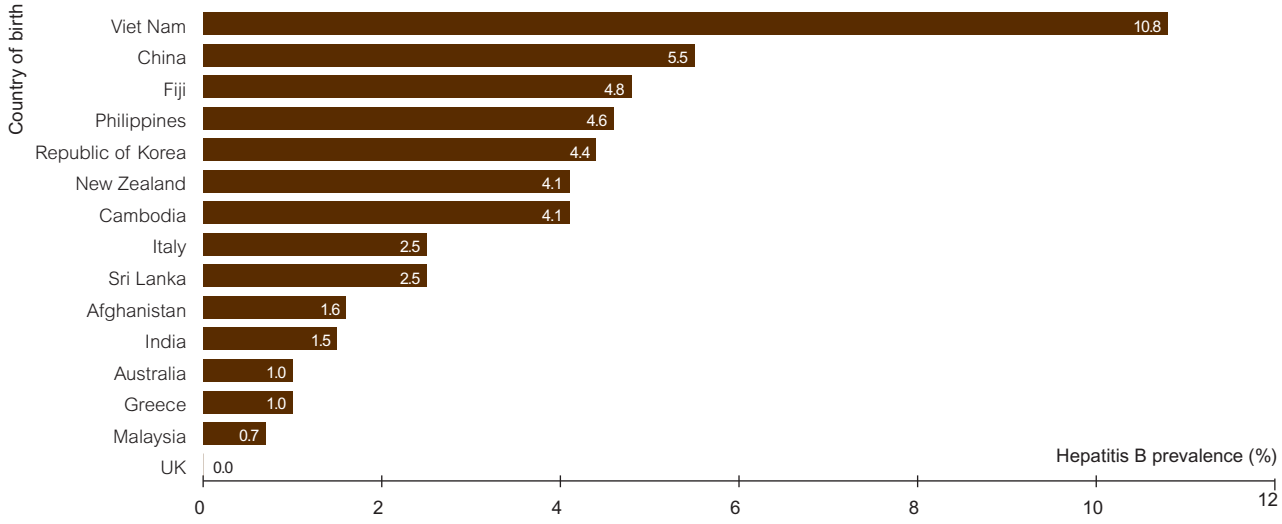
Population	Proportion of total	Total chronic hepatitis B infection	Hepatitis B prevalence
Overall	100%	232 607 (190 738-283 781)	1.0%
Born in Asia-Pacific^	38.1%	88 621	3.6%
Aboriginal and Torres Strait Islander peoples	9.3%	21 632	3.9%
People who inject drugs	5.7%	13 258	4.0%
Men who have sex with men	4.4%	10 234	3.0%
Born in Sub-Saharan Africa	4.3%	10 002	3.5%

^ South-East Asia according to Census/International Classifications does not include China, which excludes the largest population group for overseas born PLWCHB. Asia Pacific grouping has been used instead.

Hepatitis B prevalence

The estimated prevalence of chronic hepatitis B infection among people living in Australia is 1.0%, which is higher than the people living in the United Kingdom (<0. 5%) but lower than many other countries in South East Asia and the Pacific (Figure 70).

Figure 70 Estimated prevalence of chronic hepatitis B infection in Australia, 2015, by country of birth

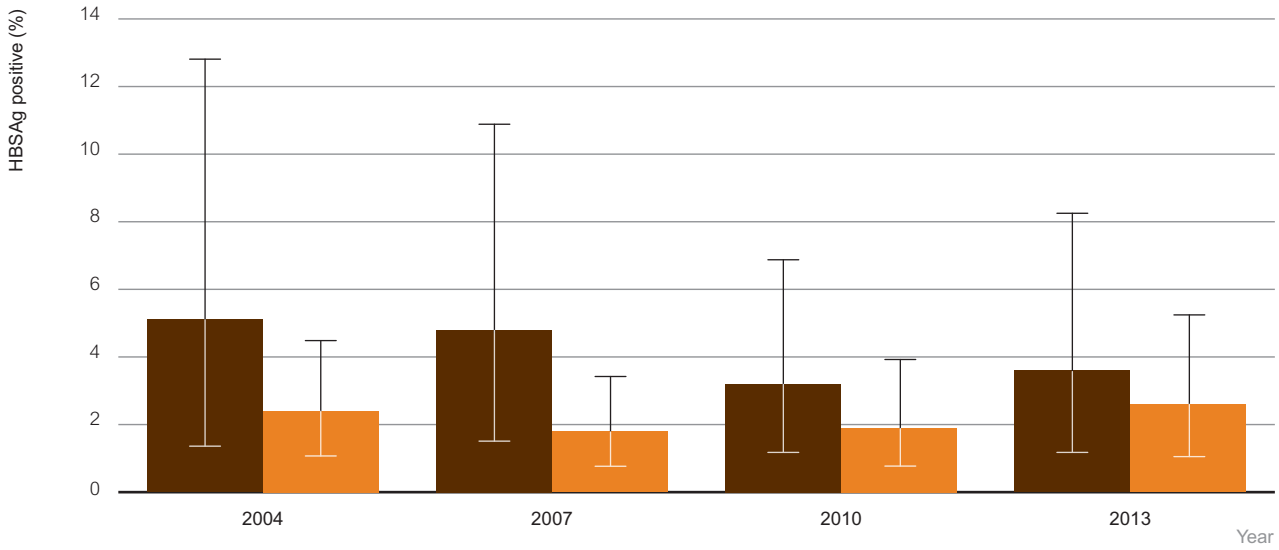


Source: WHO Collaborating Centre for Viral Hepatitis, Victorian Infectious Diseases Reference Laboratory, Doherty Institute

Australia has a concentrated hepatitis B epidemic among key populations; migrants from high prevalence countries particularly from Asia and the Pacific (see Table 18) and Aboriginal and Torres Strait Islander peoples, who together represent approximately half of those living with chronic hepatitis B in Australia. Other priority populations include people who inject drugs, and men who have sex with men.

In 2013, 3.6% and 2.6% respectively of Aboriginal and Torres Strait Islander and non-Indigenous prison entrants were HBSAg positive (Figure 71). These data come from prisoners tested for hepatitis B on entry to Australian prisons by the National Prison Entrants' Bloodborne Virus and Risk Behaviour Survey (NPEBBVS).

Figure 71 Chronic hepatitis B prevalence among prison entrants, 2004, 2007, 2010 and 2013



	2004	2007	2010	2013
Aboriginal and Torres Strait Islander	5.1%	4.8%	3.2%	3.6%
Non-Indigenous	2.4%	1.8%	1.9%	2.6%

Source: National Prison Entrants' Bloodborne Virus Survey 2004, 2007, 2010, and 2013

HBV

Hepatitis B morbidity

There is no comprehensive registry of advanced illness related to hepatitis B in Australia. One indicator of the extent of illness caused by hepatitis B is the number of liver transplants due to chronic infection. Of the 219 people who had a liver transplant in 2015, 17 (8%) had hepatitis B infection (see *Hepatitis C* section, Table 14).

There were an estimated 419 (323 – 683) deaths from hepatitis B in 2015, compared to 395 (304-640) in 2014.

Hepatitis B testing and care

The hepatitis B diagnosis and care cascade

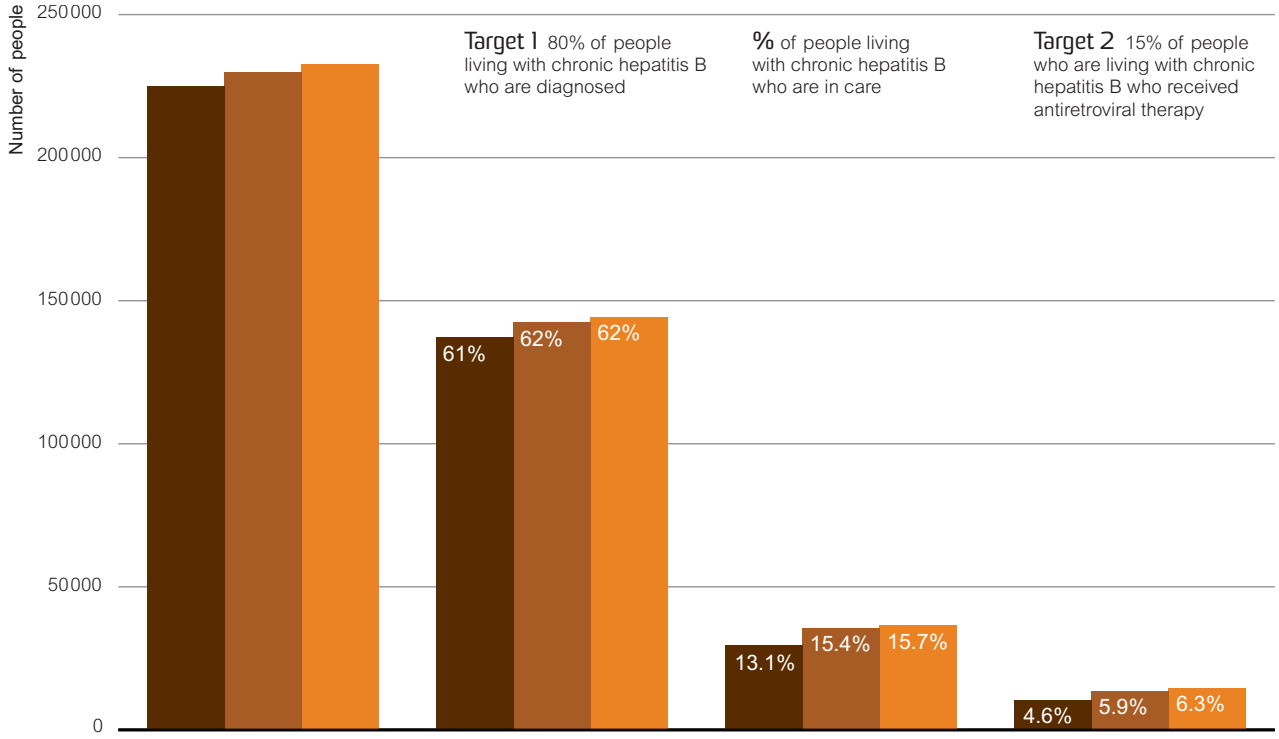
This section includes the 'Hepatitis B diagnosis and care cascade', which estimates the number of people with hepatitis B infection, the estimated number and proportion diagnosed in Australia, and the estimated number receiving care or antiviral treatment.

These estimates are produced by the WHO Collaborating Centre for Viral Hepatitis and VIDRL and the Doherty Institute, and are intended to support improvements in the delivery of services to people with hepatitis B infection. Using available data, the proportions of people in each stage of the cascade in Australia were estimated (Figure 72). The approach was informed by recommendations from a national stakeholder reference group (see Methodological Notes for further detail).

During 2015, an estimated 232 600 (190 738 to 283 781) people were living with chronic hepatitis B, an estimated 144 212 had been diagnosed with hepatitis B, 36 534 were in care (monitored or received antiviral therapy), and 14 636 were receiving antiviral therapy. This equates to an estimate of 62% of all people with hepatitis B being diagnosed, 16% of those diagnosed were in care and 6.3% of people diagnosed received antiviral therapy (Figure 74). Australia's Second National Hepatitis B Strategy 2014–2017 has a target of 80% diagnosis of all people living with chronic hepatitis B[16] and a treatment target of 15% for people living with chronic hepatitis B.[16]

This compares to 2014, when there was an estimated 229 663 (188 324 to 280 189) people living with chronic hepatitis B, with an estimated 142 391 (62%) diagnosed, 35 482 (15.4%) in care, and 13 555 (5.9%) were receiving antiviral therapy.

Figure 72 The hepatitis B diagnosis and care cascade, 2013 – 2015



	Living with hepatitis B infection	Diagnosed with hepatitis B	In care	Received treatment
2013	224 903	137 191	29 403	10 316
2014	229 663	142 391	35 482	13 555
2015	232 600	144 216	36 534	14 636

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

Source: WHO Collaborating Centre for Viral Hepatitis, Victorian Infectious Diseases Reference Laboratory, Doherty Institute

Hepatitis B testing

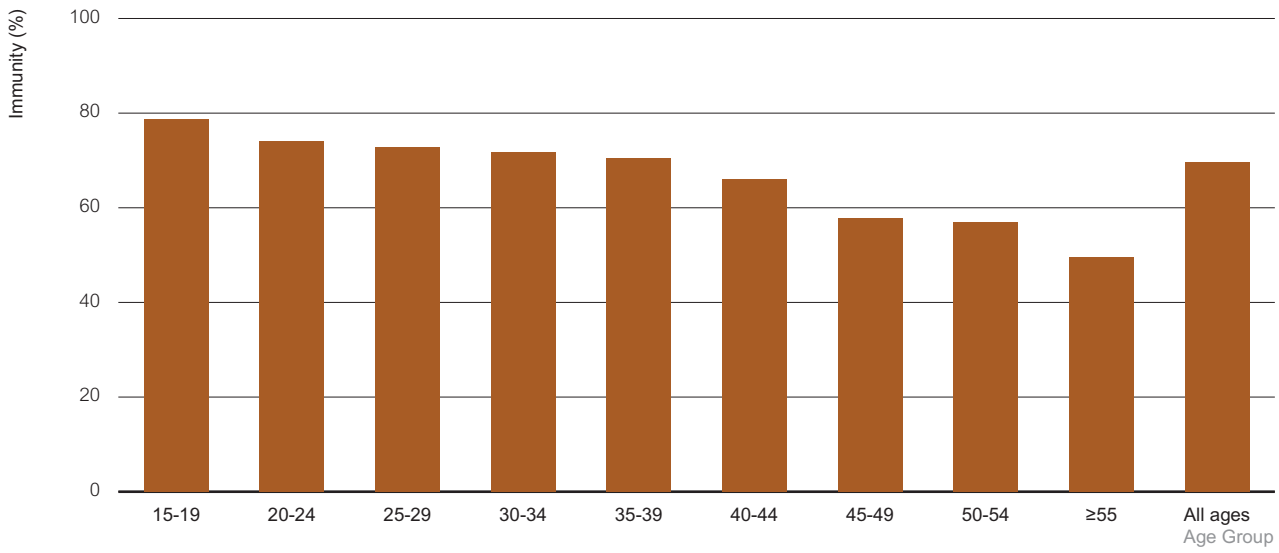
An important strategy for the prevention of hepatitis B related morbidity is targeted testing of priority populations. Guidelines recommend hepatitis B testing of people from culturally and linguistically diverse communities that include people born in the Asia-Pacific region and sub-Saharan Africa (where prevalence in 2015 was 9%), and Aboriginal and Torres Strait Islander peoples. Other identified populations include children born to mothers with chronic hepatitis B infection, and the following unvaccinated people 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 or hepatitis C or both

At sexual health clinics in Australia, all patients should be asked about past hepatitis B vaccination at their first visit. If no prior vaccination is reported or the patient's vaccination status is uncertain, in line with national guidelines the patients at risk should be offered testing for hepatitis B infection and immunity and if susceptible, offered vaccination.

In 2015, there were 17 749 people attending sexual health clinics in the ACCESS network for whom vaccination documentation or pathology details were available, with 70% of these people having documented evidence of immunity to hepatitis B. The proportion was highest among those aged 15 – 19 years (79%), decreasing by age, to 50% among those aged 55 years or more (Figure 73).

Figure 73 Proportion of people attending sexual health clinics with immunity to hepatitis B[1], based on vaccination documentation and serology, 2015, by age group[2]



	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	≥55	All ages
Immunity	79%	74%	73%	72%	71%	66%	58%	57%	50%	70%

1 Vaccinated or immunity from past exposure
2 Data from 41 sexual health clinics across Australia
Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmissible Infections and Blood Borne Viruses (ACCESS Project)

Further details about the classification scheme used are detailed in the Methodological notes. It is also important to note that a negative anti-HBs 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 from vaccination.

The data presented in Figure 73 demonstrate that although a highly effective vaccine is now available and has been offered universally for newborns since 2000, many of those born before universal vaccination remain susceptible or are from countries with different or no vaccination programs, and are at risk of infection, including young adults not reached by adolescent catch-up programs.

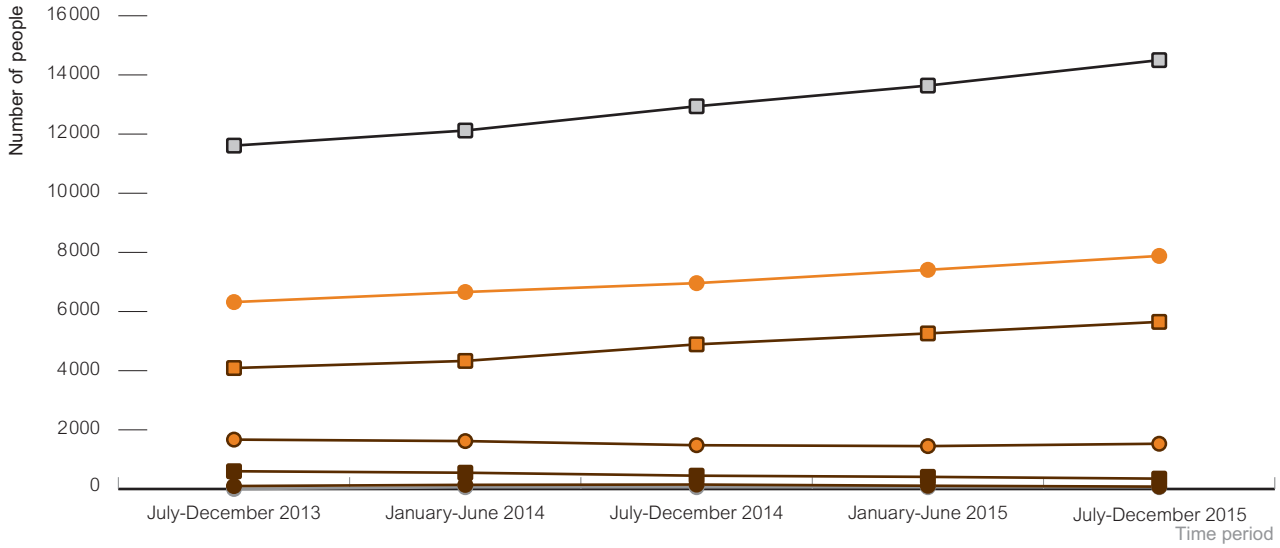
Hepatitis B treatment

While treatment for hepatitis B virus infection is not a cure 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 12 monthly) liver function tests and quantitative viral DNA tests. Treatment for hepatitis B is considered in people with elevated hepatitis B viral load, abnormal liver function tests, or those who have advanced liver disease (cirrhosis).

The number of people receiving antiviral treatment for hepatitis B has been rising in recent years. Between July 2013 and December 2015 there has been a 25% increase in the number of people on treatment, from 11 610 to 14 500. However the population of people living with chronic hepatitis B has also grown in recent years due to migration.

Of people receiving hepatitis B antiviral treatments in 2015, 54% were receiving entecavir treatment, and 39% were receiving tenofovir treatment (Figure 74). These treatment data are sourced from the Pharmaceutical Benefits Scheme which does not record Aboriginal and Torres Strait Islander status. Through data linkage projects, information on hepatitis B and C treatment coverage, and morbidity, will be available in future years.

Figure 74 Estimated number of people dispensed treatment for hepatitis B infection, by treatment type, 2013 – 2015



	July-December 2013	January-June 2014	July-December 2014	January-June 2015	July-December 2015
adefovir	600	550	450	410	350
entecavir	6 320	6 660	6 960	7 410	7 880
lamivudine (hep B)	1 670	1 620	1 480	1 450	1 530
pegasys	100	140	150	110	80
telbivudine	0	60	60	60	60
tenofovir	4 090	4 330	4 890	5 260	5 650
any drug	11 610	12 120	12 940	13 640	14 500

Note: Excludes tenofovir dispensations for HIV co-infected patients

Source: PharmDash

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 health care settings, monitoring of pregnant women living with chronic hepatitis B and their babies, and screening of blood donors.[17] 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 is used to control viral replication and resulting liver damage, which profoundly reduces progression to advanced liver disease and liver cancer.

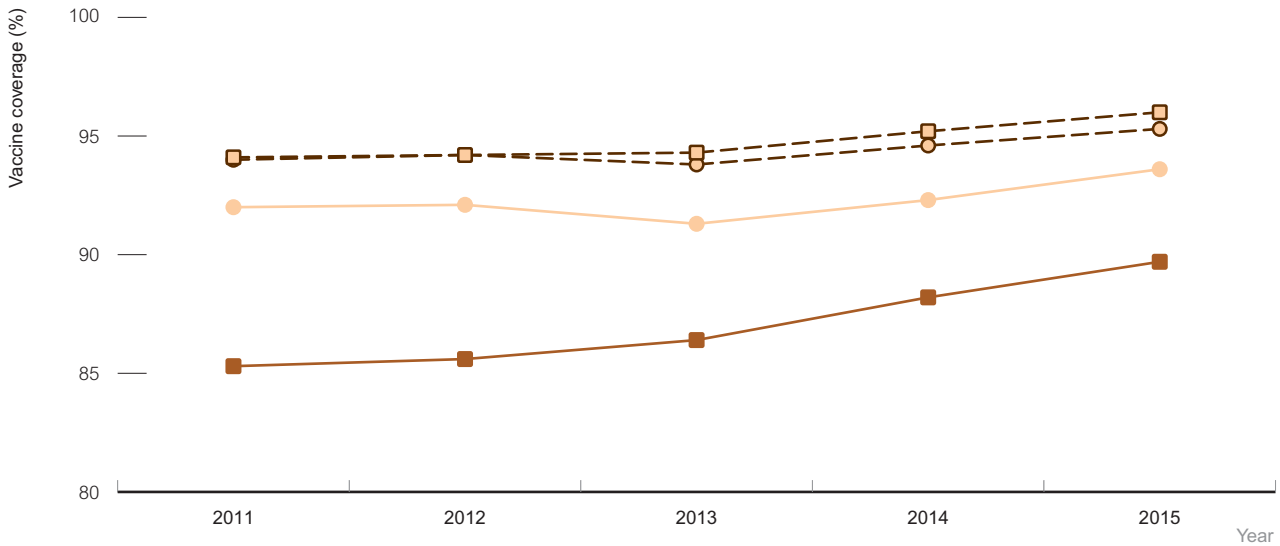
Hepatitis B vaccination

Understanding patterns of hepatitis B infection in Australia is facilitated by knowledge of the history of hepatitis B immunisation program which is described briefly below.

In the Northern Territory (NT) in 1985, hepatitis B screening was introduced for all pregnant women and vaccination to infants born to mothers living with chronic infection; in 1990, universal infant vaccination was implemented, and in 1998 a catch-up program targeting 6 – 16 year olds was introduced. In other states and territories of Australia, hepatitis B vaccination of all infants commenced in 2000 and the introduction of a universal adolescent (teenagers aged 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.[18]

Over the period 2011 – 2015, hepatitis B vaccination coverage rates for children were high overall, at around 95%. For Aboriginal and Torres Strait Islander children coverage was lower than for non-Indigenous children for the 12 months age group, but there was no difference at 24 months of age, with vaccination coverage of 96% in Aboriginal and Torres Strait Islander children and 95% in non-Indigenous children (Figure 75). The lower rates at 12 months suggest issues around timeliness of completion of the vaccination course in Aboriginal and Torres Strait Islander children, which may lead to increased risk of disease acquisition.

Figure 75 Hepatitis B vaccination coverage estimates at 12 and 24 months, 2011 – 2015, by Aboriginal and Torres Strait Islander status



	2011	2012	2013	2014	2015
Aboriginal and Torres Strait Islander 12 months	85.3%	85.6%	86.4%	88.2%	89.7%
Aboriginal and Torres Strait Islander 24 months	94.1%	94.2%	94.3%	95.2%	96.0%
Non-Indigenous 12 months	92.0%	92.1%	91.3%	92.3%	93.6%
Non-Indigenous 24 months	94.0%	94.2%	93.8%	94.6%	95.3%

Source: National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases

Main Findings
Sexually transmissible infections
other than HIV

Chlamydia

New diagnoses

- Chlamydia was the second most frequently reported notifiable condition in Australia in 2015, with a total of 66 033 notifications, and the majority (77%) of these notifications were among 15 – 29 year olds.
- Chlamydia notifications from Victoria in 2015 were incomplete and have been excluded from the report. Victorian notifications normally account for approximately 23% of notifications nationally.
- The rate of chlamydia notification has increased steadily between 2006 and 2011 (from 237 to 371 per 100 000) but since 2011 has remained relatively stable overall, with the same pattern seen in males and females.
- Among 15 – 19 year olds there has been a decline in the chlamydia notification rate by 19% since 2011, from 1 574 per 100 000 to 1 271 per 100 000 in 2015.
- The rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population in Australia (data are from the Northern Territory, Queensland, South Australia, and Western Australia) was over three times that in the non-Indigenous population in 2015.

Testing and care

- By the end of 2015 of the 257 240 new chlamydia cases in 15 – 29 year olds, an estimated 28% were diagnosed (18% of males and 42% of females), 99% were treated, and an estimated 26% of those diagnosed completed follow up (between 6 weeks to 6 months).
- From 2008 to 2015 there was a 2-fold increase in chlamydia testing in 15 – 29 year olds attending general practice (from 9.3% to 15.7%) but overall levels remain low.

Incidence

- Of the gay and bisexual men attending sexual health clinics, 27% of HIV-positive men had a new chlamydia infection detected from anorectal swabs in 2015; compared with 12% of HIV-negative men, and in the past five years incidence has increased in both populations.
- In female sex workers attending sexual health clinics, 10% had a new chlamydia infection detected in 2015, increasing from 6% in 2013. Among females not involved in sex work, the incidence of chlamydia was higher but declined slightly over time (from 14% in 2011 to 12% in 2015).

Syphilis

New diagnoses

- The number of notifications of infectious syphilis (infections of less than two years duration) in 2015 was 2 736.
- An expanded national infectious syphilis case definition was implemented in July 2015 in all jurisdictions except New South Wales, to include a 'probable' category, with 233 probable cases notified in 2015.
- The notification rate of infectious syphilis among men has increased in the past ten years, from 6.5 per 100 000 in 2006 to 21.0 per 100 000 in 2015. Trends varied by jurisdiction. At 46 per 100 000, notification rates were highest among males aged 25 – 29 years.
- The notification rate of infectious syphilis among women has fluctuated and remained low between 2006 and 2014, and increased to 2.5 per 100 000 in 2015.
- At 60.5 per 100 000, the rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population in 2015 was 6 times higher than in the non-Indigenous population (10.2 per 100 000).
- The rate of notification of infectious syphilis among the Aboriginal and Torres Strait Islander population increased from 26.3 per 100 000 in 2011 to 60.5 per 100 000 in 2015.
- There were four notifications of congenital syphilis in 2015, declining from a high of 11 in 2006.

Testing and care

- Among gay and bisexual men attending sexual health clinics participating in ACCESS, the average number of syphilis tests per man increased from 1.2 in 2011 to 1.5 in 2015. In 2015, the average number of syphilis tests per man was higher in HIV-positive men (1.8 per year), than HIV-negative men (1.4 per year).

Incidence

- In 2015, of the gay and bisexual men attending sexual health clinics, 9.7% of HIV-positive men had a new diagnosis of infectious syphilis compared with 3.7% of HIV-negative men, and in the past five years incidence increased by 42% in HIV-negative men and 38% in HIV-positive men.
- In the past five years (2011 – 2015) syphilis incidence in female sex workers was very low and relatively stable (with 0.2 – 0.4% of women with a new diagnosis of infectious syphilis per year).

Gonorrhoea

New diagnoses

- There were 18 588 cases of gonorrhoea notified in 2015
- Between 2006 and 2015, notification rates nearly doubled in both males (from 56.4 per 100 000 in 2006 to 117.3 per 100 000 in 2015) and females (from 26.8 per 100 000 in 2006 to 41.8 per 100 000 in 2015). Trends varied by jurisdiction.
- In 2015, gonorrhoea notification rates were highest among men aged 25 – 29 years (357 per 100 000) and 20 – 24 years (334 per 100 000)
- The rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population was 10 times that in the non-Indigenous population in 2015 (625.6 per 100 000 compared to 62.4 per 100 000). These data are from the Australian Capital Territory, the Northern Territory, Queensland, South Australia, Victoria, Western Australia and Tasmania
- Over the five year period 2011 – 2015, the rate of notification of gonorrhoea decreased by 22% in the Aboriginal and Torres Strait Islander population, compared with a 94% increase in the non-Indigenous population.

Testing and care

- Results from the Gay Community Periodic Survey show comprehensive STI testing (at least four samples collected for STI screening) in gay men increased from 26% in 2006 to 44% in 2015.

Incidence

- Of the gay and bisexual men attending sexual health clinics, 27% of HIV-positive men had a new gonorrhoea infection detected from rectal swabs in 2015; compared with 11% of HIV-negative men, and in the past five years incidence has increased in both populations.
- In female sex workers attending sexual health clinics, 2.3% had a new gonorrhoea infection detected in 2015, increasing from 0.9% in 2011. Among females not involved in sex work, the incidence of gonorrhoea was similar but stable over time (between 1.2% and 1.6% with new infections each year).

Interpretation:

After a decade of steady increases in both testing and diagnoses of chlamydia, there has been a levelling off in the number of chlamydia diagnoses, and even a decline in the youngest age group. However the vast majority of infections in young people remain undiagnosed and hence untreated.

Gonorrhoea and syphilis in Australia continue to be infections primarily of men having male-to-male sex in urban settings, and of young heterosexual Aboriginal and Torres Strait Islander people in remote communities.

Gonorrhoea and syphilis have been diagnosed more frequently in men in the past five years. These increases may be due to increased testing and use of more sensitive gonorrhoea testing technology in some places. The rise may also relate to increases in condom-less sex among men who have sex with men, linked to the greater availability and awareness of highly effective HIV prevention strategies.

In female sex workers, the rise in chlamydia and gonorrhoea incidence in recent years highlights the need for strengthened health promotion. There has also been an increase in gonorrhoea notifications in women in Australia which may be due to most pathology laboratories in Australia adopting dual testing, whereby if a test for either chlamydia or gonorrhoea is ordered by a clinician, both are conducted. In females involved in sex work there has been a rise in both chlamydia and gonorrhoea in the past three years.

In the Aboriginal and Torres Strait Islander population gonorrhoea rates have declined by 22% in the past five years, but remain 3-fold higher than the non-Indigenous population in remote areas, whereas syphilis has increased more than 2-fold in the past five years. A change in the national infectious syphilis case definition in 2015, resulted in additional cases being counted, however does not fully explain the increase observed. The resurgence of infection in young Aboriginal people in remote communities after years of declining rates, brings with it cases of congenital syphilis.

Overall, these data emphasise the need for enhanced health promotion, and testing and treatment to be routinely offered to sexually active adolescents, young adults, and other priority populations.

Chlamydia – new diagnoses

For 2015 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.

Chlamydia was the second most frequently reported notifiable condition in Australia in 2015, with a total of 66 033 notifications, 6 532 (10%) were among the Aboriginal and Torres Strait Islander population, 25 508 (39%) were among the non-Indigenous population, and Indigenous status was not reported for 33 993 (51%) notifications (Table 19).

In 2015, 57% (37 651) of new chlamydia diagnoses were in females, 77% (50 620) were in people aged 15 – 29 years, and 67% (44 313) were in people residing in major cities. In 2015, the female-to-male ratio in the 15 – 19 year age group was 3:1 whereas it was 1:1 in the 25 – 29 year age group. Age and sex specific patterns of notification may be influenced by differential testing rates.

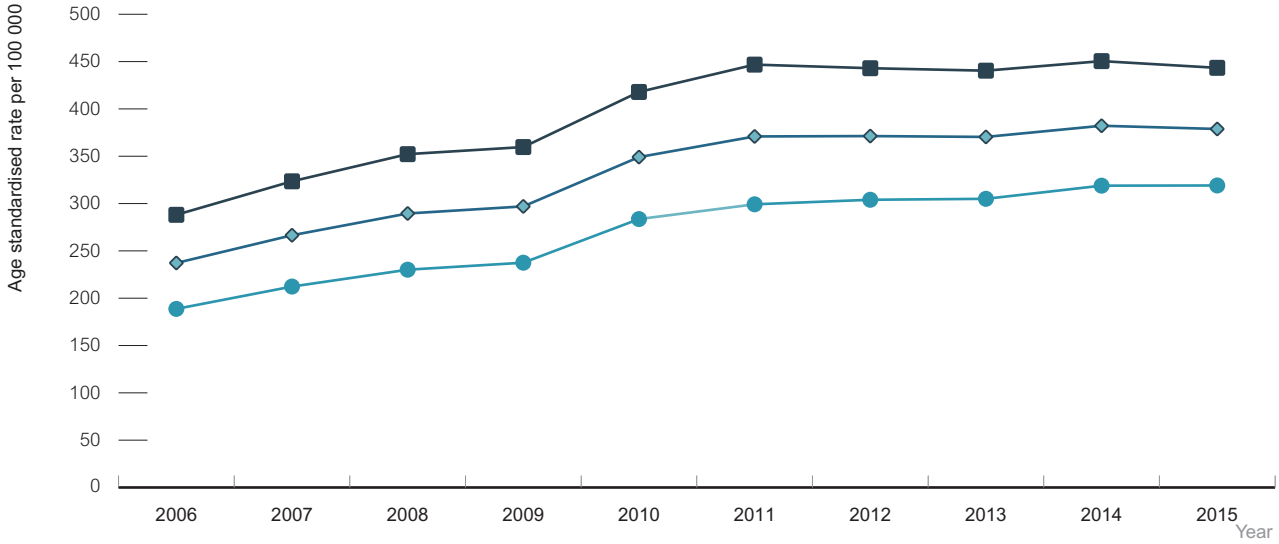
Table 19 Characteristics of new chlamydia diagnoses, 2006 – 2015

	Year of diagnosis									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015[1]
Characteristic										
Total	46 145	52 747	58 666	62 783	74 378	81 267	83 727	83 095	86 095	66 033
Sex										
Female	27 388	31 439	34 851	36 910	43 144	47 558	48 130	47 875	49 282	37 651
Male	18 663	21 204	23 713	25 772	31 047	33 582	35 036	35 187	36 774	28 376
Missing	94	104	102	101	187	127	106	33	39	2
Age group										
0 – 14	453	553	575	583	717	735	770	709	675	447
15 – 19	10 970	12 913	14 981	16 153	19 961	21 725	21 100	19 683	18 927	14 175
20 – 29	25 443	29 133	30 966	34 425	40 023	44 279	45 402	46 134	48 493	36 445
30 – 39	6 389	6 939	7 414	7 748	8 907	9 384	10 278	10 710	11 580	9 761
40+	2 872	3 178	3 698	3 802	4 693	5 036	5 618	5 833	6 416	5 200
Missing	18	31	32	72	77	108	104	26	4	5
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	4 729	5 339	5 563	5 303	6 714	7 097	7 009	6 849	6 614	6 532
Non-Indigenous	15 363	18 401	23 550	25 807	30 799	34 287	35 097	25 499	25 442	25 508
Not reported	26 053	29 007	29 553	31 673	36 865	39 883	41 166	50 747	54 039	33 993
Area of residence										
Major Cities	30 133	34 320	38 471	42 062	49 052	53 861	55 828	55 689	58 528	44 313
Inner Regional	6 826	7 858	8 890	9 821	12 090	12 993	13 164	12 490	13 087	9 311
Outer Regional	5 362	6 278	6 786	6 671	8 090	9 173	9 082	9 092	8 858	7 929
Remote	1 451	1 620	1 837	1 700	2 140	2 230	2 261	2 264	2 111	2 084
Very Remote	1 819	2 032	1 983	1 908	2 215	2 040	1 912	2 011	2 042	1 863
Missing	518	639	699	621	791	970	1 025	1 549	1 469	533
State/Territory										
ACT	808	936	984	960	1 152	1 259	1 288	1 272	1 193	1 268
NSW	11 677	12 574	14 037	14 927	18 310	20 557	21 346	20 854	22 911	22 628
NT	2 037	2 187	2 284	2 112	2 668	2 948	2 722	3 012	2 994	2 738
QLD	11 612	13 435	15 187	16 673	19 261	18 600	18 863	19 465	20 487	21 170
SA	3 204	3 535	3 708	3 850	4 403	5 267	5 067	5 532	5 495	5 385
TAS	990	1 153	1 489	1 460	2 007	1 775	1 781	1 551	1 776	1 667
VIC	9 928	11 183	12 317	13 971	16 434	19 266	20 460	19 614	19 921	N/A
WA	5 889	7 744	8 660	8 830	10 143	11 595	11 745	11 795	11 318	11 177

1 Excludes Victoria in 2015 as data were unavailable at the time of reporting, but will be available in the future

The notification rate of chlamydia increased steadily between 2006 and 2011, and has remained relatively stable between 2011 and 2015 (Figure 76). The notification rates of chlamydia has been higher in females than males in all years, and in 2015 was 443 per 100 000 and 319 per 100 000, respectively.

Figure 76 Chlamydia notification rate per 100 000, 2006 – 2015, by sex



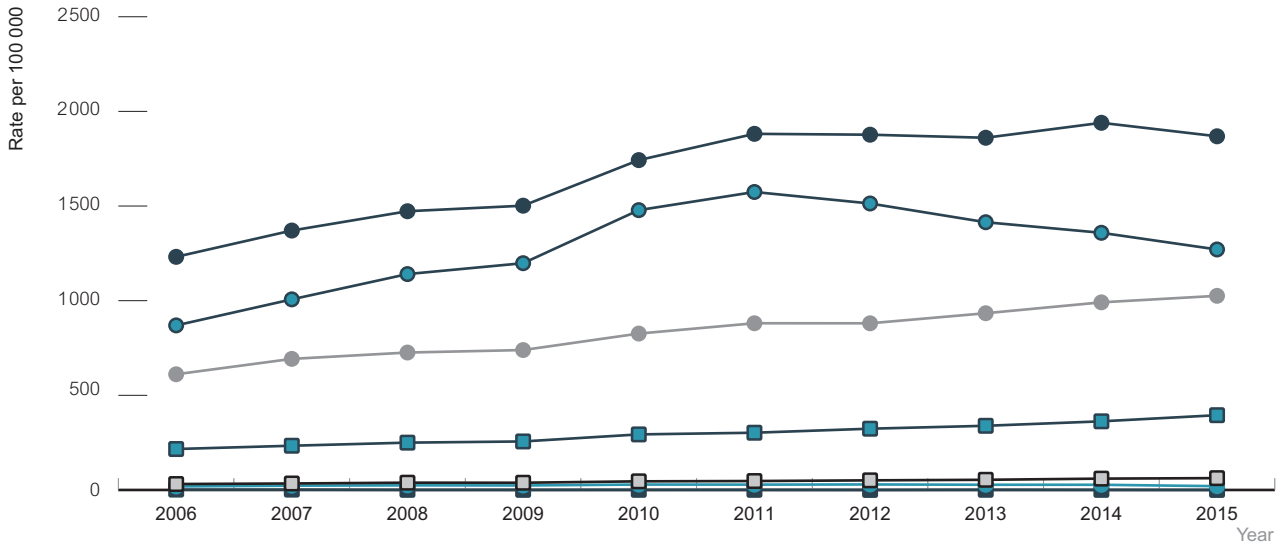
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	288.1	323.5	352.2	359.7	417.9	446.8	443.0	440.4	450.5	443.4
Male	188.7	212.3	230.1	237.5	283.6	299.2	304.0	305.0	318.9	319.1
Total	237.2	266.5	289.5	297.0	349.1	370.9	371.3	370.4	382.2	378.8

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

The trends in notification rates vary by age group. Over the ten year period 2006 to 2015, notification rates have been highest in the 20 – 24 and 15 – 19 year age groups. While notification rates in the 20 – 24 year age group have remained relatively stable in the last five years, rates in the 15 – 19 year age group have declined by 19%, from 1 574 per 100 000 in 2011 to 1 271 per 100 000 in 2015 (Figure 77). This decline in notification rates in the 15 – 19 year age group from 2011 is in both males and females (Figures 78 and 79). Notification rates of chlamydia in the 25 – 29 year age group have increased steadily since 2006.

Figure 77 Chlamydia notification rate per 100 000, 2006 – 2015, by year and age group



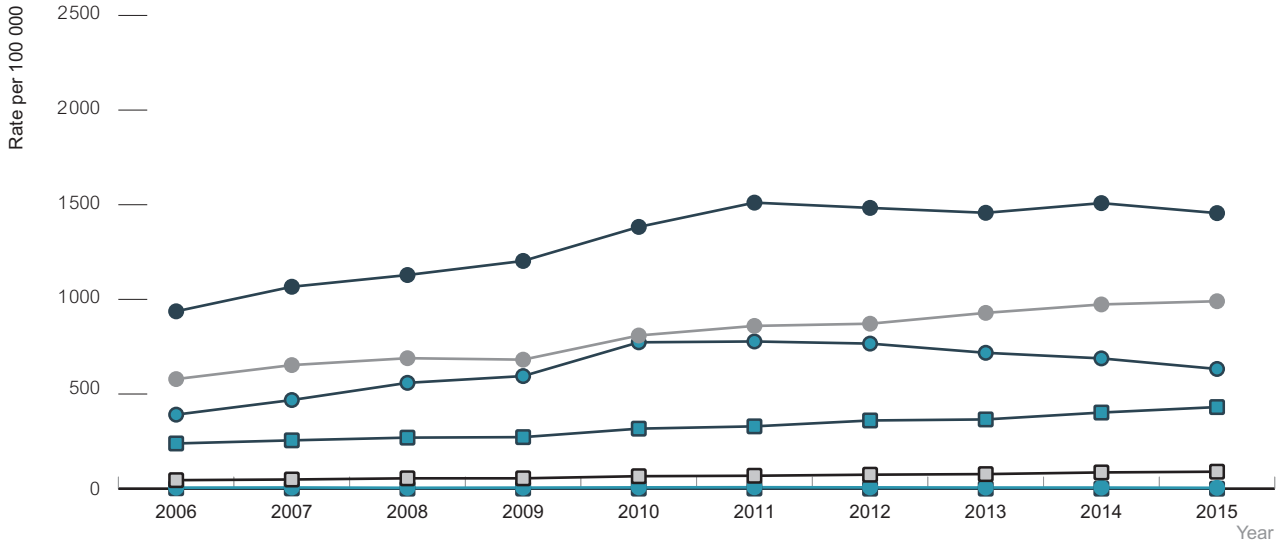
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	2.0	1.9	0.7	0.6	0.8	0.7	0.2	1.0	0.6	0.2
5 – 14	18.6	22.7	24.4	23.8	28.6	28.2	29.1	27.5	27.4	20.0
15 – 19	869.4	1 006.9	1 140.5	1 198.0	1 478.3	1 574.2	1 513.4	1 414.5	1 358.6	1 270.5
20 – 24	1 231.6	1 370.5	1 472.5	1 501.8	1 742.6	1 881.4	1 876.8	1 860.7	1 939.7	1 868.4
25 – 29	611.2	692.5	726.0	739.2	826.2	880.7	880.5	933.7	991.2	1 025.6
30 – 39	216.3	233.7	250.0	256.3	293.5	302.4	323.7	339.0	362.6	395.0
40+	31.4	34.2	38.5	38.2	45.6	47.2	50.8	53.7	59.9	62.5

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

STIs

Figure 78 Chlamydia notifications, 2006 – 2015, by year and age group, males

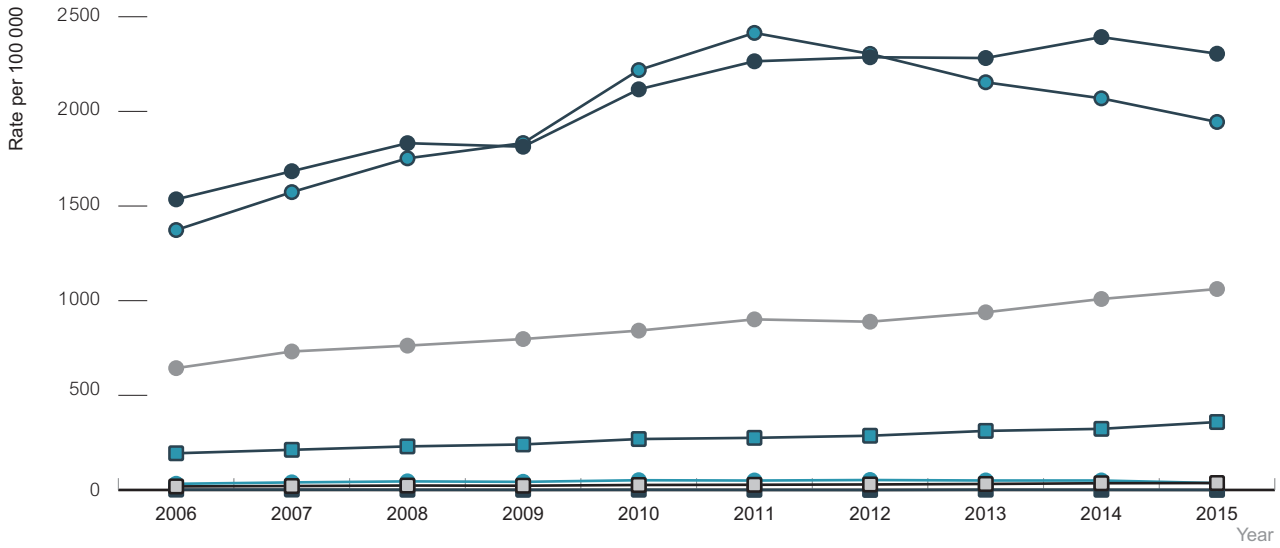


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	2.2	1.5	0.2	0.5	0.4	0.7	0.2	0.3	0.2	0.0
5 – 14	5.3	6.3	4.6	5.5	6.9	7.6	6.9	6.0	5.8	4.5
15 – 19	391.0	468.2	559.0	594.8	773.1	777.6	766.3	717.7	688.2	632.3
20 – 24	936.8	1 066.6	1 128.6	1 203.0	1 382.8	1 511.0	1 483.2	1 457.3	1 508.5	1 455.7
25 – 29	578.8	652.8	689.2	681.5	809.2	859.8	871.4	928.6	973.2	990.2
30 – 39	238.7	255.2	269.6	272.2	317.0	329.1	360.2	365.7	402.1	431.0
40+	44.9	48.4	54.6	54.6	65.8	68.2	73.8	76.9	85.7	89.6

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

Figure 79 Chlamydia notification rate per 100 000, 2006 – 2015, by age group, females



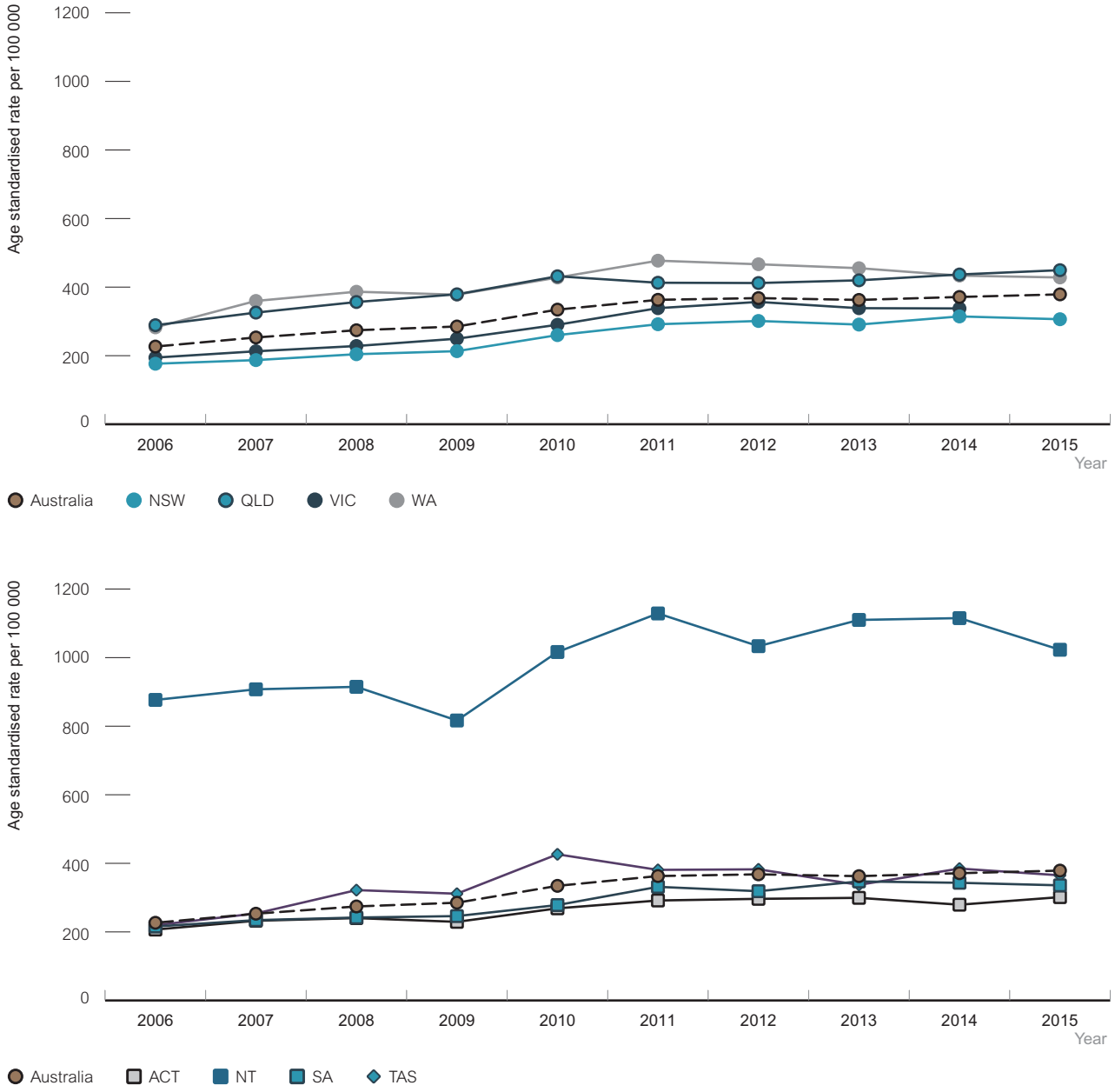
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	1.9	2.2	1.2	0.8	1.3	0.7	0.2	1.6	1.1	0.4
5 – 14	32.5	39.9	45.3	42.9	51.4	49.8	52.5	50.0	50.0	36.3
15 – 19	1 373.2	1 573.5	1 752.0	1 832.6	2 218.2	2 414.6	2 303.7	2 153.9	2 068.9	1 944.1
20 – 24	1 535.3	1 683.9	1 832.0	1 813.4	2 116.5	2 264.6	2 286.1	2 281.9	2 392.6	2 304.6
25 – 29	643.6	731.6	762.5	797.3	841.8	901.3	888.8	938.6	1 008.9	1 061.6
30 – 39	193.8	212.1	230.1	240.5	269.0	275.4	286.5	312.0	322.9	358.9
40+	18.7	20.8	23.4	22.5	26.3	27.4	29.1	31.7	35.5	36.7

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

In all jurisdictions the notification rate of chlamydia has increased steadily between 2006 and 2011, and from 2011 notifications have remained relatively stable (Figure 80, Table 20) except for Western Australia where there has been a decline by 10% from 477 per 100 000 in 2011 to 428 per 100 000 in 2015.

Figure 80 Chlamydia notification rate per 100 000 population, 2006 – 2015, by year and State/Territory



Source: Australian National Notifiable Diseases Surveillance System

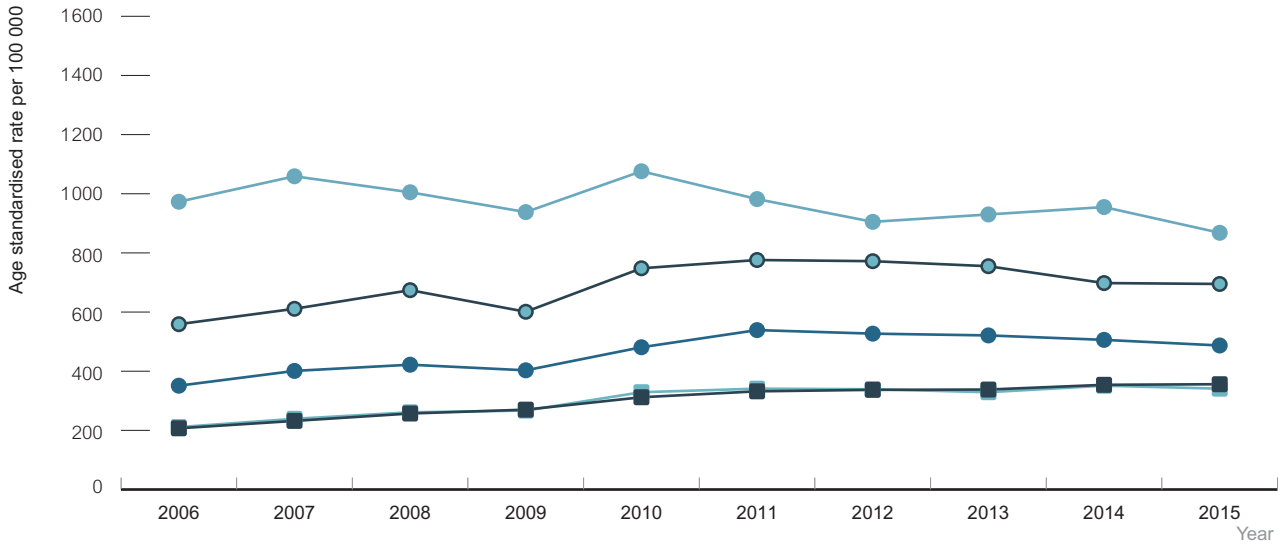
Table 20 Age standardised chlamydia notification rates per 100 000, 2006 – 2015, by State/Territory

State/Territory	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ACT	206.8	232.5	240.3	229.3	268.7	291.6	296.4	299.3	279.3	301.4
NSW	176.5	187.1	204.3	213.2	260.0	291.7	301.2	290.7	314.5	306.3
NT	876.6	907.5	914.8	816.6	1 016.3	1 128.8	1 033.4	1 109.9	1 115.2	1 022.9
QLD	288.9	325.6	356.5	379.0	431.6	412.7	411.9	419.8	436.8	449.4
SA	215.8	234.3	241.9	246.1	278.3	331.4	318.7	347.2	343.2	335.8
TAS	219.5	253.8	321.9	311.4	426.3	380.9	382.5	337.2	384.7	365.0
VIC	194.4	212.8	228.2	249.5	290.1	338.6	356.8	338.5	337.8	n/a
WA	282.5	359.7	386.5	377.9	427.9	477.1	466.6	455.2	433.5	428.1
Australia	226.6	253.1	274.2	285.1	334.3	362.9	367.9	362.6	371.2	378.8

Note: Excludes Victoria in 2015 as data were unavailable at the time of reporting, but will be available in the future

Notification rates of chlamydia have been highest in very remote regions, followed by remote regions, and outer regional areas in all years of the ten year period 2006 – 2015 (Figure 81). While the highest overall, notification rates have declined by 11% in very remote areas, from 973 per 100 000 in 2006 to 868 per 100 000 in 2015. Notification rates have increased in all other regions of residence between 2006 and 2011 and been relatively stable since then (Figure 81). The same pattern is seen in both males and females (Figures 82 and 83).

Figure 81 Chlamydia notifications, 2006 – 2015, by region of residence

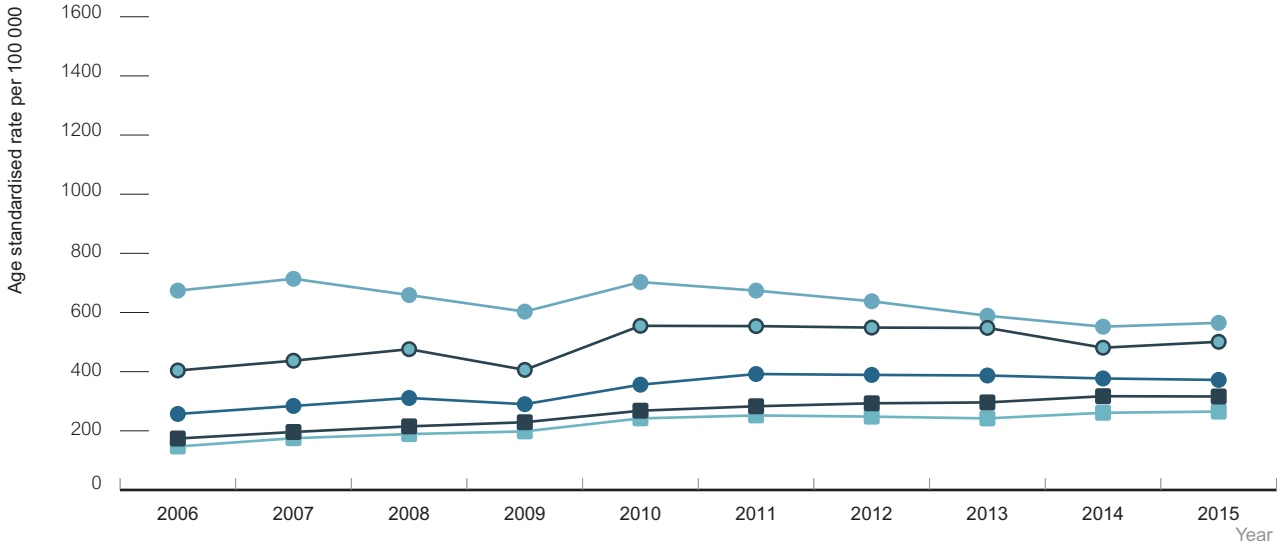


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	206.5	231.7	256.5	270.4	311.7	332.4	337.4	338.3	353.9	355.5
Inner regional	210.7	238.8	260.7	267.4	329.3	340.7	339.2	328.7	350.6	340.6
Outer regional	350.8	401.2	421.7	402.9	481.1	539.2	526.7	520.9	506.1	486.7
Remote	558.7	611.1	673.9	600.8	748.0	775.7	771.6	755.2	697.8	695.0
Very remote	972.9	1 059.2	1 005.3	938.1	1 076.1	982.1	905.1	930.0	954.5	868.0

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

Figure 82 Chlamydia notifications, 2006 – 2015, by region of residence, males



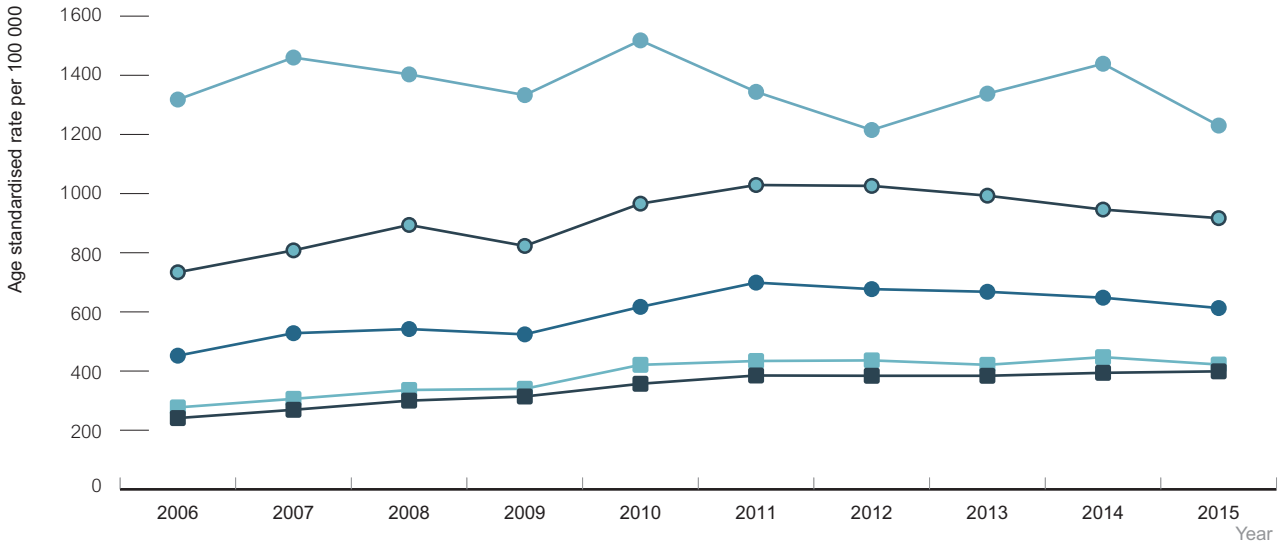
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	174.1	196.1	214.9	228.7	268.0	282.8	293.0	295.9	316.8	315.6
Inner regional	147.5	174.6	189.3	198.4	242.2	252.0	247.8	241.7	260.6	264.9
Outer regional	256.8	283.6	311.2	290.0	356.4	391.6	388.8	387.3	376.6	371.6
Remote	403.8	437.4	476.5	405.6	555.4	553.7	549.4	548.3	481.0	501.1
Very remote	673.8	713.7	659.1	602.6	702.5	674.4	638.5	589.0	551.8	565.0

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

STIs

Figure 83 Chlamydia notifications, 2006 – 2015, by region of residence, females



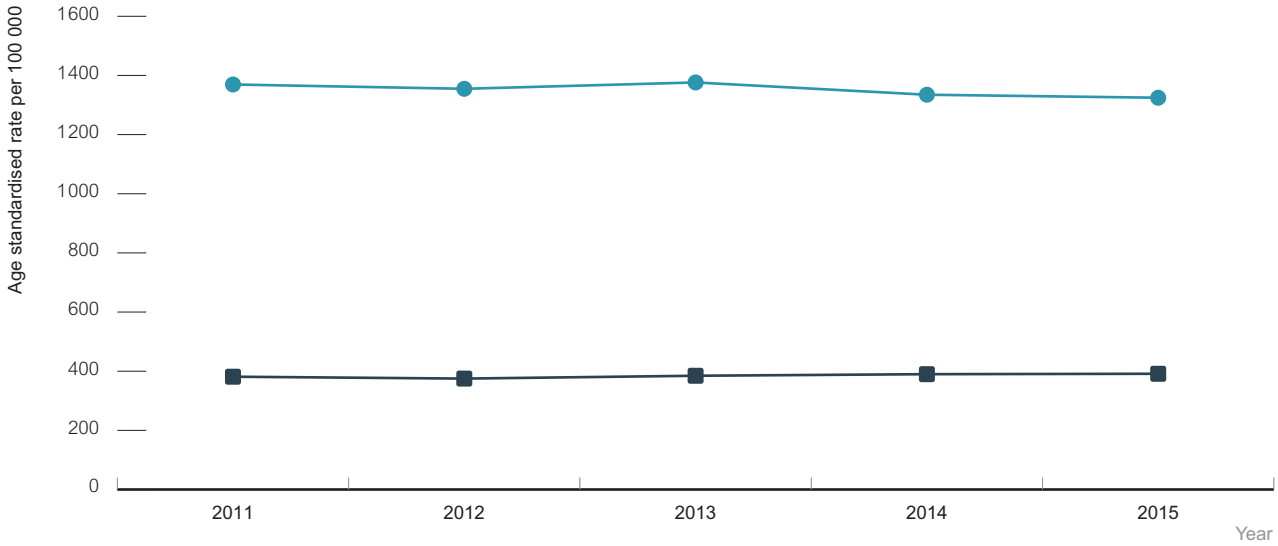
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	240.6	269.1	300.3	314.5	357.5	384.7	384.5	383.8	394.2	398.7
Inner regional	276.7	306.0	335.9	339.7	420.8	434.4	436.2	421.0	447.3	422.0
Outer regional	452.4	527.7	541.9	524.1	617.1	699.4	677.2	667.7	648.0	613.3
Remote	734.3	807.5	894.4	822.9	966.2	1 029.3	1 025.9	993.4	946.1	917.4
Very remote	1 317.7	1 460.1	1 402.8	1 332.8	1 517.5	1 344.2	1 215.2	1 337.9	1 439.0	1 230.3

Note: Excludes Victoria in all years as 2015 data were unavailable at the time of reporting, but will be available in the future

Source: Australian National Notifiable Diseases Surveillance System

The rate of notification of chlamydia in the Aboriginal and Torres Strait Islander population has been relatively stable between 2011 and 2015, but at 1 325 per 100 000 in 2015 was more than 3 times higher than the non-Indigenous population (391 per 100 000) (Figure 84). These data are from the Northern Territory, Queensland, South Australia, and Western Australia, where Aboriginal and Torres Strait Islander status was ≥50% in each of the five years. It is important to recognise that as the most populous states, New South Wales and Victoria, are not included in Aboriginal and Torres Strait Islander figures this may not reflect national trends.

Figure 84 Chlamydia notification rate per 100 000, 2011 – 2015, by Aboriginal and Torres Strait Islander status

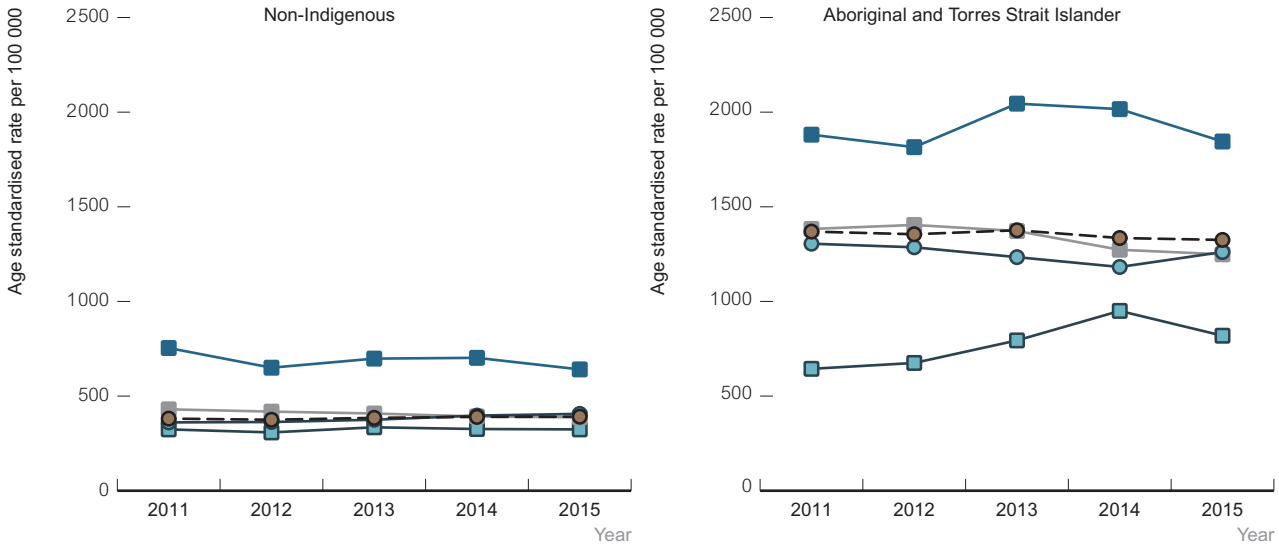


	2011	2012	2013	2014	2015
Non-Indigenous	381.4	375.0	384.6	389.9	391.3
Aboriginal and Torres Strait Islander	1 369.4	1 354.8	1 376.3	1 334.8	1 324.6

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

Between 2011 and 2015, the chlamydia notification rate was higher in all jurisdictions in the Aboriginal and Torres Strait Islander population, compared to the non-Indigenous population (Figure 85). Notification rates were highest in the Northern Territory in both the Aboriginal and Torres Strait Islander population and the non-Indigenous population.

Figure 85 Chlamydia notification rate per 100 000, 2011 – 2015, by Aboriginal and Torres Strait Islander status and State/Territory



	Non-Indigenous					Aboriginal and Torres Strait Islander				
Australia	381.4	375.0	384.6	389.9	391.3	1 369.4	1 354.8	1 376.3	1 334.8	1 324.6
WA	429.7	418.4	408.2	392.2	388.3	1 383.3	1 404.3	1 371.9	1 272.9	1 248.8
NT	754.1	650.0	698.0	701.6	640.7	1 880.6	1 815.3	2 045.0	2 016.5	1 844.6
Qld	360.6	363.1	375.1	397.4	405.8	1 304.6	1 285.8	1 233.8	1 181.5	1 261.2
SA	324.1	308.2	335.1	326.3	323.7	644.4	675.4	794.4	950.5	818.8

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

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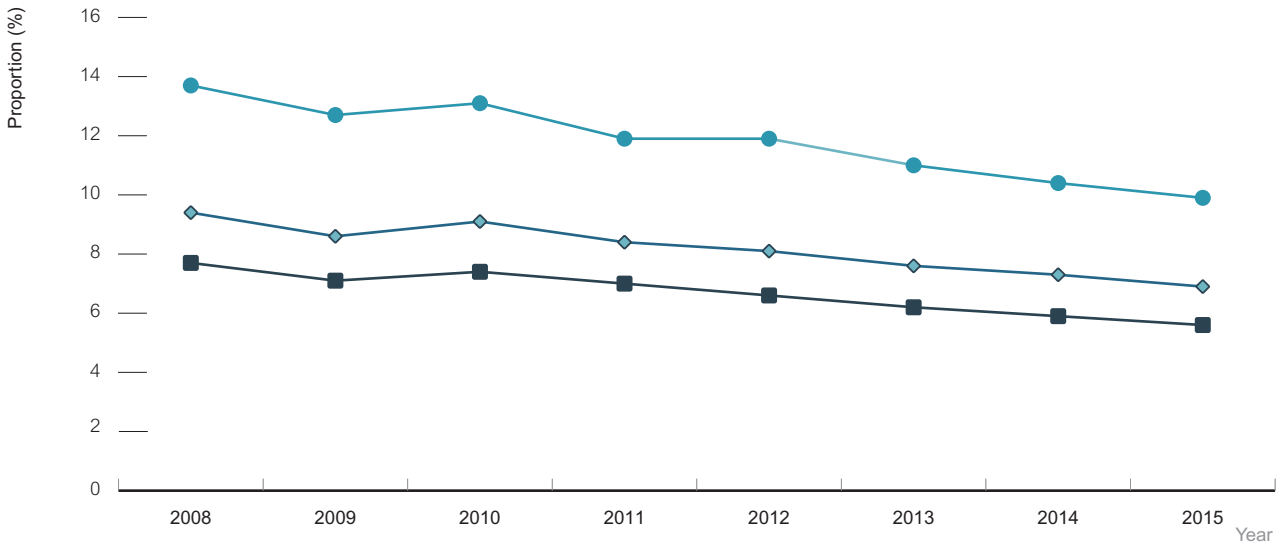
It is important to consider trends in chlamydia notifications in the context of patterns of testing. From 2008 – 2015, the ratio of chlamydia notifications to Medicare-rebated chlamydia tests declined by 29% in both males and females (Figure 86). Over the eight year period, declines have been seen across all age groups, but were highest in males aged 15 – 19 (from 28.3% in 2008 to 20.2% in 2015) and aged 20 – 24 years (from 23.3% in 2008 to 16.9% in 2015), and females aged 20 – 24 (from 11.2% in 2008 to 8.3% in 2015) and aged 15 – 19 years (from 18.7% in 2008 to 14.3% in 2015) (Figures 87 – 88).

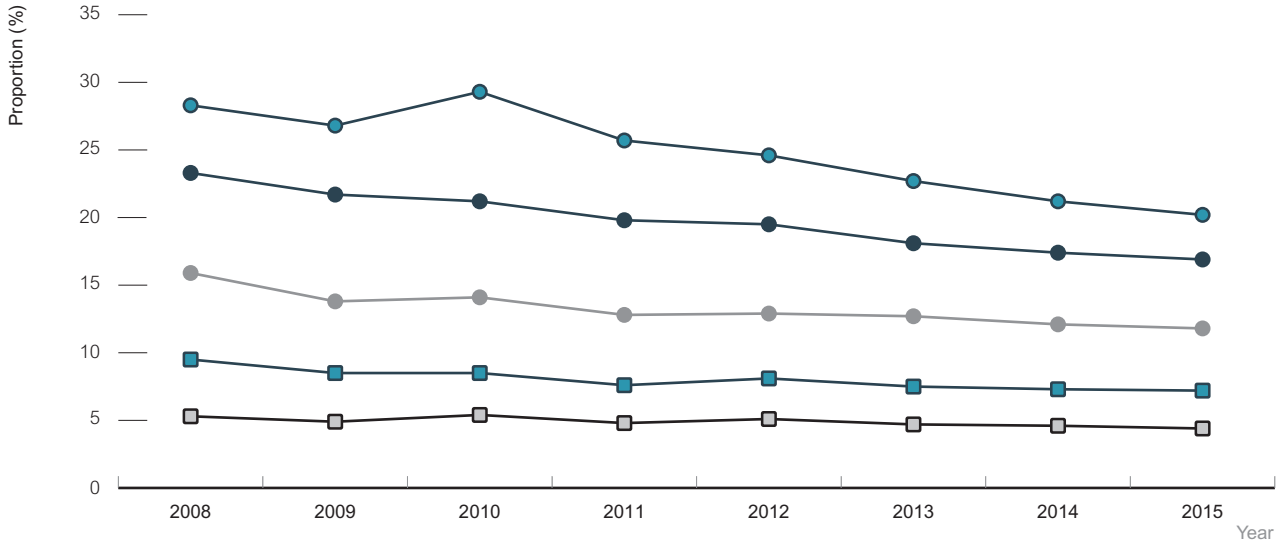
Figure 86 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008 – 2015, by sex



	2008	2009	2010	2011	2012	2013	2014	2015
Female	7.7%	7.1%	7.4%	7.0%	6.6%	6.2%	5.9%	5.6%
Male	13.7%	12.7%	13.1%	11.9%	11.9%	11.0%	10.4%	9.9%
Total	9.4%	8.6%	9.1%	8.4%	8.1%	7.6%	7.3%	6.9%

Source: Medicare, Department of Human Services, Australian National Notifiable Diseases Surveillance System

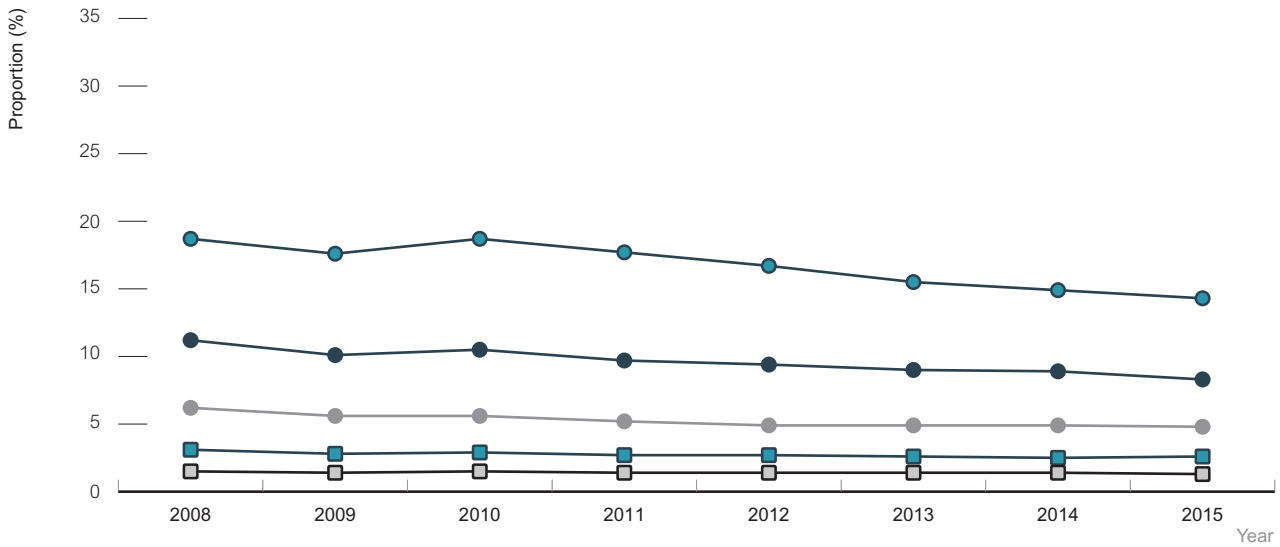
Figure 87 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008 – 2015, by age group, males



	2008	2009	2010	2011	2012	2013	2014	2015
15 – 19	28.3%	26.8%	29.3%	25.7%	24.6%	22.7%	21.2%	20.2%
20 – 24	23.3%	21.7%	21.2%	19.8%	19.5%	18.1%	17.4%	16.9%
25 – 29	15.9%	13.8%	14.1%	12.8%	12.9%	12.7%	12.1%	11.8%
30 – 39	9.5%	8.5%	8.5%	7.6%	8.1%	7.5%	7.3%	7.2%
40+	5.3%	4.9%	5.4%	4.8%	5.1%	4.7%	4.6%	4.4%

Source: Medicare, Department of Human Services, Australian National Notifiable Diseases Surveillance System

Figure 88 Ratio of chlamydia notifications to Medicare-rebated chlamydia tests, 2008 – 2015, by age group, females



	2008	2009	2010	2011	2012	2013	2014	2015
15 – 19	18.7%	17.6%	18.7%	17.7%	16.7%	15.5%	14.9%	14.3%
20 – 24	11.2%	10.1%	10.5%	9.7%	9.4%	9.0%	8.9%	8.3%
25 – 29	6.2%	5.6%	5.6%	5.2%	4.9%	4.9%	4.9%	4.8%
30 – 39	3.1%	2.8%	2.9%	2.7%	2.7%	2.6%	2.5%	2.6%
40+	1.5%	1.4%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%

Source: Medicare, Department of Human Services, Australian National Notifiable Diseases Surveillance System

Gonorrhoea – new diagnoses

There were a total of 18 588 gonorrhoea notifications in Australia in 2015; 3 518 (19%) were among the Aboriginal and Torres Strait Islander population, 8 315 (45%) were in the non-Indigenous population, and there were a further 6 755 (36%) for which Aboriginal and Torres Strait Islander status was not reported (Table 21). In 2015, the female-to-male notifications ratio was 3:1, with 74% (13 793) of gonorrhoea notifications in males. In 2015, 55% (10 213) notifications were in people aged 15 – 29 years and 71% (13 119) were in people residing in major cities.

Table 21 Characteristics of new gonorrhoea notifications, 2006 – 2015

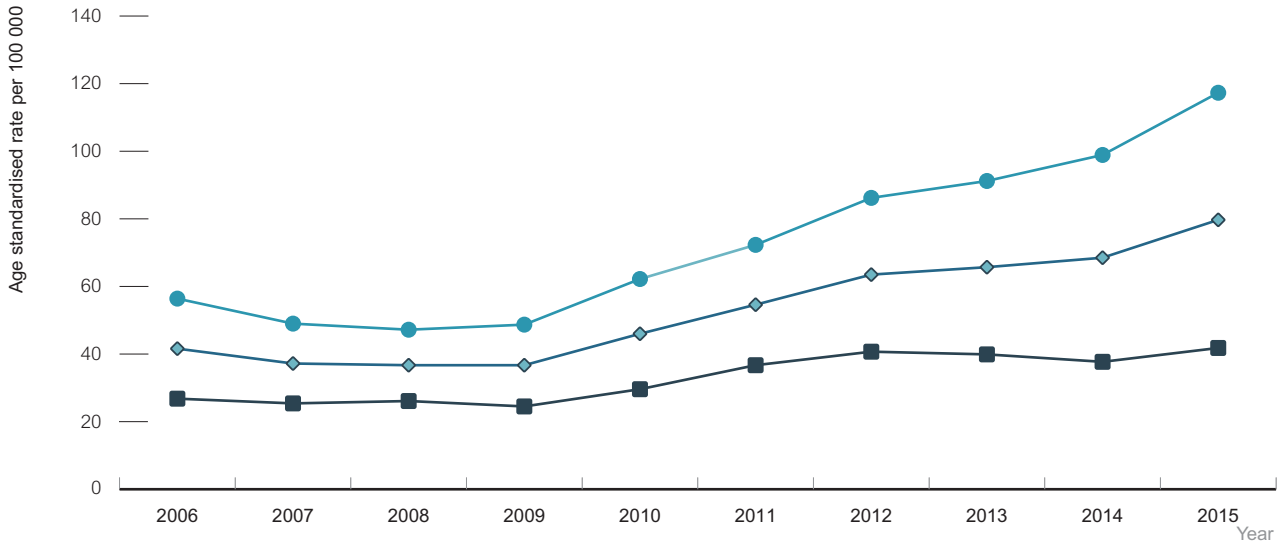
	Year of diagnosis									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Characteristic										
Total	8 388	7 664	7 745	7 955	10 091	12 065	14 213	14 913	15 758	18 588
Sex										
Female	2 670	2 574	2 708	2 605	3 176	3 960	4 447	4 425	4 216	4 761
Male	5 707	5 080	5 028	5 235	6 892	8 068	9 758	10 464	11 498	13 793
Missing	11	10	9	25	23	37	8	24	44	34
Age group										
0 – 14	170	191	183	141	172	232	266	228	249	217
15 – 19	1 485	1 536	1 597	1 525	1 907	2 297	2 430	2 236	2 037	1 992
20 – 29	3 458	3 083	3 149	3 476	4 360	5 041	6 078	6 405	6 988	8 221
30 – 39	1 971	1 658	1 595	1 623	1 986	2 387	2 946	3 307	3 565	4 593
40+	1 301	1 192	1 219	1 173	1 651	2 074	2 473	2 728	2 908	3 501
Missing	3	4	2	17	15	34	20	9	11	64
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	3 812	3 467	3 523	3 015	3 695	4 559	4 428	4 212	3 559	3 518
Non-Indigenous	2 160	1 928	2 136	2 300	2 971	3 716	4 978	6 419	6 951	8 315
Not reported	2 416	2 199	2 086	2 640	3 425	3 790	4 807	4 282	5 248	6 755
Area of residence										
Major Cities	3 794	3 467	3 519	4 148	5 395	6 367	8 352	9 070	10 535	13 119
Inner Regional	282	263	271	384	421	543	736	755	782	893
Outer Regional	1 118	999	1 134	943	1 230	1 791	1 746	1 530	1 413	1 416
Remote	1 032	989	1 042	877	1 117	1 231	1 228	1 196	1 017	1 038
Very Remote	1 918	1 777	1 617	1 460	1 679	1 890	1 770	1 612	1 406	1 402
Missing	244	169	162	143	249	243	381	750	605	720
State/Territory										
Australian Capital Territory	32	46	22	55	53	129	92	114	122	139
New South Wales	1 660	1 419	1 347	1 618	2 322	2 864	4 127	4 229	4 881	5 455
Northern Territory	1 758	1 606	1 551	1 501	1 918	2 009	1 819	1 950	1 759	1 814
Queensland	1 522	1 374	1 653	1 549	2 164	2 936	3 070	2 818	2 729	3 030
South Australia	502	457	486	368	470	440	543	807	736	795
Tasmania	18	37	25	21	21	19	33	71	65	56
Victoria	1 284	999	916	1 490	1 748	1 874	2 438	3 002	3 250	5 027
Western Australia	1 612	1 726	1 745	1 353	1 395	1 794	2 091	1 922	2 216	2 272

Source: Australian National Notifiable Diseases Surveillance System;

The notification rate of gonorrhoea was relatively stable between 2006 and 2009, at 42 per 100 000 in 2006 and 37 per 100 000 in 2009, with a similar pattern in males and females (Figure 89). Since 2009 there has been a 116% increase in notification rates, from 37 per 100 000 in 2009 to 80 per 100 000 in 2015. In males the increase has been steady and more marked (from 49 per 100 000 in 2006 to 117 per 100 000 in 2015) than females, where rates increased between 2009 and 2012, and then have stabilised (from 25 per 100 000 in 2009 to 40.7 in 2012 to 42 per 100 000 in 2015).

In the past six years most laboratories have switched to using dual chlamydia and gonorrhoea tests where if a chlamydia test was ordered, a gonorrhoea test would be conducted automatically. Most laboratories switched to dual testing by 2012.[19] 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 explain the increase in diagnoses in women until 2012.

Figure 89 Gonorrhoea notification rate per 100 000 population, 2006 – 2015, by sex

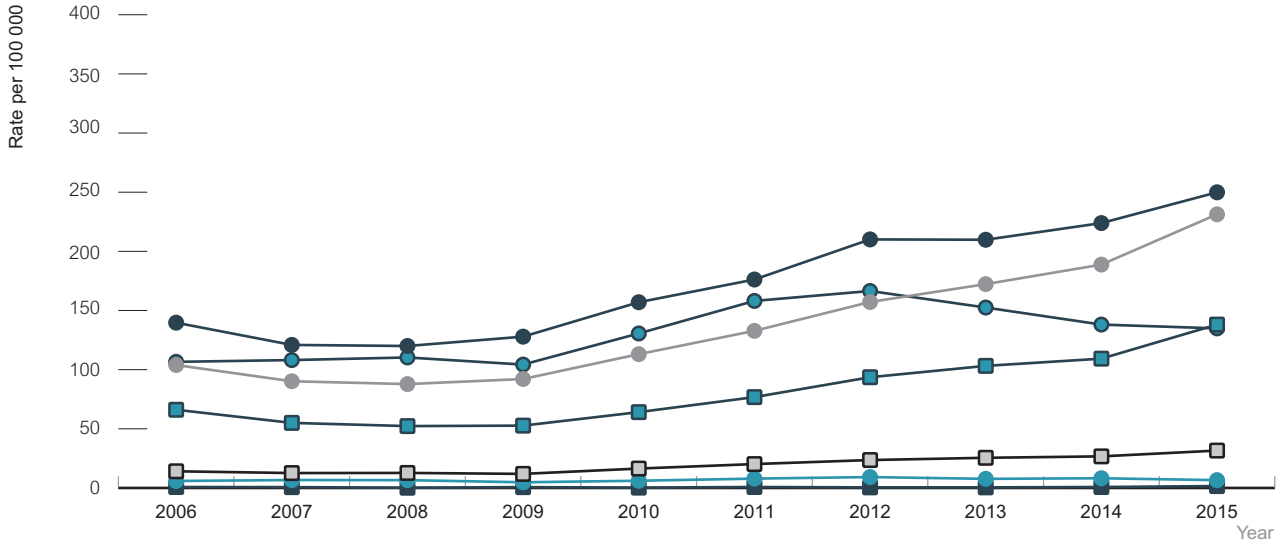


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	26.8	25.4	26.1	24.5	29.6	36.7	40.7	39.9	37.7	41.8
Male	56.4	49.0	47.2	48.7	62.2	72.3	86.2	91.2	98.9	117.3
Total	41.6	37.2	36.7	36.7	46.0	54.6	63.5	65.7	68.5	79.7

Source: Australian National Notifiable Diseases Surveillance System

Between 2006 and 2011, the notification rate of gonorrhoea has increased in all age groups, except the15 – 19 year age group. In the 15 – 19 year age group, rates peaked in 2012 at 167 per 100 000, and have declined by 19% to 135 per 100 000 in 2015 (Figure 90). Notification rates have been consistently higher among males than females, with a decline in notifications seen in the 15 – 19 year age group in both sexes (Figures 91 and 92).

Figure 90 Gonorrhoea notification rate per 100 000 population, 2006 – 2015, by age group



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.8	0.7	0.2	0.7	0.3	0.8	0.5	0.5	0.8	1.6
5 – 14	5.9	6.7	6.6	4.8	6.1	7.9	9.2	7.7	8.2	6.6
15 – 19	106.6	108.1	110.3	104.3	130.6	158.1	166.5	152.5	138.1	134.9
20 – 24	139.7	120.9	120.0	127.9	157.0	176.2	210.1	209.8	223.9	249.9
25 – 29	103.9	90.2	87.8	92.1	113.1	132.8	157.2	172.3	188.8	231.3
30 – 39	66.1	55.0	52.3	52.7	64.1	76.8	93.6	103.2	109.3	138.1
40+	14.1	12.6	12.7	11.9	16.4	20.2	23.6	25.5	26.7	31.6

Source:Australian National Notifiable Diseases Surveillance System

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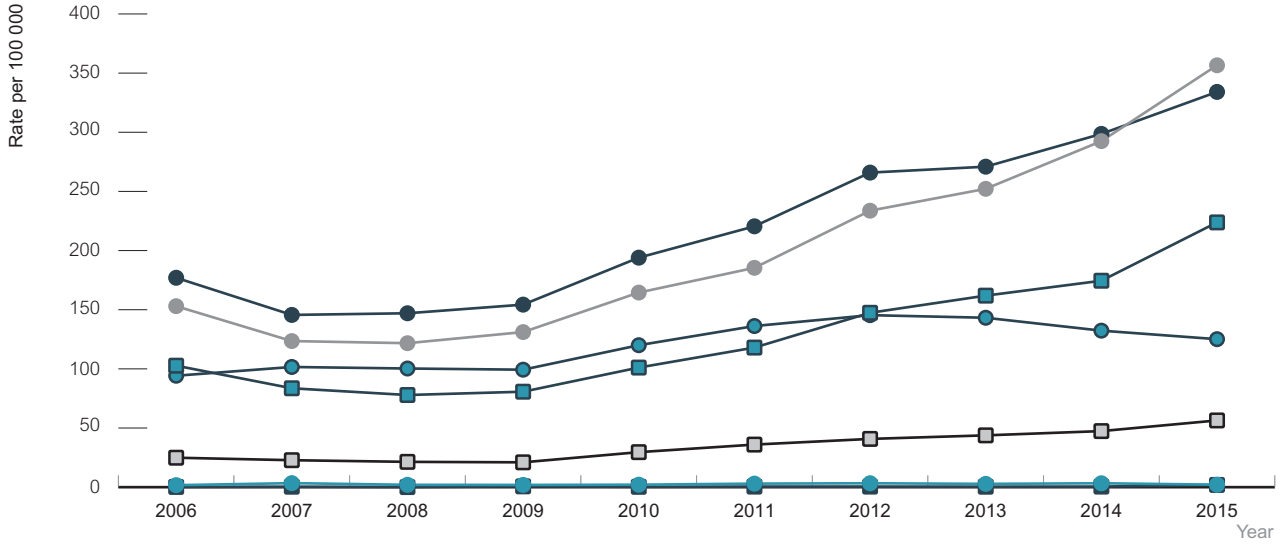
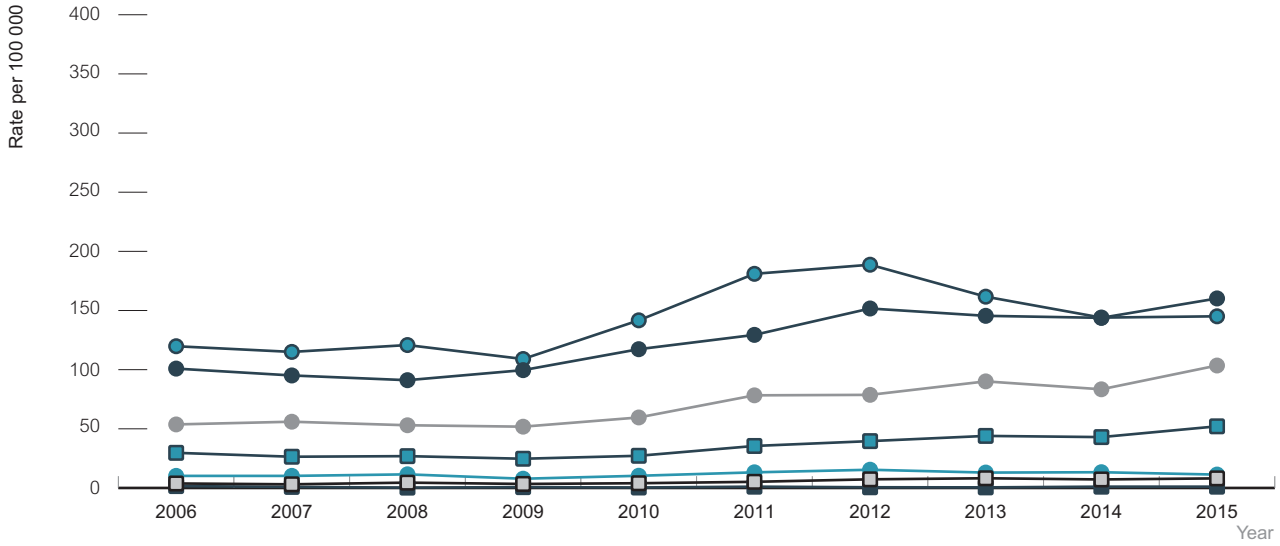
Figure 91 Gonorrhoea notification rate per 1000 000 population, 2006 – 2015, by age group, males



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.2	0.4	0.1	0.7	0.3	0.5	0.5	0.4	0.5	1.9
5 – 14	1.7	3.4	2.0	1.9	2.1	3.0	3.3	2.8	3.3	2.1
15 – 19	94.2	101.6	100.3	99.3	120.0	136.2	145.4	143.2	132.3	125.1
20 – 24	177.0	145.6	147.0	154.3	194.0	220.5	265.9	270.9	298.6	334.1
25 – 29	153.0	123.5	121.7	131.1	164.5	185.4	233.7	252.2	292.5	356.6
30 – 39	102.7	83.6	77.9	80.7	101.1	118.0	147.4	161.9	174.5	223.8
40+	24.9	22.8	21.4	21.0	29.6	36.0	40.8	43.8	47.4	56.4

Source: Australian National Notifiable Diseases Surveillance System

Figure 92 Gonorrhoea notification rate per 100 000 population, 2006 – 2015 by age group, females

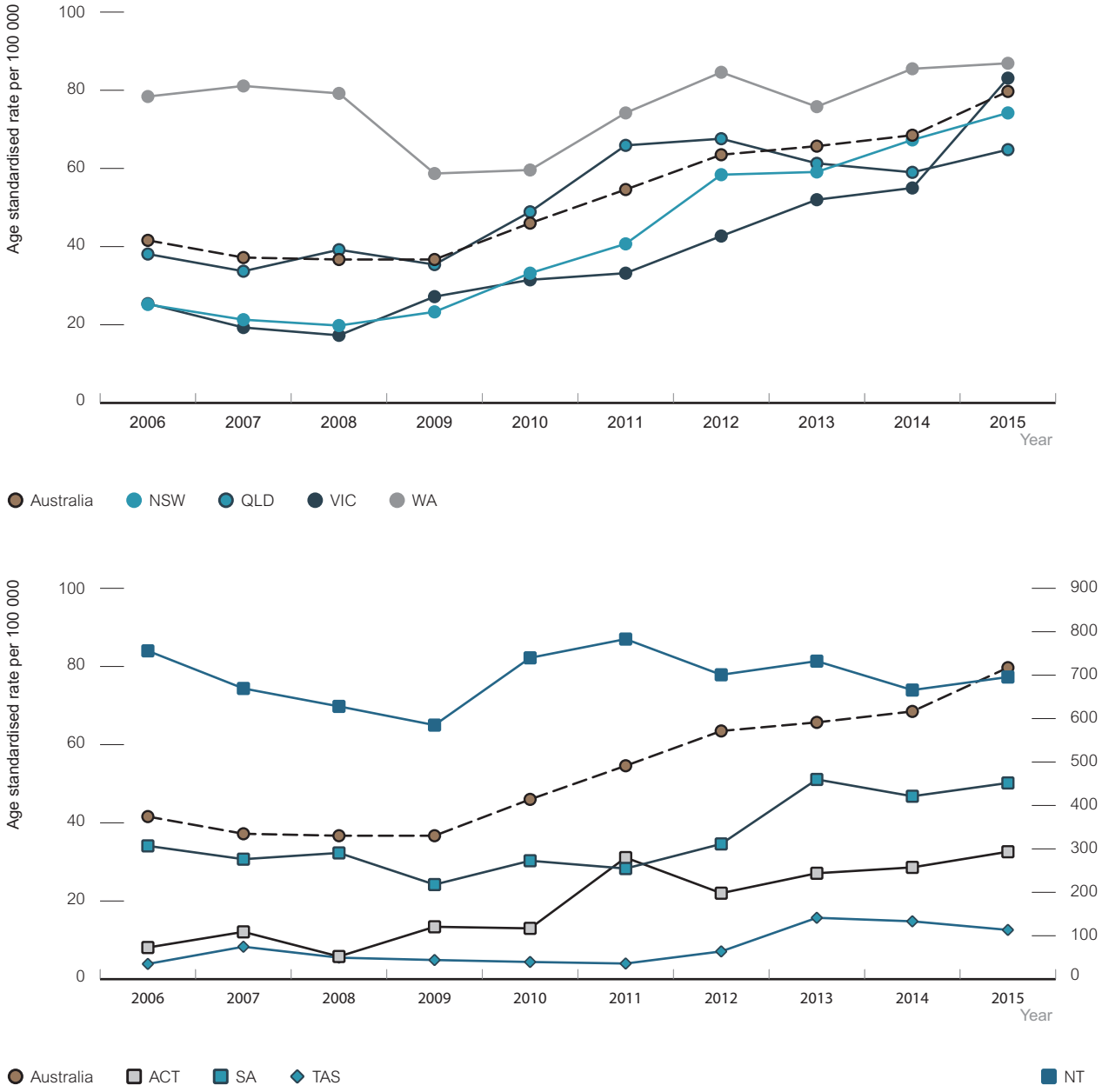


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	1.6	0.9	0.3	0.7	0.4	1.1	0.6	0.5	1.1	1.1
5 – 14	10.2	10.2	11.5	7.8	10.3	13.2	15.4	13.0	13.3	11.3
15 – 19	119.8	115.0	120.8	109.0	141.7	181.0	188.7	161.7	144.0	145.1
20 – 24	100.9	95.1	91.1	99.6	117.3	129.4	151.7	145.5	143.8	160.2
25 – 29	53.7	56.0	53.0	51.8	59.6	78.3	78.7	90.1	83.4	103.5
30 – 39	29.7	26.4	26.9	24.7	27.2	35.5	39.6	44.0	43.0	52.1
40+	3.8	3.1	4.5	3.4	4.0	5.2	7.3	8.2	7.2	8.1

Source: Australian National Notifiable Diseases Surveillance System

The rate of gonorrhoea notification was highest in the Northern Territory in 2015 (696 per 100 000) (Figure 93 and Table 22). Since 2006 gonorrhoea notification rates have increased in all jurisdictions except the Northern Territory. Increases have been greatest in the Australian Capital Territory (from 8.1 per 100 000 in 2006 to 32.6 per 100 000 in 2015), Victoria (from 25.4 per 100 000 in 2006 to 83.1 per 100 000 in 2015), and Tasmania (from 3.9 per 100 000 in 2006 to 12.6 per 100 000 in 2015). There was a sharp increase between 2014 and 2015 in Victoria, from 55.0 per 100 000 in 2014 to 83.1 per 100 000 in 2015. In 2015 a large sexual health clinic in Melbourne switched to using a more sensitive test, which may explain some of the increase seen in Victoria (see interpretation section, page 112).

Figure 93 Gonorrhoea notification rate per 100 000 population, 2006 – 2015, 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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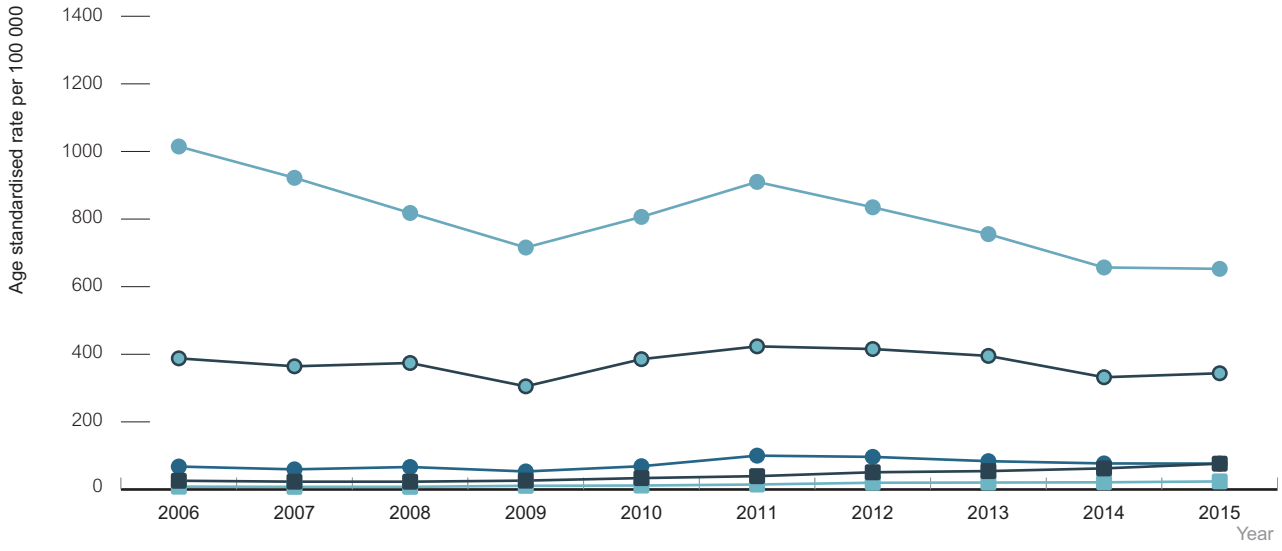
Table 22 Age standardised gonorrhoea notifications rates per 100 000 population, 2006 – 2015, by State/Territory

State/Territory	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australian Capital Territory	8.1	12.1	5.8	13.4	13.0	31.1	22.0	27.1	28.6	32.6
New South Wales	25.2	21.3	19.8	23.3	33.2	40.7	58.4	59.1	67.3	74.2
Northern Territory	756.0	669.4	628.1	585.0	739.9	783.1	700.9	732.3	665.7	695.7
Queensland	38.1	33.7	39.2	35.4	48.9	65.9	67.6	61.3	59.0	64.8
South Australia	34.1	30.7	32.3	24.2	30.3	28.3	34.6	51.1	46.8	50.2
Tasmania	3.9	8.3	5.5	4.9	4.4	4.0	7.1	15.7	14.8	12.6
Victoria	25.4	19.3	17.3	27.2	31.5	33.2	42.7	52.0	55.0	83.1
Western Australia	78.4	81.1	79.2	58.7	59.6	74.2	84.6	75.8	85.5	86.9
Australia	41.6	37.2	36.7	36.7	46.0	54.6	63.5	65.7	68.5	79.7

Source: Australian National Notifiable Diseases Surveillance System

In the ten year period 2006 to 2015, the rates of gonorrhoea notification have been highest in remote and very remote areas (Figure 94). Since 2006, the gonorrhoea notification rate in very remote areas has declined by 55%, from 1 015 per 100 000 in 2006 to 653 per 100 000 in 2015. A smaller decline of 13% has been seen in remote areas, from 388 per 100 000 in 2006 to 344 per 100 000 in 2015. Over the same time period gonorrhoea notification rates have increased in major cities, inner regional and outer regional areas, by 192%, 200% and 13% respectively (Figure 94). A similar trend is seen in males and females (Figures 95 and 96).

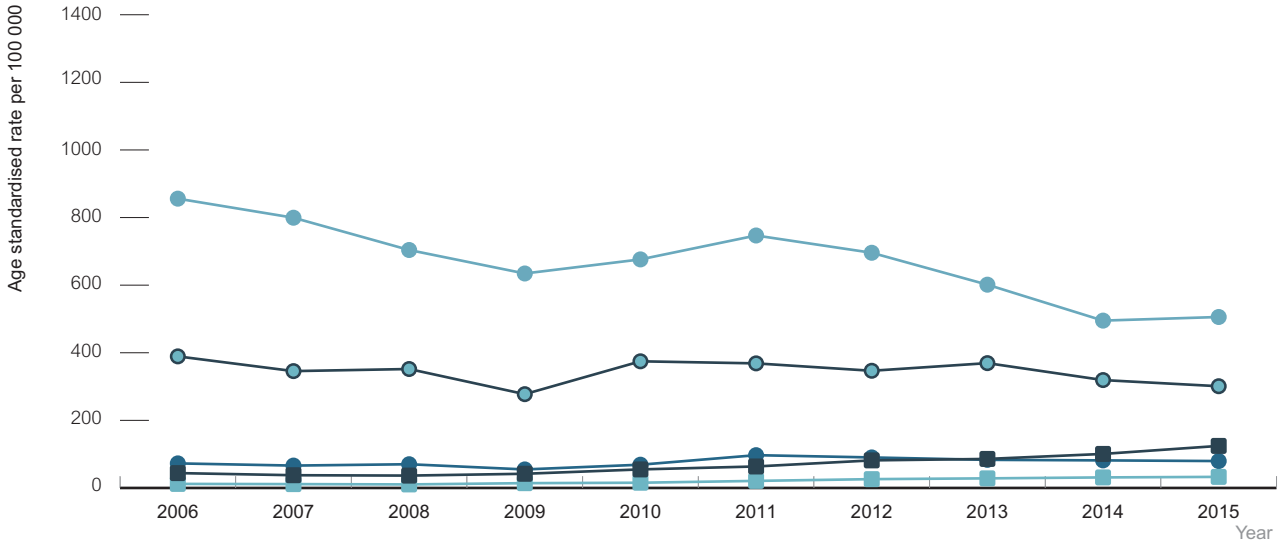
Figure 94 Gonorrhoea notification rate per 100 000, 2006 – 2015 by region of residence



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	25.8	23.1	23.0	26.2	33.7	39.4	50.9	54.4	62.4	76.3
Inner regional	8.4	7.8	7.8	10.8	11.7	14.7	19.9	20.5	21.2	23.8
Outer regional	67.8	59.5	66.5	53.3	68.8	100.1	96.4	83.7	77.0	76.5
Remote	387.9	364.4	374.2	305.1	385.5	423.4	415.5	395.2	332.0	343.8
Very remote	1 014.7	922.0	818.0	715.8	806.4	909.9	834.8	755.4	656.8	652.7

Source: Australian National Notifiable Diseases Surveillance System

Figure 95 Gonorrhoea notification rate per 100 000 population, 2006 – 2015, by region of residence, males



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	44.0	37.7	36.6	42.0	54.9	63.6	81.6	85.9	100.7	124.4
Inner regional	12.0	11.4	10.5	14.2	15.5	20.9	26.1	28.4	31.2	32.8
Outer regional	72.7	66.2	70.2	54.8	68.8	97.0	90.3	83.2	81.6	79.6
Remote	389.3	345.7	351.9	277.5	374.7	368.6	346.7	369.3	319.2	301.0
Very remote	855.9	799.5	704.0	634.5	676.2	746.9	695.8	601.4	495.1	505.8

Source:Australian National Notifiable Diseases Surveillance System

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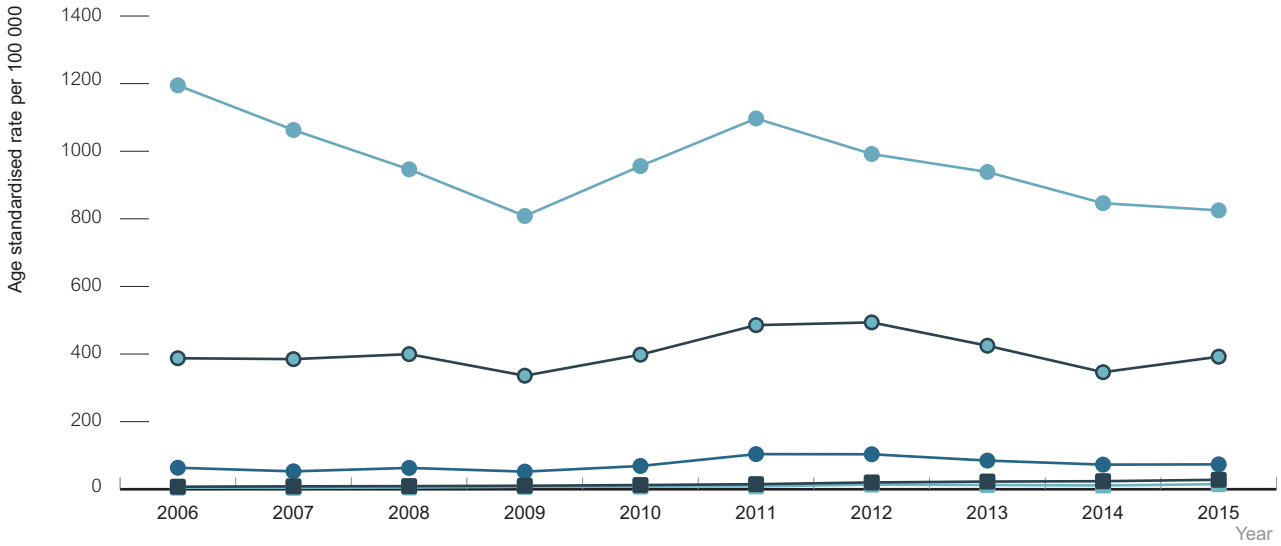
Figure 96 Gonorrhoea notification rate per 100 000 population, 2006 – 2015, by region of residence, females

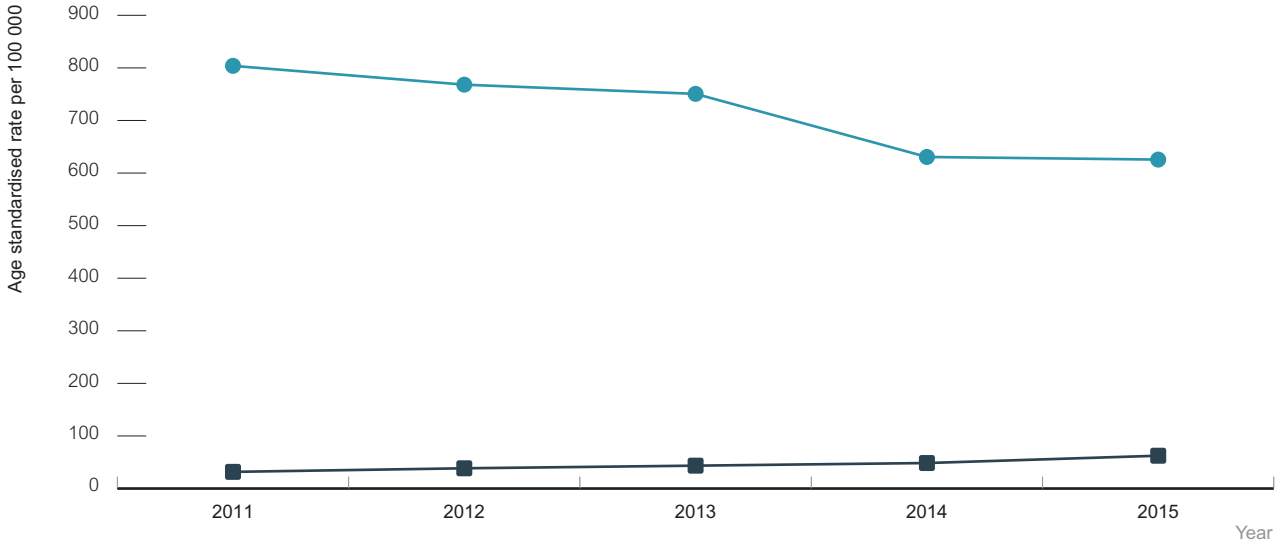


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	7.5	8.5	9.2	10.3	12.4	15.0	20.1	22.7	23.8	28.0
Inner regional	4.7	4.3	5.1	7.3	7.8	8.6	13.7	12.6	11.2	14.9
Outer regional	63.6	52.9	63.1	52.1	68.8	103.9	103.5	84.8	72.8	73.6
Remote	387.6	385.0	399.7	335.9	398.1	485.5	493.6	424.6	346.3	392.2
Very remote	1 194.9	1 062.7	946.4	808.4	956.1	1 096.9	991.8	938.6	846.3	825.0

Source: Australian National Notifiable Diseases Surveillance System

The data presented in Figures 97 and 98 include the Australian Capital Territory, the Northern Territory, Queensland, South Australia, Victoria, Western Australia and Tasmania, in which Aboriginal and Torres Strait Islander status was reported for ≥50% for each of the five years. In these jurisdictions, the rate of notification of gonorrhoea in the Aboriginal and Torres Strait Islander population decreased by 22% from 804 per 100 000 in 2011 to 626 per 100 000 in 2015, compared with an increase of 95% in the non-Indigenous population, from 32 per 100 000 in 2011 to 62 per 100 000 in 2015 (Figure 97). Despite this decrease, in 2015 notification rates in the Aboriginal and Torres Strait Islander population were 10 times higher than the non-Indigenous population in 2015 (626 per 100 000 compared to 62 per 100 000).

Figure 97 Gonorrhoea notification rate per 100 000 population, 2011 – 2015, by Aboriginal and Torres Strait Islander status

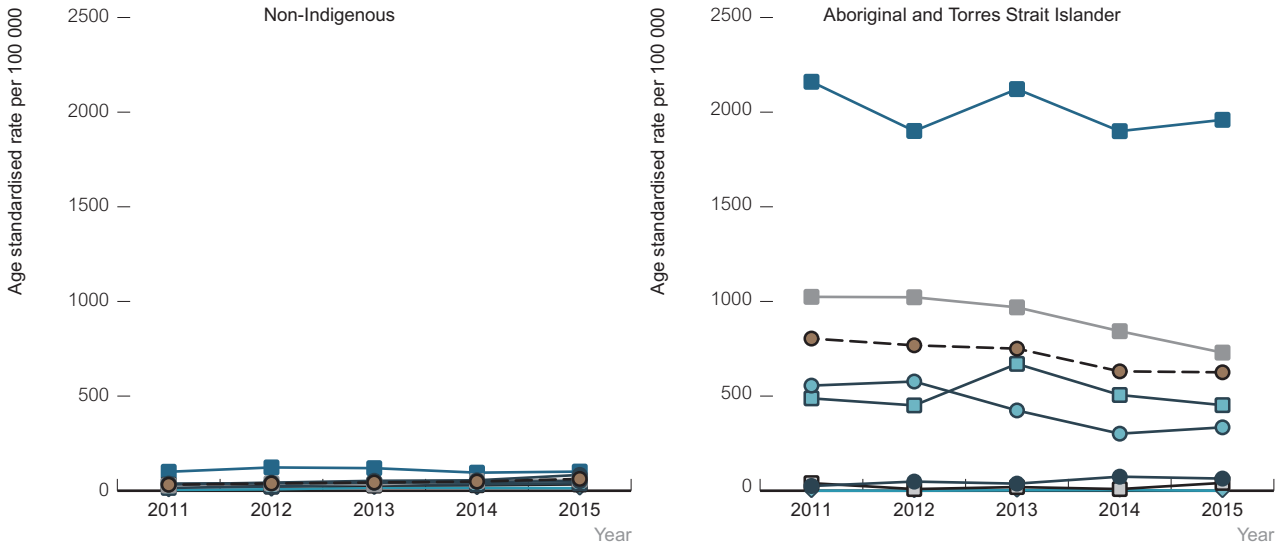


	2011	2012	2013	2014	2015
Non-Indigenous	31.7	38.5	43.5	48.5	62.4
Aboriginal and Torres Strait Islander	803.9	768.1	750.6	630.6	625.6

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.

From 2011 – 2015, the gonorrhoea notification rate in the Aboriginal and Torres Strait Islander population was highest in the Northern Territory, followed by Western Australia then South Australia (Figure 98). Rates in the non-Indigenous population were similarly highest in the Northern Territory, followed by Victoria and Western Australia. In 2015 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 98 Gonorrhoea notification rate per 100 000 population, 2011 – 2015, by State/Territory and Aboriginal and Torres Strait Islander status



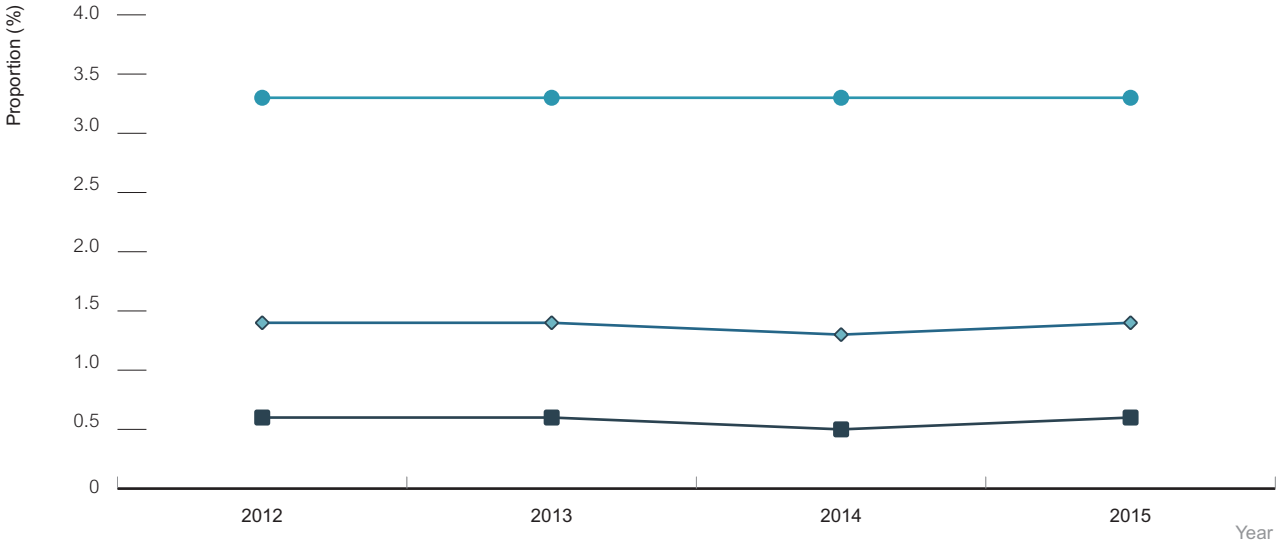
	Non-Indigenous					Aboriginal and Torres Strait Islander				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Australia	31.7	38.5	43.5	48.5	62.4	803.9	768.1	750.6	630.6	625.6
ACT	31.2	22.2	27.1	29.2	33.2	40.0	8.8	19.4	8.8	41.3
NT	100.1	123.0	119.2	95.4	101.1	2 160.4	1 900.5	2 121.8	1 899.6	1 959.4
Qld	37.6	39.5	42.2	46.4	50.6	555.4	576.9	424.1	301.4	334.8
SA	15.0	22.6	33.1	33.4	39.3	487.9	450.8	670.2	505.8	452.1
Tas	4.2	7.5	16.5	15.4	13.5	0.0	0.0	2.6	3.1	0.0
Vic	33.4	42.7	52.3	55.0	83.5	25.0	48.3	37.5	74.2	64.2
WA	27.9	38.9	33.9	51.2	58.0	1 024.2	1 022.1	968.8	842.9	729.7

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.

As most laboratories since 2012 have switched to using dual chlamydia and gonorrhoea tests then Medicare-rebated chlamydia tests can also be used to indicate the level of gonorrhoea testing.

From 2012 – 2015, the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests show relatively stable proportions over the five year period in both females and males (Figure 99). The overall proportion was 1.4% in 2015, lower at 0.6% in females and higher at 3.3% in males.

Figure 99 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012 – 2015, by sex

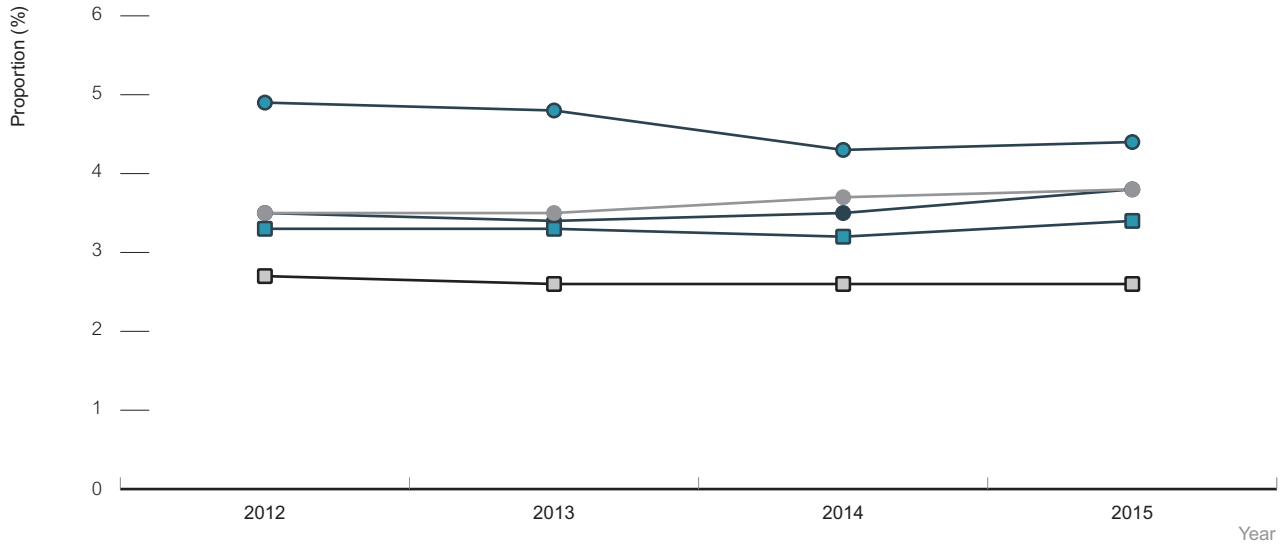


	2012	2013	2014	2015
Female	0.6%	0.6%	0.5%	0.6%
Male	3.3%	3.3%	3.3%	3.3%
Total	1.4%	1.4%	1.3%	1.4%

Source: Australian National Notifiable Diseases Surveillance System; Medicare, Department of Human Services

In males the ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests in 2015 was highest in the 15 – 19 year age group (4.4%), but also remained above 3% in those 20 – 24, 25 – 29 and 30 – 39 years. The ratio declined in the 15 – 19 year age group by 10% since 2012 (Figure 100), and increased by 9% in both the 20 – 24 and 25 – 29 year age groups.

Figure 100 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012 – 2015, by age group, males

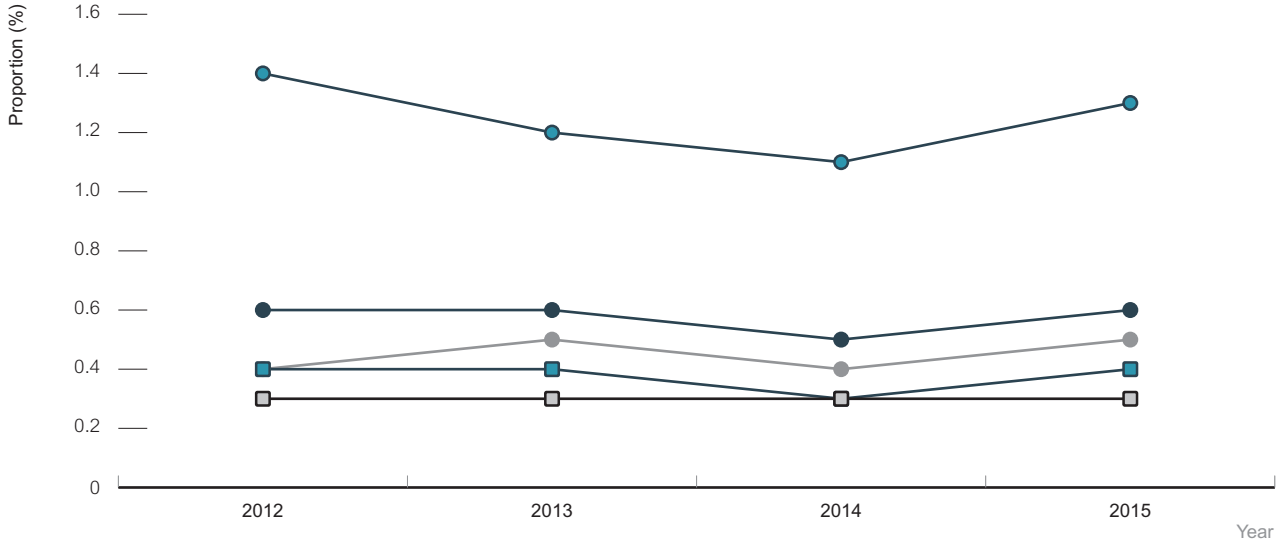


	2012	2013	2014	2015
15 – 19	4.9%	4.8%	4.3%	4.4%
20 – 24	3.5%	3.4%	3.5%	3.8%
25 – 29	3.5%	3.5%	3.7%	3.8%
30 – 39	3.3%	3.3%	3.2%	3.4%
40+	2.7%	2.6%	2.6%	2.6%

Source: Australian National Notifiable Diseases Surveillance System; Medicare, Department of Human Services

The ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests was lower in females than males in all age groups (Figures 100 and 101). In females the ratio of gonorrhoea notifications to gonorrhoea tests in 2015 was highest in the 15 – 19 year age group (1.4%), and low and relatively stable in all other age groups (Figure 101).

Figure 101 Ratio of gonorrhoea notifications to Medicare-rebated gonorrhoea tests, 2012 – 2015, by age group, females

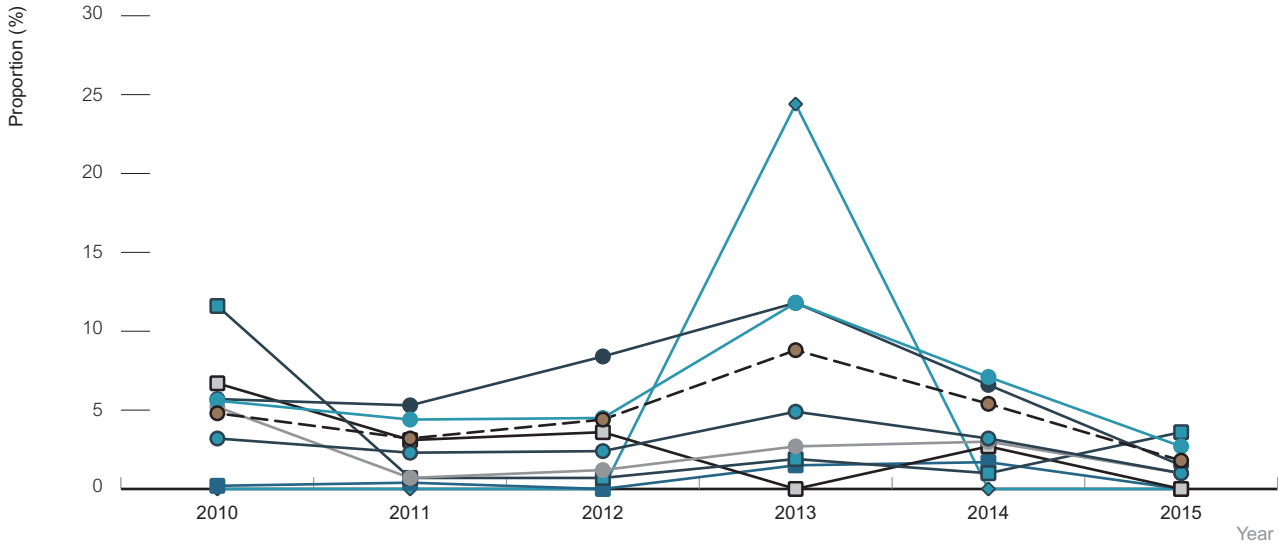


	2012	2013	2014	2015
15 – 19	1.4%	1.2%	1.1%	1.3%
20 – 24	0.6%	0.6%	0.5%	0.6%
25 – 29	0.4%	0.5%	0.4%	0.5%
30 – 39	0.4%	0.4%	0.3%	0.4%
40+	0.3%	0.3%	0.3%	0.3%

Source: Medicare, Department of Human Services, Australian National Notifiable Diseases Surveillance System

Since 1981, the Australian Gonococcal Surveillance Programme has monitored antimicrobial resistance in clinical isolates of *Neisseria gonorrhoeae* in all states and territories. Ceftriaxone is currently the recommended treatment for gonorrhoea in most places in Australia (except for some areas in Northern Australia where amoxicillin is used). In 2015, 0% of gonococcal isolates showed resistance to ceftriaxone, and 1.8% showing decreased susceptibility compared with 5.4% in 2014 (Figure 102). Decreased susceptibility was highest in South Australia (3.6%) and New South Wales (2.7%) in 2015.

Figure 102 Proportion of gonococcal isolates referred to the Australian Gonococcal Surveillance Program with decreased susceptibility to ceftriaxone (MIC 0.06 – 0.125mg/L), Australia, 2010 – 2015, by State/Territory



	2010	2011	2012	2013	2014	2015
ACT	6.7%	3.1%	3.6%	0.0%	2.7%	0.0%
NSW	5.6%	4.4%	4.5%	11.8%	7.1%	2.7%
NT	0.2%	0.4%	0.0%	1.5%	1.7%	0.0%
QLD	3.2%	2.3%	2.4%	4.9%	3.2%	1.0%
SA	11.6%	0.7%	0.7%	1.9%	1.0%	3.6%
Tas	0.0%	0.0%	0.0%	24.4%	0.0%	0.0%
Vic	5.7%	5.3%	8.4%	11.8%	6.6%	1.5%
WA	5.2%	0.7%	1.2%	2.7%	3.0%	1.0%
Australia	4.8%	3.2%	4.4%	8.8%	5.4%	1.8%

Source: Australian Gonococcal Surveillance Program[20]

Syphilis – new diagnoses

Infectious syphilis

An expanded national infectious syphilis case definition was implemented in July 2015 except for in New South Wales, where it was implemented in July 2016[21], which includes a new subcategory of 'probable' infectious syphilis. The probable category was developed to capture infectious syphilis cases in people without a prior testing history. Of the 2 736 cases of infectious syphilis notified in 2015, 233 cases were categorised as probable, accounting for one third of the 36% increase in notifications between 2014 and 2015. This increase in notifications due to the expanded case definition needs to be taken into consideration when interpreting changes in the number and rate of notifications between 2014 and 2015.

There were a total of 2 736 infectious syphilis notifications nationally in 2015, with 433 (16%) among the Aboriginal and Torres Strait Islander population, 2 043 (75%) among the non-Indigenous population, and a further 206 (8%) notifications for which Indigenous status was not reported (Table 23). In 2015, 89% (2 446) of infectious syphilis notifications were in males, 36% (997) were in people aged 15 – 29 years, and 66% (1 806) were in people residing in major cities.

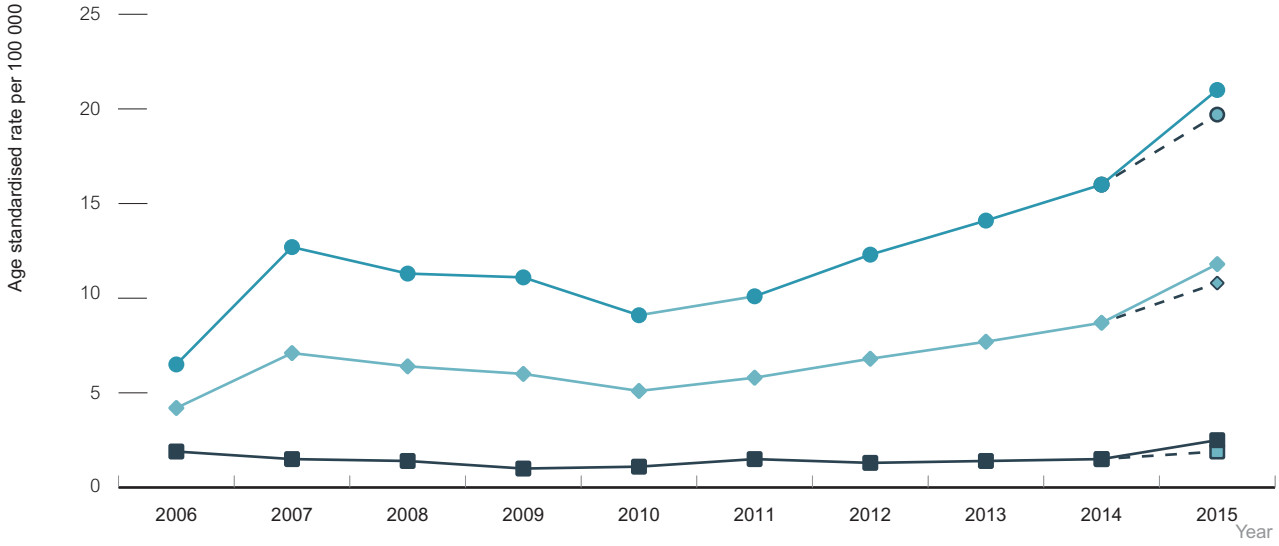
STIs

Table 23 Characteristics of new infectious syphilis diagnoses, 2006 – 2015

	Year of diagnosis									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Characteristic										
Total	843	1 450	1 328	1 289	1 117	1 268	1 529	1 754	2 005	2 736
Sex										
Female	184	152	149	105	118	159	146	153	162	287
Male	657	1 297	1 179	1 180	992	1 106	1 381	1 599	1 842	2 446
Missing	2	1	0	4	7	3	2	2	1	3
Age group										
0 – 14	14	7	8	3	0	10	6	9	11	17
15 – 19	91	63	71	39	44	90	69	75	95	140
20 – 29	204	306	332	326	294	331	389	438	542	857
30 – 39	245	446	404	366	312	322	390	492	548	739
40+	287	627	513	551	462	512	674	740	809	983
Missing	2	1	0	4	5	3	1	0	0	0
Aboriginal and Torres Strait Islander status										
Aboriginal and Torres Strait Islander	234	200	181	117	141	196	169	154	234	433
Non-Indigenous	518	1 175	1 103	1 115	920	1 022	1 256	1 462	1 604	2 043
Not reported	28	75	44	57	56	50	104	138	167	206
Area of residence										
Major Cities	535	1 113	1 009	1 052	843	957	1 198	1 279	1 510	1 806
Inner Regional	39	72	60	78	49	75	93	131	101	145
Outer Regional	37	55	83	60	96	61	74	80	131	217
Remote	67	29	46	25	42	52	39	35	52	140
Very Remote	120	112	91	43	49	79	48	46	55	102
Missing	45	69	39	31	38	44	77	183	156	326
State/Territory										
Australian Capital Territory	2	9	4	11	13	10	14	11	18	15
New South Wales	200	473	424	532	429	420	525	591	759	766
Northern Territory	146	122	83	37	44	30	14	23	70	199
Queensland	178	260	199	192	228	339	384	337	394	566
South Australia	42	49	46	37	22	18	45	41	29	70
Tasmania	4	9	8	10	6	6	13	21	14	15
Victoria	228	427	382	389	295	325	456	645	628	945
Western Australia	43	101	182	81	80	120	78	85	93	160

The rate of notification of infectious syphilis among men increased in the past six years, from 9.1 per 100 000 in 2010 to 21.0 per 100 000 in 2015. Notification rates of infectious syphilis among women have been low and relative stable in the past ten years, at below 2.0 per 100 000 in all years except 2015, where the rate was 2.5 per 100 000 (Figure 103).

Figure 103 Infectious syphilis notification rate per 100 000, 2006 – 2015, by sex



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female - all	1.9	1.5	1.4	1.0	1.1	1.5	1.3	1.4	1.5	2.5
Male - all	6.5	12.7	11.3	11.1	9.1	10.1	12.3	14.1	16.0	21.0
Total - all	4.2	7.1	6.4	6.0	5.1	5.8	6.8	7.7	8.7	11.8

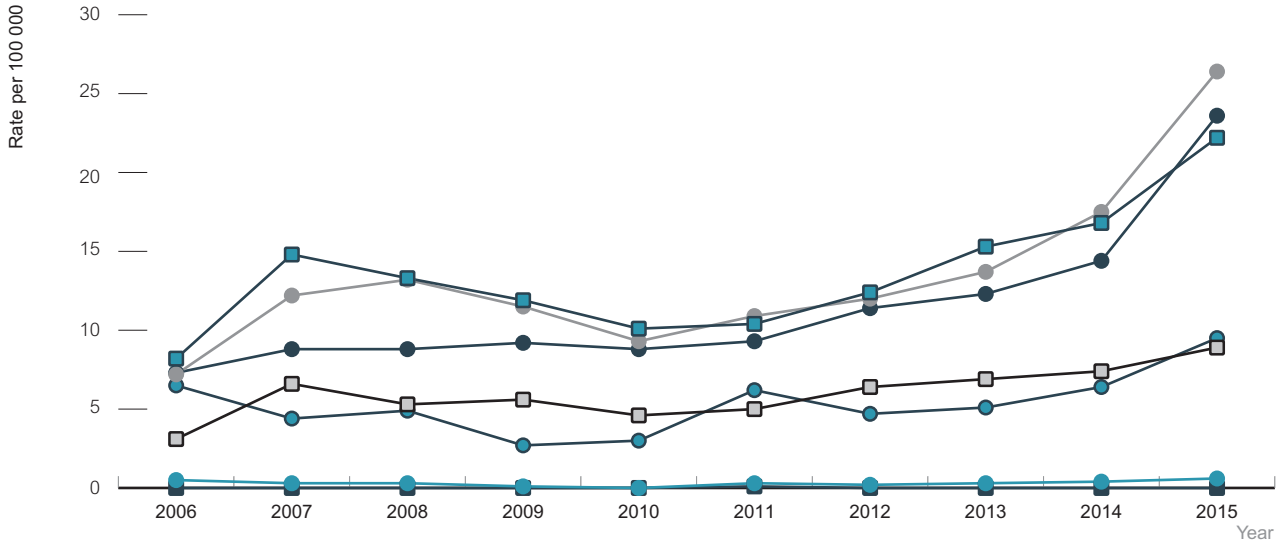
Note: The dotted line indicates the rates if only confirmed cases were included in 2015

Source: Australian National Notifiable Diseases Surveillance System

STIs

In 2015, the notification rate of diagnosis of infectious syphilis was highest in the 25 – 29, 20 – 24 and 30 – 39 year age groups (Figure 104). In these age groups, the rate of infectious syphilis diagnosis increased by 266%, 223% and 171% respectively, since 2006, with the increase most marked between 2014 and 2015. In 2015 notification rates of infectious syphilis among males were highest in men aged 25 – 29 and 30 – 39 years, with the greatest increase in 20 – 24 and 25 – 29 year olds, and among females the highest rates were in those aged 15 – 19 and 20 – 24 year olds (Figures 105-106).

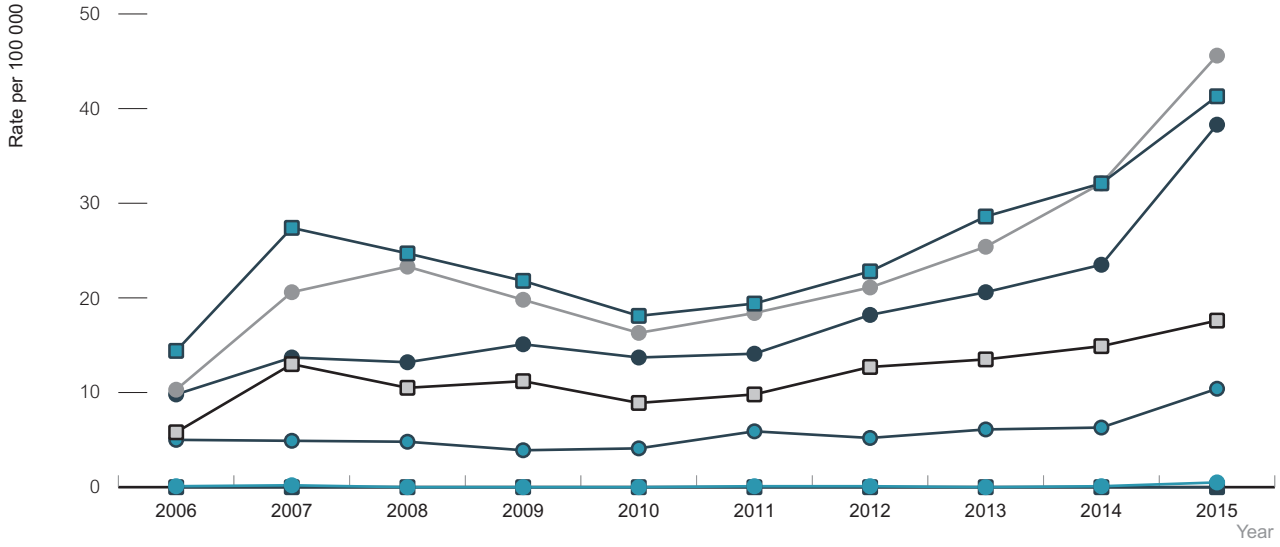
Figure 104 Infectious syphilis notification rate per 100 000 population, 2006 – 2015, by age group



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
5 – 14	0.5	0.3	0.3	0.1	0.0	0.3	0.2	0.3	0.4	0.6
15 – 19	6.5	4.4	4.9	2.7	3.0	6.2	4.7	5.1	6.4	9.5
20 – 24	7.3	8.8	8.8	9.2	8.8	9.3	11.4	12.3	14.4	23.6
25 – 29	7.2	12.2	13.2	11.5	9.3	10.9	12.0	13.7	17.5	26.4
30 – 39	8.2	14.8	13.3	11.9	10.1	10.4	12.4	15.3	16.8	22.2
40+	3.1	6.6	5.3	5.6	4.6	5.0	6.4	6.9	7.4	8.9

Source: Australian National Notifiable Diseases Surveillance System

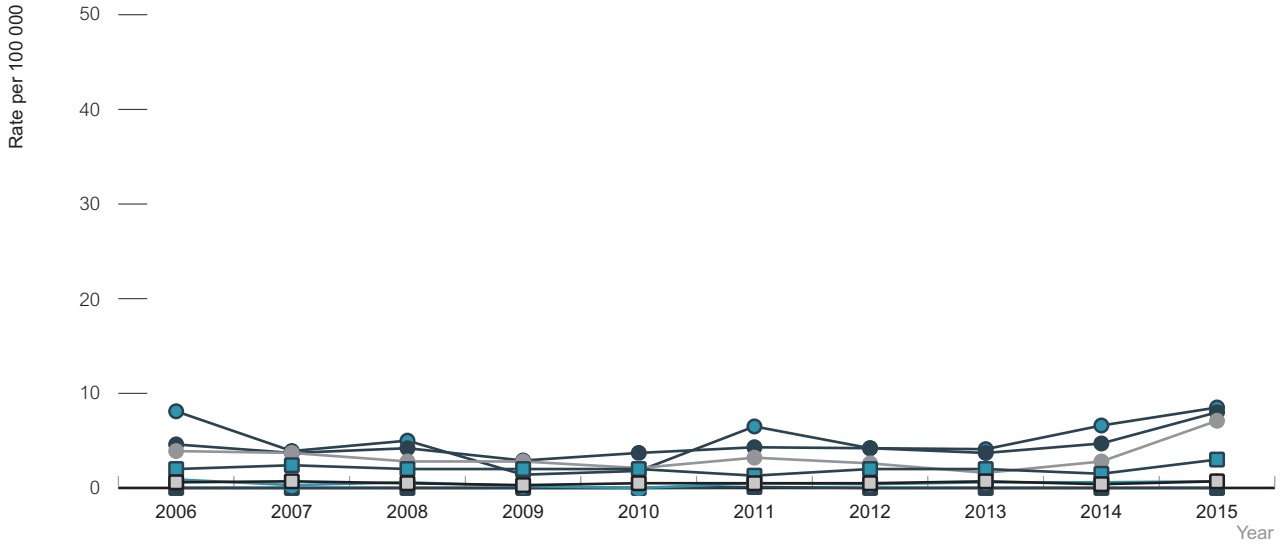
Figure 105 Infectious syphilis notification rate per 100 000 population, 2006 – 2015, by age group, males



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 – 14	0.1	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.5
15 – 19	5.0	4.9	4.8	3.9	4.1	5.9	5.2	6.1	6.3	10.4
20 – 24	9.8	13.7	13.2	15.1	13.7	14.1	18.2	20.6	23.5	38.3
25 – 29	10.3	20.6	23.3	19.8	16.3	18.4	21.1	25.4	32.1	45.6
30 – 39	14.4	27.4	24.7	21.8	18.1	19.4	22.8	28.6	32.1	41.3
40+	5.8	13.0	10.5	11.2	8.9	9.8	12.7	13.5	14.9	17.6

Source: Australian National Notifiable Diseases Surveillance System

Figure 106 Infectious syphilis notification rate per 100 000 population, 2006 – 2015, by age group, females

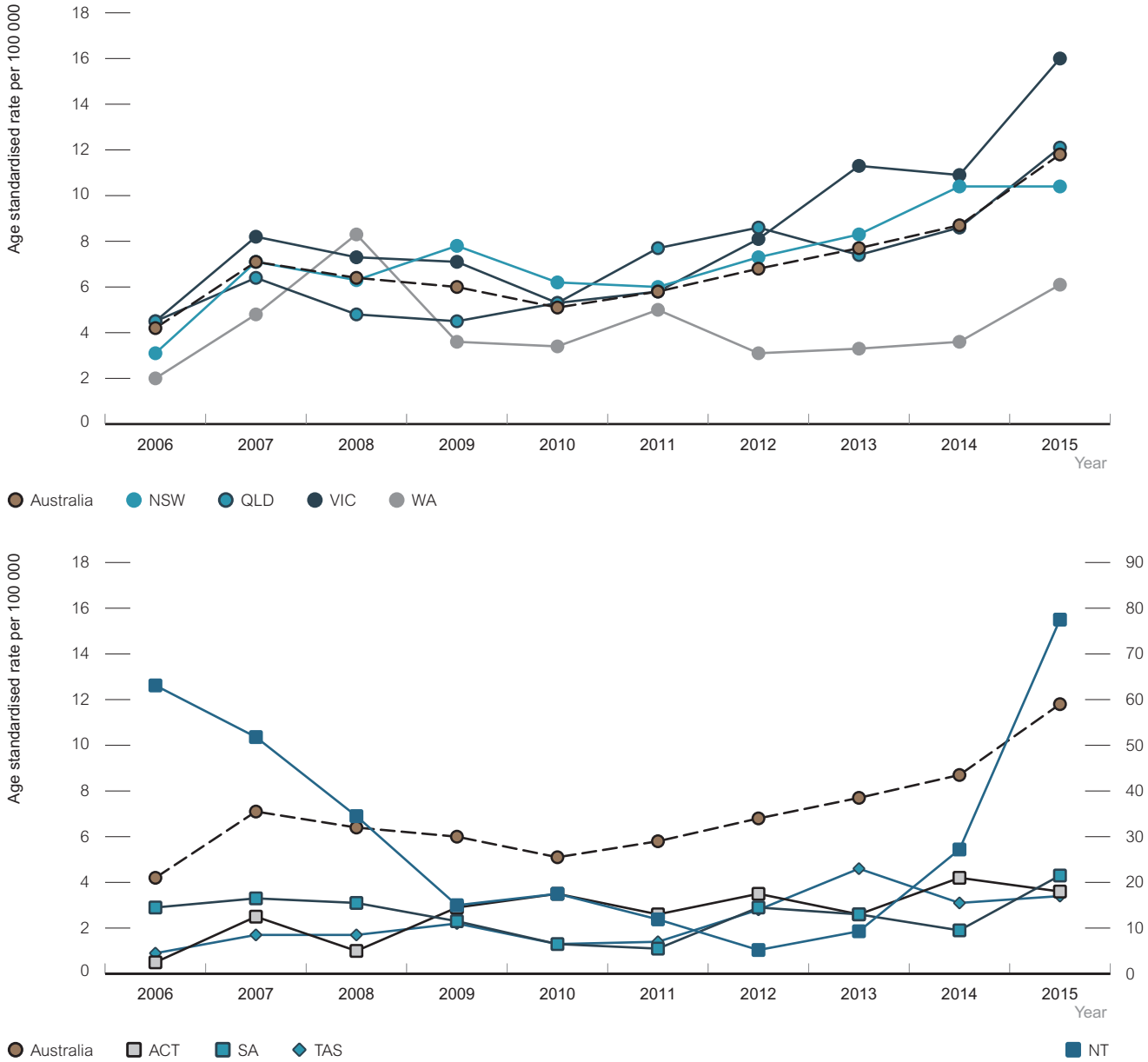


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0 – 4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
5 – 14	0.9	0.3	0.6	0.2	0.0	0.5	0.4	0.6	0.6	0.7
15 – 19	8.1	3.9	5.0	1.4	1.8	6.5	4.2	4.1	6.6	8.5
20 – 24	4.6	3.7	4.2	2.9	3.7	4.3	4.2	3.7	4.7	8.0
25 – 29	3.9	3.7	2.8	2.8	2.1	3.2	2.6	1.6	2.8	7.1
30 – 39	2.0	2.4	2.0	2.0	2.0	1.3	2.0	2.0	1.5	3.0
40+	0.6	0.7	0.5	0.3	0.5	0.5	0.5	0.7	0.4	0.7

Source: Australian National Notifiable Diseases Surveillance System

Since 2010, there has been increasing rates of notification of infectious syphilis in New South Wales, Queensland, Victoria and Australian Capital Territory, with a sharp increase between 2014 and 2015 in all of these jurisdictions except New South Wales. In the Northern Territory, notifications rates declined between 2006 (63 per 100 000) and 2012 (5.2 per 100 000), and increased markedly between 2012 and 2015 to 78 per 100 000, whereas rates in Western Australia, South Australia and Tasmania have fluctuated in the past ten years, with an increase between 2014 and 2015 (Figure 107, Table 24).

Figure 107 Infectious syphilis notification rate per 100 000 population, 2006 – 2015, by State/Territory



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

Source: Australian National Notifiable Diseases Surveillance System

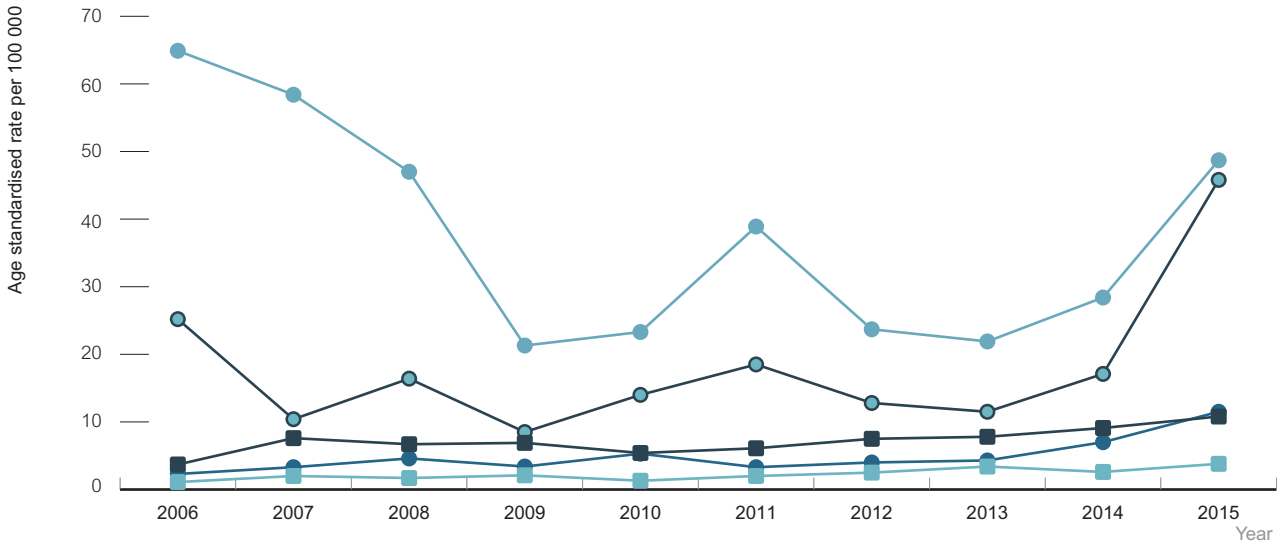
Table 24 Age standardised infectious syphilis notification rates per 100 000 population, 2006 – 2015, by State/Territory

State/Territory	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australian Capital Territory	0.5	2.5	1.0	2.9	3.5	2.6	3.5	2.6	4.2	3.6
New South Wales	3.1	7.1	6.3	7.8	6.2	6.0	7.3	8.3	10.4	10.4
Northern Territory	63.1	51.8	34.5	15.0	17.5	11.9	5.2	9.3	27.2	77.5
Queensland	4.5	6.4	4.8	4.5	5.3	7.7	8.6	7.4	8.6	12.1
South Australia	2.9	3.3	3.1	2.3	1.3	1.1	2.9	2.6	1.9	4.3
Tasmania	0.9	1.7	1.7	2.2	1.3	1.4	2.8	4.6	3.1	3.4
Victoria	4.5	8.2	7.3	7.1	5.3	5.8	8.1	11.3	10.9	16.0
Western Australia	2.0	4.8	8.3	3.6	3.4	5.0	3.1	3.3	3.6	6.1
National	4.2	7.1	6.4	6.0	5.1	5.8	6.8	7.7	8.7	11.8

Source: Australian National Notifiable Diseases Surveillance System

In 2015, infectious syphilis notification rates were highest in remote and very remote areas of residence, at 45.8 and 48.7 per 100 000 respectively. Between 2006 and 2009 notification rates decreased in very remote areas, from 64.9 per 10 000 in 2006 to 21.3 per 100 000 in 2009, but have increased in the period 2010 to 2015. Increases in notification rates were seen in all regions of residence between 2014 and 2015, with the sharpest increased in remote and very remote areas (Figure 108).

Figure 108 Infectious syphilis notification rate per 100 000 population, 2006 – 2015, by region of residence

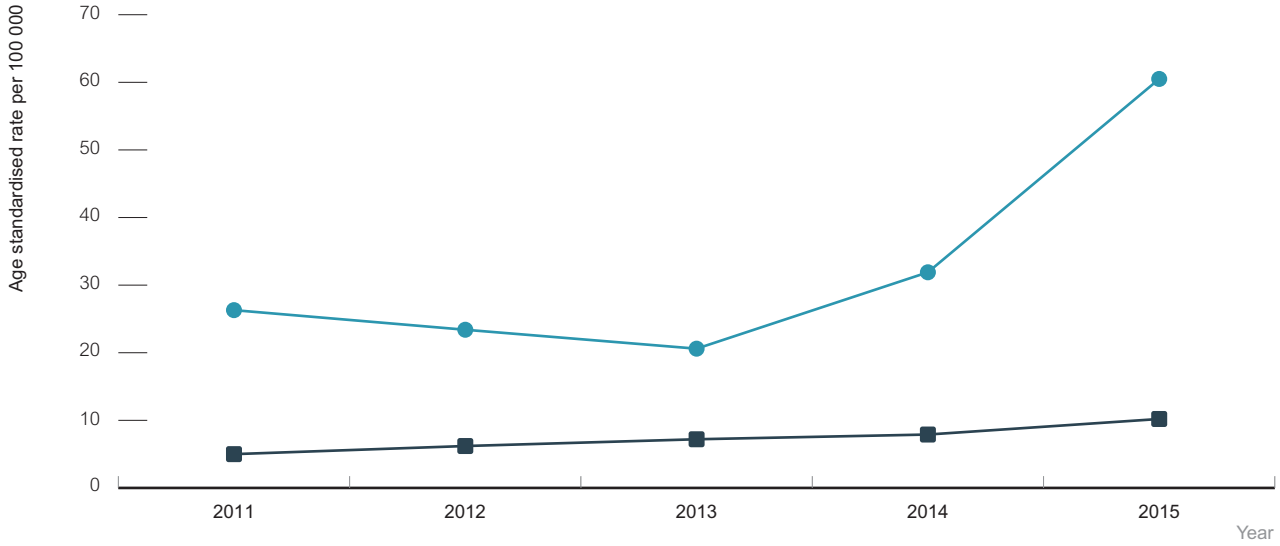


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Major cities	3.7	7.6	6.7	6.9	5.4	6.1	7.5	7.8	9.1	10.8
Inner regional	1.1	2.0	1.7	2.1	1.3	2.0	2.5	3.4	2.6	3.8
Outer regional	2.3	3.3	4.6	3.4	5.3	3.3	4.0	4.3	7.0	11.5
Remote	25.2	10.4	16.4	8.5	14.0	18.5	12.8	11.5	17.1	45.8
Very remote	64.9	58.4	47.0	21.3	23.3	38.9	23.7	21.9	28.4	48.7

Source: Australian National Notifiable Diseases Surveillance System

The rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population was 6 times that in the non-Indigenous population in 2015 (Figure 109). The rate of notification of infectious syphilis in the Aboriginal and Torres Strait Islander population decreased from 26 per 100 000 in 2011 to 21 per 100 000 in 2013 and then increased, reaching 61 per 100 000 in 2015 (Figure 109). In 2015, the notification rate of infectious syphilis among Aboriginal and Torres Strait Islander peoples were highest in the Northern Territory (214 per 100 000) and Queensland (91 per 100 000) (Figure 110), corresponding with regions in which there has been an outbreak of infectious syphilis.

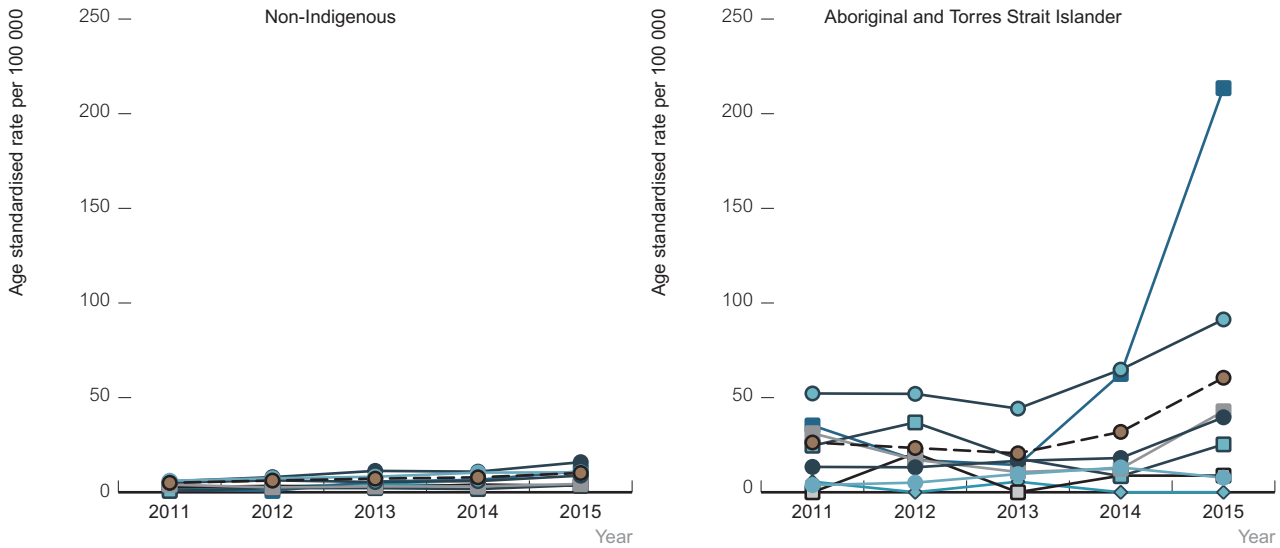
Figure 109 Infectious syphilis notification rate per 100 000 population, 2011 – 2015



	2011	2012	2013	2014	2015
Non-Indigenous	5.0	6.2	7.2	7.9	10.2
Aboriginal and Torres Strait Islander	26.3	23.4	20.6	31.9	60.5

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 110 Infectious syphilis notification rate per 100 000, 2011 – 2015, State/Territory and Aboriginal and Torres Strait Islander status

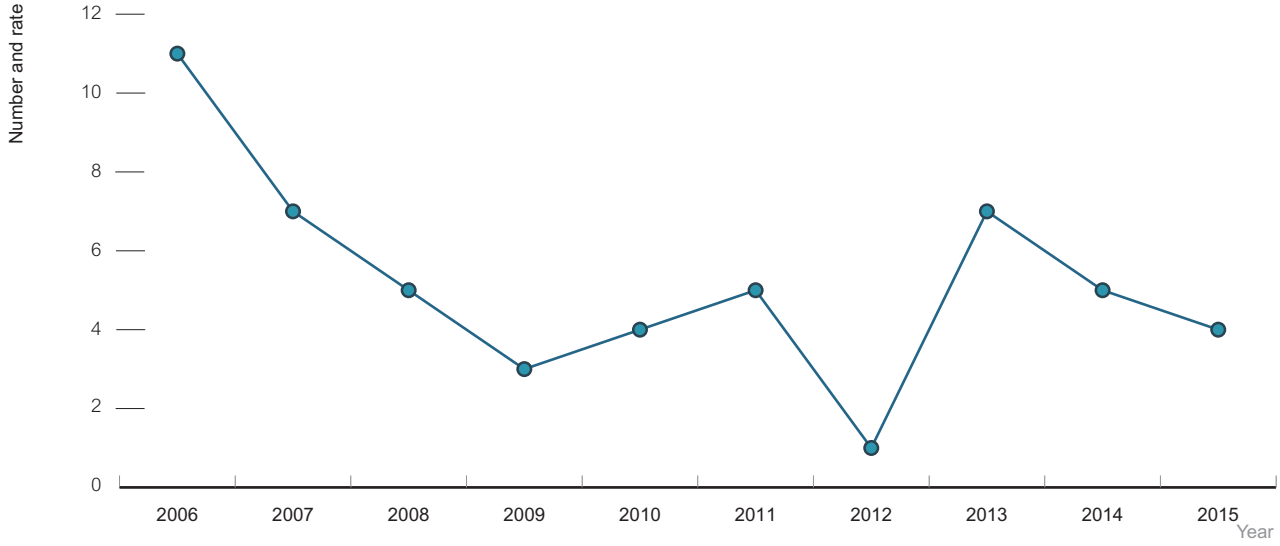


	Non-Indigenous					Aboriginal and Torres Strait Islander				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Australia	5.0	6.2	7.2	7.9	10.2	26.3	23.4	20.6	31.9	60.5
ACT	2.6	3.4	2.6	4.1	3.5	0.0	20.6	0.0	8.8	8.8
NSW	6.1	7.4	8.2	10.4	10.5	3.8	5.1	9.6	13.1	7.7
NT	1.3	0.7	5.7	6.6	11.1	35.3	17.1	14.4	62.5	213.5
Qld	5.1	6.3	5.4	5.9	8.8	52.2	52.0	44.2	64.8	91.3
SA	0.7	2.2	2.2	1.7	3.8	24.6	36.9	17.8	8.5	25.3
Tas	1.2	2.9	4.6	3.3	3.6	5.6	0.0	5.6	0.0	0.0
Vic	5.8	8.0	11.3	10.9	15.9	13.4	13.2	16.6	18.1	39.6
WA	4.0	2.6	3.1	3.1	4.4	31.2	17.2	10.7	12.5	42.8

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

Coinciding with these peaks in infectious syphilis notifications, there have been peaks in cases of congenital syphilis (Figure 111), with three out of four cases in Aboriginal and Torres Strait Islander peoples in 2015. Enhanced systems are being established in 2016 to collected additional clinical information about mothers infected with syphilis and their children.

Figure 111 Congenital syphilis cases per year, 2006 – 2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
●	11	7	5	3	4	5	1	7	5	4

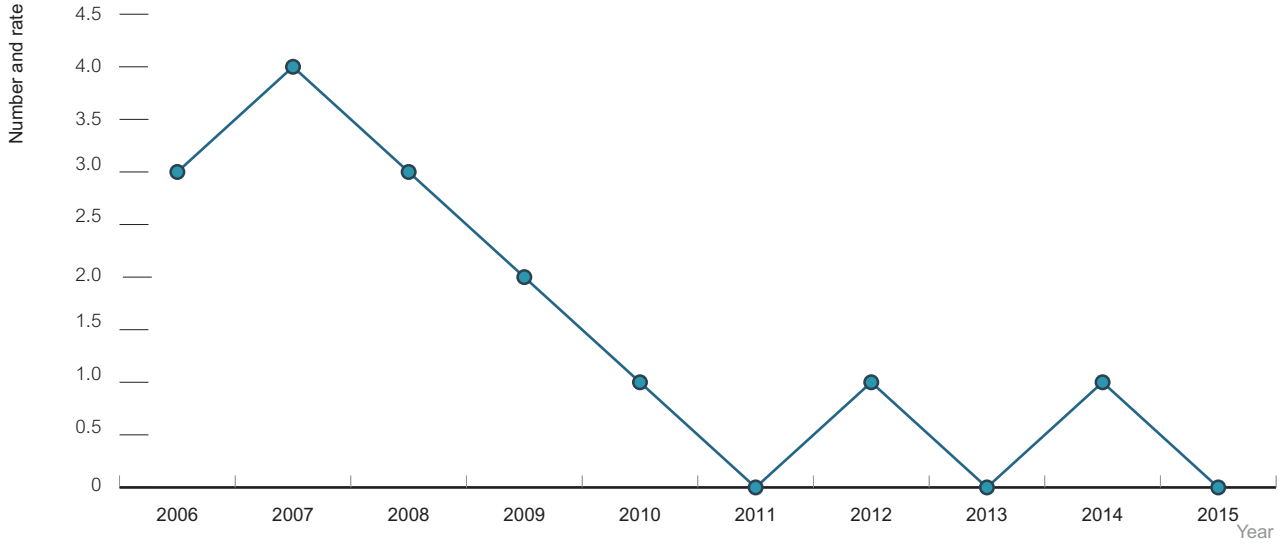
Source: Australian National Notifiable Diseases Surveillance System

STIs

Donovanosis – new diagnoses

The elimination of donovanosis from Australia is on track, with only two cases detected since 2011 (Figure 112).

Figure 112 Donovanosis notifications 2006 – 2015, by year and sex



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
●	3	4	3	2	1	0	1	0	1	0

Source: Australian National Notifiable Diseases Surveillance System

The 2015 chlamydia diagnosis and care cascade

This report includes the number and proportion of people with new chlamydia infections who were diagnosed in Australia, received treatment and had a follow up test in 6 weeks to 6 months as recommended in clinical guidelines. Chlamydia was selected, as it is the most commonly notified sexually transmissible infection.

The 'Chlamydia diagnosis and care cascade', and the estimates are used to support the improvement of the delivery of services to people diagnosed with chlamydia across the entire continuum of care—from diagnosis of infection, uptake of treatment, and management. Using available data and accounting for uncertainties, the proportions of people in each stage of the cascade in Australia were estimated (Figure 113). Methods and the associated uncertainties are described in detail in the Methodological Notes. The approach was informed by recommendations from a national stakeholder reference group (see Acknowledgements section). The cascade focuses on 15 – 29 year olds as guidelines recommended annually testing in this group and most chlamydia notifications occur in this age group. A separate cascade for males and females are presented.

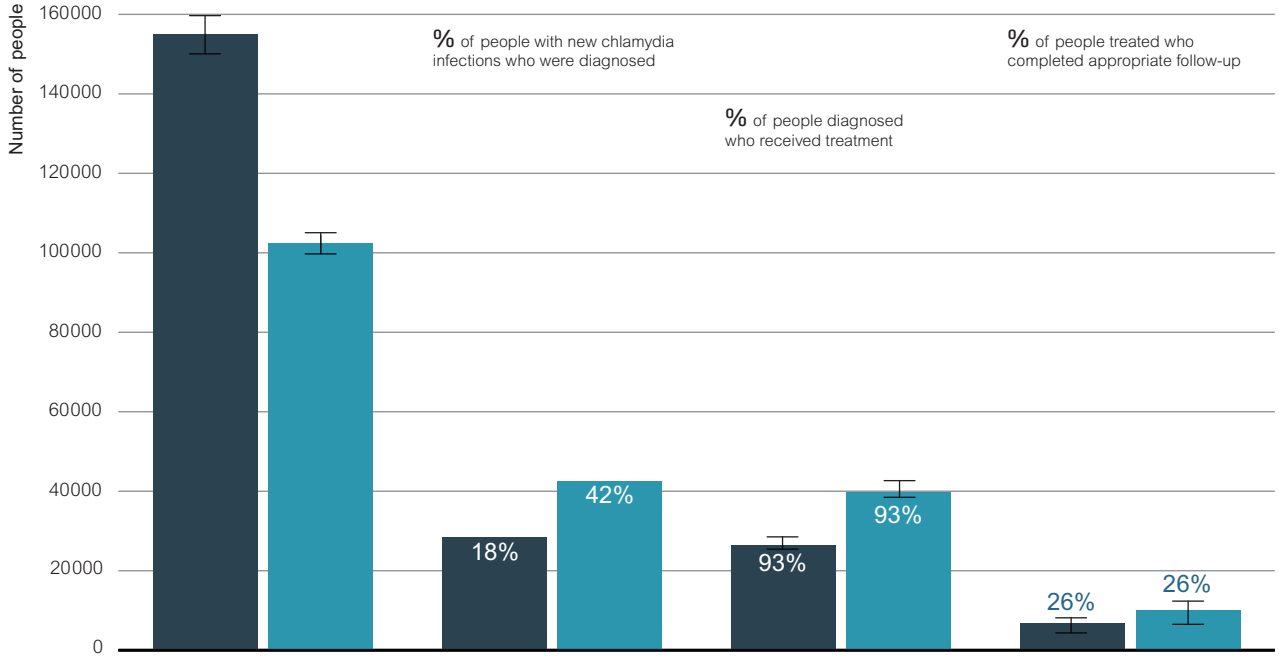
By the end of 2015, there were an estimated 257 245 (249 784 – 264 706) new cases of chlamydia in 15 – 29 year olds. These new cases include re-infections. Of these, 70 997 were diagnosed with chlamydia infection, and an estimated 66 260 (63 897 – 70 997) received treatment, and an estimated 16 929 (10 863 – 20 589) had a follow up test in 1.5 – 6 months.

This corresponds to an estimated 28% of people with new chlamydia infections who were diagnosed, 93% of those diagnosed were treated, and of those treated an estimated 26% had a follow up test.

The cascade showed there were a higher number of new infections in males than females aged 15 – 29 years in 2015 (154 920 vs 103 320) reflecting infections from both heterosexual males and men who have sex with men, and there are higher rates of re-infections in men who have sex with men. However a lower proportion of males were estimated to be diagnosed than females (18% vs 42%). A similar proportion of males and females were treated and completed follow up.

In this cascade the greatest gap in the cascade was therefore at the diagnosis step, highlighting the need to increase the coverage of regular testing in Australia in young people.

Figure 113 The 2015 chlamydia diagnosis and care cascade in 15 – 29 year olds, by sex



	New infections	Notifications	Received treatment following diagnosis	Completed follow-up
Males	154 923	28 414	26 518	6 775
Females	102 322	42 583	39 742	10 154

Source: See Methodological notes for further details of mathematical modelling used to generate estimates

STI testing and care

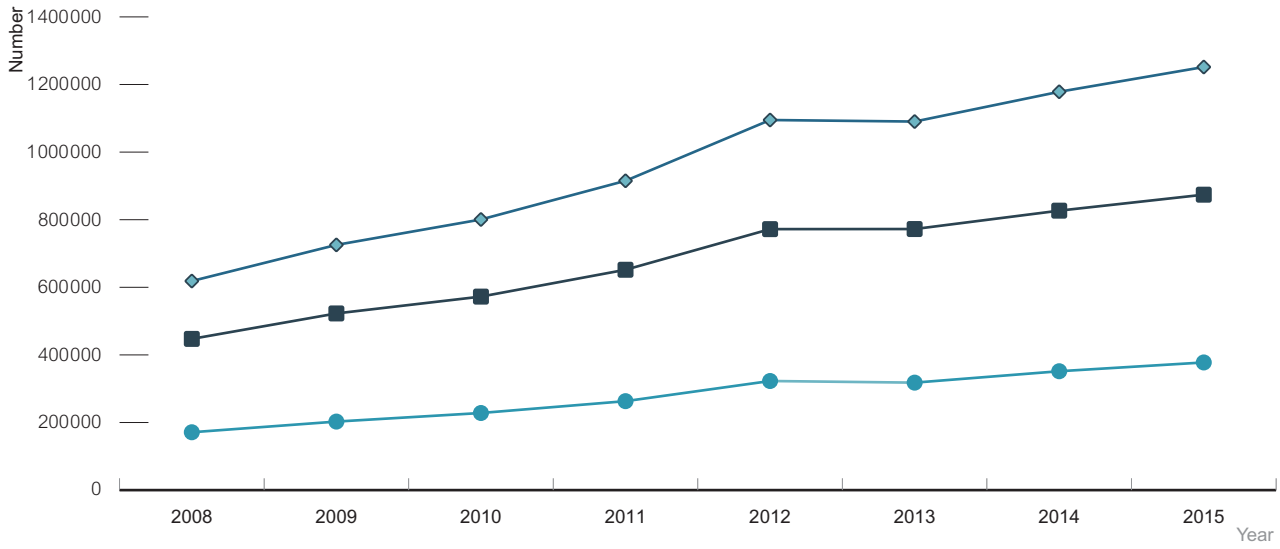
Strategies to prevent STIs include; condom use, testing, treatment and partner notification. Data on condom use are included in the HIV section.

STI Testing

National STI testing guidelines recommend regular testing in a number of key populations. Annual comprehensive STI testing is recommended for all sexually active men who have sex with men, increasing to 3 – 6 monthly for men with higher risk behaviour. Testing for HIV, syphilis, and hepatitis B are recommended as part of routine antenatal screening, including chlamydia testing for young women. For sexually active people aged <30 years, annual opportunistic chlamydia testing is advised, and testing for gonorrhoea in areas of high prevalence.

The number of Medicare-rebated chlamydia tests in Australia has increased by 95% in the past seven years in females, from 447 355 in 2008 to 874 023 in 2015, and in males has increased by 121% from 171 163 in 2008 to 377 685 in 2015 (Figure 114). More than two times as many tests were conducted in females than males in the period 2008 – 2015. It is important to note that these tests capture Medicare-rebated tests, and testing conducted in government hospitals and sexual health services are not included.

Figure 114 Number of Medicare-rebated chlamydia tests in Australia, 2008 – 2015, by sex



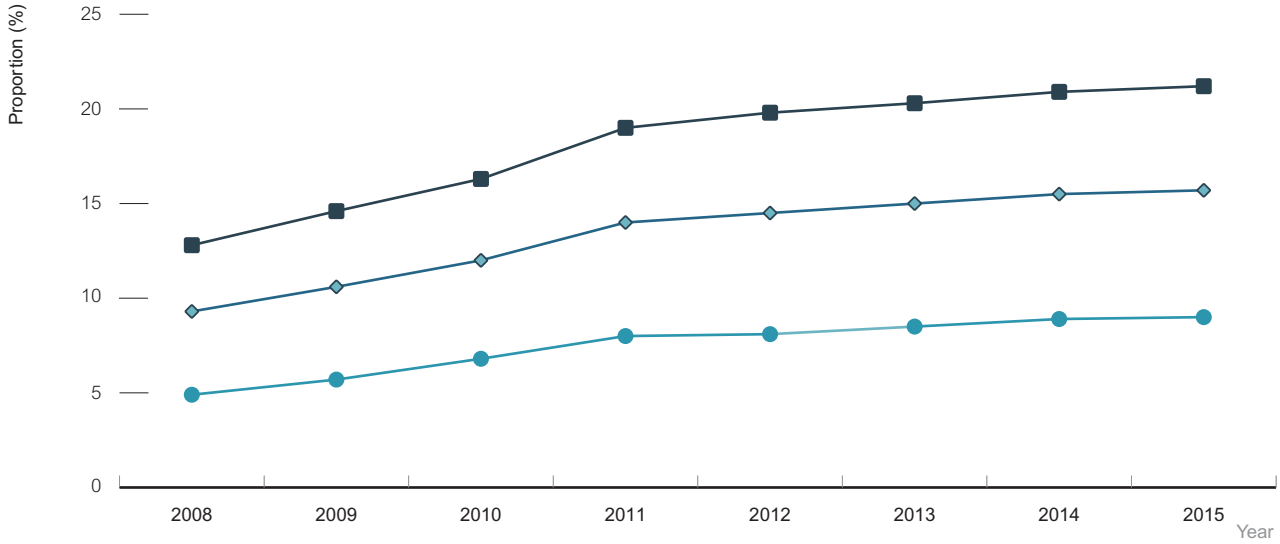
	2008	2009	2010	2011	2012	2013	2014	2015
Female	447 355	522 677	572 488	651 906	772 116	772 392	826 757	874 023
Male	171 163	202 743	228 131	263 170	322 797	317 963	351 698	377 685
Total	618 518	725 420	800 619	915 076	1094 913	1090 355	1178 455	1251 708

Source: Medicare, Department of Human Services

STIs

From 2008 to 2015 there was a 2-fold increase in chlamydia testing in 15 – 29 year olds attending general practice (from 9.3% to 15.7%) but overall levels remain low (Figure 115). Testing was higher among females than males in all years, and was 21% and 9% respectively in 2015.

Figure 115 Proportion of 15 – 29 year old GP attendees tested for chlamydia, 2008 – 2015, by sex



	2008	2009	2010	2011	2012	2013	2014	2015
Female	12.8%	14.6%	16.3%	19.0%	19.8%	20.3%	20.9%	21.2%
Male	4.9%	5.7%	6.8%	8.0%	8.1%	8.5%	8.9%	9.0%
Overall	9.3%	10.6%	12.0%	14.0%	14.5%	15.0%	15.5%	15.7%

Source: Medicare, Department of Human Services

At 41 sexual health clinics participating in the ACCESS project (see Methodological notes for further detail); the majority (84 – 89%) of gay and bisexual men attending the clinic in a year were tested for chlamydia between 2011 and 2015, a similar proportion of young heterosexuals aged 16 – 29 years (83 – 87%) and nearly all (97%) female sex workers (Table 25). A similar pattern was seen for gonorrhoea and syphilis testing among gay and bisexual men attending sexual health clinics participating in ACCESS, the average number of syphilis tests increased by 25% from 1.2 in 2011 to 1.5 per year in 2015 (Figure 116). In 2015, syphilis testing frequency was higher in HIV positive gay and bisexual men (1.8 per year), than in HIV negative gay and bisexual men (1.4 per year).

At 16 high case load general practice clinics participating in the ACCESS project about half of gay and bisexual men were tested for chlamydia and gonorrhoea in the same time frame (Table 25). Given gay and bisexual men attend such clinics for a range of reasons often unrelated to sexual health, testing may not be appropriate or they may have received sexual health testing elsewhere. The uptake of syphilis testing was higher, as these clinics see a high case load of men with HIV and syphilis testing is often conducted concurrently with HIV management checks.

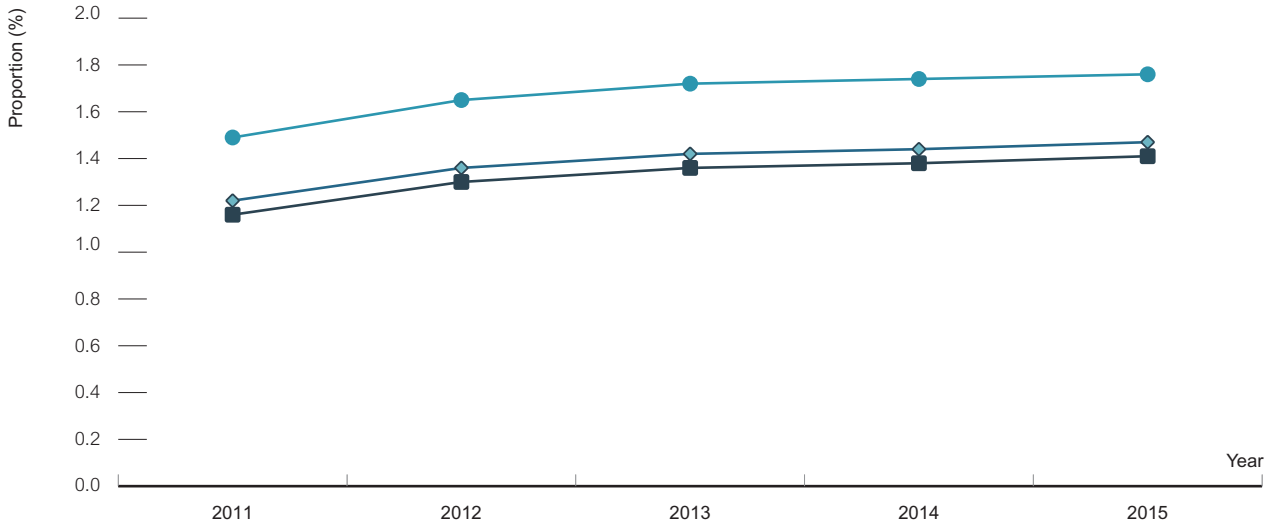
Table 25 STI testing by service type and select population, 2011 – 2015

Infection	Clinic setting	Priority population	Year				
			2011	2012	2013	2014	2015
Chlamydia	*Sexual health clinics*	Young heterosexuals (16 – 29)	83%	85%	86%	87%	87%
		Female sex workers	97%	97%	97%	97%	97%
		People who inject drugs	73%	75%	74%	76%	77%
		Gay and bisexual men	84%	85%	87%	89%	89%
	High case load general practice clinics	Gay and bisexual men	44%	46%	47%	52%	51%
Gonorrhoea	*Sexual health clinics*	Young heterosexuals (16 – 29)	77%	77%	78%	80%	82%
		Female sex workers	96%	96%	97%	97%	97%
		People who inject drugs	70%	71%	71%	73%	76%
		Gay and bisexual men	84%	85%	87%	88%	89%
	High case load general practice clinics	Gay and bisexual men	41%	45%	47%	52%	51%
Syphilis	*Sexual health clinics*	Young heterosexuals (16 – 29)	42%	43%	45%	48%	48%
		Female sex workers	83%	84%	87%	89%	89%
		People who inject drugs	63%	68%	66%	69%	72%
		Gay and bisexual men	80%	85%	88%	89%	89%
	High case load general practice clinics	Gay and bisexual men	62%	63%	60%	64%	62%

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

STIs

Figure 116 Average number of syphilis tests per year in gay and bisexual men, 2011 – 2015, by HIV status



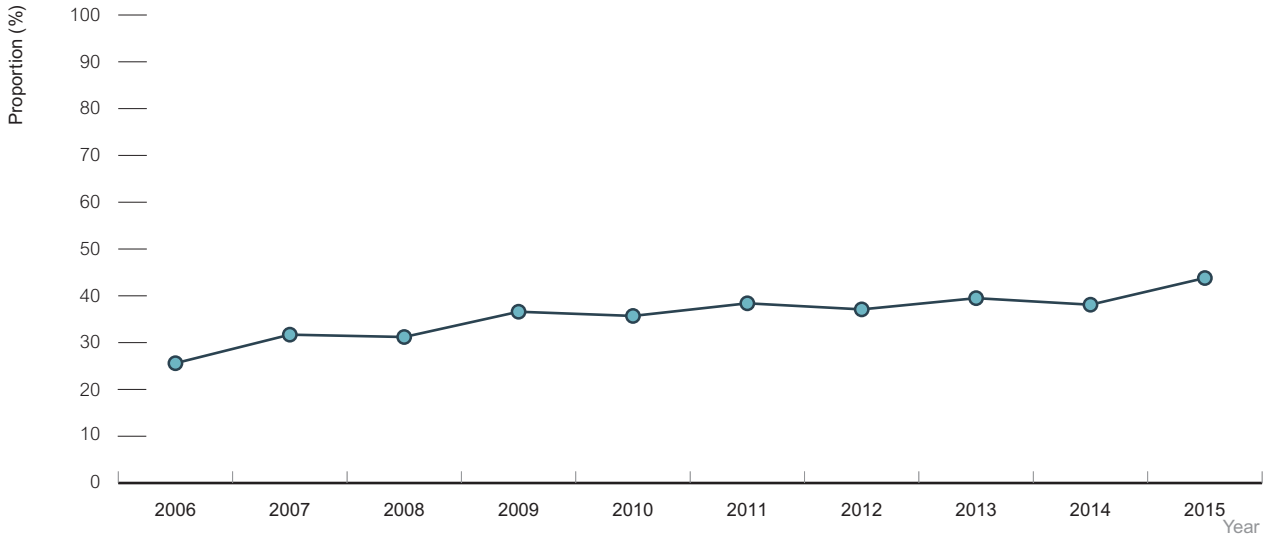
	2011	2012	2013	2014	2015
All gay and bisexual men	1.2%	1.4%	1.4%	1.4%	1.5%
HIV-negative gay and bisexual men	1.2%	1.3%	1.4%	1.4%	1.4%
HIV-positive gay and bisexual men	1.5%	1.7%	1.7%	1.7%	1.8%

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

Comprehensive STI testing

Clinical guidelines also recommended comprehensive testing for all STIs and HIV. In 2015 in the Gay Community Periodic Surveys, 44% of gay male participants report having comprehensive STI testing (at least four samples collected) in the 12 months prior to the survey (Figure 117). This proportion has increased over the last ten years, from 26% in 2006. The change is largely due to increased collection of rectal and throat swabs, see *Annual Report of Trends in Behaviour 2016* for more detail.

Figure 117 Gay men who reported having at least four samples collected for STI testing (blood, urine, anal and throat swabs) in the 12 month prior to the survey: Gay Community Periodic Survey, 2006 – 2015



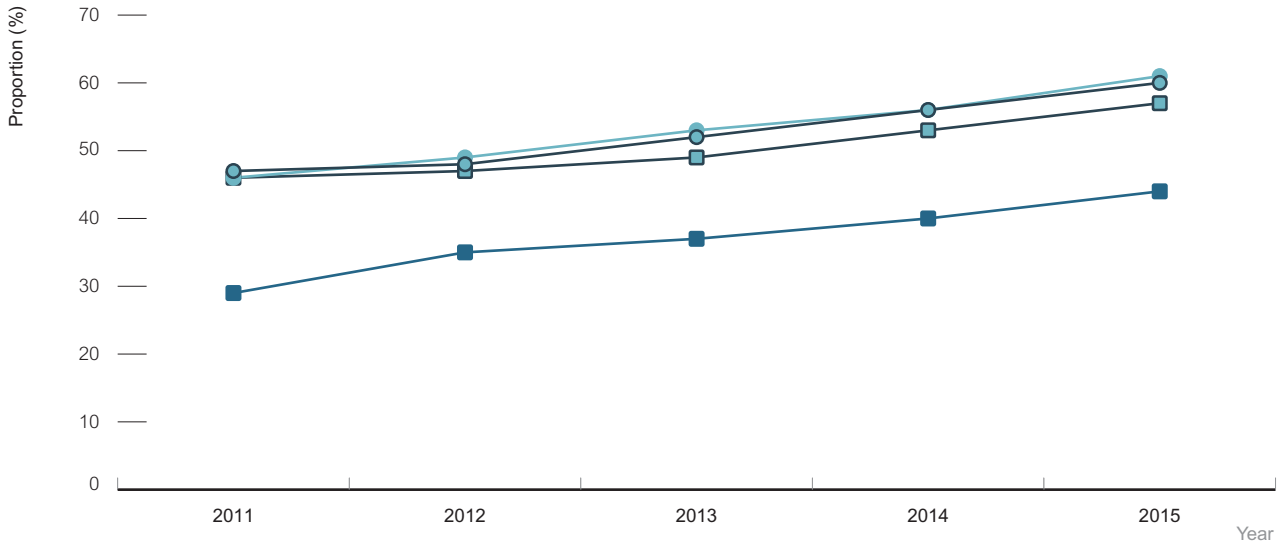
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
●	25.6%	31.7%	31.2%	36.6%	35.7%	38.4%	37.1%	39.5%	38.1%	43.8%

Source: Gay Community Periodic Survey

Repeat comprehensive testing

ACCESS sexual health service data indicate 46 – 61% of HIV-negative gay and bisexual men and 46 – 57% of HIV-positive gay and bisexual men returned for a comprehensive screen at the same clinic in a year (Figure 122). It is possible some of these men may have tested at other clinics and the ACCESS system will be enhanced in future years to capture testing at multiple clinics. Repeat comprehensive testing was lower among people who inject drugs (Figure 118).

Figure 118 Repeat comprehensive STI screen (within 13 months) at sexual health clinics, by select population, 2011 – 2015



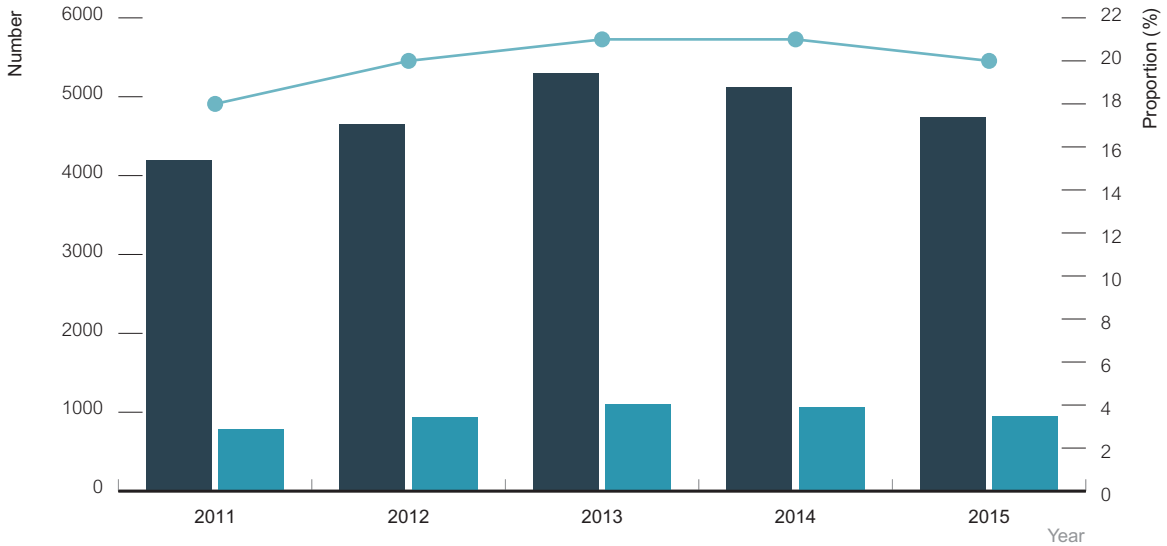
	2011	2012	2013	2014	2015
Gay and bisexual men	47%	48%	52%	56%	60%
HIV-negative gay and bisexual men	46%	49%	53%	56%	61%
HIV-positive gay and bisexual men	46%	47%	49%	53%	57%
People who inject drugs	29%	35%	37%	40%	44%

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

STIs

Clinical data from the ACCESS study shows gaps in management of STIs. At the 41 sexual health clinics participating in the ACCESS project, around 20% of people diagnosed with chlamydia were re-tested in 1 – 4 months (Figure 119).

Figure 119 Chlamydia re-testing at sexual health clinics, 2011 – 2015



	2011	2012	2013	2014	2015
Number of diagnoses	4 196	4 652	5 299	5 112	4 736
Number re-tested in 1 – 4 months	776	939	1 105	1 055	953
Proportion re-tested in 1 – 4 months	18%	20%	21%	21%	20%

Note: In 2015, initial positive results are only included till the end of August, to allow for time for re-testing

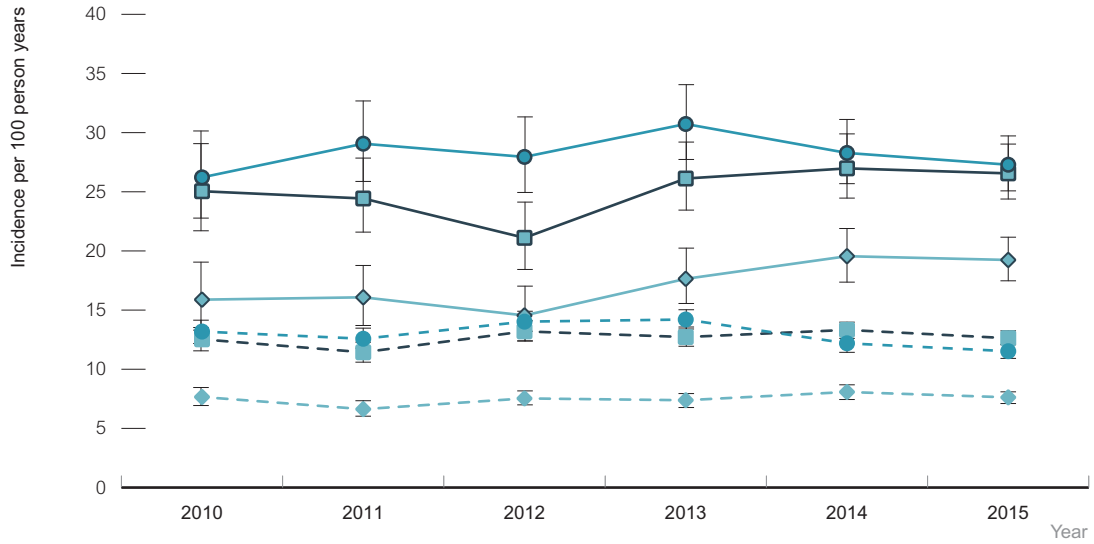
Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

STI incidence

STI incidence is the best indicator of changes in transmission in a population. STI incidence is now available from the ACCESS project and is calculated by dividing the number of incidence infections (negative test followed by a positive test) among people undergoing repeat STI testing at sexual health services by the person's time at risk (determined by the time between repeat STI 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 Methodological Notes.

In 2015 chlamydia incidence at all anatomical sites was more than 2 times higher in HIV-positive men than HIV-negative men. Chlamydia incidence was relatively stable over time at all anatomical sites, except in HIV-positive men, chlamydia incidence increased by 21% in pharyngeal specimens (Figure 120). It is important to note the confidence intervals between these estimates often overlap.

Figure 120 Chlamydia incidence in HIV-negative and positive gay and bisexual men attending sexual health clinics, 2010 – 2015, by anatomical site

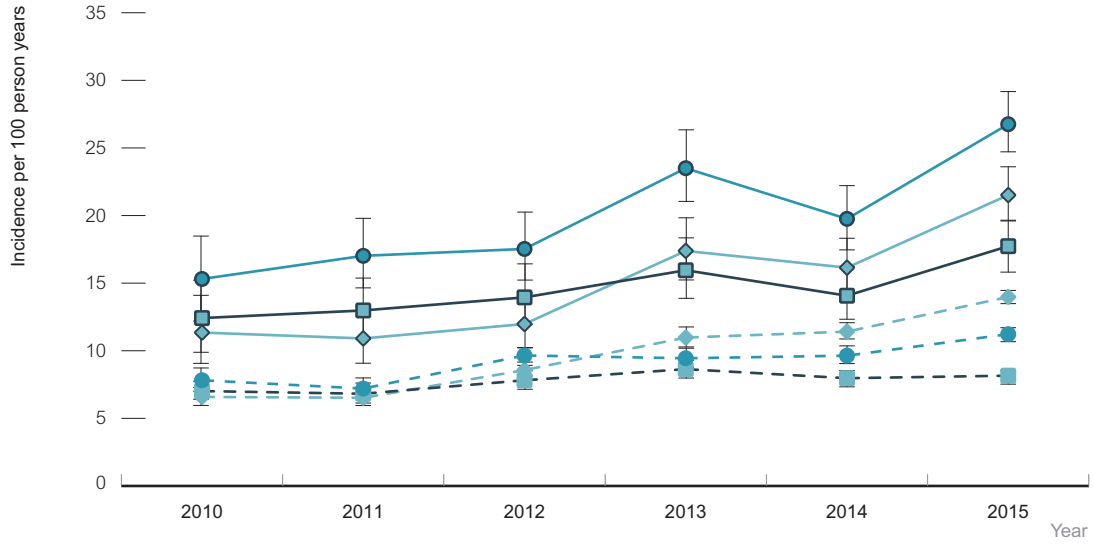


	2010	2011	2012	2013	2014	2015
Anorectal – HIV-Negative	13.2	12.6	14.0	14.2	12.2	11.5
Anorectal – HIV-Positive	26.2	29.1	27.9	30.7	28.3	27.3
Urogenital – HIV-Negative	12.5	11.4	13.2	12.7	13.3	12.6
Urogenital – HIV-Positive	25.0	24.4	21.1	26.1	27.0	26.6
Pharyngeal – HIV-Negative	7.7	6.6	7.5	7.4	8.1	7.6
Pharyngeal – HIV-Positive	15.9	16.1	14.5	17.6	19.6	19.2

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

In 2015 gonorrhoea incidence at all anatomical sites was more than 1.5 times higher than in HIV positive men than HIV negative men. Between 2010 and 2015, gonorrhoea incidence has increased at all anatomical sites in both groups (Figure 121). Caution should be taken in interpretation where confidence intervals overlap. The increase was greatest in HIV negative pharyngeal specimens (112%).

Figure 121 Gonorrhoea incidence in HIV-negative and positive gay and bisexual men attending sexual health clinics, 2010 – 2015, by anatomical site



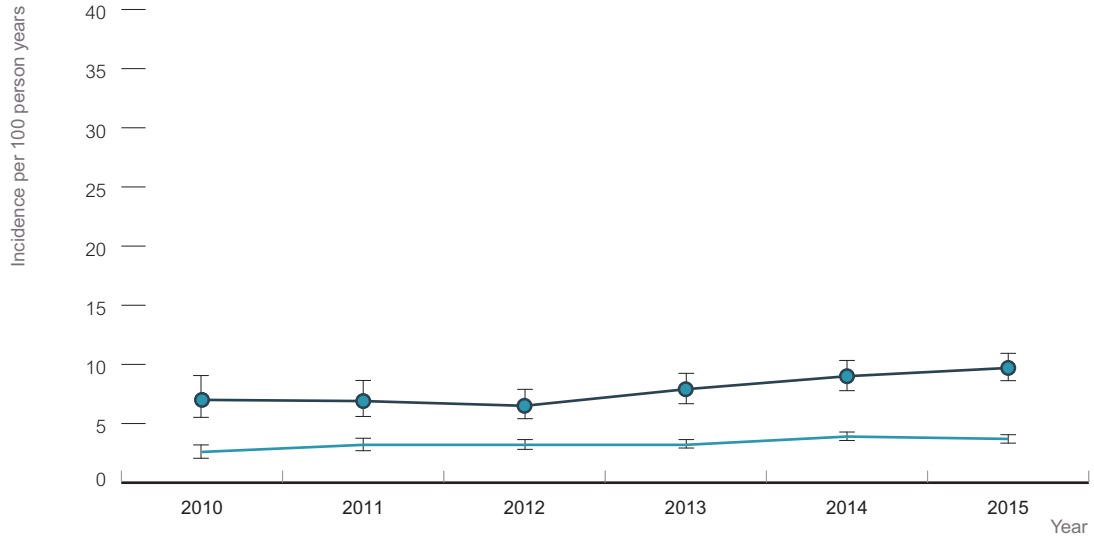
	2010	2011	2012	2013	2014	2015
Anorectal – HIV-Negative	7.8	7.2	9.7	9.4	9.6	11.2
Anorectal – HIV-Positive	15.3	17.0	17.5	23.5	19.8	26.8
Urogenital – HIV-Negative	7.0	6.8	7.8	8.6	8.0	8.2
Urogenital – HIV-Positive	12.4	13.0	13.9	16.0	14.1	17.7
Pharyngeal – HIV-Negative	6.6	6.5	8.6	11.0	11.4	14.0
Pharyngeal – HIV-Positive	11.3	10.9	12.0	17.4	16.1	21.5

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

STIs

Infectious syphilis incidence was higher among HIV-positive gay and bisexual men in each year of the years 2010 – 2015, compared to HIV-negative gay and bisexual men (Figure 122). Since 2012 incidence among HIV-positive men has increased by 49%, from 6.5 per 100 person years in 2012 to 9.7 per 100 person years in 2015.

Figure 122 Infectious syphilis incidence in HIV-negative and positive gay and bisexual men attending sexual health clinics, 2010 – 2015

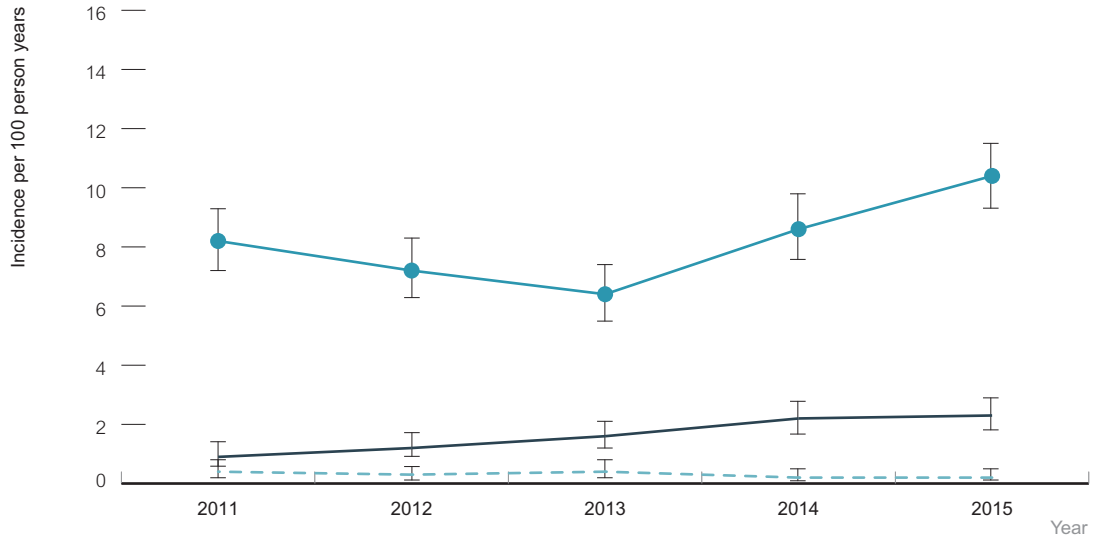


	2010	2011	2012	2013	2014	2015
HIV-negative gay and bisexual men	2.6	3.2	3.2	3.2	3.9	3.7
HIV-positive gay and bisexual men	7.0	6.9	6.5	7.9	9.0	9.7

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

STI incidence was also measured among female sex workers (Figure 123) and females not engaged in sex work (Figure 124). Infectious syphilis incidence was low and relatively stable in both populations between 2011 and 2015. In female sex workers chlamydia incidence declined between 2011 and 2013, and then increased again to 10.4 per 100 person years in 2015. Over the same time period chlamydia incidence was higher overall, but decreased in females not involved in sex work. Between 2011 and 2015, gonorrhoea incidence increased two and a half fold in female sex workers, and was relatively stable in females not engaged in sex work. Caution should be taken in comparing the two populations, given different, demographics, patterns of STI testing and health service attendance.

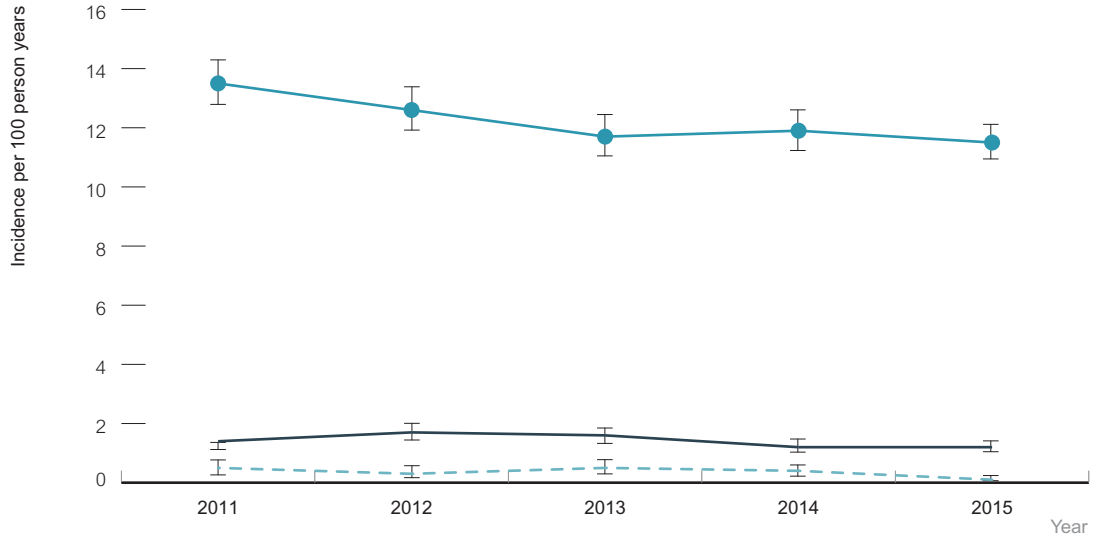
Figure 123 Incidence of sexually transmissible infections in female sex workers, 2011 – 2015



	2011	2012	2013	2014	2015
Chlamydia	8.2	7.2	6.4	8.6	10.4
Gonorrhoea	0.9	1.2	1.6	2.2	2.3
Infectious syphilis	0.4	0.3	0.4	0.2	0.2

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

Figure 124 Incidence of sexually transmissible infections in females not engaged in sex work, 2011 – 2015



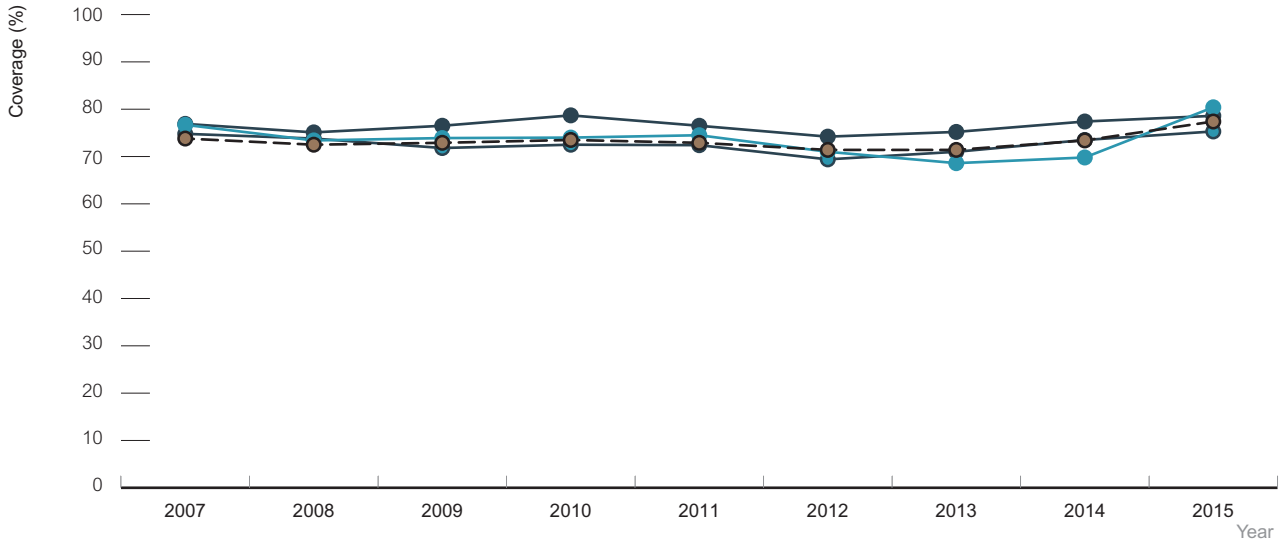
	2011	2012	2013	2014	2015
Chlamydia	13.5	12.6	11.7	11.9	11.5
Gonorrhoea	1.4	1.7	1.6	1.2	1.2
Infectious syphilis	0.5	0.3	0.5	0.4	0.1

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

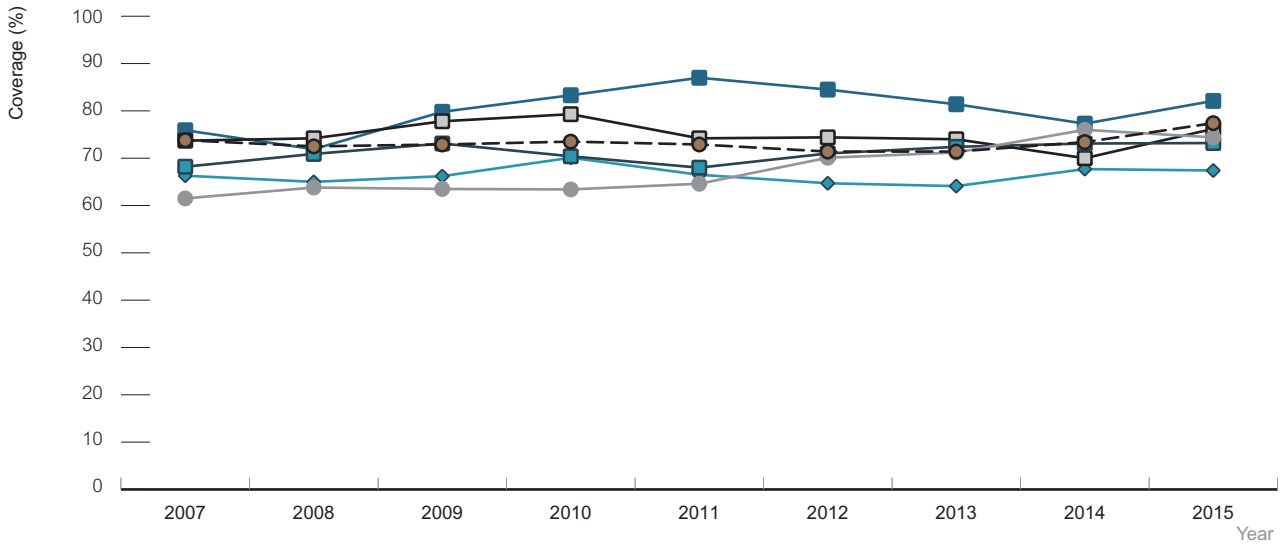
Human papillomavirus infection

Following the introduction of vaccination against human papilloma virus (HPV) in 2007, high coverage with three vaccine doses has been achieved in females (77% in 2015) and males (66% in 2015) turning 15 years of age (Figures 125 and 126).

Figure 125 Three dose HPV vaccination coverage for all females turning 15 years of age, 2007 – 2015, by State/ Territory



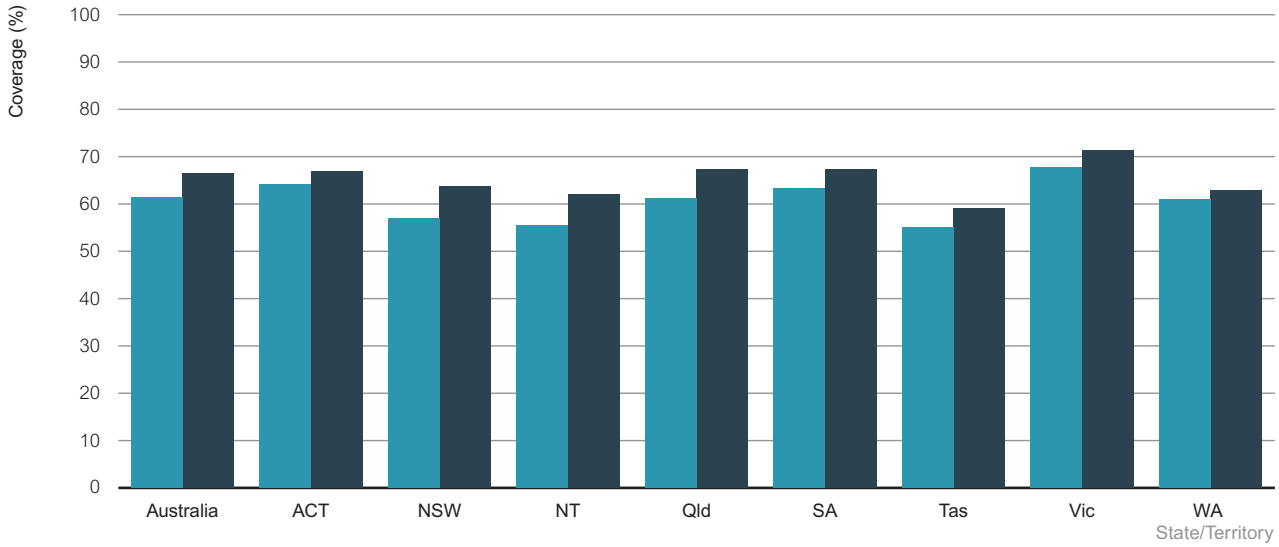
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australia	73.8%	72.5%	72.9%	73.5%	72.9%	71.4%	71.4%	73.4%	77.4%
NSW	76.7%	73.4%	73.9%	74.0%	74.5%	71.0%	68.6%	69.8%	80.4%
QLD	74.8%	73.8%	71.8%	72.5%	72.4%	69.4%	71.0%	73.5%	75.3%
Vic	76.9%	75.1%	76.5%	78.7%	76.5%	74.2%	75.2%	77.4%	78.6%



	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australia	73.8%	72.5%	72.9%	73.5%	72.9%	71.4%	71.4%	73.4%	77.4%
ACT	73.7%	74.2%	77.8%	79.3%	74.2%	74.4%	74.0%	70.0%	76.2%
NT	75.9%	71.9%	79.8%	83.3%	87.0%	84.5%	81.4%	77.3%	82.1%
SA	68.2%	70.9%	73.1%	70.4%	68.0%	71.0%	72.4%	73.1%	73.2%
Tas	66.3%	65.0%	66.2%	70.1%	66.5%	64.7%	64.1%	67.7%	67.4%
WA	61.5%	63.8%	63.5%	63.4%	64.6%	70.1%	71.2%	76.0%	74.4%

Source: National HPV Vaccination Program Register

Figure 126 Three dose HPV vaccination coverage for all males 15 years of age, 2014 – 2015



	Australia	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
2014	61.4%	64.2%	56.9%	55.4%	61.1%	63.3%	55.1%	67.8%	61.0%
2015	66.4%	66.9%	63.8%	62.0%	67.4%	67.3%	59.0%	71.3%	62.9%

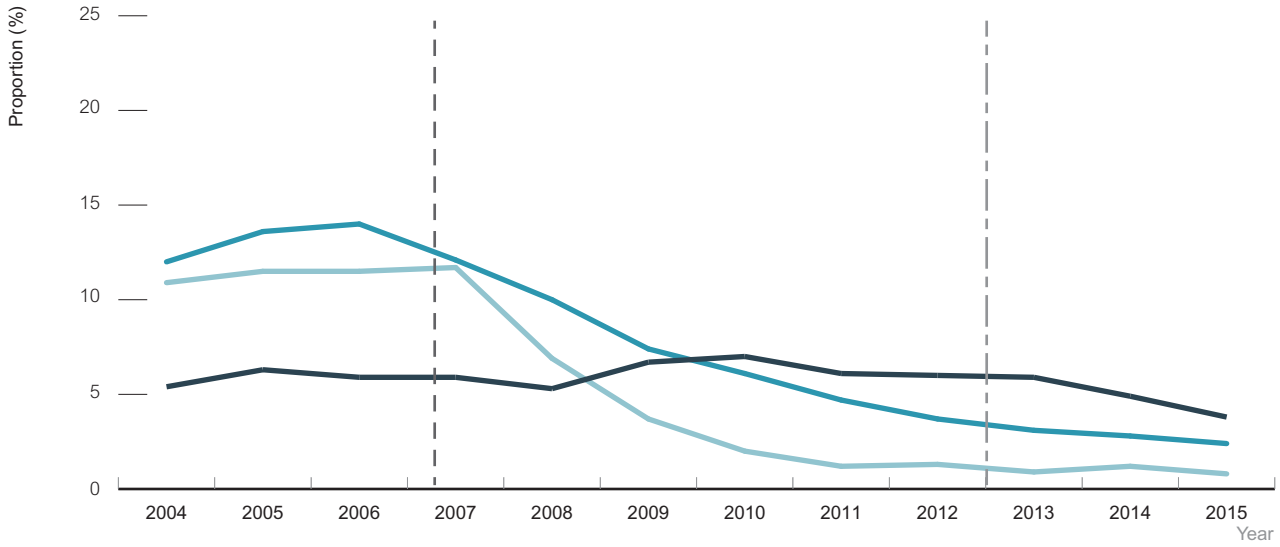
Source: National HPV Vaccination Program Register

The Genital Warts Surveillance Network aims to determine the impact of the national HPV vaccination program on genital warts diagnoses in various populations attending a national network of sexual health clinics (see Methodological Notes).

Information available from 41 sexual health clinics included in the Genital Warts Surveillance Network indicate a more than 80% reduction in genital warts among Australian-born women and heterosexual men, aged 21 years or younger to <1% in 2015 (Figure 127). In 21 – 30 year olds reductions were greater in women than men, reflecting the catch up vaccination campaign in women aged up until 26 years in 2007 – 2009 (Figure 128). Similar declines were seen in Aboriginal and Torres Strait Islander peoples (Figures 130 and 131).

The proportion of diagnosed Australian-born homosexual and bisexual men has not declined to the extent observed in the heterosexual population (Figure 129). The gradual decline is largely explained by the increasing denominator as asymptomatic men are attracted to the clinics for screening.

Figure 127 Proportion of Australian-born women diagnosed with genital warts at first visit at sexual health clinics, 2004 – 2015, by select age group



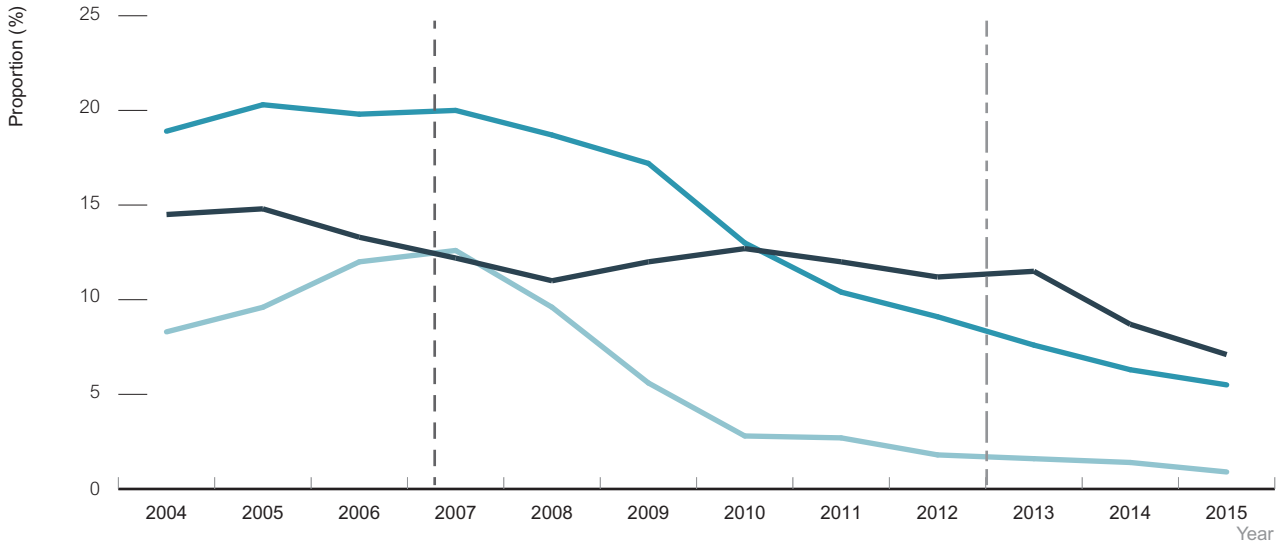
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<21 years	10.9	11.5	11.5	11.7	6.9	3.7	2.0	1.2	1.3	0.9	1.2	0.8
21 – 30 years	12.0	13.6	14.0	12.1	10.0	7.4	6.1	4.7	3.7	3.1	2.8	2.4
>30 years	5.4	6.3	5.9	5.9	5.3	6.7	7.0	6.1	6.0	5.9	4.9	3.8

* The first dotted line represents the start of the national HPV vaccination program for women in mid-2007 and the second dotted line represents the start of the national HPV vaccination program for men in 2013

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

STIs

Figure 128 Proportion of Australian-born heterosexual men diagnosed with genital warts at first visit at sexual health clinics, 2004 – 2015, by select age group

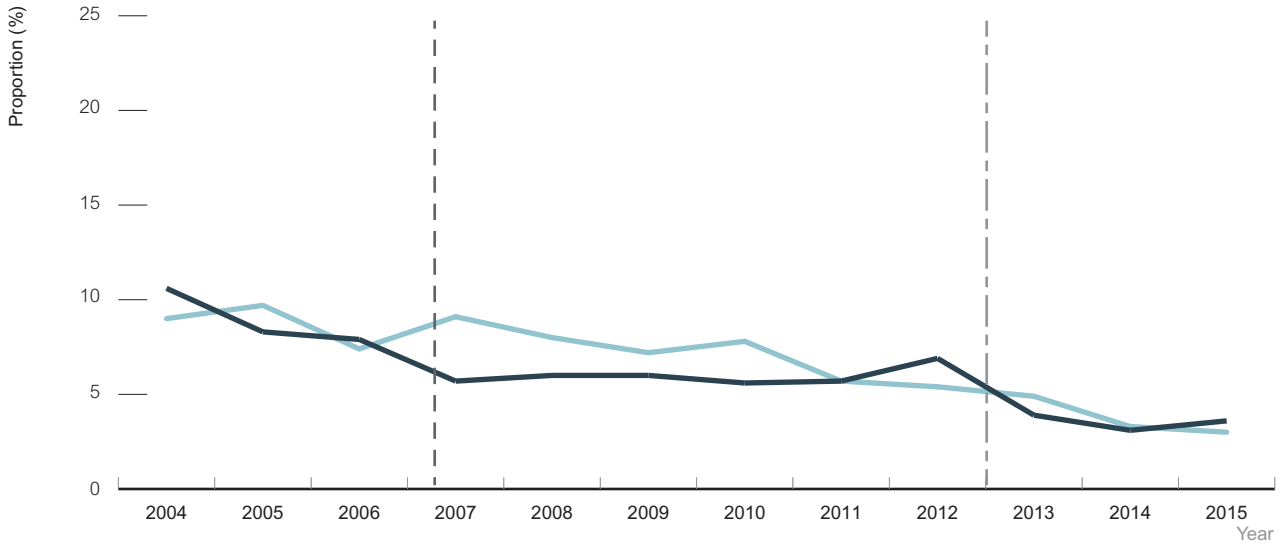


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<21 years	8.3	9.6	12.0	12.6	9.6	5.6	2.8	2.7	1.8	1.6	1.4	0.9
21 – 30 years	18.9	20.3	19.8	20.0	18.7	17.2	13.0	10.4	9.1	7.6	6.3	5.5
>30 years	14.5	14.8	13.3	12.2	11.0	12.0	12.7	12.0	11.2	11.5	8.7	7.1

* The first dotted line represents the start of the national HPV vaccination program for women in mid-2007 and the second dotted line represents the start of the national HPV vaccination program for men in 2013

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

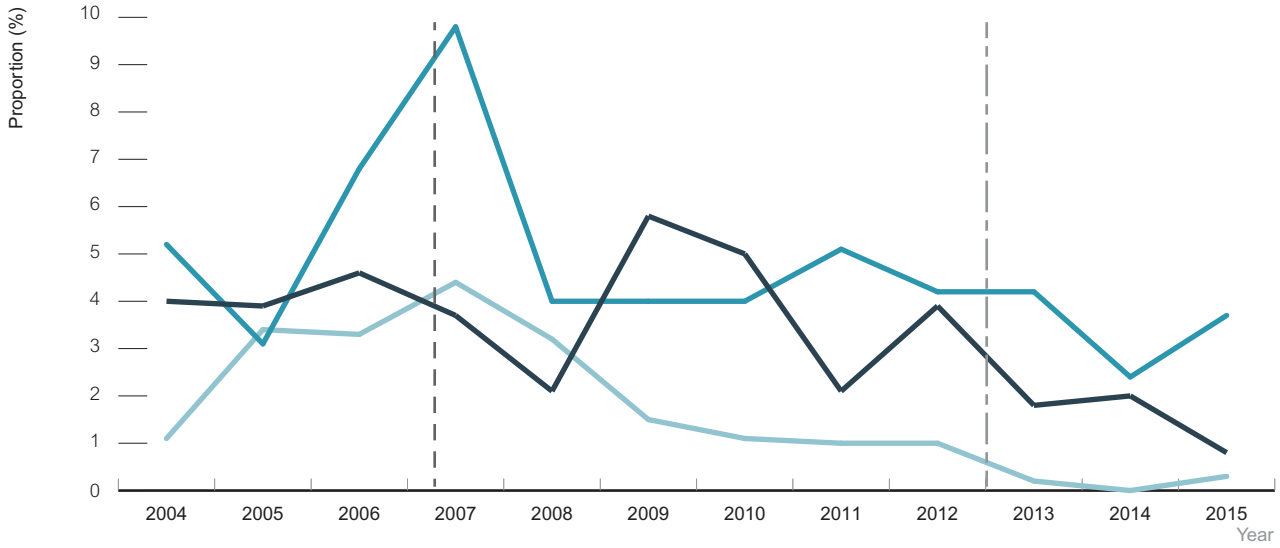
Figure 129 Proportion of Australian-born homosexual or bisexual men diagnosed with genital warts at first visit at sexual health clinics, 2004 – 2015, by year



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Homosexual men	9.0	9.7	7.4	9.1	8.0	7.2	7.8	5.7	5.4	4.9	3.3	3.0
Bisexual men	10.6	8.3	7.9	5.7	6.0	6.0	5.6	5.7	6.9	3.9	3.1	3.6

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

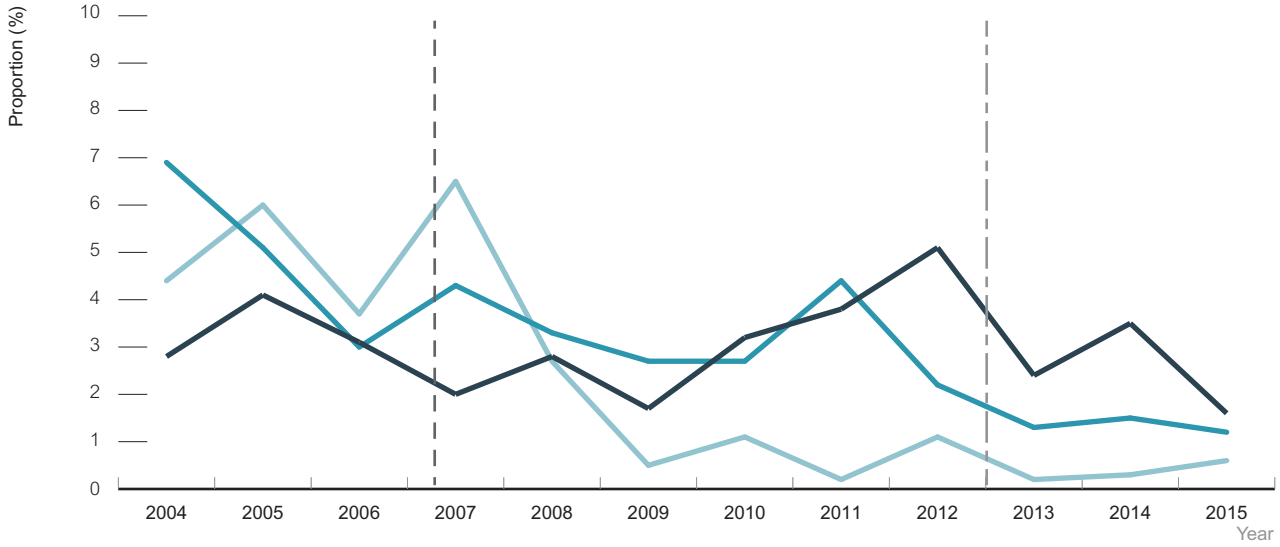
Figure 130 Proportion of Aboriginal and Torres Strait Islander males diagnosed with genital warts at first visit at sexual health clinics, 2004 – 2015, by age group



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<21 years	1.1	3.4	3.3	4.4	3.2	1.5	1.1	1.0	1.0	0.2	0.0	0.3
21 – 29 years	5.2	3.1	6.8	9.8	4.0	4.0	4.0	5.1	4.2	4.2	2.4	3.7
≥30 years	4.0	3.9	4.6	3.7	2.1	5.8	5.0	2.1	3.9	1.8	2.0	0.8

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

Figure 131 Proportion of Aboriginal and Torres Strait Islander females diagnosed with genital warts at first visit at sexual health clinics, 2004 – 2015, by age group

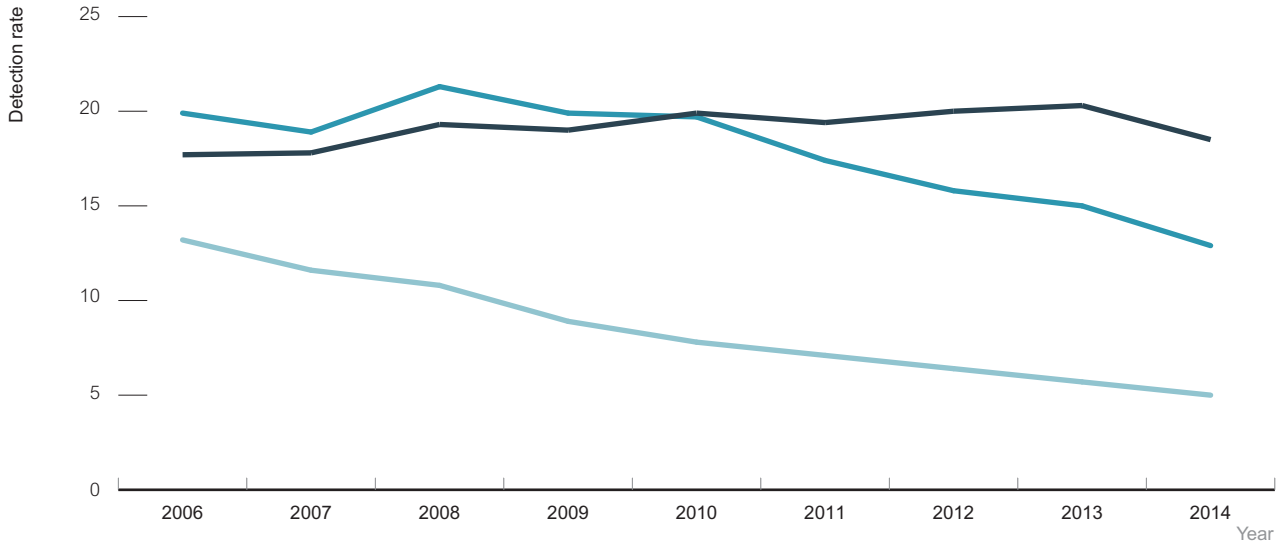


	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<21 years	4.4	6.0	3.7	6.5	2.7	0.5	1.1	0.2	1.1	0.2	0.3	0.6
21 – 29 years	6.9	5.1	3.0	4.3	3.3	2.7	2.7	4.4	2.2	1.3	1.5	1.2
≥30 years	2.8	4.1	3.1	2.0	2.8	1.7	3.2	3.8	5.1	2.4	3.5	1.6

Source: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs)

Between 2006 and 2015 the detection rate of high-grade abnormalities per 1 000 undergoing Pap screening declined by 62% in women aged <20 (Figure 132). Rates declined by 35% in women aged 20 – 24 from 2010 to 2014. A declining trend has not yet been seen in women aged 25 – 29.

Figure 132 High-grade abnormality detection rate, per 1000 women undergoing Pap screening, 2006 – 2014



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

Source: Australian Institute of Health and Welfare 'Cervical Screening in Australia 2013 – 2014'

Methodological notes

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 form 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 Torres Strait Islander status, date of HIV diagnosis, CD4+ cell count at diagnosis, source of exposure to HIV and evidence of newly acquired HIV (see below). If the person is born overseas, language spoken at home and date of arrival in Australia are also collected. 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.

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: http://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 12 months of HIV diagnosis. 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.

Rates of HIV diagnosis

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 Islanders were obtained from ABS catalogue 32380do001_2011. ABS regional population denominators by age, sex, indigenous status and state were obtained from ABS 2011 census data using remoteness according to postcode as assigned by ABS catalogue 1270055006_CG_POSTCODE_2012_RA_2011. The proportion of the population by remoteness was held constant over the range of data presented and used to evaluated remoteness populations by year using ABS population data matched by state, age, sex and Aboriginal and Torres Strait Islander status.

Rates of HIV in Aboriginal and Torres Strait Islander populations were compared to Australian-born non-Indigenous populations unless otherwise stated.

Australian Paediatric Surveillance Unit

Cases of perinatal exposure to HIV were reported to the national HIV surveillance centre by paediatricians, through the Australian Paediatric Surveillance Unit (APSU) (http://www.apsu.org.au), and through assessment of perinatal exposure in children born to women with diagnosed HIV. Diagnoses of HIV in women and their exposed children were notified through national HIV surveillance procedures. Further details are given in McDonald et al (1997) [22] and McDonald et al (2009) [23].

Australian National Notifiable Diseases Surveillance System

The National Notifiable Diseases Surveillance System (NNDSS) (http://www.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 co-ordinates the national surveillance of more than 50 communicable diseases or disease groups. Under this scheme, notifications are made to the States or Territory health authority under the provisions of the public health legislation in their jurisdiction. Computerised, de-identified unit records of notifications are supplied to the Australian Government Department of Health on a daily basis, for collation, analysis and publication on the Internet, (updated daily), and in the quarterly journal Communicable Diseases Intelligence.

Notification data provided include a unique record reference number, state or territory identifier, disease code, date of onset, date of notification to the relevant health authority, sex, age, Aboriginal and Torres Strait Islander status and postcode of residence.

Viral hepatitis

New diagnoses of hepatitis B and C were 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). Population rates of diagnosis of viral hepatitis were calculated for each State/Territory using yearly population estimates, provided by the Australian Bureau of Statistics.

Hepatitis B infection and hepatitis C infection was classified as newly acquired if evidence was available of acquisition in the 24 months prior to diagnosis (Communicable Diseases Network Australia 2004). Diagnoses of newly acquired hepatitis B infection was notifiable in all health jurisdictions. Diagnoses of newly acquired hepatitis C infection were recorded in all health jurisdictions other than Queensland.

Sexually transmissible infections

Diagnoses of specific sexually transmissible infections were notified by State/Territory health authorities to the National Notifiable Diseases 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; chlamydia was made notifiable in New South Wales in 1998. Gonorrhoea was a notifiable condition in all health jurisdictions and infectious syphilis became notifiable in all jurisdictions in 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 (see Table below).

Table: Source of notification of specific sexually transmissible infections to the National Notifiable Diseases Surveillance System by State/Territory

Diagnosis	Australian Capital Territory	New South Wales	Northern Territory	Queensland	South Australia	Tasmania	Victoria	Western Australia
Gonorrhoea	Doctor Laboratory Hospital	Laboratory	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor
Infectious Syphilis	Doctor Laboratory Hospital	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Doctor
Chlamydia	Doctor Laboratory Hospital	Laboratory	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Laboratory	Doctor Laboratory	Doctor
Donovanosis	Not notifiable	Laboratory	Doctor Laboratory	Doctor Laboratory Hospital	Doctor Laboratory	Laboratory	Doctor Laboratory	Doctor Laboratory

Respective rates of notification for chlamydia, gonorrhoea and infectious syphilis were calculated using analogous procedures to those described above for HIV notifications (see HIV new diagnoses methodology).

Number of notifications of congenital syphilis and donovanosis were obtained from the NNDSS.

Diagnosis and care cascades

HIV diagnosis and care cascade

Estimating the number of people with diagnosed infection

To estimate the number of people living with diagnosed HIV (PLDHIV) we performed a simple calculation using annual notifications, estimated mortality rates, and overseas migration rates.

Annual HIV notifications data was provided by Australia's National HIV Registry. Due to incomplete or inaccurate recording of name codes the registry contains multiple reports for some individuals. To estimate the number of duplicates we applied a statistical technique which has previously been applied to Australia's National HIV Registry[24]. This calculation estimated the number of duplicate notifications annually resulting in 8.1% duplicate cases by 2015 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[24]. This study calculated HIV- and AIDS-related deaths and also calculated standardized mortality ratios for people with HIV during different ART eras. It identified 8,519 deaths among people diagnosed with HIV or AIDS to the end of 2003. Of these deaths, 6,900 were recorded in the HIV Registry meaning 19% of all deaths were missing from the registry. Due to the back dating of deaths in the HIV Registry after 2003, we used this percentage to inflate the number of recorded deaths in the registry until the end of 2003 (inflating the 7,102 deaths recorded to the end of 2003 to 8,768 deaths overall) and estimated the overall average mortality rate for PLDHIV prior to 2003. After 2003 we used annual mortality rates from the Australian HIV Observational Database (AHOD)[25]. Over 2004 – 2015, 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 PLDHIV.

We also considered the impact of overseas migration. As people are not included in the 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 overseas migration rate for PLDHIV using data from the Australian Bureau of Statistics (ABS) and recent follow-up data of people recently diagnosed in NSW[26]. NSW Health has followed up all people diagnosed with HIV during 2013 – 2014 and reported up to 4% of people move overseas soon after their diagnosis. As this data is for recent diagnoses in recent years we assume this is an upper bound and reduce the number of PLDHIV by 2% overall with a range of 0 – 4% to reflect this initial migration. As there is likely to be a flux of people leaving temporarily and returning to Australia (some of which 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 migration 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 of the overall rate Australia residents leave Australia for longer than 12 months, however, PLDHIV require ongoing care and treatment (which is not subsidised in many countries) so we assume the permanent rate of departure is a reasonable estimate for the PLDHIV population. Overall we assumed a range in the annual overseas migration rate between zero and the overall rate of permanent departure with a best estimate in the middle.

Our overall estimate of the number of PLDHIV 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 overseas migrants using the mortality and migration rates.

Sub-population estimates

We also provided HIV estimates for the number of PLHIV and PLDHIV for each mode of exposure, region of birth, and Aboriginal and Torres Strait Islander status.

For these sub-population calculations we assumed the proportion of duplicates, overseas migration rate, and HIV mortality rate for each population equals the values for the overall 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 (http://www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0). We also assumed no Indigenous people living with diagnosed HIV move overseas.

Estimating the number of people living with HIV

To estimate the overall number of people living with HIV (PLHIV), both diagnosed and undiagnosed, we used the European Center for Disease Control (ECDC) HIV Modelling Tool to estimate the proportion of PLHIV who are undiagnosed[27].

The ECDC tool is a multi-state back-calculation model using notifications data and estimates for the rate of CD4 decline to fit diagnoses rates over time, producing estimates for HIV incidence, time between infection and diagnosis, and the undiagnosed population by CD4 count strata, using surveillance data on new HIV and AIDS diagnoses. To run the model notifications data is split by CD4 strata, whether the patient had AIDS at the time of diagnosis, and optional risk of exposure categories. Diagnoses rates can be adjusted to reflect changes over time and whether PLHIV 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 (representing gay and bisexual men), heterosexual contact, injecting drug use, and other. We ran the ECDC tool for each exposure category as well as overall (with all groups combined) and excluding male-to-male sex. The tool's diagnosis rate options where adjusted to best fit the CD4 count at diagnosis data.

For validation we compared the model estimates for undiagnosed gay and bisexual men (GBM) with empirical data from the COUNT study. 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 – 2014. In this study 8.9% of participants had previously undiagnosed HIV (95% CI 5.8 – 13.5%). This is closely matched by the ECDC tool estimated percentage undiagnosed in 2014 for GBM of 8.4% (range: 7.6 – 9.2%).

The overall prevalence of HIV in Australia was then estimated by inflating the calculated number of people living with diagnosed infection by the estimated level of undiagnosed infection.

Sub-population estimates

We applied the appropriate ECDC HIV Modelling Tool outputs to estimate the proportion of PLHIV in each sub-population who are undiagnosed. For Indigenous populations we use the percentage undiagnosed for GBM and non-GBM weighted according to the breakdown in cumulative notifications, as the Indigenous population has a lower proportion of notifications attributed to male-to-male sex.

Estimating the number retained in care

To estimate the number of PLHIV retained in care we used available clinical data on the proportion of HIV+ attending a clinic who receive an annual CD4 or VL 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 – 98.8% of HIV-positive patents were retained in care[28]. This estimate was obtained by cross-referencing of clinical data between sites and phone tracing individuals who had accessed care between February 2011 and June 2013 but who had not accessed care between June 2013 and February 2014. We assume these results are broadly representative of HIV-positive patients in Australia and assume a best estimate of 95% of PLDHIV retained in care with a range equal to the range for percentage retained after follow-up[28].

Estimating antiretroviral treatment coverage

We estimated the number of people receiving ART using a 10% sample of Pharmaceutical Benefits Scheme (PBS) patient level script claims data provided by the company Prospection. This is a randomised patient level, de-identified PBS script claims data set from 2006-present. Currently the data set has 170 million script claims and 3 million patients. It includes all PBS listed drugs with HIV indications. Our estimate is the number of unique patients in the PBS data set who filled in at least one script in the 12 months prior 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+ temporary residents taking ART -- as temporary residents are Medicare ineligible and hence not counted in the 10% sample. It is estimated there are 450 HIV+ temporary residents living in Australia at any one time[29]. The Australian HIV Observational Database Temporary Access Study (ATRAS) enrolled 180 HIV+ temporary residents in clinical care. At the start of the study only 63% of ATRAS patients were receiving ART from alternative sources, after two years (at the end of the study) 95% were on ART[29]. Assuming the percentage on treatment at enrolment in ATRAS represents the background treatment coverage for the HIV+ temporary residents not in ATRAS, we calculate 341 HIV+ temporary residents are on ART with an assumed range of 300-400 patients.

Estimating levels of virological suppression

We define virological suppression as less than 200 viral copies per ml. The proportion of people on ART with viral suppression is taken to be the proportion of people recorded in the Australian HIV Observational Database (AHOD) who had less than 200 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 PLHIV on ART with viral suppression by multiplying this proportion and range by the estimated number of people receiving ART.

Hepatitis C diagnosis and care cascade

This cascade was developed collaboratively between the Kirby Institute and the Center for Disease Analysis: http://www.centerforda.com/. The approach taken to develop the 'Hepatitis C diagnosis and care cascade' was informed by recommendations from a national stakeholder reference group. This included representatives from: The Kirby Institute; ASHM; Hepatitis Australia, NSW Ministry of Health; Queensland Department of Health; Department of Health and Human Services, Tasmanian Government; Department of Health and Human Services Victoria; Australian Department of Health, South Australia Health; WHO Regional Reference Laboratory for Hepatitis B, Victorian Infectious Diseases Reference Laboratory, The Doherty Institute; Centre for Social Research in Health; Australian Injecting and Illicit Drug Users League; Burnet Institute; Australasian Sexual Health Alliance; Australian Liver Association; The National Aboriginal Community Controlled Health Organisation; Scarlet Alliance.

Number of people living with hepatitis C

This estimate was derived using a difference equation mathematical model, as described below:

- To determine hepatitis C incidence as a result of injecting drug use, the model used estimates of the number of people who had injected drugs in Australia over the last three decades, the pattern of injecting drug use and estimates of hepatitis C incidence among people who inject drugs derived from cohort studies.
- The relative change in incidence since 2005 was informed by hepatitis C notifications in 15 – 29 year olds 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 25 years can be interpreted as surrogate for the incidence of hepatitis C infection.
- 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 – 15, and generic supply in 2015.
- Estimates of the number of people experiencing long-term sequelae of chronic hepatitis C infection were then obtained from the estimated pattern of hepatitis C incidence using rates of progression derived from cohort studies.
- Estimates of the numbers of people living with chronic hepatitis C infection in 2015 were adjusted to allow for mortality related to hepatitis C infection, injecting drug use and unrelated to hepatitis C infection or injecting.

Further information about the methods can be obtained by contacting the Center for Disease Analysis http://www.centerforda.com/.

Number of people diagnosed and living with chronic hepatitis C infection

This estimate was derived from totalling all hepatitis C notifications from 1991 to 2015 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 25%.
- 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 was deducted from the number of total hepatitis C notifications.
- The level of overseas migration was assumed to be small, given the characteristics of the infected population, and given by the annual number of permanent departures for the general population divided by the estimated resident population as estimated by the Australian Bureau of Statistics (series 340102).

Number of people who have ever received HCV treatment

To estimate the numbers of people treated for hepatitis C we totalled the number 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 the years 2014 and 2015, we included estimates for the number of patients receiving DAA therapies through clinical trials, patient access programs and generic drugs.
- 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 2/3 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).
- 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 SVR

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 SVR reported in the literature (regimen-specific). We assumed the following:

- Australian data on the proportion with SVR were prioritized, if available. A distribution of 50% genotype 1 and 50% genotypes 2/3 among people receiving hepatitis C treatment was assumed for interferon based therapies.
- A 95% SVR rate was used for DAA therapies.
- 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, Victorian Infectious Diseases Reference Laboratory at the Doherty Institute. The approach taken to develop the 'Hepatitis C diagnosis and care cascade' was informed by recommendations from a national stakeholder reference group. This included representatives from: The Kirby Institute; ASHM; Hepatitis Australia, NSW Ministry of Health; Queensland Department of Health; Department of Health and Human Services, Tasmanian Government; Department of Health and Human Services Victoria; WA Health; Australian Department of Health, South Australia Health; WHO Regional Reference Laboratory for Hepatitis B, Victorian Infectious Diseases Reference Laboratory, The Doherty Institute; Centre for Social Research in Health; Australian Injecting and Illicit Drug Users League; Burnet Institute; Australasian Sexual Health Alliance; Australian Liver Association; Scarlet Alliance.

Diagnosis

The proportion of people living with chronic hepatitis B who have been diagnosed was estimated using model-derived estimates of the total number of people who have ever had chronic hepatitis B in Australia as the denominator and the cumulative number of notifications of hepatitis B from 1971- 2015 as the numerator. Mortality is not included in this aspect of the analysis, and therefore the proportion derived represents those ever having lived with chronic hepatitis B that have ever been diagnosed.

Monitoring

The number of people who received monitoring for chronic hepatitis B in 2015 was determined using Department of Human Services data regarding 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 2015 was derived using pharmaceutical dispensing data from the Department of Human Services Australia regarding the number of individuals receiving a treatment indicated for hepatitis B virus infection (adefovir, entecavir, lamivudine, telbivudine, tenofovir, and pegylated interferon). Patient-level estimates were provided, allowing removal of those receiving tenofovir for the treatment of HIV and to avoid duplication of people receiving combination therapy.

Detailed methodology and source references can be found in the published paper which described the derivation of these estimates[30] and in the 2nd National Report of the Hepatitis B Mapping Project (www.ashm.org.au/hbvmapping).

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

Estimates of the number of people living with hepatitis B virus infection in Australia were developed by the Collaborating Centre for Viral Hepatitis, Victorian Infectious Diseases Reference Laboratory at the Doherty Institute. These estimates were derived from two sources:

The overall prevalence of chronic hepatitis B was determined using a deterministic compartmental mathematical model of hepatitis B virus infection in the Australian population from 1951 – 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 around estimates of hepatitis B prevalence was generated using the range of uncertainty inherent in original prevalence estimates applied in the Census-based methodology described above, with the range in estimated attributable deaths derived by adopting low and high mortality estimates directly in the model.

The proportion of people living with chronic hepatitis B in each population group and the relative prevalence in each was determined using the Census method, attributing prevalence of chronic hepatitis B by country of birth, Aboriginal and Torres Strait Islander status, and other risk status applied to Australian population data provided in the 2011 Census. The estimated prevalence in these groups was derived as a proportion of the total Census population as estimated in 2011, and then applied of the estimated number of people living with chronic hepatitis B in 2014 derived using the mathematical model as outlined above. Detailed methodology and sources, including individual seroprevalence estimates and population figures, can be obtained from the published paper [31].

HBV prevalence

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[32, 33]; a study of hepatitis B prevalence in migrants to the United States[34]; and the most recent global seroprevalence study conducted as part of the Global Burden of Disease Project[35]. The Australian prevalence figure was obtained from local modeled estimates[31].

The chlamydia diagnosis and care cascade

Notifications

We obtained the number of chlamydia notifications for 15 – 29 year old males and females in Australia directly from the National Notifiable Diseases Surveillance System (NNDSS).

Estimating new infections

New *Chlamydia trachomatis* infections were estimated using the modelling approach of Ali et al. [36]. This method uses a Bayesian statistical approach to calibrate model parameters to the notifications data from NNDSS, the number of tests for *Chlamydia trachomatis* obtained by Medicare (item numbers 69316, 69317, and 69319), and annual population estimates for each sex and age group published by the Australian Bureau of Statistics (ABS) over 2001 – 2015. Model outcomes were validated through comparison against chlamydia prevalence among 16 – 29 year olds measured in 2011 by the Australian Chlamydia Control Effectiveness Pilot (ACCEPt).

The Ali et al. model outputs 95% credible intervals for the annual number of incident chlamydia cases in 15 – 19, 20 – 24, and 25 – 29 year old males and females. We summed the incident chlamydia cases for each age group to estimate the number of new infections. The range corresponds to the lower and upper bound of the credible intervals with the midpoint corresponding to our best estimate.

Estimating treatment and 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 15 – 29 year olds occur across urban, regional, and remote areas respectively. Based on the Bourne et al. study in 2013, 14% of these diagnoses occurred in sexual health clinics [37]. 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 [38].

Treatment following diagnosis

Based on data from NSW sexual health clinics almost all people diagnosed with chlamydia in urban and regional areas were treated (ranging from 99-100% of those diagnosed) in 2013[39]. In NSW remote areas the percentage diagnosed is a little lower at 96% [39]. The Foster et al. study in 2014 produced a lower estimate for remotes areas in the Northern Territory of 85% [40]. Data from Western Australian general practices suggest a much lower rate of treatment with on 92% receiving a script for treatment after diagnosis[41]. Based on this data we assumed 92% of patients attending urban and regional general practice clinics receive treatment with 99% of patients in other clinical settings receiving treatment. In remote areas, we assumed 90% of those diagnosed were treated. Taking a weighted average by multiplying the notifications breakdown across regions by the estimated percentage treated, we estimate 93.3% of people diagnosed with chlamydia were treated in 2015. We assumed a range from 90% (corresponding to the percentage treated in remote areas) to 100%. Assuming the same treatment proportion and range for males and females and multiplying by the number of notifications we estimated the number of 15 – 29 year old males and females who received treatment after diagnosis.

Completed follow up

Completed follow-up is estimated via retesting rates after treatment. From the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of STIs and BBVs (ACCESS), 17 – 22% of 15 – 29 year olds diagnosed with chlamydia in national urban and regional sexual health clinics were retested for *Chlamydia trachomatis* infection within 1.5 to 6 months after treatment. In urban and regional general practice the retesting rate is higher ranging from 20 to 29%. For remote areas, 17 – 20% of males and females retested within 1.5 to 6 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 males and females and multiplying by the number of notifications we estimated the number of 15 – 29 year old males and females who retested for chlamydia after treatment.

The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections (STIs) and Blood Borne Viruses (BBVs) (ACCESS)

Briefly, the ACCESS Project is a national sexual health surveillance network using routinely collected de-identified demographic, testing, diagnosis and treatment data from health services and laboratories across Australia to monitor the sexual health of high risk population groups including gay and bisexual men, injecting drug users, Aboriginal and Torres Strait Islander people, sex workers, and young people. The ACCESS project has been described in more detail elsewhere[42]. The project is managed collaboratively between the Kirby Institute, 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 case load general practice clinics and/or sexual health clinics tested for HIV, BBV and STI, and where relevant re-tested.
- The result of the last viral load amongst HIV-positive patients seen at high case load general practice clinics and/or sexual health clinics
- HIV incidence was estimated using methodology similar to that used by Iversen et al[43]. 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 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, and vaccination of 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.

Table: Classification of patient status by Hepatitis B marker

	Hepatitis B marker		
	HBsAg	HBcAb	HBsAb
Vaccinated	Neg	Neg	Pos
Past exposure	Neg	Pos	Neg
Susceptible*	Neg	(Neg)	(Neg)
Infected	Pos	Pos	Neg

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

- The incidence of chlamydia, gonorrhea and infectious syphilis among selected priority populations.
- Proportion of diagnoses of genital warts at first visit to sexual health clinics, by select population.

The Australian Gonococcal Surveillance Program (AGSP)

The AGSP is a collaborative project involving gonococcal reference laboratories in each State/Territory and is coordinated by the NSW Gonococcal Reference Laboratory at the Prince of Wales Hospital, Sydney. The primary objective of the program is to monitor antibiotic susceptibility of isolates of Neisseria gonorrhoea, 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 (MIC 0.06 – 0.125mg/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[44].

Information is collected from hospitals, general practitioner sites and sexual health centres 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 enrolled over 3 900 people into AHOD.

AHOD data were used for the following indicators:

- The result of the last viral load test amongst HIV-positive patients.

Australian Institute of Health and Welfare 'Cervical Screening Australia 2012 – 2013'

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 2012 – 2013 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 'Cervical Screening Australia 2013 – 2014' [45] (http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129554884).

The Australian Needle and Syringe Program Survey

Briefly, the ANSPS is conducted annually over a 1 – 2 week in October at more than 50 needle and syringe programs (NSP) to provide serial point prevalence estimates of HIV and hepatitis C and to monitor injecting behaviour among people who inject drugs (PWID). All clients attending needle and syringe program (NSP) sites during one week in 2009 (51 sites), 2010 (53 sites), 2011 (53 sites), 2012 (52 sites) and 2013 (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[46].

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.
- Proportion of people seen at NSPs reporting current or past hepatitis C treatment.
- Incidence of hepatitis C infection was monitored among ANSPS respondents. Incidence of hepatitis C infection 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)

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 infection and for hepatitis C infection 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 virus and hepatitis C virus. 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, HBV and HCV infection 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 is led by Professor Juliet Richters, Professor Chris Russel, Dr Richard de Visser, Professor Judy Simpson and Professor Andrew Grulich, and the methodology has been described in detail elsewhere[47]. Briefly, this was a telephone random survey of 20 000 people drawn from the Australian population from October 2013 to November 2013 to survey sexual and reproductive health. The proportion of heterosexual participants reporting recent condom use was obtained from the Australian Study of Health and Relationships (ASHR2)[47, 48].

The Gay Community Periodic Survey (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 Centre for Social Research in Health, UNSW Sydney. The methodology associated with the Gay Community Periodic Surveys has been described in detail elsewhere[49].

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 infection 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 infection 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.

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 (http://medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp#info).

National Centre for Immunisation Research of Vaccine Preventable Diseases (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 Vaccination Program Register (NHVPR)

The NHPVR was established in early 2008 to support the National HPV Vaccination Program, and is fully funded by the Commonwealth Government. The NHVPR 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 (http://www.hpvregister.org.au/). Percentage of HPV vaccine coverage in males and females turning 15 years of age was obtained from the NHVPR.

National Prison Entrants' Bloodborne Virus Survey (NEPBBVS)

The NEPBBVS is a consecutive cross-sectional sample of prison entrants over a two week period. Previous iterations of the survey collected data in parallel over a two period in October (the same time as the community NSP survey), however the 2013 survey timing varied between jurisdictions. Participants were 793 of the 1,235 (64%) prisoners entering Australian correctional centres who were offered the survey. The 2013 NPEBBVS reports the findings for the 793 participants for whom sufficient pathology and questionnaire data were available. NPEBBVS methodology has been described in detail elsewhere[50].

NEPBBVS data were used for the following indicators:

- Hepatitis C prevalence 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 (see http://www.pbs.gov.au/info/industry/useful-resources/sources/). The 10% sample of the PBS is a randomised patient level, de-identified PBS script claims data set from 2006-present. Currently the data set 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 set who filled in at least one script in the 12 months prior to the end of December 2015 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 set who filled in at least one script in the 12 months prior to the end of December 2015 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-HBV co-infected patients.

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