Trends in incidence of HIV and other sexually transmissible infections among transgender people in Australia: a retrospective 10-year national clinical cohort study

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Summary

Background In Australia, transgender people have largely been excluded from public health surveillance for HIV and other sexually transmissible infections (STIs). We aimed to provide a comprehensive overview of HIV and STIs among transgender people in Australia, including to investigate trends over time and risk factors.

Methods A retrospective clinical cohort study was conducted using 10 years of health record data (between Jan 1, 2014, and Dec 31, 2023) from 87 health services across Australia. A primary transgender cohort and two comparative cisgender cohorts (gay and bisexual men, and heterosexual people) were established. Incidence was estimated using repeat testing, with the year fitted as an independent variable in Poisson regression while controlling for sociodemographic and behavioural characteristics.

Findings The primary cohort comprised 7284 transgender people (4672 transgender women, 2213 transgender men, and 399 non-binary people); the comparative cisgender cohorts comprised 152 144 gay and bisexual men and 394 332 heterosexual people. Among transgender people, HIV incidence decreased by 93·9%, from 1·19 per 100 person-years to 0·07 per 100 person-years (incidence rate ratio [IRR] per year 0·72 [95% CI 0·66–0·79]). For transgender people, HIV incidence was highest among women (0·37 per 100 person-years) and lowest among men (0·20 per 100 person-years; IRR 0·54 [95% CI 0·29–0·99]). Transgender people overall had an HIV incidence comparable with cisgender gay and bisexual men (0·33 per 100 person-years and 0·29 per 100 person-years, respectively; adjusted IRR 0·87 [95% CI 0·70–1·08]), whereas HIV incidence was lower among cisgender heterosexual people (0·003 per 100 person-years; 0·01 [0·01–0·01]). Incidences of other STIs were generally stable among transgender people over time (33·73 per 100 person-years for chlamydia, 30·18 per 100 person-years for gonorrhoea, and 2·67 per 100 person-years for syphilis), with some distinctions by anatomical site. Among transgender people, HIV pre-exposure prophylaxis was negatively associated with incident HIV (adjusted IRR 0·40 [95% CI 0·19–0·88]) but positively associated with other STIs (1·38 [1·31–1·46]).

Interpretation HIV incidence declined among transgender people in Australia, whereas other STIs were stable. To build on this success, HIV and STI policies, guidelines, interventions, and funding in Australia should more actively support transgender populations.

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Introduction

Transgender people are recognised by the World Health Organization (WHO) as a key population in the prevention and management HIV and other sexually transmissible infections (STIs).[1] Despite this international recognition, transgender people were, until recently, excluded from Australian HIV and STI health policy, with transgender people only referenced for the first time in the country's ninth and most recent national HIV strategy published in 2024.[2] Recent years have seen efforts to improve sexual health for transgender people, including the opening of population-specific clinics in major urban centres, tailored health promotion campaigns, and online training programmes for sexual health clinicians. Nationally, however, there are few data with which to monitor progress and identify need. As Australia seeks to end HIV and combat increasing rates of STIs,[3] research is needed to establish a baseline and articulate the epidemiology of these infections among transgender people.

Biomedical prevention, including pre-exposure prophylaxis (PrEP), has proven invaluable in preventing HIV and is indicated for transgender people in Australia's clinical guidelines.[4,5] The focus of PrEP and other biomedical prevention in Australia, however, has largely ignored transgender populations, including in terms of policy, implementation, research, and health promotion.[6] Further, Australia's national passive surveillance system

Research in context

Evidence before this study

In July, 2025, we conducted a search of the literature in several key databases (ie, Google Scholar, PubMed, and Scopus) with an aim of identifying studies detailing the epidemiology of HIV and other sexually transmissible infections (STIs) among transgender people in Australia (including binary and non-binary genders). Searches were based on combinations of keywords like "transgender", "HIV", "epidemiology", "sexually transmissible infections", "sexually transmitted infections", "STI", "STD", "non-binary", "incidence", "Australia", and similar. We looked primarily for studies published from Jan 1, 2010, to Dec 31, 2024. Two international meta-analyses were identified, which overall and in Australia found HIV prevalence was much higher among transgender people than the general population. However, only two small sample studies from Australia were included in these meta-analyses (one from 2004 and one from 2011), which did not sample non-binary people, assess changes or time, or investigate other STIs. We also found one national study of HIV and STIs among transgender people attending sexual health clinics in Australia (2010–17). That study reported differences in test positivity of HIV and STIs between transgender men and women, and also found positivity for gonorrhoea, syphilis, and HIV was much higher among transgender people than a comparable cisgender heterosexual population. Before this study, although evidence suggested transgender people in Australia had higher rates of HIV and STIs than the general population, virtually nothing was known about changes over time, the rate of new (incident) infections, risk factors for infection, the effect of HIV pre-exposure prophylaxis (PrEP), or the epidemiology among non-binary people.

Added value of this study

This retrospective 10-year national clinical cohort study offers the most comprehensive epidemiological account of HIV and STIs among transgender people in Australia to date, drawing upon the country's largest clinical cohort of these populations. The study investigates trends spanning 10 years of data, highlighting a changing epidemiology of HIV and STIs with many differences by gender and infection. Importantly, this study provides new insight on HIV and STIs among non-binary people and, for the first time, it investigates the uptake and effect of PrEP on transgender populations in Australia. The cumulative effect of these analyses is to establish a national baseline for new efforts to address HIV and STIs, and at the same time to identify needs and opportunities to support primary prevention, testing, and treatment among transgender people.

Implications of all the available evidence

The collective evidence highlights that transgender people should be integrated as a "key population" for HIV and STIs in Australia. This study highlights the unique epidemiology and risk profile of transgender people, which exceed the general population. The evidence also makes clear that transgender women and non-binary people face the greatest burden of HIV and STIs, although transgender men are not without risk. Lessons from the successful introduction of biomedical HIV prevention in Australia can be applied to address other STIs, especially the need to engage transgender communities as meaningful partners in co-design, implementation, and surveillance.

for HIV and STIs collects information on transgender populations in a way that makes the resulting data difficult to interpret, namely by situating transgender as a third gender option alongside male and female. As acknowledged in Australia's 2023 annual report on HIV and STIs, this approach likely contributes to "under-reporting in the number of transgender people diagnosed with HIV".[3] Overall, the shortage of reliable HIV data about transgender populations is a major limitation in Australia's current response.

Information on other STIs among transgender people in Australia is even more scant, remaining the purview of a handful of prevalence studies.[7–10] Although these studies provide some insight, they are mainly restricted to specific periods, places, and samples, which limits inferences, prevents trend analyses, and impedes intervention. Even in recent STI studies including transgender people, the grouping of transgender participants with cisgender gay and bisexual men prevents population-specific assessment.[11,12] Thus, little is known about the contemporary epidemiology of STIs among transgender people in Australia.

To address the need for robust data, the current study presents a detailed analysis of the incidence of HIV and other STIs among transgender people nationally in Australia. Here, we use transgender as an expansive term to encompass anyone whose gender is different from what was presumed at birth, which includes binary transgender people (ie, transgender men and transgender women) and non-binary transgender people (eg, agender and genderfluid).[13] Among transgender people, we assessed changes to HIV and STIs over a 10-year period and investigate factors associated with incident infections.

Methods

Study design and participants

In this retrospective cohort study, we collected data from transgender people using routine health record data extracted by the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS).[14] The study period was Jan 1, 2014, to Dec 31, 2023.

The cohort included people attending 87 health services: 44 public sexual health clinics, 32 general practices, nine community testing sites, and

two hospitals. Services were based in New South Wales (n=40), Victoria (n=25), Queensland (n=8), Western Australia (n=5), South Australia (n=3), Tasmania (n=3), Australian Capital Territory (n=2), and Northern Territory (n=1). Study sites included a high proportion of Australia's public sexual health clinics (81·5%) and nearly all community testing sites (90·0%). Regarding general practice clinics and hospitals, those included were selected because they were in neighbourhoods that had a high prevalence of LGBTQ+ residents, conducted a high number of HIV and STI tests annually, or that diagnosed five or more people with HIV annually.[4,14]

ACCESS was approved by the human research ethics committees of the Alfred Hospital (248/17), Northern Territory Department of Health (08/47), University of Tasmania (H0016971), and Aboriginal Health and Medical Research Council of NSW (1099/15). It was also reviewed by research panels specialised in LGBTQ+ research, ACON (2015/14), and Thorne Harbour Health (VAC REP 15/003). A waiver of individual consent was granted; in lieu, participants were notified of the sentinel surveillance system at intake and via posters displayed in public areas and advised they could opt out their data from integration into ACCESS.[14]

Cohort eligibility was determined using routinely recorded patient details. To be eligible for the primary cohort, participants had to be recorded as transgender, aged 16 years or older, and have at least two HIV or STI tests during the study period. For comparative purposes, two secondary cohorts were established using patient data from the same services. With the same age and testing requirement, the first comparative cohort comprised cisgender gay and bisexual men, and the second cisgender heterosexual men and women. Participants entered the cohort at their first test during the study period, which was defined as baseline. Cohort enrolment was dynamic with new participants meeting the eligibility criteria added over time.

Identifying transgender people in the dataset relied on standardised variables within electronic patient record systems. With some variation between systems, typically we used two variables to define the sample: gender (male, female, or other) and transgender (yes or no). Participants were coded as transgender men (gender=male, transgender=yes), transgender women (gender=female, transgender=yes), and non-binary (gender=other, transgender=yes). As none of the systems included non-binary as a gender option, "other" in combination with transgender was used to define this subsample; data on gender presumed at birth were not available. Our focus reflected earlier empirical work, which found the diverse range of transgender experiences in Australia form robust clusters around these three broad categories.[13]

The characteristics defining each cohort were fixed, meaning that if at one point a person was identified as transgender, this was applied across the study period. In this way, participants were only ever assigned to one cohort. As sociodemographic variables are typically overwritten in patient files because they are updated over time, more recent information always took primacy. For example, if an individual was recorded as cisgender in 2017 and transgender in 2023, then this person would be assigned to the transgender cohort for the entire study period. If, however, there was disagreement between sites (ie, an individual was recorded as transgender in one clinic but cisgender in another), the more marginalised identity took primacy, as research shows people anticipating stigma in health care might withhold such information.[15]

Procedures

Line-listed (ie, one record per individual per clinical encounter) patient record data were routinely extracted from study sites, including sociodemographic details, home postcode, consultation date, pathology tests, and clinical diagnoses. For STIs, testing and diagnoses data were available by anatomical site. Prescription data on PrEP were also extracted from 2016 after its introduction in Australia. Sexual health clinics and community testing sites collected enhanced behavioural details (ie, injecting drug use, sexual partner numbers, and sex work), which were extracted as available. These were collected at each visit via a self-administered digital survey and relevant to the 12 months before consultation, thus, representing a simple repeated behavioural survey. Sociodemographic details (eg, age, Aboriginal and Torres Strait Islander status, home postcode) were as collected through the standard intake procedures of participating sites.

Data were collected via specialised software (GRHANITE), which enabled secure and de-identified extraction from patient record software.[14] Identifiable details (eg, birth date) were used to generate irreversible alphanumeric hash codes, which via algorithmic linkage connected records for each individual over time and between services. This process is highly sensitive and specific.[16] Importantly, the hash-based linkage process did not rely exclusively on names, and it did not incorporate markers of gender. We highlight these two indicators as they are likely to change for some transgender people; thus, any change would not have altered the linkage process.

ACCESS used several processes to ensure data quality. These included ongoing feedback and consultation with staff at participating sites, triangulation between sites and other datasets, standardised flags for deviation, and manual review of raw data against clinical systems. Data cleaning also helped ensure quality, including by addressing unlikely values, inconsistent results, and impossible scenarios (eg, a patient aged 205 years). This work was carried out by a specialist team of epidemiologists and computer scientists, with discrepancies discussed among a panel of sexual health clinicians and other experts. More information is detailed in the study

protocol.[13] For this analysis specifically, less than 3% of patient records had missing sociodemographic data; we assumed these data were missing at random and given the small number of cases it was not expected this would make any discernible difference to study results.

Outcomes

Among transgender people in Australia, our objectives were to: calculate the incidence of HIV and STIs, estimate changes to incidence over time, investigate factors associated with incident infections, and compare incidence to other populations, specifically cisgender gay and bisexual men and people who are heterosexual. For each of these objectives, the incidences of HIV and STIs were the primary outcomes.

Incidences of HIV and STIs were calculated via a previously validated method, which used Poisson binomial to estimate an infection date between negative and positive tests.[17] An incident case was defined as a positive test or diagnosis after a previous negative result, with a lost-to-follow-up period defined as more than 15 months. If an individual re-engaged with at least two subsequent test events, they were returned to the cohort. Person-years (ie, time at risk) were calculated as the time between tests, minus any time lost to follow-up. Incidence was calculated over the study period and annually, including 6 months before and after the study period to improve intertest interval accuracy. For infectious syphilis, recorded clinical diagnoses rather than test results were used to define incident cases.

Statistical analysis

Incidence was calculated for the entire study period and annually per calendar year. Trends in annual incidence were investigated using Poisson regression with year fitted as an independent variable; crude incidence rate ratios (IRRs), adjusted IRRs, and 95% CIs were calculated to assess changes over time. Annual incidence was graphed for visual assessment of trends; where non-linear trends were indicated, join-point regression analysis investigated trends over shorter periods.[18] We assessed if participant characteristics changed over time, with variables observed to change (as determined by trend analyses) included in the multivariable analyses of trends. The number of tests for each participant was included to control for potential biases in test frequency.

Poisson regression was used to compare the overall incidence of each infection between the primary and comparative cohorts, controlling for sociodemographic and behavioural differences. This approach was also applied to investigate factors independently associated with incident HIV and STIs among the primary transgender cohort. For multivariable analyses, participants with missing data were excluded. Within each year, PrEP uptake was organised as a dichotomous variable (0=no PrEP script in a year, 1=any PrEP script in a year); logistic regression with accompanying odds ratios (ORs) was used to investigate PrEP uptake. Stata Standard Edition 18.0 was used for all analyses.

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

During the 10-year study period (between Jan 1, 2014, and Dec 31, 2023), 1 386 478 individuals attended a participating service, of whom 8669 (0·6%) were recorded as transgender. Among those, 7284 individuals were tested at least twice for HIV or STIs, resulting in a final sample of 4672 (64·1%) transgender women, 2213 (30·4%) transgender men, and 399 (5·5%) non-binary people. The comparative cohorts included 152 144 cisgender gay and bisexual men and 394 332 cisgender heterosexual people. There were no marked changes in key sociodemographic characteristics over time (table 1; appendix p 2). Enhanced behavioural data were available for 6726 transgender people. There were some changes to sex work and sexual partner numbers over time, but no changes observed for injecting drug use; further details are provided in the appendix (p 2).

Among the transgender cohort, there were 79 cases of incident HIV diagnosed over 24 330 person-years of follow-up, an overall rate of 0·33 per 100 person-years

See Online for appendix

	Primary cohort				Comparative cohorts	
	Transgender women (n=4672)	Transgender men (n=2213)	Non-binary (n=399)	Overall (n=7284)	Cisgender gay or bisexual men (n=152 144)	Cisgender heterosexual individuals (n=394 332)
Age†	29 (23–37)	26 (22–34)	28 (24–33)	28 (23–36)	31 (25–42)	27 (23–34)
Aboriginal or Torres Strait Islander	131 (2·8%)	81 (3·7%)	9 (2·3%)	221 (3·0%)	3053 (2·0%)	13 203 (3·3%)
Born overseas	1845 (39·5%)	923 (41·7%)	272 (68·2%)	3040 (41·7%)	71 400 (46·9%)	229 554 (58·2%)
Live in a major city‡	4219 (91·9%)	1844 (87·4%)	369 (96·9%)	6432 (90·8%)	128 768 (89·9%)	286 044 (81·3%)
HIV positive	189 (4·1%)	21 (1·0%)	12 (3·0%)	222 (3·1%)	3631 (2·4%)	694 (0·2%)
Recent sex work§¶	557 (12·8%)	564 (28·0%)	163 (43·4%)	1284 (19·1%)	1866 (1·8%)	17 708 (6·9%)
Recent injecting drug use§¶‖	126 (2·9%)	48 (2·4%)	4 (1·1%)	178 (2·7%)	2436 (2·3%)	4770 (1·9%)
Recent high partner number (≥10) §¶	271 (6·3%)	36 (1·8%)	72 (19·2%)	379 (5·6%)	19 328 (18·5%)	15 214 (5·9%)

Data are n (%) or median (IQR). IRR=incidence rate ratio. *Baseline defined as the first visit during the study period. †Age data were not available for one transgender patient. ‡Postcode data were not available for 199 transgender patients. §Enhanced behavioural data were only available for patients who attended a sexual health clinic or community testing site at least once during the study period, which included 6726 transgender patients (4337 transgender women, 2013 transgender men, and 376 non-binary people). ¶Recent defined as within 12 months of visit. ‖Injecting drug use not reported for four transgender patients.

Table 1: **Sociodemographic, behavioural, and clinical characteristics among transgender people (primary cohort), cisgender gay and bisexual men (comparative cohort), and cisgender heterosexual individuals (comparative cohort) attending study sites, at baseline*, 2014–23**

(95% CI 0·26–0·41; table 2). HIV incidence was highest among transgender women (0·37 per 100 person-years [95% CI 0·29–0·48]) and non-binary people (0·30 per 100 person-years [0·10–0·93]; IRR 0·80 [95% CI 0·25–2·26]) and lowest among transgender men (0·20 per 100 person-years [0·11–0·34]; 0·54 [0·29–0·99]). Compared with the transgender cohort and accounting for sociodemographic factors, HIV incidence was similar among cisgender gay and bisexual men (0·29 per 100 person-years [95% CI 0·27–0·30]; adjusted IRR 0·87 [95%CI 0·70–1·08]) but lower among cisgender heterosexual people (0·003 per 100 person-years [0·003–0·004]; 0·01 [0·01–0·01]).

Over 10 years, HIV incidence decreased by 93·9% among transgender people, decreasing from 1·19 per 100 person-years (95% CI 0·68–2·09) in 2014 to 0·07 per 100 person-years (95% CI 0·02–0·29) in 2023 (IRR per year 0·72 [95% CI 0·66–0·79]; figure 1; appendix p 4). This trend was evident even when controlling for changes to sex work and partner numbers (adjusted IRR 0·72 [95% CI 0·66–0·79]).

PrEP uptake increased during the study period from 334 (18·8%) of 1780 transgender people in 2016 to 690 (30·2%) of 2288 in 2023 (OR 1·07 [95% CI 1·06–1·10]). PrEP uptake was highest among transgender women (1672 [37·5%] of 4464), then non-binary people (83 [23·9%] of 348; OR 0·52 [95% CI 0·41–0·67]), and transgender men (232 [10·7%] of 2174; 0·20 [0·17–0·23]). Living in a major city (compared with rural and regional areas) and being Aboriginal or Torres Strait Islander were independently and positively associated with incident HIV, whereas PrEP use was negatively

	STIs			HIV		
	Incident cases (follow-up in person-years)	Incidence rate per 100 person-years (95% CI)	Adjusted IRR (95% CI)*	Incident cases (follow-up in person-years)	Incidence rate per 100 person-years (95% CI)	Adjusted IRR (95% CI)†
Gender						
Transgender men	743 (6082·0)	12·2 (11·4–13·1)	Ref	12 (6155·1)	0·20 (0·11–0·34)	Ref
Transgender women	6041 (16 864·1)	35·8 (34·9–36·7)	1·96 (1·80–2·13)	64 (17 174·0)	0·37 (0·29–0·48)	2·04 (1·02–4·06)
Non-binary	432 (972·3)	44·4 (40·4–48·8)	1·83 (1·62–2·07)	3 (1001·3)	0·30 (0·10–0·93)	1·50 (0·41–5·50)
Age						
>30 years	3044 (10 749·7)	28·3 (27·3–29·3)	Ref	47 (13 362·0)	0·35 (0·26–0·47)	Ref
≤30 years	4172 (13 168·7)	31·7 (30·7–32·7)	1·08 (1·03–1·14)	32 (10 968·4)	0·29 (0·21–0·41)	1·01 (0·63–1·62)
Indigenous status						
Non-Indigenous	6999 (23 102·3)	30·3 (29·6–31·0)	Ref	72 (23 500·8)	0·31 (0·24–0·39)	Ref
Aboriginal or Torres Strait Islander	217 (816·1)	26·6 (23·3–30·4)	1·12 (0·97–1·29)	7 (829·6)	0·84 (0·40–1·77)	4·33 (1·91–9·83)
Country of birth						
Australia	4156 (15 674·2)	26·5 (25·7–27·3)	Ref	43 (15 893·4)	0·27 (0·20–0·37)	Ref
Overseas	3060 (8244·2)	37·1 (35·8–38·5)	1·13 (1·07–1·19)	36 (8437·0)	0·43 (0·31–0·59)	1·58 (0·97–2·57)
Area of residence						
Rural or regional	345 (3009·7)	11·5 (10·3–12·7)	Ref	3 (3030·0)	0·10 (0·03–0·31)	Ref
Major city	6805 (20 609·6)	33·0 (32·2–33·8)	1·77 (1·58–2·00)	73 (20 991·3)	0·35 (0·28–0·44)	3·61 (1·11–11·77)
Recent sexual partners‡						
<10	5371 (19 181·1)	28·0 (27·3–28·8)	Ref	75 (19 524·4)	0·38 (0·31–0·48)	Ref
≥10	1432 (1499·6)	95·5 (90·7–100·6)	1·41 (1·32–1·50)	2 (1552·1)	0·13 (0·03–0·52)	0·27 (0·07–1·14)
Recent sex work‡						
No	5123 (16 364·1)	31·3 (30·5–32·2)	Ref	65 (16 673·7)	0·39 (0·31–0·50)	Ref
Yes	1692 (4333·8)	39·0 (37·2–41·0)	1·43 (1·35–1·52)	12 (4420·4)	0·27 (0·15–0·48)	0·74 (0·38–1·44)
Recent injecting drug use‡						
No	6279 (19 731·2)	31·8 (31·1–32·6)	Ref	73 (20 103·9)	0·36 (0·29–0·46)	Ref
Yes	536 (966·6)	55·5 (51·0–60·4)	1·40 (1·28–1·54)	4 (990·2)	0·40 (0·15–1·08)	1·14 (0·41–3·17)
HIV status						
Negative, no PrEP	3592 (17 229·1)	20·9 (20·2–21·5)	Ref	69 (19 478·0)	0·35 (0·28-·45)	Ref
Negative, on PrEP§	2823 (4816·9)	58·6 (56·5–60·8)	1·38 (1·31–1·46)	10 (4852·4)	0·21 (0·11–0·38)	0·40 (0·19–0·88)
Positive	801 (1872·3)	42·8 (39·9–45·9)	1·18 (1·09–1·28)	¶	¶	¶

IRR=incidence rate ratio. PrEP=pre-exposure prophylaxis. STI=sexually transmissible infection. *Multivariable analysis included patients with basic and enhanced data (n=6726); frequency of testing included as covariate, with a positive association observed (adjusted IRR 1·34 [95% CI 1·33–1·36]). †Multivariable analysis included patients with basic and enhanced data not known to have HIV at baseline (n=6504); frequency of testing included as covariate, with no association observed (adjusted IRR 1·14 [95% CI 0·96–1·35]). ‡Recent defined as within 12 months of visit. §Defined as any use during a calendar year. ¶Patients known to have HIV at baseline not included.

Table 2: **Factors associated with incident cases of HIV and STIs (chlamydia, gonorrhoea, or syphilis) among transgender people in Australia, 2014–23**

associated (table 2). Sex work, partner numbers, and use of injecting drugs were not associated with HIV incidence among transgender people.

There were 3277 incident cases of chlamydia (any anatomical site) among transgender people over 9716 person-years of follow-up (33·73 per 100 person-years [95% CI 32·59–34·90]). Chlamydia was highest among transgender women (38·54 per 100 person-years [95% CI 37·05–39·91]) and lower among non-binary people (28·67 per 100 person-years [25·00–32·87]; IRR 0·75 [95% CI 0·64–0·86]) and transgender men (16·33 per 100 person-years [14·54–18·33]; 0·43 [0·38–0·48]). Compared with transgender people, chlamydia incidence overall was lower among cisgender gay and bisexual men (27·20 per 100 person-years [95% CI 27·01–27·39]; adjusted IRR 0·79 [95% CI 0·76–0·82]) and cisgender heterosexual people (9·10 per 100 person-years [8·96–9·22]; adjusted IRR 0·29 [0·28–0·30]; figure 2). These associations were evident even when controlling for sociodemographic and behavioural differences between cohorts.

By anatomical site, chlamydia incidence among transgender people was highest for anorectal infections (32·14 per 100 person-years [95% CI 30·88–33·46]), followed by urogenital (9·74 per 100 person-years [9·13–10·39]) and pharyngeal (5·91 per 100 person-years [5·36–6·52]). While transgender women had the highest rate for both anorectal and urogenital infections, non-binary people had the highest rate for infections of the pharynx (figure 3).

Although there was no overall change to chlamydia incidence among the transgender cohort over the study period (IRR 1·00 [95% CI 0·99–1·01]), we identified two distinct trends. Accounting for changes to sex work and partner numbers, incidence at any anatomical site increased from 27·46 per 100 person-years (95% CI 22·80–33·07) in 2014 to 38·40 per 100 person-years (35·18–41·92) in 2019 (36·6% increase; adjusted IRR 1·07 [95% CI 1·03–1·10]) before decreasing to 29·61 per 100 person-years (26·55–33·03) in 2023 (22·9% decrease; 0·94 [0·91–0·98]). By anatomical site, although anorectal chlamydia increased among transgender people by 40·9% from 2014 to 2023 (IRR 1·02 [95% CI 1·01–1·03]), incidence was stable (including with shorter trend periods) for infections of the urethra (1·00 [0·98–1·03]) and pharynx (1·01 [0·97–1·05]; appendix p 5).

Among the transgender cohort, there were 2920 incident cases of gonorrhoea (any anatomical site) over 9677 person-years of follow-up (30·18 per 100 person-years [95% CI 29·11–31·30]). Gonorrhoea was highest among transgender women (34·42 per 100 person-years [33·09–35·80]) and non-binary people (31·67 per 100 person-years [27·80–36·08]; IRR 0·92 [95% CI 0·80–1·05]) and lowest among transgender men (12·06 per 100 person-years [10·54–13·81]; 0·35 [0·31–0·40]). Gonorrhoea was similar between transgender people and cisgender gay and bisexual men (22·94 per 100 person-years [95% CI 22·77–23·11]; IRR 1·00 [95% CI 0·97–1·04]) but much lower among cisgender heterosexual people (2·63 per 100 person-years [2·56–2·70]; 0·12 [0·11–0·12]).

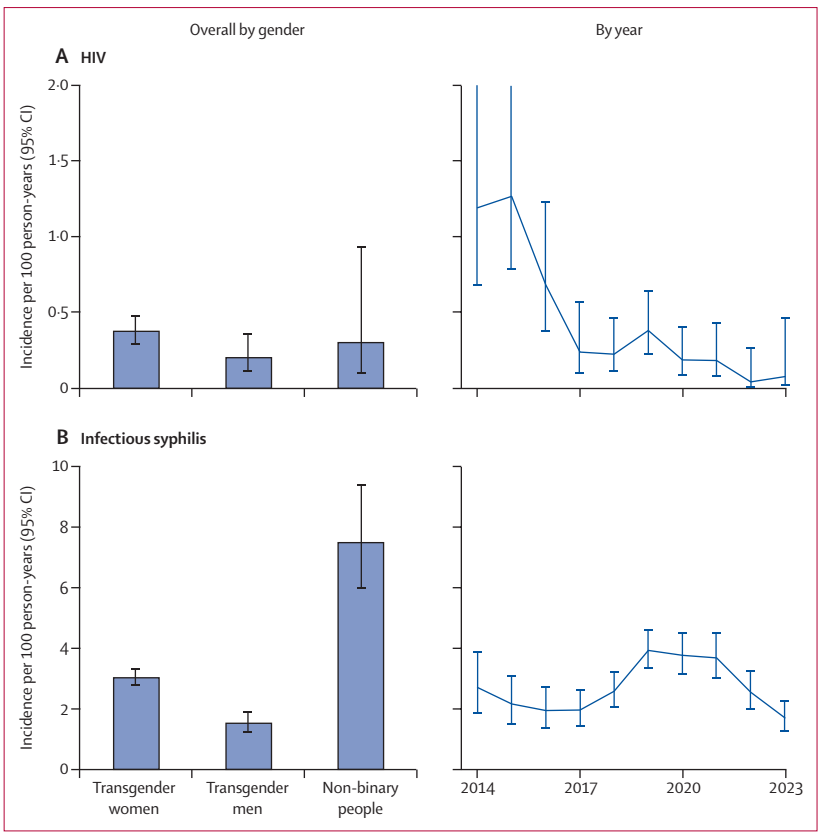

Figure 1: **Incidence of HIV and infectious syphilis among transgender people in Australia, overall and by year and gender (2014–23)***

*More detail on testing, incident cases, and incident rates of HIV and syphilis can be found in the appendix (p 4).

By anatomical site, gonorrhoea incidence among transgender people was highest for anorectal infections (23·38 per 100 person-years [95% CI 22·30–24·50]), followed by pharyngeal infections (20·95 per 100 person-years [19·97–21·98]), and lowest for urogenital (7·22 per 100 person-years [6·67–7·82]). As shown in figure 3 and reflecting the patterns observed with chlamydia, anorectal and urogenital gonorrhoea were highest among transgender women, whereas pharyngeal incidence was highest among non-binary people.

Although there was no clear 10-year trend of gonorrhoea incidence among transgender people (IRR 0·99 [95% CI 0·97–1·01]), just comparing 2013 with 2023 there was a 34·8% increase in incident gonorrhoea (1·03 [1·01–1·06]). There were also two distinct trends within this time period, including when controlling for behavioural changes. Specifically, gonorrhoea incidence increased by 93·6% from 2014 to 2019 (adjusted IRR 1·08 [95% CI 1·05–1·12]) and then decreased by 30·4% to 2023 (0·92 [0·89–0·95]). By site, anorectal gonorrhoea incidence increased by 75·9% during the study period (IRR 1·06

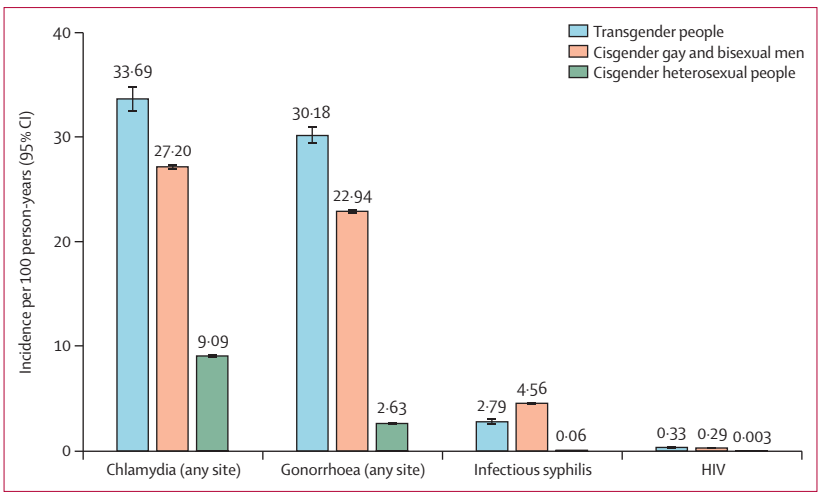

Figure 2: **Comparing the incidence of HIV and other sexually transmissible infections between transgender people (primary cohort), cisgender gay and bisexual men (comparative cohort), and cisgender heterosexual people (comparative cohort), by cohort and infection, 2014–23**

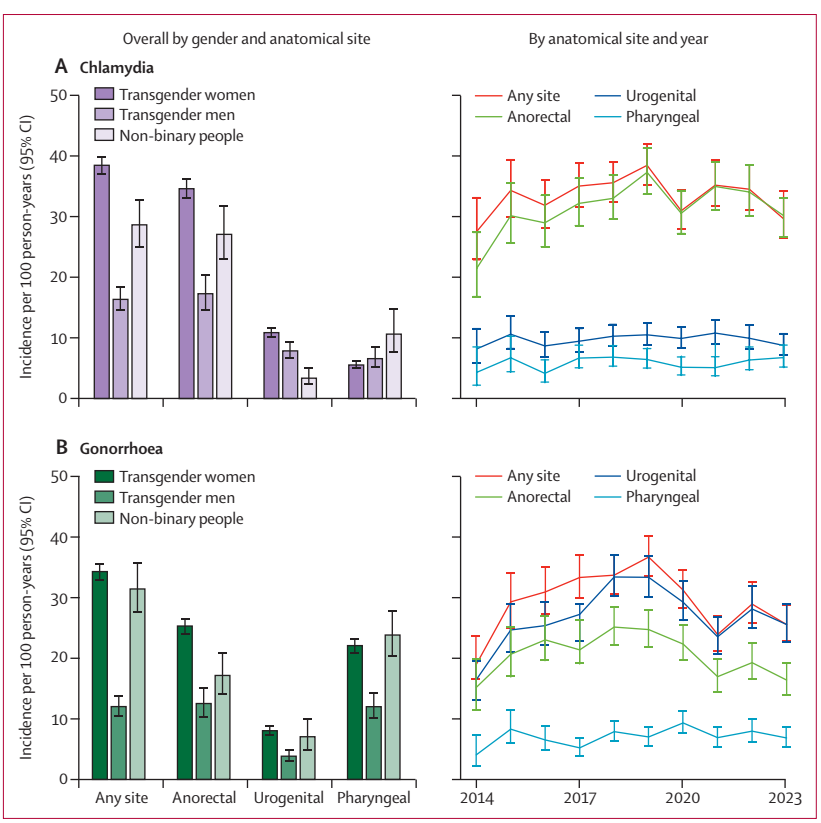

Figure 3: **Incidence of chlamydia and gonorrhoea among transgender people in Australia, overall and by year, gender, and anatomical site (2014–23)***

*More details on testing, incident cases, and incidence rates of chlamydia and gonorrhoea can be found in the appendix (pp 5–6).

[95% CI 1·02–1·11]) but remained stable for both urogenital (1·02 [0·99–1·06]) and pharyngeal infections (1·01 [0·97–1·05]; appendix p 6).

There were 678 incident cases of infectious syphilis among transgender people over 24 311 person-years of follow-up (2·79 per 100 person-years [95% CI 2·59–3·01]). Infectious syphilis was highest among non-binary people (7·51 per 100 person-years [95% CI 5·99–9·41]), lower among transgender women (3·07 per 100 person-years [2·81–3·34]; IRR 0·41 [95% CI 0·32–0·52]), and lowest among transgender men (1·25 per 100 person-years [1·00–1·57]; 0·17 [0·12–0·23]). Compared with the transgender cohort, syphilis incidence was higher among cisgender gay and bisexual men (4·56 per 100 person-years [95% CI 4·50–4·62]; adjusted IRR 1·63 [95% CI 1·51–1·76]) but lower among cisgender heterosexual people (0·06 per 100 person-years [0·05–0·06]; 0·21 [0·19–0·25]).

Among the transgender cohort, the incidence of infectious syphilis was 2·68 per 100 person-years (95% CI 1·84–3·90) in 2014 and 1·72 per 100 person-years (1·29–2·29) in 2023 (figure 1; appendix p 4). Although there was no overall 10-year trend (IRR 1·02 [95% CI 0·99–1·04]), two within-period trends were identified: syphilis incidence increased by 45·3% from 2014 to 2019 (1·14 [1·07–1·23]) and then decreased by 55·7% to 2023 (0·83 [0·78–0·90]). These changes were evident even when controlling for changes to sex work and partner numbers among transgender people.

The incident rate for chlamydia, gonorrhoea, and syphilis combined was 30·17 per 100 person-years (95% CI 29·48–30·87) among transgender people. For transgender people, factors independently and positively associated with STI incidence were being younger than 30 years, living in a major city, sex work, injecting drug use, and having more than ten sexual partners. Compared with people who tested negative for HIV and were not on PrEP, those accessing PrEP had higher STI incidence, as did people with diagnosed HIV (table 2).

Discussion

Over a decade, HIV incidence decreased by 93·9% among transgender people in Australia. At the same time, incidence of other STIs remained stable or increased. Generally, transgender women and non-binary people had higher rates of HIV and STIs than transgender men, whereas transgender people overall had higher rates than their cisgender heterosexual peers. Compared with cisgender gay and bisexual men, syphilis incidence was lower among transgender people, whereas the incidences of HIV and gonorrhoea were comparable, and the incidence of chlamydia was higher.

Decreasing HIV incidence among transgender people in Australia is perhaps due, at least in part, to biomedical HIV prevention. Aside from this study, very little is known about PrEP among transgender people in Australia, with questions of access and equity rarely engaging transgender populations.[19,20] Therefore, it is promising that PrEP uptake was high and increasing among our sample. Such increases could reflect community-led initiatives promoting PrEP to transgender communities.[21,22] Of the factors considered by our study,

only PrEP was negatively associated with incident HIV among transgender people. PrEP's proliferation among cisgender gay and bisexual men is also likely to have contributed given some overlap with transgender people's social and sexual networks.[23]

Although PrEP was associated with decreased HIV incidence among transgender people, it was also associated with increased incidence of other STIs. Australian research with cisgender gay and bisexual men found that as PrEP use increased, condom use decreased and incidences of STIs increased; it is likely something similar happened among transgender populations.[24,25] These findings reinforce the need for comprehensive prevention in sexual health, which incorporates PrEP while also contending with its implications for other STIs.

Aligning with previous Australian research, our results highlight differences in HIV and STIs not only between transgender and cisgender people but also between transgender people of different genders.[7] Although public health globally tends to position transgender women as at highest risk for these infections, our results find non-binary people also require special consideration (especially for STIs of the pharynx). Further research is needed to understand what contributes to HIV and STI risk among non-binary and other gender diverse people. HIV incidence was also higher among Aboriginal and Torres Strait Islander transgender people than non-Indigenous people, suggesting this population might require intersectionally tailored support.[26] Taken together, these results suggest policies, interventions, and funding are needed to support HIV and STI prevention among Australia's diverse transgender populations.

Across genders, these results highlight that transgender people have a unique epidemiology of HIV and STIs, which warrants attention in Australia's public health response. As Australia moves into an era of biomedical STI prevention (notably doxycycline as post-exposure prophylaxis),[27] the inclusion of transgender people is essential. Such inclusion should provide transgender people with the same level of resources afforded their cisgender peers (including but not limited to financial investment, community engagement, health promotion, and others). Further, research shows that cisgenderism and transphobia negatively impact uptake of and retention in sexual health care in Australia, so addressing these forms of stigma and discrimination is vital to addressing HIV and STIs among transgender populations.[28,29]

A primary strength of this study is its large, national, and longitudinal sample. Although this kind of sentinel surveillance can offer an important perspective on HIV and STIs, it stands strongest as a complement to passive systems. As described, however, Australia's national passive surveillance system does not yet capture reliable data on transgender people.[3] Fortunately, simple changes to the disease notification form (notably to ask about current gender as well as gender presumed at birth) have been shown in the state of Victoria to improve data quality for transgender people.[30] If implemented nationally, this approach could enhance disease surveillance for transgender populations. Further, there are numerous interesting possibilities if sentinel, passive, and behavioural surveillance datasets could be routinely and confidentially linked to create more comprehensive and powerful data in support of precision population health for HIV, STIs, and beyond.

This study has several limitations. First, the use of clinical data means these results are not necessarily representative of the general community. Previous research finds those attending sexual health clinics (which comprised half of study sites) tend to be at higher risk for HIV and STIs than other contexts, suggesting our estimates are likely an upper bound for these infections.[31] Second, given limitations in Australia's national data systems (eg, the Census, passive health surveillance), it is not possible to assess the representativeness of our cohort. Third, analyses were limited to variables recorded within health records. Although some prominent markers of risk were captured, there are other likely relevant factors (eg, race, socioeconomic status) that could not be considered. Fourth, this study can only account for testing conducted within the ACCESS network. Despite the network's high coverage of services offering sexual health care, experiences in other settings are missing.

A fifth limitation relates to the organisation of gender. As a secondary analysis of routine data, this study was limited to the existing structures of health record systems, which tend to differ over time and between clinics. Indeed, many health record systems in Australia have only recently been able to record transgender experience, so our analysis might under-represent the true number of transgender people. Further, our use of the gender marker "other" as proximal for non-binary status among transgender patients is likely to have under-represented this population specifically. Similarly, our study was unable to account for how individual experiences of gender could evolve over time, which could affect risk for and reporting of HIV and STIs. With these limitations in mind, study results should be considered a baseline for the epidemiology of these infections among transgender people, with many opportunities for improved data and further research. Indeed, working to improve how gender details are collected within health records (including with the introduction of a two-step process)[32] could not only improve health surveillance but also patient experience.

Although decreasing incidence of HIV among transgender people in Australia is promising, our results highlight several ongoing needs. The addition of transgender people in the country's current HIV strategy is important and should be supported with appropriate investment. As described, passive and sentinel data systems should continue to evolve for maximum inclusion of gender diversity. Further, implementation of biomedical STI prevention should explicitly seek to respond to

transgender people's needs. Relatedly, our results suggest special attention to Aboriginal, Torres Strait Islander, and non-binary people is warranted, including in research, policy, and practice. Although our study offers a detailed assessment of HIV and STIs among these populations, far more work is required. Ultimately, it is vital we empower Australia's diverse transgender communities to design, implement, and lead a new strategic era for preventing and managing HIV and STIs.

Contributors

DC and TC conceived of this study with guidance from JA, MS, DJT, VC, RG, MH, and BD. JA prepared the study dataset, and DJT, AM, CTMS, CB, and CKF led data collection and supported clinical interpretation. TC led community consultation, and DC conducted all analyses with support from JA. DC and JA accessed and verified the data and underwriting code. All authors reviewed and provided input on several versions of the manuscript and approved the submitted and revised versions.

Declaration of interests

MH received funding from Gilead Sciences and AbbVie for investigator-initiated research unrelated to this study and paid directly to their institute. VC received funding from ViiV Healthcare and Gilead Sciences for consultations on injectable PrEP and HIV treatment, unrelated to this study.

Data sharing

Due to the sensitive and personal nature of HIV and STIs, data from the ACCESS network (including the data used in this study) are not publicly available. Individuals can submit a concept note request to access de-identified line-listed or aggregate patient data, which will be reviewed by the ACCESS investigative team. Eligible concepts must align with the overarching goals of ACCESS (ie, to enhance surveillance and knowledge of HIV and STIs), demonstrate analytical rigour, define dissemination and impact, and participate in collaboration with relevant communities. Those granted access will receive a dataset and supporting data dictionary as defined by the parameters of their study and are required to sign a data use agreement detailing fair use, confidentiality, security, privacy, and other conditions. To view the ACCESS study protocol, for more information on data sharing, or to submit a concept note, please see online.

For **further information** see https://accessproject.org.au/

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