HIV in Australia

Annual surveillance short report 2018

UNSW SYDNEY

Kirby Institute

ISSN 2206-1630 (Online)

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

Suggested citation:
Kirby Institute. HIV in Australia: annual surveillance short report 2018.
Sydney: Kirby Institute, UNSW Sydney; 2018.

Art © Sebastian Zagarella (artist/installation producer) Inside Out Exhibition www.insideoutexhibition.com.au, Simonology (wallpaper design) Simonology Photography www.simonology.net, and Designer Rugs (rug design) www.designerrugs.com.au

Design il Razzo, Email: admin@ilrazzo.com.au

The Kirby Institute for infection and immunity in society
UNSW Sydney, Sydney, NSW 2052

Telephone: 02 9385 0900 (International +61 2 9385 0900)
Email: recpt@kirby.unsw.edu.au

HIV in Australia
Annual surveillance short report 2018

The Kirby Institute

Prepared by:

Jonathan King
Skye McGregor
Hamish McManus
Richard Gray
Rebecca Guy

Other contributors:

- Office of Health Protection, Australian Government Department of Health
- State/territory health departments
- Angie Pinto, Denton Callander, Jane Costello, Jennifer Iversen, Morgan Stewart, Rainer Puhr, The Kirby Institute, UNSW Sydney
- Campbell Aitken, Clarissa Moreira, Jason Asselin, Burnet Institute
- Limin Mao, Centre for Social Research in Health, UNSW Sydney

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

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

Contents

Figures

Tables

Preface

This short report is a review of available surveillance data pertaining to the occurrence of HIV in Australia. It is a reference document for organisations and individuals interested in the occurrence of HIV in Australia, drawing together relevant data from many sources into a single comprehensive report. The report is available through the website **kirby.unsw.edu.au** together with the Australian HIV Public Access Dataset, holding records of cases of HIV diagnosed in Australia by 31 December 2017 and reported by 31 March 2018.

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

Some of the information in this report regarding risk behaviour is also published, along with further behavioural data, in the *Annual reports of trends in behaviour.* [1] Other relevant information is also published in the following reports prepared by the Kirby Institute:

- *Australian NSP survey: prevalence of HIV, and injecting and sexual behaviour among NSP attendees national data report 2013–2017* [2]
- *Needle syringe program national minimum data collection national data report 2017* [3]
- *Australian NSP survey: prevalence of HIV, HCV and injecting and sexual behaviour among needle and syringe program attendees 20 year national data report 1995–2014* [4]

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

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

Abbreviations

ABS	Australian Bureau of Statistics
ACCESS	Australian Collaboration for Coordinated Enhanced Sentinel Surveillance
AIDS	acquired immunodeficiency syndrome
BBV	bloodborne virus
HIV	human immunodeficiency virus
PEP	post-exposure prophylaxis
PrEP	pre-exposure prophylaxis
STI	sexually transmissible infection
TasP	treatment as prevention
UNAIDS	Joint United Nations Programme on HIV/AIDS

Medical and epidemiological terms

age-standardised rate of infection: The proportion of infected people in a particular population, adjusted mathematically to account for the age structure of the population so that comparisons can be made between populations with different age structures (i.e. with more or fewer younger people).

AIDS: Acquired immunodeficiency syndrome, the spectrum of conditions caused by damage to the immune system in advanced HIV infection.

area of residence: Locations of residence, indicated by postcode, are classified into one of three categories: major cities, inner or outer regional areas, and remote or very remote areas (i.e. areas with relatively unrestricted, partially restricted and restricted access to goods and services).

diagnosis: A labelling or categorisation of a condition, usually by a doctor or other healthcare professional, on the basis of testing, observable signs and symptoms reported by the patient. 'Newly diagnosed infection' means that a person previously not known to have the infection has been tested and now found to have the infection.

endemic: A disease is endemic if it is common in a region or local area, or in a group of people

human immunodeficiency virus (HIV): HIV is transmissible by sexual and blood contact as well as from mother to child. If untreated, HIV can progress to AIDS.

'Newly diagnosed' HIV: This means that a person previously not known to have HIV has been tested and now found to have the virus.

'Newly acquired' HIV: This means a person has become infected with HIV within the past year.

Primary HIV infection (or seroconversion illness): A flu-like illness that occurs soon after infection with HIV.

incidence: The rate at which a condition occurs in a population, usually expressed as the number of diagnoses (or pregnancies, injuries etc.) over a period of time during which people are exposed to risk (see person-years).

infection: The condition of having bacteria or viruses multiplying in the body. Many infections cause no symptoms, so the person may be unaware they have an infection unless they are tested.

notifiable disease: A disease is notifiable if doctors and/or laboratories are required to report cases to the authorities for disease surveillance, i.e. monitoring of disease at population level.

person-years: A measure of the **incidence** of a condition (e.g. a disease or pregnancy) over variable time periods. If 100 people are exposed to the risk of an infection for a year, or 50 people are exposed for two years, the number of infections can be reported 'per 100 person-years'.

prevalence: The number of cases of a condition at a single time, usually expressed as a proportion (percentage, or per 100 000 people) of the population. Prevalence decreases if people with the condition die or are cured, and increases as new cases occur.

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

virus: A very small microscopic infectious agent that multiplies inside living cells. Antibiotics are not effective against viral infections, so treatment requires antiviral drugs.

For more information on sexually transmissible infections see the *Australian STI management guidelines for use in primary care*.[5]

Summary data

HIV

New HIV diagnoses

- There were 963 new HIV diagnoses in Australia 2017, the lowest number of diagnoses since 2010, with a 7% decline over the last five years, and a 5% decline between 2016 and 17.
- Male-to-male sex continues to be the major HIV risk exposure in Australia, reported for 607 (63%) HIV diagnoses in 2017, with heterosexual sex reported for 238 (25%) diagnoses, both male-to-male sex and injecting drug use for 53 (5%) diagnoses and injecting drug use for 33 (3%) diagnoses.
- The decrease in overall new HIV diagnoses is attributed to an 11% decline in new HIV diagnoses reporting male-to-male sex as likely exposure over the past five years, and a 15% decline between 2016 and 2017.
- In comparison, there was a 10% increase between 2013 and 2017 in diagnoses reporting heterosexual sex, with a 14% increase between 2016 and 2017.
- Of 238 HIV diagnoses in 2017 that were attributed to heterosexual sex, 61% (145) were in males, and 54% (128) were in people born in Australia. A further 13% (32) were in people born in Sub-Saharan Africa, and 13% (30) in people born in Southeast Asia.
- Based on the test for immune function (CD4+ cell count) 274 (36%) of new HIV diagnoses in 2017 were classified as late diagnoses (CD4+ cell count of less than 350 cells/μL), the highest proportion in the past ten years. These diagnoses are likely to have been in people who had acquired HIV at least four years before diagnosis without being tested.
- Over the past five years (2013–2017) the proportion with late diagnoses was higher in people born in born in Sub-Saharan Africa (53%), Southeast Asia (48%) and Central America (43%). The proportion with late diagnoses was also higher in people with heterosexual sex as their HIV risk exposure (46%), men with bisexual sex as their HIV risk exposure (44%), and men aged over 50 years with male-to-male sex as their HIV risk exposure (37%).
- In 2017, there were 31 new HIV diagnoses among Aboriginal and Torres Strait Islander people. The age standardised rate of HIV notification increased by 41% in the Aboriginal and Torres Strait Islander population between 2013 and 2017, compared to a 12% decline in Australian-born non-Indigenous people. In 2017 the notification rate was 1.6 times as high as in the Australian-born non-Indigenous population (4.6 per 100 000 and 2.8 per 100 000, respectively).
- Over the years 2015–2017, a higher proportion of HIV notifications in the Aboriginal and Torres Strait Islander population were attributed to heterosexual sex (21%) and injecting drug use (18%) than in the Australian-born non-Indigenous population (18% and 3%, respectively).
- In 2013–2017, among 191 babies born in Australian to women with HIV, 1% of newborns were diagnosed with HIV, compared to 27% in 1993–1997.

HIV incidence and prevalence

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

Testing and care

- Data from behavioural surveys indicate that 67% of gay and bisexual men participating in the Gay Community Periodic Survey were tested for HIV in 2017, and 49% of people who inject drugs participating in the Australian Needle and Syringe Program Survey were tested for HIV in 2017.
- Among gay and bisexual men attending sexual health clinics in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network, the proportion who had had a repeat HIV test within seven months of a previous test has increased in the last five years, from 42% in 2013 to 57% in 2017.
- There has been a large increase in the past ten years in the number of people living with HIV who are receiving treatment, with the proportion of gay and bisexual men participating in the Gay Community Periodic Survey reporting treatment increasing from 68% in 2008 to 92% in 2017.
- There were an estimated 27 545 people living with HIV in Australia in 2017. Of those, an estimated 24 646 (89%) were diagnosed, 23 414 (95% of those diagnosed) were retained in care (having had a viral load or CD4+ cell count in the past year), 21 560 (87% of those diagnosed) were receiving antiretroviral therapy, and 20 412 (95% of those on antiretroviral therapy) had suppressed viral load (less than 200 HIV-1 RNA copies/mL). This corresponds to 74% of all people living with HIV having suppressed viral load in 2017, which exceeds the UNAIDS 73% target for 2020, but is below the 86% target for 2030.
- There were an estimated 2899 (11%) people living with HIV in Australia in 2017 who were unaware of their HIV status (undiagnosed). Compared to overall, the estimated proportion with undiagnosed HIV was higher in people with heterosexual sex (17%) and injecting drug use (15%) as their HIV risk exposure, and lower in men with male-to-male sex as their HIV risk exposure (9%). The estimated proportion with undiagnosed HIV was also higher among people born in Southeast Asia (27%), and in women (13%).

Prevention

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

Interpretation:

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

In the last few years, state-funded programs have provided PrEP to an increasing proportion of the gay and bisexual men at higher risk of HIV in Australia, with early evidence of impact on HIV transmission, yet uptake needs to increase across all jurisdictions and other populations to have the greatest benefit.

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

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

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

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

1 HIV

Details of HIV notifications are given in this chapter.

1.1 New HIV diagnoses

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

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

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

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

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

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

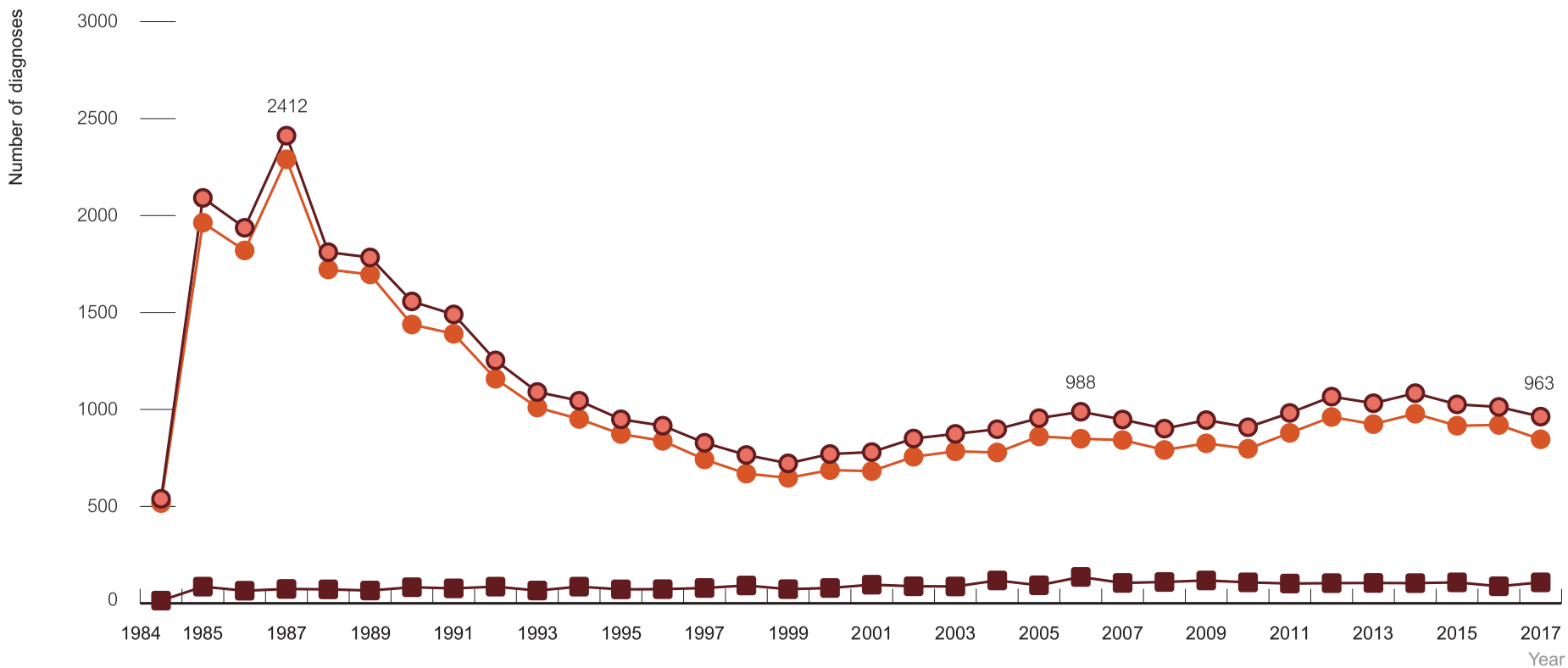
Table 1.1.2 Characteristics of new HIV diagnoses, 2008–2017

	Year of HIV diagnosis										
Characteristic	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2008–2017[a]
Total cases[b]	901	945	908	982	1066	1032	1084	1026	1013	963	9920
Sex											
Male	791	825	797	879	961	924	978	916	920	846	8837
Female	110	118	108	102	104	105	104	108	88	108	1055
Median age (years)											
Male	37	37	37	37	36	37	34	35	34	35	36
Female	31	32	31	32	31	34	35	36	34	34	33
Aboriginal and Torres Strait Islander status											
Non-Indigenous	868	911	875	954	1027	992	1,036	969	962	922	9516
Aboriginal and Torres Strait Islander	19	24	22	24	33	26	33	39	46	31	297
Not reported	14	10	11	4	6	14	15	18	5	10	107
Age group in years											
0-14	7	10	6	8	1	6	3	3	5	2	51
15-19	12	13	13	17	22	23	14	19	11	11	155
20-29	240	253	230	263	318	271	317	297	313	256	2758
30-39	296	304	286	305	323	288	346	303	310	312	3073
40-49	219	221	229	239	224	247	217	208	196	174	2174
50+	127	144	144	150	178	197	187	196	178	208	1709
Language spoken at home[c]											
English	688	717	679	780	797	528	836	734	735	537	7,031
Other language	56	93	76	80	85	75	105	129	135	133	967
Not reported	157	135	153	122	184	429	143	163	143	293	1,922
Newly acquired[d]	284	301	305	371	396	347	425	398	365	241	3,433
(% of new diagnoses)	31.5	31.9	33.6	37.8	37.2	33.6	39.2	38.8	36.0	25.0	34.6
Late and advanced HIV status at HIV diagnosis[e]											
Late HIV diagnosis, %	31.6	35.0	35.0	28.8	31.5	32.0	28.5	28.9	32.7	35.9	31.8
Advanced HIV diagnosis, %	17.2	20.5	20.0	18.9	17.8	18.4	16.7	15.9	19.5	22.5	18.6
Median CD4+ cell count, cells/μL	430	408	400	429	430	420	440	440	420	390	420
State/Territory, n											
ACT	7	11	13	11	17	21	18	14	13	13	138
NSW	326	339	310	333	408	355	346	348	317	310	3,392
NT	10	12	5	9	20	13	9	9	23	11	121
QLD	174	182	209	196	208	181	246	203	195	185	1,979
SA	39	50	34	57	31	58	39	44	42	45	439
TAS	11	14	9	15	13	11	16	16	19	11	135
VIC	262	262	236	279	267	307	302	283	312	310	2,820
WA	72	75	92	82	102	86	108	109	92	78	896
HIV exposure risk category											
Male-to-male sex[f]	587	598	589	687	743	680	761	700	712	607	6,664
Male-to-male sex and injecting drug use	32	38	22	32	34	44	50	49	51	53	405
Injecting drug use	32	23	23	20	25	28	31	30	14	33	259
Heterosexual sex	207	231	208	193	207	217	201	205	209	238	2117
Person from a high–prevalence country[g]	82	80	73	45	50	36	46	38	35	41	527
Partner from a high–prevalence country	12	20	22	27	21	26	30	33	29	32	252
Partner at high risk[h]	27	29	18	33	31	44	28	39	38	30	317
Not further specified	86	102	95	88	105	111	97	95	107	135	1,021
Receipt of blood/tissue[i]	0	1	0	0	4	3	0	8	1	0	17
Mother with/at risk of HIV	5	8	5	7	1	4	3	4	5	3	45
Other/undetermined	38	46	61	43	52	56	38	30	21	29	414

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

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

Figure 1.1.1 New HIV diagnoses in Australia, 1984–2017, by sex



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

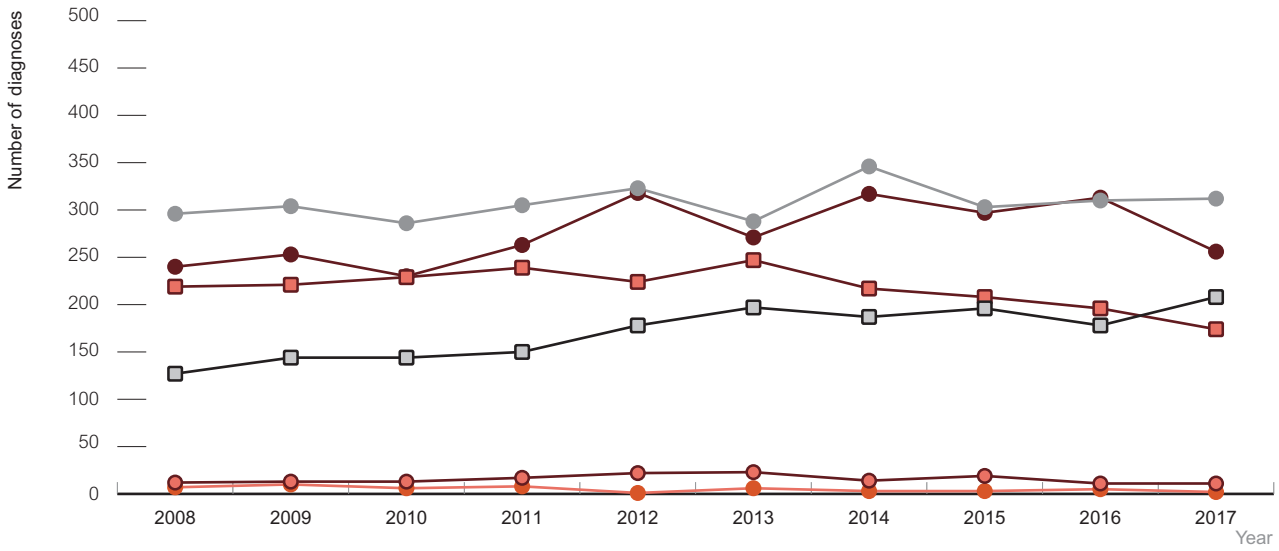
a Total includes transgender people and people for whom data on sex was missing.

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

Demographics

In 2017 the largest number of notifications was in the age group 30–39 years (312), followed by those aged 20–29 years (256) and those aged over 50 years (208) (Figure 1.1.2, Table 1.1.2). Over the five years 2013–2017, the number of HIV diagnoses increased by 6% in the 50+ year age group and decreased by 30% in the 40–49 year age group. The number of diagnoses remained low in younger age groups, with 11 diagnoses in the 15–19 year age group and two in the 0–14 year age group in 2017; the number of diagnoses in both age groups fluctuated over the past five years.

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



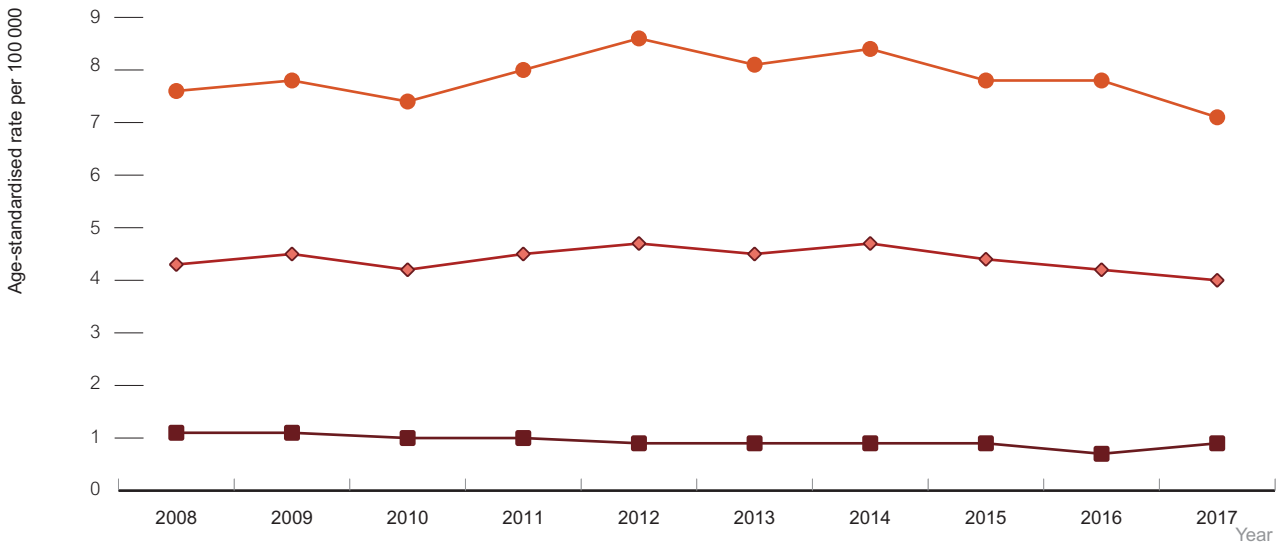
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	7	10	6	8	1	6	3	3	5	2
15–19	12	13	13	17	22	23	14	19	11	11
20–29	240	253	230	263	318	271	317	297	313	256
30–39	296	304	286	305	323	288	346	303	310	312
40–49	219	221	229	239	224	247	217	208	196	174
50+	127	144	144	150	178	197	187	196	178	208

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

HIV

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

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

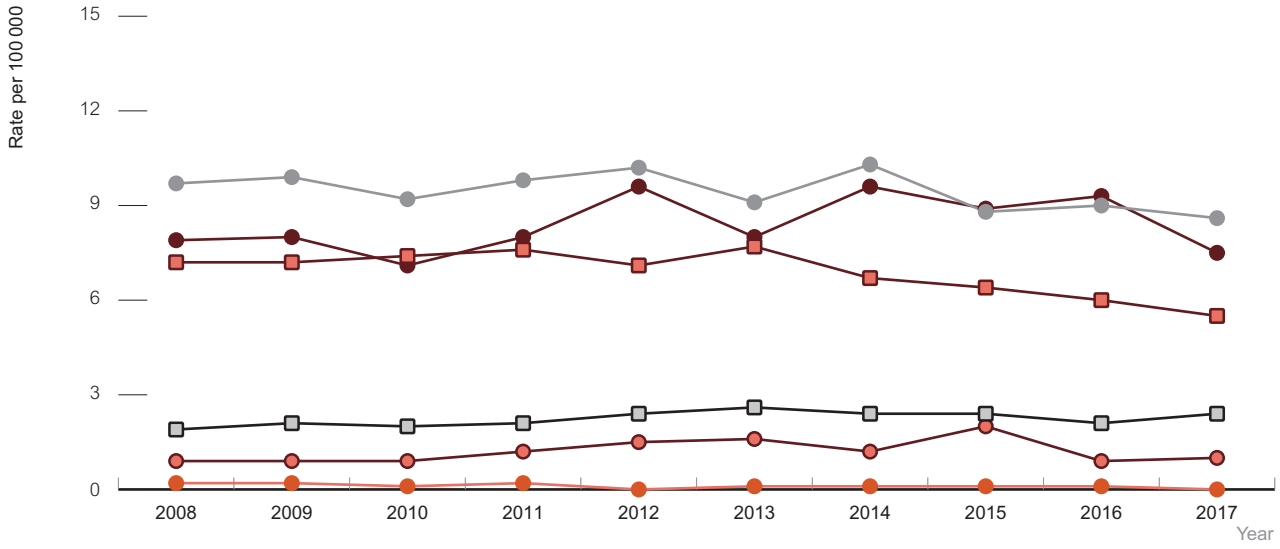


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men	7.6	7.8	7.4	8.0	8.6	8.1	8.4	7.8	7.8	7.1
Women	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.7	0.9
Total	4.3	4.5	4.2	4.5	4.7	4.5	4.7	4.4	4.2	4.0

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

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

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

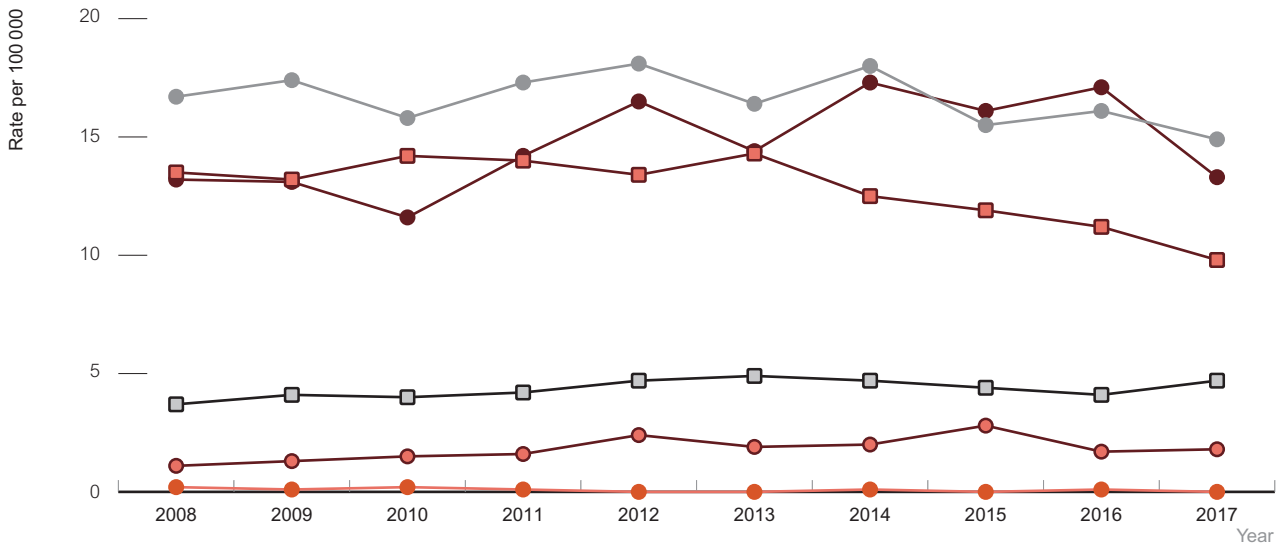


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0–14	0.2	0.2	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.0
15–19	0.9	0.9	0.9	1.2	1.5	1.6	1.2	2.0	0.9	1.0
20–29	7.9	8.0	7.1	8.0	9.6	8.0	9.6	8.9	9.3	7.5
30–39	9.7	9.9	9.2	9.8	10.2	9.1	10.3	8.8	9.0	8.6
40–49	7.2	7.2	7.4	7.6	7.1	7.7	6.7	6.4	6.0	5.5
50+	1.9	2.1	2.0	2.1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

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

HIV

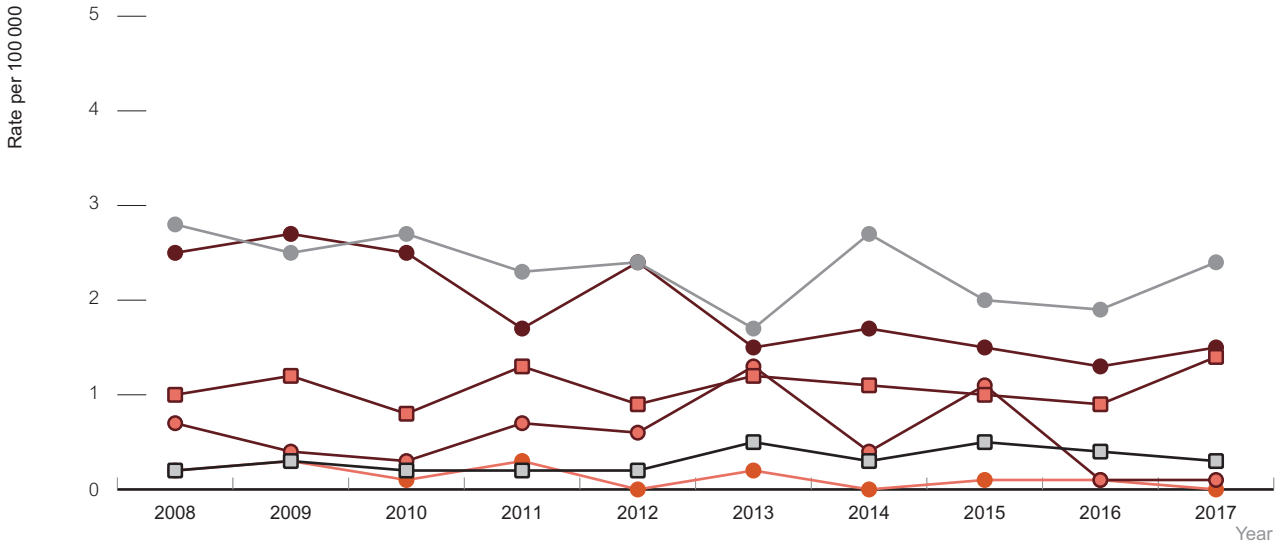
Figure 1.1.5 HIV notification rate per 100 000 population, 2008–2017, by age group, males



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

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

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



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

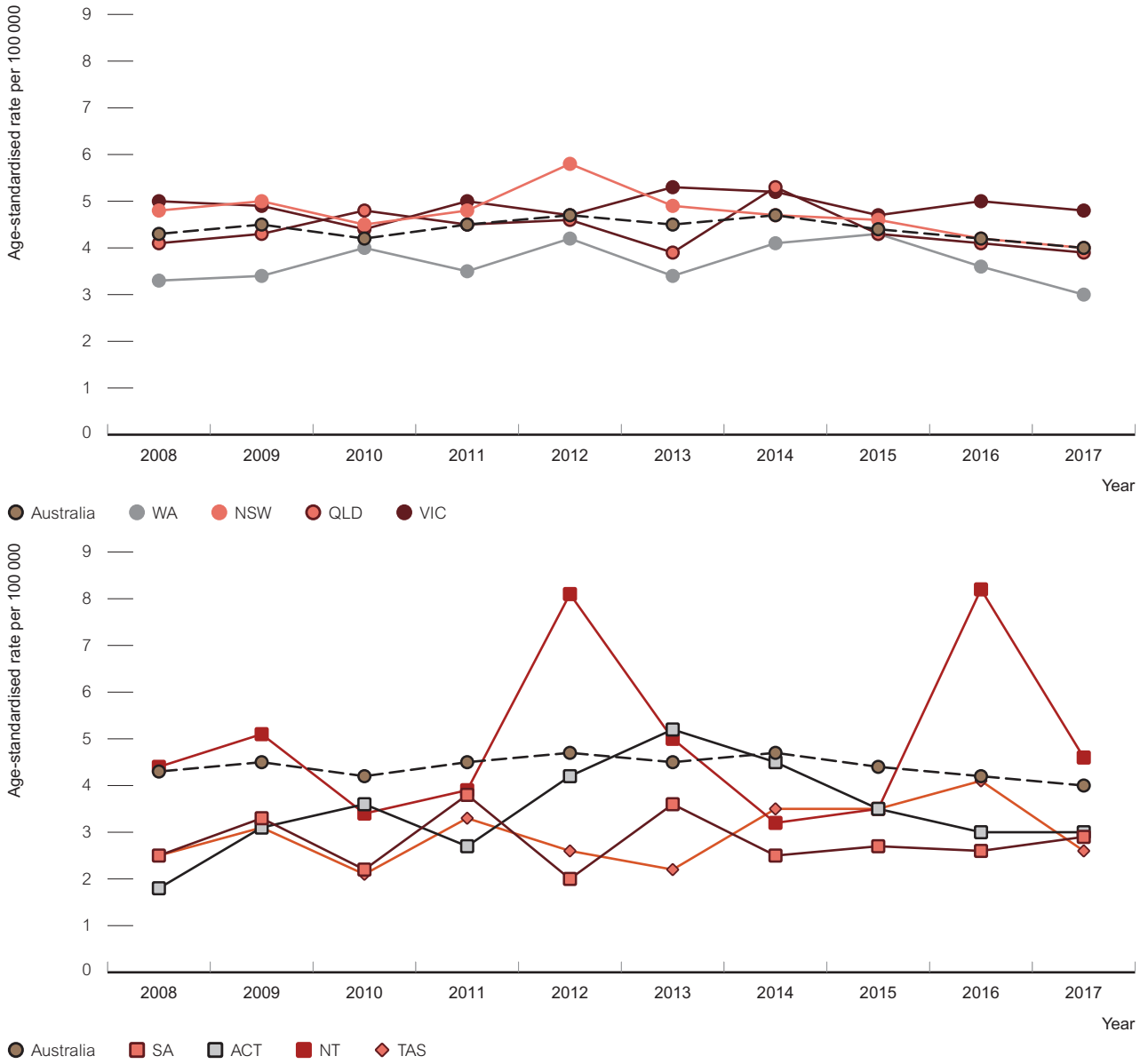
Source: State and territory health authorities; see Methodology for detail.

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

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

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

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



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

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

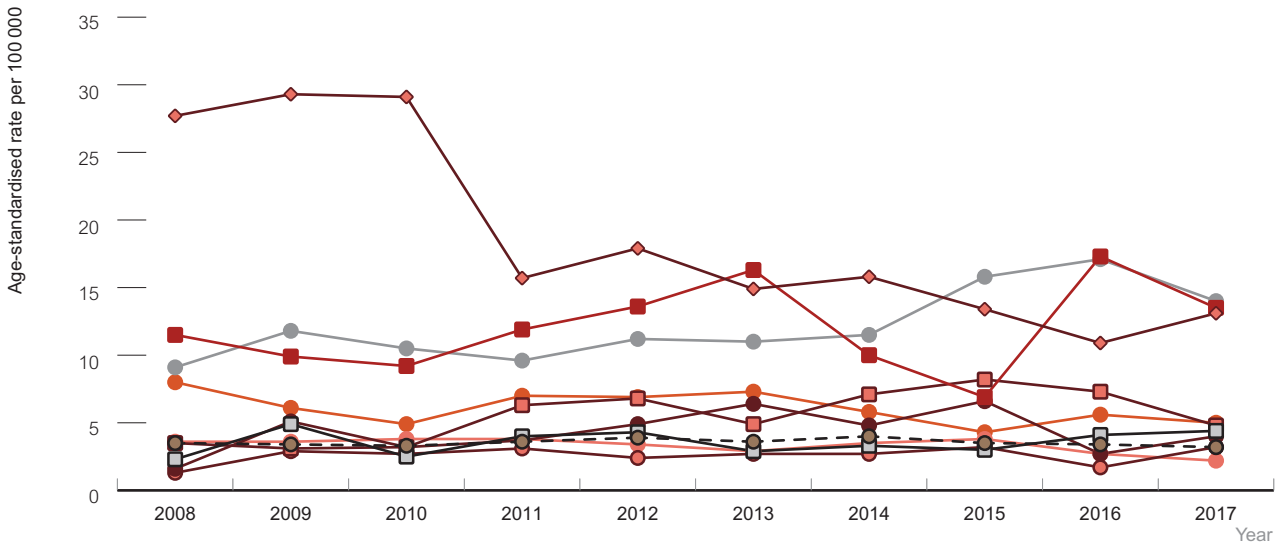
State/Territory	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australian Capital Territory	1.8	3.1	3.6	2.7	4.2	5.2	4.5	3.5	3.0	3.0
New South Wales	4.8	5.0	4.5	4.8	5.8	4.9	4.7	4.6	4.2	4.0
Northern Territory	4.4	5.1	3.4	3.9	8.1	5.0	3.2	3.5	8.2	4.6
Queensland	4.1	4.3	4.8	4.5	4.6	3.9	5.3	4.3	4.1	3.9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

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

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

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

Figure 1.1.8 New HIV diagnoses, rate per 100 000 population, 2008–2017, by region of birth



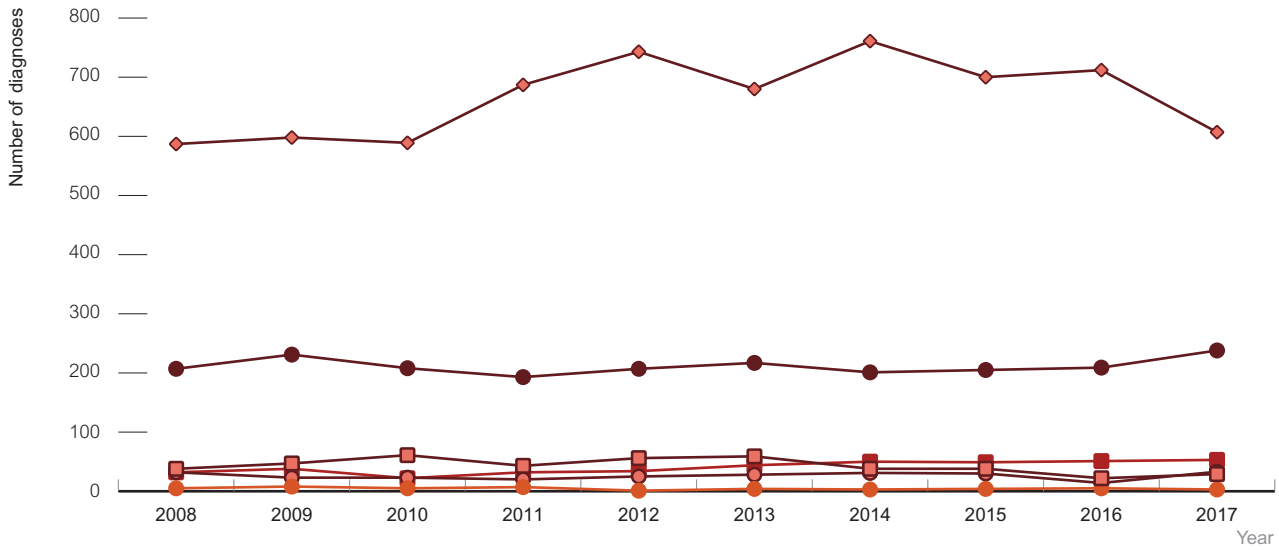
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	3.5	3.4	3.3	3.6	3.9	3.6	4.0	3.5	3.4	3.2
Oceania and Antarctica	8.0	6.1	4.9	7.0	6.9	7.3	5.8	4.3	5.6	5.0
Northwest Europe	3.6	3.6	3.8	3.8	3.4	2.9	3.5	3.8	2.7	2.2
Southern and Eastern Europe	1.3	2.9	2.7	3.1	2.4	2.7	2.7	3.2	1.7	3.2
North Africa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

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

HIV risk exposure

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

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



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

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

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

HIV

Subpopulations

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

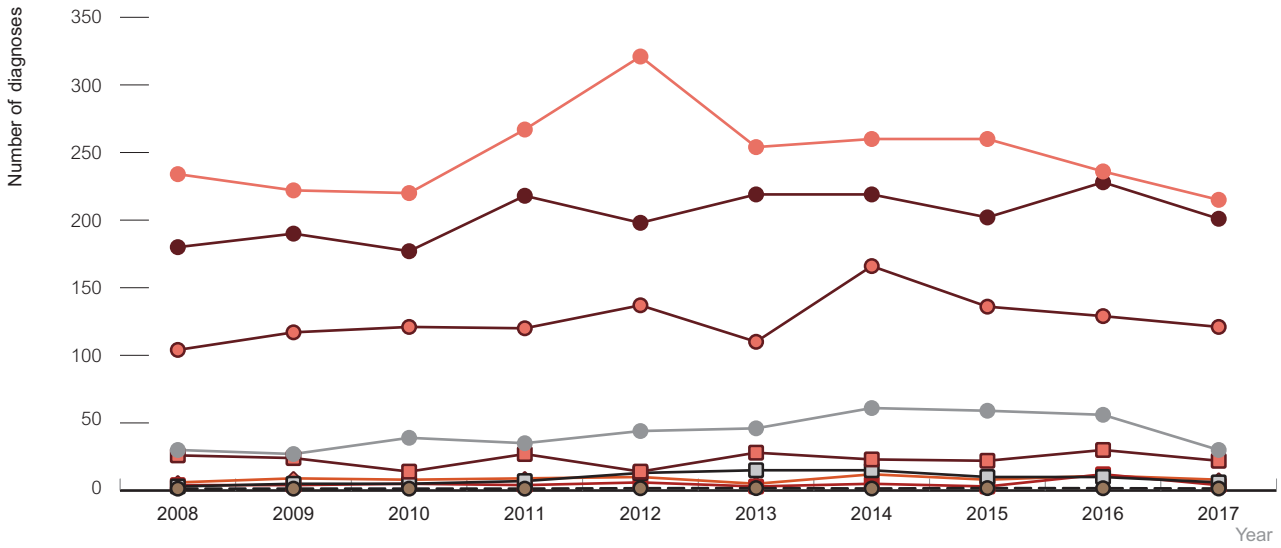
The median age at HIV diagnosis for men reporting male-to-male sex as HIV risk exposure was 36 years in 2008 and 35 years in 2017 (data not shown). Of the 607 cases of HIV newly diagnosed in 2017 for whom exposure to HIV included male-to-male sex, 67 (11%) also reported sex with women. There were an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

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

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

Among men born overseas with male-to-male sex as their risk exposure, the proportion who were born in Asia (Southeast Asia, Northeast Asia, and Southern and Central Asia) has increased over the past 10 years from 28% in 2008 to 52% in 2017 (Table 1.1.2).

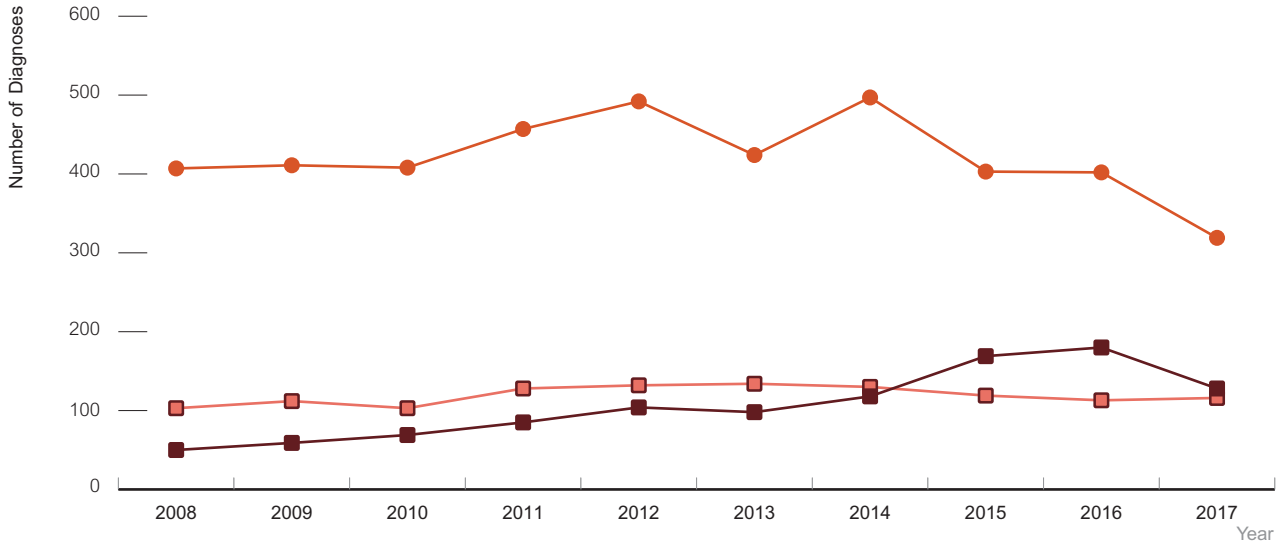
Figure 1.1.10 New HIV diagnoses in men who reported male-to-male-sex as exposure risk, 2008–2017, by state/territory



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

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

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

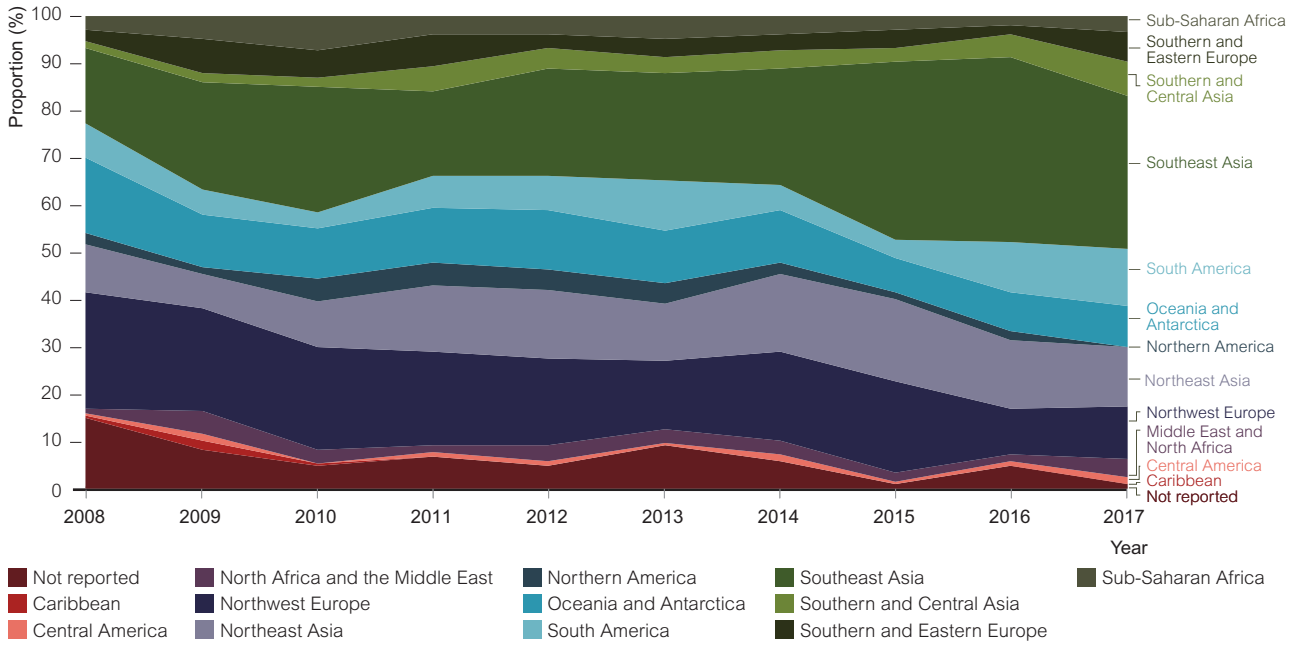


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Born in Australia	407	411	408	457	492	424	497	403	402	319
Born in Asia	50	59	69	85	104	98	118	169	180	128
Born in Other	103	112	103	128	132	134	130	119	113	116

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

HIV

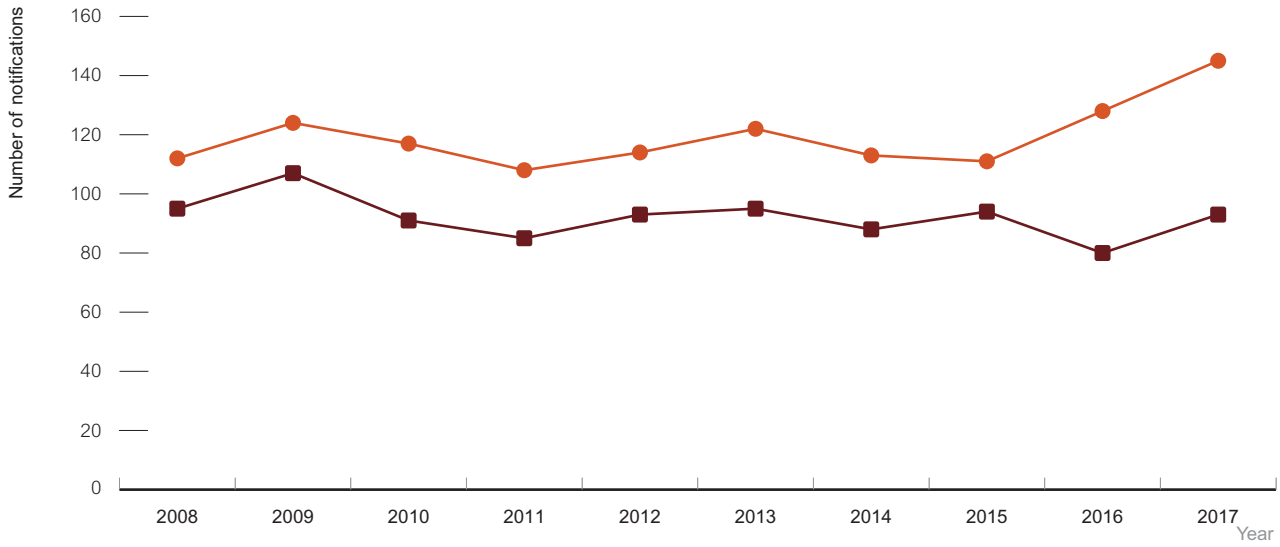
Figure 1.1.12 Proportion of HIV diagnoses in non-Australian-born men with male-to-male sex as risk exposure, 2008–2017, by region of birth



Source: State and territory health authorities.

Heterosexuals: Of 238 new HIV diagnoses in 2017 for which exposure to HIV was attributed to heterosexual sex, 145 were in men and 93 in women (Figure 1.1.13). Over half (54%, 128) were born in Australia, but a further 13% (32) born in Sub-Saharan Africa, and 13% (30) born in Southeast Asia (data not shown). In men, the number of diagnoses attributed to heterosexual sex has increased by 19% in the last five years, and has fluctuated in women, but remained relatively stable.

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



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

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

In 2017, nine men (6%) were reported as having a sexual partner at high risk of HIV, 16 (11%) were born in a high-prevalence country, and 30 (21%) had sex with a person from a high-prevalence country; for 90 men (62%) the sexual contact risk was not further specified (Figure 1.1.14). Of men in the 'heterosexual contact risk not further specified' category, two thirds (62%) were born in Australia (data not shown).

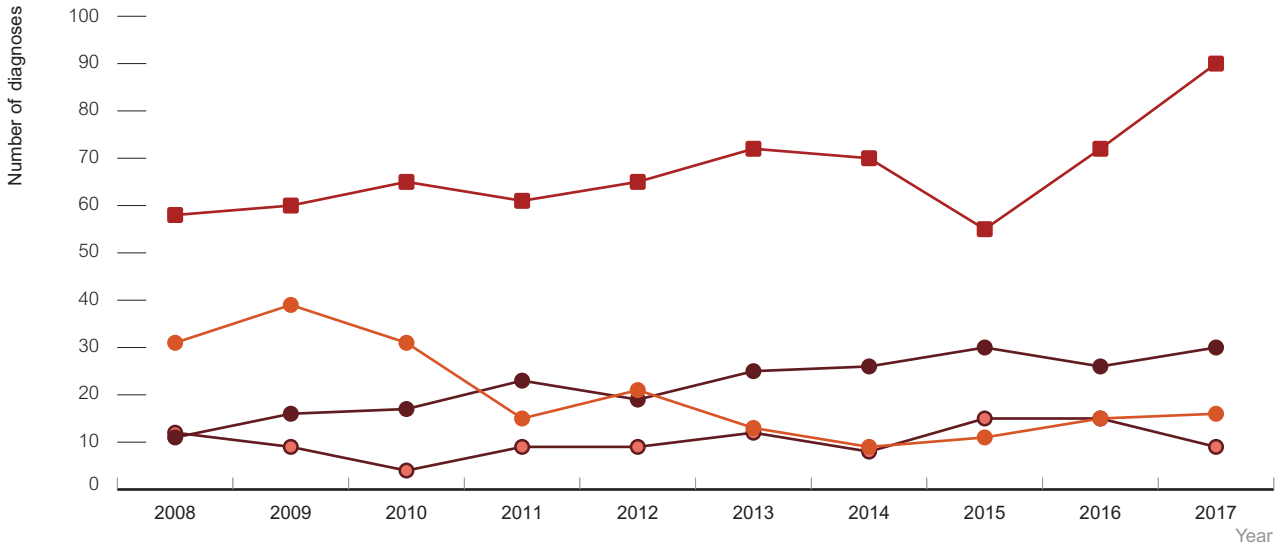
In 2017, 21 (23%) of women were reported as having a sexual partner at high risk of HIV, 25 (27%) were born in a high-prevalence country, and 2 (2%) had sex with a person from a high-prevalence country; for 45 (48%) sexual contact risk was not further specified (Figure 1.1.15). Of women in the 'heterosexual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

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

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

In the 10 year period 2008–2017, the number of heterosexual notifications in Australian-born males has increased by 45%, from 49 in 2008 to 89 in 2017 (Figure 1.1.17), compared to very little change in females (Figure 1.1.18). Heterosexual notifications among both males and females born in Asia have declined in the last ten years, by 55% and 47%, respectively. Heterosexual notifications in people born in Sub-Saharan Africa and other regions of birth have remained relatively steady over the same time-period.

Figure 1.1.14 Number of new HIV diagnoses in men reporting heterosexual sex, 2008–2017, by risk exposure subcategory



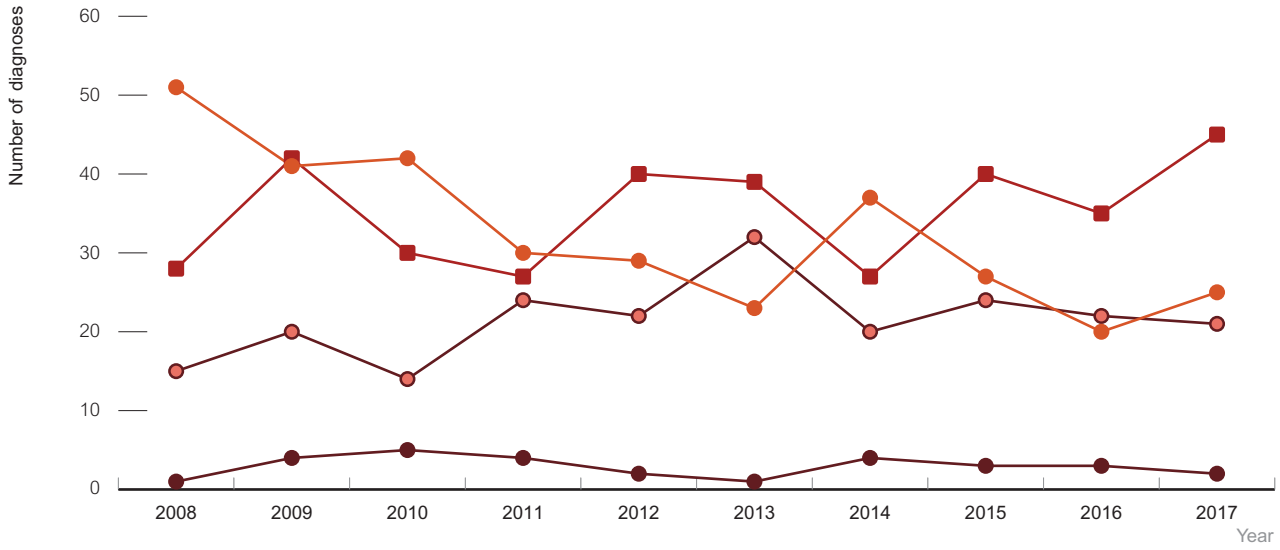
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Partner at high risk of HIV[a]	12	9	4	9	9	12	8	15	15	9
Person from a high–prevalence country	31	39	31	15	21	13	9	11	15	16
Partner from a high–prevalence country	11	16	17	23	19	25	26	30	26	30
Heterosexual contact risk not further specified	58	60	65	61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

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

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

HIV

Figure 1.1.15 Number of new HIV diagnoses in women reporting heterosexual sex, 2008–2017, by risk exposure subcategory

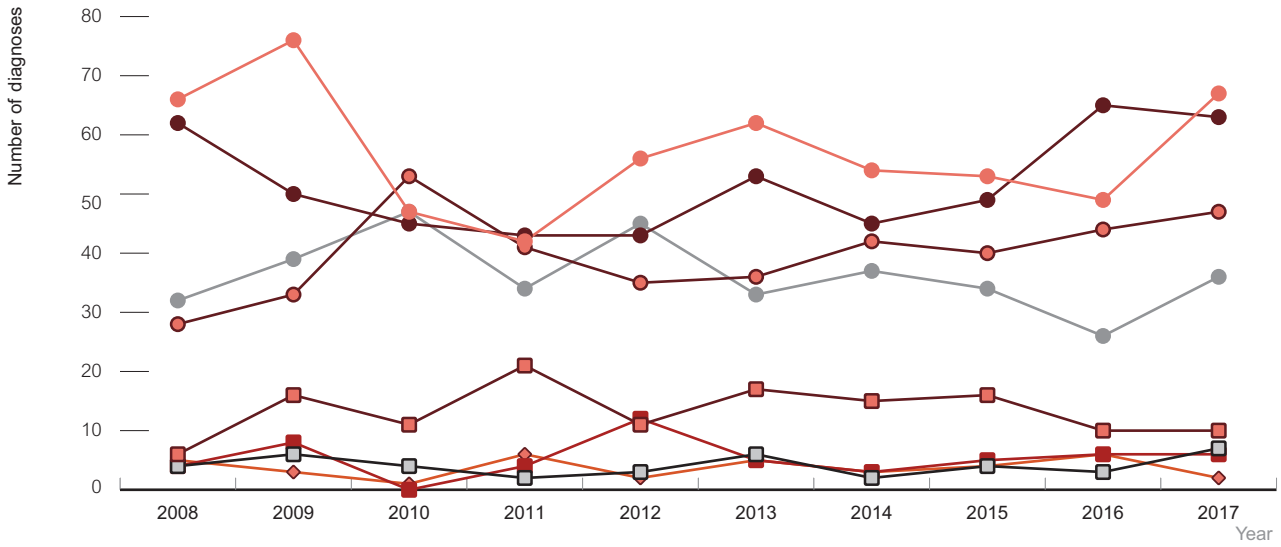


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Partner at high risk of HIV[a]	15	20	14	24	22	32	20	24	22	21
Person from a high–prevalence country	51	41	42	30	29	23	37	27	20	25
Partner from a high–prevalence country	1	4	5	4	2	1	4	3	3	2
Heterosexual contact risk not further specified	28	42	30	27	40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

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

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

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

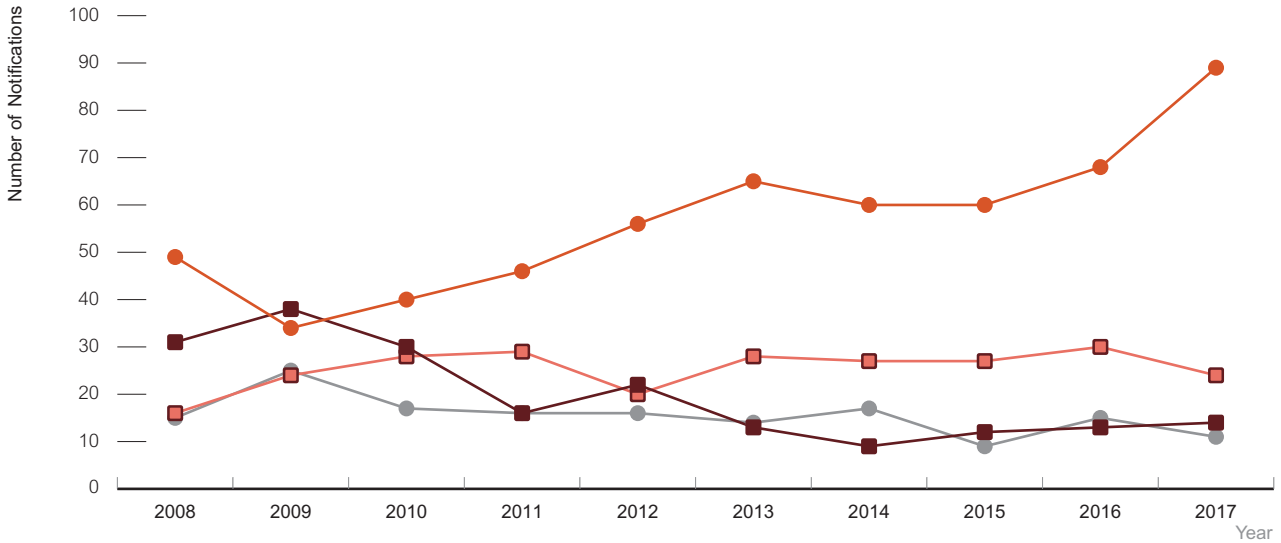


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ACT	4	6	4	2	3	6	2	4	3	7
NSW	66	76	47	42	56	62	54	53	49	67
NT	4	8	0	4	12	5	3	5	6	6
QLD	28	33	53	41	35	36	42	40	44	47
SA	6	16	11	21	11	17	15	16	10	10
TAS	5	3	1	6	2	5	3	4	6	2
VIC	62	50	45	43	43	53	45	49	65	63
WA	32	39	47	34	45	33	37	34	26	36

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

HIV

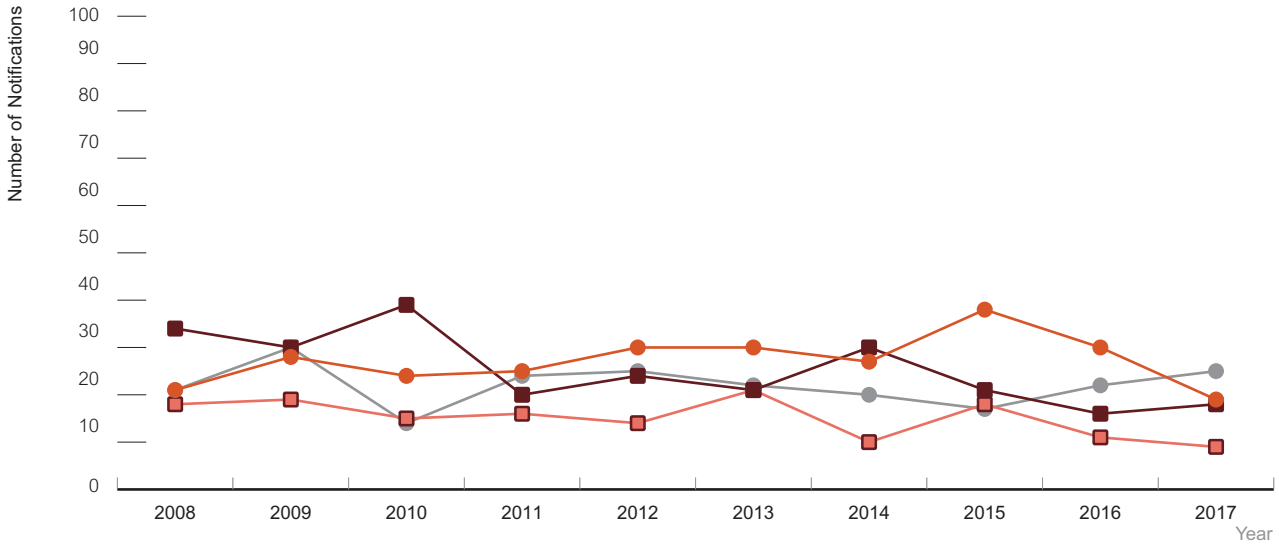
Figure 1.1.17 New HIV diagnoses in people who report heterosexual sex as an exposure risk, 2008–2017, by region/country of birth, men



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

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

Figure 1.1.18 New HIV diagnoses in people who report heterosexual sex as an exposure risk, 2008–2017, by region/country of birth, women



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

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

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

Age-standardised rates of HIV notification among the Aboriginal and Torres Strait Islander population were similar to the Australian-born non-Indigenous population in 2008, after which they started diverging; in 2017 rates were 1.6 times as high among the Aboriginal and Torres Strait Islander population (4.6 per 100 000 compared to 2.8 per 100 000 in the Australian-born non-Indigenous population) (Figure 1.1.19). The rate among Aboriginal and Torres Strait Islander people decreased between 2016 and 2017 from 6.5 per 100 000 to 4.6 per 100 000. Trends in HIV notification rates in the Aboriginal and Torres Strait Islander population are based on small numbers, particularly at the jurisdictional level, and may reflect localised occurrences rather than national patterns (see Figure 1.1.4 for the number of notifications by jurisdiction).

In the five years 2013–2017, HIV diagnoses reporting male-to-male sex accounted for 71% of diagnoses in the Australian born non-Indigenous population, compared to 45% in the Aboriginal and Torres Strait Islander population. In comparison, a greater proportion of HIV diagnoses in Aboriginal and Torres Strait Islander people were attributed to heterosexual sex (21%) or injecting drug use (18%) than in the Australian-born non-Indigenous population (18% and 3%, respectively) (Figure 1.1.20).

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

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

a Not adjusted for multiple reporting.

b Includes 'Other/not reported'

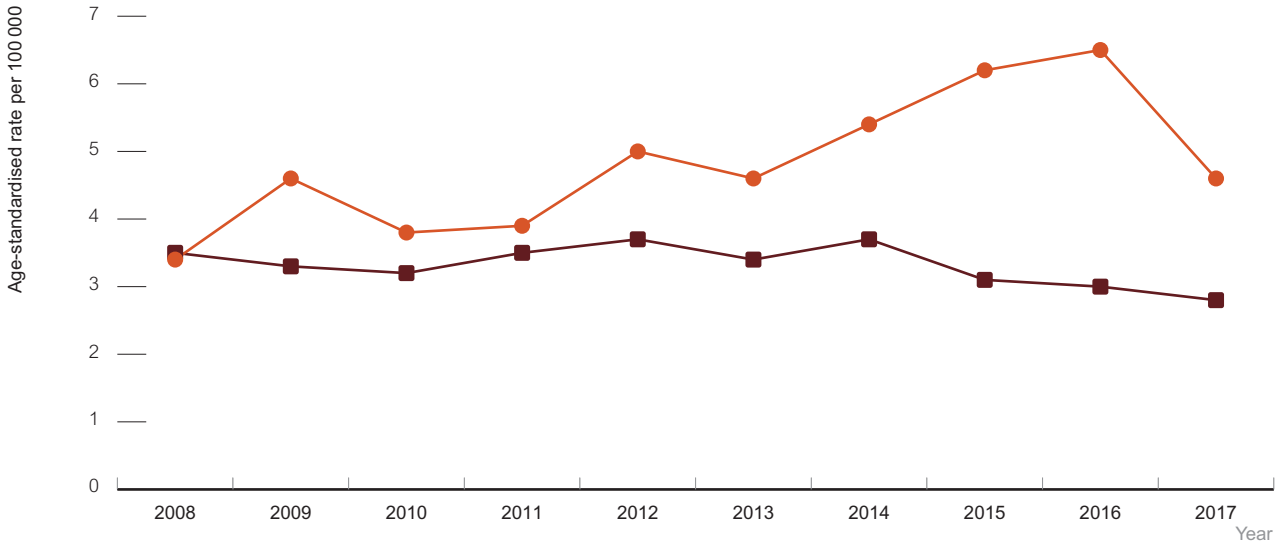
c Newly acquired HIV was defined as a new HIV diagnosis with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis.

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

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

Source: State and territory health authorities.

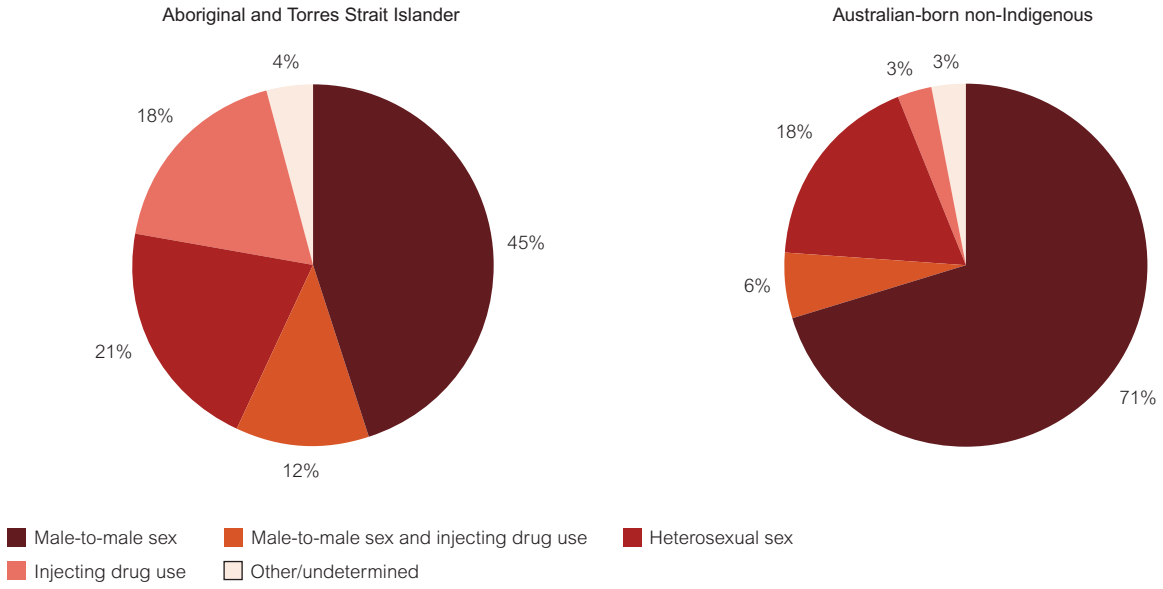
Figure 1.1.19 Newly diagnosed HIV notification rate per 100 000 Australian-born population, 2008–2017, by Aboriginal and Torres Strait Islander status



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

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

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

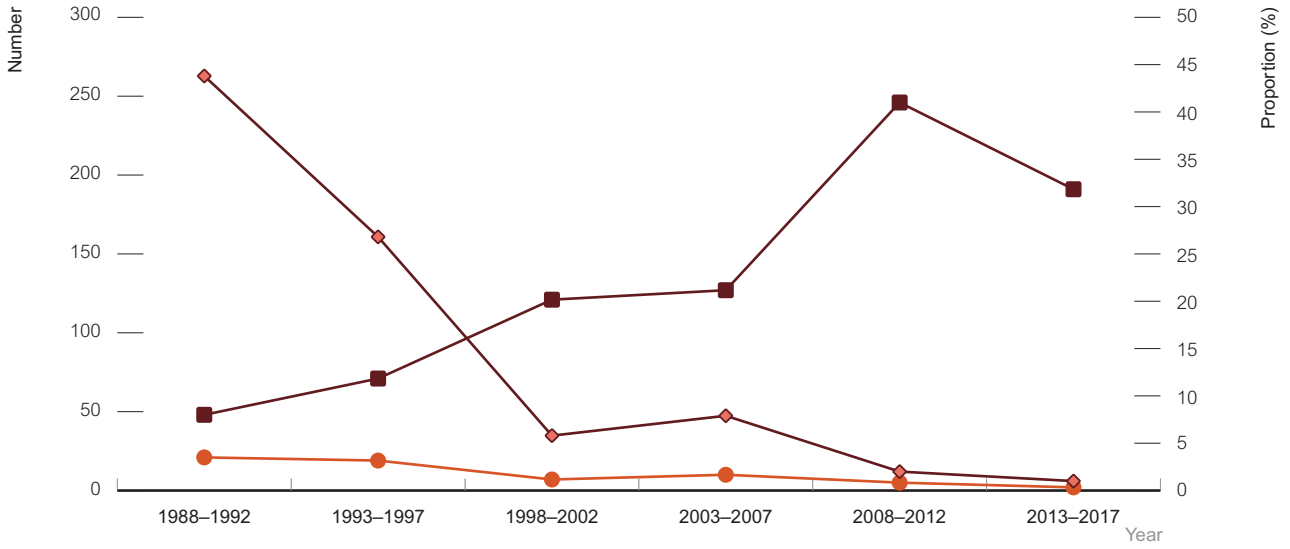


Note: **Percentages may not add to 100% due to rounding**

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

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

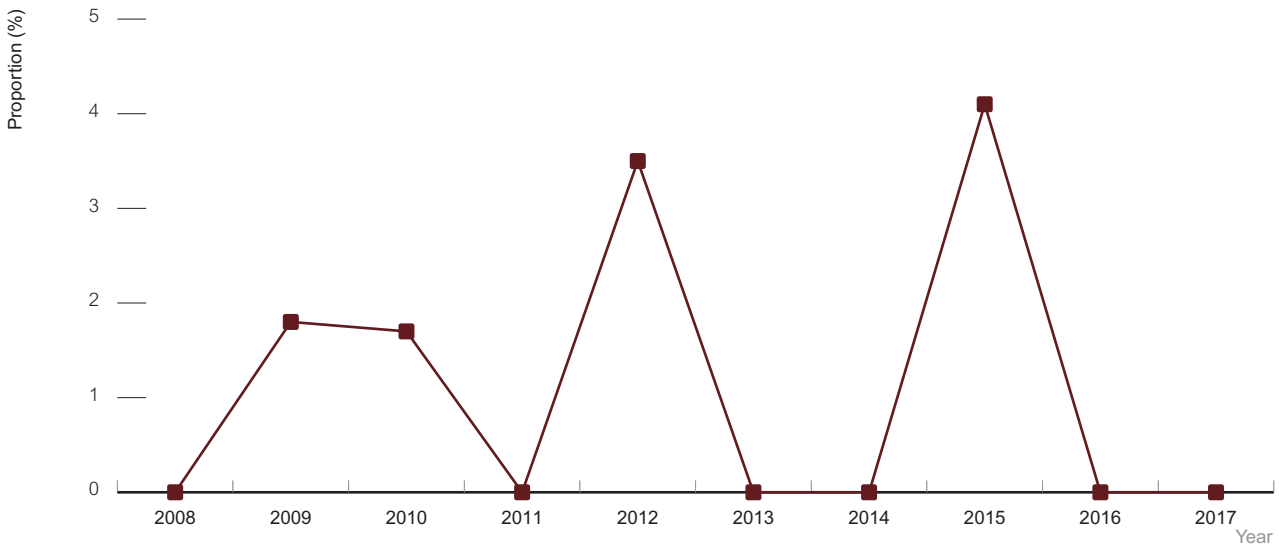
Figure 1.1.21 Number of Australian-born children perinatally exposed to HIV and proportion HIV-positive, 1985–2017, by year of birth



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

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

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



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

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

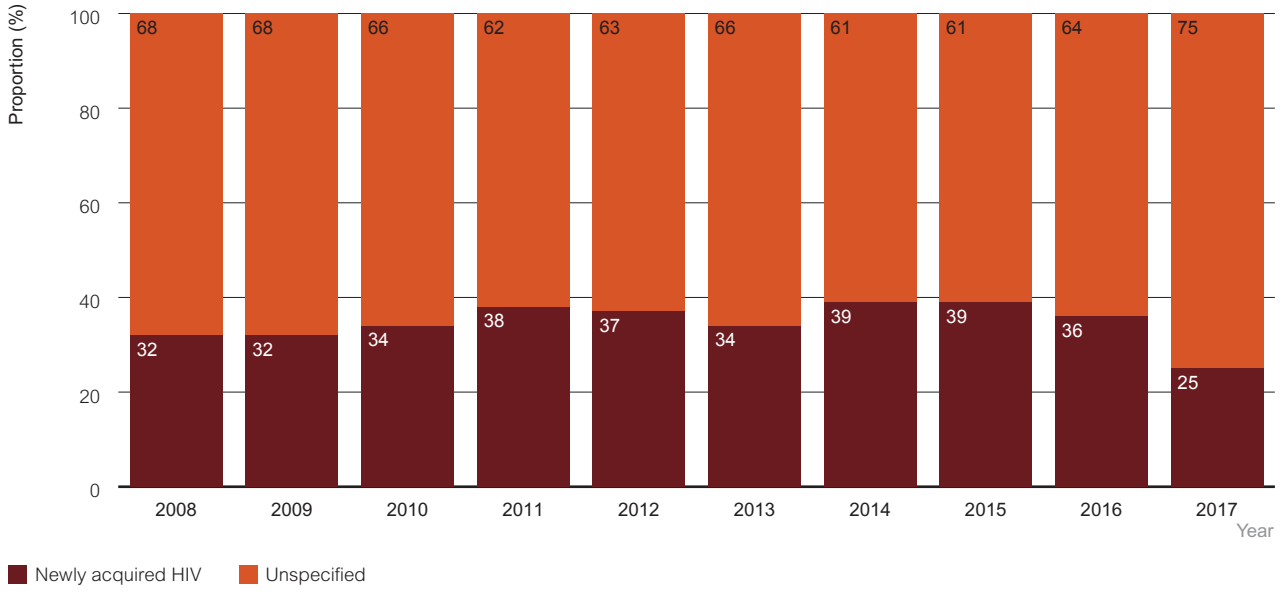
HIV

New HIV diagnoses classified as newly acquired

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

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

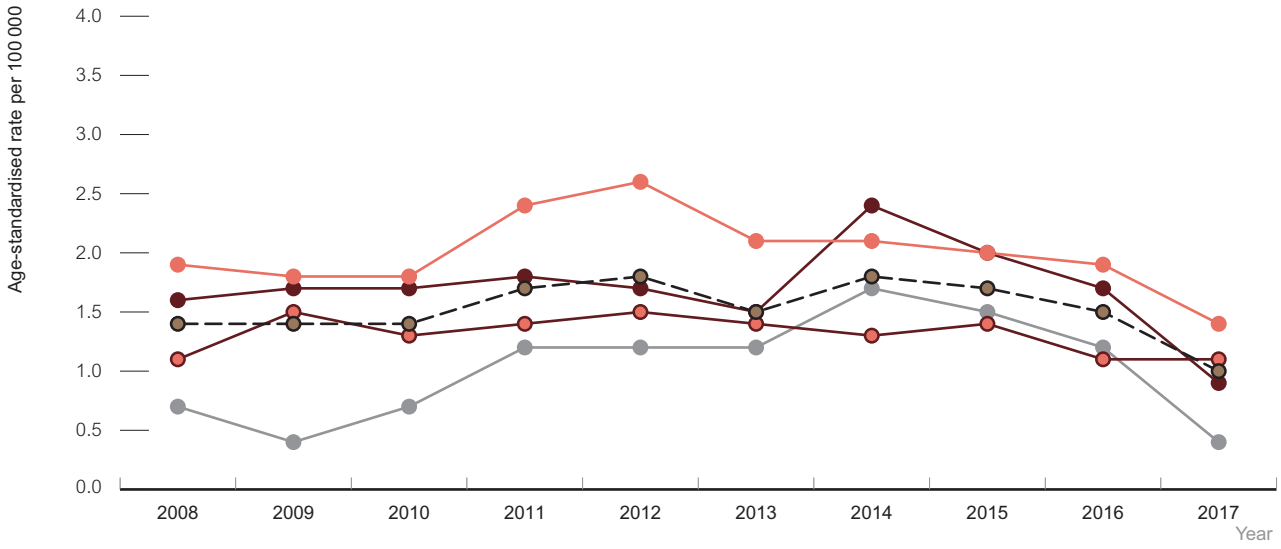
Figure 1.1.23 Newly diagnosed HIV in Australia, 2008–2017, by newly acquired HIV status and year



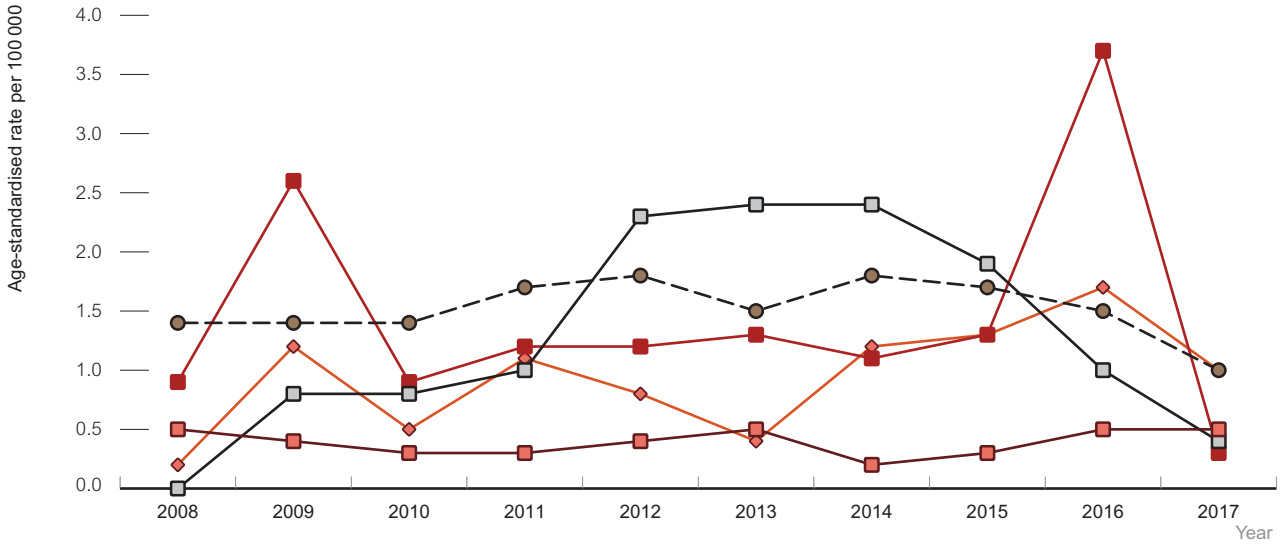
Note: Newly acquired HIV was defined as newly diagnosed infection with a negative or indeterminate HIV antibody test result or a diagnosis of primary HIV within one year before HIV diagnosis. Unspecified diagnoses are all diagnoses that do not meet the definition for newly acquired HIV.

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

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



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

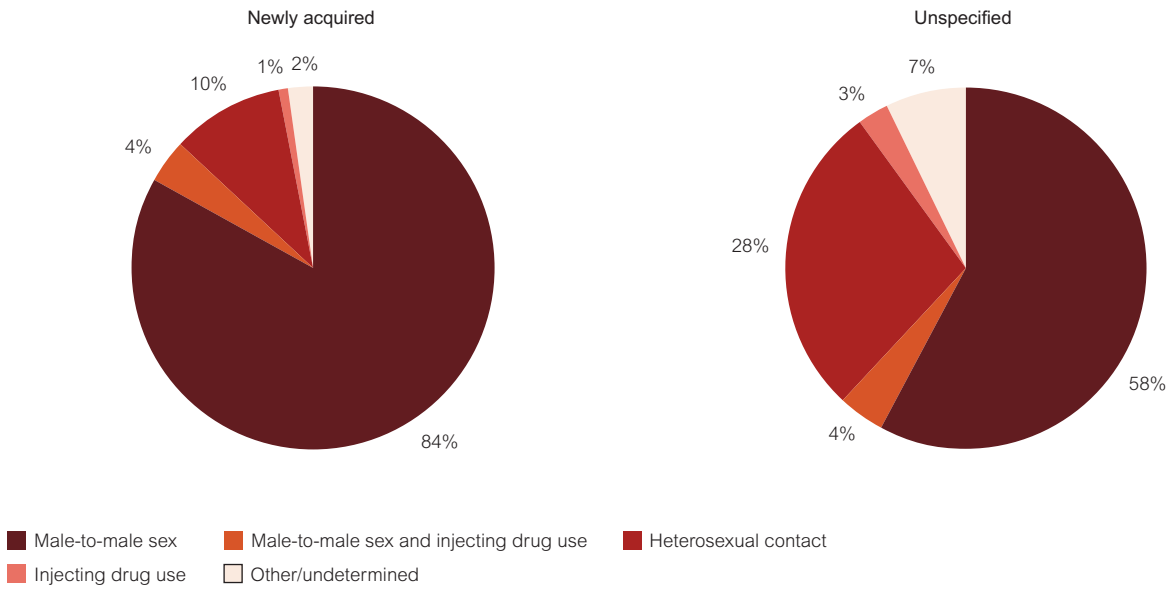


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ACT	0.0	0.8	0.8	1.0	2.3	2.4	2.4	1.9	1.0	0.4
NT	0.9	2.6	0.9	1.2	1.2	1.3	1.1	1.3	3.7	0.3
SA	0.5	0.4	0.3	0.3	0.4	0.5	0.2	0.3	0.5	0.5
TAS	0.2	1.2	0.5	1.1	0.8	0.4	1.2	1.3	1.7	1.0
Australia	1.4	1.4	1.4	1.7	1.8	1.5	1.8	1.7	1.5	1.0

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

Over the past 10 years (2008–2017) men with male-to-male sex as their HIV risk exposure accounted for 84% of newly acquired HIV diagnoses, compared to 58% of unspecified HIV diagnoses (not classified as newly acquired) (Figure 1.1.25), likely reflecting more frequent testing in this population. Over the past 10 years, the number of newly acquired HIV notifications in men reporting male-to-male sex peaked at 365 in 2014 and then decreased by 49% to 187 in 2017, representing an overall decrease of 21% between 2008 and 2017, and a 36% decrease in the past 5 years (Figure 1.1.26).

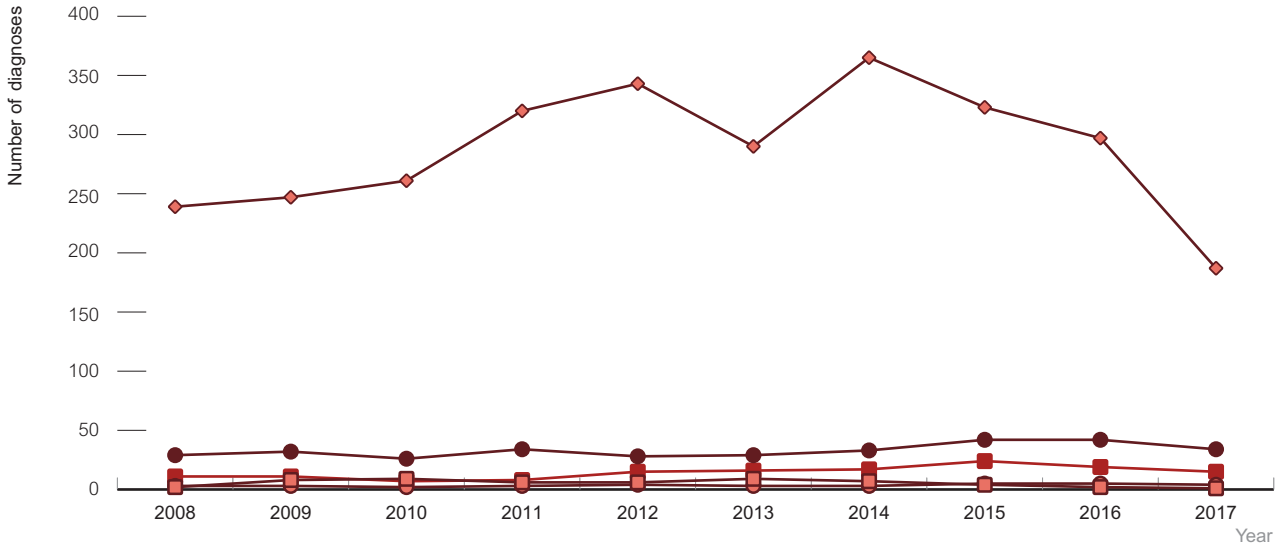
Figure 1.1.25 New HIV diagnoses classified as newly acquired or unspecified, 2008–2017, by HIV exposure category



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

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

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



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

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

HIV

Clinical and immunological markers of timing of HIV diagnosis

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

Likely place of HIV acquisition

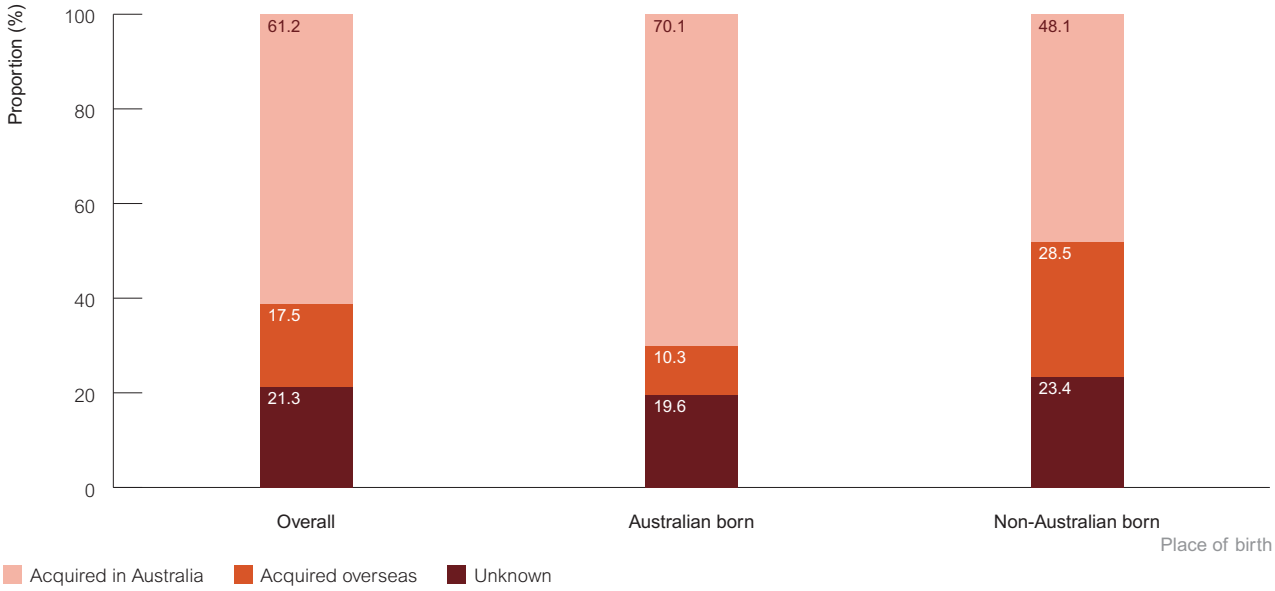
Between 2014 and 2017, notifications of new HIV diagnoses included likely place of HIV acquisition reported by the clinician, i.e. acquired in Australia, acquired overseas or place of acquisition unknown (see Methodology for further details).

Of new HIV diagnoses with male-to-male sex as their HIV exposure risk, 70% of Australian-born men were likely to have acquired HIV in Australia, compared with just under half (48%) among men born outside Australia. Among Australian-born men a further 10% of newly diagnosed men were likely to have acquired HIV overseas, compared with 29% among men born overseas (Figure 1.1.27).

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

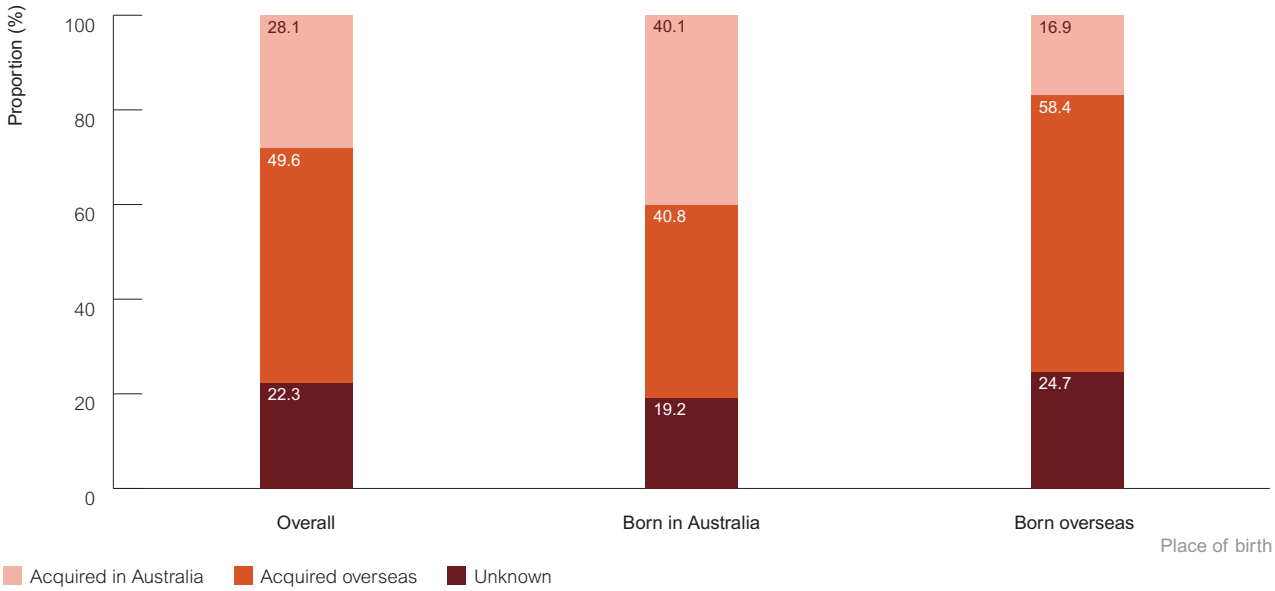
The above proportions may be misrepresentative as the likely place of acquisition was reported as unknown for between 17% and 28% of new diagnoses, depending on country of birth and HIV risk exposure.

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



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

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



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

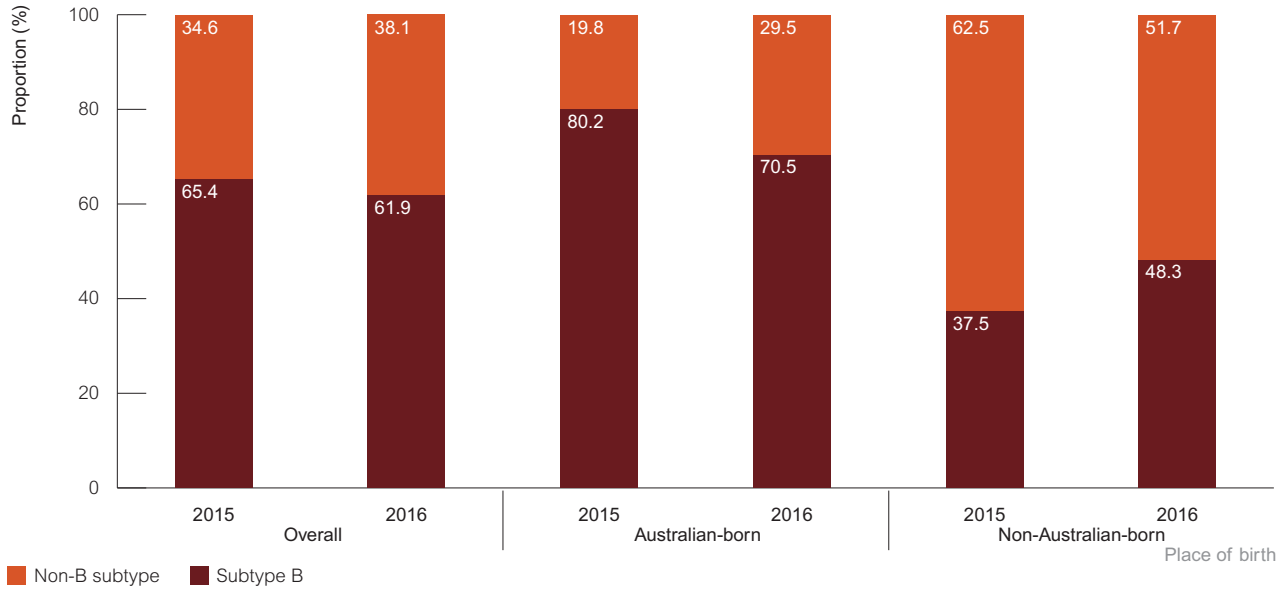
HIV subtype

HIV subtype has been included in this report for the second time as changes in the distribution of subtypes at a population level can inform prevention programs. There are at least nine subtypes of HIV-1 virus globally, A, B, C, D, F, G, H, J and K. Additionally, different subtypes can combine, creating what is known as a 'circulating recombinant form'. The dominant HIV subtype in the Americas, Western Europe and Australasia is subtype B[6, 7]. Subtype C is more common in India and high-prevalence countries of sub-Saharan Africa.

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

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

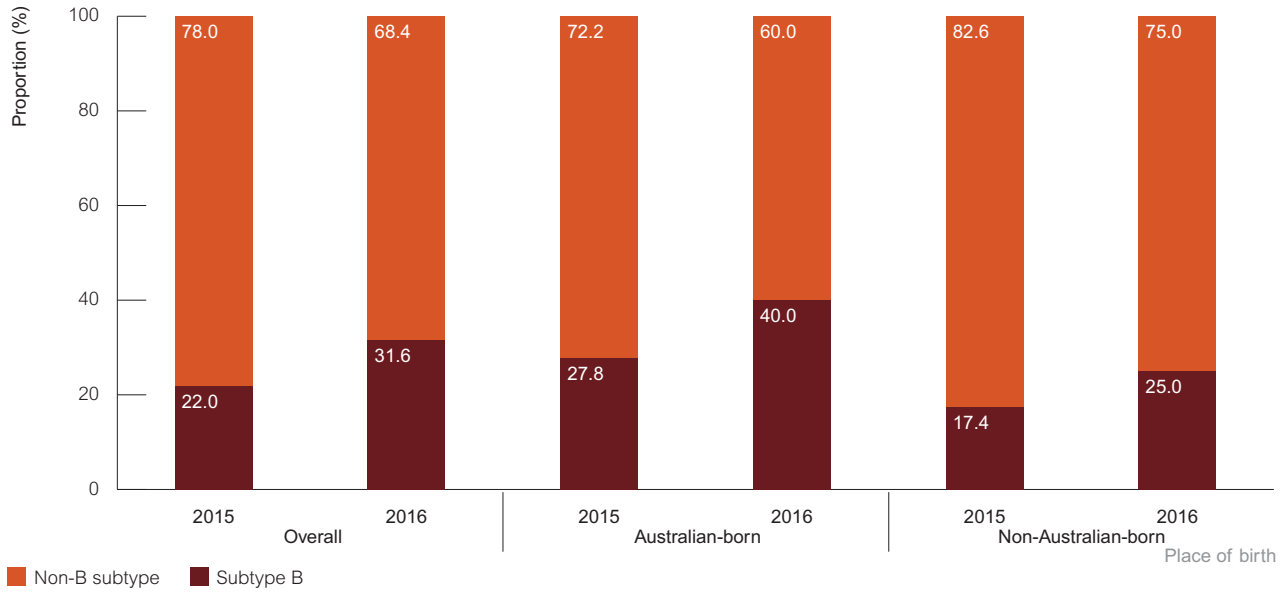
Figure 1.1.29 HIV subtype distribution in new HIV diagnoses in men who reported male-to-male sex as their exposure risk, 2015 and 2016, by country of birth



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

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

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



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

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

Late and advanced HIV diagnoses

HIV

CD4+ cell count at HIV diagnosis can indicate how long a person has had HIV before being diagnosed. CD4+ cell count is above 500 cells/μL in most people without HIV, and declines on average by 50 to 100 cells/μL per year in people with HIV.[8] Late HIV diagnosis is defined as CD4+ cell count less than 350 cells/μL at diagnosis (see Methodology for further details).

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

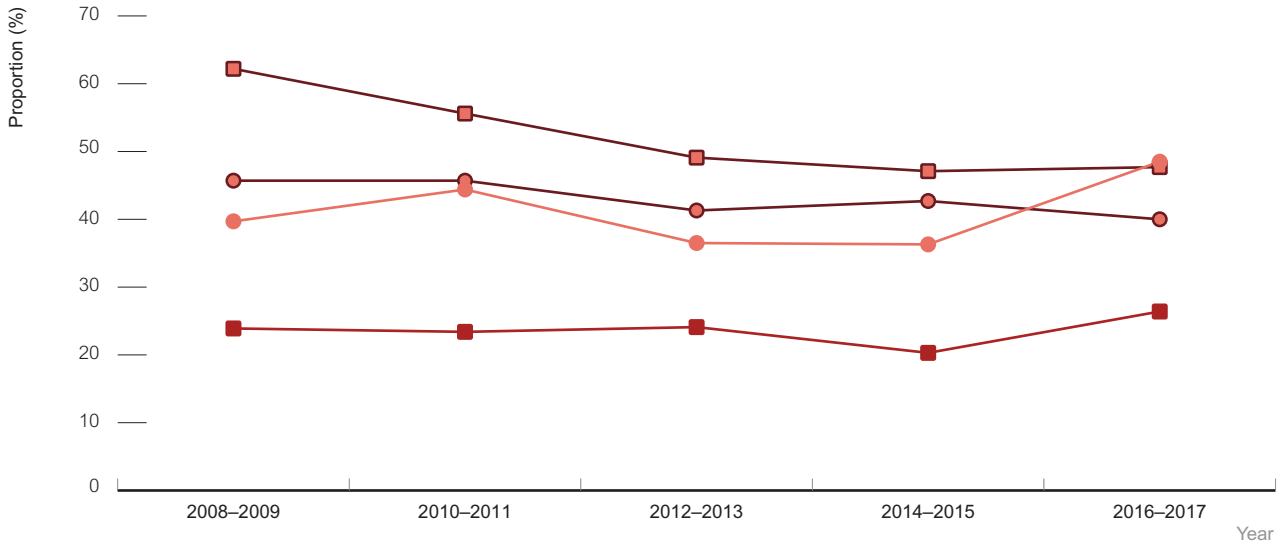
Over the past five years (2013–2017) the proportion of HIV notifications with late diagnosis was highest in people born in Sub-Saharan Africa (53%), Southeast Asia (48%) and Central America (43%) (data not shown).

Late HIV diagnoses by key characteristics and exposure category

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

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

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



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

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

Source: State and territory health authorities

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

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

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

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

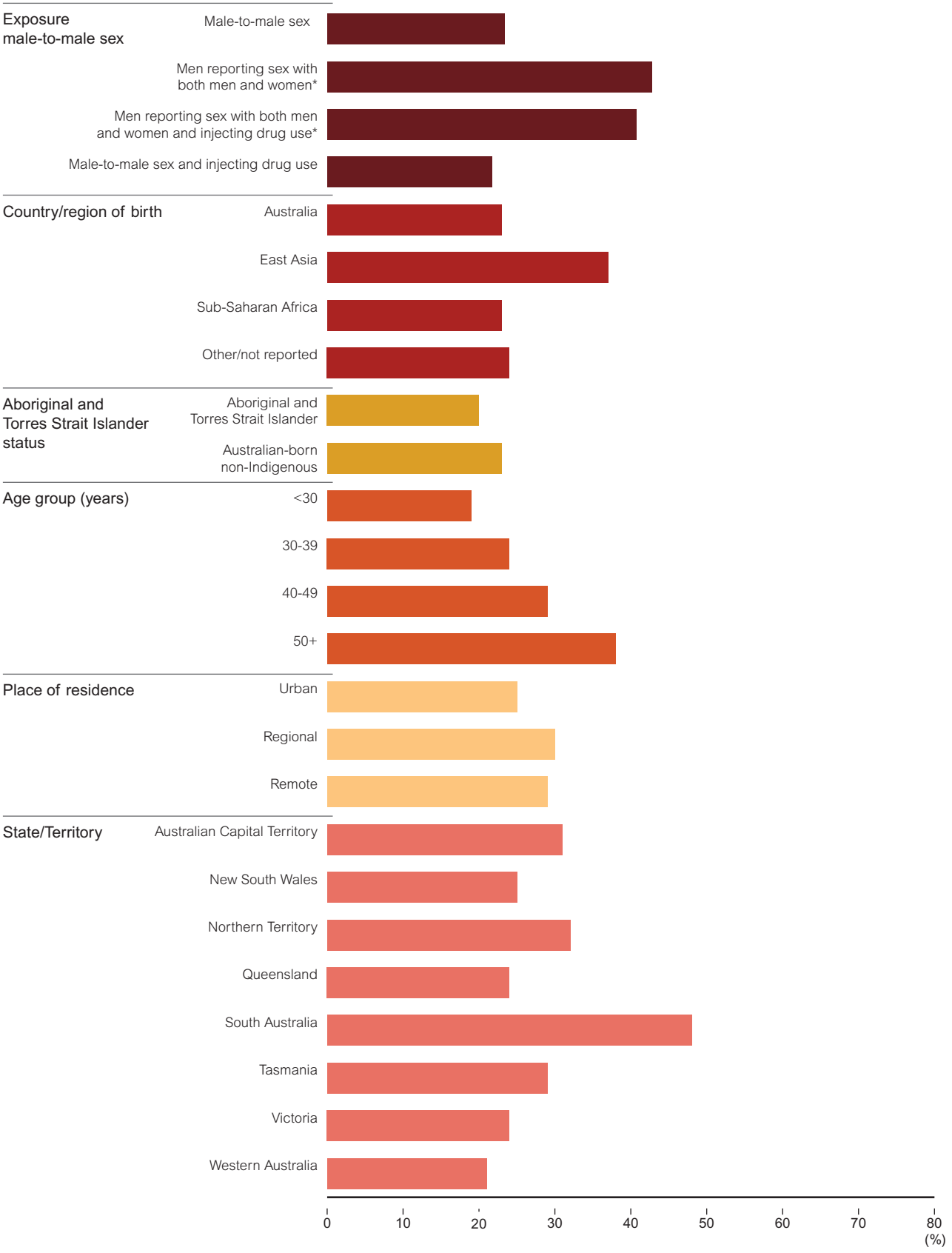
c Includes ABS regions Southeast Asia and Northeast Asia.

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

e Excludes notifications with no postcode provided.

Source: State and territory health authorities.

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



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

Source: State and territory health authorities.

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

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

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

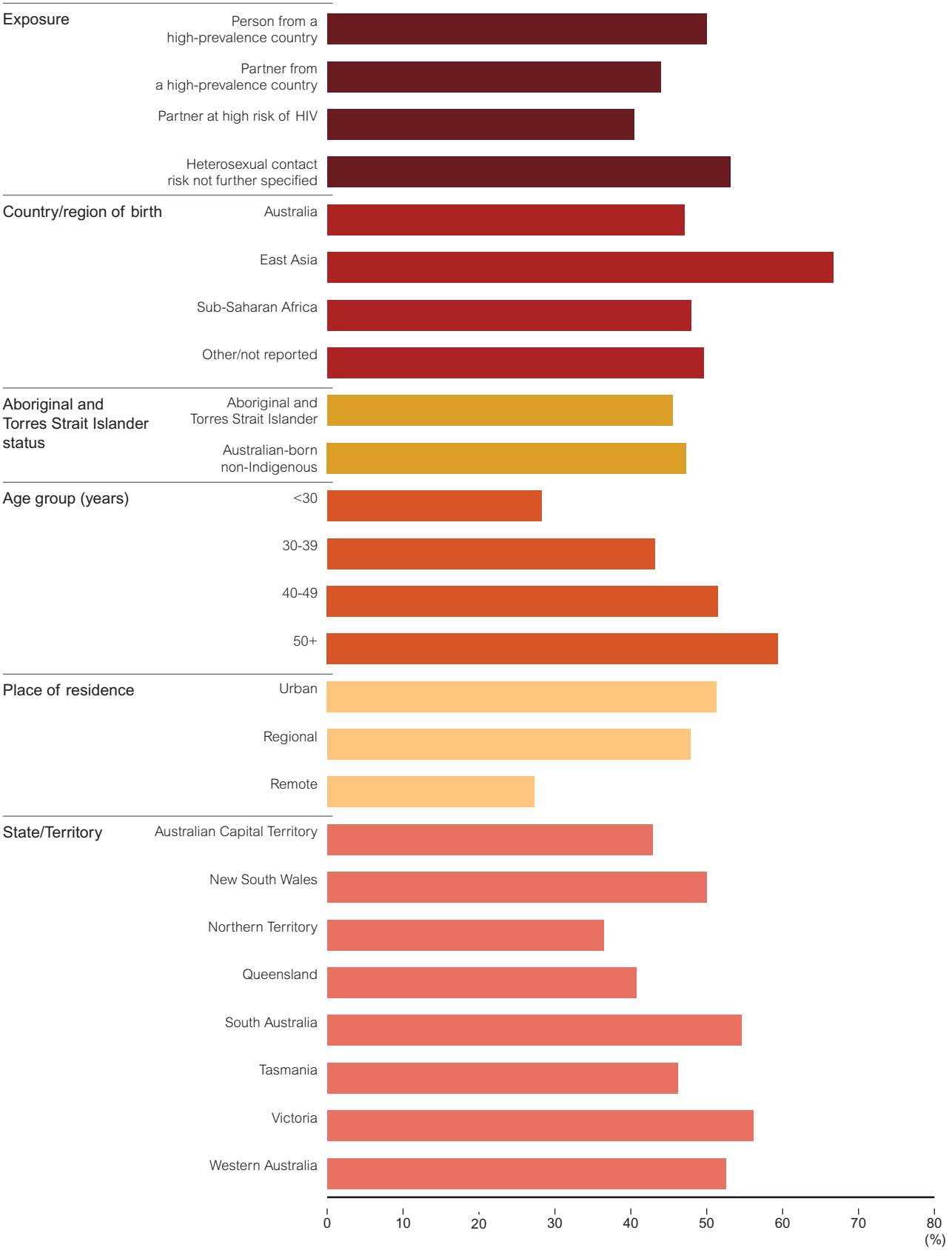
a Late HIV diagnosis was defined as new HIV diagnoses with a CD4+ cell count of less than 350 cells/μL. Newly acquired HIV was not categorised as late or advanced diagnoses irrespective of CD4+ cell count. Notifications without a CD4+ cell count available were excluded.

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

c Includes ABS regions Southeast Asia and Northeast Asia.

Source: State and territory health authorities

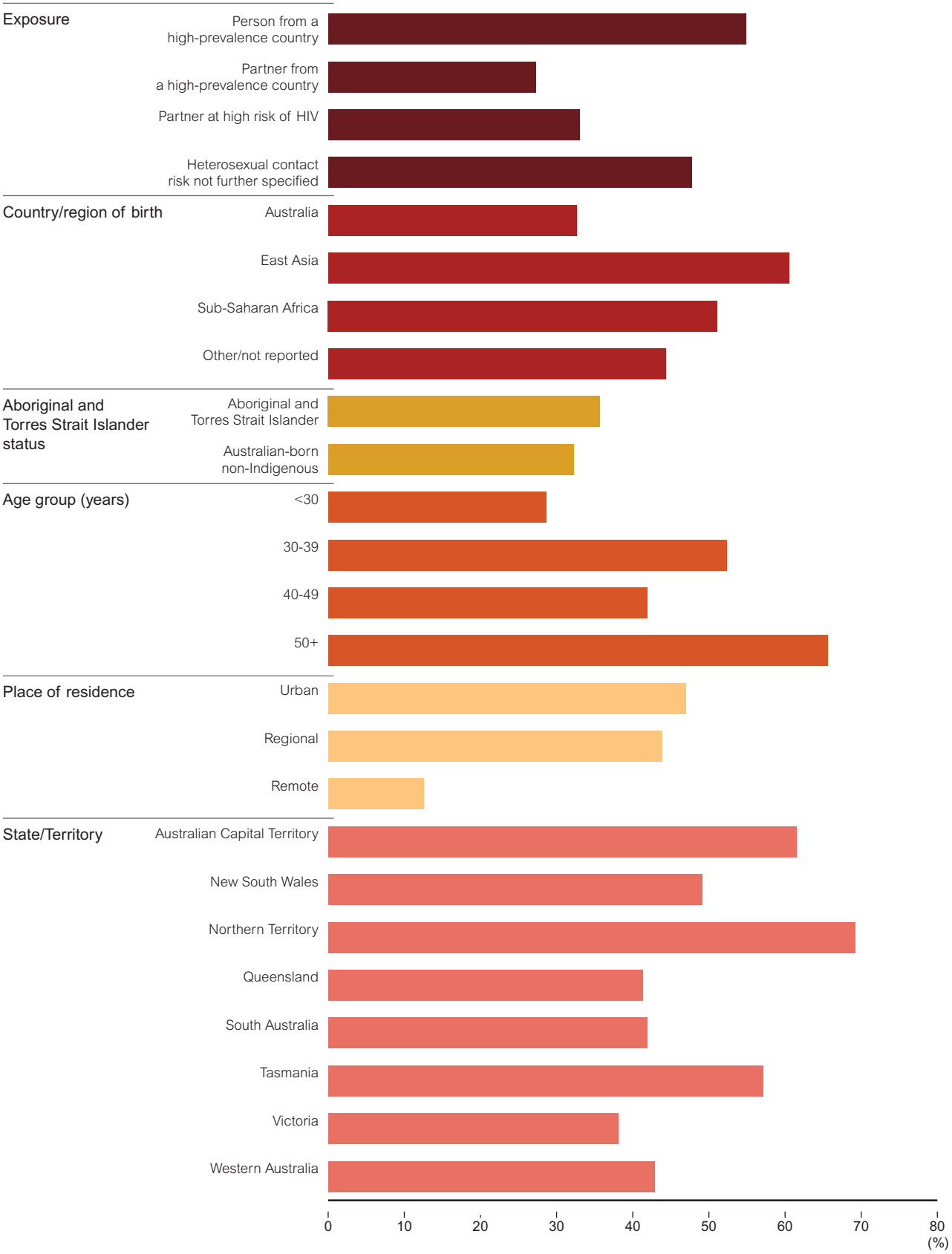
Figure 1.1.33 The proportion of late HIV diagnoses in men who reported heterosexual sex as an exposure risk, 2013–2017, by subcategory (n=522)



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

Source: State and territory health authorities.

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



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

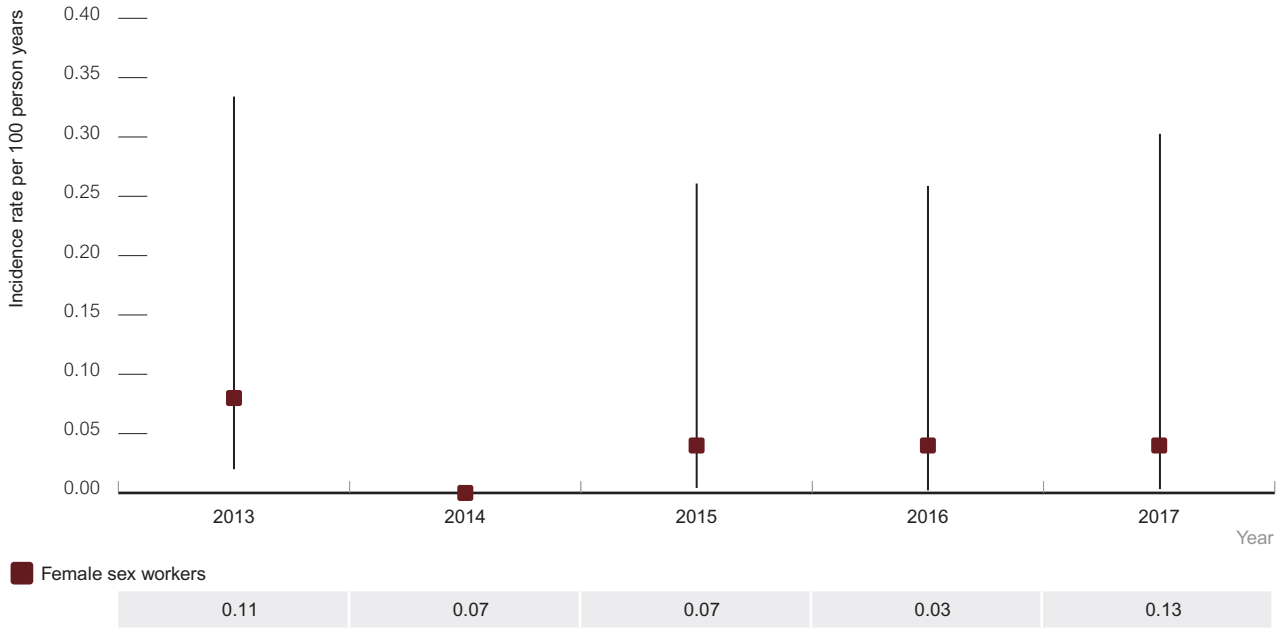
Source: State and territory health authorities

1.2 HIV incidence

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

For the years 2013 to 2017, among female sex-workers attending sexual health services who had at least one repeat HIV test (*n* =7 212), there were 5 seroconversions during 12 771 person-years at risk, equating to an overall HIV incidence of 0.04 per 100 person-years (95% CI 0.02–0.09). The HIV incidence remained at or under 0.08 per 100 person-years over the past five years (Figure 1.2.1).

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



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

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

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

1.3 Number of people living with HIV and prevalence

Number of people living with HIV

At the end of 2017, among the 27 545 people estimated to be living with HIV in Australia, 20 922 infections were attributable to male-to-male sex exposure, 6 245 to heterosexual sex, 605 to injecting drug use, and 168 to 'other' exposures (vertical transmission to newborn, blood/tissue recipient, healthcare setting, haemophilia/coagulation disorder) (Table 1.3.1).

There were an estimated 582 people living with HIV in Australia at the end of 2017 who were reported to be Aboriginal and Torres Strait Islander at the time of HIV diagnosis. After adjusting for missing country of birth data, there were 2 529 people living with HIV born in Southeast Asia and 1 553 born in Sub–Saharan Africa (Table 1.3.1).

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

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

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

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

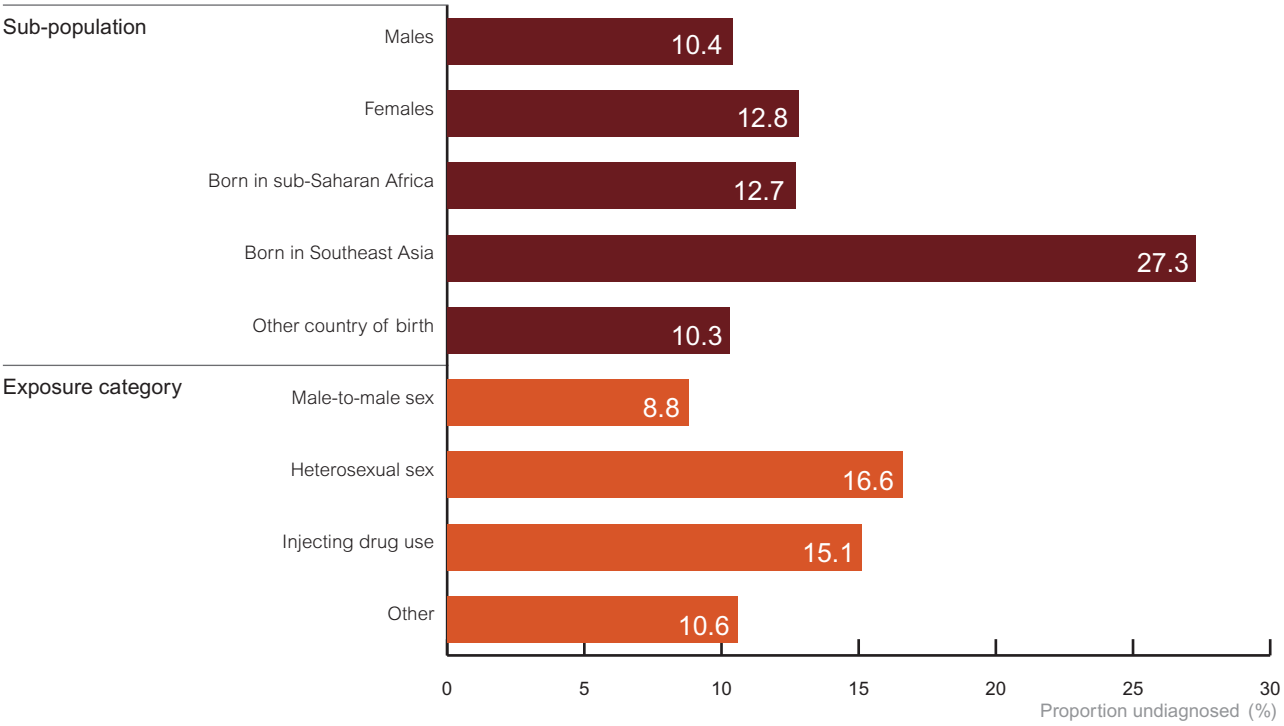
Source: See Methodology for details of mathematical modelling used to generate estimates.

Undiagnosed HIV infection

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

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

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

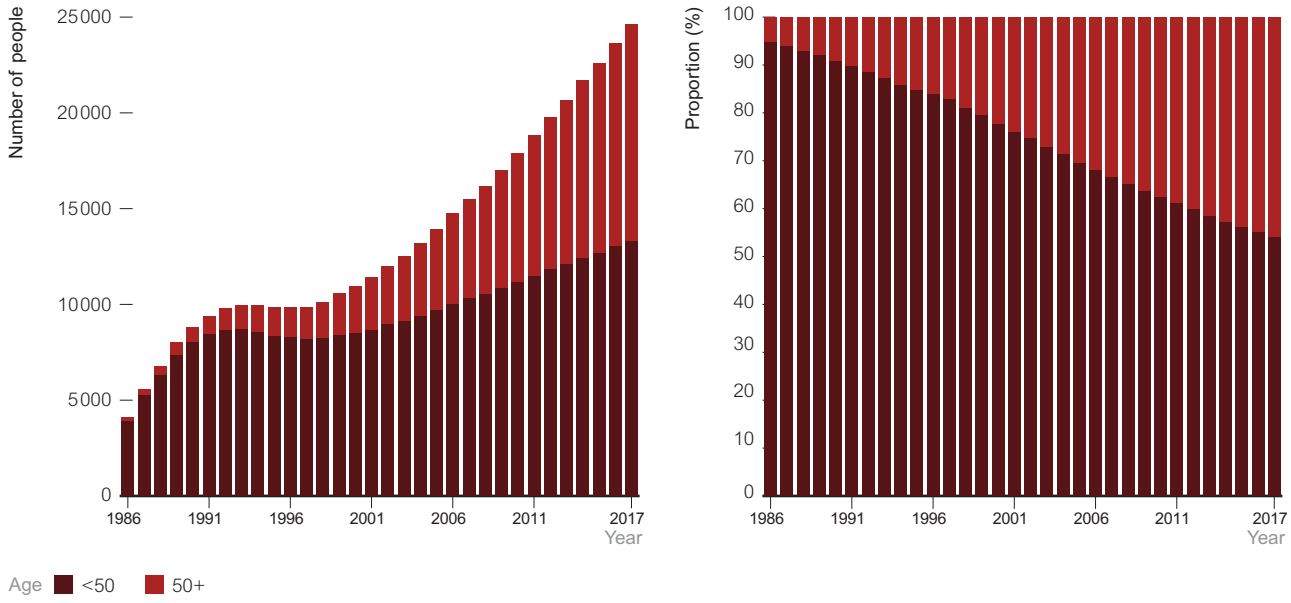


Source: See Methodology for details of mathematical modelling used to generate estimates.

Age of people living with diagnosed HIV

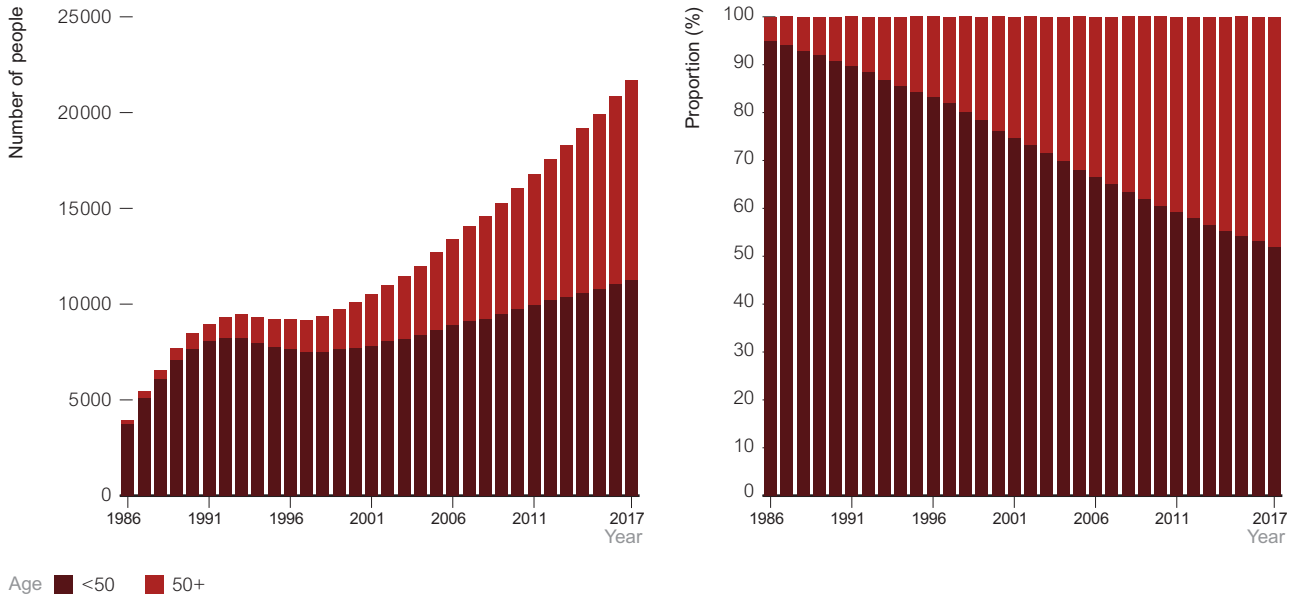
Since 1986 the number of people living with diagnosed with HIV has increased six-fold (4110 in 1986 to 24 645 in 2017). The age of the HIV-positive population has increased quite dramatically since 1986 due to the emergence of antiretroviral therapy in the mid-1990s, resulting in vastly improved survival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

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



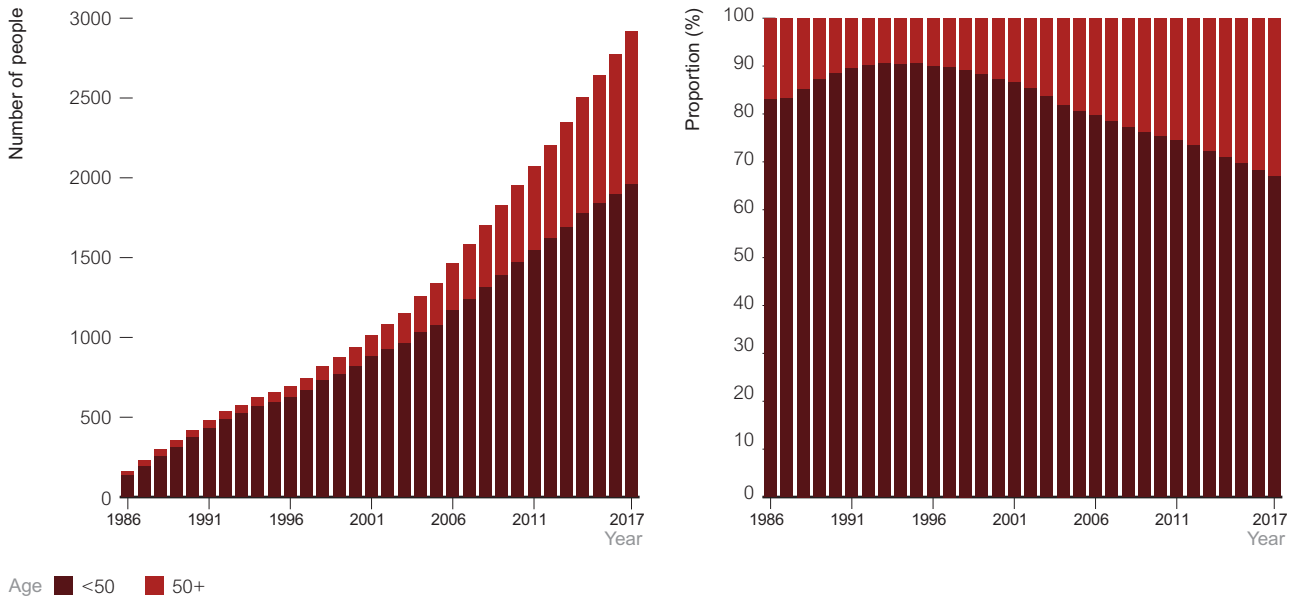
Source: See Methodology for details of mathematical modelling used to generate estimates.

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



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

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



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

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

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

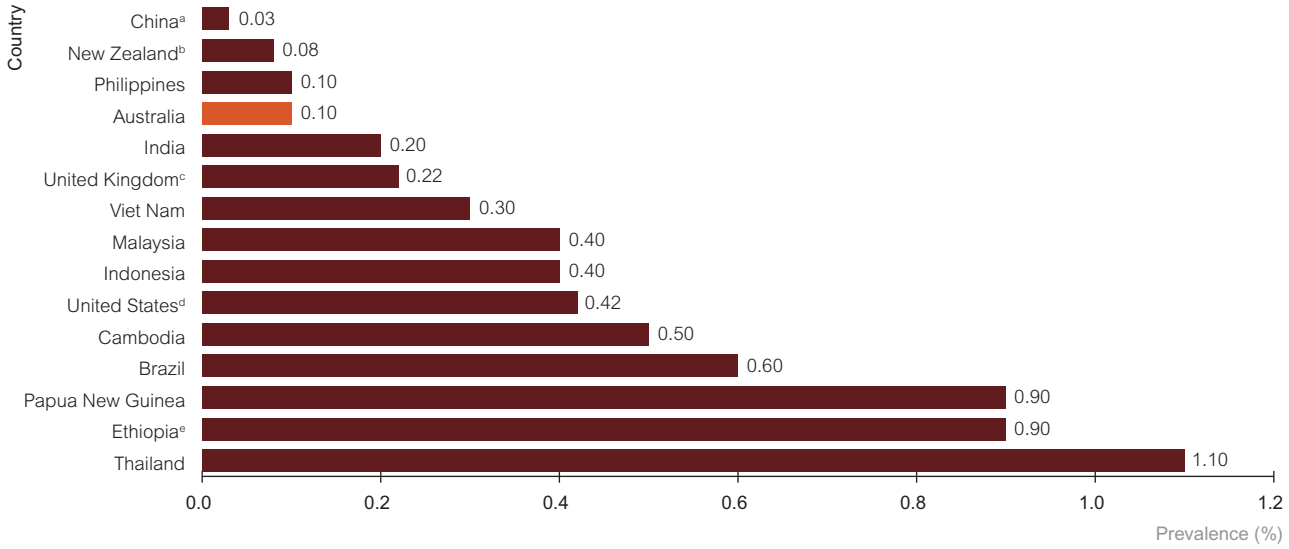
Source: See Methodology for details of mathematical modelling used to generate estimates.

HIV prevalence

The estimated HIV prevalence in Australia (the proportion of people who are living with HIV) in 2017 was 0.14% among adults aged older than 15 years (Figure 1.3.5). The prevalence in Australia is low compared to that reported to UNAIDS by other high-income countries including the United Kingdom (0.22% in 2016), the United States (0.42% in 2015) and neighbouring countries in the Asia Pacific region (Figure 1.3.5). HIV prevalence among Aboriginal and Torres Strait Islander people was estimated to be 0.11% in 2017 (Table 1.3.1).

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

Figure 1.3.5 Estimated HIV prevalence in selected countries, 2017

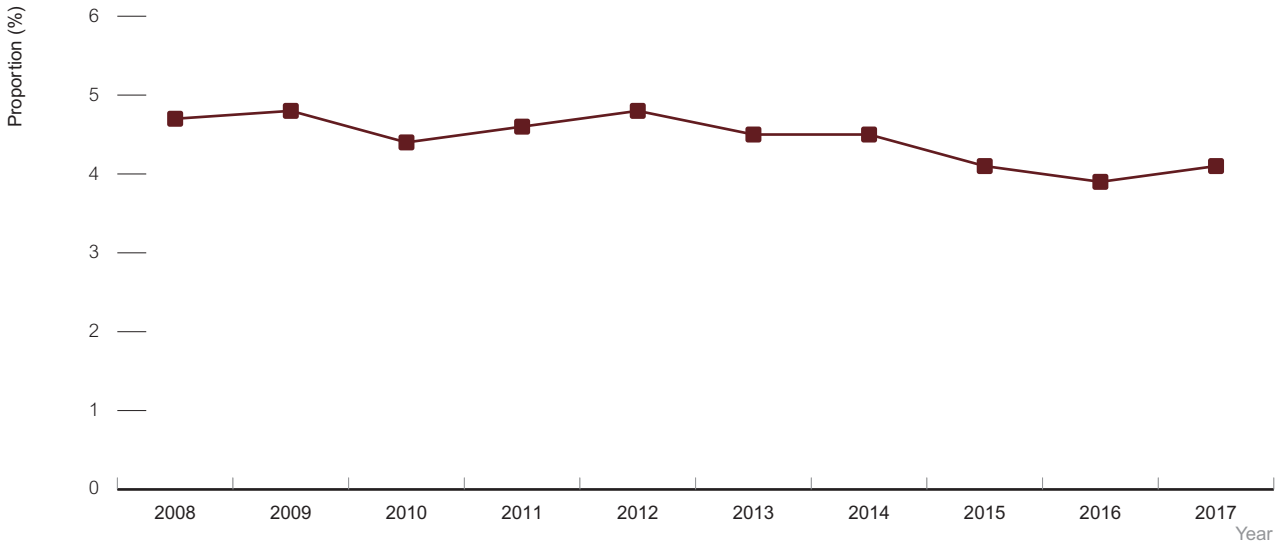


a 2013 prevalence
b 2017 prevalence (AIDS Epidemiology Group (AEG), 2017)
c 2016 prevalence (Public Health England, 2017)
d 2015 prevalence (Center for Disease Control (CDC), 2015)
e 2015 Prevalence

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

HIV

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

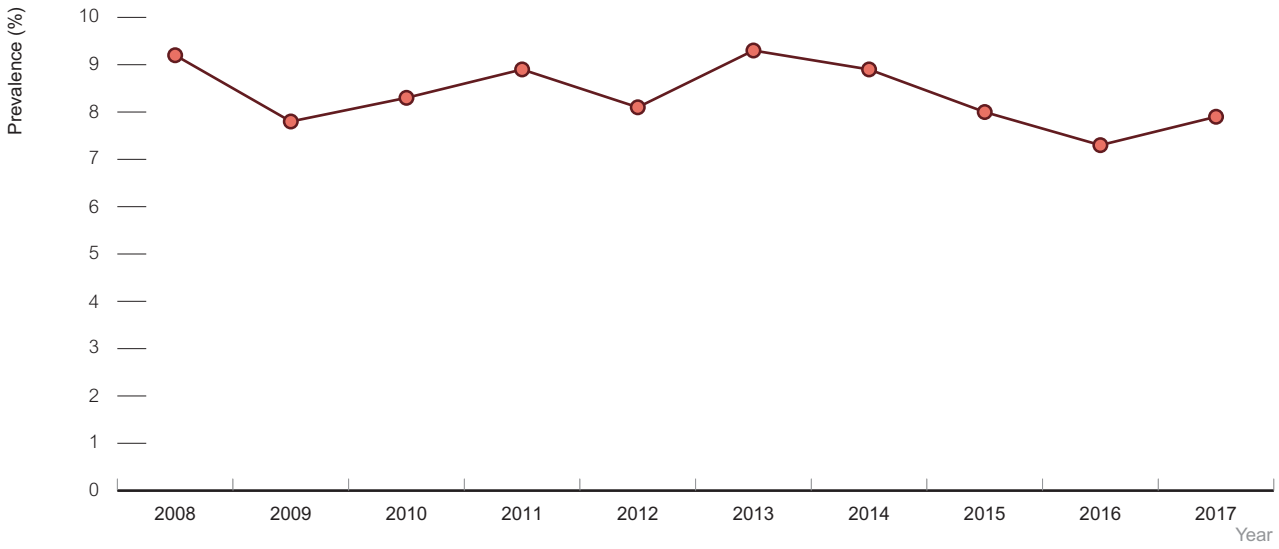


Proportion (%)									
4.7	4.8	4.4	4.6	4.8	4.5	4.5	4.1	3.9	4.1

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

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

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

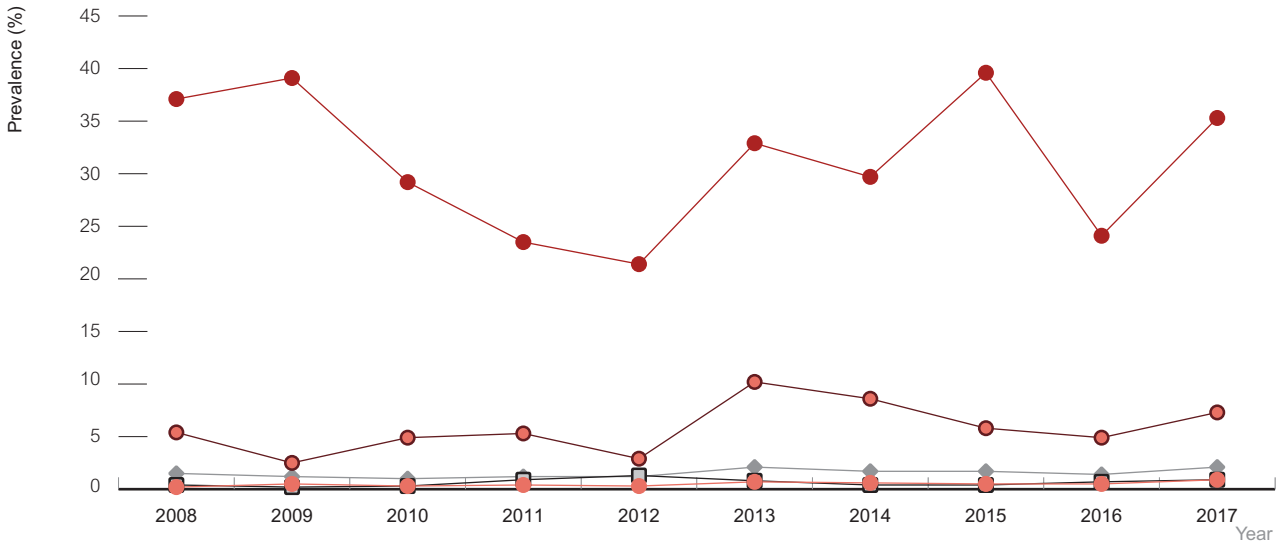


HIV prevalence (%)									
9.2	7.8	8.3	8.9	8.1	9.3	8.9	8.0	7.3	7.9

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

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

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



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

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

HIV

1.4 HIV testing and care

The HIV diagnosis and care cascade

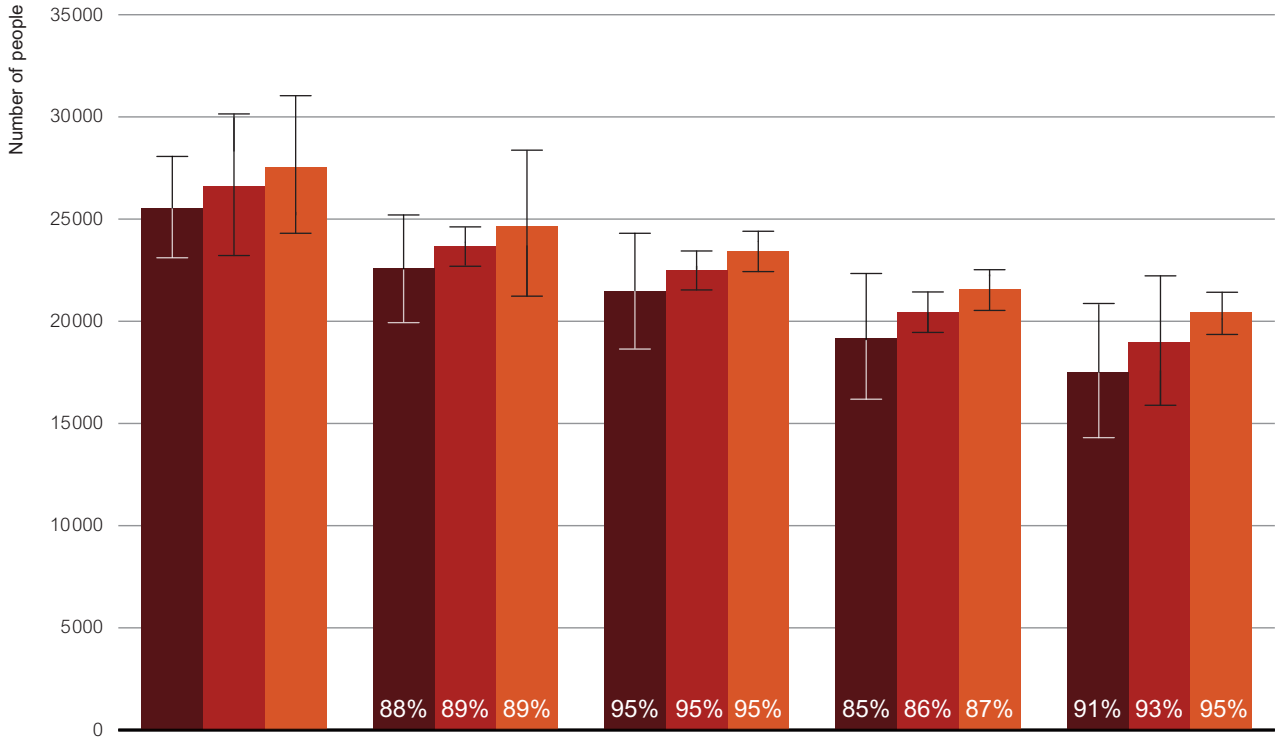
This report includes the 'HIV diagnosis and care cascade', which estimates the number of people living with HIV in Australia, and the number and proportion of people with HIV who are diagnosed, receiving antiretroviral treatment, retained in care (having had a viral load or CD4+ cell count in the past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

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

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

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

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



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

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

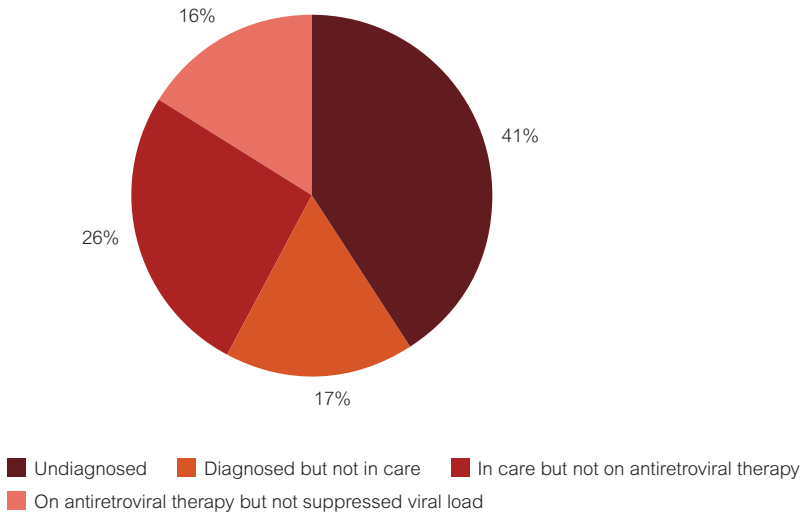
HIV

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

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

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

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

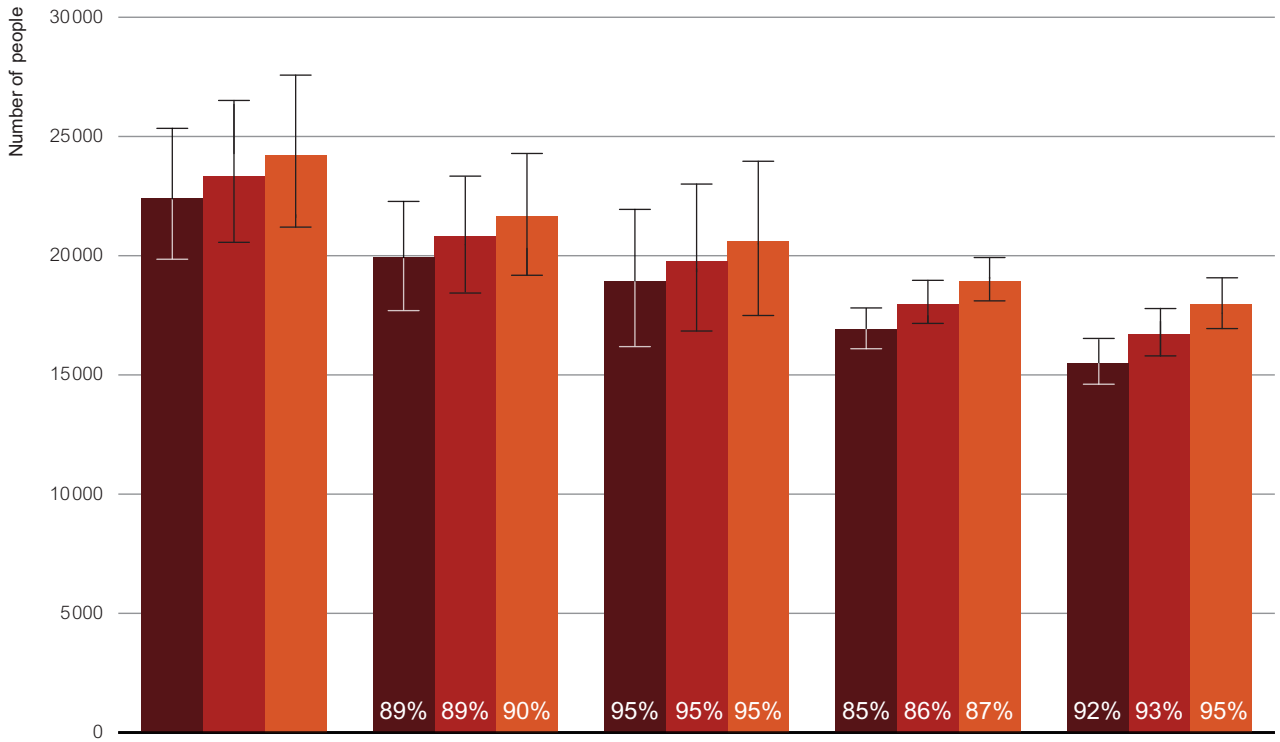


Source: See Methodology for details of mathematical modelling used to generate estimates.

The HIV diagnosis and care cascade for males

It was estimated that there were 24 206 males living with HIV in Australia in 2017. Of these an estimated 21 677 (90%) were diagnosed, 20 593 (95% of those diagnosed) were retained in care, 18 949 (87% of those diagnosed) were receiving antiretroviral therapy, and 17 953 (95% of those on antiretroviral therapy) had a suppressed viral load (Figure 1.4.3, Table 1.4.2). This corresponds to 74% of all males living with HIV with a suppressed viral load in 2017.

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



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

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

HIV

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

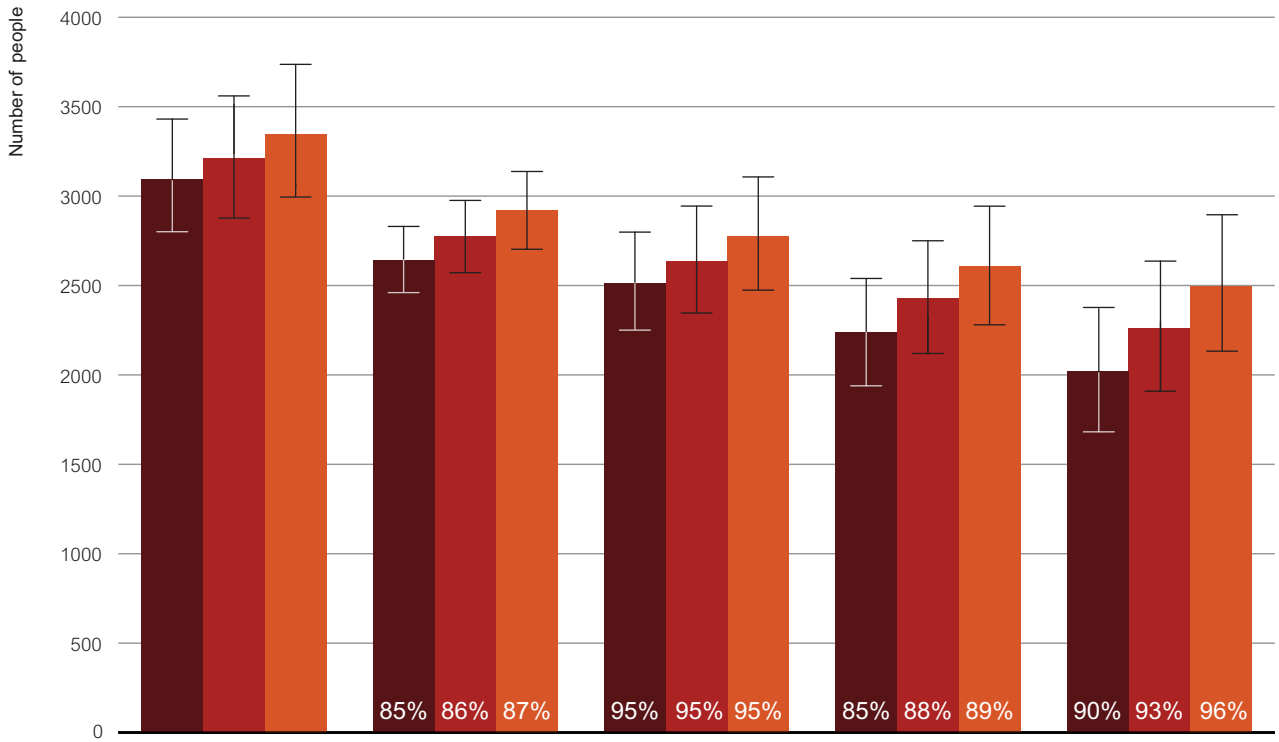
Year	Living with HIV (range)	Living with HIV and diagnosed (range)	Retained in care (range)	Receiving antiretroviral therapy (range)	Suppressed viral load (range)
2015	22 420 (19 752 to 25 311)	19 922 (17 678 to 22 207)	18 926 (16 158 to 21 941)	16 920 (16 075 to 17 768)	15 488 (14 530 to 16 467)
2016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

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

The HIV diagnosis and care cascade for females

It was estimated that there were 3 349 females living with HIV in Australia in 2017. Compared to males, a lower proportion were estimated to be diagnosed (87%) but a higher proportion (89% of those diagnosed) were receiving antiretroviral therapy, and had a suppressed viral load (96% of those on antiretroviral therapy) (Figure 1.4.4,Table 1.4.3). This corresponds to 75% of all females living with HIV with a suppressed viral load in 2017.

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



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

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

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

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

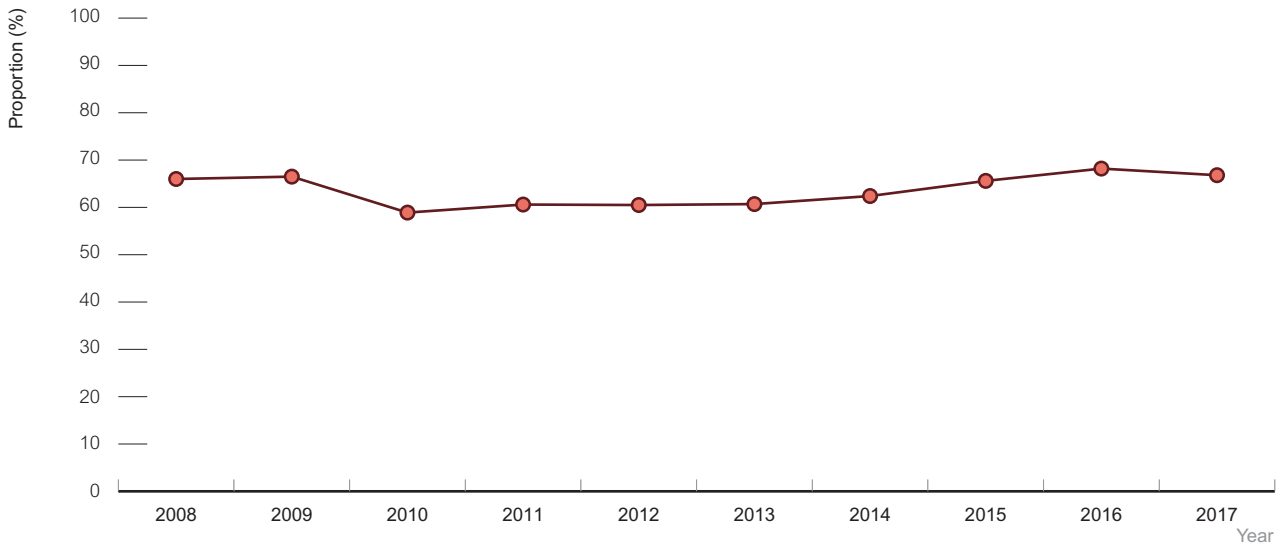
Source: See Methodology for details of mathematical modelling used to generate estimates.

HIV testing

National testing guidelines recommend HIV testing in a number of contexts, such as according to exposure risk, during antenatal care, for certain healthcare workers, and for particular priority populations.[5] Guidelines recommend all sexually active gay and other men who have sex with men should retest every 12 months, or every three to six months for men at higher risk based on behavioural criteria.[9]

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

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

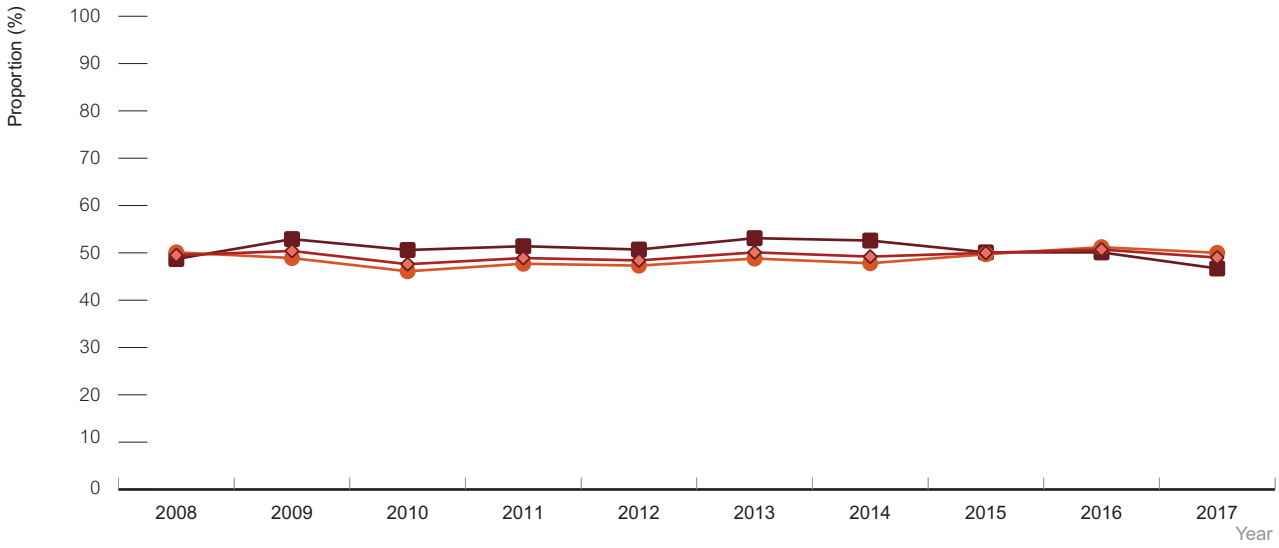


Proportion (%)									
66.0	66.5	58.9	60.6	60.5	60.7	62.4	65.6	68.2	66.8

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

HIV

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Men (%)	50.1	48.9	46.1	47.7	47.3	48.8	47.8	49.7	51.2	50.0
Women (%)	48.7	52.9	50.6	51.4	50.7	53.1	52.6	50.1	50.1	46.7
Total (%)	49.5	50.4	47.6	48.9	48.4	50.1	49.2	50.0	50.7	49

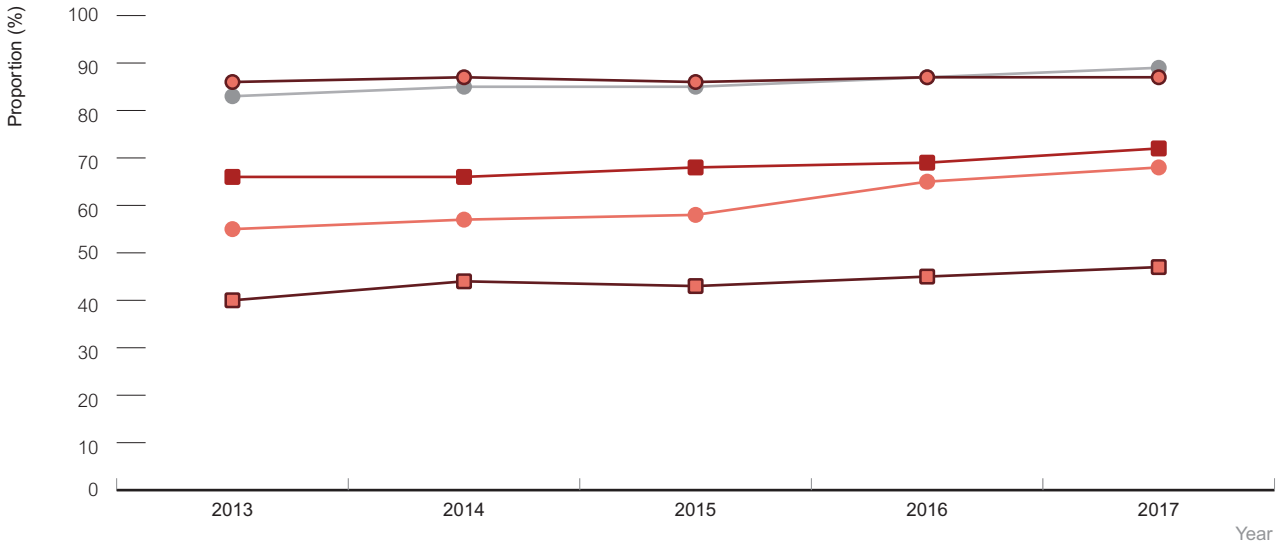
Source: Australian Needle and Syringe Program Survey; see Methodology for detail.

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

At the 43 sentinel sexual health clinics across Australia participating in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network (see Methodology for further detail), between 2013 and 2017 the proportion of gay and bisexual men who were tested for HIV at least once in a year has remained steady, between 86% and 87% (Figure 1.4.7). Among gay and bisexual men attending high-caseload general practice clinics, the proportion who were tested for HIV at least once in a year increased from 55% in 2013 to 68% in 2017 (Figure 1.4.7). There was a 25% increase in the proportion of gay and bisexual men attending sexual health clinics who had a repeat HIV test within 13 months of a previous HIV test, from 55% in 2013 to 68% in 2017, and a 36% increase in the proportion of men who had a repeat HIV test within seven months, from 42% in 2013 to 57% in 2017, with the increases mostly occurring between 2015 and 2016 (Figure 1.4.8).

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

Figure 1.4.7 Proportion of sexual health and high-caseload general practice clinic attendees tested for HIV in a year, 2013–2017, by priority population

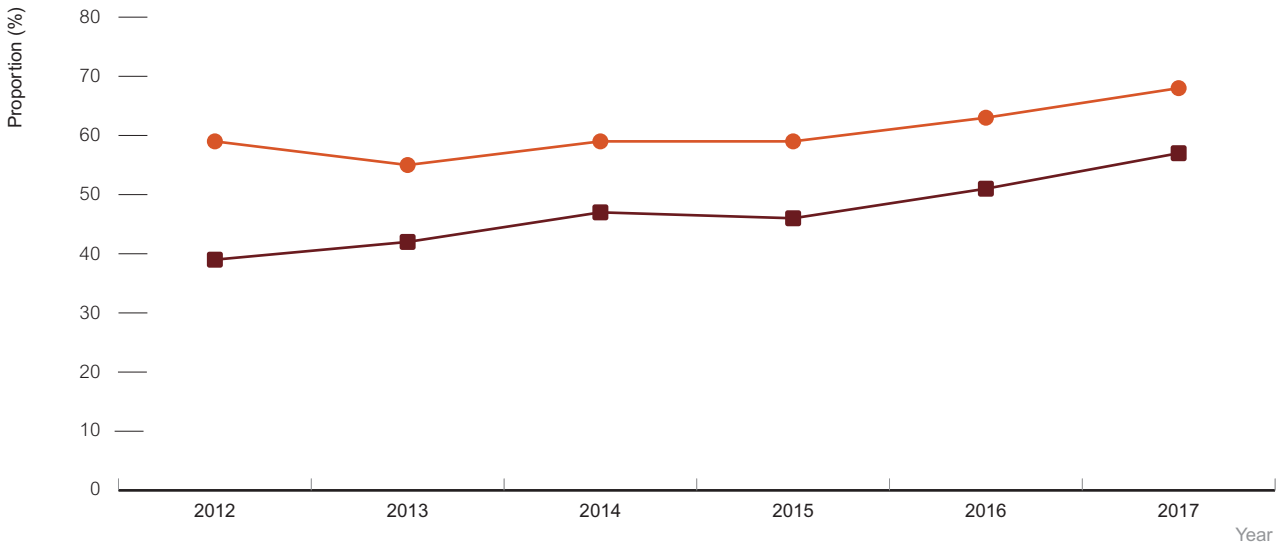


	2013	2014	2015	2016	2017
Heterosexuals aged 16–29y, sexual health clinic (%)	40	44	43	45	47
Female sex workers, sexual health clinic (%)	83	85	85	87	89
People who inject drugs, sexual health clinic (%)	66	66	68	69	72
Gay and bisexual men, sexual health clinic (%)	86	87	86	87	87
Gay and bisexual men,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

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

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

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



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

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

HIV care

HIV treatment

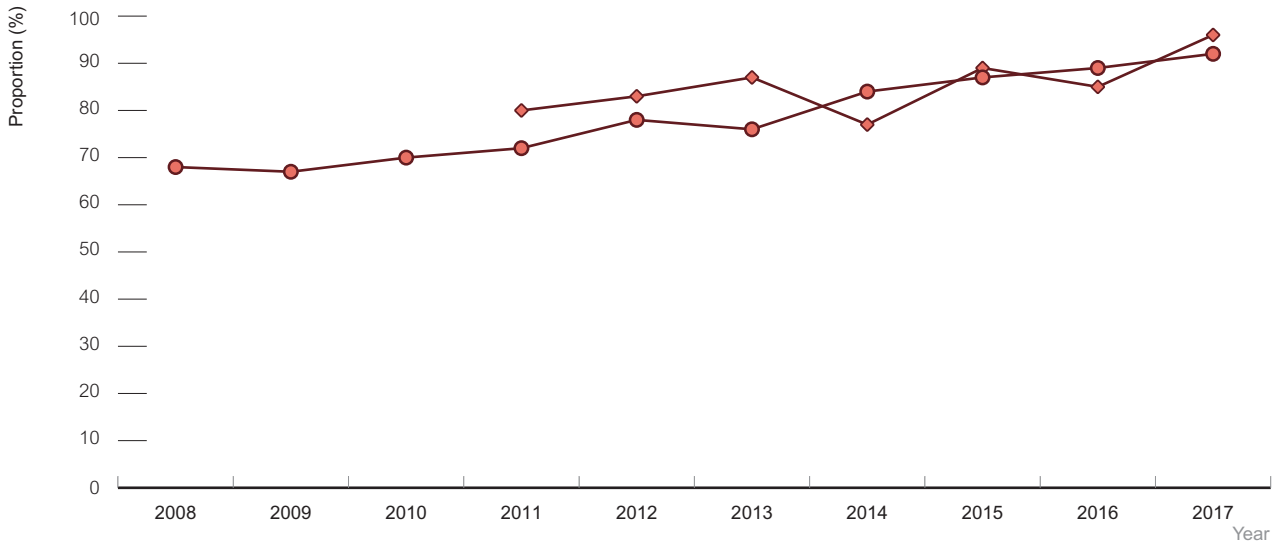
There has been a large increase over the past 10 years in the number of people living with HIV, the proportion taking effective treatments and the proportion achieving suppressed viral load. HIV treatments do not cure the infection, but prevent it from causing illness and–while undetectable viral load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

The estimated treatment coverage among people diagnosed with HIV in Australia is presented in the diagnosis and care cascades (Figures 1.4.1, 1.4.3 and 1.4.4): 87% of people with diagnosed HIV were receiving antiretroviral therapy overall in 2017, 87% in males and 89% in females.

Information on treatment coverage is also available for subpopulations. According to the Gay Community Periodic Surveys, the proportion of gay men diagnosed with HIV who reported receiving antiretroviral treatment increased from 68% in 2008 to 78% in 2012 and 92% in 2017. Among men attending the 43 sexual health clinics participating in the ACCESS (Australian Collaboration for Coordinated Enhanced Sentinel Surveillance) network, the proportion receiving antiretroviral treatment increased from 80% in 2011 to 96% in 2017 (Figure 1.4.9). The proportion on treatment was above 90% in 2017 for gay and bisexual men, Aboriginal and Torres Strait Islander people, the CALD population, and people who inject drugs (Figure 1.4.10). Between 2008 and 2017 the proportion on treatment increased in all priority populations, with the increase greatest among people who inject drugs, with an absolute 48% increase.

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

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



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

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

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

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

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

HIV transmitted drug resistance

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

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

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

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

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

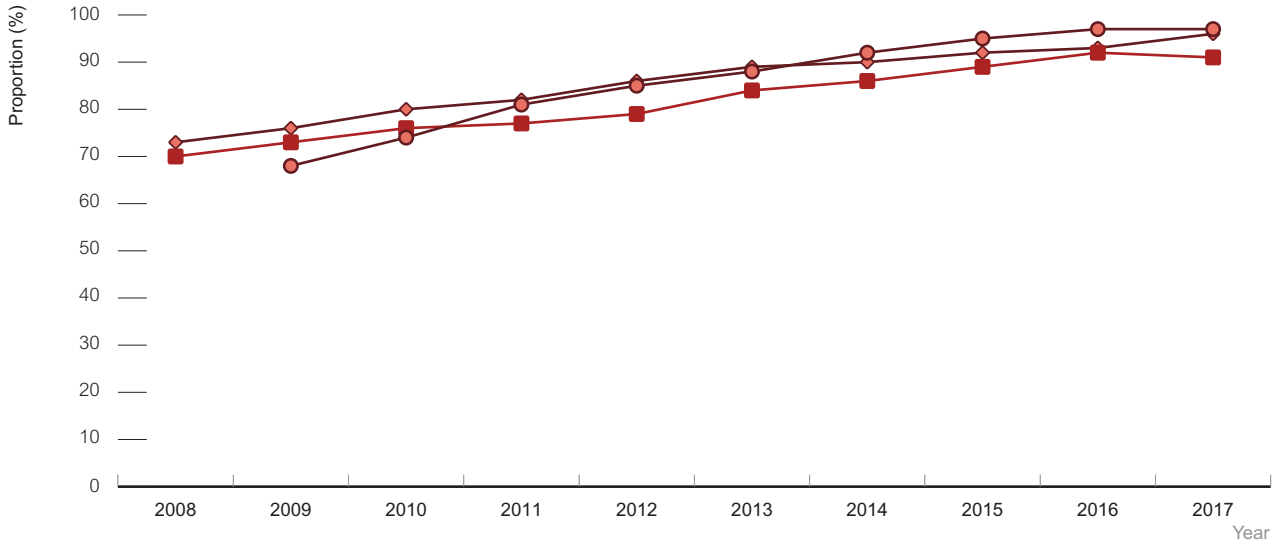
Source: State/territory health authorities; NSW NHMRC Partnership Project; see Methodology for detail.

Suppressed viral load

HIV viral load represents the amount of HIV virus in a person's blood, with higher levels increasing the chances of HIV transmission during risk exposures. Studies have shown that taking combination antiretroviral treatment regularly sustains a suppressed viral load and reduces the likelihood of HIV transmission to effectively zero.[10] As treatment coverage has increased in Australia, there has been a corresponding increase in the proportion of people with suppressed viral load (<200 copies/mL). This increase has been observed consistently in three difference data sources: from 86% in 2012 to 96% in 2017 in the Australian HIV Observational Database, from 79% in 2012 to 91% in 2017 at 44 sexual health clinics across Australia participating in the ACCESS network, and from 85% in 2012 to 97% in 2017 at 24 primary care clinics with a high caseload of gay men in Victoria and New South Wales participating in the ACCESS network (Figure 1.4.10). See Methodology for further detail.

Among select priority populations accessing sexual health clinics, the highest proportion with a suppressed viral load in 2017 was gay and bisexual men (92%), followed by people from a CALD background and Aboriginal and Torres Strait Islander people (both 89%) (Figure 1.1.11). A lower, but still substantial proportion of people who inject drugs achieved a suppressed viral load in 2017 (79%).

Figure 1.4.10 Proportion of patients with a suppressed viral load from patients in the Australian HIV Observational Database, sexual health clinics and high-caseload general practice clinics, 2008–2017

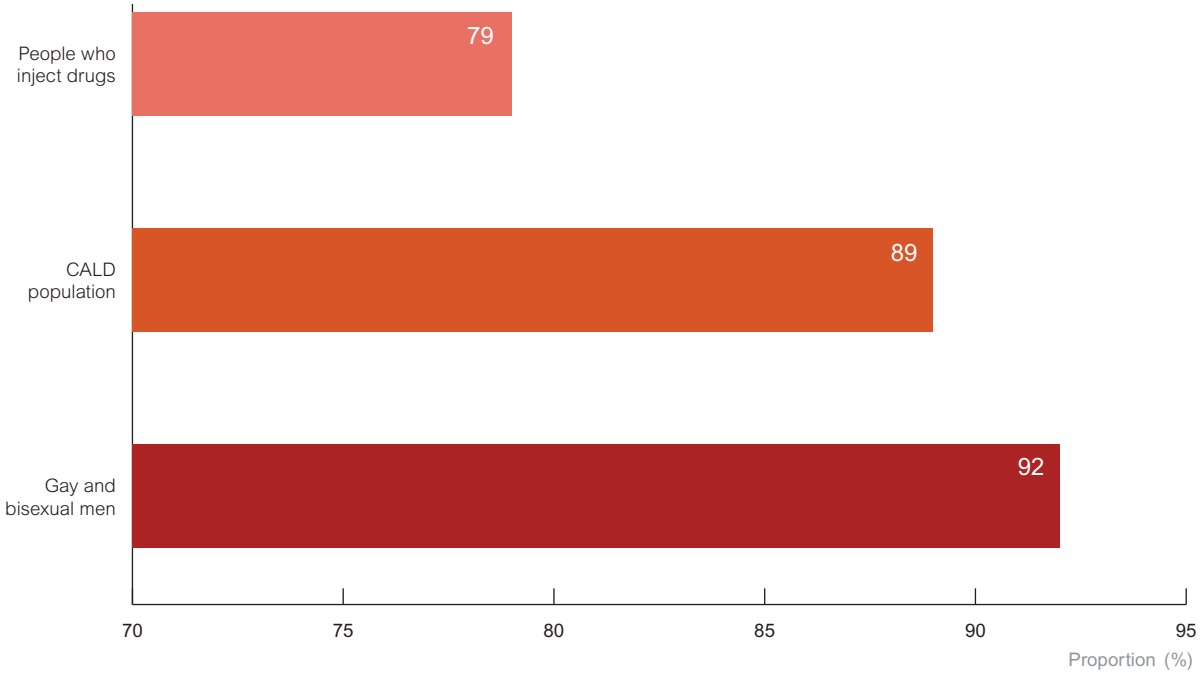


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AHOD (%)	73	76	80	82	86	89	90	92	93	96
Sexual health clinic (%)	70	73	76	77	79	84	86	89	92	91
High-caseload general practice clinic (%)		68	74	81	85	88	92	95	97	97

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

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

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



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

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

1.5 HIV Prevention

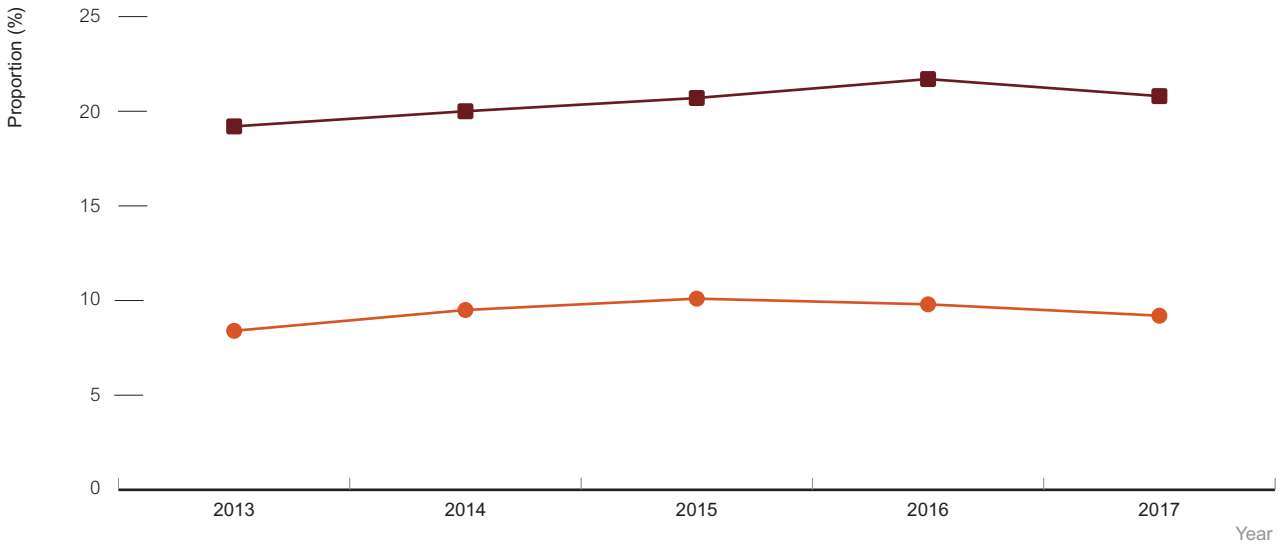
Primary prevention strategies aim to protect people from acquiring HIV. They include: condom use; harm reduction strategies such as needle and syringe programs, opioid substitution therapy and peer interventions to reduce injecting risk behaviour;[11, 12] and biomedical prevention strategies such as post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP). Testing and treatment are secondary prevention, as they prevent transmission to others due to behavioural change after diagnosis, or starting treatment and achieving undetectable (suppressed) viral load, which reduces the risk of onward transmission to zero.

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

In contrast, the number of men using biomedical prevention strategies, such as PrEP, has increased (see section on pre-exposure prophylaxis below). Further information regarding sexual risk behaviour appears in the *Annual reports of trends in behaviour*,[2] prepared by the Centre for Social Research in Health.

Information on condom use in the Australian population is also available. The Australian Study of Health and Relationships (ASHR) is a national population-representative telephone survey of 20 000 people conducted every 10 years. The second ASHR, conducted in 2012–2013, indicated that about half of heterosexual men (48%) and women (47%) reported always using condoms with casual partners in the previous six months. Of men who had anal intercourse with casual male partners, 58% reported that they had always used condoms in the previous six months.[13]

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



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

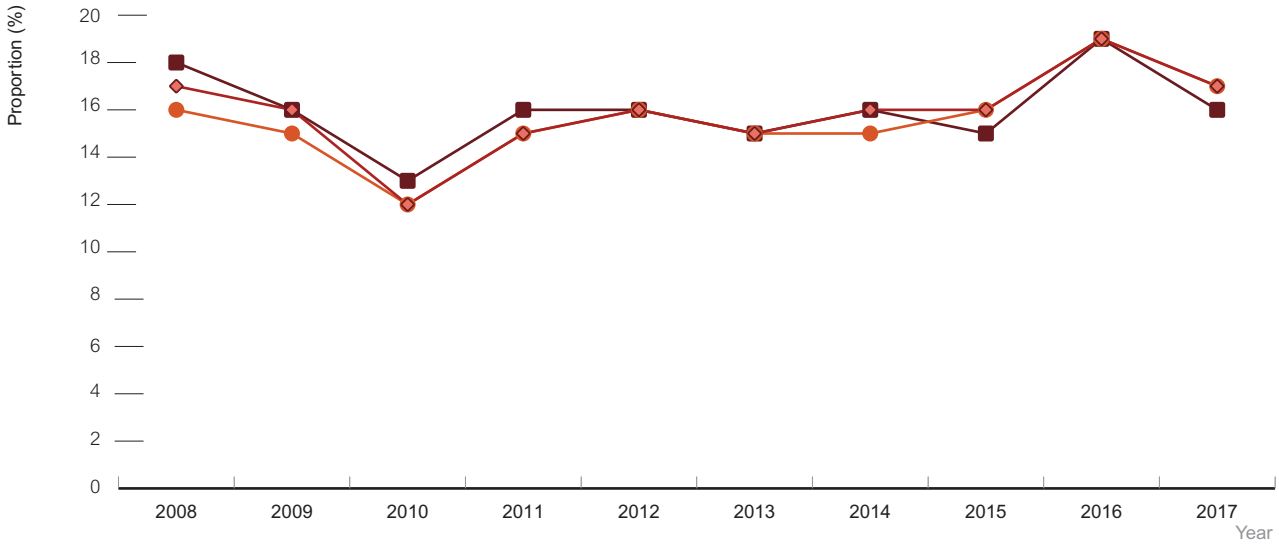
Note: Unadjusted data; CLAIC – condomless anal intercourse; UVL – undetectable viral load.

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

Use of sterile needles and syringes

The reuse of needles and syringes that have been used by others (receptive syringe sharing) is the major risk factor for the transmission of HIV and viral hepatitis among people who inject drugs. Harm reduction strategies such as needle and syringe programs, opioid substitution therapy and peer interventions can reduce injecting risk behaviour. [11, 12] Opioid substitution has been shown to reduce the incidence of HIV and hepatitis C among people who inject drugs.[14-16] Health promotion is important to enhance the effectiveness of these harm reduction strategies and to support people to inject safely. Each year over the past 10 years, between 12% and 19% of people who inject drugs attending needle and syringe programs reported receptive syringe sharing in the last month, with similar rates in men and women (Figure 1.5.2).

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



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

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

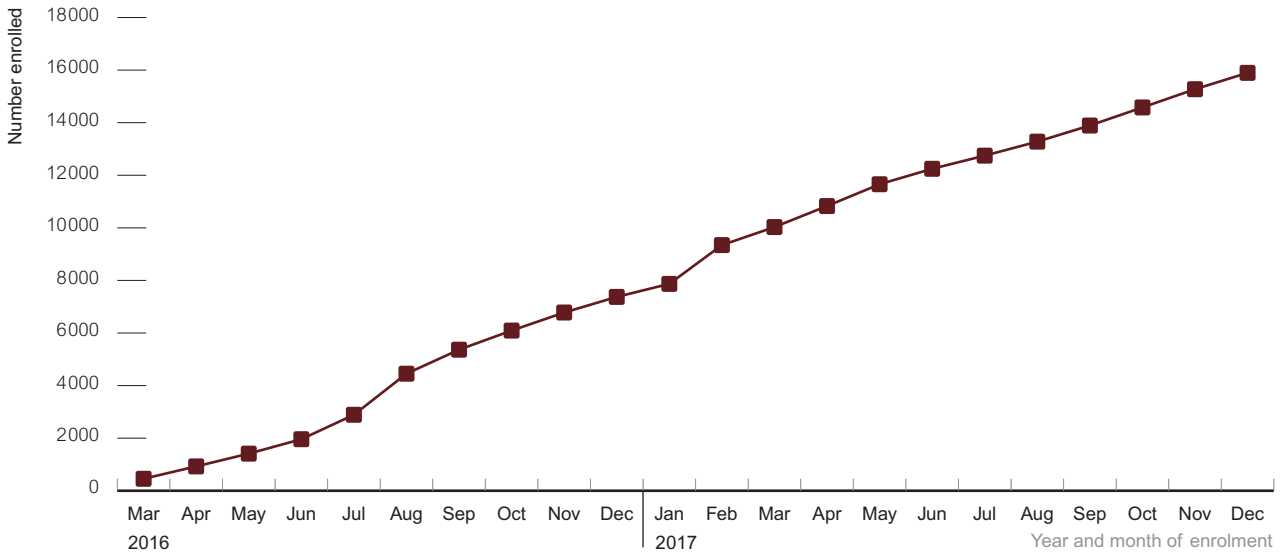
Blood screening

Since 1985, all blood donors have been screened for HIV to prevent onward transmission. There has been no known case of HIV acquisition through blood transfusion in Australia since the late 1990s. For further information, see *Transfusion-transmissible infections in Australia: 2016 surveillance report*, prepared by the Kirby Institute, UNSW Sydney and Australian Red Cross Blood Service.[17]

Pre-exposure prophylaxis (PrEP)

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

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



Cumulative total

455	926	1411	1960	2889	4452	5365	6092	6779	7373	7868	9343	10 030	10 829	11 658	12 246	12 746	13 279	13 892	14 580	15 274	15 895

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

HIV

Methodology

The National HIV Registry

National surveillance for newly diagnosed HIV

HIV is a notifiable disease in each state/territory health jurisdiction in Australia. All new HIV diagnoses are reported by doctors and laboratories to state/territory health authorities. Information sought on the notification forms includes: name code (based on the first two letters of the family name and the first two letters of the given name), sex, date of birth, postcode, country of birth, Aboriginal and/or Torres Strait Islander status, date of HIV diagnosis, CD4+ cell count at diagnosis, likely place of HIV acquisition, source of exposure to HIV and evidence of newly acquired HIV (see below). If the person was born overseas, language spoken at home and date of arrival in Australia are also recorded. These data are then forwarded to the Kirby Institute for collation and analysis. The database where HIV diagnoses are stored is referred to as the National HIV Registry.

Information on country of birth has been reported by all jurisdictions since 2002 and language spoken at home has been reported by New South Wales, Victoria and Queensland since 2004 and by all jurisdictions since 2008. Information on date of arrival in Australia and likely place of acquisition has been reported by all jurisdictions since 2014.

In New South Wales, information on cases of newly diagnosed HIV was sought only from the diagnosing doctor prior to 2008. From 2008, information was also sought from the doctors to whom the person with HIV was referred, and follow-up was carried out for cases for which the information sought at HIV notification was incomplete. These new procedures resulted in more complete information on new HIV diagnoses and reassignment of cases found to have been newly diagnosed in earlier years.

The procedures used for national HIV surveillance of newly diagnosed HIV are available at: **kirby.unsw.edu.au.**

Newly acquired HIV

Newly acquired HIV is defined as newly diagnosed HIV with evidence of a negative or indeterminate HIV antibody test or a diagnosis of primary HIV (seroconversion illness) within the previous 12 months. Information on the date of the last negative or indeterminate test or date of onset of primary HIV has been routinely sought from each state/territory health jurisdiction since 1991.

Late and advanced HIV diagnosis

Advanced HIV diagnosis is defined as newly diagnosed HIV with a CD4+ cell count of less than 200 cells/μL, and late HIV diagnosis was defined as newly diagnosed HIV with a CD4+ cell count of less than 350 cells/μL. New HIV diagnoses classified as newly acquired HIV were not categorised as late or advanced diagnoses irrespective of CD4+ cell count.

Rates of HIV diagnosis

Age-standardised notification rates were calculated using population denominators obtained from the ABS by state, year, sex and age (ABS series 3101051-3101058) and were standardised using ABS Standard Population Catalogue 3100DO003_201212. Population denominators by country/region of birth were based on the standard Australian Classification of Countries (ABS series 1269.0) with proportion of population by region of birth and year ascertained from ABS SuperTable data. Population denominators by year, sex, age and state for Aboriginal and Torres Strait Islanders were obtained from ABS catalogue 32380 estimated and projected population. ABS regional population denominators by age, sex, Indigenous status and state were obtained from ABS catalogue 32380do009_2011.xls and from 2011 census based Aboriginal and Torres Strait Islander Population Projections by Age, Sex and Remoteness Area (2011–2026). Remoteness area categories for these data were "metropolitan", "inner and outer regional", and "remote and very remote". State-based proportions were assigned based on proportions by age, sex and state for each remoteness region in 2011 estimates.

Rates of HIV in Aboriginal and Torres Strait Islander populations were compared to Australian-born non-Indigenous populations unless otherwise stated. This was done so the epidemiology excludes imported HIV cases where trends can fluctuate in response to immigration patterns, and focus on HIV infection endemic to Australia.

HIV-transmitted drug resistance and subtype

Testing to determine HIV subtype and drug resistance mutations is performed for all new HIV diagnoses by reference laboratories in Australia. This information is not currently collected at national level. In New South Wales and South Australia, HIV drug resistance and subtype information for new HIV diagnoses in 2015 were provided where testing was performed. In New South Wales this information is collected as part of a National Health and Medical Research Council Partnership Project, and in South Australia this information is routinely collected by health authorities.

Only resistance testing performed within 12 months of diagnosis was included and reported as a measure of transmitted drug resistance. Of all resistance mutations, surveillance drug resistance mutations (SDRMs) were identified and reported using a WHO-endorsed list of SDRMs that includes 93 mutations (34 nucleoside reverse transcriptase inhibitor; 19 non-nucleoside reverse transcriptase; 40 protease inhibitor. [18] All subtypes other than B were categorised as non-B subtype.

High HIV-prevalence countries

Countries recognised by UNAIDS as having a national prevalence above 1% in any of the years in the past 10 years (2006–2015) were considered high-prevalence. The following countries were considered high-prevalence:

Angola
Bahamas
Barbados
Belize
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Central African Republic
Chad
Congo (Rc)
The Democratic Republic of Congo, (Zaire)
Cote D'Ivoire
Djibouti
Dominican Republic
Equatorial Guinea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Guyana
Haiti
Jamaica
Kenya
Lesotho
Liberia
Malawi
Mali
Mozambique
Namibia
Nigeria
Panama
Russian Federation
Rwanda
Sierra Leone
South Africa
South Sudan
Suriname
Swaziland
United Republic of Tanzania
Thailand
Togo
Trinidad And Tobago
Uganda
Ukraine
Zambia
Zimbabwe

Australian Paediatric Surveillance Unit

Cases of perinatal exposure to HIV were reported to the Kirby Institute by paediatricians through the Australian Paediatric Surveillance Unit (apsu.org.au), and also notified through state and territory health authorities according to national HIV surveillance procedures. Further details of perinatal exposure to HIV data collection are described elsewhere.[19,20]

Diagnosis and care cascade

The approach taken to develop the HIV diagnosis and care cascade was informed by recommendations from a national stakeholder reference group (see Acknowledgments for members of the reference group).

Estimating the number of people with diagnosed HIV

To estimate the number of people living with diagnosed HIV or diagnosed PLHIV we performed a simple calculation using annual notifications, estimated mortality rates, and emigration rates.

Annual HIV notifications data was provided by Australia's National HIV registry. Due to incomplete or inaccurate recording of name codes the registry contains multiple reports for some individuals especially during the early stages of the epidemic. To estimate the number of duplicates we applied a statistical technique which has previously been applied to Australia's National HIV Registry [19]. This calculation estimated the number of duplicate notifications annually up to 2016 resulting in 8.1% duplicate notifications by 2016 with the majority of duplicates occurring early in the epidemic. For the 2017, we assumed all notifications were unique.

We combined two approaches to estimate the number of deaths among people diagnosed with HIV. To estimate the number of deaths up to 2003 we used a linkage study conducted between Australia's National Death Index and the National HIV Registry for cases to the end of 2003 [19]. This study calculated HIV- and AIDS-related deaths and 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 National HIV Registry meaning 19% of all deaths were missing from the registry. Due to the back dating of deaths in the National HIV Registry after 2003, we used this percentage to inflate the number of recorded deaths in the registry until the end of 2003 (inflating the 7 102 deaths recorded to the end of 2003 to 8 768 deaths overall) and estimated the overall average mortality rate for diagnosed PLHIV prior to 2003. After 2003 we used annual mortality rates from the Australian HIV Observational Database (AHOD) [20]. Between 2004 and 2017, similar annual mortality rates were estimated for the AHOD cohort regardless of whether people were retained, lost or returned to follow-up. We used the annual overall mortality rate from AHOD as the best estimate and the 95% confidence interval as a range in our calculations for the number of diagnosed PLHIV.

We also considered the impact of emigration. As people are not included in the National HIV Registry until they have been diagnosed in Australia (even if they have been diagnosed previously overseas) we did not consider the entry of people living with diagnosed HIV.

We estimated an emigration rate for diagnosed PLHIV using data from the Australian Bureau of Statistics (ABS) and follow-up data of people recently diagnosed in New South Wales [21]. New South Wales 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 these data are for diagnoses in recent years we assume this is an upper bound and reduce the number of annual notifications by 2% with a range of 0–4% to reflect this initial migration. As there is likely to be a flux of people leaving temporarily and returning to Australia (some of whom may still receive care and treatment while overseas), we used data on the annual number of people in the overall population who permanently leave Australia (provided by the ABS for 1976–2016 in series 340102) and the estimated resident population (ABS series 310104) to calculate an overall annual emigration rate. Since 1981 this rate has risen from around 0.1% to 0.4% of the resident population leaving Australia permanently. From June 2017, permanent removals are no longer recorded by the ABS due to the removal of the green card from customs processes upon leaving Australia. For the 2017 cascade estimates, we assumed the same emigration rate as for 2016. The permanent rate of departure is the lower-bound of the overall rate Australian residents leave Australia for longer than 12 months, however, diagnosed PLHIV 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 diagnosed PLHIV population. We adjusted this rate to reflect the different emigration rates for males and females older than 15 years in the general population. Overall, we assumed a range in the annual emigration rate between zero and double the overall rate of permanent departure.

Our overall estimate of the number of diagnosed PLHIV in Australia each year is obtained by adding the number of unique notifications to the previous year's estimate and subtracting the number of deaths and emigrants using the mortality and migration rates.

Sub-population estimates

We also provided HIV estimates for the number of people living with HIV and the number of people diagnosed for each exposure risk category, region of birth, males, females, and Aboriginal and Torres Strait Islander status.

For each sub-population, we estimated the proportion of duplicates separately. We also adjusted the death and emigration rates to reflect the differences in these rates in males and females in the general population. Mortality and migration rates were adjusted for the Indigenous and non-Indigenous Australian born population to reflect the higher overall mortality in Aboriginal and Torres Strait Islanders as reported by the ABS (**abs.gov.au/ausstats/abs@.nsf/mf/3302.0**). We also assumed no Indigenous people living with diagnosed HIV move overseas. Finally, we separately estimated the emigration rate for males and females as well as the rate by region of birth to reflect the large differences in emigration. We did this using net overseas migration (NOM) departures for 2004–2015 (which were provided to the Kirby Institute by the ABS by age, sex, jurisdiction and age; ABS series 34120) calculating the relative difference between the sub-population and the overall NOM rates and applying this to the overall migration rate for diagnosed PLHIV. For years before and after 2004–2015 we estimated the relative emigration rate using linear regression. Similarly, we assumed a higher post-diagnosis emigration rate for overseas-born people based on the NSW 6-monthly follow-up data (which was 0.72% for Australian-born people and 10.08% for overseas-born people).

Estimating the number of people living with HIV

To estimate the overall number of people living with HIV (PLHIV), both diagnosed and undiagnosed, we used the European Center for Disease Control (ECDC) HIV Modelling Tool (version 1.3.0) to estimate the proportion of PLHIV who are undiagnosed [22].

The ECDC tool is a multi-state back-calculation model using notifications data and estimates for the rate of CD4+ cell count decline to fit diagnoses rates over time, producing estimates for HIV incidence, time between infection and diagnosis, and the undiagnosed population by CD4+ cell count strata, using surveillance data on new HIV and AIDS diagnoses. To run the model, notifications data is split by CD4+ cell count 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, heterosexual contact, injecting drug use, and "other" risk exposures. We ran the ECDC tool for each exposure risk category as well as overall (with all groups combined) and excluding male-to-male sex. Separate models were run for Indigenous and non-Indigenous Australian-born populations, males and females, and for each region of birth. The tool's diagnosis rate options were adjusted to best fit the CD4+ cell count at diagnosis data.

For validation we compared the model estimates for undiagnosed gay and bisexual men with empirical data from the COUNT study [23]. 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 were 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 and for each subpopulation was then estimated by inflating the calculated number of people living with diagnosed infection by the estimated level of undiagnosed infection. Due to running the ECDC model separately, the sum of number undiagnosed for individual subpopulations can be different to the overall population estimate.

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-positive people attending a clinic who receive an annual CD4+ or viral load test. An issue with clinic data is people can appear to be lost to follow-up, and hence not in care, when they have just transferred to another clinic. A recent study in a network of the six main HIV clinical care sites in Victoria estimated 91.4-98.8% of HIV-positive patients were retained in care [24]. 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 PLHIV retained in care with a range equal to the range for percentage retained after follow-up [24].

Estimating antiretroviral treatment coverage

We estimated the number of people receiving antiretroviral therapy using a 10% sample of Pharmaceutical Benefits Scheme (PBS) patient level script claims data provided by the company Prospection. This is a randomised patient level, de-identified PBS script claims data set from 2006 to present. Currently the data has over 170 million script claims and over three million patients. It includes all PBS listed drugs with HIV indications. Our estimate is the number of unique

patients in the PBS data who filled in at least one script in the 12 months prior to the end of December 2015 multiplied by 10. We assumed that 10% of the Australian population were sampled to estimate the uncertainty range as a 95% confidence interval (which equates to approximately 5%).

To the PBS number we added an estimate for the number of HIV-positive temporary residents taking antiretroviral therapy as temporary residents are not eligible for Medicare and hence not counted in the 10% sample. The National Association of People with HIV Australia (NAPWHA) recently obtained data on the number of people receiving antiretroviral therapy through compassionate access schemes from the three major pharmaceutical companies providing antiretroviral therapy in Australia. Based on this data we estimate 500 (range: 450-550) HIV-positive temporary residents living in Australia are on antiretroviral therapy [25]. We split this estimate into males and females on ART using the proportions of males and females from the Australian HIV Observational Database Temporary Access Study (ATRAS) [26]

Estimating levels of virological suppression

We define virological suppression as less than 200 viral copies per ml. The proportion of people on antiretroviral therapy with viral suppression is taken to be the proportion of people recorded in the Australian HIV Observational Database (AHOD) who had less than 200 viral copies per ml at their last viral load test. Uncertainty bounds were estimated by calculating the 95% confidence interval for this proportion. We estimate the number of PLHIV on antiretroviral therapy with viral suppression by multiplying this proportion and range by the estimated number of people receiving antiretroviral therapy.

PrEP enrolment data and associated estimates

The number of gay and bisexual men receiving PrEP was based on number enrolled in PrEP implementation prjoects in New South Wales (EPIC–NSW), Queensland (QPrEPd) and Victoria (PrEPX) by the end of 2017.

The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS)

Briefly, the ACCESS project is a national sexual health surveillance network using routinely collected deidentified demographic, testing, diagnosis and treatment data from health services and laboratories across Australia to monitor the sexual health of high-risk population groups including gay and bisexual men, injecting drug users, Aboriginal and

Torres Strait Islander people, sex workers and young people. The ACCESS project has been described in more detail elsewhere.[27] The project is managed collaboratively between the Kirby Institute, the Burnet Institute and the National Reference Laboratory. In total, ACCESS collects data from over 110 health services, pharmacies and laboratories.

ACCESS data were used for the following indicators:

- The proportion of people attending high-caseload general practice clinics and/or sexual health clinics tested for HIV, and where relevant, retested.
- The result of the last viral load amongst HIV-positive patients seen at high-caseload general practice clinics and/or sexual health clinics.
- HIV incidence was estimated using methodology similar to that used previously.[28] HIV incidence was calculated based on an observed positive HIV test in patients with more than one HIV test with the first test result being negative. Patients were at risk between the first negative HIV test and the later of last-ever negative HIV test or seroconversion (the midpoint between last negative HIV-test and first positive HIV-test). For any calendar year, at-risk time commenced from the later of: 1 January for that year and first-ever negative HIV test if in that year until the earlier of: seroconversion date, last-ever negative HIV test if not HIV-positive and 31 December for that year. HIV incidence and confidence intervals were calculated using the person-years method.

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.[29]

Information is collected from hospitals, general practitioner sites and sexual health clinics throughout Australia. Participating sites contribute data biannually from established computerised patient management systems. Core variables from these patient management systems are transferred electronically to the Kirby Institute, where the data are collated and analysed. By March 2014, 31 participating clinical sites were enrolled with over 3900 people into AHOD.

AHOD data were used for the result of the last viral load test amongst HIV-positive patients.

The Australian Needle and Syringe Program Survey (ANSPS)

The ANSPS is conducted annually over a one- to two-week period in October at more than 50 needle and syringe programs (NSPs) to provide serial point prevalence estimates of HIV and hepatitis C and to monitor injecting behaviour among people who inject drugs. All clients attending NSPs during one week in 2009 (51 sites), 2010 (53 sites), 2011 (53 sites), 2012 (52 sites), 2013 (52 sites), 2014 (51 sites), 2015 (47 sites) and 2016 (50 sites) were asked to complete a brief, self-administered questionnaire and to provide a finger prick blood spot sample for HIV and hepatitis C antibody testing. The ANSPS methodology has been described in detail elsewhere.[30]

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.
- HIV prevalence among survey respondents.

The Gay Community Periodic Surveys (GCPS)

The Gay Community Periodic Surveys are conducted annually using time and location convenience samples of men at gay community venues and events in capital cities (Sydney, Melbourne, Brisbane, Adelaide, Perth and Canberra). The report is prepared by the Centre for Social Research in Health, UNSW Sydney. The methodology associated with the Gay Community Periodic Surveys has been described in detail elsewhere.[31]

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

- HIV prevalence in gay men using self-reported HIV-positive status.
- The proportion of non-HIV-positive gay men having had self-reported test for HIV within the last 12 months.
- Self-reported use of antiretroviral therapy for the treatment of HIV.

Pharmdash

Data on dispensed prescriptions for a Pharmaceutical Benefits Scheme (PBS) 10% sample is updated every quarter and supplied to a number of approved users or clients including Prospection which provides a dashboard interface (Pharmdash) for querying the PBS 10% sample (pbs.gov.au/info/industry/useful-resources/sources/). The 10% sample of the PBS is a randomised patient level, de-identified PBS script claims database from 2006 to present. Currently the database has 170 million script claims and three million patients. It includes all PBS listed drugs with HIV indications.

Pharmdash data were used for the following indicators:

- The number of people receiving antiretroviral treatment (ART). The overall total number of people receiving ART was taken as the number of unique patients in the PBS data who filled at least one script in the 12 months prior to the end of December 2016 multiplied by 10. Given the size of the sample we assumed a negligible range in this estimate.
- Total number of patients receiving treatment for HIV per year. The overall total number of people receiving ART was taken as the number of unique patients in the PBS data who filled at least one script in the 12 months prior to the end of December 2016 multiplied by 10. Similarly estimates of patient numbers dispensed individual antiretroviral drug types were developed.

Acknowledgements

The National Bloodborne Virus and Sexually Transmissible Infections (NBBVSTI) Surveillance Subcommittee 2018

- Dr Christine Selvey (Chair), New South Wales Ministry of Health, Sydney, NSW
- Ms Amy Bright, Office of Health Protection, Australian Government Department of Health, Canberra, ACT
- Mr Aaron Cogle, National Association of People with HIV Australia, Sydney, NSW
- Associate Professor Benjamin Cowie, WHO Regional Reference Laboratory for Hepatitis B, Victorian Infectious Diseases Reference Laboratory, The Doherty Institute, Melbourne, VIC
- Ms Carol ElHayek, Burnet Institute, Melbourne, VIC
- Ms Carolien Giele, Communicable Disease Control Directorate, Public Health Division, Department of Health Western Australia, Perth, WA
- Professor Margaret Hellard, Burnet Institute, Melbourne, VIC
- Ms Jo Holden, New South Wales Ministry of Health, Sydney, NSW
- Ms Nasra Higgins, Department of Health and Human Services Victoria, State Government of Victoria, Melbourne, VIC
- Ms Rebecca Hundy, Australian Capital Territory Health, Canberra, ACT
- Professor Monica Lahra, Division of Microbiology and WHO Collaborating Centre for STD, The Prince of Wales Hospital, Sydney, NSW
- Dr Carolyn Lang, Communicable Diseases Branch, Queensland Department of Health, Brisbane, QLD
- Ms Kerryn Lodo, Department of Health and Human Services, Tasmanian Government, Hobart, TAS
- Ms Jennifer MacLachlan, WHO Regional Reference Laboratory for Hepatitis B, Victorian Infectious Diseases Reference Laboratory, The Doherty Institute, Melbourne, VIC
- Dr Limin Mao, Centre for Social Research in Health, UNSW Sydney, Sydney, NSW
- Mr Matthew O'Dwyer, Communicable Diseases Branch, Queensland Department of Health, Brisbane, QLD
- Dr Russell Waddell, Australasian Chapter of Sexual Health Medicine, Sydney, NSW; SA Health, Adelaide, SA
- Associate Professor James Ward, South Australian Health and Medical Research Institute (SAHMRI), Adelaide, SA
- Ms Shellee Williams, Centre for Disease Control, Northern Territory Department of Health, Darwin, NT
- Professor Rebecca Guy, Scientia Professor John Kaldor, Dr Skye McGregor, Mr Jonathan King, Ms Jane Costello, Ms Morgan Stewart, The Kirby Institute, UNSW Sydney, Sydney, NSW

Annual Surveillance Report 2018 Advisory Committee

- Ms Amy Bright, Office of Health Protection, Australian Government Department of Health, Canberra, ACT
- Mr Aaron Cogle, National Association of People with HIV Australia, Sydney, NSW
- Ms Jules Kim, Scarlet Alliance, Sydney, NSW
- Mr Scott McGill, Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine, Sydney, NSW
- Ms Jennifer MacLachlan, WHO Regional Reference Laboratory for Hepatitis B, Victorian Infectious Diseases Reference Laboratory, The Doherty Institute, Melbourne, VIC
- Dr Limin Mao, Centre for Social Research in Health, UNSW Sydney, Sydney, NSW
- Mr Heath Paynter, Australian Federation of AIDS Organisations, Sydney, NSW
- Ms Helen Tyrrell, Hepatitis Australia, Canberra, ACT
- Dr Russell Waddell, Australasian Chapter of Sexual Health Medicine, Sydney, NSW; SA Health, Adelaide, SA
- Ms Melanie Walker, Australian Injecting & Illicit Drug Users League, Canberra, ACT
- Professor Rebecca Guy (Chair), Professor Basil Donovan, Professor Lisa Maher, Scientia Professor John Kaldor, Dr Jennifer Iversen, Dr Benjamin Bavinton, Dr Skye McGregor, Dr Hamish McManus, Mr Jonathan King, Dr Praveena Gunaratnam, Ms Jane Costello, The Kirby Institute, UNSW Sydney, Sydney, NSW

National Annual Surveillance Reports Cascades Reference Groups

HIV

- Ms Amy Bright, Ms Rebecca Newton, Lucas De Toca; Office of Health Protection, Australian Government Department of Health, Canberra, ACT
- Dr Christine Selvey, Ms Barbara Telfer, Ms Tove Fitzgerald; NSW Ministry of Health, Sydney, NSW
- Dr Alun Richards, Mr John Marquess; Department of Health, Queensland Government, Brisbane, QLD
- Dr Russell Waddell, Ms Lea Narciso; South Australia Health, Adelaide, SA
- Ms Nasra Higgins, Ms Heather O'Donnell, Mr Michael West; Department of Health and Human Services Victoria, State Government of Victoria, Melbourne, VIC
- Dr Faline Howes, Ms Kerryn Lodo; Department of Health and Human Services, Tasmanian Government, Hobart, TAS
- Ms Rebecca Hundy; Australian Capital Territory Health, Canberra, ACT
- Professor Donna Mak, Ms Caroline Giele, Ms Lisa Bastian, Western Australia Health, Perth, WA
- Dr Manoji Gunathilake, Ms Shellee Williams; Centre for Disease Control, Northern Territory Department of Health, Darwin, NT
- Mr Aaron Cogle; National Association of People with HIV Australia, Sydney, NSW
- Adjunct Associate Professor Darryl O'Donnell; Australian Federation of AIDS Organisations, Sydney, NSW
- Mr Scott McGill; Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine, Sydney, NSW
- Ms Melanie Walker; Australian Injecting & Illicit Drug Users League, Canberra. ACT
- Ms Jules Kim; Scarlet Alliance, Sydney, NSW
- Dr Nick Medland, Dr Eric Chow; Melbourne Sexual Health Centre, Melbourne, VIC
- Associate Professor Mark Stoové, Mr Jason Asselin; Burnet Institute, Melbourne, VIC
- Associate Professor James Ward; South Australian Health and Medical Research Institute, Adelaide, SA
- Professor Martin Holt; Centre for Social Research in Health, UNSW Sydney, Sydney, NSW
- Dr Jennifer Power; Australian Research Centre in Sex, Health and Society, La Trobe University, Melbourne, VIC
- Professor Charles Gilks; University of Queensland, Brisbane, QLD
- Dr Roanna Lobo, Ms Corie Gray; Curtin University, Perth, WA
- Professor Andrew Grulich (Chair), Scientia Professor John Kaldor, Professor Basil Donovan, Professor Matthew Law, Associate Professor Kathy Petoumenos, Professor Rebecca Guy, Dr Skye McGregor, Dr Richard Gray, Dr Hamish McManus, Mr Jonathan King, Dr Praveena Gunaratnam, Dr Tanya Applegate, Associate Professor Catherine O'Connor, Mr Phillip Keen, Ms Jane Costello, The Kirby Institute, UNSW Sydney, Sydney, NSW

ACCESS
(Australian Collaboration for Coordinated Enhanced Sentinel Surveillance)

- Canberra Sexual Health Centre, Canberra; Interchange General Practice, Canberra; ACT
- Liverpool Sexual Health Clinic, Liverpool; Coffs Harbour Sexual Health Clinic, Coffs Harbour; Grafton Sexual Health Clinic, Grafton; Albury Sexual Health Clinic, Albury; Goulburn Sexual Health Clinic, Goulburn; Griffith Sexual Health Clinic, Griffith; Narooma Sexual Health Clinic, Narooma; Queanbeyan Sexual Health Clinic, Queanbeyan; Wagga
- Sexual Health Clinic, Wagga Wagga; Holden Street Clinic, Gosford; Newcastle Sexual Health Clinic, Newcastle; Forster Sexual Health Clinic, Forster; Bligh Street Clinic, Tamworth; Taree Manning Clinic, Taree; Illawarra Sexual Health Clinic, Warrawong; Nowra Sexual Health Clinic, Nowra; Kirketon Road Centre, Darlinghurst; Clinic 180, Potts Point; Lismore Sexual Health Service, Lismore; Tweed Heads Sexual Health Service, Tweed Heads; Clinic 16, North Shore Sexual Health Service, Sydney; Manly Sexual Health Clinic, Sydney; RPA Sexual Health Clinic, Sydney; Short Street Centre Sexual Health Clinic, Kogarah; Western Sydney Sexual Health Centre, Parramatta; Mt Druitt Sexual Health Clinic (formerly Luxford Road Sexual Health Clinic), Mt Druitt; Blue Mountains Sexual Health Clinic, Katoomba; Nepean Sexual Health Clinic, Penrith; Sydney Sexual Health Centre, Sydney; WAYS Youth Health Clinic, Bondi Junction; Lightning Ridge Sexual Health Service, Lightning Ridge; Bourke Sexual Health Service, Bourke; Dubbo Sexual Health, Dubbo; Orange Sexual Health Clinic, Kite Street Community Health Centre, Orange; Broken Hill Sexual Health, Broken Hill; a[TEST], Darlinghurst; a[TEST], Newtown; Bungendore Medical Centre, Bungendore; East Sydney Doctors, Darlinghurst; Fountain Street General Practice, Alexandria; Macleay Street Medical, Potts Point; UNSW Health Service, Kensington; Taylor Square Private Clinic, Surry Hills; Dr Doong Practice, Burwood; Kildare Road Medical Centre, Blacktown; Waterloo Medical Centre, Waterloo; Holdsworth House Medical Practice, Darlinghurst; Family Planning NSW; Westmead Hospital, Westmead; Immunology B Ambulatory Care, St Vincent's Hospital, Darlinghurst; NSW
- Clinic 34 Darwin and Clinic 34 Alice Springs, Sexual Health and Blood Borne Virus Unit, Centre for Disease Control, Department of Health, Darwin, NT
- Cairns Sexual Health Clinic, Cairns; Gold Coast Sexual Health Service, Miami; Princess Alexandra Sexual Health, Woolloongabba; Townsville Sexual Health Service, Townsville; Mackay Sexual Health Clinic, Mackay; Mount Isa Sexual Health Clinic, Mount Isa; Palm Island Sexual Health Clinic, Palm Island; QLD
- Clinic 275 Sexual Health, Adelaide; O'Brien Street General Practice, Adelaide; Rapido Testing Service, Shine SA, Adelaide; SA
- Hobart Sexual Health Service, Hobart; Launceston Sexual Health Service, Launceston; Devonport Sexual Health Service, Devonport; TAS
- Melbourne Sexual Health Centre, Melbourne; Barwon Reproductive and Sexual Health (BRASH) Clinic, Geelong; Centre Clinic, St Kilda; Frankston Health, Frankston; Cohealth (formerly known as North Yarra Community Health), Collingwood; North Richmond Community Health, Richmond; Bendigo Community Health Clinic, Bendigo; EACH Social and Community Health, Melbourne; Dandenong Superclinic, Dandenong; Prahran Market Clinic, Prahran; Northside Clinic, North Fitzroy; Family Planning Victoria, Melbourne; Clarinda Medical Centre, Clarinda; The Alfred Hospital, Melbourne; VIC
- Fremantle Hospital Sexual Health Clinic, Fremantle; M Clinic, Perth; GP on Beaufort, Mount Lawley; WA

Collaboration of Australian Needle and Syringe Programs

- Directions ACT, Canberra; ACT
- ACON Hunter; First Step Program Port Kembla; Hunter Harm Reduction Services, Newcastle; Kirketon Road Centre and Clinic 180, Kings Cross; Mid North Coast Harm Reduction, Coffs Harbour; NSW Users and AIDS Association, Surry Hills; Northern NSW Harm Reduction, Ballina, Byron Bay, Lismore, Nimbin, and Tweed Heads; Sydney Harm
- Minimisation, Redfern, Canterbury and RPA Hospital; South Court Primary Care NSP, Nepean; Western Sydney HIV/Hepatitis C Prevention Service, Blacktown, Mount Druitt and Parramatta; NSW
- Northern Territory AIDS and Hepatitis C Council, Alice Springs, Darwin and Palmerston; NT
- Biala Community Alcohol and Drug Services, Brisbane; Cairns ATODS NSP, Cairns; Queensland Injectors Health Network, Brisbane, Gold Coast and Sunshine Coast; Kobi House, Toowoomba; West Moreton Sexual Health Service, Ipswich; Townsville ATODS NSP; QLD
- Drug and Alcohol Services South Australia, Adelaide; Anglicare Salisbury, Salisbury; Drug Arm, Warradale; Hindmarsh Centre, Hindmarsh; Noarlunga Community Health Service, Noarlunga; Nunkuwarrin Yunti Community Health Centre, Adelaide; Port Adelaide Community Health Centre, Port Adelaide; Street Link Youth Health Service, Adelaide; SA
- Anglicare NSP Service, Hobart and Glenorchy; Clarence Community Health Centre, Clarence; Burnie NSP Service, Burnie; TAS
- Barwon Health Drug and Alcohol Services, Geelong; Health Information Exchange, St Kilda; Health Works, Footscray; Inner Space, Collingwood; North Richmond NSP, North Richmond; Southern Hepatitis/HIV/AIDS Resource and Prevention Service, Melbourne: VIC.
- Hepatitis WA, Perth: WA AIDS Council Mobile Exchange, Perth; Western Australia Substance Users Association, Perth and South Coast; WA.
- St Vincent's Centre for Applied Medical Research and NSW State Reference Laboratory for HIV at St Vincent's Hospital, Sydney, NSW

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

- ACT Corrections Health; Alexander Maconochie Centre, ACT
- NT Department of Correctional Services; Prison Health Top End Health Services; Prison and Watch House Health Service Central Australia; Darwin Correctional Centre; Alice Springs Correctional Centre, NT
- QLD Corrective Services; QLD Department of Health; Prison Health Services, West Moreton Hospital and Health Service; Cairns & Hinterland Hospital and Health Service; Arthur Gorrie Correctional Centre, Wacol; Brisbane Correctional Centre; Brisbane Women's Correctional Centre; Lotus Glenn Correctional Centre, Mareeba, QLD
- SA Department of Correctional Services; SA Prison Health Services; Adelaide Remand Centre; Adelaide Women's Prison; City Watch House, Adelaide; Yatala Labour Prison; Port Augusta Prison, SA
- TAS Correctional Health Services; Hobart Reception Prison; Launceston Reception Prison; Risdon Prison Complex, Mary Hutchinson Women's Prison, TAS
- Corrections Victoria; Justice Health Victoria; Dame Phyllis Frost Centre, Ravenhall; Melbourne Assessment Prison; Melbourne Reception Prison, VIC
- Justice Health and Forensic Mental Health Network; Cessnock Correctional Centre; Metropolitan Remand and Reception Centre, Silverwater; Parklea Correctional Centre; Silverwater Women's Correctional Centre; South Coast Correctional Centre, Nowra; Tamworth Correctional Centre, NSW
- WA Corrective Services; Bandyup Women's Prison, Middle Swan; Hakea Prison, Canning Vale; Greenough Regional Prison, Narngulu, WA

National Organisations

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

State/Territory Health Departments

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

References

1. Bryant, J., et al., *Annual Report of Trends in Behaviour 2018: Viral Hepatitis in Australia*. 2018-08-13.
2. Memedovic, S., et al., *Australian NSP Survey National Data Report 2012-2016, Prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees.* 2017, Kirby Institute, University of New South Wales: Sydney.
3. Heard, S., et al., *Needle and Syringe Program National Minimum Data Collection*. 2017, Kirby Institute, University of New South Wales: Sydney.
4. Iversen, J. and L. Maher, *AUSTRALIAN NSP SURVEY Prevalence of HIV, HCV and injecting and sexual behaviour among Needle and Syringe Program attendees 20 YEAR NATIONAL DATA REPORT 1995 - 2014*. 2015, Kirby Institute, University of New South Wales: Sydney.
5. Australian Sexual Health Alliance, *Australian STI management guidelines for use in primary care*. 2018, ASHA: Sydney.
6. Hawke, K.G., et al., *HIV non-B subtype distribution: emerging trends and risk factors for imported and local infections newly diagnosed in South Australia.* AIDS Res Hum Retroviruses, 2013. **29**(2): p. 311-7.
7. Castley, A., et al., *A national study of the molecular epidemiology of HIV-1 in Australia 2005–2012*. PLOS ONE, 2017. **12**(5): p. e0170601.
8. Maartens, G., C. Celum, and S.R. Lewin, *HIV infection: epidemiology, pathogenesis, treatment, and prevention*. Lancet, 2014. **384**(9939): p. 258-271.
9. STIs in Gay Men Action Group (STIGMA), *Australian sexually transmitted infection & HIV testing guidelines 2014 for asymptomatic men who have sex with men.* 2014, STIGMA: Sydney.
10. Rodger, A.J., et al., *Sexual Activity Without Condoms and Risk of HIV Transmission in Serodifferent Couples When the HIV-Positive Partner Is Using Suppressive Antiretroviral Therapy.* Jama, 2016. **316**(2): p. 171-81.
11. Turner, K.M., et al., *The impact of needle and syringe provision and opiate substitution therapy on the incidence of hepatitis C virus in injecting drug users: pooling of UK evidence.* Addiction, 2011. **106**(11): p. 1978-88.
12. World Health Organization, *Guidance on prevention of viral hepatitis B and C among people who inject drugs*. 2012, WHO: Geneva, Switzerland.
13. de Visser, R.O., et al., *Safer sex and condom use: findings from the Second Australian Study of Health and Relationships.* Sex Health, 2014. **11**(5): p. 495-504.
14. White, B., et al., *Opioid substitution therapy protects against hepatitis C virus acquisition in people who inject drugs: the HITS-c study.* Med J Aust, 2014. **201**(6): p. 326-9.
15. Nolan, S., et al., *The impact of methadone maintenance therapy on hepatitis C incidence among illicit drug users.* Addiction, 2014. **109**(12): p. 2053-9.
16. Tsui, J.I., et al., *Association of opioid agonist therapy with lower incidence of hepatitis C virus infection in young adult injection drug users.* JAMA Intern Med, 2014. **174**(12): p. 1974-81.
17. Kirby Institute, *Transfusion-transmissible infections in Australia Surveillance Report 2017*. 2017, Kirby Institute, UNSW Sydney and Australian Red Cross Blood Service: Sydney.
18. Bennett, D.E., et al., *Drug Resistance Mutations for Surveillance of Transmitted HIV-1 Drug-Resistance: 2009 Update.* PLOS ONE, 2009. **4**(3): p. e4724.
19. Nakhaee, F., et al., *Changes in mortality following HIV and AIDS and estimation of the number of people living with diagnosed HIV/AIDS in Australia, 1981-2003.* Sex Health, 2009. **6**(2): p. 129-34.
20. The Kirby Institute, *Australian HIV Observational Database Annual Report*. 2014, The Kirby Institute, UNSW Australia: Sydney, Australia.
21. NSW Government Health, *NSW HIV Strategy 2016-2020 Quarter 2 2016 Data Report*. 2016, NSW Government Health: Sydney, NSW.
22. van Sighem, A., et al., *Estimating HIV Incidence, Time to Diagnosis, and the Undiagnosed HIV Epidemic Using Routine Surveillance Data.* Epidemiology, 2015. **26**(5): p. 653-60.
23. Holt, M., et al., *The prevalence and correlates of undiagnosed HIV among Australian gay and bisexual men: results of a national, community-based, bio-behavioural survey.* J Int AIDS Soc, 2015. **18**: p. 20526.
24. McMahon, J.H., et al., *Clinic Network Collaboration and Patient Tracing to Maximize Retention in HIV Care.* PLoS One, 2015. **10**(5): p. e0127726.
25. Cogle, A.N.A.o.P.w.H.A., *Survey of Medicare ineligible people living with HIV and ART access, 2016* National Association of People with HIV Australia (NAPWHA), Sydney.
26. Petoumenos, K., et al., *Subsidized optimal ART for HIV-positive temporary residents of Australia improves virological outcomes: results from the Australian HIV Observational Database Temporary Residents Access Study.* J Int AIDS Soc, 2015. **18**: p. 19392.
27. Ali, H., et al., *Increasing access by priority populations to Australian sexual health clinics.* Sex Transm Dis, 2013. **40**(10): p. 819-21.
28. Iversen, J., et al., *Reduction in HCV incidence among injection drug users attending needle and syringe programs in Australia: a linkage study.* Am J Public Health, 2013. **103**(8): p. 1436-44.
29. The Australian HIV Observational Database, *Rates of combination antiretroviral treatment change in Australia, 1997-2000.* HIV Med, 2002. **3**(1): p. 28-36.
30. MacDonald, M., et al., *HIV prevalence and risk behaviour in needle exchange attenders: a national study. The Collaboration of Australian Needle Exchanges.* Med J Aust, 1997. **166**(5): p. 237-40.
31. Hull, P., et al., *Gay Community Periodic Survey. Sydney: Centre for Social Research in Health*. 2013, UNSW Australia.