Australia's progress towards hepatitis C elimination

Annual Report 2023

Burnet
reach for the many

UNSW
Kirby Institute

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Acknowledgement of Country

The authors acknowledge the Traditional Owners of the Lands on which this report was produced, including the Boon Wurrung people of the Kulin Nation (where the Burnet Institute is located) and the Gadigal people of the Eora Nation (where the Kirby Institute is located). We pay respect to all Aboriginal and Torres Strait Islander people and recognise their cultural, spiritual, and educational practices, their ongoing connection to Lands, Waters, and Communities, and that 'sovereignty was never ceded'.

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Contents

Preface

Hepatitis C is a significant public health issue in Australia. Until direct-acting antivirals (DAAs) became available to all Medicare-eligible Australians with hepatitis C on 1st March 2016, there was a growing number of people living with hepatitis C, a rising burden of liver disease, and increasing rates of liver cancer and premature deaths attributed to long-term hepatitis C.[1] At the end of 2015 an estimated 162 590 people had chronic hepatitis C in Australia.[2,3,4] The most recent estimate (from 2021) highlighted that Aboriginal and Torres Strait Islander people are disproportionately affected by hepatitis C, representing 16% of all people living with hepatitis C at the end of 2015.[5] Unrestricted access to DAAs, a highly tolerable and effective medication,[6,7] through public subsidy since March 2016 means there is an opportunity to eliminate hepatitis C as a public health threat in Australia by 2030.

At the end of 2022, an estimated 60% of all people living with hepatitis C over the period 2016—2022 had been treated, and approximately 74 400 people remained living with hepatitis C*.[2,3,4] Despite Australia's progress, data from this year's report show that declines in testing and treatment have been substantial over recent years; without a reinvigoration of efforts to prevent new infections, and an increase in the number of people diagnosed and treated, Australia will not achieve its elimination goals. Progress towards hepatitis C elimination is also hindered by structural and legal frameworks that criminalise drug use, the key risk factor for hepatitis C transmission in Australia. People who inject drugs are disproportionately represented in prison populations, the setting with the highest concentration of hepatitis C infection. To achieve hepatitis C elimination, DAA treatment needs to be combined with effective primary prevention measures, raised awareness about hepatitis C treatment and cure, and increased testing and linkage to care among people at risk of hepatitis C. Stigma towards affected communities needs to be reduced, and convenient, accessible, and acceptable models of care are needed, to ensure all people living with hepatitis C can benefit from curative treatment. Hepatitis C service delivery should consider the overlap with common comorbidities such as substance use and mental health disorders. By providing person-centred care that recognises people's experiences of trauma and racism, and focusses on social, cultural, and emotional needs, in addition to medical needs, services can better support individuals throughout their hepatitis C journey.

To understand progress towards hepatitis C elimination, monitoring trends using data is required, from measurement of new infections, counts of people tested and treated, people receiving hepatitis C-related liver transplants, and people experiencing stigma and discrimination, through to projections based on mathematical modelling. This is the fifth national report on progress towards hepatitis C elimination in Australia. It brings together national data from across the sector, to give an overview on progress towards eliminating hepatitis C in Australia. This report also highlights gaps in our knowledge and informs future directions in Australia's hepatitis C elimination response. Future reports will aim to fill gaps identified and collate data for all priority populations† and settings.

* Estimates of treatment coverage, people living with hepatitis C at the end of 2015 and at the end of 2022, were derived as part of the National hepatitis C diagnosis and care cascade (Chapter Three).[2,3,4]

† The Fifth National Hepatitis C Strategy 2018–2022 identifies six priority populations: people living with hepatitis C, people who inject drugs and/or accessing drug treatment programs, people who previously injected drugs, people in custodial settings, Aboriginal and Torres Strait Islander people, and people from culturally and linguistically diverse backgrounds.[8]

Acronyms

ACCHS	Aboriginal Community Controlled Health Services
BBV	blood borne virus
CI	confidence interval
DAA	direct-acting antiviral
GBM	gay, bisexual, and other men who have sex with men
HCV	hepatitis C virus
NSP	needle and syringe program
PBS	Pharmaceutical Benefits Scheme
RNA	ribonucleic acid
STI	sexually transmissible infection
SVR	sustained virological response

Figures

Executive Summary

Australia is working towards eliminating hepatitis C as a public health threat by 2030. This elimination goal is in line with global targets set by the World Health Organization and targets included in Australia's National Hepatitis C Strategy 2018–2022. Moving to unrestricted access to direct-acting antivirals (DAAs) for the treatment of hepatitis C in March 2016 provoked a catalytic change in Australia's hepatitis C response and meant the goal of elimination became possible. Around 100 000 people have started treatment since 2016, which is part of the considerable progress towards elimination. Rates of new hepatitis C infections are declining. While this report does not yet have a population-level rate of new hepatitis C infections (that is, incidence), the available data we do have, such as incidence within primary care clinics and samples of people who inject drugs, indicate rates of current infection have declined since 2016. Further, hepatitis C treatment initiations in prisons continue to represent a large and increasing proportion of all treatment initiations nationally (25% in 2019, 29% in 2020, 31% in 2021, and 35% in 2022).

Despite the good news, data indicate that levels of hepatitis C testing, and therefore diagnosis and treatment, have declined. This suggests that Australia's elimination response has slowed; an estimated 74 400 people remained living with chronic hepatitis C at the end of 2022. Also, as we move forward, and the population of people cured of hepatitis C continues to grow (already over 100 000 people), we need to ensure people's liver health is monitored, particularly by checking for liver cirrhosis, a key risk factor for liver cancer.

If Australia is to reach elimination by 2030, a range of interventions are urgently needed including health promotion campaigns to ensure key risk populations are aware that hepatitis C treatment and retreatment is available to them and to encourage them to engage in care. Overcoming financial barriers to hepatitis C care through reimbursement to people and/or healthcare providers could assist in increasing the demand for testing and treatment. Effort and investment are also needed to support the provision of accessible, simplified, and convenient models of testing and treatment, so that people living with or at risk of hepatitis C can access testing, are retained in care, and complete treatment. This may include novel interventions such as point-of-care testing, dried blood spot testing, peer-led models of care, testing and treatment in non-traditional settings such as pharmacies, and expanding drug treatment programs to include hepatitis C care. While prisons remain an important focus of the provision of hepatitis C services, resources should be allocated to both prison and justice-related community settings to increase accessibility to hepatitis C infection prevention, testing, and treatment. Expanding models of care also requires supporting the relevant workforce through education and skill development. Ongoing investment is also needed to stop new infections and reinfections, including in prisons, using the full suite of harm reduction programs, in recognition that people can and will use drugs and it is critical we do all we can to keep people from being harmed.

Importantly, this report highlights that stigma and discrimination towards people at risk of and living with hepatitis C is prevalent. Interventions to reduce stigma in the community and healthcare settings are critical to enable people to engage with hepatitis C testing and treatment services and continue progress towards hepatitis C elimination.

One

Newly acquired hepatitis C infections

Measuring the rate of new hepatitis C infections helps monitor strategies that aim to prevent ongoing transmission, including primary prevention and secondary prevention (testing and treatment). New acquisition of hepatitis C is best measured using an incidence rate, which describes the rate at which people test positive for the hepatitis C virus (HCV) after previously testing negative. The direct measurement of incidence requires monitoring of repeat testing of individuals (i.e., HCV antibody and ribonucleic acid (RNA) tests) over time to detect new infections. It is important to note that incidence rates are sensitive to changes in testing patterns, as occurred when testing initially increased after DAAs were introduced in 2016. Also, regular and repeat testing among specific cohorts improves the reliability of incidence rates. The data on rates of hepatitis C incidence remains somewhat limited.

Measuring changes in the rate of new infections of hepatitis C can be monitored through the number of notifications of hepatitis C among people aged 15–24 years.[4,9,10] These notifications may reflect incident infections because younger people are likely to have initiated injecting drug use relatively recently.[11]

Hepatitis C incidence measurement in Australia is also possible using data collated by the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmissible Infections (STI) and Blood Borne Viruses (BBV; ACCESS),[12] which links individuals' diagnostic testing data over time.[13,14] ACCESS includes primary care clinics that provide specialist health services to people who inject drugs, such as needle and syringe programs (NSPs), opioid agonist therapy, and hepatitis C testing and treatment. ACCESS sites include both specialist and general health services, where attendees may be people currently injecting, people who previously injected drugs, or people who have never injected drugs (see Methods, ACCESS section for details on included sites). HCV antibody test positivity of >10% at some of the primary care clinics included in ACCESS (see Chapter Two) suggest these specific sites represent key sentinel sites for monitoring changes in hepatitis C incidence and the impact of hepatitis C prevention efforts. ACCESS also includes clinics that specialise in the health of HIV-positive gay, bisexual, and other men who have sex with men (GBM). Testing data from 37 ACCESS sites across seven jurisdictions, and 18 679 individuals were used in incidence rate measurements. Most primary care clinics in ACCESS are in Victoria (VIC), and most clinics that specialise in the health of GBM and sexual health clinics are in VIC and New South Wales (NSW).

PROGRESS ON REDUCING NEW INFECTIONS

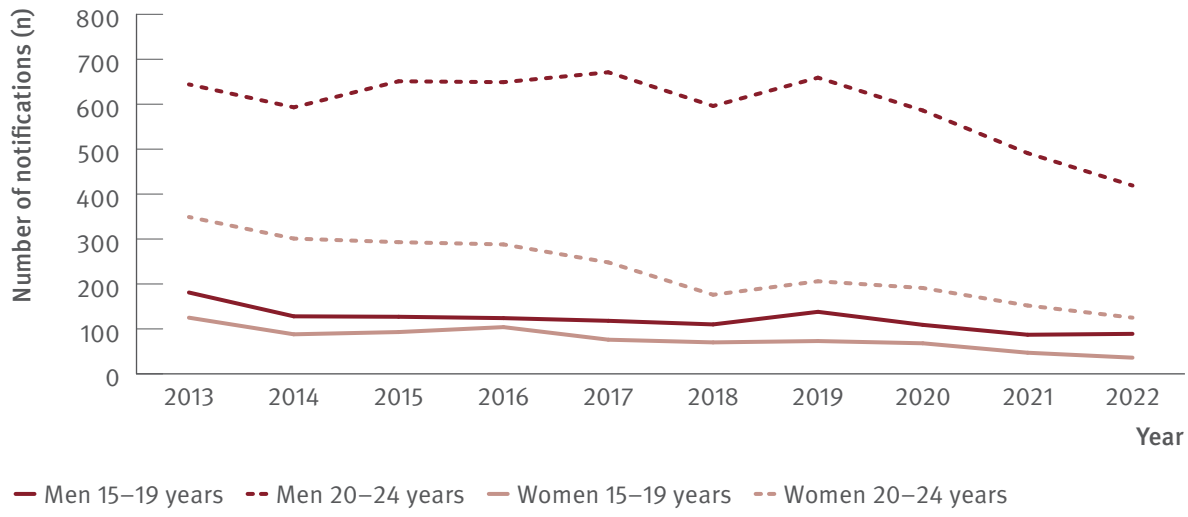
Among men and women aged 20–24 years, the number of hepatitis C notifications has declined since 2017 (Figure 1). The monitoring of hepatitis C notifications among people aged 15–24 years as a surrogate measure for hepatitis C incidence needs to consider unknown levels of testing and their influence on trends.

Declines in hepatitis C incidence were observed among individuals tested at ACCESS primary care clinics and among HIV-positive GBM tested at ACCESS GBM and sexual health clinics between 2013 and 2022 (Figures 2 and 3).

Improving the reliability of monitoring hepatitis C incidence trends will require improvements in surveillance coverage, as well as the refinement of methods to account for changes in testing patterns and their impact on hepatitis C notification and incidence rates. In addition, more data are needed to understand progress in reducing hepatitis C incidence in priority populations, as well as within specific geographic areas to help inform targeted strategies.

Monitoring new hepatitis C infections

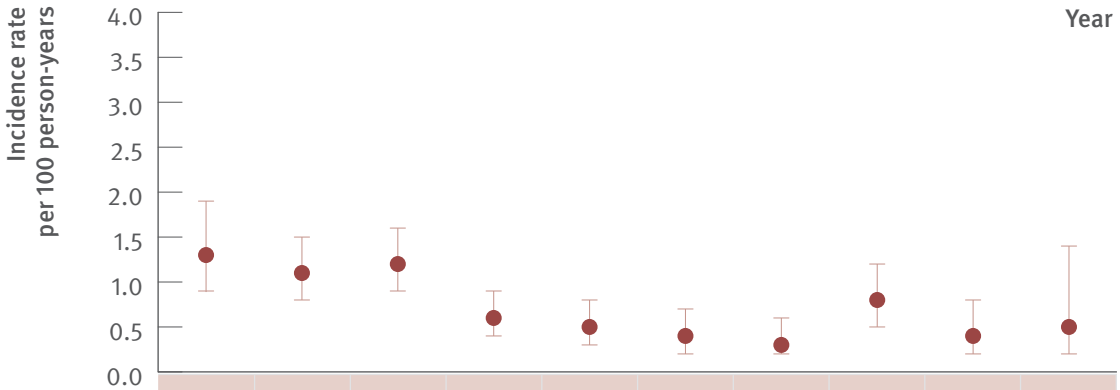
Figure 1. Number of hepatitis C (unspecified and newly acquired) notifications by age group and gender, 2013–2022



Source: Australian National Notifiable Diseases Surveillance System.[4,9,10]

Notes: Cases other than newly acquired were assigned as unspecified.

Figure 2. Incidence of primary hepatitis C infection among individuals tested at ACCESS primary care clinics, ACCESS, 2013–2022



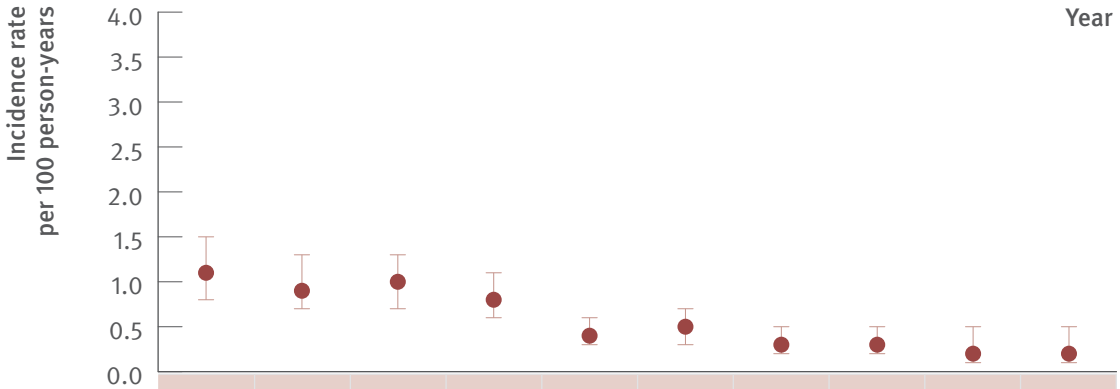
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Incident infections	31	31	38	19	18	14	11	21	8	4
Person-years	2 374	2 904	3 199	3 396	3 469	3 378	3 184	2 697	1 939	789

Observed incidence rate — 95% CI

Source: ACCESS.[12]

Notes: N=9 998 individuals and 47 957 hepatitis C tests (HCV antibody and/or HCV RNA). Analysis includes 14 sites: 12 in VIC, one in Western Australia (WA), and one in Queensland (QLD). The WA site contributed data from 2016 onwards. Primary care clinics see high caseloads of people at risk of hepatitis C and provide both specialist services to current or former people who inject drugs as well as general health services. First incident infection only included in analysis. Incident infection date was assigned as the midpoint between the positive HCV antibody or HCV RNA test date and previous HCV antibody negative test date. ACCESS collates data from January 2009. Individuals included tested HCV antibody negative on their first test observed and had at least one follow-up test (HCV antibody or HCV RNA or both on or before 31st December 2022). Individuals were 15 years or older. CI: confidence interval.

Figure 3. Incidence of primary hepatitis C infection among HIV-positive GBM tested at ACCESS GBM or sexual health clinics, ACCESS, 2013–2022



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Incident infections	45	43	48	42	21	25	18	14	10	3
Person-years	4 062	4 627	5 012	5 262	5 463	5 555	5 357	4 932	4 027	1 770

● Observed incidence rate — 95% CI

Source: ACCESS.[12]

Notes: N=8 681 individuals and 111 721 hepatitis C tests (HCV antibody and/or HCV RNA). Analysis includes 23 sites: 12 in NSW, four in VIC, one in South Australia (SA), two in Australian Capital Territory (ACT), one in WA, two in QLD, and one in Tasmania (TAS). The TAS site contributed data from 2013 onwards. GBM were classed as being HIV-positive for the entire calendar year of their diagnosis and were 15 years or older. First incident infection only included in analysis. Incident infection date was assigned as the midpoint between the positive HCV antibody or HCV RNA test date and previous HCV antibody negative test date. ACCESS collates data from January 2009. Individuals included tested HCV antibody negative on their first test observed, and had at least one follow-up test (HCV antibody or HCV RNA or both on or before 31st December 2022). CI: confidence interval.

Two

Testing and diagnosis

Eliminating hepatitis C in Australia relies on finding people living with chronic hepatitis C through diagnostic testing and facilitating appropriate care and treatment. Testing for the presence of HCV antibodies is used as an initial screening for hepatitis C infection. The presence of antibodies indicates exposure to HCV but does not indicate current infection. To diagnose current infection, HCV antibody positive individuals need an HCV RNA test.[15] Guidelines published in 2022 recommend clinicians request reflex testing for hepatitis C, meaning a laboratory proceeds to an HCV RNA test if HCV antibodies are detected.[16]

ACCESS collates data on consultations, HCV antibody and HCV RNA tests conducted, and test outcomes from sites that offer specialist services for people at risk of hepatitis C, including people currently or with a history of injecting drug use and HIV-positive GBM. ACCESS can provide data on consultations and hepatitis C testing among attendees of primary care and sexual health clinics, and within primary care, for the priority population of individuals accessing opioid agonist therapy; people prescribed opioid agonist therapy are likely to have a history of current, recent, or past injecting drug use. Also, a subset of sexual health clinics participating in ACCESS that had data available for this report, had high completion of the Aboriginal and Torres Strait Islander status of individuals in their patient management systems (of unique individuals who attended included clinics 2013–2022 for a consultation (N=346 313), 15% of people had no Aboriginal or Torres Strait Islander status recorded (missing), 19% were recorded as 'not stated', 63% were neither Aboriginal nor Torres Strait Islander people, and 3% were Aboriginal and Torres Strait Islander people). When restricted to individuals contributing one test per year, data from the ACCESS sites can be used to describe trends in test uptake (tests conducted divided by consultations) and positivity (positive tests divided by tests conducted).

The ATLAS network is an established national STI and BBV surveillance and research network specific to Aboriginal and Torres Strait Islander people.[17] Data from the ATLAS network for this report were provided by Aboriginal Community Controlled Health Services (ACCHS) located in urban, regional, and remote areas (34 ACCHS/sites). ATLAS can provide trends in annual hepatitis C testing uptake, annual HCV antibody test uptake and positivity, the proportion of individuals receiving an HCV antibody test, and among those testing positive, the proportion then tested for HCV RNA or viral load.

The Australian Needle Syringe Program Survey is a sentinel surveillance system conducted annually at participating NSP sites across Australia (N=1 781 participants across 53 NSP sites in 2022). The number of respondents in 2020, 2021, and 2022 was lower than in previous years due to the ongoing impacts of the COVID-19 pandemic and public health measures designed to reduce community transmission in some jurisdictions and sites. The Australian Needle Syringe Program Survey asks about a range of risk and health-seeking behaviours, including hepatitis C testing. Respondents were invited to provide a dried blood spot sample for HCV antibody and HCV RNA testing. The proportion of respondents undergoing dried blood spot for HCV RNA testing has increased over time, with ~90% of respondents tested for HCV RNA in 2020, 2021, and 2022.[18]

Population-level monitoring of testing related to diagnosis of current hepatitis C infection can occur through the publicly available Medical Benefits Scheme claims dataset, when item numbers are restricted to 69499 and 69500. These item numbers are specifically used for testing to detect HCV RNA and not used for tests associated with treatment monitoring.[19]

The Migrant Blood-borne Virus and Sexual Health Survey was conducted online and in paper form between September 2020 and June 2021. It was completed by people residing in Australia and born in Sub-Saharan Africa, Southeast, or Northeast Asia. Conducted by Curtin University, this survey focussed only on STIs and BBVs, and aimed to assess the knowledge, attitudes, and practices of people from culturally and linguistically diverse backgrounds. The survey was drafted and pre-tested in English before being translated into Vietnamese, Simplified Chinese, Traditional Chinese, Karen, and Khmer.[20,21] Methods of recruitment included direct invitation (email, telephone, and social media), promotion through print and social media, and face-to-face approaches during community and outreach events.[22] The Migrant Blood-borne Virus and Sexual Health Survey provides key data on awareness of hepatitis C and uptake of viral hepatitis testing among the priority population for hepatitis C of people from a culturally and linguistically diverse background.

PROGRESS ON DIAGNOSIS OF HEPATITIS C INFECTION

Across ACCESS sites, a decline in hepatitis C testing activity was seen in 2020 and 2021, with larger declines seen within primary care clinics compared to GBM or sexual health clinics; most primary care clinics are in VIC, the jurisdiction with longer periods of COVID-19 related restrictions in 2020 and 2021.

Across the most recent 10 years of data (2013–2022) within ACCESS primary care clinics, annual hepatitis C test uptake (HCV antibody or HCV RNA) was stable with 6% (5 716/93 867) of people who attended a consultation in 2022 tested for hepatitis C (Figure 4). Among HIV-positive GBM, annual hepatitis C test uptake stabilised in 2022 to 49% (4 341/8 838) of men tested (Figure 5). Among individuals ever prescribed opioid agonist therapy, annual hepatitis C test uptake increased since 2020, to 9% (873/9 678) of people who attended in 2022 tested for hepatitis C (Figure 6). Among Aboriginal and Torres Strait Islander people, annual hepatitis C test uptake increased to 32% (523/1 609) of people who attended in 2022 tested for hepatitis C (Figure 7).

PROGRESS ON DIAGNOSIS OF HEPATITIS C INFECTION (CONTINUED)

Within ACCESS primary care clinics, highlights of HCV antibody testing and HCV antibody positivity data include that while more HCV antibody tests were observed among women compared to men, overall, positivity was higher among men; HCV antibody positivity among men has declined, to 10% (218/2 232) in 2022, the lowest positivity since 2013 (Figure 8). Among HIV-positive GBM, HCV antibody positivity halved between 2017 (1.4%, 64/4 481) and 2022 (0.7%, 25/3 674) (Figure 9). Among individuals ever prescribed opioid agonist therapy, HCV antibody positivity was 35% (109/316) among men and 40% (56/139) among women in 2022 (Figure 10). Among Aboriginal and Torres Strait Islander people, while more HCV antibody tests were observed among women compared to men, higher positivity was observed among men; positivity among men though declined markedly from 2018 to 11% (14/128) in 2022 (Figure 11).

In the ATLAS network, annual hepatitis C test uptake (HCV antibody or HCV RNA) decreased in 2022 to 9% (5 997/68 176), compared to a peak in test uptake of 13% (7 185/57 135) in 2019, an observation likely explained by the impact of COVID-19 on health service activities (Figure 12). While more HCV antibody tests were among women compared to men, higher positivity was observed for men, and this remained consistent between 2016 and 2022 (Figure 13). Between 2016 and 2022, 6% (1 785/27 683) of ACCHS clients tested for HCV antibody were positive and 51% (908/1 785) were subsequently tested for HCV RNA or viral load (Figure 14). It is important to note that universal screening for hepatitis C is not recommended and within ACCHS—as elsewhere—testing should be based on individual risk assessment between clients and practitioners.

Approximately half of Australian Needle Syringe Program Survey respondents reported testing for hepatitis C in the previous year. In 2022, in some jurisdictions, there was an increase in the proportion of respondents tested, notably ACT and SA returned to pre–2020 levels of testing (Figure 15). There was slightly higher uptake of hepatitis C testing among women (Figure 16), and among Indigenous respondents (Figure 17). In 2022, overall HCV antibody positivity among respondents was 32% (554/1 724), the sixth consecutive year that positivity was ‹50%, following two decades of HCV antibody positivity ≥50% (all years between 1999 and 2016). Between 2015 and 2020, at least half of Aboriginal and Torres Strait Islander respondents were HCV antibody positive, however positivity in this group was ‹50% in 2021 and 2022.[18]

PROGRESS ON DIAGNOSIS OF HEPATITIS C INFECTION (CONTINUED)

Among Australian Needle Syringe Program Survey respondents tested for HCV RNA, the proportion with current infection (weighted by HCV antibody status and gender from 2015–2019) declined from 51% (496/978) to 12% (200/1 653) between 2015 and 2022. Among men, the proportion with current infection declined from 53% (350/658) to 13% (137/1 065) between 2015 and 2022. Among women, the proportion with current infection declined from 45% (141/311) to 10% (58/552) between 2015 and 2022 (Figure 18).

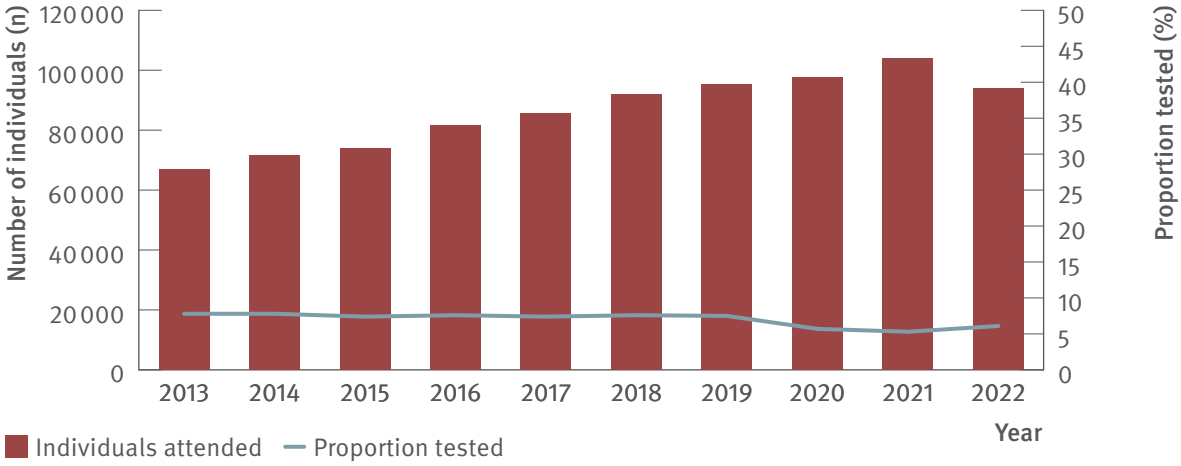
From the beginning of 2017, Medicare claims for HCV RNA tests related to hepatitis C diagnosis have declined steadily year-on-year to approximately 11 600 tests in 2022, the lowest number of tests annually between 2013 and 2022 (Figure 19).

A total of 1 489 people completed the Migrant Blood-borne Virus and Sexual Health Survey; 59% were women (n=880) and 55% (n=825) were under 40 years of age. Over one-third (37%, n=547) were born in Southeast Asia, 29% in Northeast Asia (n=437) and 24% in sub-Saharan Africa (n=363). Of the 1 405 respondents who answered a question about awareness of viral hepatitis variants, 39% (n=553) could not distinguish between different types (i.e., hepatitis A, B or C). Of the 538 respondents who answered a question about whether they had heard of hepatitis C specifically, 71% (n=382) indicated that they had. Of the 382 people who had heard of hepatitis C, 83% (n=317; n=10 missing responses) knew it was transmissible via injecting equipment. Of these 382 respondents, 53% (n=205) knew that people can get hepatitis C more than once, and 41% (n=153) knew there was no vaccine for hepatitis C. However, among the 382 people who had heard of hepatitis C, only 26% (n=99, n=6 missing responses) knew there was a cure for hepatitis C (Figure 20).

In the Migrant Blood-borne Virus and Sexual Health Survey, with respect to testing, 1 433 respondents provided a valid response and 68% (n=975) had ever been tested for HIV, hepatitis B, hepatitis C, or any other sexually transmissible infection. Of the 975 people ever tested, 26% (n=252) had been tested less than 12 months ago. Of the 975 people ever tested, 697 knew details of the testing and 36% (250/697) knew that their most recent tested included hepatitis B and/or hepatitis C serology. For those whose most recent test included hepatitis C and/or hepatitis B serology, (n=250), 222 respondents provided a reason/s for testing (more than one option could be selected); the most common reasons for seeking testing were: “It was part of my regular health check” (35%, n=77), “it was a requirement for my work/study” (23%, n=52), and “I wanted to know if I had an STI or BBV” (13%, n=29). Only 9% (n=19) of these respondents indicated that they were tested because their “doctor/nurse suggested it”.

Monitoring hepatitis C testing

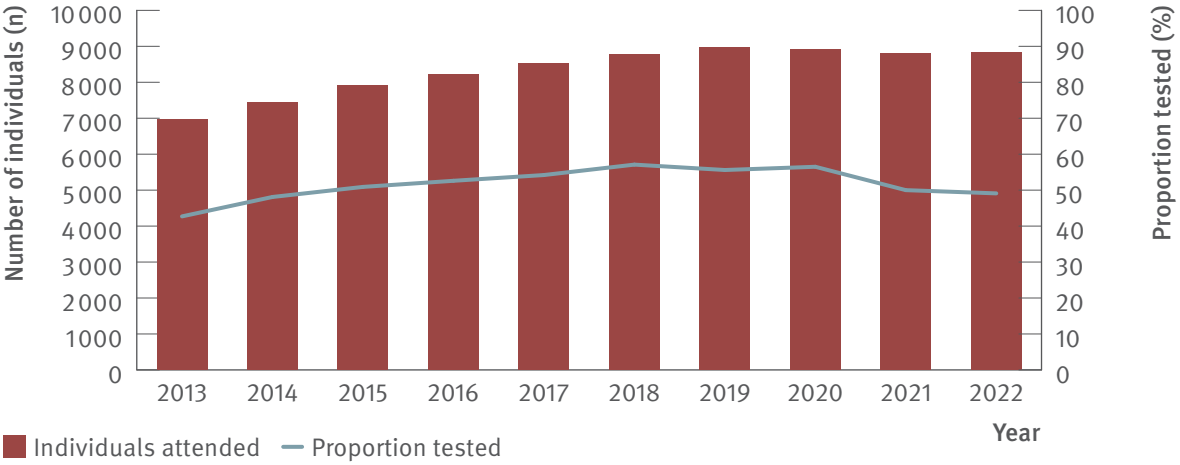
Figure 4. Number of individuals attending ACCESS primary care clinics and proportion tested for HCV (HCV antibody only or HCV antibody and RNA or HCV RNA only), ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes 14 sites: 12 in VIC, one in WA, and one in QLD. The WA site contributed data from 2016 onwards. Primary care clinics have high caseloads of people at risk of hepatitis C and provide both specialist services to current and former people who inject drugs as well as general health services. Clinic attendances included in-person and telehealth consultations. Individuals were 15 years or older and contributed one consultation and one test per year.

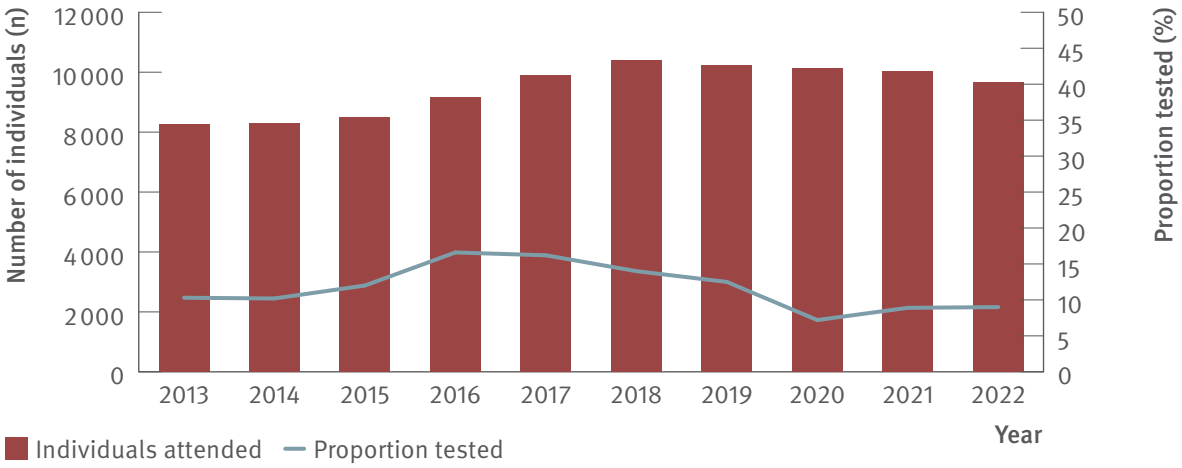
Figure 5. Number of HIV-positive GBM attending ACCESS GBM or sexual health clinics and proportion tested for HCV (HCV antibody only or HCV antibody and RNA or HCV RNA only), ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes 23 sites: 12 in NSW, four in VIC, one in SA, two in ACT, one in WA, two in QLD, and one in TAS. The TAS site contributed data from 2013 onwards. Clinic attendances included in-person and telehealth consultations. GBM were classed as being HIV-positive for the entire calendar year of their diagnosis, were 15 years or older, and contributed one consultation and one test per year.

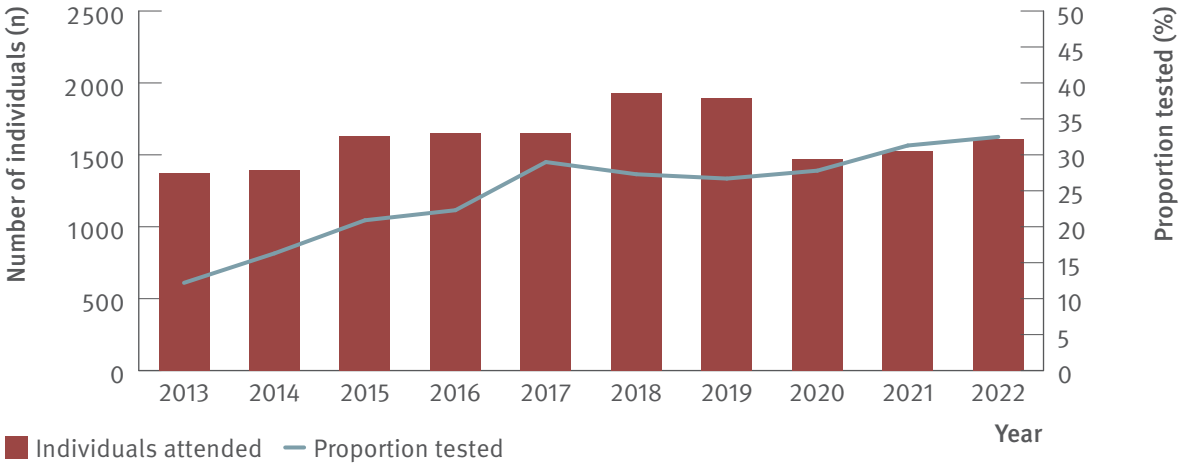
Figure 6. Number of individuals ever prescribed opioid agonist therapy attending ACCESS primary care clinics and proportion tested for HCV (HCV antibody only or HCV antibody and RNA or HCV RNA only), ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes 14 sites: 12 in VIC, one in WA, and one in QLD. The WA site contributed data from 2016 onwards. Primary care clinics have high caseloads of people at risk of hepatitis C and provide both specialist services to current and former people who inject drugs as well as general health services. Clinic attendances included in-person and telehealth consultations. Individuals were 15 years or older, had at least one electronic medical record of a prescription for opioid agonist therapy between January 2009 and December 2022, and contributed one consultation and one test per year.

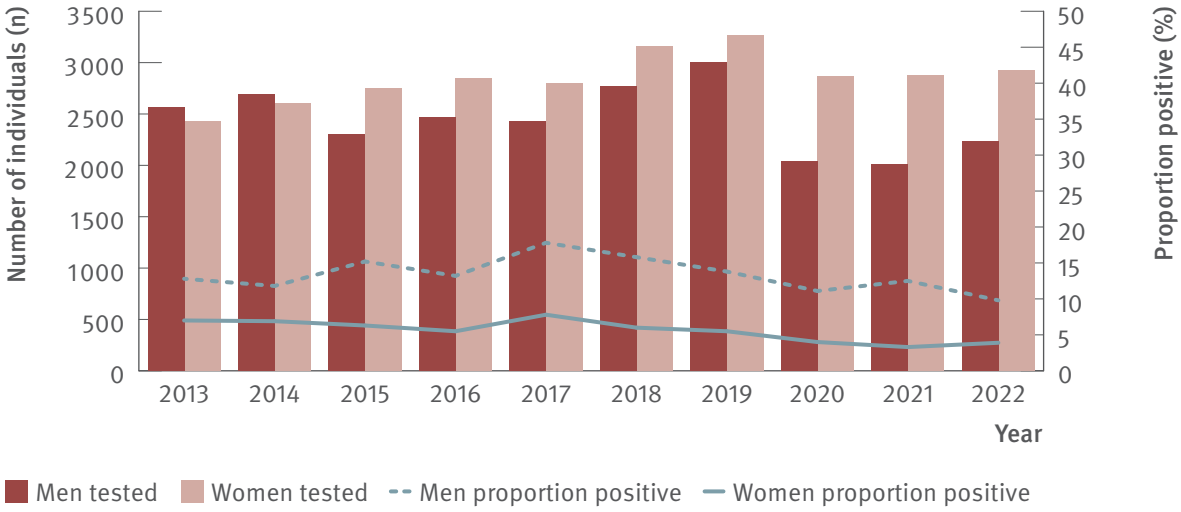
Figure 7. Number of Aboriginal and Torres Strait Islander people attending ACCESS sexual health clinics and proportion tested for HCV (HCV antibody only or HCV antibody and RNA or HCV RNA only), ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes seven sites: four in NSW, one in VIC, one in ACT, and one in SA. Clinic attendances included in-person and telehealth consultations. Individuals were 15 years or older and contributed one consultation and one test per year. Overall, of unique individuals who attended included clinics 2013–2022 for a consultation (N=346 313), 15% of people had no Aboriginal or Torres Strait Islander status recorded (missing), 19% were recorded as 'not stated', 63% were neither Aboriginal nor Torres Strait Islander people, and 3% were Aboriginal and Torres Strait Islander people.

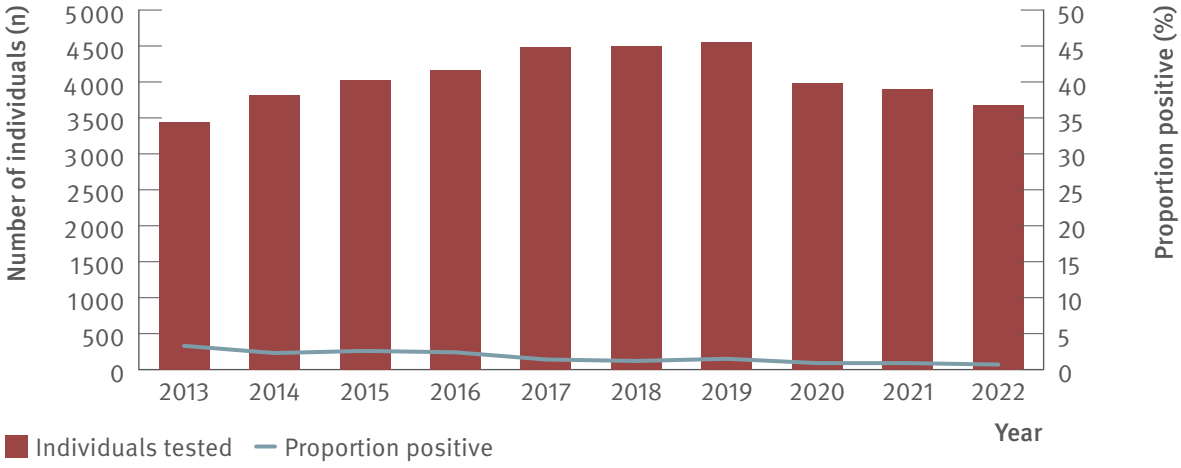
Figure 8. Number of individuals tested for HCV antibody at ACCESS primary care clinics and proportion of HCV antibody tests positive by gender, ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes 14 sites: 12 in VIC, one in WA, and one in QLD. The WA site contributed data from 2016 onwards. Primary care clinics have high caseloads of people at risk of hepatitis C and provide both specialist services to current and former people who inject drugs as well as general health services. Clinic attendances included in-person and telehealth consultations. Individuals were 15 years or older and contributed one test per year. Individuals recorded as a gender other than man or woman were not reported due to small sample size. Individuals included either had no previous HCV antibody test recorded in ACCESS since 2009 or had previously tested HCV antibody negative. Individual's HCV antibody tests after an HCV antibody positive test being observed were excluded from analysis.

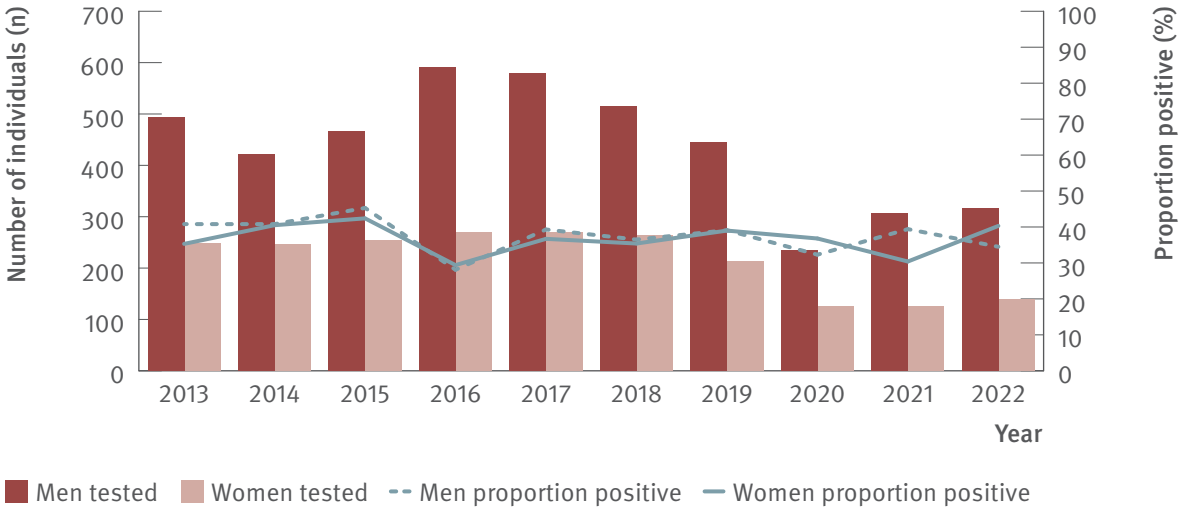
Figure 9. Number of HIV-positive GBM tested for HCV antibody at ACCESS GBM or sexual health clinics and proportion of HCV antibody tests positive, ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes 23 sites: 12 in NSW, four in VIC, one in SA, two in ACT, one in WA, two in QLD, and one in TAS. The TAS site contributed data from 2013 onwards. GBM were classed as being HIV-positive for the entire calendar year of their diagnosis, were 15 years or older, and contributed one test per year. Individuals included either had no previous HCV antibody test recorded in ACCESS since 2009 or had previously tested HCV antibody negative. Individual's HCV antibody tests after an HCV antibody positive test being observed were excluded from analysis.

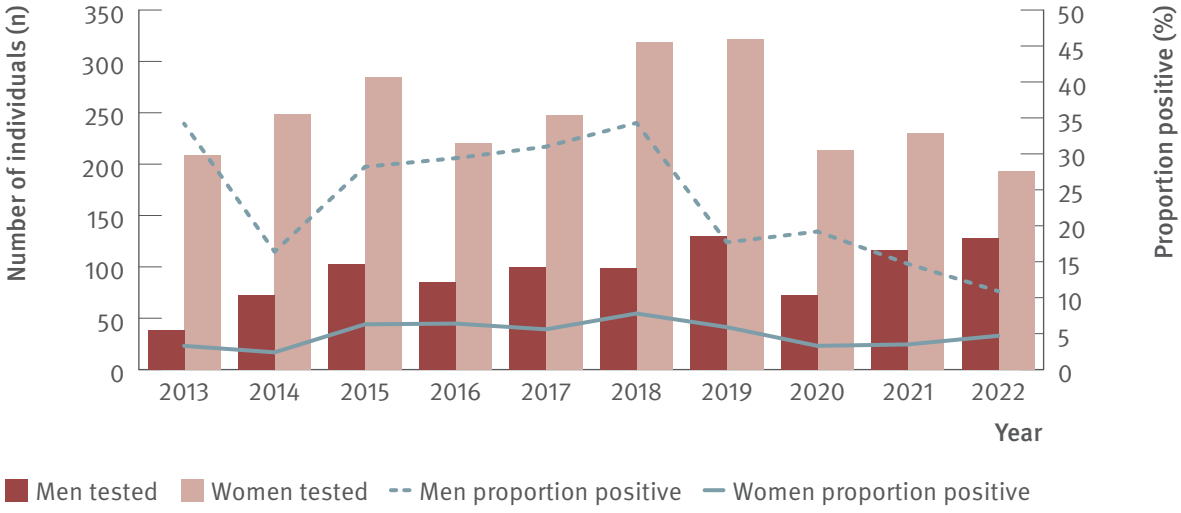
Figure 10. Number of individuals ever prescribed opioid agonist therapy tested for HCV antibody at ACCESS primary care clinics and proportion of HCV antibody tests positive by gender, ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes 14 sites: 12 in VIC, one in WA, and one in QLD. The WA site contributed data from 2016 onwards. Primary care clinics have high caseloads of people at risk of hepatitis C and provide both specialist services to current and former people who inject drugs as well as general health services. Individuals were 15 years or older, had at least one electronic medical record of a prescription for opioid agonist therapy between January 2009 and December 2022, and contributed one test per year. Individuals recorded as a gender other than man or woman were not reported due to small sample size. Individuals included either had no previous HCV antibody test recorded in ACCESS since 2009 or had previously tested HCV antibody negative. Individual's HCV antibody tests after an HCV antibody positive test being observed were excluded from analysis.

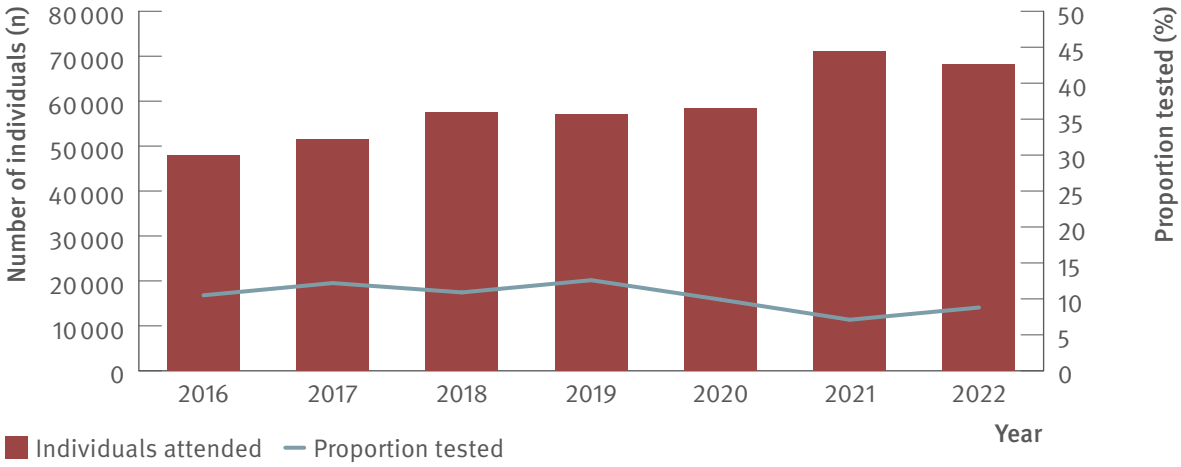
Figure 11. Number of Aboriginal and Torres Strait Islander people tested for HCV antibody at ACCESS sexual health clinics and proportion of HCV antibody tests positive, ACCESS, 2013–2022



Source: ACCESS.[12]

Notes: Analysis includes seven sites: four in NSW, one in VIC, one in ACT, and one in SA. Clinic attendances included in-person and telehealth consultations. Individuals were 15 years or older and contributed one test per year. Individuals recorded as a gender other than man or woman were not reported due to small sample size. Individuals included either had no previous HCV antibody test recorded in ACCESS since 2009 or had previously tested HCV antibody negative. Individual's HCV antibody tests after an HCV antibody positive test being observed were excluded from analysis. Overall, of unique individuals who attended included clinics 2013–2022 for a consultation (N=346 313), 15% of people had no Aboriginal or Torres Strait Islander status recorded (missing), 19% were recorded as 'not stated', 63% were neither Aboriginal nor Torres Strait Islander people, and 3% were Aboriginal and Torres Strait Islander people.

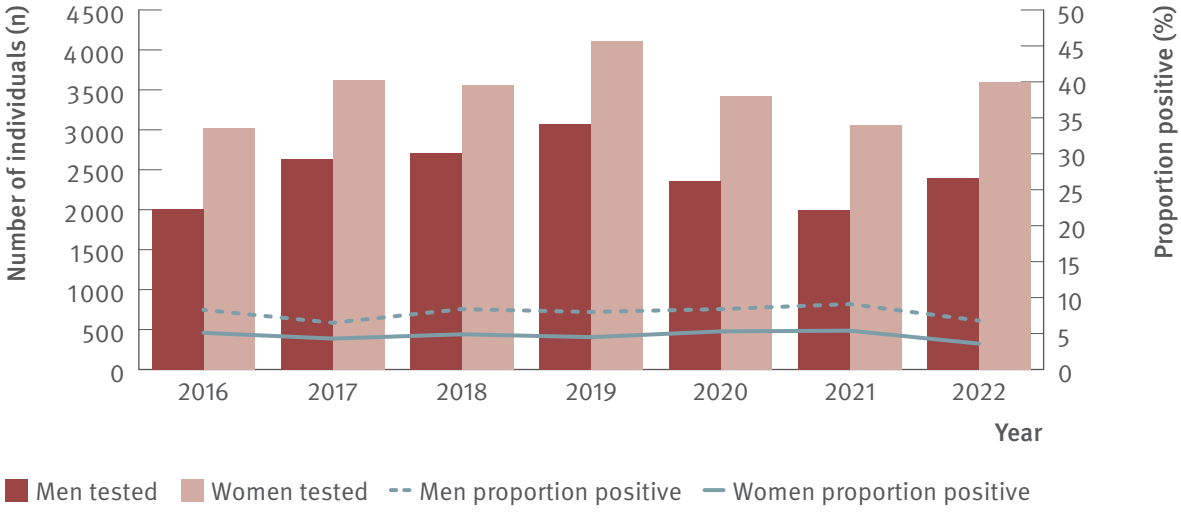
Figure 12. Number of individuals attending ACCHS and proportion tested for HCV (HCV antibody only or HCV antibody and RNA or HCV RNA only), ATLAS network, 2016–2022



Source: ATLAS Indigenous Primary Care Surveillance and Research Network, 2016–2022.[17]

Notes: Individuals defined as people aged 15 years or older, who visited a doctor, nurse, or Aboriginal health practitioner ('medical consultations') between 2016 and 2022.

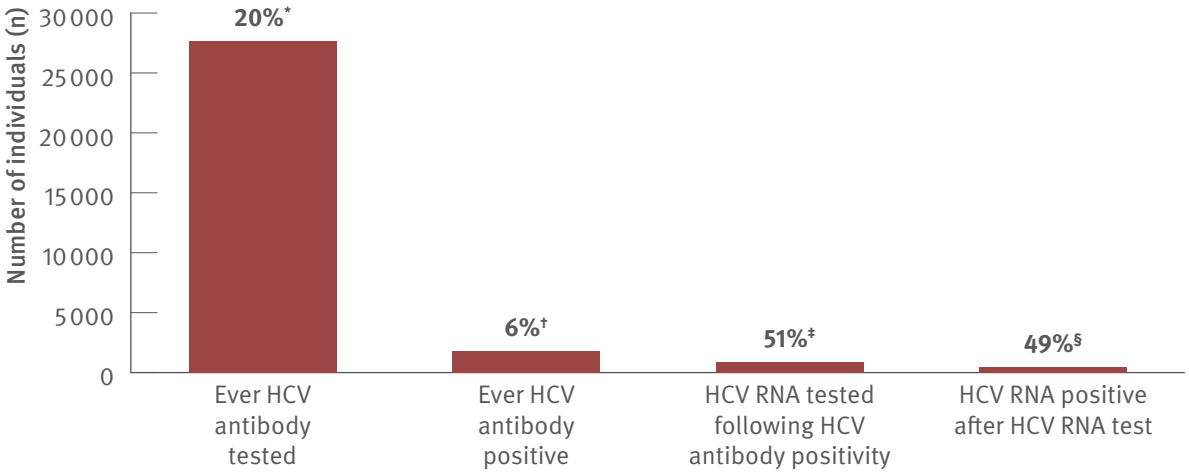
Figure 13. Number of individuals attending ACCHS tested for HCV antibody and proportion positive by gender, ATLAS network, 2016–2022



Source: ATLAS Indigenous Primary Care Surveillance and Research Network, 2016–2022.[17]

Notes: Individuals defined as people aged 15 years or older, who visited a doctor, nurse, or Aboriginal health practitioner ('medical consultations') between 2016 and 2022. Number of people tested per year as follows: 2016: 2 012 men, 3 020 women; 2017: 2 640 men, 3 626 women; 2018: 2 709 men, 3 566 women; 2019: 3 077 men, 4 108 women; 2020: 2 358 men, 3 420 women; 2021: 1 998 men, 3 058 women; 2022: 2 399 men, 3 598 women.

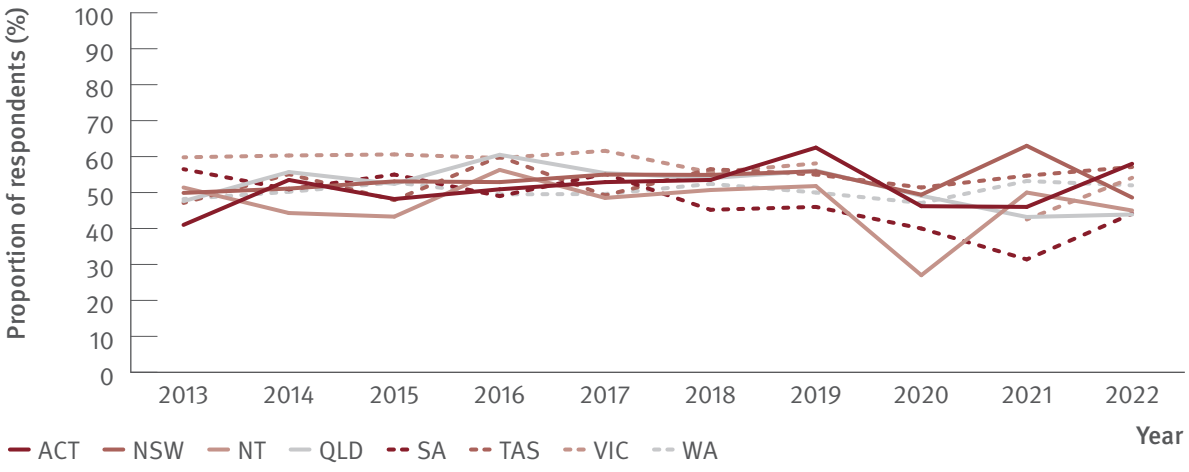
Figure 14. Hepatitis C testing cascade: number and proportion of individuals attending ACCHS tested for HCV antibody or RNA and among those tested, the number and proportion testing positive, ATLAS network, aggregated for years 2016–2022



Source: ATLAS Indigenous Primary Care Surveillance and Research Network, 2016–2022.[17]

Notes: Individuals defined as people aged 15 years or older, who visited a doctor, nurse, or Aboriginal health practitioner ('medical consultations') between 2016 and 2022. 'Ever HCV antibody positive' was defined as having had a positive test result at any time since data collection began (1st January 2016) until end of the sample period (December 2022). *A total of 135 838 individuals aged 15 years or older attended medical appointments between 2016 and 2022, of whom 20.4% (27 683/135 838) had an HCV antibody test. †Of those tested for HCV antibody, 6.4% (1 785/27 683) tested HCV antibody positive. ‡Of those HCV antibody positive, 50.9% (908/1 785) had an HCV RNA test following HCV antibody positivity of which §49.2% (447/908) were HCV RNA positive.

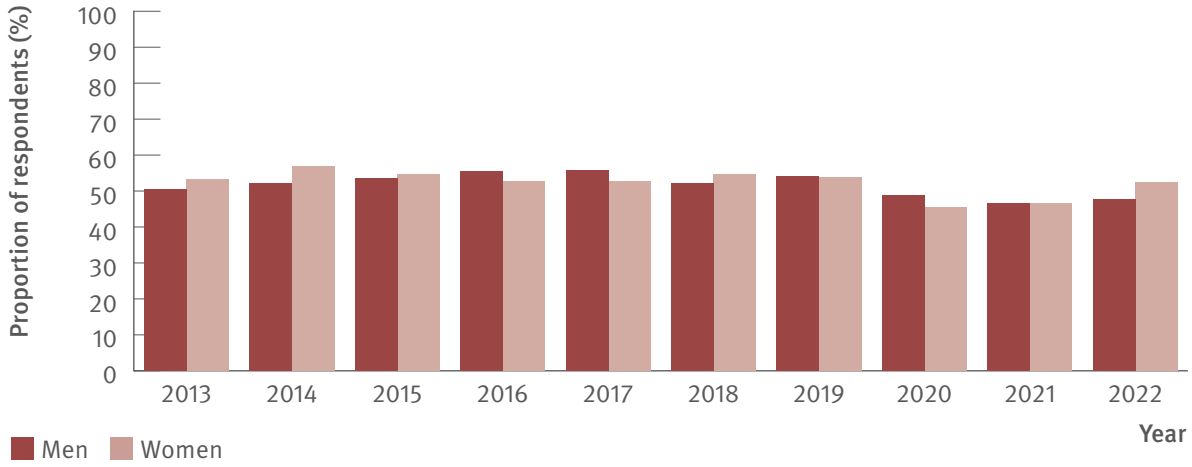
Figure 15. Proportion of Australian Needle Syringe Program Survey respondents self-reporting recent (past 12 months) hepatitis C testing by jurisdiction, 2013–2022



Source: Australian Needle Syringe Program Survey. National Data Report 2018–2022.[18]. Australian Needle Syringe Program Survey 25 year National Data Report 1995–2019.[23]

Notes: No participant recruitment occurred in VIC in 2020.

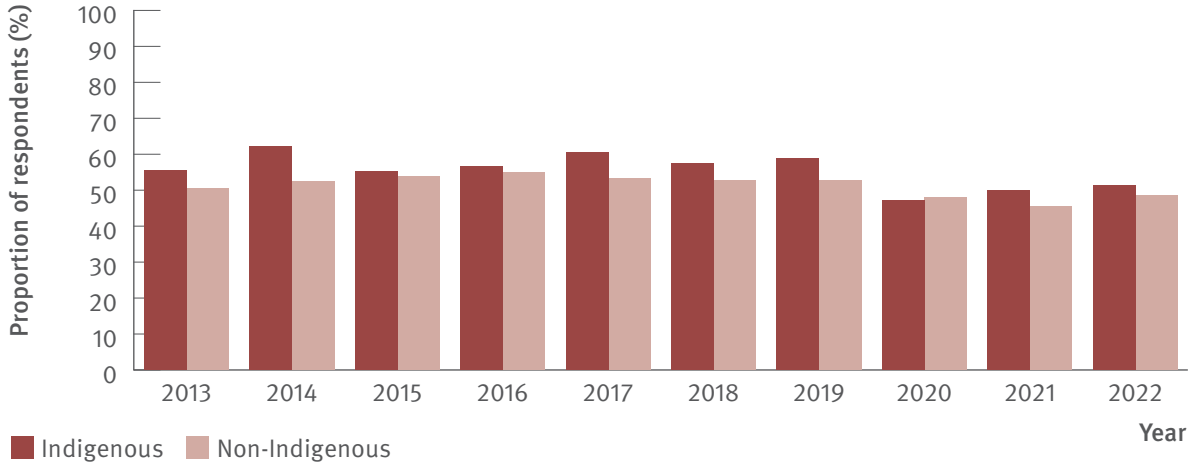
Figure 16. Proportion of Australian Needle Syringe Program Survey respondents reporting recent (past 12 months) hepatitis C testing by gender, 2013–2022



Source: Australian Needle Syringe Program Survey. National Data Report 2018–2022.[18] Australian Needle Syringe Program Survey 25 year National Data Report 1995–2019.[23]

Notes: No participant recruitment occurred in VIC in 2020.

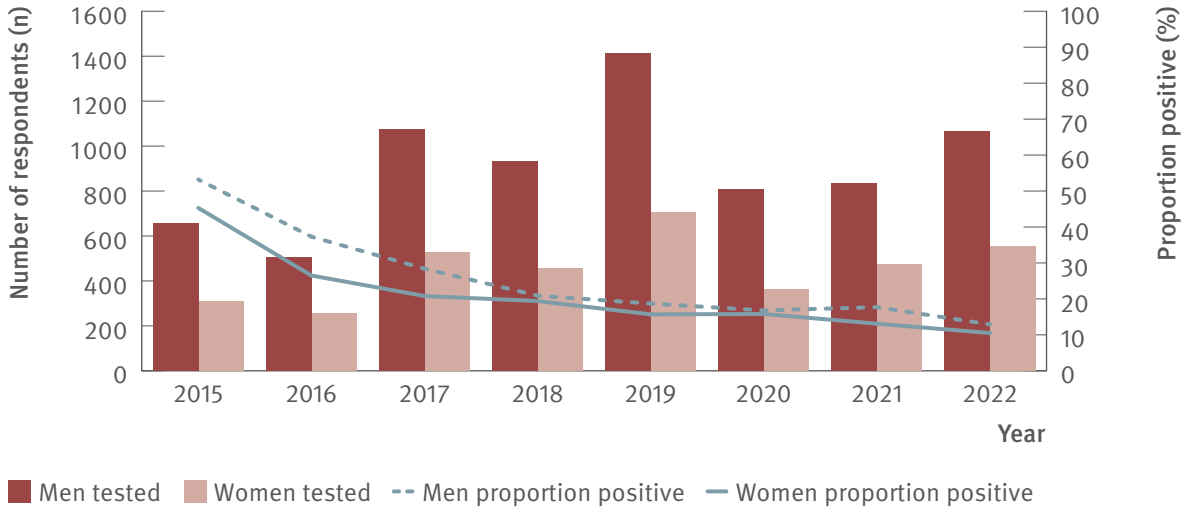
Figure 17. Proportion of Australian Needle Syringe Program Survey respondents reporting recent (past 12 months) hepatitis C testing by Indigenous status, 2013–2022



Source: Australian Needle Syringe Program Survey. National Data Report 2018–2022.[18] Australian Needle Syringe Program Survey 25 year National Data Report 1995–2019.[23]

Notes: No participant recruitment occurred in VIC in 2020.

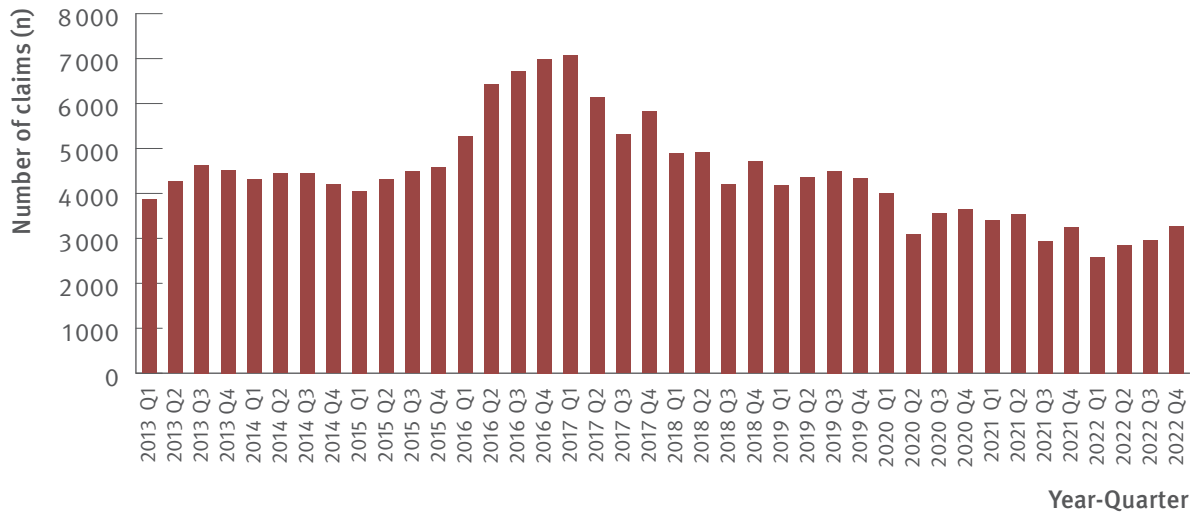
Figure 18. Number of Australian Needle Syringe Program Survey respondents tested for HCV RNA and proportion positive by gender, 2015–2022



Source: Australian Needle Syringe Program Survey. National Data Report 2018–2022.[18] Australian Needle Syringe Program Survey 25 year National Data Report 1995–2019.[23]

Notes: No participant recruitment occurred in VIC in 2020. Weighted for gender and HCV antibody status 2015–2019.

Figure 19. Number of claims to Medicare for items 69499 and 69500 (detection of HCV RNA, new infections only), 2013–2022

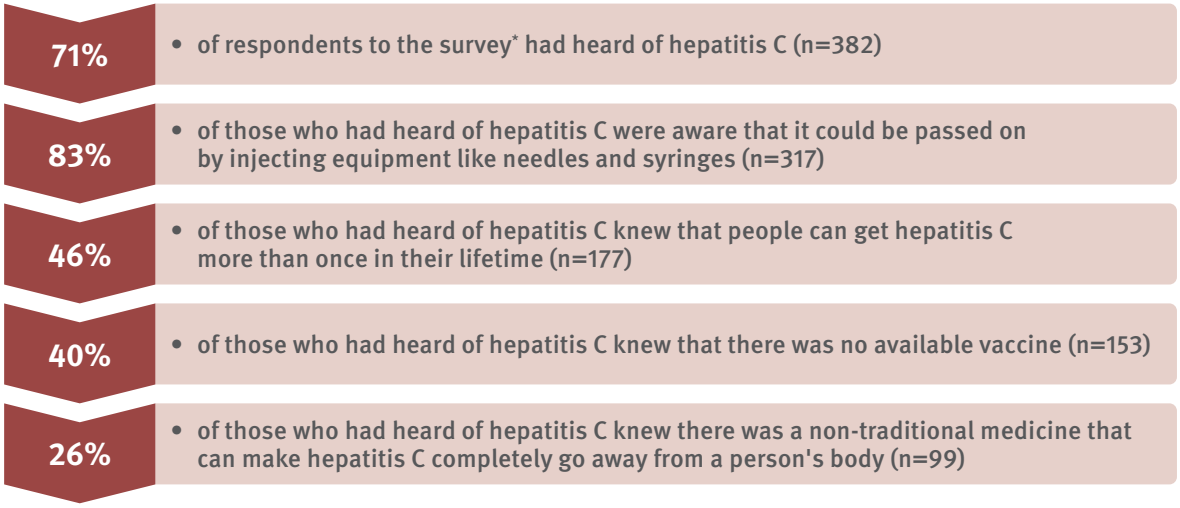


Source: Medicare Australia Statistics.[19]

Notes: Medical Benefit Scheme item numbers (69499 and 69500) are used for testing to detect current hepatitis C infection which are not used for tests associated with treatment monitoring. Prison-based testing is not included in Medical Benefit Scheme data.

Monitoring hepatitis C knowledge and testing among migrants

Figure 20. Awareness and knowledge of hepatitis C among people from culturally and linguistically diverse backgrounds, Migrant Blood-borne Virus and Sexual Health Survey, national, 2020–2021 N=538*



Source: Migrant Blood-borne Virus and Sexual Health Survey.[22]

Notes: *A total of 1 489 people completed the Migrant Blood-borne Virus and Sexual Health Survey. Of the 1 489 respondents, 538 were asked about hepatitis C specifically and were included in this data; respondents to the survey who had never heard of hepatitis, or who knew the difference between hepatitis A, B, or C, were prompted to skip remaining hepatitis questions so were excluded from this data.

Three

Uptake of direct-acting antiviral treatment

Achieving hepatitis C elimination in Australia relies on maintenance of primary prevention strategies and ensuring people who are diagnosed with chronic hepatitis C access care, treatment, and cure, especially those at risk of transmitting their infection to others.[24,2,25,26] DAAs for the treatment of hepatitis C have a high cure rate, are highly tolerable,[6,7] and following listing on the Pharmaceutical Benefits Scheme (PBS) in March 2016, are available at minimal cost to Medicare-eligible Australians.

Treatment uptake

The monitoring treatment uptake in Australia project provides estimates of the number of individuals initiating DAA treatment, and retreatment, between March 2016 and December 2022, recorded in the PBS database. DAA treatment initiations (first treatment) by jurisdiction and provider type are described.[27]

The Australian Needle Syringe Program Survey provides annual self-reported hepatitis C treatment uptake among people who inject drugs attending NSPs.[18]

The National Prisons Hepatitis Network collated data from prison-based hepatitis service providers on the number of DAA treatments initiated in 103 (2019), 94 (2020), 95 (2021), and 101 (2022) prisons across eight states and territories.[28] In 2022, the total number of HCV antibody tests and HCV RNA tests conducted across included prisons were also collated. The Monitoring treatment uptake in Australia project uses PBS data of all DAA dispensations between March 2016 and December 2022 including treatment initiated in prison.[27] The PBS database does not record a person's location (prison or community). To separate treatment initiated in the community from in-prison, the number of prison-based treatments (from prison-based service providers) was minused from the total number of DAA treatments recorded in the PBS database, and the remainder then representing community-based treatments. The proportion of treatment initiated in prison is then the number of in-prison treatments divided by total treatments recorded in the PBS database. In previous years, the denominator of treatments obtained from the PBS included only first treatment initiations, whilst the numerator included any treatment initiated in the prisons. In 2022, PBS data includes both first treatment and retreatments and has also been applied to previous years. This has resulted in a change to the estimated percentage of treatments initiated in prisons from previous reports.

Retreatment

The National Retreatment Project includes all individuals with hepatitis C who initiated DAA treatment through the PBS and were retreated. As the PBS data does not capture reason for retreatment, retreatment data from the REACH-C cohort[29,30] were used in conjunction with a statistical technique (a Random Forest machine learning model) to classify records in the PBS data as being retreatment for reinfection or treatment failure.[31]

Further, the National Retreatment Project can provide the number of treatment initiations subsequently discontinued. Individuals commencing DAAs between 2016 and mid-2022 who had more than one dispensation of DAAs through the PBS were included. Individuals with a single dispensation of their entire treatment course were excluded. Treatment discontinuation was defined as one or more repeat authorised prescription courses (28-day supply) not dispensed. Early discontinuation was defined as discontinuing after the first 28 days of treatment. Late discontinuation was defined as discontinuing after 56 days or more of treatment.[32,27]

Cascades of care

ACCESS data from primary care clinics provided a hepatitis C care cascade for patients; the cascade reflects the status of individuals at 31st December 2022 and includes individuals who had a clinical consultation within the six years prior (2016–2022).[12,33]

The ATLAS network provided a cascade of care using patient data of treatment uptake (proportion of HCV RNA positive individuals prescribed DAA treatment) and HCV RNA testing after treatment.[17] Undetectable HCV viral load was defined as individuals testing negative for HCV RNA or HCV viral load following their DAA treatment, during the study period (2016–2022).

The national hepatitis C diagnosis and care cascade is a population-level cross-sectional cascade estimated annually as part of the *HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report.*[2,3,4,6] Using available data, mathematical modelling, and accounting for uncertainties, the number, and proportion of people in each stage of the diagnosis and care cascade in Australia were estimated including the number of people living with chronic hepatitis C in Australia, the number and proportion of people who have been diagnosed, and the number who received DAA treatment.

PROGRESS ON INCREASING TREATMENT UPTAKE

Treatment uptake

Between March 2016 and December 2022, an estimated 100 684 people living with chronic hepatitis C initiated DAA therapy (first treatment), including 33 202 people in 2016, 20 969 people in 2017, 15 209 in 2018, 11 314 in 2019, 8 228 in 2020, 6 557 in 2021, and 5 205 in 2022 (Figure 21). Treatment uptake by jurisdiction and provider is shown from 2018, to highlight trends in more recent years, with variations in uptake by jurisdiction (Figure 22). Hepatitis C treatment initiations declined through 2019–2022 with 2022 having the lowest number of people treated in the DAA era. A slight increase in the numbers of initiations by non-specialists was seen in 2022 (Figure 23).

Lifetime treatment uptake among Australian Needle Syringe Program Survey respondents rose considerably among both men and women, from 30% (137/459) in 2016 to 66% (134/204) in 2022 among men and from 26% (47/182) to 70% (85/122) among women (Figure 24).

In 2022, 28 201 HCV antibody tests and 13 574 HCV RNA tests were conducted in 101 prisons from which data were collected. In 2022, 2 560 hepatitis C treatments (DAA) were initiated in prisons across all Australian jurisdictions. This represents 35% (2 560/7 344) of all hepatitis C treatment episodes in Australia in 2022, highlighting the importance of the prison sector in national elimination efforts. The number of treatment initiations recorded annually nationally is presented in Figure 25, and then data for each jurisdiction is presented in Figure 26 and Table 1. In 2022, across the various jurisdictions, the proportion of DAA initiations occurring in the prisons ranged from 7% to 64% of the jurisdictional total. These data do not distinguish between first and subsequent treatments (retreatments either because of reinfection or treatment failure). Emerging evidence of hepatitis C reinfections in the prisons[34,35,36] underscores the need to scale up prevention interventions, monitor reinfection rates, and differentiate first and subsequent treatments in future data collations.

The commencement of treatment for hepatitis C within prisons varies across jurisdictions according to the prevalence of disease within the jurisdiction, the size of the prison population, the number of people previously treated in prison or the community, and the number of new diagnoses. While the most recent nation-wide estimate (2016) of HCV antibody positivity among people in prison was 22%, the prevalence varies considerably between jurisdictions[37] reflecting differences in the characteristics of people incarcerated and in particular the proportion of people incarcerated who have histories of injecting drug use. As only the total annual number of treatment initiations is provided, without reliable information on the numbers of people eligible for treatment in prison, comparison of individual programs across jurisdictions is not possible.

PROGRESS ON INCREASING TREATMENT UPTAKE (CONTINUED)

The National Prisons Hepatitis Network aims to harmonise data collection and indicators across jurisdictions. Systematic surveillance studies have now been re-established and future reports will aim to provide more comprehensive and updated data on hepatitis C prevalence, diagnoses, and treatments by jurisdiction over time.

Retreatment

The National Retreatment Project included 100 449 individuals who initiated DAA therapy through the PBS 2016–2022, of whom 9% received retreatment (n=8 514). Among the 8 514 individuals retreated (2016–2022), the total number of retreatments was 10 385 (that is some people were retreated more than once). The model classified 56% (4 776/8 514) of retreatments as due to reinfection and 44% (3 738/8 514) as due to treatment failure.

Data on retreatment is shown from 2018, to highlight trends in more recent years. Retreatment for reinfection increased steadily over the study period from 524 episodes in 2018 to 1 332 in 2020 and similarly 1 392 in 2021, then increasing again to 1 526 in 2022. Corresponding with the availability of pangenotypic and salvage regimens, retreatment for treatment failure increased from 542 in 2018 to 1 211 in 2019, with subsequent progressive declines to 613 in 2022 (Figure 27). There were variations in retreatment by jurisdiction for reinfection (Figure 28) and treatment failure (Figure 29), consistent with previously described jurisdictional variations in treatment initiations. Reinfection retreatments increased in NSW and QLD in 2022; potential explanations include increasing diagnoses due to a recovery in hepatitis C service delivery following COVID-19, increased implementation of dried blood spot testing (in NSW, with a focus on prison-based testing), and/or implementation of the National Australian HCV Point-of-Care Testing Program (with a strong focus on high intensity testing campaigns in prisons).

Overall, between March 2016 and December 2022, a total of 111 069 treatment initiations (first treatment and retreatments) were recorded in the PBS database; including 33 295 in 2016, 21 677 in 2017, 16 275 in 2018, 13 462 in 2019, 10 381 in 2020, 8 635 in 2021, and 7 344 in 2022 (Figure 30).

Of the 97 558 individuals who were treated with DAAs between 2016 to mid-2022, 90 843 were included in analysis of discontinuation, of whom 8% (7 796/97 558) discontinued treatment. Treatment discontinuation increased from 6% (994/14 731) in the first half of 2016 to 14% (272/1 858) in 2022, driven by increases in early treatment discontinuation (Figure 31). Increasing treatment discontinuation parallels the broadening of treatment to younger and more marginalised populations over time and highlights the need for enhanced support for treatment adherence and continued evaluation of therapeutic strategies to reduce discontinuation including shortened treatment duration regimens.

PROGRESS ON INCREASING TREATMENT UPTAKE (CONTINUED)

Cascades of care

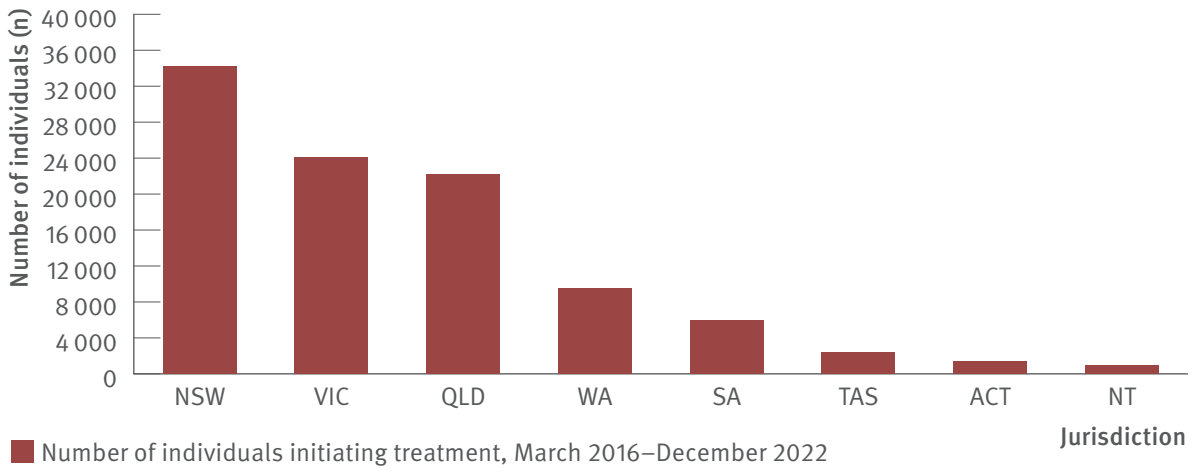
At the end of 2022, among those with a clinical consultation at ACCESS primary care clinics between 2016 and 2022, and an HCV RNA positive test recorded in ACCESS (N=4 638), 55% (2 571/4 638) had initiated treatment and of those treated, 49% (1 267/2 571) had an HCV RNA test ›8 weeks post-treatment, of which 92% (1 171/1 267) were HCV RNA negative (Figure 32).

Over the seven years of the ATLAS network data (2016–2022), of those ACCHS clients with a detected HCV viral load, 28% (123/447) were recorded to then receive DAA treatment and 60% (74/123) of the clients prescribed DAA treatment received further HCV RNA testing after eight weeks. Of those retested after treatment initiation, 89% (66/74) had an undetectable HCV viral load (Figure 33). The ATLAS network is currently investigating the steps in the testing and treatment cascade where major decreases were observed, to determine the reasons driving this apparent loss from care.

The hepatitis C diagnosis and care cascade modelling estimated that at the end of 2022, 74 400 people were living with hepatitis C, of whom 81% at been diagnosed with hepatitis C and of those, 75% had received an HCV RNA confirmed diagnosis. Of the 79 000 people living with chronic hepatitis C at the start of 2022 (end of 2021), 5 210 (7%) received hepatitis C treatment (DAA) during 2022 (Figure 34).

Monitoring treatment uptake

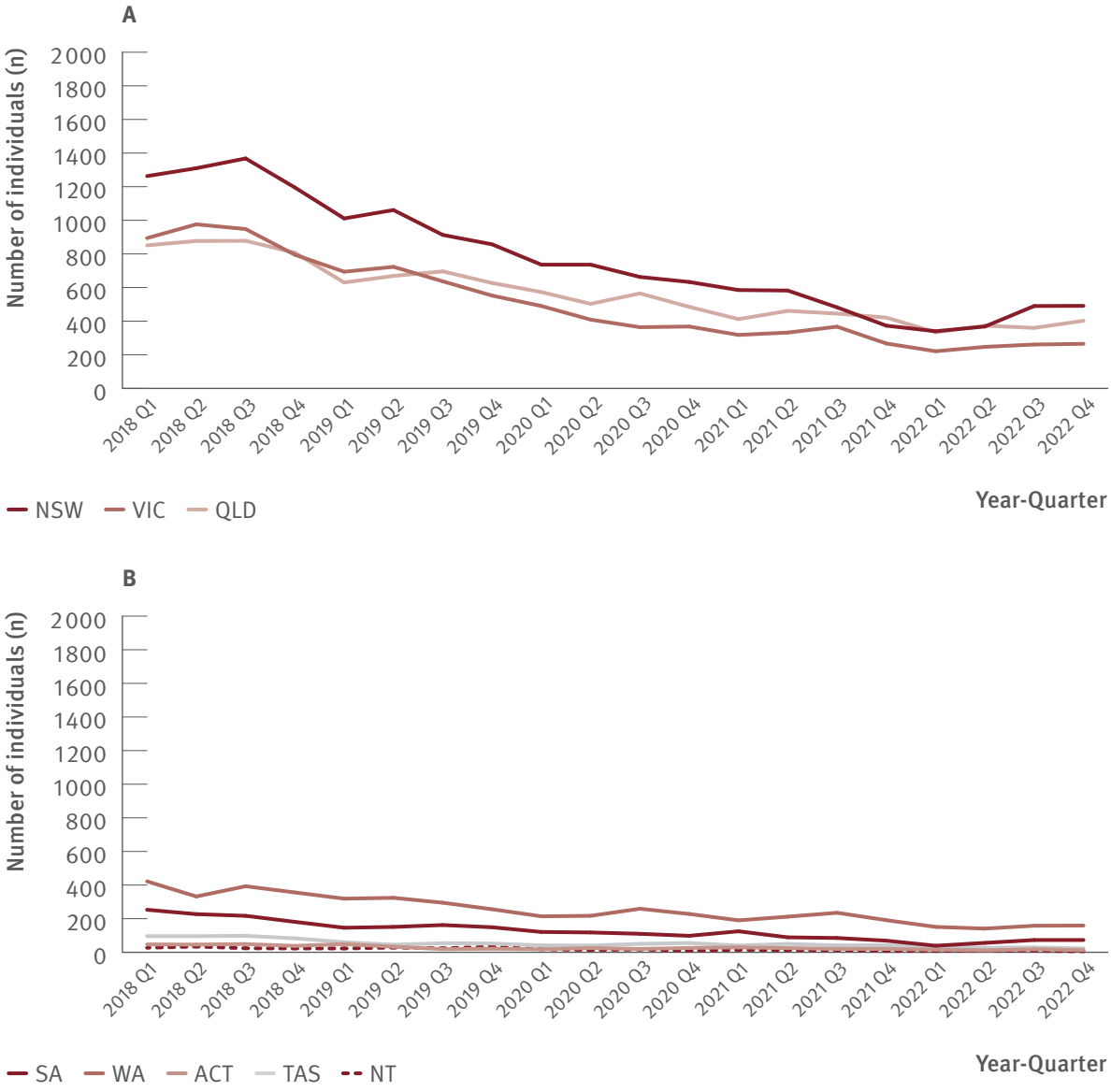
Figure 21. Estimated number of individuals initiating DAA treatment by jurisdiction, PBS database, March 2016–December 2022



Source: Monitoring hepatitis C treatment uptake in Australia.[27]

Notes: Includes individuals initiating first treatment. Treatment numbers may vary from previous or future reports due to refinements made to the PBS data between releases. Jurisdiction data were not available for 16 individuals.

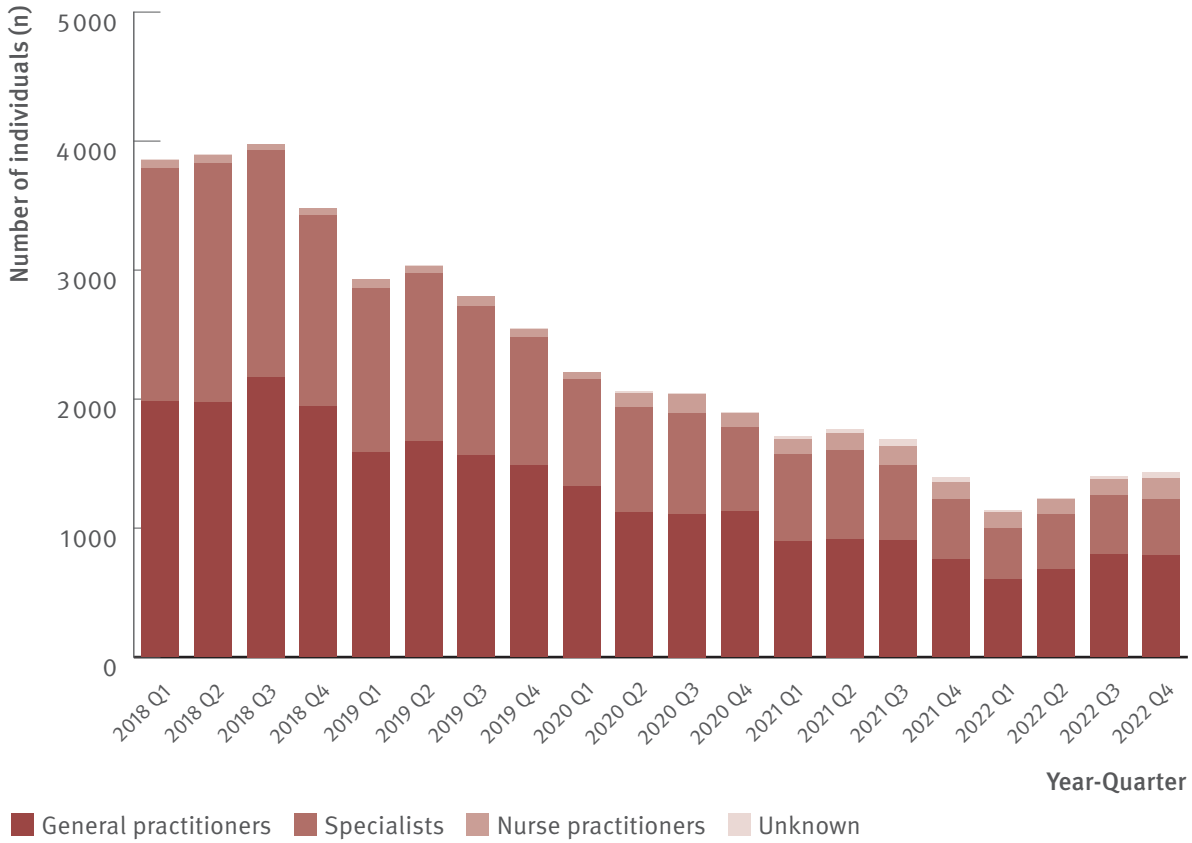
Figure 22. Estimated number of individuals initiating DAA treatment by jurisdiction, PBS database, 2018–2022



Source: Monitoring hepatitis C treatment uptake in Australia.[27]

Notes: Treatment numbers may vary from previous or future reports due to refinements made to the PBS data between releases.

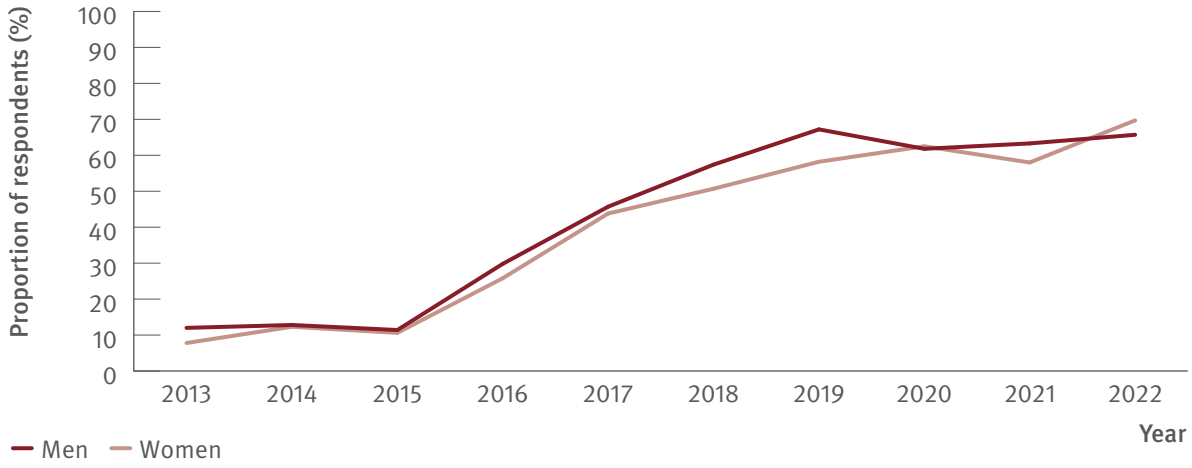
Figure 23. Estimated number of individuals initiating DAA treatment by prescriber type, PBS database, 2018–2022



Source: Monitoring hepatitis C treatment uptake in Australia.[27]

Notes: Treatment numbers may vary from previous or future reports due to refinements made to the PBS data between releases. Nurse practitioners have been authorised to prescribe DAA therapy for hepatitis C treatment since June 2017.

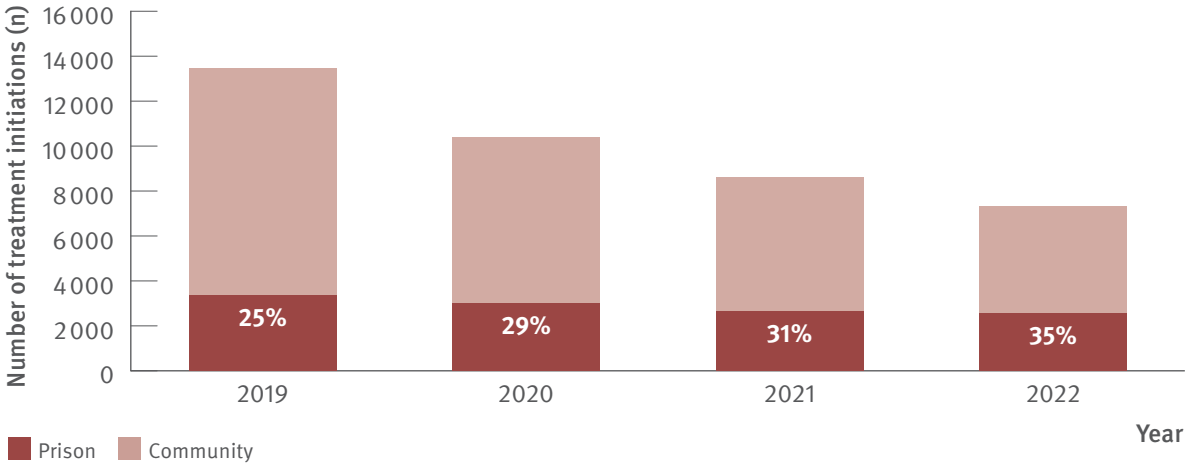
Figure 24. Proportion of Australian Needle Syringe Program Survey respondents who tested HCV antibody positive, self-reporting lifetime history of hepatitis C treatment by gender, 2013–2022



Source: Australian Needle Syringe Program Survey. National Data Report 2018–2022.[18]. Australian Needle Syringe Program Survey 25 year National Data Report 1995–2019.[23]

Notes: Includes respondents who tested HCV antibody positive and excludes those self-reporting spontaneous hepatitis C clearance. No participant recruitment occurred in VIC in 2020.

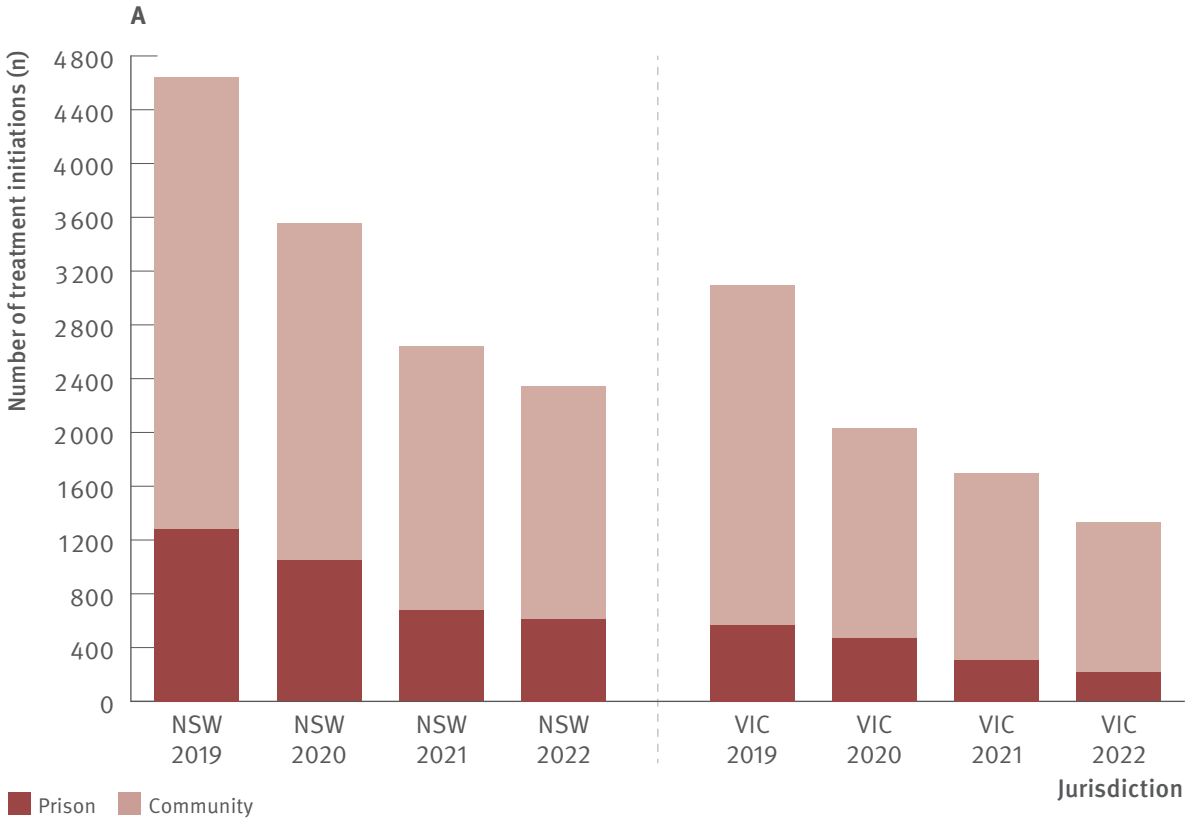
Figure 25. Number and proportion* of DAA treatment initiations in prison versus in the community nationally, National Prisons Hepatitis Network and PBS database, 2019, 2020, 2021, and 2022

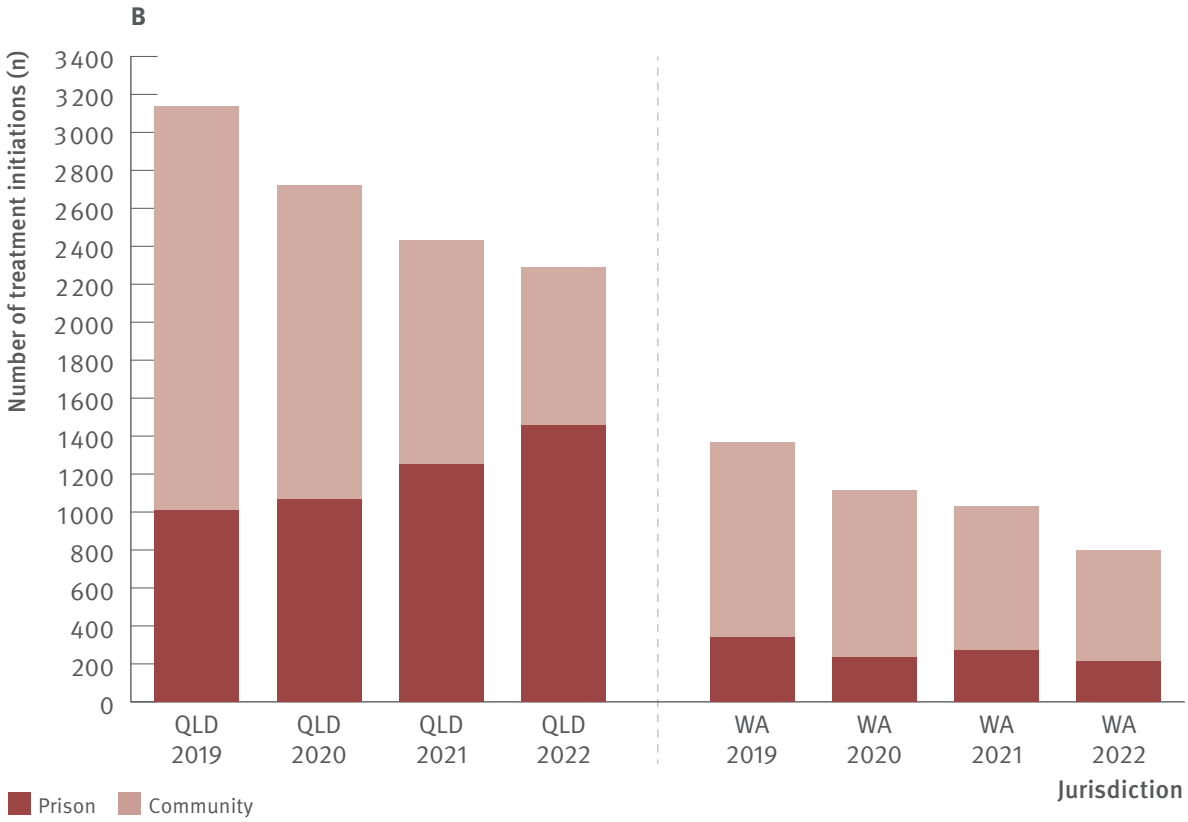


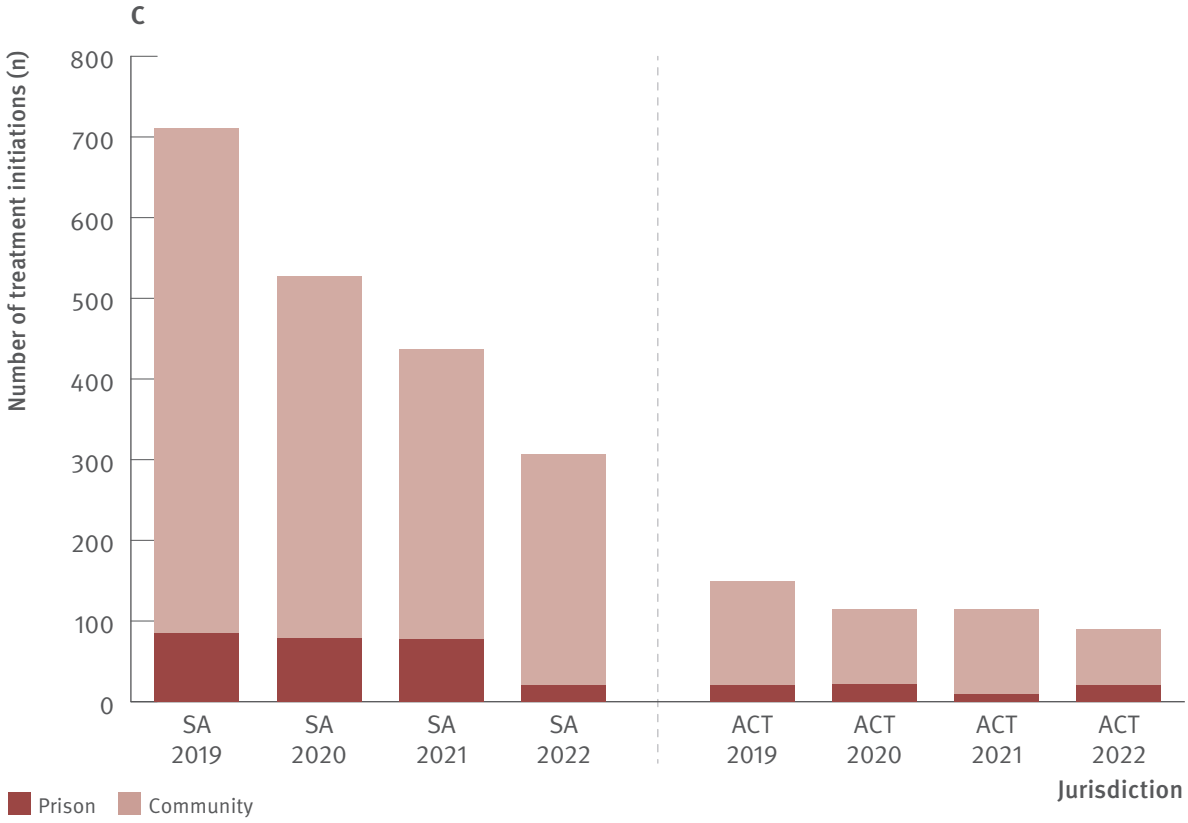
Source: State and Territory justice health authorities via the National Prisons Hepatitis Network.[28] Monitoring treatment uptake in Australia.[27]

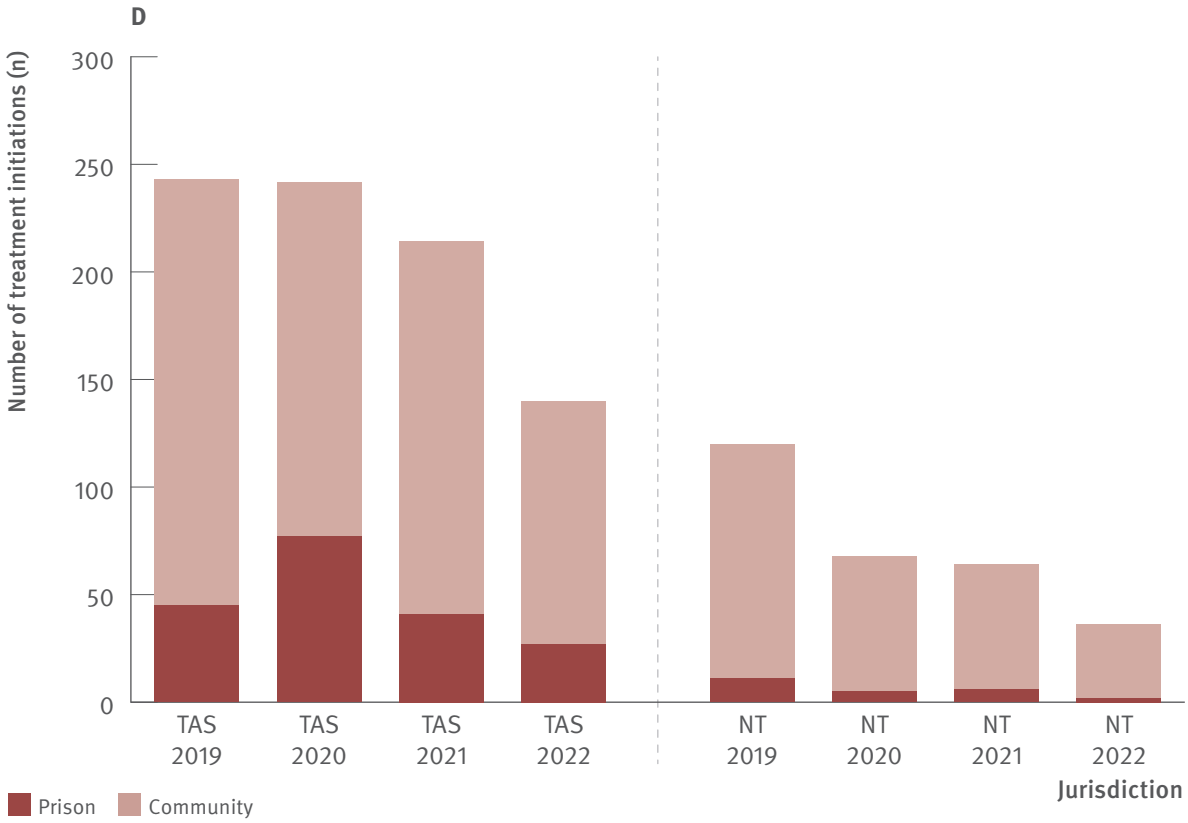
Notes: *The proportion of all treatments that were initiated in prisons nationally was calculated using the actual number of treatments reported by jurisdictional hepatitis services as a proportion of all treatments derived from the PBS database. 'Community' treatment initiations are therefore defined as all PBS treatments minus all treatments reported by jurisdictional prison-based hepatitis services.

Figure 26. Number of DAA treatment initiations in prison versus in the community by jurisdiction (A, B, C, and D), National Prisons Hepatitis Network and PBS database, 2019, 2020, 2021, and 2022









Source: State and Territory justice health authorities via the National Prisons Hepatitis Network.[28] Monitoring treatment uptake in Australia.[27]

Table 1. Number of DAA treatment initiations in prison versus in the community, nationally and by jurisdiction, National Prisons Hepatitis Network and PBS database, 2019, 2020, 2021, and 2022

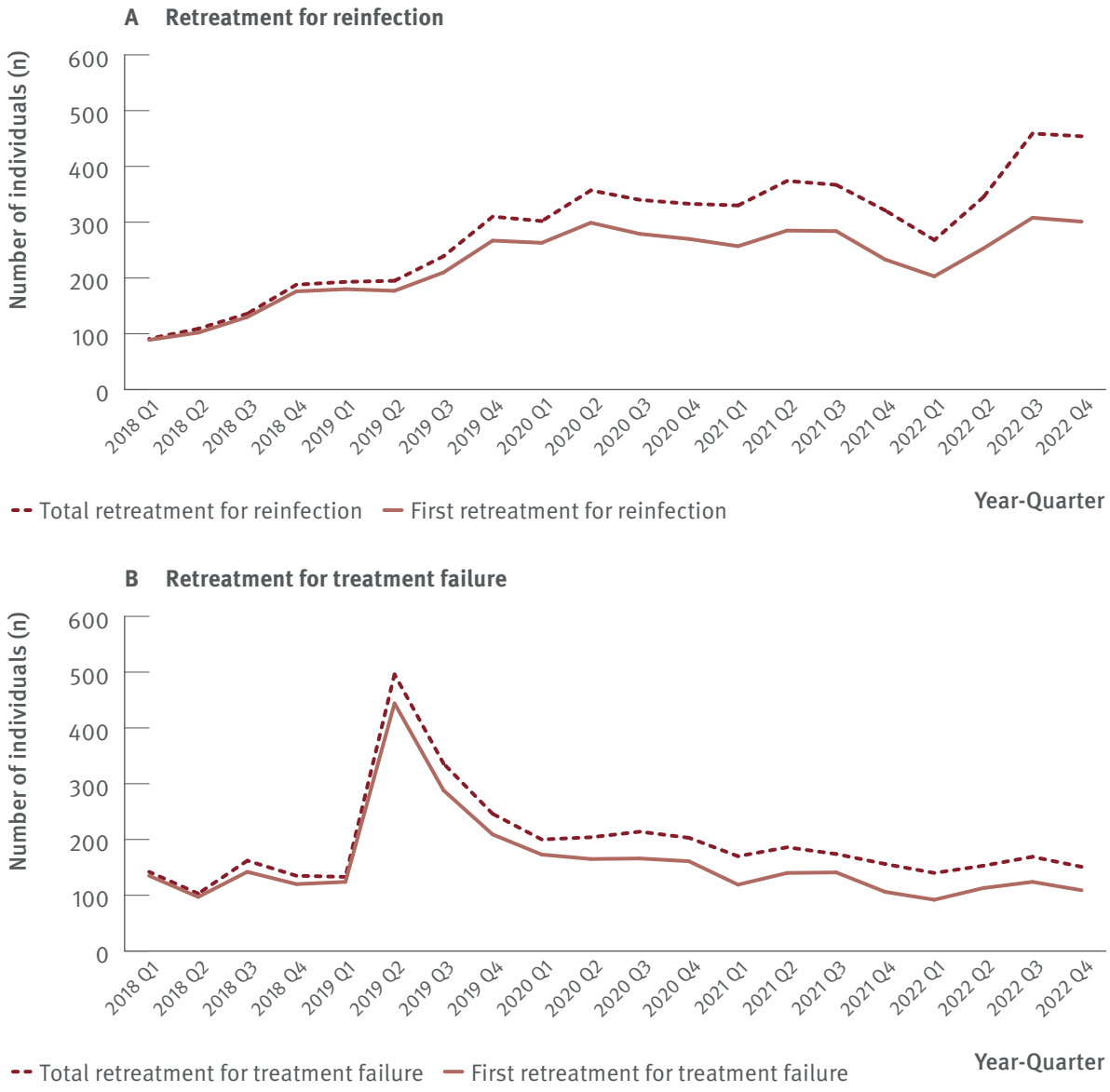
	National	NSW	VIC	QLD	WA	SA	ACT	TAS	NT
2019									
Number of prisons	102	39	14	14	17	9	2[a]	5	3[b]
Number of DAA treatment initiations in prisons*	3 360	1 281	569	1 008	341	85	20	45	11
Total number of treatment initiations†	13 462	4 637	3 094	3 138	1 368	711	149	243	120
2020									
Number of prisons	96	32[c]	15	14	18	9	1	5	2
Number of DAA treatment initiations in prisons*	3 005	1 048	472	1 068	234	79	22	77	5
Total number of treatment initiations†	10 381	3 557	2 030	2 721	1 118	527	114	242	68
2021									
Number of prisons	97[d]	35[e]	14	14	17	9	1	5	2
Number of DAA treatment initiations in prisons*	2 639	676	308	1 252	270	77	9	41	6
Total number of treatment initiations†	8 635	2 646	1 695	2 431	1 033	437	115	214	64
2022									
Number of prisons	102[f]	39	14	14[g]	17	9	1	6	2
Number of DAA treatment initiations in prisons*	2 560	610	215	1 454	212	20	20	27	2
Total number of treatment initiations†	7 344	2 346	1 336	2 288	798	307	90	140	39

Source: State and Territory justice health authorities via the National Prisons Hepatitis Network.[28] Monitoring treatment uptake in Australia.[27]

Notes: PBS treatment numbers may vary from previous or future reports due to refinements made to PBS data between releases (2019–2022 data from 2023 release of data). *Total number of treatment initiations reported by jurisdictional prison-based hepatitis services. †Total treatment initiations (including retreatments) obtained from PBS database; national total includes treatment initiations with no jurisdiction recorded. [a]One prison and one mental health correctional facility. [b]Two prisons and one youth detention. [c]Between 2019 and 2020, five prisons closed. Data were collected from 31 public prisons (January–December) and one private prison (June–June 2020), data were not collected from two private prisons. [d]Data were collected from 95 prisons. [e]Data were collected from 32 public prisons; data were not collected from three private prisons. [f]Data were collected from 92 public prisons and nine private prisons. [g]Data were collected from 13 prisons.

Monitoring retreatment

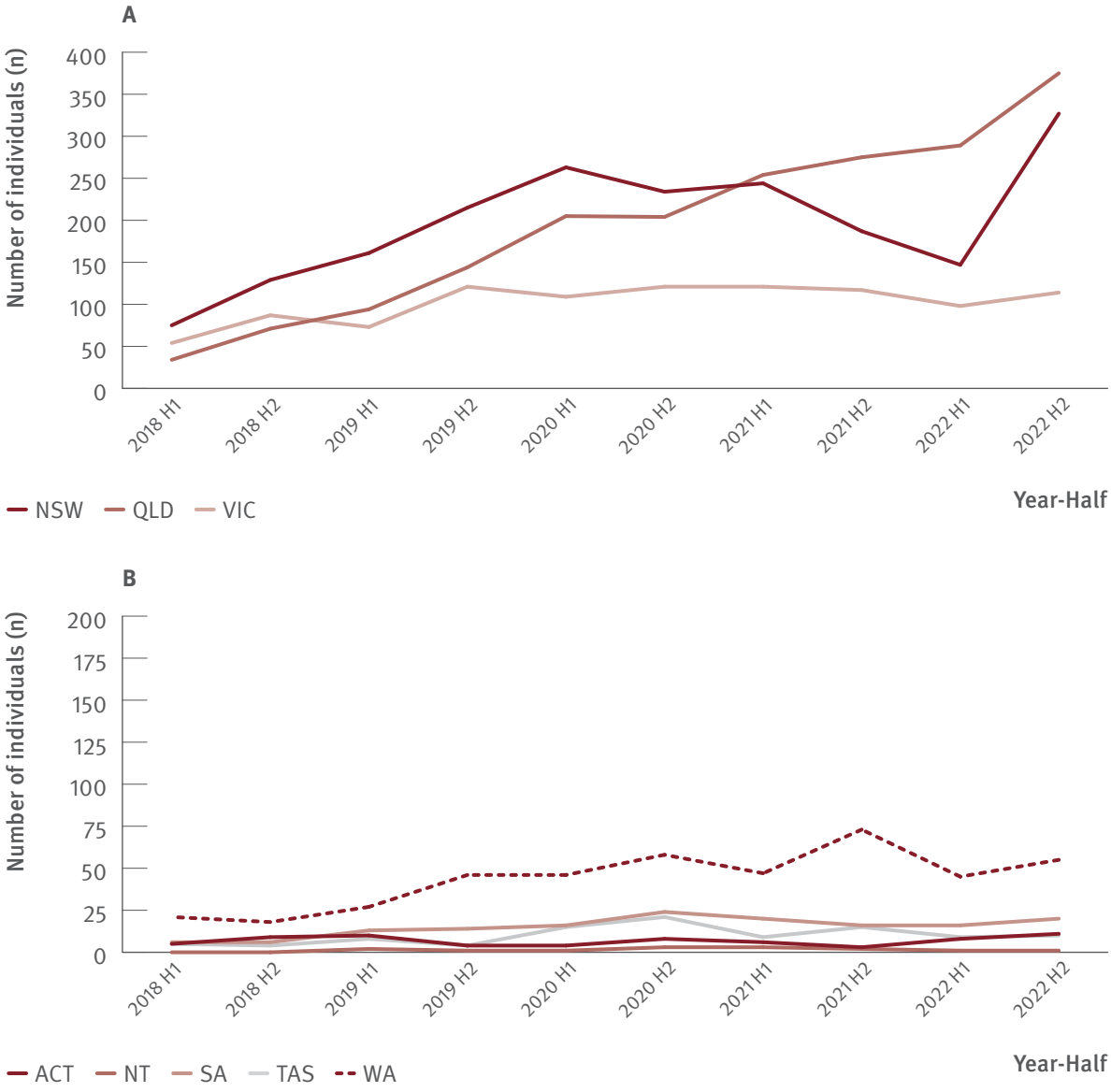
Figure 27. Estimated number of individuals retreated for hepatitis C reinfection (A) or treatment failure (B), National Retreatment Project, 2018–2022



Source: National Retreatment project.[31]

Notes: Data on retreatment is shown from 2018, to highlight trends in more recent years. Full analysis includes all individuals with hepatitis C who initiated DAA treatment through the PBS and were retreated, 2016–2022. As the PBS data does not capture reason for retreatment, retreatment data from the REACH-C cohort were used to train a Random Forest machine learning model to classify retreatment for reinfection or virological failure. Of individuals initiating DAA treatment through the PBS between 2016 and 2022 (N=100 449), 9% received retreatment (n=8 514). The model classified 56% (n=4 776) as reinfection and 44% (n=3 738) as treatment failure. Half (53%) of all individuals retreated for treatment failure discontinued initial treatment (≥28 days of treatment course had not been dispensed).

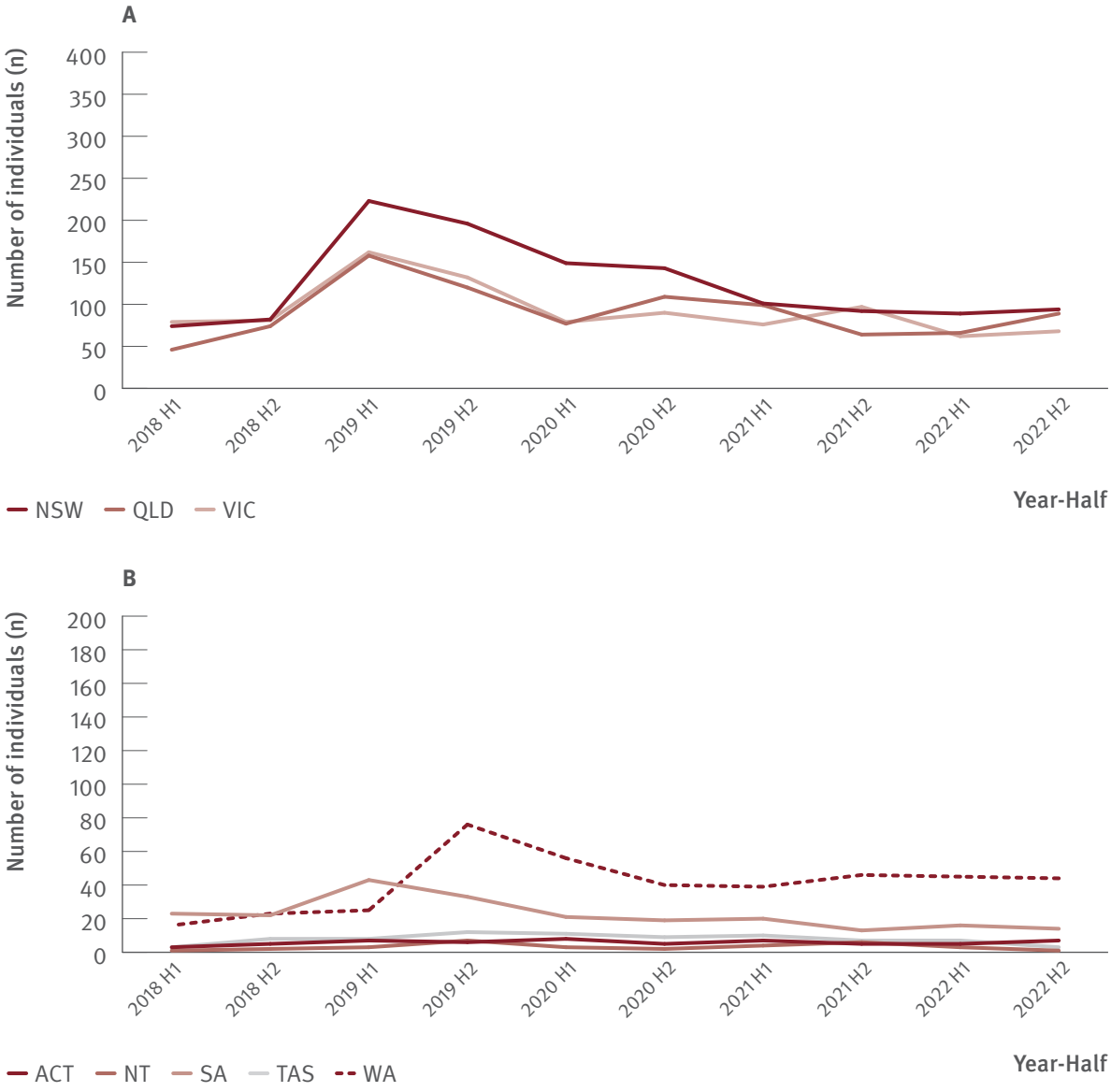
Figure 28. Estimated number of individuals retreated for hepatitis C reinfection by jurisdiction, National Retreatment Project, 2018–2022



Source: National Retreatment Project.[31]

Notes: Data on retreatment is shown from 2018, to highlight trends in more recent years. Full analysis includes all individuals with hepatitis C who initiated DAA treatment through the PBS and were retreated, 2016–2022. As the PBS data does not capture reason for retreatment, retreatment data from the REACH-C cohort were used to train a Random Forest machine learning model to classify retreatment for reinfection or treatment failure. Of individuals initiating DAA treatment through the PBS between 2016 and 2022 (N=100 449), 9% received retreatment (n=8 514). The model classified 56% (n=4 776) as reinfection and 44% (n=3 738) as treatment failure.

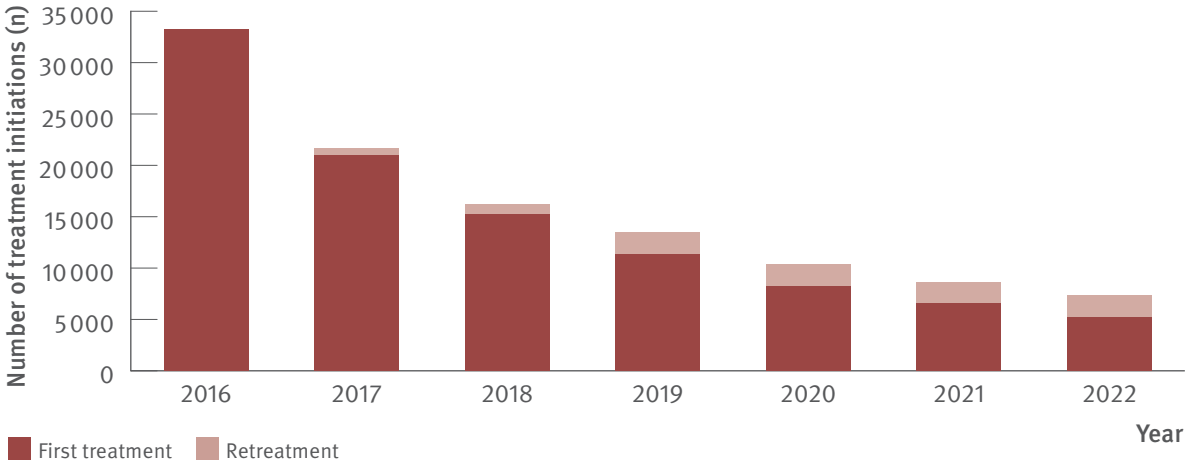
Figure 29. Estimated number of individuals retreated for hepatitis C treatment failure by jurisdiction, National Retreatment Project, 2018–2022



Source: National Retreatment Project.[31]

Notes: Data on retreatment is shown from 2018, to highlight trends in more recent years. Full analysis includes all individuals with hepatitis C who initiated DAA treatment through the PBS and were retreated, 2016–2022. As the PBS data does not capture reason for retreatment, retreatment data from the REACH-C cohort were used to train a Random Forest machine learning model to classify retreatment for reinfection or treatment failure. Of individuals initiating DAAs through the PBS between 2016 and 2022 (N=100 449), 9% received retreatment (n=8 514). The model classified 56% (n=4 776) as reinfection and 44% (n=3 738) as treatment failure.

Figure 30. Total estimated number of individuals receiving DAA treatment (including retreatment), PBS database, March 2016–December 2022



Source: Monitoring hepatitis C treatment uptake in Australia.[27]

Notes: Treatment numbers may vary from previous or future reports due to refinements made to the PBS data between releases.

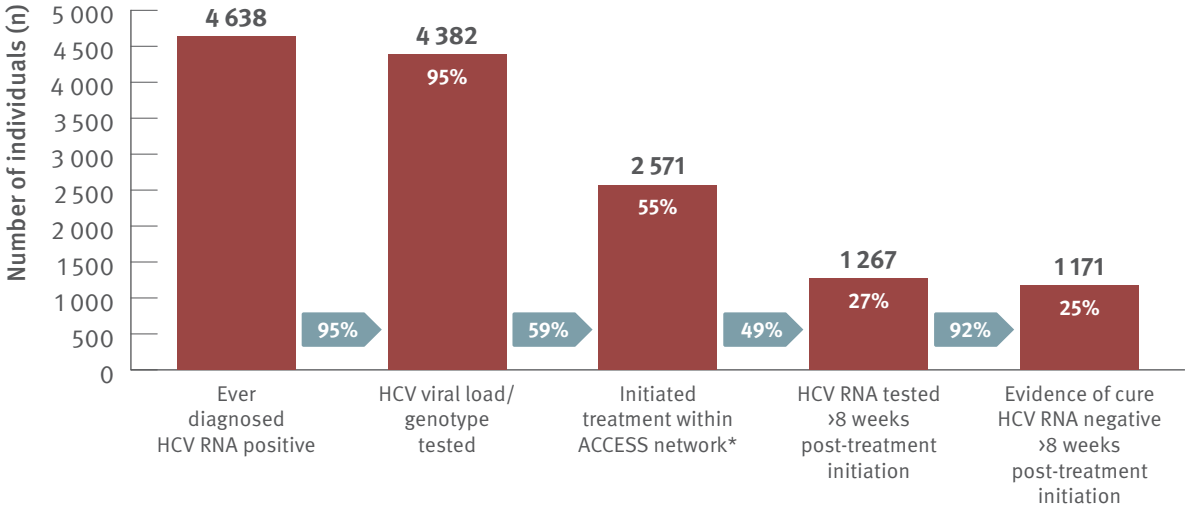
Figure 31. Estimated number of DAA treatment discontinuations, National Retreatment Project, 2016–June 2022

Source: National Retreatment Project.[32]

Notes: Individuals with a single dispensation of their entire treatment course were excluded. Treatment discontinuation was defined as one or more repeat authorised prescription courses (28-day supply) not dispensed. Early discontinuation was defined as discontinuing after the first 28 days of treatment. Late discontinuation was defined as discontinuing after 56 days or more of treatment. Individuals who discontinued initial treatment and restarted a different regimen ≤28 days before estimated end of treatment were considered treatment switches and were not considered treatment discontinuations or retreatments. Of 97 558 individuals who were treated with DAAs between 2016 to mid-2022, 90 843 were included in analysis, of whom 7 796 (8%) discontinued treatment.

Cascades of care

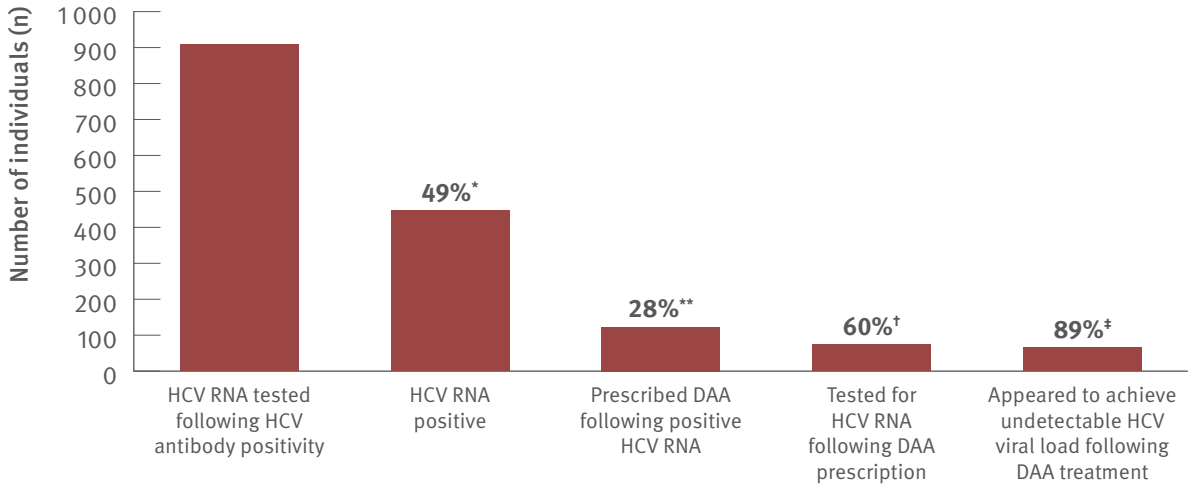
Figure 32. Hepatitis C treatment cascade at ACCESS primary care clinics: number of individuals hepatitis C diagnosed, number and proportion of individuals who initiated treatment, and tested for HCV RNA post-treatment initiation, 2016–2022



Source: ACCESS.[12] Updated from Traeger et al., *PLOS One*. 2020.[33]

Notes: Cascade includes individuals with evidence of ever being diagnosed HCV RNA positive, i.e., a positive HCV RNA test result recorded in ACCESS since 2009. The cascade reflects the status of individuals on 31st December 2022 and is restricted to individuals who had a clinical consultation within the six years prior (2016–2022). Includes individuals attending ACCESS primary care clinics (same primary care clinics as other ACCESS sections in report). *Treatment initiation was indicated by the presence of an electronic medical record of a prescription of DAA therapy recorded at an ACCESS clinic. Individuals were assumed to have progressed through preceding cascade stages if evidence of reaching a subsequent stage was present.

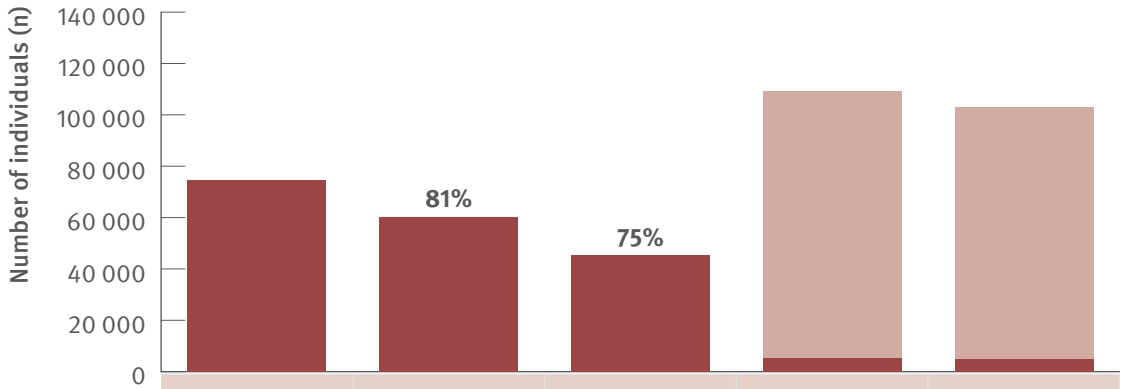
Figure 33. Hepatitis C treatment cascade: number and proportion of individuals attending ACCHS tested for HCV RNA and prescribed DAAs, and among those treated, the number and proportion who appeared to achieve an undetectable HCV viral load, ATLAS network, aggregated for years 2016–2022



Source: ATLAS Indigenous Primary Care Surveillance and Research Network, 2016–2022.[17]

Notes: Individuals defined as people aged 15 years or older, who visited a doctor, nurse, or Aboriginal health practitioner ('medical consultations') 2016–2022. 'Undetectable viral load' defined as testing negative for HCV RNA or HCV viral load following DAA treatment. A total of 135 838 individuals aged 15 years or older attended medical appointments between 2016 and 2022. *Of individuals HCV RNA tested, 49% (447/908) were HCV RNA positive. **Of individuals who tested HCV RNA positive following a positive HCV antibody test, 28% (123/447) were then prescribed DAA treatment. †Of those prescribed DAAs, 60% (74/123) had an HCV RNA test following treatment, of whom ‡ 89% (66/74) had an undetectable viral load and 11% (8/74) were either positive or not tested (data unavailable to define these eight further).

Figure 34. The hepatitis C diagnosis and care cascade, HIV, viral hepatitis and sexually transmissible infections in Australia, Annual Surveillance Report



	Living with heptitis C	Diagnosed with hepatitis C	HCV RNA confirmed hepatitis C	Received treatment (DAA)	Cured
2015–2022 combined				104 110	97 820
At the end of 2022	74 400	60 240	45 180	5 210	4 890

Source: Updated by Kirby Institute, from the *HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2021.*[2,3,4]

Notes: The diagnosis and care cascade estimates were derived using mathematical modelling; mathematical modelling uses available data from observational research studies and administrative datasets to derive estimates like the population prevalence of hepatitis C, accounting for uncertainties. Living with hepatitis C is the estimated number of individuals in the overall population who had detectable HCV RNA in 2022; diagnosed with hepatitis infection is the estimated number of individuals living with chronic HCV in 2022 who have been previously diagnosed (HCV antibody positive or HCV RNA); HCV RNA confirmed hepatitis C is the estimated number of individuals who are confirmed with HCV from RNA testing; received DAA treatment is the observed number of individuals who received treatment with DAAs since 2015 (cumulative) and in 2022 recorded in the PBS database; and cured is the estimated number of treated individuals who achieved undetectable HCV RNA post-treatment since 2015 (cumulative) and in 2022.

Four

Hepatitis C-attributable morbidity: transplantations

Reducing hepatitis C-related mortality is a key goal of global and national hepatitis C elimination targets. Given the elevated risk of hepatocellular carcinoma among people with cirrhosis, even after hepatitis C cure, morbidity and mortality remain important outcomes to monitor.

People with cirrhosis who are cured through DAA therapy have a very low risk of progression to liver failure but remain at risk (albeit reduced compared to those not cured) of hepatocellular carcinoma. Due to this, observed declines in cases of hepatocellular carcinoma are likely to be delayed. Further, for people with hepatitis C-related hepatocellular carcinoma who achieve cure, improved liver function post cure may allow curative treatments for hepatocellular carcinoma other than liver transplantation. However, reductions in the incidence of liver failure and subsequent liver transplants due to liver failure are useful indicators in monitoring long-term outcomes achievable though hepatitis C elimination efforts.

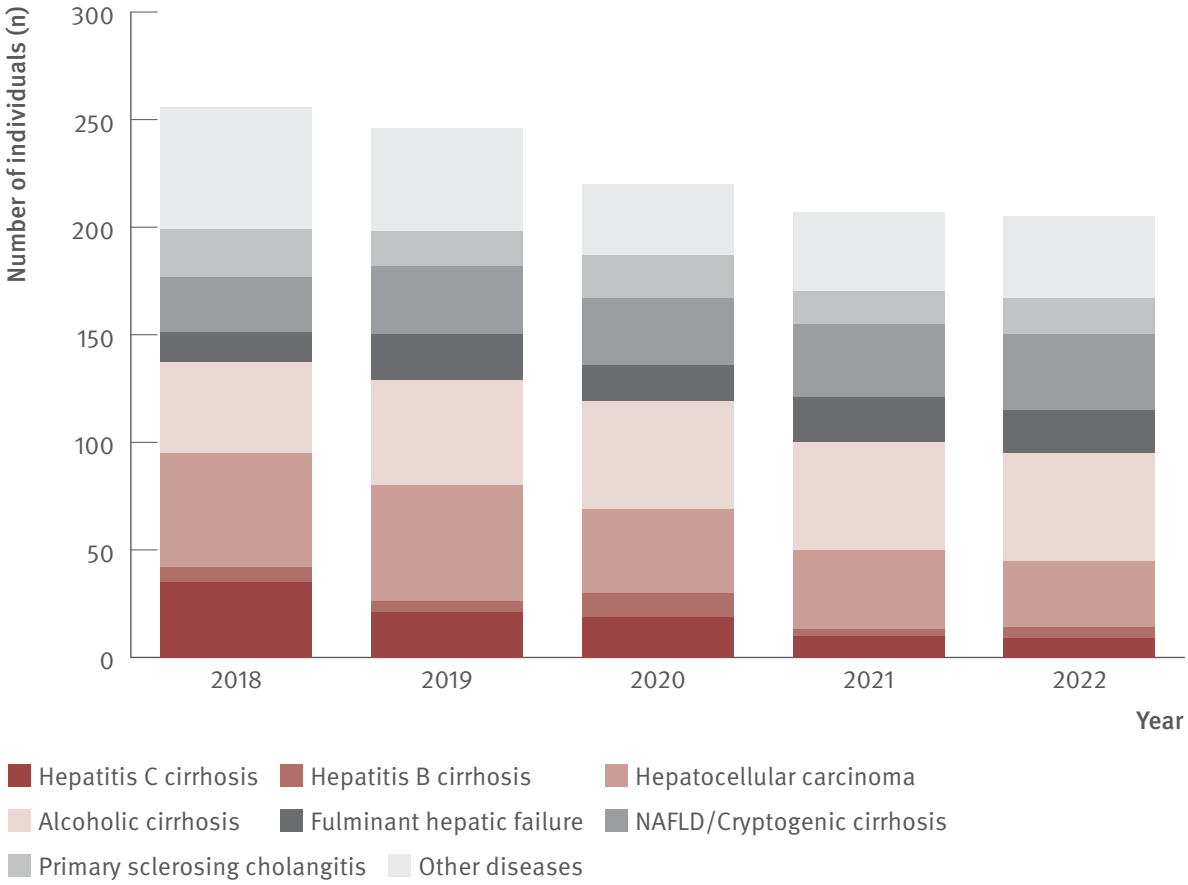
No national registry collates data on morbidity and mortality outcomes among people diagnosed with hepatitis C. However, the Australia and New Zealand Liver and Intestinal Transplant Registry collates data on the primary diagnosis of liver transplant recipients.

PROGRESS ON REDUCING HEPATITIS C-ATTRIBUTABLE MORBIDITY: TRANSPLANTATIONS

The number of individuals who were recipients of a liver transplant and had a primary diagnosis of hepatitis C cirrhosis declined in the past five years (Figure 35).

There are scarce data on mortality, morbidity, and other outcomes related to hepatitis C, a gap that requires urgent action. Monitoring the long-term outcomes of those living with hepatitis C and the effect of primary and secondary prevention on mortality and morbidity is crucial for evaluating strategies to eliminate hepatitis C.

Figure 35. Number of Australian adult liver transplant recipients by primary diagnosis and year of first transplant, Australia and New Zealand Liver and Intestinal Transplant Registry, 2018–2022



Source: Australia and New Zealand Liver and Intestinal Transplant Registry.[38]

Notes: Australian transplant recipients only. Adults defined as 16 years or older. NAFLD: non-alcoholic fatty liver disease.

Five

Stigma and discrimination experienced by people living with hepatitis C

Stigma is a significant barrier to testing, diagnosis, and treatment for hepatitis C, and is therefore important to address if progress in these areas is to be achieved. Understanding how and where hepatitis C-related stigma is both expressed and experienced can provide context to other indicators, such as any lack of progress in testing, treatment uptake, and maintained engagement with healthcare services across populations of people living with or at risk of hepatitis C, among specific groups, or within particular settings. Shame, fear, experiences of discrimination, and concerns about privacy can all contribute to individuals not disclosing their engagement in risk practices (e.g., injecting drug use) and therefore not being offered hepatitis C testing. This then flows on to individuals not receiving timely diagnosis and treatment.

Standardised population-level monitoring of hepatitis C-related stigma has been undertaken in Australia since 2016, with tools developed as part of the Stigma Indicators Monitoring Project available to provide insights into experiences of stigma related to hepatitis C and injecting drug use.[39] The Stigma Indicators Monitoring Project periodically includes indicators of the experience and expression of stigma in cross-sectional surveys of priority population groups, healthcare workers, and the general public.

An indicator of stigma expressed towards people living with hepatitis C and people who inject drugs was included in surveys of Australian healthcare workers between 2018 and 2022. In 2022, 1 993 healthcare workers were recruited via a Qualtrics research panel to complete an online survey. The same recruitment method was used for the 2021 survey, however, in 2018, healthcare workers were recruited via paid social media advertising. These different approaches to recruitment resulted in differences in the demographic profile of participants[40] and should be considered when interpreting changes in reports of expressed stigma over time.

The indicator of expressed stigma was also included in surveys of the Australian general public between 2017 and 2021. In 2021, 2 251 adults were recruited via Qualtrics to complete an online survey. This recruitment approach differed from 2020 (when participants were recruited via paid social media advertising) and 2017 (when the indicator was included in the Australian Survey of Social Attitudes, a postal survey of a representative sample of the Australian adult population). The demographic profile of the 2020 survey was noticeably different from the 2017 and 2021 surveys,[41] which should also be considered when interpreting differences between time points.

As noted in Australia's progress towards hepatitis C elimination: annual report 2022,[42] an indicator of stigma experienced by people who inject drugs has been included in surveys of Australian people who inject drugs between 2016 and 2021, as well as cohort studies of people who inject drugs.[43,44] No new data regarding experiences of stigma were collected from these regular monitoring surveys in 2022, however, an indicator of experienced stigma within specific healthcare settings was included in the Illicit Drug Reporting System, a sentinel survey of people who regularly inject drugs. In 2022, 879 people who inject drugs were recruited via NSP services and peer referral to complete the Illicit Drug Reporting System survey.[45]

PROGRESS ON REDUCING STIGMA

In 2021, the Stigma Indicators Monitoring Project surveyed a sample of the Australian general public using a Qualtrics research panel. Half of the participants surveyed (50%, 1 130/2 251) reported that they would behave negatively towards people because of their hepatitis C. This proportion was not significantly different to the proportion recorded in the 2017 Australian Survey of Social Attitudes (50%, 476/943) but was larger than in the 2020 survey of the Australian general public (recruited via paid social media advertising) (30%, 599/1 998) (Figure 36). In 2021, a larger proportion of the Australian general public (78%, 1 766/2 251) reported that they would behave negatively towards people because of their injecting drug use (compared with hepatitis C). This included one-third of the sample (33%, 743/2 251) who indicated that they would 'often' or 'always' behave negatively towards people because of their injecting drug use (Figure 37). This proportion was smaller than the proportion recorded in the 2017 Australian Survey of Social Attitudes (86%, 819/956) but larger than in the 2020 survey of the Australian general public (72%, 1 451/2 002). It is important to note that across each year (2017, 2020, and 2021) the recruitment methods differed.

In 2022, the Stigma Indicators Monitoring Project surveyed a sample of Australian healthcare workers using a Qualtrics research panel. In that survey, 30% (592/1 993) of participants reported that they would behave negatively towards people because of their hepatitis C (Figure 38). This was a larger proportion than was recorded in 2018 (20%, 109/542) (a sample recruited via ASHM and paid social media advertising) but a smaller proportion than in 2021 (36%, 329/906) (a sample recruited using a Qualtrics research panel). In 2022, a larger proportion of Australian healthcare workers (70%, 1 393/1 993) reported that they would behave negatively towards people because of their injecting drug use (compared with hepatitis C; Figure 39). This was a larger proportion than was recorded in 2018 (56%, 309/549) but was not significantly different from 2021 (69%, 627/907).

Identifying factors that are associated with the expression of stigma is an important step in developing targeted intervention strategies to reduce stigma. Across surveys of healthcare workers and the Australian general public, conservatism was identified as a particularly strong predictor of behaving negatively towards people because of their hepatitis C or injecting drug use. As previously noted, there were some significant demographic differences between recruitment waves of both healthcare workers and the general public, however, conservatism was the most significant factor associated with expressed stigma across recruitment waves and methods. The samples recruited via paid social media advertising (i.e., healthcare workers in 2018 and the general public in 2020) were the least conservative on average and were also the least likely to report any expression of stigma towards people who inject drugs or people living with hepatitis C. These results suggest that targeted interventions to reduce stigma should be developed with consideration of how best to address attitudes and behaviours that are influenced by other underlying perspectives, opinions, and political standpoints.

PROGRESS ON REDUCING STIGMA (CONTINUED)

In 2022, healthcare workers who had witnessed their colleagues behave negatively towards patients or clients because of their hepatitis C or injecting drug use were more likely to report that they would do so themselves. This highlights the significant influence that peers and workplace cultures could have on instances of stigma. Recent stigma intervention research has utilised social norms theory in an attempt to reduce stigmatising attitudes and negative behaviour towards people who inject drugs among Australian healthcare workers.[46] This research found associations between participants' perceptions of their colleagues' attitudes and their own likelihood of behaving negatively towards people who inject drugs. Further, by challenging their perceptions of their colleagues' attitudes, participants' own attitudes and behavioural intentions both improved. These findings suggest that social norms provide an important framework to develop stigma reduction initiatives within healthcare settings.

Previously reported monitoring data have highlighted the continued prevalence of stigma experienced by people living with hepatitis C and people who inject drugs in Australia.[42] The Stigma Indicators Monitoring Project found that in 2021, 53% of people diagnosed with hepatitis C reported any past-year experience of stigma or discrimination in relation to their hepatitis C,[44] and 80% of people who inject drugs reported any past-year experience of stigma or discrimination in relation to their injecting drug use, including 22% who reported 'often' or 'always' experiencing injecting drug use-related stigma or discrimination within the past year in any context (i.e., not specifically related to a healthcare setting). Reports of stigma and discrimination were noticeably lower among participants attending treatment services (in cohort studies) than among community-based samples of people who inject drugs, suggesting important associations between experiencing stigma and remaining connected to healthcare services.[42]

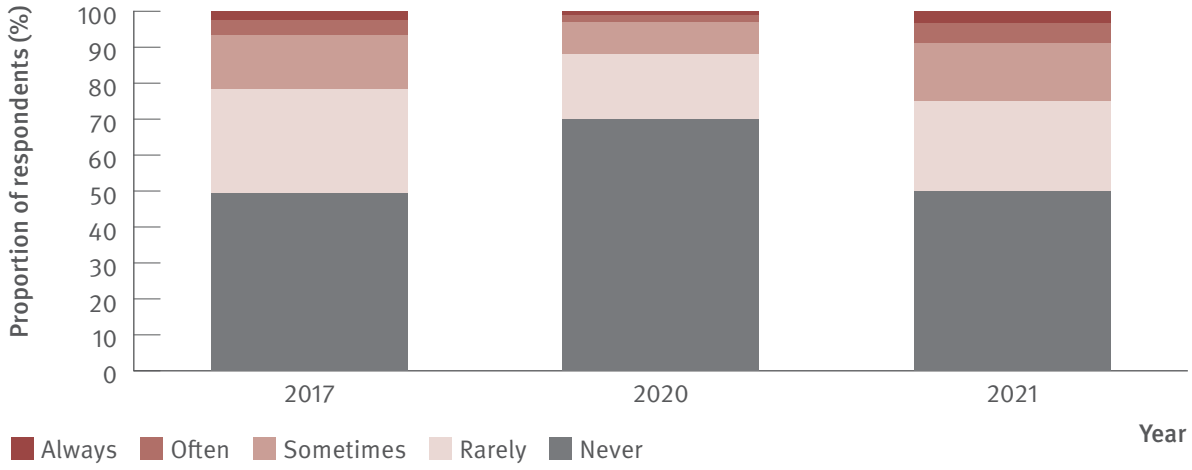
In the 2022 Illicit Drug Reporting System survey, 22% of participants reported experiencing stigma within the previous six months when visiting an alcohol and other drugs healthcare service and 40% experienced any stigma at a general healthcare service (Figure 40).[45] It is noteworthy that people who inject drugs were less likely to experience stigma in alcohol and other drugs services than in general healthcare settings. However, it is also concerning that more than one in five participants encountered stigma in these services that specialise in drug-related healthcare. Further, the higher frequency of stigma encountered in general health settings highlights a need to develop and implement strategies to reduce stigma directed towards people who inject drugs throughout all healthcare services.

PROGRESS ON REDUCING STIGMA (CONTINUED)

While there were some fluctuations in reports of expressed stigma by healthcare workers and the general public between survey rounds, minimal change was evident over time when recruitment strategies and demographic profiles of the respective samples were similar. This lack of change in reports of expressed stigma towards people living with hepatitis C and people who inject drugs is not surprising given the lack of large-scale intervention efforts. Literature has shown some positive results of small-scale stigma reduction interventions. However, for meaningful change to become evident, significant investment is required to develop strategies and initiatives that directly address stigma in healthcare settings and the community more broadly. Given the common experiences of stigma reported by people who inject drugs and people living with hepatitis C across various contexts and the high prevalence of expressed stigma reported in the Stigma Indicators Monitoring Project, it is clear that a universal approach is needed to address stigma towards any affected individual or group, including structural and systemic factors.[47]

Regular monitoring of stigmatising experiences among people who inject drugs and people living with hepatitis C (including those who do not inject drugs) is required, within healthcare settings and more widely, as is continued monitoring of expressed stigma towards these groups by the general public and healthcare workers. Measuring stigma from these varied perspectives is necessary to understand any changes in experiences and effects of stigma over time, as well as the impact of any interventions to reduce stigma.

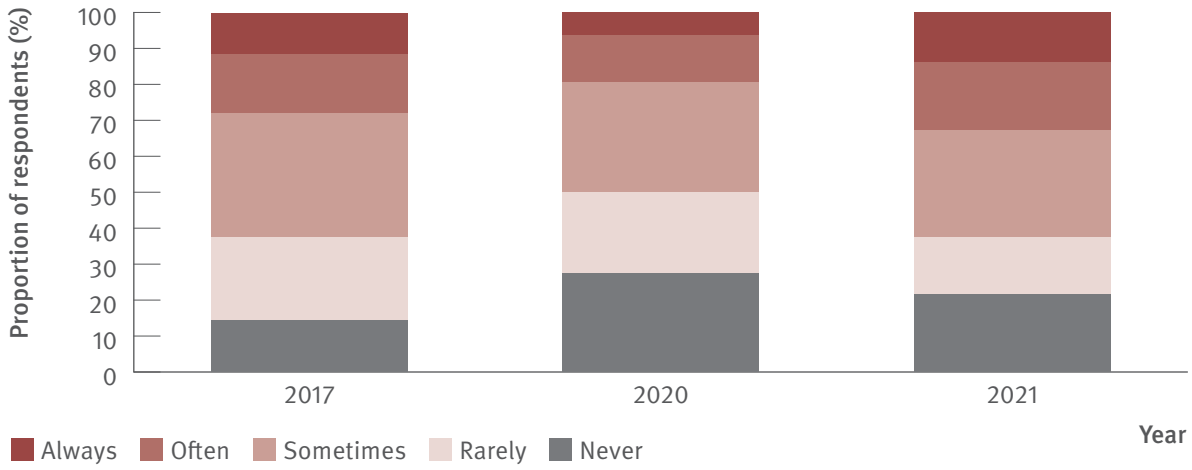
Figure 36. Reports of negative behaviour towards people because of their hepatitis C status by the Australian public, 2017–2021



Source: Stigma Indicators Monitoring Project.[41]

Notes: In 2017, the Stigma Indicator was included in the Australian Survey of Social Attitudes (n=1 001). The Australian Survey of Social Attitudes collects data from a representative sample of the Australian adult population, randomly selected from the Australian Electoral roll. In 2020, the Stigma Indicator was included in an online survey of Australian adults (N=2 010). Participants were recruited via paid social media advertising. In 2021, the Stigma Indicator was included in an online survey of Australian adults (N=2 251). Participants were recruited via a Qualtrics research panel.

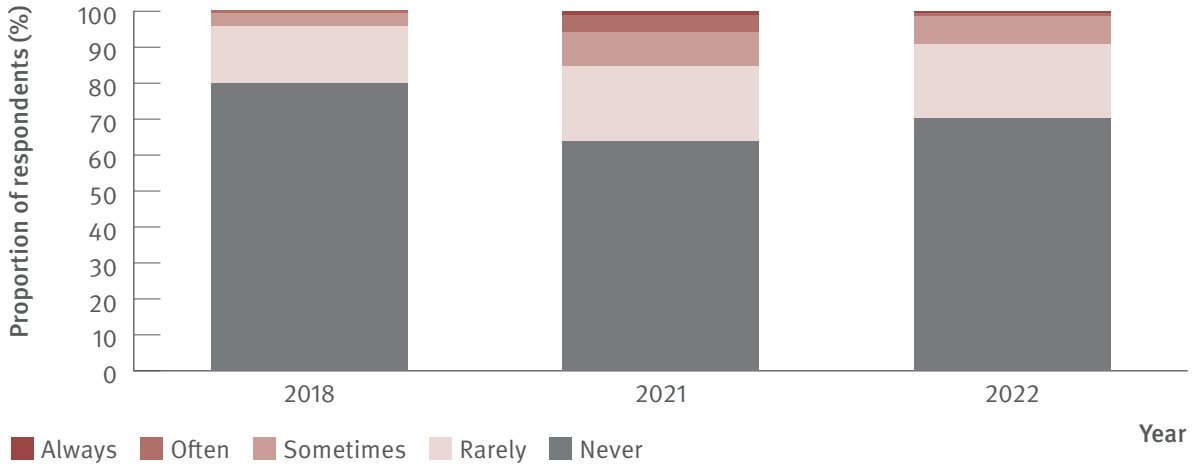
Figure 37. Reports of negative behaviour towards people because of their injecting drug use by the Australian public, 2017–2021



Source: Stigma Indicators Monitoring Project.[41]

Notes: In 2017, the Stigma Indicator was included in the Australian Survey of Social Attitudes (n=1 001). The Australian Survey of Social Attitudes collects data from a representative sample of the Australian adult population, randomly selected from the Australian Electoral roll. In 2020, the Stigma Indicator was included in an online survey of Australian adults (N=2 010). Participants were recruited via paid social media advertising. In 2021, the Stigma Indicator was included in an online survey of Australian adults (N=2 251). Participants were recruited via a Qualtrics research panel.

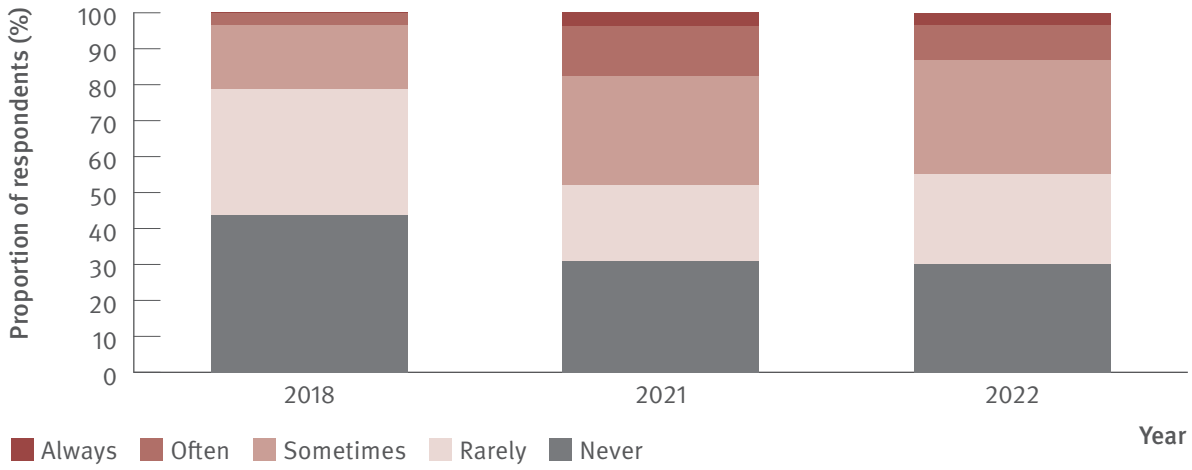
Figure 38. Reports of negative behaviour towards people because of their hepatitis C status by healthcare workers, 2018–2022



Source: Stigma Indicators Monitoring Project.[40]

Notes: In 2018, the Stigma Indicator was included in an online survey of Australian healthcare workers (N=551). The survey was promoted by ASHM and via paid social media advertising. In 2021 and 2022, the Stigma Indicator was included in online surveys of Australian healthcare workers (N=907 and N=1 993, respectively). Participants for these surveys were recruited via Qualtrics research panels.

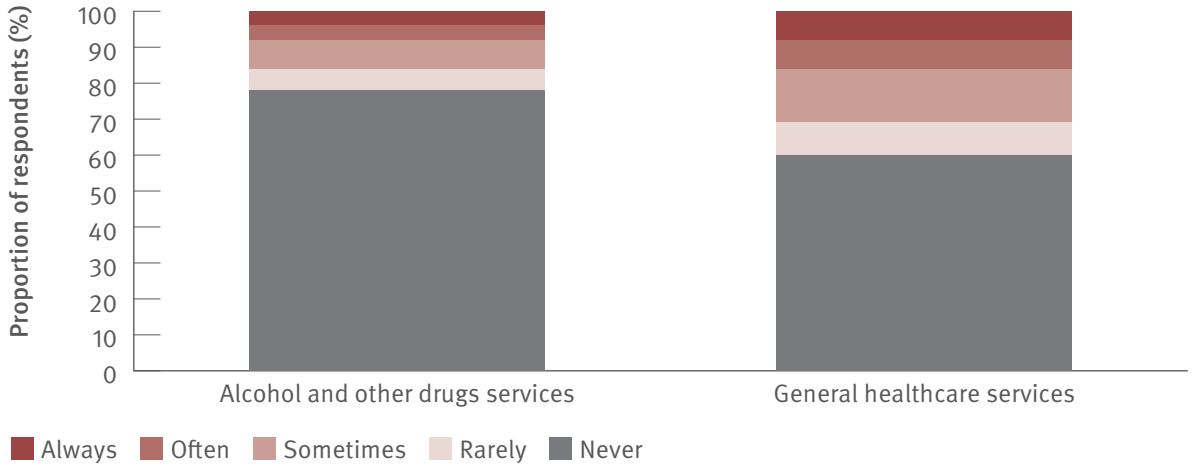
Figure 39. Reports of negative behaviour towards people because of their injecting drug use by healthcare workers, 2018–2022



Source: Stigma Indicators Monitoring Project.[40]

Notes: In 2018, the Stigma Indicator was included in an online survey of Australian healthcare workers (N=551). The survey was promoted by ASHM and via paid social media advertising. In 2021 and 2022, the Stigma Indicator was included in online surveys of Australian healthcare workers (N=907 and N=1 993, respectively). Participants for these surveys were recruited via Qualtrics research panels.

Figure 40. Reports of experiencing stigma when visiting healthcare services, Illicit Drug Reporting System, 2022



Source: Adapted from Sutherland et al. *Drug Trends Bulletin Series*. 2022.[45]

Six

Primary prevention

Key actions for preventing the primary transmission of hepatitis C focus on reducing receptive sharing of needles, syringes, and injecting equipment. Measuring the availability and distribution of sterile injecting equipment and monitoring the injecting behaviours of people who inject drugs provide important indicators for assessment of hepatitis C prevention efforts.

The Needle Syringe Program National Minimum Data Collection reports annually on needles and syringes distributed in community settings nationally, providing an overview of activity to prevent re-use of needles and syringes, as well as estimates of coverage and population size.[48] Despite new hepatitis C infections occurring in Australia's prisons,[34,35,36] no regulated needle and syringe distribution programs currently operate in Australian custodial settings.

The annual Australian Needle Syringe Program Survey[18] and the Illicit Drug Reporting System[45] questionnaires ask participants about episodes of recent receptive sharing to identify trends in injecting practices.

The Gay Community Periodic Survey provides national estimates on injecting drug use among GBM and gives specific insights into injecting drug use among GBM by HIV status.[49,50]

PROGRESS ON PREVENTION OF HEPATITIS C ACQUISITION

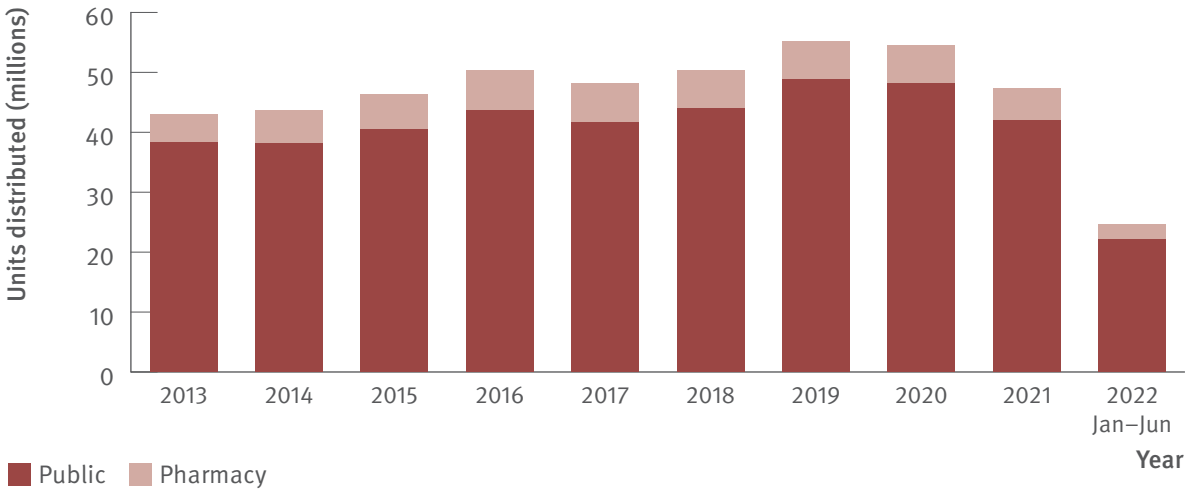
The number of needles and syringes distributed in Australia has increased steadily over the past decade and in 2019 the highest number of needles and syringes distributed since 2007 was recorded (Figure 41).

Among respondents in the Australian Needle Syringe Program Survey who injected in the past month, approximately one in five reported receptive sharing of needles and syringes in the past month and this proportion has remained relatively stable over the past ten years from 2013 to 2022 (Figure 42).

The Illicit Drug Reporting System has shown declines over time in the receptive and distributive sharing of needles and syringes with borrowing of needles reported by <10% of respondents since 2013 and lending needles reported by 8% of participants in 2022 (Figure 43).

Data from the Gay Community Periodic Survey shows that injecting drug use is more prevalent among HIV-positive than HIV-negative GBM, with little change in the prevalence of self-reported injecting over the past 10 years (Figure 44).

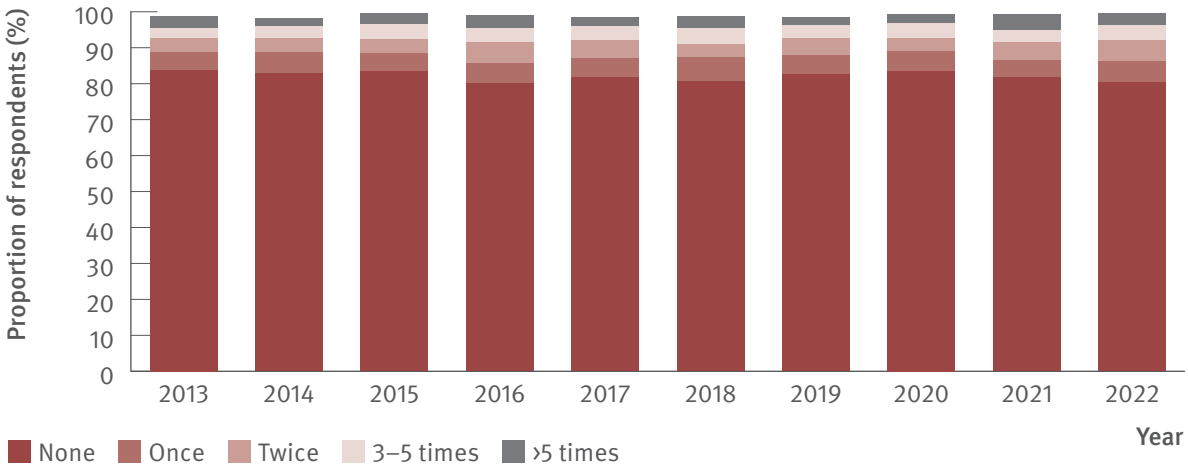
Figure 41. Number of needle and syringe units distributed by sector, Needle Syringe Program National Minimum Data Collection, 2013–June 2022



Source: Needle Syringe Program National Minimum Data Collection: National Data Report 2022.[48]

Notes: July–December 2022 data not available at the time of reporting.

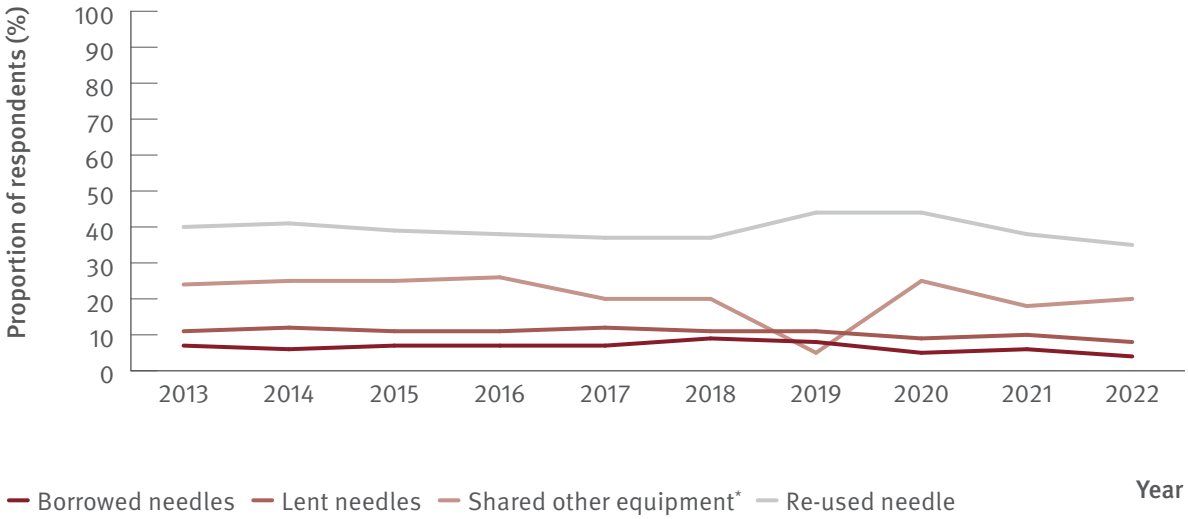
Figure 42. Proportion of Australian Needle Syringe Program Survey respondents reporting re-use of someone else's needles and syringes in the past month, 2013–2022



Source: Australian Needle Syringe Program Survey. National Data Report 2018–2022.[18] Australian Needle Syringe Program Survey 25 year National Data Report 1995–2019.[23]

Notes: Not reported not included. Injection risk behaviour variables are presented among those who injected in the previous month, not the entire sample. For 2013 to 2022, sample size was (in order): 2 111, 2 141, 2 071, 1 993, 2 314, 2 452, 2 333, 1 173, 1 259, and 1 581.

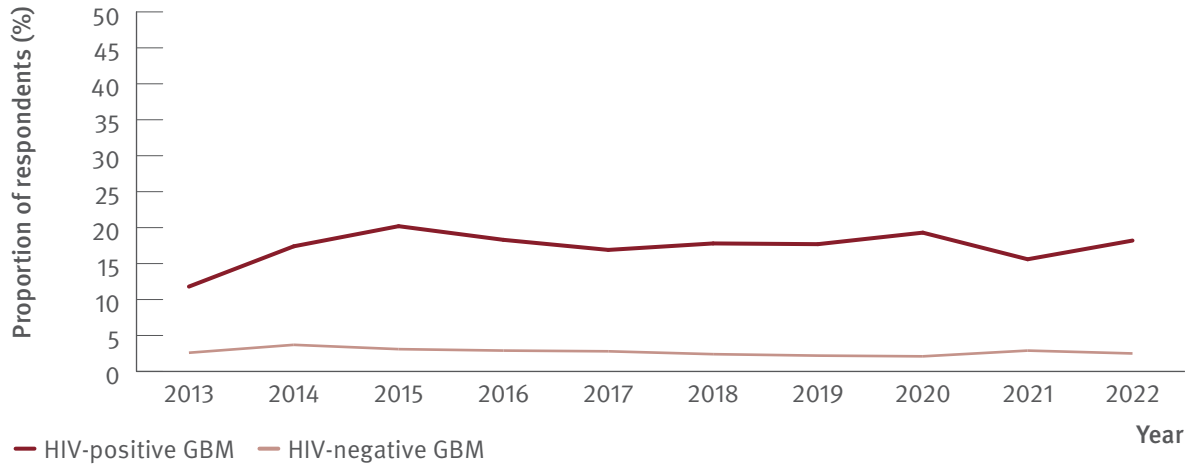
Figure 43. Proportion of respondents reporting borrowing and lending of needles, sharing of injecting equipment, and re-use of needles in the past month, national, Illicit Drug Reporting System, 2013–2022



Source: Australian Drug Trends 2022: key findings from the National Illicit Drug Reporting System (IDRS) Interviews.[45]

Notes: *Includes spoons, water, tourniquets, and filters.

Figure 44. Proportion of GBM who reported any drug injection in the six months prior to the survey by HIV status, national, Gay Community Periodic Survey, 2013–2022



Source: Annual Report of Trends in Behaviour 2022: HIV and STIs in Australia.[49,50]

Notes: Unadjusted data.

Seven

Modelling

Mathematical models are useful tools for identifying key issues affecting the likelihood of Australia eliminating hepatitis C as a public health threat. Over the past decade, several models have highlighted the cost-effectiveness and feasibility of hepatitis C treatment and elimination. There is ongoing work in this area, in particular focussing on the interventions required to ensure Australia meets its elimination targets (e.g., increased testing), the cost-effectiveness of these interventions, how funds can be spent optimally to achieve elimination, and modelling and mapping to identify if key regions or sub-populations are being left behind in the elimination response.

PROGRESS TOWARDS ELIMINATION

Modelling from the Kirby Institute showed that hepatitis C incidence and treatment coverage goals would be met under an optimistic scenario (annual treatment numbers are maintained at 2021 levels; 6 470 each year from 2023 onwards) by 2028, and only the treatment coverage goal would be met under an intermediate scenario (considered a realistic treatment uptake where annual treatment numbers are maintained at 2022 levels; 5 210 each year from 2023 onwards) by 2029. It will be hard to meet any World Health Organization elimination goals under a pessimistic scenario, where the annual treatment numbers decline and are maintained at 3 880 each year from 2023 onwards (Figure 45 and Table 2).

This model produces estimates of the number of people living with hepatitis C and the resulting time trends by first producing a specific estimate for the year 2015. The number of people living with hepatitis C at the end of 2015 was first estimated using observed cumulative notifications, estimated spontaneous clearance, mortality, and migration rates, and an estimate for the percentage of people undiagnosed. In addition, the model mortality rates are calibrated to match empirical data from the NSW linkage study to best reflect the number of cases of decompensated cirrhosis, hepatocellular carcinoma, and liver-related death. The resulting model estimates are compared to available measured data to ensure they are valid and as accurate as possible. This process is repeated annually and can result in changes to the model estimates from year to year due to the availability of new data and information.

In 2021, the treatment coverage (that is, the proportion of people treated) estimated in the model was compared to available treatment coverage among samples of people including respondents of the Australian Needle Syringe Program Survey and patients in clinical studies, and suggested the modelled estimate was too low. To address this discrepancy, the rate of spontaneous clearance used in the model was increased (from 28% to 36%; informed by a systematic review). This resulted in a 14% reduction in the estimated number of people living with hepatitis C in 2015 (from 188 690 to 162 590) with subsequent reductions for the years since.

Modelling by the Burnet Institute estimated the impact of public health interventions on hepatocellular carcinoma-related mortality. The modelling only included people with cirrhosis who had also achieved sustained virological response (SVR) following treatment for hepatitis C.

PROGRESS TOWARDS ELIMINATION (CONTINUED)

The model inputs were taken from existing literature and adherence to ultrasound screening, measured among patients attending a Victorian hospital liver clinic between 2003 and 2022. Baseline adherence to ultrasound frequency observed among patients was compared to the recommended six-monthly frequency.[51] Patient adherence levels were classified as non-adherent (those who attended 0–9% of their scheduled ultrasounds), partially adherent (10–79% of their scheduled ultrasounds), or completely adherent (80–100% of their scheduled ultrasounds).

Four public health intervention scenarios were modelled: realistic adherence improvements (5–10 percentage point improvement in ultrasound adherence relative to baseline), optimistic adherence improvements (10–20 percentage point improvement in ultrasound adherence relative to baseline), diagnosis sensitivity improvements (increasing ultrasound sensitivity for Barcelona Clinic Liver Cancer stages 0, A, and B), and treatment improvements (six to 12 month improvements to survival when treated for Barcelona Clinic Liver Cancer stage A, B, and C hepatocellular carcinoma). Table 3 describes the baseline data and model estimated relative improvements in each scenario compared to baseline. For each of the four scenarios described above, 100 simulated people with cirrhosis were modelled over a 10-year period. The model simulated how many additional life years would be gained under the four scenarios in comparison to the status quo. Status quo was defined as: baseline levels of adherence to ultrasound observed in patients described above; current treatment efficacy, and current ultrasound sensitivity (Table 3).

Data from 108 patients attending the hospital liver clinic showed 31% (34/108) of patients were non-adherent, 44% (48/108) were partially adherent, and 24% (26/108) were completely adherent to the six-monthly screening recommendations (Figure 46). These data were used as the baseline adherence, for calculating potential additional life years gained if improvements to these baselines were made. Optimistic adherence improvements were beneficial, with 100 simulated people gaining an additional 20 life years over 10 years. Realistic adherence improvements resulted in an additional 11 life years for 100 simulated people over 10 years. Treatment improvements led to an additional nine life years for 100 simulated people over 10 years. Diagnosis sensitivity improvements led to an additional six life years for 100 simulated people over 10 years (Figure 47).

Adherence to the recommendation of six-monthly liver ultrasound screening could be improved and modest improvements in adherence (10–20 percentage point improvements in adherence) could substantially improve life expectancy at a population level. Implementation of additional strategies to support people to stay engaged in care and attend regular liver ultrasounds should be a priority for liver surveillance programs.

Figure 45. Annual change in people living with chronic hepatitis C, hepatitis C incidence (all), treatment coverage, and liver-related deaths (viraemic and cured) in Australia 2030 (2010–2030) with World Health Organization HCV elimination targets (dotted lines: Panel B: -- 80% and -- 90% reductions in incidence, Panel C: -- 80% eligible treated, and Panel D: -- 65% reduction in deaths)

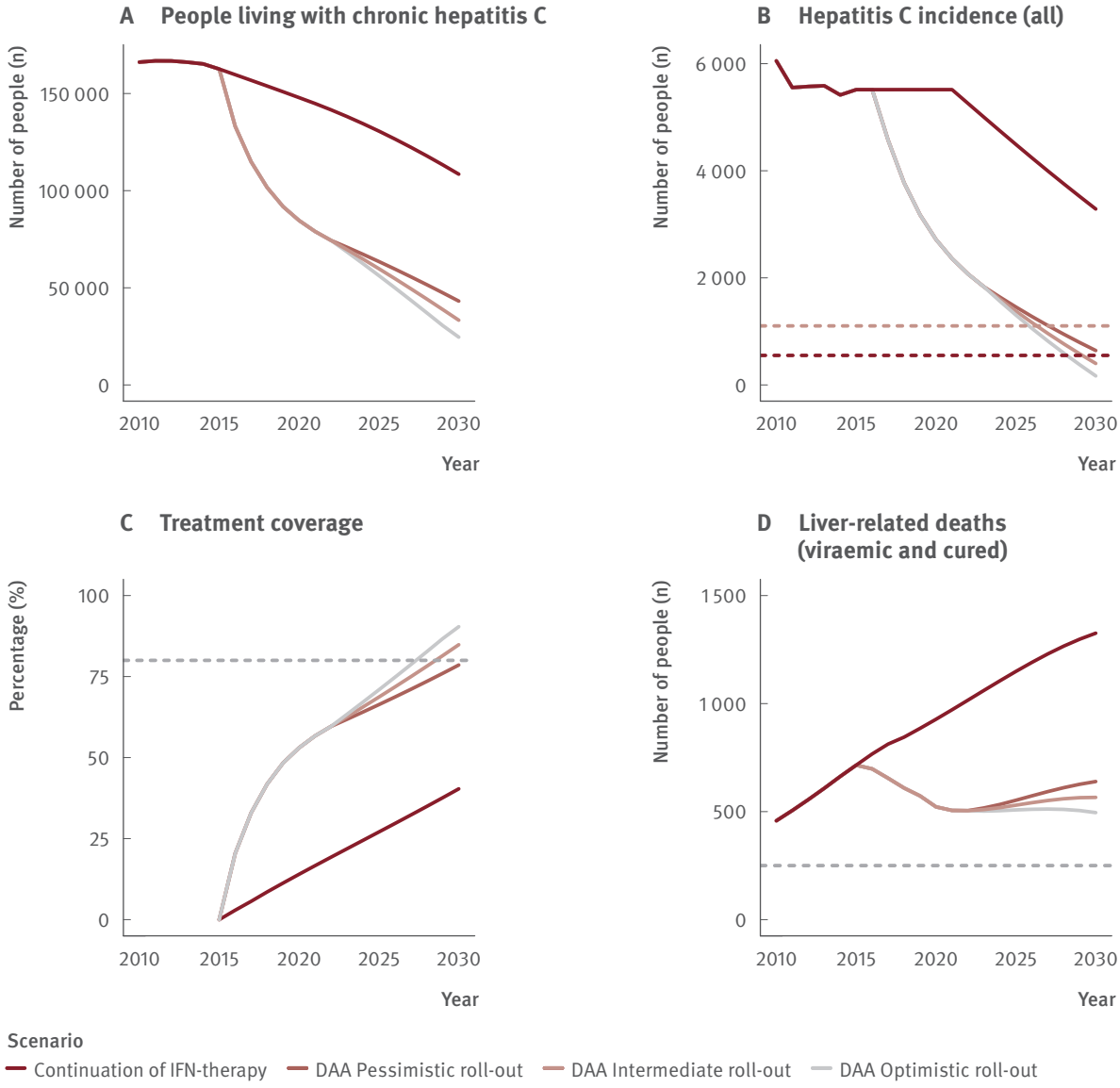


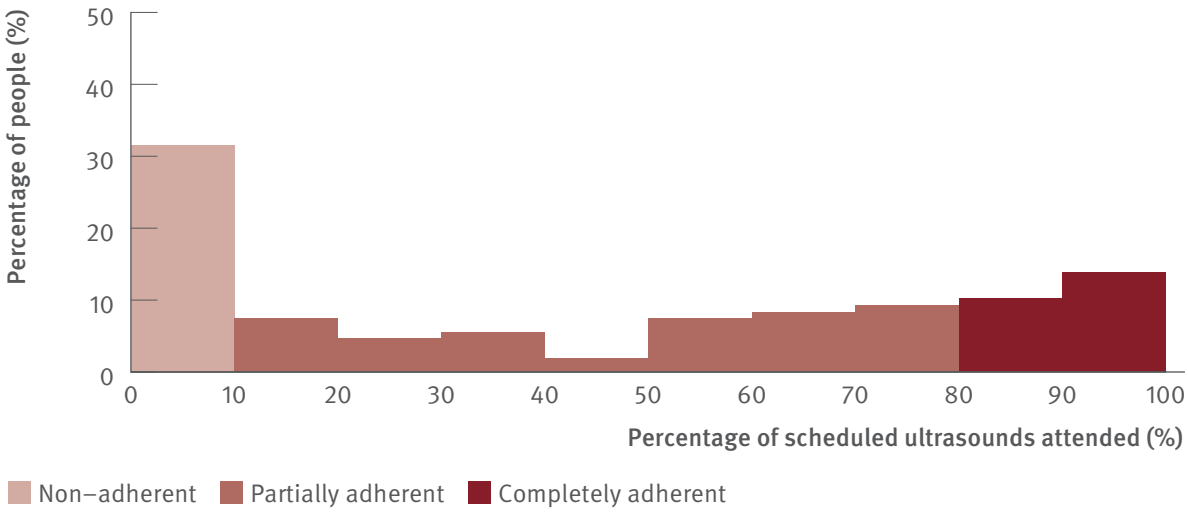
Table 2. Scenarios for the annual number of people in Australia receiving DAA

Treatment roll-out scenarios	2015 (Interferon + DAA)	2016	2017	2018	2019	2020	2021	2022	Post-2023
Pessimistic roll-out	4 720	33 200	20 970	15 210	11 310	8 230	6 470	5 210	3 880
Intermediate roll-out	4 720	33 200	20 970	15 210	11 310	8 230	6 470	5 210	5 210
Optimistic roll-out	4 720	33 200	20 970	15 210	11 310	8 230	6 470	5 210	6 470

Source: Updated from Kwon et al., *J Viral Hepat.* 2019[2] and Kwon et al., *PLoS One.* 2021.[3]

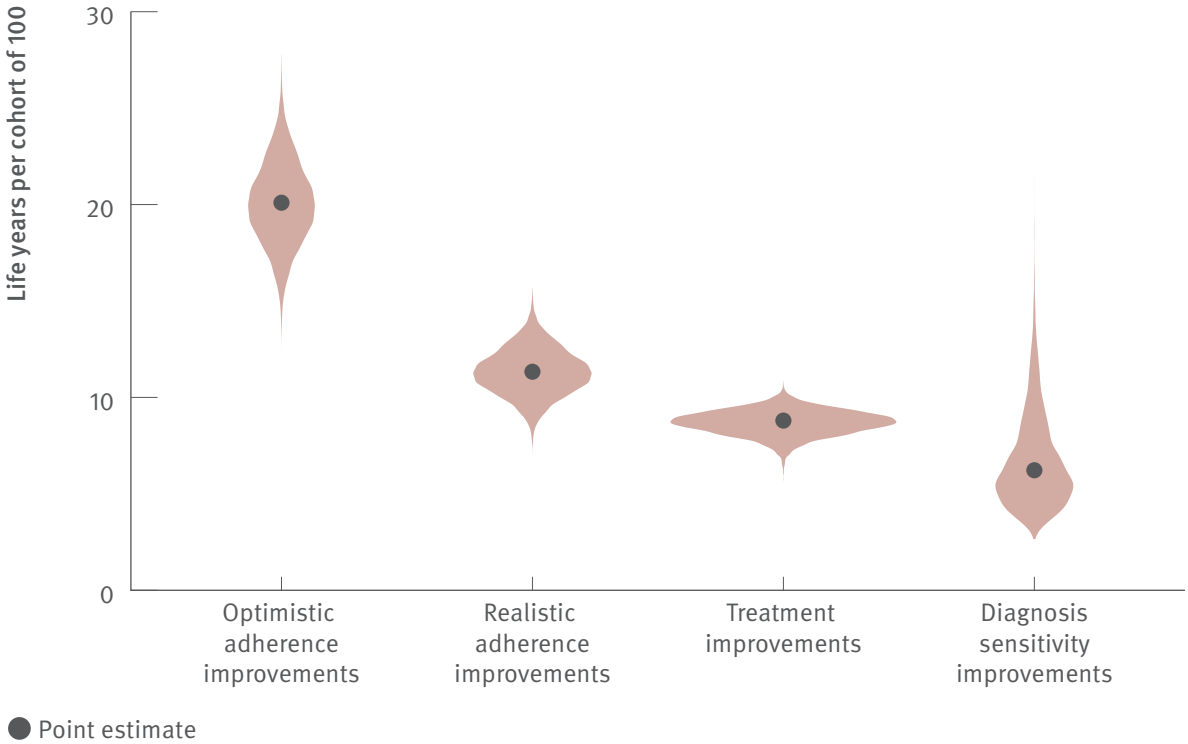
Notes: We assumed a pessimistic roll-out scenario corresponding to 40% less people being treated with DAA therapy than 2021, an intermediate roll-out scenario corresponding to the annual number treated equalling the number in 2022, and an optimistic scenario where the annual number treated increased back to the 2021 level.

Figure 46. Adherence to scheduled ultrasounds among people with cirrhosis and cured of hepatitis C, attending a Victorian hospital liver clinic, between 2003 and 2022, (N=108)



Source: Adapted from Cumming et al. 2023.[52]

Figure 47. Average additional simulated life years gained per 100 simulated people over a 10-year simulated period by the public health intervention



Source: Adapted from Cumming et al. 2023.[52]

Table 3. Public health intervention scenarios modelled, with the approximate change in model inputs for each scenario

Scenario	Model input	Before scenario	After scenario
Treatment improvements	Years added from treatment at stage A	3.5	4.5
	Years added from treatment at stage B	1.5	2
	Years added from treatment at stage C	0.25	0.75
Diagnosis sensitivity improvements	US sensitivity for BCLC stage 0	25%	30%
	US sensitivity for BCLC stage A	55%	60%
	US sensitivity for BCLC stage B	85%	90%
Realistic adherence improvements	Non-adherence	30%	25%
	Complete adherence	25%	35%
	Partial adherence	45%	55%
Optimistic adherence improvements	Non-adherence	30%	20%
	Complete adherence	25%	40%
	Partial adherence	45%	65%

Source: Adapted from Cumming et al. 2023.[52]

Notes: BCLC: Barcelona Clinic Liver Cancer, US: ultrasound. In the model a non-adherent person attends none of their six-monthly scheduled ultrasounds, a completely adherent person attends all scheduled ultrasounds, and a partially adherent person attends some of their scheduled ultrasounds. The percentage of ultrasounds attended by a partially adherent person is modelled using the input 'partial adherence attendance.'

Methods

This report brings together national data sources to assess Australia's progress towards eliminating hepatitis C. Some data were not included due to unavailability at the time of reporting; future reports will aim to provide the most comprehensive picture possible.

Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmissible Infections and Blood Borne Viruses

ACCESS was established to monitor STI and BBV testing and test outcomes among priority populations.[12,13,14] ACCESS focusses on recruiting sites that serve priority populations, including people who inject drugs and HIV-positive GBM. ACCESS collates data on consultations, hepatitis C testing and test outcomes from participating sites. Please note that the data included in this report may differ to those presented in previous or subsequent reports due to the availability of expanded data and associated enhancement of analytical, linkage, and processing methods.

Record linkage

Individuals' electronic medical records were linked between sites using a linkage code and probabilistic matching so that consultation, testing and test outcome data account for individuals attending more than one ACCESS site.

Sites

Data from 37 sites in total were used and stratified into primary care clinics that specialise in the health of people who inject drugs as well as providing general primary care (14 sites (one site has three health services counted as one site and one site has eight health services counted as one site)), and primary care clinics specialising in the health of GBM (11 sites) and sexual health clinics (12 sites). Seven sexual health clinics were used for analysis of hepatitis C testing among Aboriginal and Torres Strait Islander people; two clinics were not the same as those included in the analysis of hepatitis C testing among HIV-positive GBM.

Primary care clinics included 12 in VIC, one in WA, and one in QLD; of these clinics six had onsite NSPs and all nine clinics had opioid agonist therapy providers at the time of reporting. Primary care clinics specialising in the health of GBM included three in VIC, five in NSW, one in WA, one in ACT, and one in QLD. Sexual health clinics included one in VIC, seven in NSW, one in SA, one in ACT, one in TAS, and one in QLD. Sexual health clinics included for analysis of Aboriginal and Torres Strait Islander people were one in VIC, four in NSW, one in SA, and one in ACT. ACCESS continues to expand and refine its system; therefore, future reports will include data from additional sites.

Gay, bisexual, and other men who have sex with men

Individuals classified as GBM were males who:

- were recorded as gay or bisexual in an ACCESS clinic's patient management system, or
- had ever had a rectal swab for chlamydia or gonorrhoea at an ACCESS clinic,[53] or
- were HIV-positive and had ever had a syphilis test at an ACCESS clinic (algorithm developed by Burnet Institute based on syphilis epidemiology and prevalence among HIV-positive GBM populations in VIC).

Note that at the GBM clinics, only a small proportion of individuals could be classified on recorded sexuality alone, meaning that classification of individuals as GBM at these clinics is based largely on STI testing history criteria within the algorithm.

HIV-positive gay, bisexual, and other men who have sex with men

Individuals defined as HIV-positive GBM:

- had a positive HIV diagnostic test result recorded at an ACCESS clinic, or
- had an HIV viral load test result in an ACCESS clinic's patient management system, and
- were defined as GBM using the algorithm outlined above.

HIV status could only be determined if a history of HIV diagnostic or viral load testing was recorded at a site within the ACCESS network.

Incidence definition

Individuals were included in the incidence estimate if they were HCV antibody negative and HCV RNA negative or HCV antibody negative and HCV RNA testing was not performed during their first testing episode recorded by ACCESS from 2009 (at risk for primary infection). Time-at-risk was defined as the cumulative time between everyone's first negative test (HCV antibody) and last test (HCV antibody and/or HCV RNA). Time-at-risk was assigned to the calendar year in which it occurred for annual incidence estimates.

Incident hepatitis C cases were defined as:

- acute infection (HCV antibody negative and HCV RNA positive after an HCV antibody negative),
- antibody seroconversion (HCV antibody positive after an HCV antibody negative), or
- HCV RNA positive after an HCV antibody negative in the absence of an HCV antibody test.

Date for incident infection was assigned as the midpoint between the positive test (HCV antibody or HCV RNA) and prior HCV antibody negative test. Only individuals' first incident infection recorded in ACCESS were included in analyses.

Test uptake

Annual test uptake was defined as number of individuals tested divided by number of individuals who attended a consultation, with individuals only counted once a year. Clinic attendances included in-person and telehealth consultations.

Proportion positive

Annual positivity was defined as number of individuals tested positive divided by number of individuals tested, with individuals only counted once a year. Individuals' HCV antibody tests after an HCV antibody positive test being observed were excluded from analysis.

Treatment

Treatment initiation was inferred by presence of an electronic medical record prescription for hepatitis C treatment stored in patient management systems of participating clinics.

ATLAS network

The ATLAS network is an STI and BBV sentinel surveillance and research network representative of ACCHS led by Professor James Ward and Dr Clare Bradley from the University of Queensland Poche Centre for Indigenous Health. ATLAS is funded through the National Health and Medical Research Council, Medical Research Future Fund, and Commonwealth Department of Health, and includes many of Australia's leading public health researchers among its investigator group. ATLAS augments the National Notifiable Disease Surveillance System[10] and helps us understand the burden of disease due to STIs and BBVs among Aboriginal and Torres Strait Islander people. The ATLAS network currently includes 34 ACCHS largely associated with five 'clinical hubs' across QLD (two hubs), NSW, SA, and the Kimberley, WA. Regular reports addressing 12 performance measures are provided to ACCHS to assess clinical practice and drive continuous quality improvement initiatives internally. Data were also aggregated at the hub, jurisdictional, and national level and used to inform clinical guidelines and to guide future research questions.

Currently, three performance measures focus on hepatitis C testing and management: hepatitis C testing rate (proportion of individuals receiving an HCV antibody test and among those testing positive, the proportion then tested for HCV RNA or HCV viral load), hepatitis C treatment uptake (proportion of HCV RNA positive individuals prescribed DAA treatment), and SVR (proportion of individuals who, after having been prescribed DAA treatment, achieve an undetectable HCV viral load).

The goal of hepatitis C testing is not to test the entire patient population, but rather the population at risk of hepatitis C. The ATLAS network recognises that its current surveillance approach is limited by an inability to capture data on chronic/historical hepatitis C infection diagnosed prior to 2016 and not being actively managed by the ACCHS. It must be noted that a change in methodology now limits case inclusion to clients HCV RNA tested following a positive HCV antibody test, not clients recorded as ever being tested for HCV RNA. Similarly, only clients prescribed DAA treatment following a recorded HCV RNA positive result were included in this year's analysis. This change reduces case counts but improves our knowledge of the cascade of care in ACCHS.

Monitoring hepatitis C treatment uptake in Australia

The methods for the estimations have been described in detail elsewhere.[27] In brief, the total PBS data of DAA dispensation for all individuals who initiated treatment between March 2016 and December 2022 in Australia were used to estimate the number of individuals initiating DAA treatment, and for all subgroup analyses of DAA uptake. The data of the second or further courses of treatment (for treatment failure or hepatitis C reinfection) were not included where indicated. Prescriber speciality was based on the prescriber derived major speciality codes recorded by the PBS. In this coding system, medical trainees (i.e., registrars) were also considered as specialists. The proportion of treatment initiations by prescriber type between 2019 and 2021 should be interpreted cautiously given the increasing number of unidentified prescriber type in these years. Jurisdictions were based on the patient residence at the time of treatment prescription.

National Prisons Hepatitis Network

Data on HCV antibody and HCV RNA testing and new treatment initiations in Australia's prisons were collated by the National Prisons Hepatitis Network from prison-based hepatitis services.

For some jurisdictions, there were some annual differences in the number and type of prisons included in data collection. Data from both public and private prisons were included for all jurisdictions. For NSW in 2020, data were included from 31 public prisons (January–December) and one private prison (January–June only); data from two private prisons were not included in 2020. For NSW in 2021, data were included from 32 public prisons; data from three private prisons were not included. For NSW in 2022, data were included from 36 public prisons and three private prisons. For the ACT in 2019, treatment initiations were included for one mental health correctional facility which was excluded in following years. For the NT in 2019, treatment initiations were included for one juvenile justice facility which was excluded in following years. For QLD in 2022, data were not collected from one public prison. For TAS in 2022, data were collected from one new prison between July and December only.

Australian Capital Territory

Hepatitis C testing data were obtained from pathology results in patients' medical records—ACT Pathology via the Clinical Integration System prior to November 2022, and via the Digital Health Record from November 2022 onwards.

Data on newly initiated hepatitis C therapies (DAAs) were entered by clinical staff, reviewable from electronic medical records and auditable from pharmacy and MedChart Electronic Medication Management and subsequently the Digital Health Record.

New South Wales

The data corresponding to HCV antibody and HCV RNA testing numbers were obtained by using a script-generated data extract from existing pathology results in Justice Health Electronic Health System for the period of interest. Treatment data (DAAs) were collected via the pharmacy dispatch report when medications were dispensed to centres.

Northern Territory

Hepatitis C testing data were provided by Territory Pathology who provide the pathology services to the NT Prisons. Treatment data (DAA) were obtained through the Viral Hepatitis Service's hepatitis C clinical database that records treatment initiations. Accuracy and completeness of data were dependent on the quality of the data recorded by the clinicians. For Darwin, data were confirmed by pharmacy records.

Queensland

Hepatitis C testing data were obtained from AUSLAB. AUSLAB is an integrated laboratory information system in pathology, clinical measurements, forensics, and public health laboratories. It provides real-time results which are uploaded by the pathology laboratories. Treatment data (DAA) were obtained directly from Prisoner Health Services in each facility as part of the annual Hepatitis C Treatment Uptake Progress Report.

South Australia

Hepatitis C testing data were obtained from the contracted pathology provider (SA Pathology service). Paper-based health records were used in prisons; the number of treatment initiations (DAA) was based on pharmacy prescriptions filled.

Tasmania

Hepatitis C testing data were collated in collaboration with the Royal Hobart Hospital pathology service. Hepatitis C Treatment Program data were collected from records maintained by the Correctional Primary Health Service Pharmacy.

Victoria

Data were sourced from the Department of Justice and Community Safety (Victorian Government). Hepatitis C testing data were obtained from the electronic medical records system. Treatment data (DAA) were based on the monthly Statewide Hepatitis Program worksheet reported by St Vincent's Hospital Melbourne.

Western Australia

Hepatitis C testing data were obtained through the contracted pathology provider. The number of treatment initiations (DAA) was based on pharmacy prescriptions filled, cross-checked against data recorded on the WA Department of Justice electronic patient health record.

Australia and New Zealand Liver and Intestinal Transplant Registry

The primary diagnosis at the first liver transplant of each adult patient (aged 16 years or older) who underwent a transplant at one of the five Australian liver transplant centres were sourced from the Australia and New Zealand Liver and Intestinal Transplant Registry.

Stigma Indicators Monitoring Project

For more information about the development of the Stigma Indicator, see Broady et al.[39]

Survey of the general public

In 2017, the Stigma Indicator was included in the Australian Survey of Social Attitudes (N=1 001). The Australian Survey of Social Attitudes collects data from a representative sample of the Australian adult population, randomly selected from the Australian Electoral Roll.

In 2020, the Stigma Indicator was included in an online survey of Australian adults (N=2 010). Participants were recruited via paid social media advertising.

In 2021, the Stigma Indicator was included in an online survey of Australian adults (N=2 251). Participants were recruited via a Qualtrics research panel.

Survey of healthcare workers

In 2018, the Stigma Indicator was included in an online survey of Australian healthcare workers (N=551). The survey was promoted by ASHM and via paid social media advertising.

In 2021 and 2022, the Stigma Indicator was included in online surveys of Australian healthcare workers (N=907 and N=1 993, respectively). Participants for these surveys were recruited via Qualtrics research panels.

Gay Community Periodic Survey

The Gay Community Periodic Survey is a repeated, cross-sectional survey of GBM conducted using time-location sampling at gay venues, events, and clinics, supplemented by online recruitment. The Centre for Social Research in Health (University of New South Wales) conducts the survey in seven Australian states and territories, with community-based recruitment focussed on metropolitan areas. Its methods are described in detail elsewhere.[49,50]

Modelling the Australian response to hepatitis C

The hepatitis C cascade estimates and outputs from the hepatitis C model are reviewed annually to ensure they are consistent with available epidemiological data and as accurate as possible. This includes updating parameter values and input data from clinical studies as results become available. This can lead to changes in the estimates for the number of hepatitis C and hepatitis C-related liver disease burden and mortality. For example, for the 2019 estimates in the 2020 annual surveillance report,[4] the modelling incorporated evidence of duplicate notifications from linkage studies in NSW and VIC and updated spontaneous clearance (from 25% to 28%) which resulted in a 35 310 (23%) reduction in the estimated number of people living with hepatitis C in 2019.

Recent data from several clinical studies suggest the estimate for cumulative treatment coverage in 2020 was too low. In particular, the Australian Needle Syringe Program Survey, the ETHOS Engage study, and the SEARCH study (emergency department screening) have reported hepatitis C treatment coverage of 60% to 74%,[18,54,55] whereas the hepatitis C cascade estimate for 2021 was 48%. The primary reason for this discrepancy was probably an overestimate of the number of people living with hepatitis C in Australia. Two plausible reasons for this overestimation are: 1) there was a substantial number of duplications in the hepatitis C notifications due to interstate movement and 2) the estimate for spontaneous clearance used was too low.

The percentage of notifications that are interstate duplicates is currently unknown, however, we reviewed empirical estimates for spontaneous clearance to see if changes to that input parameter in the model were warranted.

Spontaneous clearance

Previously the modelling used a 28% spontaneous clearance rate based on data from a large clinical cohort from British Columbia which has a similar hepatitis C epidemic to Australia.[56] In British Columbia, all tests for HCV antibodies and HCV RNA are conducted in one laboratory for the whole province making it ideal for linkage and assessing the level of spontaneous clearance. This cohort study included 1.7 million individuals who had previously tested for hepatitis C and included patient data from 1990 to 2018, which was linked to medical visits, hospitalisations, cancers, prescription drugs, and mortality. However, the 28% (in 2018 32 031 HCV RNA positive of 44 507 people HCV RNA tested) clearance rate reported in this study may be an underestimate due to bias in the testing system (where people are more likely to have an HCV antibody test if they have an elevated Alanine transaminase (known as ALT), and hence were more likely to have chronic infection versus cleared infection).

A systematic review and meta-analysis conducted in 2017 reported an overall spontaneous clearance rate of 36% (95% CI: 24%–51%) in 12 months.[57] This review included 43 studies and data from 20 110 individuals who progressed from acute to chronic infection and only included first infection patients with a minimum of one-year of follow-up since the time of the infection (with at least two consecutive tests of undetectable HCV RNA for confirmation). A similar review among people who inject drugs estimated a 25% spontaneous clearance rate,[58] which was what we used in our model prior to 2020. A limitation of estimating spontaneous clearance rates from studies of people who inject drugs is the spontaneous clearance rate in a high-risk population could be underestimated due to the ongoing risk of reinfection which may influence the detection of HCV RNA. The lower spontaneous clearance rate among people who inject drugs in another study also supports this argument[57] with the ongoing

issue of exposure to reinfection due to ongoing injecting. In Australia, around 25% of the population living with hepatitis C are people who inject drugs (currently),[59] therefore applying an injecting specific spontaneous clearance rate to the broader population might be too low. Hence, estimates from the broader population studies would likely produce more accurate estimates. This was seen in the systematic review where the clearance rate from the larger overall population cohort studies resulted in higher spontaneous clearance rates; the clearance rate was 36% from a large cohort in Scotland.[60]

Based on the data and assessment presented, an increase in the spontaneous clearance rate used in the modelling was warranted. Using the 36% rate from the systematic review in the model we obtain a treatment coverage for 2022 of 60% which is consistent with the treatment coverage described above. Therefore, the estimates for the 2022 hepatitis C cascade used a spontaneous clearance rate of 36%.

Note the estimates could still overestimate the number of people living with hepatitis C due to the presence of interstate notification duplications. When these become available from ongoing linkage studies, we will incorporate the data and reassess the spontaneous clearance rate used for our surveillance modelling.

Reduction in disease progression rate among cured

The modelling assumed the population who are cured in the F3 and F4 stages of hepatitis C infection have reduced progression rates from F3 to hepatocellular carcinoma (77% reduction) and F4 to decompensation (76% reduction) and hepatocellular carcinoma (77% reduction).[61,62,63] This was based on a prospective study with 1 323 patients to investigate the effects of a SVR among patients with hepatitis C and compensated cirrhosis.[63] Recent Australian empirical data reports few decompensated cirrhosis cases among the cured population suggesting these progression reductions to decompensated cirrhosis were too small and the corresponding parameter in the model needed updating.

Several prospective cohort studies have been conducted suggesting a larger progression reduction to decompensated cirrhosis once cured. In an Italian study, no patients developed liver decompensation after achieving SVR (versus 7% without an SVR).[62] This corresponds to a 100% reduction in decompensated incidence among the cured population compared to the viraemic population. Another study of 1 323 patients showed that SVR was associated with a 74% decrease in the incidence of hepatic decompensation (hazard ratio, 0.26, 95% CI: 0.17–0.39).[63] Finally, in 2021, a 70% reduction in decompensated incidence among the SVR group compared to the no-SVR group was reported.[64] Based on the results of these studies we have updated the relative reduction in decompensated cirrhosis incidence among those cured in the F4 stage to the best-estimated value of 90% with a range of 70%–100%. This change resulted in a lower decompensated cirrhosis incidence among the cured population and stabilised trends in decompensated cirrhosis incidence (rather than an increase following an initial decline after DAA treatment first became available). This change in decompensated cirrhosis incidence also results in lower estimates for hepatitis C liver-related mortality in recent years. With these changes (updated spontaneous clearance rate and reduction in decompensated cirrhosis progression rate among cured), the trends in decompensated cirrhosis, hepatocellular carcinoma, and mortality produced by the model better align with the trends reported in the NSW linkage.[1]

Methods associated with the Kirby Institute's modelling are also published in detail.[2,3,4]

Publicly available data

Notifications of hepatitis C

Notifications of newly acquired hepatitis C were acquired from the National Notifiable Diseases Surveillance System[10] with details and notifications requirements, procedures, and case definitions available from the Australian Government Department of Health.[65] Notifications are also reported annually in the *HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report*.[4,9]

Medicare claims for HCV RNA testing

Data tables of Medicare claims are available through Medicare Australia Statistics.[19]

Australian Needle Syringe Program Survey

The Australian Needle Syringe Program Survey National, led by Professor Lisa Maher, provides serial point prevalence estimates of HIV and HCV antibody prevalence, HCV RNA prevalence, and monitors sexual and injecting behaviour among people who inject drugs in Australia. The Australian Needle Syringe Program Survey is conducted annually at more than 50 NSP services over a one-to-two-week period in October each year. Participants complete a brief self-administered questionnaire and provide a capillary blood sample which is subsequently tested for HIV and HCV antibodies, and HCV RNA. The Australian Needle Syringe Program Survey Data Report is published annually, including full details of the methodology.[18]

Hepatitis C cascade of diagnosis and care

The estimates for the hepatitis C cascade of diagnosis and care are published annually in the *HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report,*[4] with methods associated with the updated cascade described in detail.

Needle Syringe Program National Minimum Data Collection

The Needle Syringe Program National Minimum Data Collection, led by Professor Lisa Maher, provides data from all Australian jurisdictions incorporating the following three components: NSP service type and location, non-identifiable client occasions of service, and needle syringe distribution. The Needle Syringe Program National Minimum Data Collection National Data Report is published annually, with full details of methods included.[18]

The Illicit Drug Reporting System

The Illicit Drug Reporting System publishes an annual report, with full details of methods included.[43]

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NSW Community Restorative Centre (CRC)

Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmissible Infections and Blood Borne Viruses

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Dr Aleksandar Misev (Visiting Medical Officer, from 2022)
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Melanie Gordon (Population Health Nurse Justice Health)
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References

1. Alavi M, Law MG, Valerio H, et al. Declining hepatitis C virus-related liver disease burden in the direct-acting antiviral therapy era in New South Wales, Australia. *J Hepatol.* 2019;**71**(2):281–288. doi: https://doi.org/10.1016/j.jhep.2019.04.014.

2. Kwon JA, Dore GJ, Grebely J, et al. Australia on track to achieve WHO HCV elimination targets following rapid initial DAA treatment uptake: a modelling study. *J Viral Hepat.* 2019;**26**(1):83–92. doi: https://doi.org/10.1111/jvh.13013.

3. Kwon JA, Dore GJ, Hajarizadeh B, et al. Australia could miss the WHO hepatitis C virus elimination targets due to declining treatment uptake and ongoing burden of advanced liver disease complications. *PLoS One.* 2021;**16**(9):e0257369. doi: https://doi.org/10.1371/journal.pone.0257369.

4. King J, McManus H, Kwon JA. HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2023. Sydney, Australia: Kirby Institute, UNSW Sydney; 2023. Available at: https://www.kirby.unsw.edu.au/research/reports (accessed 1st December, 2023). doi: https://doi.org/10.26190/f5ph-f972.

5. Kirby Institute. Progress towards hepatitis C elimination among Aboriginal and Torres Strait Islander people in Australia: monitoring and evaluation report 2021. Sydney, Australia: Kirby Institute, UNSW Sydney; 2021. Available at: https://kirby.unsw.edu.au/report/progress-towards-hepatitis-c-elimination-among-aboriginal-and-torres-strait-islander-people (accessed 26th August, 2023).

6. Dore GJ, Feld JJ. Hepatitis C virus therapeutic development: in pursuit of "perfectovir". *Clin Infect Dis.* 2015;**60**(12):1829–1836. doi: https://doi.org/10.1093/cid/civ197.

7. Doyle JS, Aspinall E, Liew D, et al. Current and emerging antiviral treatments for hepatitis C infection. *British J Clinical Pharmacol.* 2013;**75**(4):931–943. doi: https://doi.org/10.1111/j.1365-2125.2012.04419.x.

8. Australian Government, Department of Health. Fifth National Hepatitis Strategy 2018–2022. Canberra, Australia: Australian Government, Department of Health; 2018. Available at: https://www.health.gov.au/resources/publications/fifth-national-hepatitis-c-strategy-2018-2022 (accessed 19th August, 2023).

9. King J, McManus H, Kwon JA, et al. HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2022. Available at: https://www.kirby.unsw.edu.au/research/reports/asr2022 (accessed 2nd November, 2023).

10. Australian Government, Department of Health. National Notifiable Disease Surveillance System. Canberra, Australia: Australian Government, Department of Health; 2022. Available at: https://www.health.gov.au/initiatives-and-programs/nndss (accessed 18th September, 2023).

11. O'Keefe D, Horyniak D, Dietze P. From initiating injecting drug use to regular injecting: retrospective survival analysis of injecting progression within a sample of people who inject drugs regularly. *Drug Alcohol Depend.* 2016;**158**:177–180. doi: https://doi.org/10.1016/j.drugalcdep.2015.11.022.

12. Burnet Institute, Kirby Institute, and National Reference Laboratory. The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmissible Infections and Blood Borne Viruses (ACCESS). Melbourne, Australia: Burnet Institute, Kirby Institute, and National Reference Laboratory; 2022. Available at: https://accessproject.org.au/ (accessed 15th May, 2023).

13. Callander D, Moreira C, El-Hayek C, et al. Monitoring the control of sexually transmissible infections and blood-borne viruses: protocol for the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS). *JMIR Res Protoc.* 2018;**7**(11):e11028. doi: https://www.researchprotocols.org/2018/11/e11028/.

14. Nguyen L, Stoové M, Boyle D, et al. Privacy-preserving record linkage of deidentified records within a public health surveillance system: evaluation study. *J Med Internet Res.* 2020;**22**(6):e16757. doi: https://www.jmir.org/2020/6/e16757/.

15. ASHM. National Hepatitis C Testing Policy 2020. Sydney, Australia: ASHM; 2020. Available at: http://testingportal.ashm.org.au/national-hcv-testing-policy/ (accessed 1st June, 2023).

16. Hepatitis C Virus Infection Consensus Statement Working Group. Australian recommendations for the management of hepatitis C virus infection: a consensus statement (2022). Melbourne, Australia: Gasteroenterological Society of Australia, 2022. Available at: https://www.hepcguidelines.org.au/ (accessed 3rd October, 2023).

17. Bradley C, Hengel B, Crawford K, et al. Establishment of a sentinel surveillance network for sexually transmissible infections and blood borne viruses in Aboriginal primary care services across Australia: the ATLAS project. *BMC Health Services Research.* 2020;**20**(769). doi: https://doi.org/10.1186/s12913-020-05388-y.

18. Heard S, Zolala F, Maher L. Australian Needle Syringe Program Survey National Data Report 2018–2022: prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees. Sydney, Australia: Kirby Institute, UNSW Sydney; 2023. Available at: https://www.kirby.unsw.edu.au/research/reports/australian-nsp-survey-national-data-report-2018-2022 (accessed 1st September, 2023).

19. Australian Government. Medicare Australia Statistics. Canberra, Australia: Australian Government, Department of Human Services; 2023. Available at: http://medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp (accessed 5th August, 2023).

20. Vujcich D, Roberts M, Brown G, et al. Are sexual health survey items understood as intended by African and Asian migrants to Australia? Methods, results and recommendations for qualitative pretesting. *BMJ Open.* 2021;**11**(12):e049010. doi: https://doi.org/10.1136/bmjopen-2021-049010.

21. Vujcich D, Roberts M, Gu Z, et al. Translating best practice into real practice: methods, results and lessons from a project to translate an English sexual health survey into four Asian languages. *PLoS One.* 2021;**16**(12):e0261074. doi: https://doi.org/10.1371/journal.pone.0261074.

22. Vujcich D, Brown G, Durham J, et al. Strategies for recruiting migrants to participate in a sexual health survey: methods, results, and lessons. *Int J Environ Res Public Health.* 2022;**19**(19):12213. doi: https://doi.org/10.3390/ijerph191912213.

23. Heard S, Iversen J, Geddes L, et al. Australian NSP survey: prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees, 25 year National Data Report 1995–2019. Sydney, Australia: Kirby Institute, UNSW Sydney; 2020. Available at: https://kirby.unsw.edu.au/report/australian-nsp-survey-25-year-national-data-report-1995-2019 (accessed 15th April, 2023).

24. Scott N, Sacks-Davis R, Wade AJ, et al. Australia needs to increase testing to achieve hepatitis C elimination. *Med J Aust.* 2020;**212**(8):365–370. doi: https://doi.org/10.5694/mja2.50544.

25. Martin NK, Thornton A, Hickman M, et al. Can hepatitis C Virus (HCV) direct-acting antiviral treatment as prevention reverse the HCV epidemic among men who have sex with men in the United Kingdom? Epidemiological and modeling insights. *Clin Infect Dis.* 2016;**62**(9):1072–1080. doi: https://doi.org/10.1093/cid/ciw075.

26. Scott N, McBryde ES, Thompson A, et al. Treatment scale-up to achieve global HCV incidence and mortality elimination targets: a cost-effectiveness model. *Gut.* 2017;**66**(8):1507–1515. doi: http://dx.doi.org/10.1136/gutjnl-2016-311504.

27. Kirby Institute. Monitoring hepatitis C treatment uptake in Australia (Issue 13). Sydney, Australia: Kirby Institute, UNSW Sydney; July 2023. Available at: https://www.kirby.unsw.edu.au/research/reports/monitoring-hepatitis-c-treatment-uptake-australia-issue-13-july-2023 (accessed 4th August, 2023).

28. National Prisons Hepatitis Network. Sydney, Australia: Kirby Institute, UNSW Sydney; 2023. Available at: https://www.nphn.net.au/about (accessed 5th November, 2023).

29. Yee J, Carson J, Hanson J, et al. Real world efficacy of antiviral therapy in chronic hepatitis C in Australia (REACH-C). Sydney, Australia: Kirby Institute, UNSW Sydney; 2023. Available at: https://kirby.unsw.edu.au/project/reach-c (accessed 7th October, 2023).

30. Carson JM, Hajarizadeh B, Hanson J, et al. Retreatment for hepatitis C virus direct acting antiviral therapy virological failure in primary and tertiary settings: the REACH-C cohort. *J Viral Hepat.* 2022;**29**(8):661–676. doi: https://doi.org/10.1111/jvh.13705.

31. Carson JM, Barbieri S, Matthews GV, et al. National trends in retreatment of HCV due to reinfection or treatment failure in Australia. *J Hepatol.* 2022;**78**(2):260–270. doi: https://doi.org/10.1016/j.jhep.2022.09.011.

32. Carson J, Barbieri S, Matthews GV, et al. Increasing national trend of direct-acting antiviral discontinuation among people treated for HCV 2016–2021. *Hepatol Commun.* 2023;**7**(4):e0125. doi: https://doi.org/10.1097/HC9.0000000000000125.

33. Traeger MW, Pedrana AE, van Santen DK, et al. The impact of universal access to direct-acting antiviral therapy on the hepatitis C cascade of care among individuals attending primary and community health services. *PLoS One.* 2020;**15**(6):e0235445. doi: https://doi.org/10.1371/journal.pone.0235445.

34. Merone L, Ashton S, Harris A, et al. A complex increase in hepatitis C virus in a correctional facility: bumps in the road. *Aust NZ J Public Health.* 2022;**46**(3):377–381. doi: https://doi.org/10.1111/1753-6405.13238.

35. Hajarizadeh B, Grebely J, Byrne M, et al. Evaluation of hepatitis C treatment-as-prevention within Australian prisons (SToP-C): a prospective cohort study. *Lancet Gastroenterol Hepatol.* 2021;**6**(7):533–546. doi: https://doi.org/10.1016/S2468-1253(21)00077-7.

36. Cunningham EB, Hajarizadeh B, Bretana NA, et al. Ongoing incident hepatitis C virus infection among people with a history of injecting drug use in an Australian prison setting, 2005–2014: the HITS-p study. *J Viral Hepat.* 2017;**24**(9):733–741. doi: https://doi.org/10.1111/jvh.12701.

37. Butler T, Simpson M. National prison entrants' blood-borne virus survey report 2004, 2007, 2010, 2013 and 2016. Sydney, Australia: Kirby Institute, UNSW Sydney; 2017. Available at: https://www.kirby.unsw.edu.au/research/reports/national-prison-entrants-bloodborne-virus-and-risk-behaviour-survey-report-2004-2007-2010-2013-and-2016 (accessed 22nd August, 2023).

38. Australian and New Zealand Liver and Intestinal Transplant Registry. Melbourne, Australia: Austin Hospital; 2023. Available at: https://www.anzlitr.org/ (accessed 24th August, 2023).

39. Broady TR, Cama E, Brener L, et al. Responding to a national policy need: development of a stigma indicator for blood-borne viruses and sexually transmissible infections. *Aust NZ J Public Health.* 2018;**42**(6):513–515. doi: https://doi.org/10.1111/1753-6405.12809.

40. Broady T, Brener L, Cama E, et al. Stigma snapshot: health care workers 2022. Sydney, Australia: Centre for Social Research in Health, UNSW Sydney; 2022. Available at: https://www.unsw.edu.au/arts-design-architecture/our-research/research-centres-institutes/centre-social-research-health/our-projects/stigma-indicators-monitoring-project (accessed 3rd October, 2023).

41. Broady T, Brener L, Cama E, et al. Stigma snapshot: general public 2021. Sydney, Australia: Centre for Social Research in Health, UNSW Sydney; 2022. Available at: https://www.unsw.edu.au/arts-design-architecture/our-research/research-centres-institutes/centre-social-research-health/our-projects/stigma-indicators-monitoring-project (accessed 3rd October, 2023).

42. Burnet Institute and Kirby Institute. Australia's progress towards hepatitis C elimination: annual report 2022. Melbourne, Australia: Burnet Institute; 2022. Available at: https://www.burnet.edu.au/knowledge-and-media/research-reports-plus-policy-briefs/australia-s-progress-towards-hepatitis-c-elimination-annual-report-2022/ (accessed 5th September, 2023).

43. Broady T, Brener L, Cama E, et al. Stigma snapshot: people who inject drugs 2021. Sydney, Australia: Centre for Social Research in Health, UNSW Sydney; 2022. Available at: https://www.unsw.edu.au/arts-design-architecture/our-research/research-centres-institutes/centre-social-research-health/our-projects/stigma-indicators-monitoring-project (accessed 5th October, 2023).

44. Broady T, Brener L, Cama E, et al. Stigma snapshot: people living with hepatitis C 2021. Sydney, Australia: Centre for Social Research in Health, UNSW Sydney; 2022. Available at: https://www.unsw.edu.au/arts-design-architecture/our-research/research-centres-institutes/centre-social-research-health/our-projects/stigma-indicators-monitoring-project (accessed 3rd October, 2023).

45. Sutherland R, Uporova J, King C, et al. Australian Drug Trends 2022: key findings from the National Illicit Drug Reporting System (IDRS) Interviews. Sydney, Australia: National Drug and Alcohol Research Centre, UNSW Sydney; 2022. Available at: https://ndarc.med.unsw.edu.au/project/illicit-drug-reporting-system-idrs (accessed 8th October, 2023).

46. Broady TR, Brener L, Horwitz R, et al. Reducing stigma towards people living with HIV and people who inject drugs using social norms theory: an online study with Australian health care workers. *Drug Alcohol Depend.* 2023;**249**:109953. doi: https://doi.org/10.1016/j.drugalcdep.2023.109953.

47. Treloar C, Cama E, Lancaster K, et al. A universal precautions approach to reducing stigma in health care: getting beyond HIV-specific stigma. *Harm Reduction Journal.* 2022;**19**(1):74. doi: https://doi.org/10.1186/s12954-022-00658-w.

48. Heard S, Iversen J, Geddes L, et al. Needle Syringe Program National Minimum Data Collection: National Data Report 2022. Sydney, Australia: Kirby Institute, UNSW Sydney; 2022. Available at: https://www.kirby.unsw.edu.au/sites/default/files/documents/NSP-NMDC-2022_National-Data-Report.pdf (accessed 25th September, 2023).

49. Broady T, Cama E, Rance J, et al. Annual Report of Trends in Behaviour 2022: HIV and STIs in Australia. Sydney, Australia: Centre for Social Research in Health, UNSW Sydney; 2022. Available at: https://www.unsw.edu.au/research/csrh/our-projects/annual-report-of-trends-in-behaviour (accessed 25th September, 2023).

50. Holt M, Lea T, Mao L, et al. Adapting behavioural surveillance to antiretroviral-based HIV prevention: reviewing and anticipating trends in the Australian Gay Community Periodic Surveys. *Sex Health.* 2017;**14**(1):72–79. doi: https://doi.org/10.1071/SH16072.

51. Lubel JS, Roberts SK, Strasser SI, et al. Australian recommendations for the management of hepatocellular carcinoma: a consensus statement. *Med J Aust.* 2021;**214**(10):475–483. doi: https://doi.org/10.5694/mja2.50885.

52. Cumming J, Scott N, Howell J, et al. Improving hepatocellular carcinoma screening outcomes in patients with cirrhosis who have been successfully treated for hepatitis C: a Markov chain model. Paper presented at: International HIV Coinfection and Viral Hepatitis Elimination Conference; July 2023; Brisbane, Australia. Available at: https://az659834.vo.msecnd.net/eventsairaueprod/production-ashm-public/00decd0deea648cea64ac9b9d57fb6aa (accessed 1st November, 2023).

53. Ampt FH, El Hayek C, Agius PA, et al. Anorectal swabs as a marker of male-to-male sexual exposure in STI surveillance systems. *Epidemiol Infect.* 2017;**145**(12):2530–2535. doi: https://doi.org/10.1017/S095026881700098X.

54. Prince DS, Pipicella JL, Fraser M, et al. Screening Emergency Admissions at Risk of Chronic Hepatitis C (SEARCH) to diagnose or 're-diagnose' infections is effective in Australia. *J Viral Hepat.* 2021;**28**(1):121–128. doi: https://doi.org/10.1111/jvh.13393.

55. Valerio H, Alavi M, Conway A, et al. Declining prevalence of current HCV infection and increased treatment uptake among people who inject drugs: the ETHOS Engage study. *Int J Drug Policy.* 2022;**105**:103706. doi: https://doi.org/10.1016/j.drugpo.2022.103706.

56. Bartlett SR, Yu A, Chapinal N, et al. The population level care cascade for hepatitis C in British Columbia, Canada as of 2018: impact of direct acting antivirals. *Liver Int.* 2019;**39**(12):2261–2272. doi: https://doi.org/10.1111/liv.14227.

57. Aisyah DN, Shallcross L, Hully AJ, et al. Assessing hepatitis C spontaneous clearance and understanding associated factors: a systematic review and meta-analysis. *J Viral Hepat.* 2018;**25**(6):680–698. doi: https://doi.org/10.1111/jvh.12866.

58. Grebely J, Larney S, Peacock A, et al. Global, regional, and country-level estimates of hepatitis C infection among people who have recently injected drugs. *Addiction.* 2019;**114**(1):150–166. doi: https://doi.org/10.1111/add.14393.

59. Iversen J, Dore GJ, Starr M, et al. Estimating the Consensus hepatitis C Cascade of Care among people who inject drugs in Australia: pre and post availability of direct acting antiviral therapy. *Int J Drug Policy.* 2020;**83**:102837. doi: https://doi.org/10.1016/j.drugpo.2020.102837.

60. Seeff LB, Hollinger FB, Alter HJ, et al. Long-term mortality and morbidity of transfusion-associated non-A, non-B, and type C hepatitis: a National Heart, Lung, and Blood Institute collaborative study. *Hepatology.* 2001;**33**(2):455–463. doi: https://doi.org/10.1053/jhep.2001.21905.

61. Morgan RL, Baack B, Smith BD, et al. Eradication of hepatitis C virus infection and the development of hepatocellular carcinoma: a meta-analysis of observational studies. *Ann Intern Med*. 2013;**158**(5):329–337. doi: https://doi.org/10.7326/0003-4819-158-5-201303050-00005.

62. Di Marco V, Calvaruso V, Ferraro D, et al. Effects of eradicating hepatitis C virus infection in patients with cirrhosis differ with stage of portal hypertension. *Gastroenterology*. 2016;**151**(1):130–139.e132. doi: https://doi.org/10.1053/j.gastro.2016.03.036.

63. Nahon P, Bourcier V, Layese R, et al. Eradication of hepatitis C virus infection in patients with cirrhosis reduces risk of liver and non-liver complications. *Gastroenterology*. 2017;**152**(1):142–156. doi: https://pubmed.ncbi.nlm.nih.gov/27641509/.

64. Morisco F, Federico A, Marignani M, et al. Risk factors for liver decompensation and HCC in HCV-cirrhotic patients after DAAs: a multicenter prospective study. *Cancers (Basel)*. 2021;**13**(15):3810. doi: https://doi.org/10.3390/cancers13153810.

65. Australian Government, Department of Health. Australian national notifiable diseases and case definitions. Canberra, Australia: Australian Government, Department of Health; 2023. Available at: https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-casedefinitions.htm (accessed 7th June, 2023).

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