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Disparities in hepatitis C among people aged 12–59 with no history of injection drug use, United States, January 2013–March 2020

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Abstract

Background and Aims: In the United States, hepatitis C virus (HCV) infection occurs primarily through injection drug use (IDU), but transmission also occurs through other ways. This study examined HCV prevalence and disparities among US residents aged 12–59 years with no IDU history.

Methods: We analysed 2013–March 2020 National Health and Nutrition Examination Survey data to calculate the HCV prevalence among people with no drug use history and only a non-IDU history, collectively referred to as no IDU history. These estimates were compared to those with an IDU history and stratified by sociodemographic and hepatitis A and hepatitis B serologic characteristics.

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AUTHOR CONTRIBUTIONS

Kathleen N. Ly: Conceptualisation, Methodology, Data Curation, Formal Analysis, Software and Writing – Original Draft. **Laurie K. Barker:** Methodology, Visualisation, Data Curation, Software, Validation and Writing – Reviewing and Editing. **Greta Kilmer:** Conceptualisation, Methodology, Writing – Reviewing and Editing. **Jaimie Z. Shing:** Conceptualisation, Methodology, Writing – Reviewing and Editing. **Ruth B. Jiles:** Conceptualisation, Writing – Reviewing and Editing. **Eyasu Teshale:** Conceptualisation, Methodology, Writing – Reviewing and Editing, Supervision.

CONFLICT OF INTEREST STATEMENT

All authors report no financial or other conflicts of interest.

ETHICS STATEMENT

NHANES data collection and analysis in the RDC was approved by the NCHS Ethics Review Board. Analysis of de-identified NHANES data is exempt from the federal regulations for the protection of human research participants.

DISCLAIMER (REQUIRED BY RDC)

The findings and conclusions in this paper are those of the author(s) and do not necessarily represent the views of the Research Data Center, the National Center for Health Statistics or the Centers for Disease Control and Prevention.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Results: The current HCV infection prevalence among people aged 12–59 was .7% overall, and specifically 17.2% among people with an IDU history, .9% among people with a non-IDU history and .2% among people with no drug use history. These rates represented 1.4 million people with current HCV infection, of whom, 730 000 had an IDU history, 262 000 had a non-IDU history and 309 000 had no drug use history. Among people with no drug use history, current HCV infection prevalence was higher for people born during 1954–1965 versus after 1965, had completed high school or less versus at least some college and had past/present hepatitis B versus vaccinated for hepatitis B.

Conclusion: While the HCV infection burden was highest among people with an IDU history, we found a sizeable burden among people without such a history. These findings support policies and practices aimed at addressing disparities among people needing treatment.

Keywords

disparities; HCV; hepatitis C; non-traditional risk factors; prevalence

1 | INTRODUCTION

In the United States, hepatitis C virus (HCV) remains a major contributor to hepatocellular carcinoma, liver cirrhosis and early mortality despite the availability of curative treatment.^{1–}

⁵ By 2007, HCV infection had surpassed HIV infection as a cause of death.⁶ This shift reflects the ongoing challenges in HCV infection testing, diagnosis and treatment, alongside improvements in HIV infection management. While steady declines in the national HCV-associated mortality rate were observed in more recent years, disparities have existed differentially across certain sociodemographic groups, with rates consistently at least two times the national average.² The HCV RNA-positivity prevalence during January 2017–March 2020 was approximately .9%, representing 2.2 million people.⁷ Nearly one-third were unaware of their HCV infection.⁷ Before the discovery of HCV in 1988 and the testing of the donor blood supply in 1992, HCV was primarily transmitted via percutaneous exposure to blood during medical procedures or from injection drug use (IDU).⁸

In the United States, HCV infection occurs primarily and efficiently through IDU.^{2,9,10} However, transmission occurs in other ways. In 2021, 71% of newly reported acute hepatitis C cases had missing IDU information and 13% did not indicate IDU as a risk behaviour.² In addition to IDU, hepatitis C risk behaviours and exposures reported in 2021 included sexual contact, particularly among men who have sex with men, needlestick injury, household contact, occupational exposure to blood and health care procedures such as surgery, dialysis and transfusion.² Furthermore, HCV transmission can occur through tattoos and piercings performed outside of licensed professional settings from practices that do not adhere to proper hygiene and infection control measures.¹¹ Finally, 199 cases were confirmed and reported as perinatal hepatitis C among children in the United States in 2021, emphasising the importance of universal hepatitis C screening during pregnancy.^{2,12}

The epidemiology of HCV infection is shifting. Newly reported chronic cases are predominantly among young adults who share injection drug needles and other drug paraphernalia; however, HCV infection prevalence and mortality are highest among people

born during 1945–1965, where transmission mainly occurred through other ways.^{6,13–15} In 2012, the US Centers for Disease Control and Prevention (CDC) recommended universal HCV screening among this birth cohort to facilitate the diagnosis and linkage to care of people living with HCV infection.¹⁶ Despite the longstanding recommendation, the current HCV infection prevalence was higher among people aged 55–64 years compared to any other adult age group during January 2017–March 2020, suggesting inequitable access to testing and treatment efforts in this age group.⁷ HCV transmission among the 1945–1965 birth cohort could have occurred during the 1960s–1980s through blood transfusions, organ transplants and medical procedures before universal precautions were implemented to prevent transmission of bloodborne pathogens.^{17,18} People from this birth cohort with chronic HCV infection have been undiagnosed for decades, increasing their risk for serious liver-related morbidity and mortality. The misconception that people born during 1945–1965 acquired their HCV infection mostly from IDU can be a barrier to testing. Patients can opt out of screening and might be more likely to do so if they believe IDU is the only risk for HCV transmission.

Many interventions and strategies are now available to improve outcomes along the HCV care cascade. In 2014, all-oral direct-acting antiviral agents (DAAs) that can cure $\geq 95\%$ of people with current HCV infection became available.¹⁹ In the following years, several complementary recommendations were released by national societies and the CDC. Recommendations included (1) the expansion of testing recommendations to include a one-time HCV screening of all adults aged ≥ 18 years and pregnant people during each pregnancy and (2) simplified treatment guidelines that recommend DAA treatment for all patients with acute or chronic HCV infection.^{12,20}

Using a US nationally representative sample, we sought to establish the prevalence and measure disparities in HCV infection among people aged 12–59 years who did not report an IDU history. In support of national recommendations for universal HCV screening,¹² this analysis will provide evidence to help public health professionals focus outreach efforts and encourage health care providers to communicate with patients about HCV infection risks.

2 | METHODS

2.1 | Data source and survey design

We used National Health and Nutrition Examination Survey (NHANES) data from January 2013 to March 2020 obtained from the CDC National Center for Health Statistics (NCHS).²¹ NHANES conducts interviews, health examinations and laboratory testing in two-year cycles for about 5000 civilian, non-institutionalised participants in the United States who are selected using a complex, multistage sampling design. The study period was selected for two reasons: a change in the hepatitis C laboratory testing sequence that began in 2013 to include the detection of HCV ribonucleic acid (RNA) to identify people with current HCV infection because curative treatment became available and the early suspension of NHANES data collection field operations in March 2020, due to the COVID-19 pandemic.^{22,23} Publicly available data were linked with restricted-use data for year of birth, HCV antibody (anti-HCV) confirmatory Inno-Lia results (2015–2016) and drug use information and analysed in the NCHS Research Data Center (RDC) (Atlanta,

Georgia, USA). NHANES data collection and analysis in the RDC was approved by the NCHS Ethics Review Board.²⁴ Analysis of de-identified NHANES data is exempt from the federal regulations for the protection of human research participants.

2.2 | Study population and measures

The study population was limited to participants aged 12–59 years because the drug use questions were available consistently for this group during the study period. Primary outcomes were laboratory evidence of HCV infection and self-reported drug use history. We stratified HCV infection prevalence estimates by sociodemographic characteristics and hepatitis A and hepatitis B status. Self-reported sociodemographic characteristics included age group (12–39 years, 40–59 years), gender (male, female), year of birth (born during 1954–1965, after 1965), race and ethnicity (non-Hispanic Other, non-Hispanic Black, non-Hispanic White, Hispanic), education level (completed high school or less, at least some college) and health insurance status (private, Medicare and other government plan; Medicaid and state-sponsored plan; no coverage). The ‘Other’ race category was collapsed due to the small sample size of participants who identified as belonging to race categories other than Black and White, such as Asian and multi-racial people. Because of the intersectionality of infection risks, laboratory-based hepatitis A and hepatitis B status were also examined.

2.3 | Definitions for drug use history

Participants who reported ever having used a needle to inject drugs not prescribed by a doctor were categorised as having an IDU history. Participants without an IDU history who reported ever having used cocaine, heroin or methamphetamine were classified as having a history of using drugs but not IDU (non-IDU). Participants who reported never using cocaine, heroin or methamphetamine and did not report an IDU history were classified as having no drug use history.

2.4 | Definitions for laboratory-assessed hepatitis C status

A current HCV infection was defined as having detectable HCV RNA in a blood specimen drawn during the examination. Cleared HCV infection was defined as having no detectable HCV RNA and a reactive Inno-Lia test result to confirm the presence of anti-HCV. Together, the participants with current and cleared infection form the group who had confirmed past or present HCV infection (Figure 1).

Hepatitis B status included three categories: (1) ‘susceptible’ (negative for total hepatitis B core antibody (anti-HBc), hepatitis B surface antigen (HBsAg) and hepatitis B surface antibody [anti-HBs]), (2) ‘vaccinated’ (negative for total anti-HBc and HBsAg and positive for anti-HBs) and (3) ‘past or present infection’ (positive for total anti-HBc).

2.5 | Statistical analyses

We measured the prevalence and characteristics of HCV infection among people with no IDU history, which included those who used drugs but did not inject. Prevalence estimates were weighted using the provided survey examination weights adjusted to account for missing HCV laboratory results, as described elsewhere.^{25,26} Variance estimates accounted

for the clustered sampling design. Clopper-Pearson exact confidence intervals (CIs) with the Korn-Graubard adjustment were calculated for all prevalence estimates.²⁷

Unadjusted prevalence ratios compared predicted marginal proportions of HCV infection between groups. Overall associations between hepatitis C outcomes and each characteristic within drug use history categories were assessed by the Satterthwaite-adjusted *F*-test; the *t*-statistic was used to assess contrasted predicted marginal proportions; *p* values <.05 were considered statistically significant; only statistically significant and reliable comparisons were interpreted.

We calculated the weighted average of the civilian non-institutionalised population aged 12–59 years during January 2013–March 2020 using the population totals from the American Community Survey available on the NHANES website.²⁸ Projected population estimates of HCV infection were obtained by multiplying the weighted prevalence rates for the general population by the weighted average population total. To obtain the projected population estimates among participants with HCV infection and participants by status of drug use history, the projected population estimates among the general population were further multiplied by the corresponding prevalence rates.

Cells with counts less than five were suppressed to prevent potential disclosure of individual-level information. Proportions not meeting NCHS presentation standards were footnoted.²⁹ Only the direction of the prevalence ratio was interpreted if at least one prevalence rate was deemed unreliable. Statistical analyses were performed using SAS-Callable SUDAAN, Release 10.0 (Research Triangle Institute, Research Triangle Park, North Carolina, USA).

3 | RESULTS

3.1 | Population characteristics

During January 2013–March 2020, 17 397 participants aged 12–59 years were sampled, interviewed and examined, representing 202 164 000 people. Of these, 15 899 people had sufficient laboratory testing information to determine HCV infection status and was the group used to calculate HCV infection prevalence estimates. Of these, 14 542 people had information on both HCV infection and drug use status and was the group used to calculate HCV infection prevalence among those with information on drug use status. Of 188 people who tested positive for the HCV RNA or confirmatory anti-HCV test, 106 were HCV RNA-positive and 82 were HCV RNA-negative (Table 1).

Of the 14 542 people with information on HCV infection and drug use status, most were aged 12–39 years, born after 1965, non-Hispanic White, completed at least some college, insured privately, by Medicare, or a government (non-state-sponsored) plan, and susceptible to hepatitis A and hepatitis B (Appendix).

3.2 | Prevalence of HCV infection overall and among people with no IDU history

Among people aged 12–59 years, 1.5% (95% CI, 1.1%–1.9%) had past or present HCV infection overall, and specifically 1.7% (95% CI, 1.0%–2.7%) among those with a non-IDU

history and .4% (95% CI, .2%–.7%) among those with no drug use history, compared to 40.1% (95% CI, 29.8%–51.0%) with an IDU history (Table 1). These rates represented 3.0 (95% CI, 2.2–3.8) million people with past or present HCV infection overall and specifically 495 000 (95% CI, 291 000–786 000) people with a non-IDU history and 617 000 (95% CI, 309 000–1.1 million) people with no drug use history, compared to 1.7 (95% CI, 1.3–2.2) million people with an IDU history.

Among people aged 12–59 years, the prevalence of current HCV infection was .7% (95% CI, .5%–.9%) overall, and specifically .9% (95% CI, .4%–1.7%) among people with a non-IDU history and .2% (95% CI, .1%–.4%) among people with no DU history, compared to 17.2% (95% CI, 11.4%–24.4%) among people with an IDU history (Table 1). These rates represented 1.4 (95% CI, 1.0–1.8) million people with current HCV infection overall and specifically 262 000 (95% CI, 116 000–495 000) people with a non-IDU history and 309 000 (95% CI, 154 000–617 000) people with no drug use history, compared to 730 000 (95% CI, 484 000–1.0 million) with an IDU history.

3.3 | Characteristics of people with HCV infection and no IDU history

Among people aged 12–59 years with a history of non-IDU, groups that had a higher prevalence of past or present HCV infection included people born during 1954–1965 compared to those born after 1965 (PR = 5.3; 95% CI, 2.2–12.9) and people who completed high school or less compared to those who completed at least some college (PR = 2.9, 95% CI, 1.2–7.2) (Table 2). Among people aged 12–59 years with no drug use history, people aged 40–59 years compared to 12–39 years, born during 1954–1965 compared to after 1965 and completed high school or less compared to at least some colleges, had about six times the prevalence of past or present HCV infection (Table 3). There was also a higher past or present HCV infection among people with past or present hepatitis B compared to those vaccinated for hepatitis B. Irrespective of history of drug use, there was a significantly higher prevalence of past or present HCV infection among people born during 1954–1965 compared to those born after 1965 (Figure 2).

4 | DISCUSSION

In this analysis of the non-institutionalised US population aged 12–59 years during January 2013–March 2020, we estimated more than half a million people with no IDU history who have current HCV infection. This finding confirms that many people acquired HCV infection via routes other than drug injection, giving credence to the recent recommendation to expand from risk-based testing to universal screening.¹² Universal HCV screening is a strategy that will help close the gap in identifying individuals who do not disclose risk factors. Additionally, universal HCV screening obviates the need to enquire about risk factors, which might address the stigma associated with HCV infection.

Among people with no drug use history, current HCV infection prevalence rates were higher among people born during 1954–1965 (compared to those born after 1965), had completed a high school education or less (compared to those who completed at least some college) and with past or present hepatitis B (compared to those vaccinated for hepatitis B). These findings might suggest disparities in social factors and the need for strategies

that are tailored to the needs of the populations disproportionately impacted. Though IDU is currently the main risk factor for HCV transmission, individuals born during 1954–1965 acquired their HCV infection from additional routes, including blood transfusions, organ transplants and other health care-associated procedures, during the 1960s–1980s before implementation of universal infection control measures for bloodborne pathogens. Hepatitis C testing and treatment costs are covered under Medicare, removing cost-related barriers. Future studies should seek to explore the social determinants of health factors contributing to inequitable access to hepatitis C services among population groups with a higher prevalence of HCV infection. The higher prevalence of HCV infection among individuals who ever had hepatitis B might suggest shared modes of transmission, such as IDU, and underscores the importance of integrated services for multiple conditions, including hepatitis C, hepatitis B and HIV.^{2,30}

Tailoring hepatitis C public health efforts to disproportionately affected populations and communities is essential for addressing disparities, improving the effectiveness of universal recommendations and enhancing elimination efforts.³¹ Local interventions should consider the unique needs of each community, including barriers to accessing services, provider training in rural and underserved areas and cultural norms. The HCV elimination programme at Cherokee Nation Health Services in Oklahoma embodies this approach.³² In response to the high HCV infection prevalence in American Indian communities, the HCV elimination programme was launched in 2015 and focused on universal HCV screening, primary HCV workforce expansion and harm reduction services.³² Efforts focused on screening anyone who visited the Cherokee health centres, ensuring wide coverage in early identification, treatment and support services. By targeting screening and providing culturally competent care, this initiative has effectively reduced the prevalence of HCV infection in the Cherokee Nation and serves as a model for other tribal health systems.³² Other local and global initiatives using tailored approaches have similarly documented successful reductions in hepatitis C disparities.^{31,33}

There are several limitations to report. First, stigma associated with drug use might have introduced social desirability, non-response and recall bias in self-reported drug use, potentially resulting in an overestimation of people with no drug use history and an underestimation of people with a drug use history. A sensitivity analysis from a previous NHANES publication assessed selection bias by comparing the distribution of characteristics of participants aged 20–59 years who did and did not respond to the IDU history question during 2001–2016. The analysis concluded that selection bias could not be ruled out.³⁴ To mitigate potential biases, NHANES questionnaires that cover sensitive topics, including drug use, were administered through an audio computer-assisted self-interview in the mobile examination centre.²¹ Despite the potential for bias, NHANES remains the only data source that comprehensively integrates detailed interview and laboratory testing data to produce US population-based HCV infection seroprevalence estimates by drug use status. Second, although NHANES is representative of US households and can produce generalisable findings, these data do not fully represent all people with HCV infection. People experiencing homelessness and people in institutionalised settings, who have disproportionately higher HCV prevalence than the general population, are not included in the NHANES sampling frame.^{21,26} Third, this study population was limited to

people aged 12–59 years to include all ages for which drug use information during our study period; therefore, we did not capture people born in the oldest Baby Boomer birth cohort (1945–1953) who have a higher prevalence of HCV infection than people in the general population and those born in the younger Baby Boomer years.^{13,14,35} Fourth, several prevalence estimates within sociodemographic categories did not meet NCHS standards for presentation due to small sample sizes, which limited our ability to interpret those findings as well as account for potential confounders through multivariable analyses.²⁹ Finally, while we were able to examine socioeconomic factors such as educational attainment and health insurance status, socio-determinants of health factors that are community-based could have contributed to disparities in HCV infection but could not be explored in this analysis due to the lack of geographic identifiers in NHANES data.

In conclusion, we estimated that 1.4 million people aged 12–59 years have a current HCV infection and need treatment, with over half a million people having no IDU history. Among people with current HCV infection and no drug use history, disparities were found among people born during 1954–1965, people with lower educational attainment and people with past/present hepatitis B. This study supports universal HCV screening as a strategy that will help close the gap in identifying individuals who do not disclose risk factors. Utilising quality surveillance and supplementary data sources can more effectively guide and monitor the progress of outreach efforts. To address disparities, efforts at the federal, state and local should focus on tailored approaches to improve equitable access to HCV testing, treatment and preventive services among disproportionately impacted populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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FUNDING INFORMATION

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available by linking publicly available NHANES data with restricted-use data for year of birth, HCV antibody (anti-HCV) confirmatory Inno-Lia results (2015–2016), and drug use information by submission and approval of a research proposal to the CDC's National Center for Health Statistics Research Data Center (RDC) (Atlanta, GA, USA).

Abbreviations:

anti-HBc hepatitis B core antibody

anti-HBs	hepatitis B surface antibody
anti-HCV	HCV antibody
CDC	US Centers for Disease Control and Prevention
CI	confidence interval
DAA	direct-acting antiviral agent
HBsAg	hepatitis B surface antigen
HCV	hepatitis C virus
IDU	injection drug use
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
RDC	Research Data Center
RNA	ribonucleic acid

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Key Points

In this cross-sectional study representative of US households, we estimated over half a million people who have current hepatitis C but did not report injecting drugs. Disparities were found among people born during 1954–1965 and people with lower educational attainment. These findings support broader outreach and strategies tailored to the needs of the populations disproportionately impacted. Universal hepatitis C screening is a strategy that will help address stigma and close the gap in identifying individuals who do not disclose traditional risk factors.

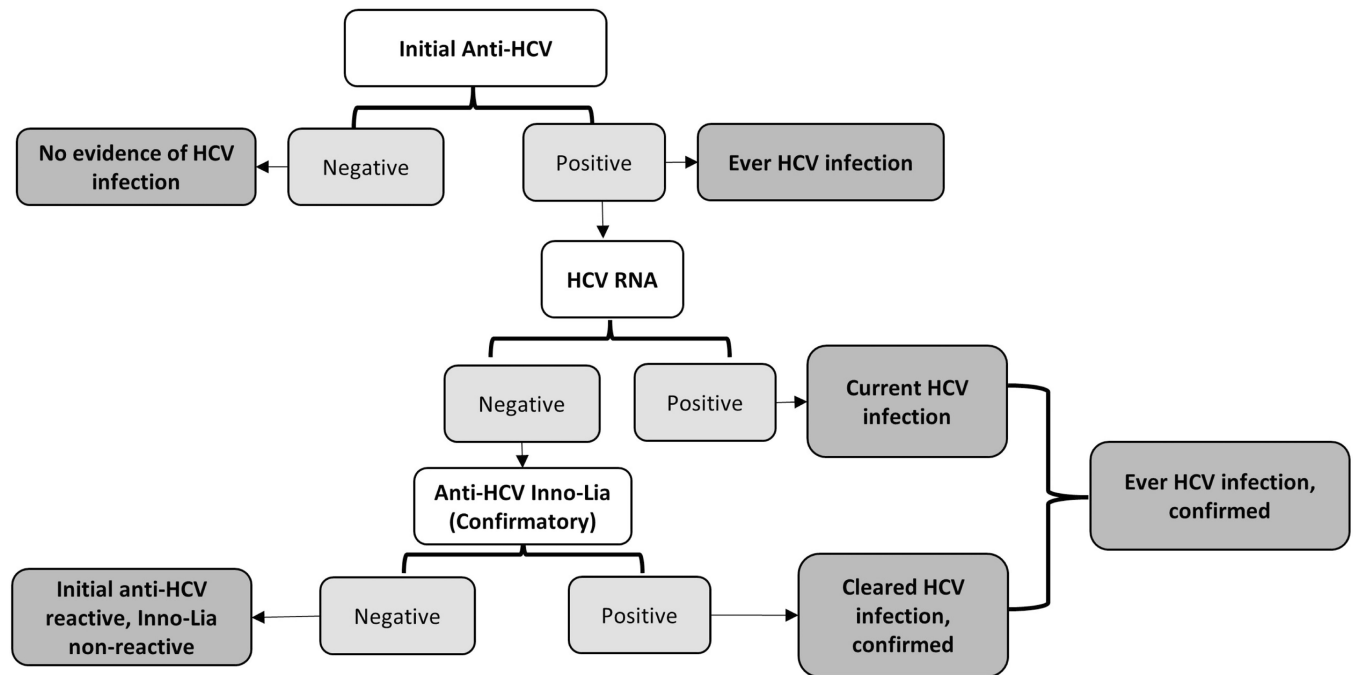


FIGURE 1.

Hepatitis C virus infection testing algorithm^a and classification, National Health and Nutrition Examination Survey, January 2013–March 2020. Data source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey, January 2013–March 2020 (pre-COVID-19 pandemic data). Anti-HCV, HCV antibody; HCV, hepatitis C virus. ^aAll viral hepatitis laboratory testing was performed per its laboratory procedure manual, and the need for retesting was determined using signal-to-cutoff results defined by standard testing protocols.

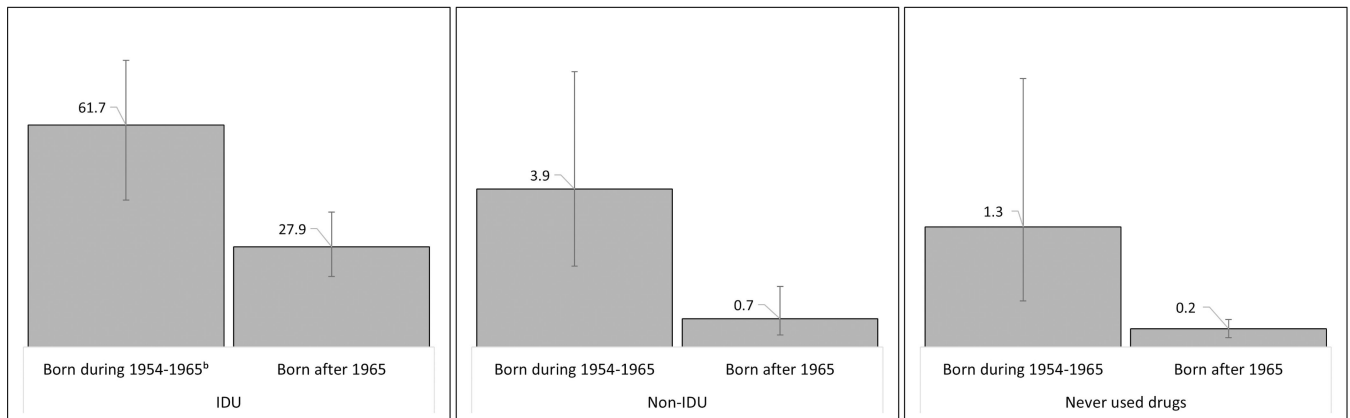


FIGURE 2.

Prevalence (%) of past or present hepatitis C virus infection^a among people aged 12–59 years by birth year cohort and drug use status, United States, January 2013–March 2020. Data source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey, January 2013–March 2020 (pre-COVID-19 pandemic data). IDU, injection drug use. ^aClassified based on either (1) an HCV RNA-positive result (current infection) or (2) a screening anti-HCV-positive specimen that was HCV RNA-negative but confirmed anti-HCV-positive (cleared infection). ^bEstimate does not meet NCHS standards for the presentation of proportions because the confidence interval width is more than 30%.

TABLE 1

Prevalence of hepatitis C virus infection by reported drug use status among people aged 12–59 years, United States, January 2013–March 2020.

Past or present HCV infection ^d					Current HCV infection ^d			Cleared HCV infection ^d		
Sample size	n	Wt. % (95% CI)	Population No. (95% CI)		n	Wt. % (95% CI)	Population No. (95% CI)	n	Wt. % (95% CI)	Population No. (95% CI)
Overall	15 899	188	1.5 (1.1–1.9)	3.0 (2.2–3.8) million	106	.7 (.5–.9)	1.4 (1.0–1.8) million	82	.8 (.5–1.1)	1.6 (1.0–2.2) million
Reported drug use status (N = 14 542)										
Used drugs, but did not inject (non-IDU)	1796	32	1.7 (1.0–2.7)	495 000 (291 000–786 000)	15	.9 (.4–1.7)	262 000 (116 000–495 000)	17	.8 (.3–1.7)	233 000 (87 000–495 000)
Never used drugs	12 508	46	.4 (.2–.7)	617 000 (309 000–1.1 million)	30	.2 (.1–.4)	309 000 (154 000–617 000)	16	.2 (.1–.3)	309 000 (154 000–463 000)
Ever inject drugs	238	98	40.1 (29.8–51.0)	1.7 (1.3–2.2) million	56	17.2 (11.4–24.4)	730 000 (484 000–1.0 million)	42	22.9 (13.6–34.8)	972 000 (577 000–1.5 million)

Data source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey, January 2013–March 2020 (pre-COVID-19 pandemic data). All estimates met NCHS standards for the presentation of proportions.

Abbreviations: HCV, hepatitis C virus; Wt., Weighted.

^aClassified based on either (1) an HCV RNA-positive result (current infection) or (2) a screening anti-HCV-positive specimen that was HCV RNA-negative but confirmed anti-HCV-positive (cleared infection). Populations for groups may not add up to the overall total due to rounding of the percent prevalence used to calculate projected population estimates and the projected population estimates.

TABLE 2

Prevalence of past or present hepatitis C virus infection among people aged 12–59 years who reported ever using drugs but did not inject by sociodemographic characteristics, hepatitis A immunity status and hepatitis B infection status, United States, January 2013–March 2020.

Characteristic	Sample size	n	Past or present HCV infection ^a			p-value ^c
			Wt. % (95% CI)	Wt. Prevalence Ratio ^b (95% CI)		
Total	1796	32	1.7 (1.0–2.7)	–		–
Gender						.89
Male	1099	17	1.7 (.8–2.9)	.9 (.3–2.6)		.89
Female	697	15	1.8 (.6–4.0)	Reference		
Age (years)						.001
12–39	844	<5	–	–		–
40–59	952	30	3.0 (1.7–5.0)	–		–
Year of birth						
1954–1965	538	23	3.9 (2.0–6.8)	5.3 (2.2–12.9)		.01
After 1965	1258	9	.7 (.3–1.5)	Reference		
Race and ethnicity						.29
Non-Hispanic Other ^e	197	<5	–	–		
Non-Hispanic Black	294	7	2.3 (.9–4.9)	1.3 (.5–3.3)		.55
Non-Hispanic White	822	17	1.8 (.8–3.2)	Reference		
Hispanic	483	5	.7 (.1–2.0)	.4 (.1–1.5)		.15
Education (aged 20+ years)						.02
High school or less	764	21	2.9 (1.4–5.3)	2.9 (1.2–7.2)		.04
At least some college	982	11	1.0 (.4–2.0)	Reference		
Health insurance						.26
Private, Medicare and other government plans	1009	17	1.3 (.6–2.4)	Reference		
Medicaid and state-sponsored plans	283	7	3.0 (.9–7.3)	2.3 (.7–7.3)		.25
No coverage	299	5	2.7 (.5–8.0)	2.1 (.6–7.6)		.38
Hepatitis A antibody ^f						.18
Positive	602	14	2.6 (1.2–5.0)	1.9 (.7–4.9)		.21
Not positive	1179	18	1.4 (.6–2.7)	Reference		
Hepatitis B status ^f						.001
Susceptible	1311	20	1.3 (.7–2.3)	–		–
Past or present infection	81	7	12.9 (2.3–35.4) ^d	–		–
Vaccinated	400	<5	–	–		–

Note: Data source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey, January 2013–March 2020 (pre-COVID-19 pandemic data).

Abbreviations: HCV, hepatitis C virus; Wt., Weighted.

^aClassified based on either (1) an HCV RNA-positive result (current infection) or (2) a screening anti-HCV-positive specimen that was HCV RNA-negative but confirmed anti-HCV-positive (cleared infection).

^bPrevalence ratios are unadjusted.

^c Satterthwaite-adjusted F -test to assess whether there is an association between past or present HCV infection and the given sociodemographic characteristic, hepatitis A antibody status and hepatitis B infection status and individual contrasted predicted marginals from the T -statistic.

^d Estimate does not meet NCHS standards for the presentation of proportions because the effective sample size is less than 30.

^e The 'Other' race category was collapsed due to small sample sizes and included people who identified as belonging to race categories other than Black and White, such as Asian and multi-racial people.

^f Hepatitis A immunity was determined by a total hepatitis A virus antibody (anti-HAV)-positive result. Hepatitis B status included three categories: (1) 'susceptible' (negative for total hepatitis B core antibody (anti-HBc), hepatitis B surface antigen (HBsAg) and hepatitis B surface antibody [anti-HBs]), (2) 'vaccinated' (negative for total anti-HBc and HBsAg and positive for anti-HBs), and (3) 'past or present infection' (positive for total anti-HBc). Anti-HBs results are reported as geometric mean titre values measured in milli-International Units/millilitre (mIU/mL). Participants whose anti-HBs values were ≥ 10 mIU/mL were considered 'positive' and immune, whereas participants whose anti-HBs values were <10 mIU/mL were considered 'negative' and could be susceptible or have waned titre levels from a previously resolved infection or vaccination.

TABLE 3

Prevalence of past or present and current hepatitis C virus infection among people aged 12-59 years who reported never using drugs by sociodemographic characteristics, hepatitis A immunity status and hepatitis B infection status, United States, January 2013-March 2020.

Characteristic	Sample size	Past or present HCV infection ^a				Current HCV infection ^b			
		<i>n</i>	Wt. % (95% CI)	Wt. Prevalence Ratio ^c (95% CI)	<i>p</i> -value ^d	<i>n</i>	Wt. % (95% CI)	Wt. Prevalence Ratio ^c (95% CI)	<i>p</i> -value ^d
Total	12 508	46	.4 (.2-.7)	—	—	30	.3 (.1-.4)	—	—
Gender					.88				.62
Male	5832	26	.4 (.2-.7)	1.1 (.4-3.1)	.88	17	.3 (.1-.5)	1.3 (.5-3.8)	.61
Female	6676	20	.4 (.1-.9)	Reference		13	.2 (.1-.5)	Reference	
Age (years)					<.001				<.001
12-39	8104	12	.1 (.1-.2)	Reference		5	.0 (.0-.1)	Reference	
40-59	4404	34	.8 (.4-1.6)	6.6 (2.8-15.9)	.01	25	.6 (.3-1.0)	11.8 (3.3-42.8)	<.001
Year of birth					<.001				.002
1954-1965	2027	23	1.3 (.5-2.9)	6.4 (2.5-16.6)	.04	15	.8 (.3-1.5)	5.3 (2.1-14.6)	.03
After 1965	10 481	23	.2 (.1-.3)	Reference		15	.1 (.1-.3)	Reference	
Race and ethnicity					.54				.39
Non-Hispanic Other ^f	2170	8	.5 (.2-1.1)	1.1 (.4-3.2)	.24	<5	—	—	—
Non-Hispanic Black	2986	11	.4 (.2-.6)	.8 (.3-2.0)	.59	10	.3 (.1-.6)	1.1 (.4-2.7)	.91
Non-Hispanic White	3864	18	.5 (.2-1.0)	Reference		13	.3 (.1-.6)	Reference	
Hispanic	3488	9	.2 (.1-.5)	.5 (.2-1.4)	.24	5	.1 (.0-.3)	.3 (.1-1.0)	.06
Education (aged 20+ years)					<.001				<.001
High school or less	3373	26	1.1 (.5-2.1)	5.5 (2.4-12.7)	.02	20	.7 (.4-1.3)	6.7 (2.5-17.8)	.01
At least some college	5442	18	.2 (.1-.4)	Reference		10	.1 (.0-.2)	Reference	
Health insurance					.17				.01
Private, Medicare and other government plans	7202	22	.4 (.1-.8)	Reference		14	.2 (.1-.4)	Reference	
Medicaid and state-sponsored plans	2758	13	.4 (.1-.8)	1.0 (.4-2.9)	.93	7	.2 (.0-.4)	.8 (.3-2.2)	.63
No coverage	1532	9	.9 (.3-1.8)	2.5 (.8-7.4)	.14	8	.8 (.3-1.7)	3.8 (1.3-11.2)	.08
Hepatitis A antibody ^g					.68				.27
Positive	6790	25	.4 (.2-.8)	1.1 (.6-2.1)	.68	16	.3 (.1-.6)	1.7 (.7-4.6)	.30
Not positive	5659	21	.4 (.2-.7)	Reference		14	.2 (.1-.4)	Reference	
Hepatitis B status ^g					<.001				<.001
Susceptible	8632	26	.4 (.2-.8)	2.9 (1.1-7.6)	.07	18	.2 (.1-.4)	2.9 (1.1-7.7)	.06
Past or present infection	485	11	3.2 (1.1-7.4) ^e	22.7 (7.0-73.3)	.03	6	2.3 (.5-6.6) ^e	27.4 (6.9-109.0)	.09
Vaccinated	3383	9	.1 (.0-.3)	Reference		6	.1 (.0-.3)	Reference	

Note: Data source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey, January 2013-March 2020 (pre-COVID-19 pandemic data).

Abbreviations: HCV, hepatitis C virus; Wt., Weighted.

^aClassified based on either (1) an HCV RNA-positive result (current infection) or (2) a screening anti-HCV-positive specimen that was HCV RNA-negative but confirmed anti-HCV-positive (cleared infection).

^bClassified based on an HCV RNA-positive result.

^cPrevalence ratios are unadjusted.

^dSatterthwaite-adjusted *F*-test to assess whether there is an association between ever and current HCV infection and the given sociodemographic characteristic, hepatitis A antibody status and hepatitis B infection status and individual contrasted predicted marginals from the *T*-statistic.

^eEstimate does not meet NCHS standards for presentation of proportions because the width of the confidence interval relative to the proportion is more than the 130% threshold for proportions with absolute confidence interval width between .05 and .30 (or 5% and 30% expressed as percentages).

^fThe 'Other' race category was collapsed due to small sample sizes and included people who identified as belonging to race categories other than Black and White, such as Asian and multi-racial people.

^gHepatitis A immunity was determined by a total hepatitis A virus antibody (anti-HAV)-positive result. Hepatitis B status included three categories: (1) 'susceptible' (negative for total hepatitis B core antibody (anti-HBc), hepatitis B surface antigen (HBsAg) and hepatitis B surface antibody [anti-HBs]), (2) 'vaccinated' (negative for total anti-HBc and HBsAg and positive for anti-HBs), and (3) 'past or present infection' (positive for total anti-HBc). Anti-HBs results are reported as geometric mean titre values measured in milli-International Units/millilitre (mIU/mL). Participants whose anti-HBs values were ≥ 10 mIU/mL were considered 'positive' and immune, whereas participants whose anti-HBs values were < 10 mIU/mL were considered 'negative' and could be susceptible or have waned titre levels from a previously resolved infection or vaccination.