





# Hepatitis C among people experiencing homelessness in Chile: prevalence and associated factors

## Hepatitis C en personas en situación de calle en Chile: prevalencia y factores asociados

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**Received:** 27/03/2026

*Arbitrado por pares*

**Accepted:** 27/05/2026

**Online:** 25/06/2026

### Author contribution

FI: Investigation, Writing - Original Draft, Writing - Review and Editing. LAD: Investigation, Writing - Original Draft, Writing - Review and Editing. HB: Review and Editing. CP: Review and Editing. FC: Investigation, Writing - Original Draft. BR: Review and Editing. DS: Review and Editing. VE: Review and Editing. PV: Review and Editing. MH: Review and Editing. MPM: Review and Editing. CRC: Review and Editing. MA: Review and Editing. AS: Review and Editing. AO: Review and Editing. JPA: Review and Editing.

### Conflict of interest

None.

### Funding

The study was funded by Gilead Sciences, Inc. as part of the 'Aristotle' program.

### Cite as

Idalsoaga F, Díaz LA, Blaney H, Contreras F, Ricouz B, Salinas D, et al. Hepatitis C among people experiencing homelessness in Chile: prevalence and associated factors. *Rev Gastroenterol Peru.* 2026;46(2):138-43. doi: 10.47892/rgp.2026.462.2241.

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### ABSTRACT

**Objective:** Hepatitis C virus (HCV) infection remains an important public health concern among people experiencing homelessness (PEH), yet data from Latin America are limited. We aimed to estimate HCV prevalence and describe associated risk factors and linkage to care in this population. **Materials and methods:** We conducted a retrospective study of 800 PEH in Santiago, Chile. Participants underwent rapid HCV antibody screening followed by confirmatory RNA testing. Standardized data on sociodemographic characteristics and potential risk factors were collected. **Results:** Four participants tested positive for HCV, corresponding to a prevalence of 0.5%. Reported exposures among HCV-positive individuals included tattoos, high-risk sexual behaviors, previous blood transfusion, and cocaine use; none reported intravenous drug use. Linkage to care was limited, with only one individual (25%) initiating direct-acting antiviral therapy. Barriers included lack of health insurance coverage, administrative obstacles, unstable living conditions, and loss to follow-up. **Conclusions:** HCV prevalence in this cohort was low. However, distinct risk profiles and important gaps in treatment access were identified. These findings support the need for targeted microelimination strategies and strengthened linkage-to-care pathways for PEH in Latin America.

**Keywords:** Liver Diseases; Health Inequities; Ill-Housed Persons; Hepatitis, Viral, Human (source: MeSH NLM).

### RESUMEN

**Objetivo:** La infección por el virus de la hepatitis C (VHC) sigue siendo un problema relevante de salud pública en personas en situación de calle (PSC), aunque los datos en América Latina son limitados. Nuestro objetivo fue estimar la prevalencia de VHC y describir los factores de riesgo asociados y la vinculación a la atención en esta población. **Materiales y métodos:** Realizamos un estudio retrospectivo que incluyó a 800 PSC en Santiago, Chile. Los participantes fueron evaluados mediante una prueba rápida de anticuerpos anti-VHC, seguida de confirmación con ARN-VHC. Se recopilaron datos estandarizados sobre características sociodemográficas y posibles factores de riesgo. **Resultados:** Cuatro participantes tuvieron resultado positivo para VHC, lo que corresponde a una prevalencia de 0,5%. Las exposiciones reportadas entre los casos positivos incluyeron tatuajes, conductas sexuales de riesgo, transfusión sanguínea previa y consumo de cocaína; ninguno reportó uso de drogas intravenosas. La vinculación a la atención fue limitada, con solo una persona (25%) iniciando tratamiento con antivirales de acción directa. Las barreras identificadas incluyeron falta de cobertura de salud, obstáculos administrativos, condiciones habitacionales inestables y pérdida de seguimiento. **Conclusiones:** La prevalencia de VHC en esta cohorte fue baja. Sin embargo, se identificaron perfiles de riesgo específicos e importantes brechas en el acceso al tratamiento. Estos hallazgos apoyan la necesidad de estrategias de microeliminación dirigidas y de fortalecer las rutas de vinculación a la atención para PSC en América Latina. **Palabras clave:** Enfermedades del Hígado; Inequidades en Salud; Personas en Situación de Calle; Hepatitis Viral Humana (fuente: DeCS Bireme).

## INTRODUCTION

Hepatitis C virus (HCV) infection is a major contributor to chronic liver disease, affecting an estimated 50 million people worldwide<sup>(1-3)</sup>. The liver-related consequences of HCV infection vary widely, ranging from mild histopathological changes to advanced liver fibrosis, which can progress to cirrhosis and hepatocellular carcinoma (HCC)<sup>(4)</sup>. Despite the availability of an effective cure, the number of people living with HCV continues to rise, particularly among populations with increased risk for HCV acquisition. Between 2018 and 2030, an estimated 43% of global HCV transmission is projected to result from unsafe injecting practices among people who inject drugs (PWID)<sup>(5)</sup>.

People experiencing homelessness (PEH) have a markedly higher prevalence of HCV infection than the general population, with reported active HCV infection rates ranging from 3.4% to 12%, representing an approximately 15- to 40-fold increase compared with housed populations; however, prevalence varies substantially across regions<sup>(6,7)</sup>. Among United States (U.S.) veterans experiencing homelessness, HCV prevalence was 12.1%, compared with 2.7% among housed veterans<sup>(7)</sup>. In Spain, overall prevalence declined from 6.3% to 3.4% between 2019 and 2023, yet remained more than 15-fold higher than in the general Spanish population<sup>(6)</sup>. Similarly, studies from Germany and the United Kingdom have reported 12% and 8% active HCV infection among PEH, respectively<sup>(8,9)</sup>.

The principal risk factor is injection drug use in Western countries. Among PEH who actively inject drugs, HCV prevalence reaches approximately 28%, compared with 1.4% among those without a history of injection drug use<sup>(6)</sup>. However, HCV risk is not explained by injection drug use alone: homelessness itself independently increases the risk of HCV acquisition. A meta-analysis found that recent homelessness or unstable housing was associated with a 65% higher risk of HCV acquisition compared with stable housing, even after accounting for other factors<sup>(10)</sup>. Reinfection after successful treatment is also a major concern in this population; in a study among individuals who achieved cure in the U.S., the HCV reinfection rate was 12.0 per 100 person-years overall, increasing to 18.9 per 100 person-years among those with unstable housing<sup>(11,12)</sup>.

This excess burden is driven by overlapping vulnerabilities-including injection drug use, unstable housing, and limited healthcare access-as well as lack of income, alcohol misuse, and prior incarceration. Multiple barriers impede HCV screening and treatment among PEH, including precarious living conditions, rigid hospital-based care pathways, low awareness, funding constraints, and logistical challenges<sup>(13,14)</sup>.

The profile of PEH-and the pathways into homelessness-in Latin America differs from what has been reported in the U.S. and Europe. In this region, structural social determinants and resource constraints, together with harmful alcohol

use, play a central role, while the prevalence of severe mental health conditions is often reported as lower and injection drug use appears substantially less common than in Europe, the U.S., and Canada, particularly among PEH<sup>(15)</sup>. In addition, regional data on HCV prevalence among PEH in Latin America remain scarce, limiting the ability to design context-specific public health policies and to appropriately prioritize this population within HCV microelimination strategies<sup>(10)</sup>.

The primary objective was to estimate the prevalence of active HCV infection among PEH in Santiago, Chile; the secondary objectives were to identify factors associated with HCV infection and to describe reported risk factors and barriers to linkage to treatment.

## MATERIALS AND METHODS

### Study design and participants

We conducted a retrospective cohort study of PEH who received care at healthcare facilities operated by the Salud Calle Foundation, a nonprofit organization in downtown Santiago, Chile, from November 1, 2023, to December 31, 2024. This organization delivers health services to PEH, including primary and mental health care, through outreach in street settings and shelters. Care is provided by a multidisciplinary team comprising physicians, nurses, and midwives. We included adults ( $\geq 18$  years) who self-reported experiencing homelessness, defined as being unsheltered (sleeping in places not intended for human habitation) or residing in an emergency shelter on the night before recruitment. We excluded individuals  $< 18$  years of age, those who did not meet the study definition of homelessness, and participants with insufficient data for inclusion in the analyses (Figure 1).

All patients who met the inclusion criteria were offered testing. Patients who tested positive for hepatitis C were scheduled for a different day at the laboratory, where anti-HCV antibody testing was performed, followed by HCV RNA testing. Additionally, co-infection testing for hepatitis B virus (HBV), human immunodeficiency virus (HIV), liver tests, and an abdominal ultrasound were conducted. All participants with a confirmed HCV infection underwent a structured evaluation by a trained social worker to systematically characterize their social profile, substance use-related exposures, and potential barriers to accessing care. As part of the standard follow-up provided by Salud Calle, participants received active accompaniment and support to facilitate linkage to the public health system and initiation of direct-acting antiviral therapy. Risk factors for HCV infection were defined based on patient self-report. In contrast, barriers to care were identified through a combination of patient self-report and challenges documented by the social worker during the linkage-to-care process.

### Data collection

We used a de-identified electronic spreadsheet database to collect data from participants meeting the predefined

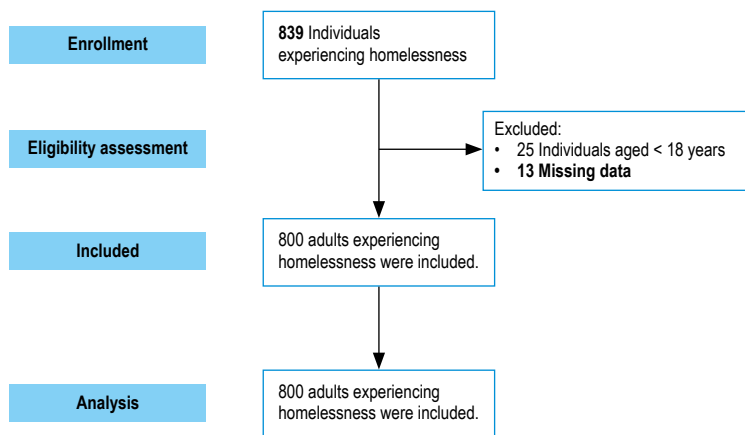


Figure 1. Study flowchart.

eligibility criteria. A medical history was obtained through standardized clinical interviews, including sociodemographic and health-related information. Alcohol use history was abstracted from clinical records; alcohol consumption was quantified as patient-reported grams per day.

**Statistical analysis**

The primary endpoint of this study was the prevalence of active HCV infection, while the secondary outcomes were factors associated with HCV infection. Continuous data were described using the mean and standard deviation (SD) or the median and interquartile range (IQR) for variables without a normal distribution. Normality was assessed using the Shapiro-Wilk test. Nominal data were presented as percentages. Comparisons of numerical variables with a normal distribution were conducted using Student’s t-test or ANOVA, while non-parametric tests were applied to variables without a normal distribution. A binary logistic regression analysis was performed to evaluate factors associated with HCV. Statistical analyses were conducted using Stata software version 17.0 (College Station, TX: StataCorp LP). A p-value of <0.05 was considered statistically significant.

**Ethical considerations**

The study was approved by the Ethics Committee of Pontificia Universidad Católica de Chile (IRB 231207001), which granted a waiver of informed consent, and was conducted per Good Clinical Practice guidelines, the Declaration of Helsinki, and applicable local laws.

**RESULTS**

**Baseline characteristics of the cohort**

The study included 800 participants, with a mean age of 43 years (IQR 32-55). Among them, 318 (39.7 %) were women. All participants identified as Hispanic or Latino (100%). Overall, 508 (63.5%) were living unsheltered and 292 (36.5%) were residing in shelters at the time of recruitment. Compared with women, men were older (46 [35-56] vs 37 [28-51] years, p=0.004) and more frequently lived unsheltered (72.5% vs 49.3%, p=0.001), whereas women more often resided in shelters (50.7% vs 27.5%, p=0.001). HCV prevalence did not differ by sex (0.6% vs 0.3%, p=0.815) (Table 1).

We identified four positive HCV cases, representing a prevalence of 0.5% in the screened population. All positive

Table 1. Demographic and Clinical Characteristics of the cohort.

	Global (N= 800)	Men (N=482)	Woman (N=318)	p-value
Age (mean)	43 (32-55)	46 (35-56)	37 (28-51)	0.004
Sex (women) (N, %)	318 (39.7%)	-	-	-
Place of residence (N, %)				
Street	508 (63.5)	349 (72.5)	157 (49.3)	0.001
Shelter	292 (36.5)	133 (27.5)	161 (50.7)	
Hepatitis C (N, %)				0.815
Positive test	4 (0.5)	3 (0.6)	1(0.3)	
Negative test	795 (99.5)	479 (99.4)	317 (99.7)	

**Table 2.** Characteristics of patients with a positive test for hepatitis C virus.

	Global (N= 4)
Age (Mean, IQR)	63 (43-70)
Sex (Women) (N, %)	1 (25%)
Type of Health Insurance (N, %)	
Private	1 (25%)
Public	3 (75%)
Other chronic diseases	
Diabetes Mellitus	1 (25%)
Hypertension	1 (25%)
Depression	1 (25%)
Place of residence (N, %)	
Street	2 (50%)
Shelter	2 (50%)
Employment Status (N, %)	
Formal	1 (25%)
Informal	3 (75%)
Social Support (N, %)	
NGO	4 (100%)
Governmental	0 (0%)
Substance Use (N, %)	
Smoking	2 (50%)
Cocaine	1(25%)
Others	1(25%)
Alcohol Use (N, %)	
Active consumption	3 (75%)
Grams per day	118±33.2
Risk Factors for HCV(N, %)	
IV drug use	0 (0%)
Blood transfusions	1(25%)
Tattoos	2 (50%)
High-risk sexual activity	3 (75%)
Days between rapid test and confirmation Test (Mean, IQR)	79.6±43.8
HCV Treatment (N, %)	
Started	1(25%)
Completed 12 weeks	1(25%)
SVR confirmed	1(25%)
Reason for Not Starting Treatment (N, %)	
Health coverage issues	1(25%)
Administrative limitations	1(25%)
Lost to clinical follow-up	1(25%)
Patient declined	0 (0%)
Cirrhosis at the Time of HCV Diagnosis (N, %)	2 (50%)

IQR: Interquartile range; HCV: Hepatitis C virus; HIV: Human Immunodeficiency Virus; NGO: Non-Governmental Organization; IV drug: intravenous drug use; SVR: Sustained Virologic Response

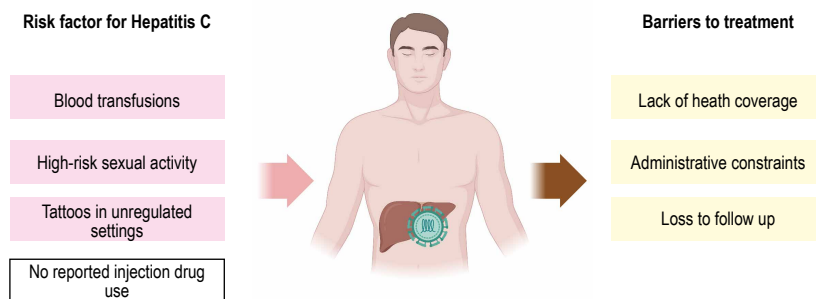
cases were confirmed with an HCV RNA test. Among the four patients with a positive HCV test, the mean age was 63 years (IQR 43-70), and one (25%) patient was female. The mean time between rapid testing and confirmatory testing was 79.6 ± 43.8 days. Cirrhosis at the time of HCV diagnosis was present in two patients (50%). Regarding health insurance, 1 (25%) patient had private coverage, while 3 (75%) had public coverage. No patient had HBV or HIV co-infections. Chronic comorbidities were each present in 1 (25%) patient and included type 2 diabetes, hypertension, and depression. Place of residence was evenly distributed, with 2 (50%) patients living on the street and 2 (50%) in shelters. Employment status was mostly informal (3 patients, 75%) versus formal (1 patient, 25%), and all patients received social support from non-governmental organizations. Substance use included smoking in two (50%) patients, cocaine in one (25%), and other substances in one (25%). Three patients (75%) reported active alcohol consumption, with a mean intake of 118 ± 33.2 grams per day. HCV risk factors were reported as follows: IV drug use 0%, blood transfusions 25%, tattoos 50%, and high-risk sexual activity 75%. Regarding treatment, one (25%) patient started therapy, completed 12 weeks, and achieved confirmed sustained virologic response (Table 2). Reasons for not initiating treatment were documented during the linkage-to-care process and included lack of health coverage, administrative barriers within the public health system, and loss to clinical follow-up; no participant declined antiviral therapy (Figure 2).

In an univariate analysis, no sociodemographic risk factors were associated with HCV infection (age OR 1.03; 95% CI: 0.95-1.11; p=0.385, male sex OR 0.83; 95% CI: 0.06-1.4; p=0.888, and living on the street vs. in shelters OR 1.09; 95% CI: 0.08-3.4; p=0.942) (Figure 3). Given that only four cases were identified, we did not perform adjusted models.

## DISCUSSION

People experiencing homelessness represent an extremely vulnerable population with substantial barriers to healthcare access. Globally, homelessness has been associated with high rates of intravenous drug use and HCV infection, with prevalence reaching up to 80% in some regions (16-19). This cohort study found that, after HCV screening in a healthcare facility for PEH, four positive cases were identified, corresponding to a prevalence of 0.5%. This represents one of the lowest HCV prevalence rates reported among PEH, and none of the HCV-positive participants had a history of intravenous drug use.

Compared with other regions, Chile has a relatively low HCV prevalence in the general population, estimated at 0.24% (20). Interestingly, PEH in this study had a higher prevalence, nearly twice that of the general population, despite the absence of PWID in this cohort. Intravenous drug use is the main risk factor associated with HCV in other regions, including Spain (6), the United States (16), and Canada (21). However, other risk factors may contribute to



**Figure 2.** Risk factors and barriers to treatment access were identified during interviews with patients with confirmed hepatitis C infection.

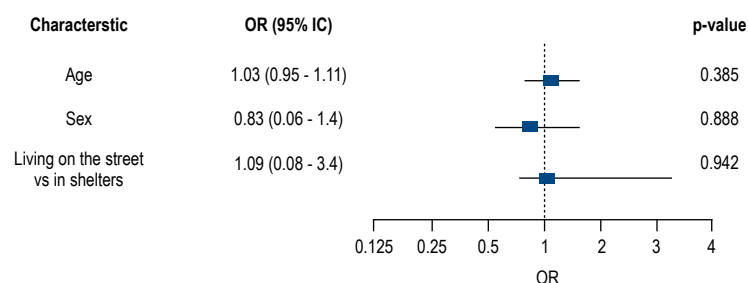
HCV transmission among PEH in Latin America, particularly in Chile.

In this study, reported risk factors among individuals with HCV included tattoos, high-risk sexual behaviors, drug use, and prior blood transfusion. In contrast, age, sex, and living on the street versus in a shelter did not appear to be associated with a higher risk of infection, similar to findings reported in other regions. However, given the small number of HCV-positive cases, larger studies are needed to confirm these findings.

Another concerning issue is the lack of effective treatment in this population. In most Latin American countries, there is universal access to DAAs; however, in our cohort, only 25% were able to access and receive therapy effectively. The main barriers were limited access to treatment and administrative challenges within the healthcare system. HCV microelimination strategies<sup>(22)</sup> have been a key public health policy implemented globally to achieve the WHO’s goal of eliminating HCV by 2030<sup>(23)</sup>. However, in many regions, including several Latin American countries, PEH are not recognized as a high-risk population, largely due to the lack of data on HCV in this group. As a result, there are no screening programs for viral hepatitis or liver diseases in general. To eliminate HCV, interventions should focus on improving access to

treatment for PEH, addressing healthcare system barriers, and increasing awareness of alternative risk factors beyond intravenous drug use. Ensuring universal access to DAAs and improving follow-up care could significantly enhance treatment outcomes. Additionally, national and regional strategies should prioritize PEH as a vulnerable population to align with the WHO’s 2030 goal of HCV elimination.

The study has some limitations. First, the very low number of HCV-positive cases (n=4) is the main limitation. This substantially reduced statistical power, prevented robust multivariable analyses, and limited the ability to identify factors independently associated with HCV infection. Therefore, the absence of statistically significant associations should be interpreted with caution, as it may reflect insufficient events rather than a true lack of association. Second, the study was conducted within a single non-profit network in downtown Santiago, which may limit generalizability. Third, risk exposures and barriers were based on self-report and clinical records, which may underestimate stigmatized behaviors. Fourth, delays between rapid testing and confirmatory RNA testing may have contributed to loss to follow-up and biased estimates of linkage to care. Finally, the retrospective and cross-sectional design limits causal inference and does not capture incident infections over time. Despite these limitations, the study provides relevant data on



**Figure 3.** Risk factors associated with hepatitis C virus infection among people experiencing homelessness (association analysis was performed using a binary logistic regression).

HCV among PEH in Chile, using a screening strategy with confirmatory testing and identifying potential risk factors beyond intravenous drug use.

In conclusion, HCV prevalence among PEH in this cohort from Santiago, Chile, was low. Although the small number of cases limits definitive conclusions, the findings suggest that risk factors other than intravenous drug use, including tattoos, high-risk sexual behaviors, and prior blood transfusion, may contribute to HCV infection in this setting. Persistent barriers to confirmatory testing, follow-up, and treatment also highlight the need to strengthen linkage-to-care pathways for PEH. Larger studies are needed to better characterize HCV risk profiles and inform feasible microelimination strategies in Latin America.

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