



ELSEVIER

Contents lists available at ScienceDirect

## Annals of Hepatology

journal homepage: [www.elsevier.es/annalsofhepatology](http://www.elsevier.es/annalsofhepatology)

Original article

## Clinical, etiological, and demographic aspects of cirrhosis in South America: a report from the South American Liver Research Network



Jhon E. Prieto<sup>a,\*</sup>, Diego R. Puentes<sup>b</sup>, Angelo Z. Mattos<sup>c</sup>, Enrique Carrera E.<sup>d</sup>, Javier Diaz Ferrer<sup>e</sup>, Martín Padilla-Machaca<sup>f</sup>, Domingo Balderramo<sup>g</sup>, Manuel Mendizabal<sup>h</sup>, Marco Arrese<sup>i</sup>, Robin G. Prieto<sup>a</sup>, Diana Torres<sup>j</sup>, Marlon R. Toazza<sup>c</sup>, Guilherme John Neto<sup>c</sup>, Angelo A. Mattos<sup>c</sup>, Cristina N. Zambrano R.<sup>k</sup>, Maria Grazia Venturelli Romero<sup>f</sup>, Fortunato S. Principe-Meneses<sup>l</sup>, Chiara Zecchin<sup>h</sup>, Martin Salvatierra<sup>g</sup>, Juan D. Córdoba<sup>a</sup>, Daniela Moreno<sup>a</sup>, Javier Eslava-Schmalbach<sup>b</sup>, José D. Debes<sup>m,n</sup>

<sup>a</sup> Centro de Enfermedades Hepáticas y Digestivas (CEHYD), Bogotá, Colombia

<sup>b</sup> Grupo de Equidad en Salud, Facultad de Medicina, Universidad Nacional de Colombia, Bogotá, Colombia

<sup>c</sup> Graduate Program in Medicine: Hepatology, Federal University of Health Sciences of Porto Alegre, Brazil

<sup>d</sup> Hospital Especialidades Eugenio Espejo, USFQ, Quito, Ecuador

<sup>e</sup> Hospital Nacional Edgardo Rebagliati, Lima, Perú

<sup>f</sup> Unidad de hígado Hospital Guillermo Almenara, EsSalud Universidad de Marcos, Lima, Perú

<sup>g</sup> Servicio de Gastroenterología, Hospital Privado Universitario de Córdoba, Instituto Universitario de Ciencias Biomédicas de Córdoba, Córdoba, Argentina

<sup>h</sup> Unidad de Hígado y Trasplante Hepático, Hospital Universitario Austral, Pilar, Argentina

<sup>i</sup> Departamento de Gastroenterología, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile

<sup>j</sup> Unidad de Gastroenterología Integral, Bogotá, Colombia

<sup>k</sup> Unidad de Gastroenterología, Hospital de Especialidades Carlos Andrade Marín, Quito, Ecuador

<sup>l</sup> Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Lima, Perú

<sup>m</sup> Department of Gastroenterology and Hepatology, Erasmus MC University Medical Center, Rotterdam, the Netherlands

<sup>n</sup> Department of Medicine, University of Minnesota, Minneapolis, MN, USA

## ARTICLE INFO

## Article History:

Received 15 September 2025

Accepted 29 November 2025

Available online 19 January 2026

## Keywords:

Cirrhosis

Etiology

Complications

## ABSTRACT

**Introduction and Objectives:** Cirrhosis is a major global public health concern. In South America, previous studies have identified alcohol-related liver disease (ALD) and chronic hepatitis C as the leading causes. This study describes and characterizes a contemporary South American cohort of patients with cirrhosis, focusing on the current spectrum of etiologies, demographic aspects, and the frequency of complications.

**Patients and Methods:** This was a multicenter, retrospective cohort study conducted across 11 centers in 6 South American countries. Patients included were adults (>18 years) with confirmed cirrhosis, and a minimum of two follow-up visits.

**Results:** A total of 1780 patients (50.7% male, median age 61 years) were evaluated. Metabolic dysfunction-associated steatotic liver disease (MASLD) was the leading cause of cirrhosis (34.1%), followed by viral etiology (19.8%), autoimmune liver disease (18%), and ALD alone (16%). Comorbidities were highly prevalent, with self-reported alcohol intake in 37.8%, hypertension in 36.2%, and diabetes in 33.7%. Nearly two-thirds of patients (63.5%) developed at least one complication, with ascites being the most common (43.5%). Only 28.1% of the cohort underwent pre-transplant evaluation.

**Abbreviations:** ALD, Alcohol-related Liver Disease; ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; AUD, Alcohol Use Disorder; AILD, Autoimmune Liver Disease; BMI, Body Mass Index; CAD, Coronary artery disease; CEHYD, Centro de Enfermedades Hepáticas y Digestivas; DAAs, Direct-Acting Antivirals; dL, Deciliter; DM, Diabetes Mellitus; EASL, European Association for the Study of the Liver; g, Grams; GBD, Global Burden of Disease; GGT, Gamma-glutamyl transferase; HCC, Hepatocellular carcinoma; HCV, Hepatitis C Virus; HIV, Human Immunodeficiency Virus; HTN, Arterial Hypertension; INR, International Normalized Ratio; IQR, Interquartile Ranges; L, Liter; LRC, Liver-Related Complication; MASLD, Metabolic Dysfunction-Associated Steatotic Liver Disease; MC, Medical Center; MELD, Model for End-stage Liver Disease; METALD, Metabolic Dysfunction and Alcohol-Related Liver Disease; mL, Milliliter; MN, Minnesota; ng, Nanograms; REDcap, Research Electronic Data Capture; SALRN, South American Liver Research Network; SD, Standard drink; TSH, Thyroid-stimulating hormone; UI, International Units; USFQ, Universidad San Francisco de Quito; WBC, White blood cells

\* Corresponding author.

E-mail address: [prieto.jhon@gmail.com](mailto:prieto.jhon@gmail.com) (J.E. Prieto).

<https://doi.org/10.1016/j.aohep.2026.102186>

1665-2681/© 2026 Fundación Clínica Médica Sur, A.C. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

**Conclusions:** In this contemporary South American cohort, MASLD has emerged as the leading cause of cirrhosis, and autoimmune disease affected nearly one-fifth of individuals with cirrhosis. The high burden of complications, with nearly two-thirds of patients developing at least one, and the low rate of pre-transplant evaluation suggest a significant unmet need for timely diagnosis and advanced care in the region.

© 2026 Fundación Clínica Médica Sur, A.C. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## 1. Introduction

Cirrhosis represents the final stage of chronic liver disease, being characterized by advanced fibrosis, architectural distortion of the liver, and regenerative nodule formation [1,2]. Cirrhosis predominates in men in the seventh decade of life and is most commonly caused by alcohol-related liver disease (ALD), chronic hepatitis B and C, and metabolic dysfunction-associated steatotic liver disease (MASLD) [3–5].

Cirrhosis can be classified as compensated or asymptomatic with a median survival since diagnosis close to 12 years, or decompensated, defined by the presence of ascites, variceal bleeding, hepatic encephalopathy, hepatocellular carcinoma (HCC) or other complications of the disease, with a median survival under 1.5 years [6–8].

According to the Global Burden of Disease (GBD) study in 2017, cirrhosis affected nearly 123 million people globally, with an approximate prevalence of 1.6% [9]. In 2019, cirrhosis and other chronic liver diseases worldwide [10], caused more than 1.5 million deaths. By 2021, it represented the twelfth leading cause of global deaths [11].

Prevalence data for Latin America are scarce, but isolated studies on its etiology have identified ALD and chronic hepatitis C virus (HCV) infection, as being the leading causes of cirrhosis. ALD has been described as the main cause in Brazil, Chile, Argentina, Ecuador, and Peru, with percentages ranging between 37 and 63% [12–16]. Conversely, HCV was the main etiology in two studies from Colombia and Mexico, with percentages of 28% and 36%, respectively [17,18]. Although there is little information regarding the current situation in South America, the remarkable increase in obesity and diabetes in recent decades may have modified the most frequent etiologies occurring in this region.

Obtaining a better understanding of the current scenario of cirrhosis in South America is of great significance for promoting public health policies to address different currently unmet needs with respect to cirrhosis in the region. Therefore, the South American Liver Research Network (SALRN) performed this study with the aim of describing the main characteristics of cirrhosis in the current scenario in a multicenter cohort.

## 2. Materials and Methods

### 2.1. Study design

We conducted a retrospective cohort study including 11 centers from 6 South American countries: Argentina, Brazil, Colombia, Chile, Ecuador, and Peru. The inclusion criteria were patients with a confirmed diagnosis of cirrhosis, older than 18 years at diagnosis, and with at least two follow-up clinic visits. Exclusion criteria were incomplete data or an unconfirmed cirrhosis diagnosis. The principal investigators at each center identified patients with either a recent diagnosis of cirrhosis or a prior diagnosis that met the inclusion criteria. Their clinical, demographic, laboratory, imaging, and endoscopic data were systematically recorded using a study-specific template designed in REDCap® by the University of Minnesota [19,20], while maintaining patient anonymity.

### 2.2. Variables definitions and outcomes

#### 2.2.1. Cirrhosis diagnosis

The diagnosis of cirrhosis was established based on clinical criteria (e.g., thrombocytopenia, ascites, variceal hemorrhage, hepatic

encephalopathy, or HCC, radiological criteria (e.g., liver surface nodularity, alterations in liver size, ascites, splenomegaly), endoscopic findings (presence of esophageal varices), liver biopsy results (e.g., regenerative nodules surrounded by fibrosis), liver elastography, or a combination of these parameters, as outlined in the international literature [1–4,6–8,21].

Cirrhosis was classified as either compensated or decompensated based on the absence or presence of complications such as ascites, variceal bleeding, or encephalopathy, in accordance with the Baveno VII recommendations [8]. Patients with Child-Pugh class A were categorized as compensated, whereas those with Child-Pugh classes B or C were categorized as decompensated.

HCC, a complication that can occur in individuals with compensated or decompensated cirrhosis, was also included. The dates of cirrhosis diagnoses, first complications, and outcomes such as death or transplantation were documented. Medications taken by the patients at the time of entry into the study, relevant medical history, and physical examination data including body mass index (BMI) were also recorded. Hypertension (HTN), diabetes mellitus (DM), and dyslipidemia were defined according to international guidelines [22–24]. Relevant laboratory data describing the liver's synthetic function were also included [25].

#### 2.2.2. Alcohol consumption definition

One standard drink was defined as a beverage containing approximately 14 g (0.6 fluid ounces) of pure ethanol (i.e., alcohol), corresponding to 12 fluid ounces of regular beer (5% alcohol), 5 fluid ounces of wine (12% alcohol), or 1.5 fluid ounces of 80-proof distilled spirits (40% alcohol) [26]. Alcohol intake was classified into the following categories: no intake, light (up to 7 standard drinks per week), moderate (8–14 SD per week), heavy (15–21 SD per week), and alcohol use disorder (AUD) (more than 21 SD per week) (adapted from [ref 26]). The duration of alcohol intake was calculated based on the cumulative average consumption since the initiation of alcohol use, as documented in the medical records. The patients' abstinence status was also recorded.

#### 2.2.3. Classification of liver disease etiologies

The etiologies were grouped into five categories: viral, ALD, MASLD, autoimmune liver disease (AILD, including autoimmune hepatitis, primary biliary cholangitis, primary sclerosing cholangitis, and overlap syndromes), and other etiologies. In cases where cirrhosis was attributed to dual or multiple etiologies, each center determined the most representative etiology based on clinical history. If no definitive primary etiology could be identified, the case was classified as "combinations." By the conclusion of the study, the number of such cases was minimal and was subsequently grouped under the "other etiologies" category. The Brunt classification system was employed for the staging and grading of the histological characteristics of MASLD [27]. Esophageal varices were classified using the Baveno VII classification [8].

### 2.3. Statistical analysis

Continuous variables were reported as the median [interquartile ranges (IQR) 25–75%] according to data normality and tested using the Shapiro-Wilk test, while the categorical variables were presented as frequencies and proportions. Differences between groups were

analyzed using the Wilcoxon rank-signed test by sex and the Kruskal-Wallis test by etiology for continuous data. Categorical variables were compared by sex, etiology, and country using the Chi-square test or Fisher's exact test, as appropriate. Statistical significance was set at a p-value <0.05 in a two-tailed test. Analyses were performed using STATA v16.1 and R 4.0.3.

2.4. Ethical considerations

Due to the retrospective study design without intervention or modification, no informed consent was required. The study was conducted in accordance with the principles declared in the 18th World Medical Assembly (Helsinki, 1964), which serves as a global reference for human research. The initial protocol was approved by the Medical Ethics Committee of the Faculty of Medicine at the National University of Colombia, under approval number CE-0011-23. Each Ethics Committee from all participating centers approved the study protocols. All data were processed confidentially in an anonymous database, accessible only to the coordinating center.

3. Results

The cohort included 1936 patients diagnosed with cirrhosis. Of these, 156 were excluded: 81 due to duplicate records, 70 due to incomplete data, and 5 because they were under 18 years of age at the time of diagnosis. Consequently, 1780 patients were included in the final analysis, with 903 (50.7%) being male (Fig. 1). Among the included patients, 997 (56%) were diagnosed with cirrhosis prior to their first visit to our centers (all liver referral centers), 425 (23.9%) were diagnosed during their first visit, and the remaining 358 (20.1%) were diagnosed after their first visit. The earliest diagnosis of cirrhosis in the cohort was recorded on May 6, 1989, while the most recent diagnosis was on August 13, 2024. The first medical evaluation at our centers occurred on June 21, 2002, and the most recent evaluation was on August 13, 2024. The median time between the diagnosis of

cirrhosis and inclusion in the REDCap registry was 61.7 months (IQR 27.3-104.5).

The geographical contribution was: 527 patients (29.6%) from two centers in Colombia, 376 patients (21.1%) from one center in Brazil, 374 patients (21%) from three centers in Peru, 242 patients (13.6%) from two centers in Argentina, 214 patients (12%) from two centers in Ecuador, and 47 patients 2.6% from one center in Chile, (Supplementary Table 1).

3.1. Characteristics of the cohort at the time of cirrhosis diagnosis

The median age at diagnosis was 61 years (IQR 53.5-68), with significant differences observed between males (median 59 years, IQR 52.2-67) and females (median 63 years, IQR 55-70),  $p < 0.001$  (Table 1). At the time of diagnosis, 924 patients (51.9%) were classified as compensated, showing no signs of decompensation according to the Baveno VII criteria and were categorized as Child-Pugh class A. The remaining 856 patients (48.1%) exhibited prior or current decompensation and were classified as decompensated and/or as Child-Pugh class B or C. Among this decompensated group, more than half -436 patients (50.9%)- experienced their first decompensation at the time of their cirrhosis diagnosis. At least one comorbidity was found in 1576 patients (88.5%): self-reported alcohol use in 669 patients (37.8%), HTN in 643 patients (36.2%), diabetes in 599 patients (33.7%), obesity in 564 patients (32%), dyslipidemia in 292 patients (16.6%), coronary artery disease in 143 patients (8.1%), rheumatological disease in 130 patients (7.3%), and human immunodeficiency virus infection (HIV) in 30 patients (1.7%). The median BMI was 27 (IQR 24-31), with no significant differences found based on gender. The baseline blood tests are described in Table 1.

3.1.1. Diagnosis of cirrhosis

Cirrhosis was determined in 75% of patients using a combination of two or more criteria (clinical or laboratory findings, radiology, imaging, elastography, or biopsy), and in 25% of cases using a single

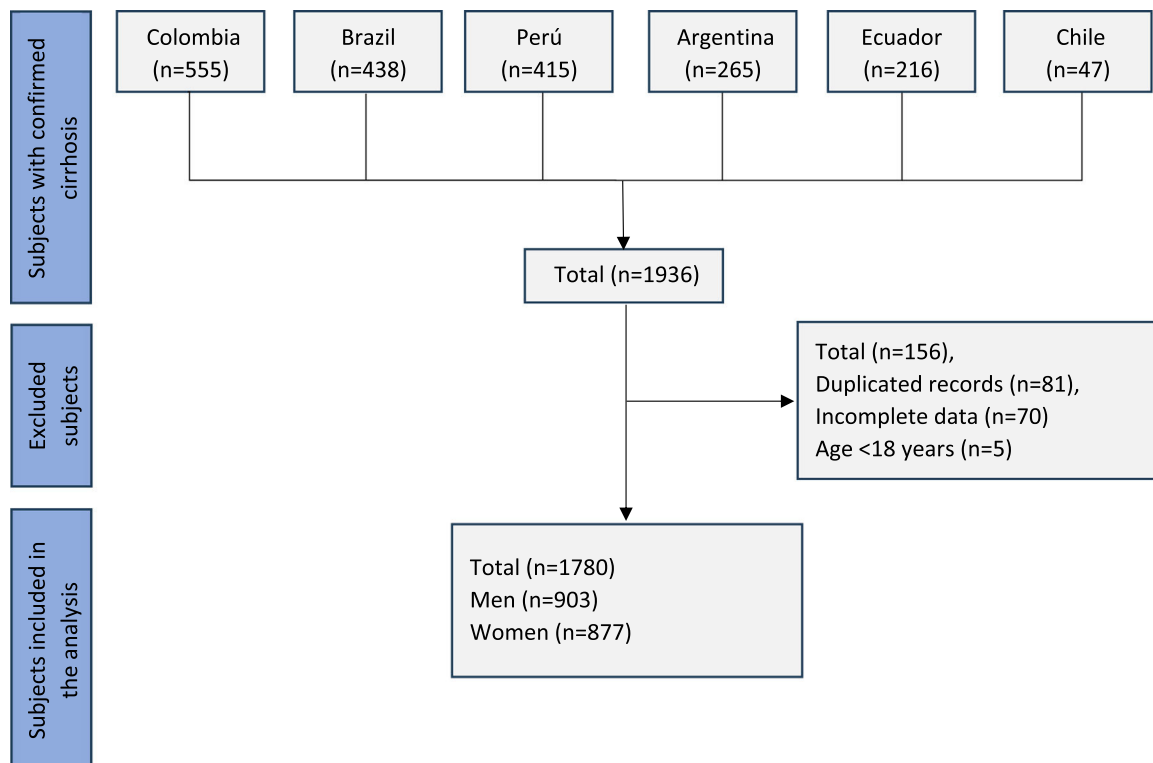


Fig. 1. Flow chart for population selection.

**Table 1**  
Population characteristics by sex.

Variable	Women (n = 877) Median (IQR)	Men (n = 903) Median (IQR)	Total (n = 1780) Median (IQR)	p-value
Age at diagnosis	63.0 (55-70)	59 (52.2-67)	61 (53.5-68)	<0.001***
BMI	27.0 (24-31)	27 (24.5-30.8)	27 (24-31)	0.37
Comorbidities	n (%)	n (%)	n (%)	
HTN	327 (37.3)	316 (35.0)	643 (36.2)	0.31
Diabetes	268 (30.6)	331 (36.7)	599 (33.7)	0.005**
Obesity	286 (32.9)	278 (31.2)	564 (32.0)	0.57
Dyslipidemia	153 (17.6)	139 (15.6)	292 (16.6)	0.25
CAD	57 (6.6)	86 (9.6)	143 (8.1)	0.02*
Rheumatologic	98 (11.2)	32 (3.6)	130 (7.3)	<0.001***
HIV	6 (0.7)	24 (2.7)	30 (1.7)	0.001**
Alcohol consumption	n=873	n=897	n=1770	
None	761 (87.2)	340 (37.9)	1101 (62.2)	<0.001***
Light	54 (6.2)	153 (17.1)	207 (11.7)	
Moderate	21 (2.4)	141 (15.7)	162 (9.2)	
Heavy	18 (2.1)	147 (16.4)	165 (9.3)	
AUD	19 (2.1)	116 (12.9)	135 (7.6)	
Initial Child-Pugh class	n (%)	n (%)	n (%)	
A	595 (68.1)	555 (61.8)	1150 (64.9)	0.01*
B	220 (25.2)	260 (29.0)	480 (27.1)	
C	59 (6.7)	83 (9.2)	142 (8.0)	
Final Child-Pugh class				
A	552 (64.0)	493 (57.2)	1045 (60.6)	0.007**
B	209 (24.2)	232 (27.0)	441 (25.6)	
C	101 (11.8)	136 (15.8)	237 (13.8)	
Laboratory findings				
WBC (cells/mL)	5270 (4060-6880)	5540 (4300-7320)	5430 (4200-7100)	0.005**
Neutrophils (cells/mL)	59.6 (51-66)	60 (52-67)	60 (52-66.4)	0.03*
Hemoglobin (g/dL)	13 (11.2-14)	13.5 (11.4-15)	13 (11.4-14.7)	<0.001***
Hematocrit (%)	39 (34.6-43)	40 (34.5-45)	40 (34.6-44)	<0.001***
Platelets (cells/mm <sup>3</sup> )	133000 (90000-194000)	117000 (80000-169500)	124000 (85000-184000)	<0.001***
Glucose (mg/dL)	98 (87-116)	101 (89-126)	99 (88-120)	0.001**
Creatinine (mg/dL)	0.73 (0.6-0.9)	0.9 (0.76-1.1)	0.8 (0.7-1)	<0.001***
Sodium (mEq/L)	140 (137-142)	139 (136-141)	139 (136-141)	<0.001***
Total cholesterol (mg/dL)	170 (136-202)	156 (131-187)	162 (134-194)	<0.001***
TSH (μU/mL)	2.6 (1.5-4.3)	2.7 (1.7-4.4)	2.7 (1.6-4.4)	0.5
Ferritin (ng/mL)	122 (39-238)	245.5 (73.5-540.5)	169 (48.2-385)	<0.001***
AST (U/dl)	54 (36-88)	51 (36-81)	52.5 (36-85)	0.15
ALT (U/dl)	43 (27-78)	42 (28-68)	42.5 (28-72)	0.19
GGT (U/dl)	104 (52-224)	125 (61-230)	115 (56-226)	0.01*
AP (IU/dl)	153 (106-234)	133 (98-206)	143 (102-218)	<0.001***
INR	1.1 (1-1.3)	1.2 (1.09-1.39)	1.2 (1.0-1.3)	<0.001***
Total bilirubin (mg/dL)	1.08 (0.7-1.97)	1.3 (0.86-2.3)	1.2 (0.8-2.1)	<0.001***
Serum albumin (g/dL)	3.8 (3.2-4.2)	3.7 (3.1-4.2)	3.8 (3.2-4.2)	0.28
MELD Index	5.8 (2.4-9.8)	8.7 (6.1-12.5)	7.4 (4.1-11.2)	<0.001***
Alpha-fetoprotein (ng/mL)	3.5 (2-7)	3.8 (2.4-7)	3.6 (2.2-7)	0.14

BMI: Body Mass Index. CAD: Coronary artery disease. GGT: Gamma-glutamyl transferase. HTN: Hypertension. INR: International Normalized Ratio. MELD: Model for End-stage Liver Disease. TSH: Thyroid-stimulating hormone. WBC: White blood cells. Alcohol consumption: light (up to 7 standard drinks (SD) per week), moderate (8-14 SD per week), heavy (15-21 SD per week), and alcohol use disorder (AUD) (more than 21 SD per week)

\*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001. ALT: Alanine aminotransferase. AP: Alkaline phosphatase. AST: Aspartate aminotransferase.

method. The most common diagnostic method was a combination of clinical/laboratory findings and imaging (50.7% of cases). Complementary data according to sex are shown in Supplementary Table 2.

The Child-Pugh score was calculated for 1772 patients at baseline, with 1150 (64.9%) classified as Class A, 480 (27.1%) as Class B, and 142 (8%) as Class C. The median MELD score at diagnosis was 7.4 (IQR 4.1-11.2). Esophageal varices were identified in 1161 individuals (65%), and 408 (35.1%) were classified as large varices.

### 3.1.2. Etiology of cirrhosis

MASLD emerged as the leading cause of cirrhosis, accounting for 608 patients (34.1%), when considered alone (503 patients, 28.2%) and in combination with alcohol-associated liver disease (MetALD); (105 patients, 5.9%). Overall, MASLD-related etiologies appeared in 39.3% of all patients (all combinations). Viral etiology was the second leading cause, affecting 352 patients (19.8%) of the cohort. While hepatitis C and B viruses were the sole causes of cirrhosis in 215 patients (12.1%) and 34 patients (1.9%), respectively, this figure includes cases

where they were combined with other factors. AILD followed as the third most common cause, diagnosed in 320 patients (18%). ALD, when considered alone, was the fourth leading cause, affecting (16.3%). The remaining 210 (11.8%) were attributed to other etiologies which included cryptogenic cirrhosis, hemochromatosis, cardiac/vascular causes, secondary biliary cholangitis, alpha-1 antitrypsin deficiency, amyloidosis, medications, toxins, HIV, and multiple combinations (Fig. 2). The distribution of etiology according to age group is shown in Fig. 3, with country-specific data provided in Table 2.

### 3.2. Follow-up of the cohort

The median follow-up period for the total cohort, from the diagnosis of cirrhosis to the last evaluation, was 42 months (IQR 14.5-79.2). For compensated patients, the follow-up period was 50.4 months (IQR 20.0-88.4), and for decompensated patients, it was 32.4 months (IQR 9.3-71.4). The median interval between the diagnosis of

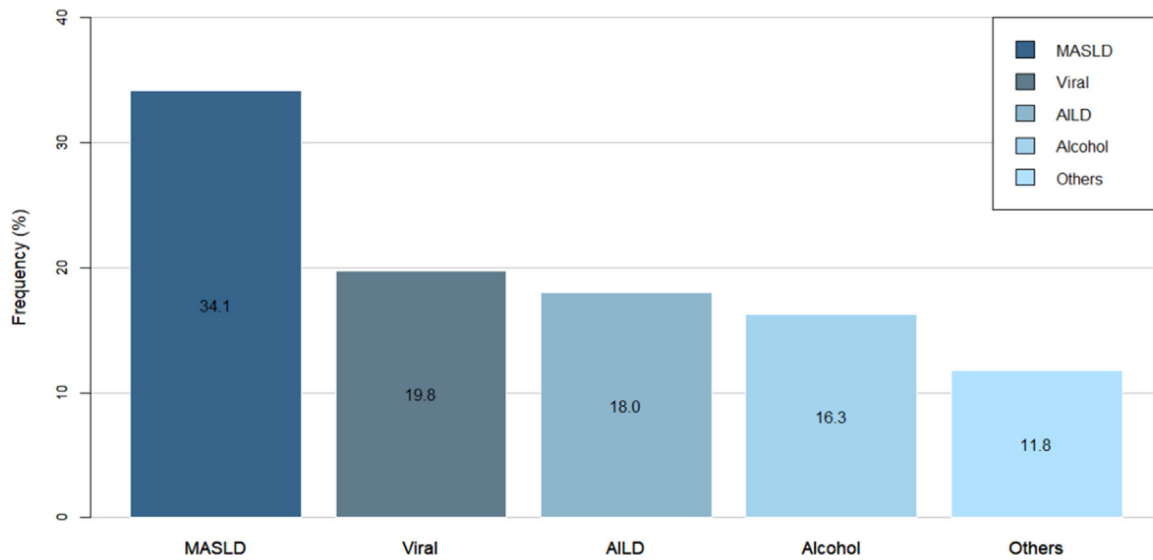


Fig. 2. Cirrhosis global etiology.

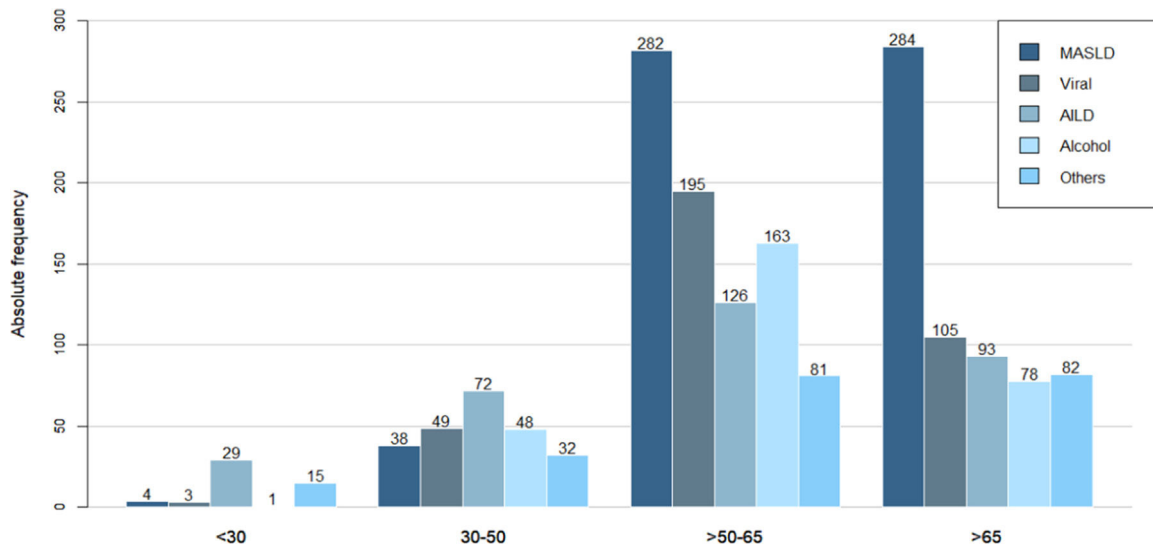


Fig. 3. Cirrhosis etiology by age (Years).

cirrhosis and the first medical evaluation was 1.3 months (IQR 0.00-16.3). The median time between the last evaluation and inclusion in the REDCap registry was 9 months (IQR 0.00-38). Overall, 1131 patients (63.5%) experienced at least one liver-related complication during the study period. Ascites was the leading complication, occurring in 774 (43.5%) of all patients. Variceal bleeding and encephalopathy were reported in 22.9% of patients (Table 3). Among the compensated patients, 667 (72.2%) did not experience any episodes of decompensation, while 257 (27.8%) experienced at least one decompensation episode. The details of these episodes are illustrated in the flowchart (Fig. 4). A pre-transplant evaluation was carried out for 497 (27.9%) patients with cirrhosis. Of these patients, 170 were under evaluation, 103 patients were rejected, and 224 were accepted for the transplantation waiting list. Finally, 72 out of 224 (32.1%) patients underwent liver transplantation (Table 3).

Mortality data were limited to overall mortality. The incidence rate of mortality in compensated and decompensated patients was 0.23 (95% CI: 0.20-0.27) and 0.43 (95% CI: 0.37-0.50), respectively. The median survival time for patients classified as compensated at the time of diagnosis was 328.2 months, whereas the median survival time for decompensated patients at diagnosis was 220.8 months.

#### 4. Discussion

To the best of our knowledge, this study represents the largest South American investigation to date describing the current characteristics of cirrhosis across multiple countries, encompassing more than 1700 patients. We found that MASLD, either alone or combined with other causes, was the leading etiology of cirrhosis, affecting more than one-third of patients. Furthermore, two-thirds of the cohort were classified as Child-Pugh A at diagnosis, indicating a predominance of compensated cirrhosis.

The median age at cirrhosis diagnosis was 61 years, consistent with findings from a Swedish study [28], the Global Burden of Disease study [10], which included patients aged 50 to 74 years, and prior South American series reporting median ages between 60 and 62 years [17,18,29].

Interestingly, our study observed a nearly equal gender distribution, differing from the global trend of male predominance in cirrhosis [9,28]. In Latin America, three studies have reported a female predominance ranging from 54% to 62% [13,17,30]. However, most other reports describe a male predominance [12,14-16,18,29,31-33], with proportions ranging from 52% to 83%, such as a Chilean study analyzing 44,894

**Table 2**  
Etiology of cirrhosis by country.

Variable	Country							p-value
	Colombia 527 (29.6)	Brazil 376 (21.1)	Peru 374 (21.0)	Argentina 242 (13.6)	Ecuador 214 (12.0)	Chile 47 (2.7)	Total 1780 (100.0)	
Etiology	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	<0.001***
MASLD	171 (32.4)	45 (12.0)	176 (47.1)	53 (21.9)	32 (15.0)	26 (55.3)	503 (28.2)	
MetALD	55 (10.4)	7 (1.9)	24 (6.4)	12 (5.0)	4 (1.9)	3 (6.4)	105 (5.9)	
HCV	42 (8.0)	124 (33.0)	29 (7.8)	24 (9.9)	1 (0.5)	2 (4.3)	222 (12.5)	
HCV- MASLD	3 (0.6)	5 (1.3)	18 (4.8)	2 (0.8)	0 (0.0)	0 (0.0)	28 (1.6)	
HCV-Alcohol	5 (1.0)	39 (10.4)	5 (1.2)	2 (0.8)	0 (0.0)	0 (0.0)	51 (2.9)	
HCV- MetALD	2 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.1)	
HBV	8 (1.5)	14 (3.7)	12 (3.2)	2 (0.8)	2 (0.9)	0 (0.0)	38 (2.1)	
HBV-Alcohol	4 (0.8)	0 (0.0)	4 (1.1)	1 (0.4)	1 (0.5)	1 (2.1)	11 (0.6)	
AIH	45 (8.5)	20 (5.3)	15 (4.0)	23 (9.5)	22 (10.3)	9 (19.1)	134 (7.5)	
PBC	21 (4.0)	5 (1.3)	15 (4.0)	11 (4.6)	2 (0.9)	0 (0.0)	54 (3.0)	
PSC	3 (0.6)	5 (1.3)	1 (0.3)	8 (3.3)	0 (0.0)	0 (0.0)	17 (1.0)	
AIH-PBC	39 (7.4)	2 (0.5)	25 (6.7)	3 (1.2)	1 (0.5)	0 (0.0)	70 (3.9)	
AIH-MASLD	25 (4.7)	0 (0.0)	7 (1.9)	2 (0.8)	2 (0.9)	3 (6.4)	39 (2.2)	
AIH-Alcohol	4 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (0.2)	
CBP-MASLD	1 (0.2)	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.1)	
Alcohol	60 (11.4)	84 (22.3)	25 (6.7)	54 (22.3)	65 (30.4)	2 (4.3)	290 (16.3)	
DILI	0 (0.0)	0 (0.0)	1 (0.3)	2 (0.8)	2 (0.9)	0 (0.0)	5 (0.3)	
Toxic	0 (0.0)	1 (0.3)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.1)	
Another comb	5 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (0.3)	
Other	34 (6.4)	25 (6.6)	15 (4.0)	43 (17.8)	80 (37.3)	1 (2.1)	198 (11.1)	
Grouped Etiology	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	<0.001***
MASLD	226 (42.9)	52 (13.8)	200 (53.5)	65 (26.9)	36 (16.8)	29 (61.7)	608 (34.1)	
Viral	64 (12.1)	182 (48.4)	68 (18.2)	31 (12.8)	4 (1.9)	3 (6.4)	352 (19.8)	
AILD	138 (26.2)	32 (8.5)	64 (17.1)	47 (19.4)	27 (12.6)	12 (25.5)	320 (18.0)	
Alcohol	60 (11.4)	84 (22.4)	25 (6.7)	54 (22.3)	65 (30.4)	2 (4.3)	290 (16.3)	
Other	39 (7.4)	26 (6.9)	17 (4.5)	45 (18.6)	82 (38.3)	1 (2.1)	210 (11.8)	

p-values: \**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001. AIH: Autoimmune hepatitis. AILD: Autoimmune liver disease. DILI: Drug-induced liver injury. HBV: Hepatitis B virus. HCV: Hepatitis C virus. MASLD: Metabolic Dysfunction-Associated Liver Disease. MetALD: Metabolic dysfunction and alcohol-related liver disease. PBC: Primary biliary cholangitis. PSC: Primary sclerosing cholangitis.

**Table 3**  
Complications and pre-transplant evaluation of cirrhosis by country

Variable	Country							p-value
	Colombia 527 (29.6)	Brazil 376 (21.1)	Peru 374 (21.0)	Argentina 242 (13.6)	Ecuador 214 (12.0)	Chile 47 (2.7)	Total 1780 (100.0)	
Yes	238 (45.2)	258 (68.6)	254 (67.9)	195 (80.6)	180 (84.1)	6 (12.8)	1131 (63.5)	<0.001***
Complication	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Ascites	156 (29.6)	177 (47.1)	139 (37.2)	140 (57.8)	158 (73.8)	4 (8.5)	774 (43.5)	
Variceal bleeding	78 (14.8)	97 (25.8)	112 (30.0)	82 (33.9)	38 (17.8)	1 (2.1)	408 (22.9)	
Encephalopathy	44 (8.4)	93 (24.7)	90 (24.1)	69 (28.5)	107 (50.0)	4 (8.5)	407 (22.9)	
HCC	64 (12.1)	74 (19.7)	65 (17.4)	32 (13.2)	12 (5.6)	0 (0.0)	247 (13.9)	
HRS	4 (0.8)	7 (1.9)	4 (1.1)	16 (6.6)	3 (1.4)	0 (0.0)	34 (1.9)	
HPS	0 (0.0)	1 (0.3)	2 (0.5)	2 (0.8)	0 (0.0)	0 (0.0)	5 (0.3)	
SBP	0 (0.0)	7 (1.9)	6 (1.6)	14 (5.8)	1 (0.5)	0 (0.0)	28 (1.6)	
PVT	22 (5.2)	15 (4.1)	11 (4.4)	16 (9.1)	1 (3.6)	-	65 (5.2)	
AKI	9 (4.4)	58 (49.2)	30 (13.2)	26 (15.1)	85 (49.7)	0 (0.0)	208 (23.3)	
Pretransplant Evaluation	79 (15.0)	199 (52.9)	50 (13.4)	162 (66.9)	2 (0.9)	5 (10.6)	497 (27.9)	
Pretransplant assessment	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Under evaluation	37 (46.8)	64 (32.2)	21 (42.0)	46 (28.4)	2 (100.0)	0 (0.0)	170 (34.2)	
Rejected	17 (21.5)	58 (29.1)	18 (36.0)	10 (6.2)	0 (0.0)	0 (0.0)	103 (20.7)	
Accepted	25 (31.7)	77 (38.7)	11 (22.0)	106 (65.4)	0 (0.0)	5 (100.0)	224 (45.1)	

\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001. AKI: Acute kidney injury. HCC: Hepatocellular carcinoma. HPS: Hepatopulmonary syndrome. HRS: Hepatorenal syndrome. PVT: Portal vein thrombosis. SBP: Spontaneous bacterial peritonitis

death certificates [34]. The variation in our findings may relate to the distribution of patients by country. For example, in Colombia — where women predominated — MASLD was the leading etiology, whereas in Brazil — where men predominated — alcohol-related cirrhosis was most frequent. No consistent pattern was evident in other countries.

Our etiological analysis confirmed MASLD as the main cause of cirrhosis, affecting over one-third of the cohort and predominating among patients older than 50 years. Hypertension, diabetes, dyslipidemia, and obesity — conditions associated with metabolic syndrome — were

present in a similar proportion of these patients. The predominance of MASLD in South America aligns with previous data showing that Latin America has one of the highest global prevalences of MASLD (31%), surpassing the worldwide estimate of 25% [35,36]. The region also exhibits high obesity rates, ranging from 19.7% in Peru to 28.9% in Mexico [37], and a high prevalence of type 2 diabetes mellitus, ranging from 8% to 13% among adults aged 20–79 years [38]. Earlier series have highlighted this shift in cirrhosis etiology, with MASLD increasing from 25% in Colombia (2016) to 29% in Ecuador (2019) and 30% in Mexico (2022

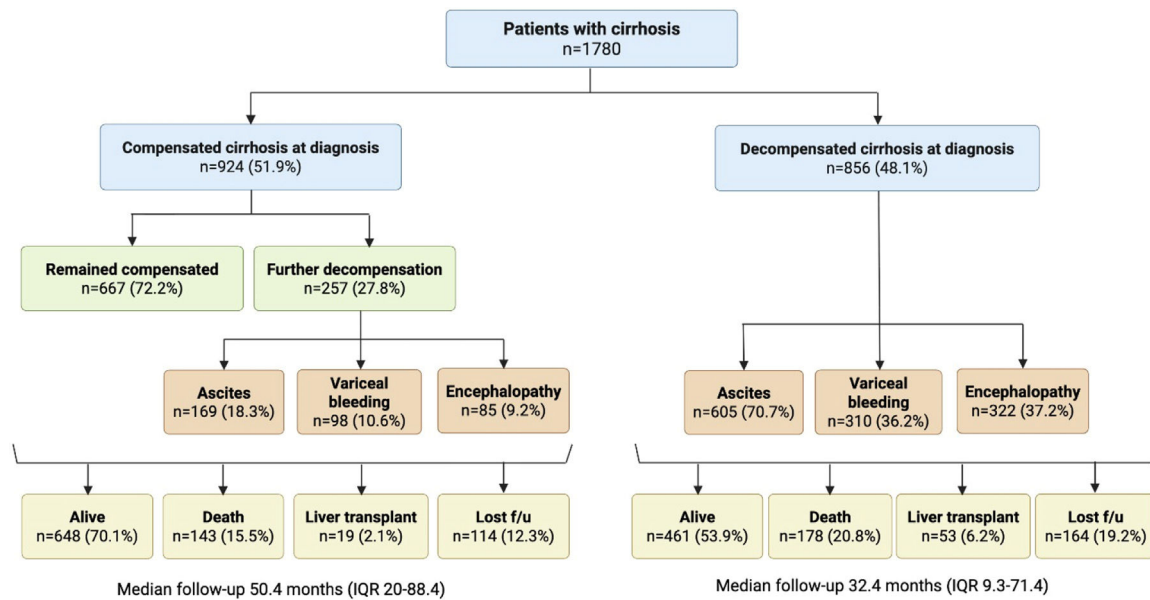


Fig. 4. Flow chart for decompensation events and outcomes for the entire cohort.

[31,30,39]). Similarly, our group has demonstrated this transition-from hepatitis C to MASLD-as the predominant underlying liver disease in patients with HCC [40–42].

Viral hepatitis ranked as the second leading etiology, accounting for nearly 20% of cases. Hepatitis C, once the predominant cause of cirrhosis in Brazil, Colombia, and Mexico (28%,36%), has declined, likely due to the introduction of direct-acting antivirals (DAAs), which have reduced its prevalence and complications [43]. Nevertheless, HCV remains an important cause in the region, probably because access to treatment is still limited by cost and underdiagnosis [44].

Another interesting finding was the prominence of autoimmune liver disease (AILD), which ranked third overall, affecting nearly one-fifth of patients and emerging as the leading cause among those younger than 50 years. Latin American studies have shown a progressive rise in autoimmune etiologies — from 0% in earlier series to around 20% in recent reports from Chile and Colombia [12,13,15,17,32–34]. This increase may reflect both improved diagnostic accuracy and a true rise in autoimmune disorders globally, including in South America. [45,46] Regional factors such as racial admixture, dietary changes, exposure to xenobiotics, air pollution, infections, and other environmental stressors may also contribute [46,47].

Alcohol-related cirrhosis was less frequent in our cohort, contrasting with earlier studies in which alcohol was the leading cause, accounting for one to two-thirds of cases [12–16,29,33,34]. This discrepancy may result from underreporting of alcohol intake, an increasing prevalence of MASLD that has shifted relative etiologic frequencies, or the reclassification of some patients under the new MASLD/MetALD framework.

From an etiological standpoint, the clinical differences between groups are noteworthy (Supplementary Table 3). Demographically, autoimmune cirrhosis occurred more often in younger patients and women, while MASLD affected older individuals, and alcohol-related disease was predominant in men. Paraclinically, viral etiologies showed greater thrombocytopenia and higher transaminase levels.

Although our study did not include specific analyses by ethnicity, most patients were of mestizo ancestry. Regional variations in racial admixture may partially explain inter-country differences, such as the higher prevalence of MASLD and AILD. For instance, Argentina and Brazil have larger populations of European descent, whereas other regions have stronger Indigenous or African ancestry, potentially influencing disease distribution. [47]

Two-thirds of patients presented at least one cirrhosis complication, with ascites being the most frequent (over 40%), consistent with prior reports from the region. [1,3,4,16,17,32,39] HCC was diagnosed in nearly one of seven patients, frequently associated with MASLD, echoing trends observed elsewhere [40–42]. Despite the high burden of advanced disease, only one-third of these patients were referred for liver transplant evaluation, highlighting persistent barriers to transplantation access in the region [48].

Cirrhosis remains a major public health concern in South America and globally (9,35,49). Given the region's limited resources for chronic disease management, prevention policies must be prioritized. Approximately 70% of cirrhosis cases are preventable through effective public health measures aimed at reducing obesity, diabetes, hypertension, and dyslipidemia, and at controlling these conditions once present. Health education initiatives promoting balanced diets, physical activity, and responsible alcohol consumption — along with taxation policies, stricter regulations, and enforcement of laws on underage drinking — are critical [49,50]. Furthermore, policies targeting viral hepatitis through universal HBV vaccination and HCV elimination programs could substantially reduce cirrhosis incidence and its complications [43,44,49]. Liver specialists and national societies should advocate for earlier diagnosis and prevention by raising public awareness and engaging non-hepatology healthcare providers.

We acknowledge certain limitations, mainly related to the study's retrospective design. In addition, the sample distribution among countries did not reflect their population sizes, precluding country-specific analyses. Selection bias is also possible, as most participating centers were tertiary-level institutions. Nonetheless, the study's major strengths include its large sample size, participation of six South American countries, and the inclusion of patients with recently diagnosed cirrhosis — providing an up-to-date snapshot of the regional disease landscape. Therefore, we believe our findings accurately represent the current South American scenario of cirrhosis etiology and epidemiology and can inform public health strategies across the continent.

## 5. Conclusions

In conclusion, this large multicenter cohort confirms that MASLD is now the leading cause of cirrhosis in South America, showing a marked rise compared with previous reports. Nearly two-thirds of patients had at least one cirrhosis complication, most commonly

ascites, and access to liver transplantation remains insufficient across the region.

### Author contributions

Jhon Edison Prieto Ortiz: Responsible for the integrity of the work as a whole; study concept and design; acquisition of data; analysis and interpretation of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content; administrative support; study supervision. Diego Ricardo Puentes Montenegro: Analysis and interpretation of data; drafting of the manuscript; statistical analysis. Angelo Z. Mattos: Acquisition of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content; study supervision. Enrique Carrera Estupiñan: Acquisition of data; study supervision. Javier Diaz Ferrer: Acquisition of data; study supervision. Martín Padilla-Machaca: Acquisition of data; study supervision. Domingo Balderramo: Acquisition of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content; study supervision. Manuel Mendizabal: Acquisition of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content; study supervision. Marco Arrese: Acquisition of data; study supervision. Robin Germán Prieto Ortiz: Acquisition of data; analysis and interpretation of data; drafting of the manuscript. Diana Torres: Acquisition of data. Marlon R. Toazza: Acquisition of data. John Neto Guilherme: Acquisition of data. Angelo A. Mattos: Acquisition of data; critical revision of the manuscript for important intellectual content; study supervision. Cristina N. Zambrano R.: Acquisition of data. Maria Grazia Venturelli Romero: Acquisition of data. Fortunato S. Principe-Meneses: Acquisition of data. Chiara Zecchin: Acquisition of data. Martin Salvatierra: Acquisition of data. Juan Diego Córdoba Pérez: Acquisition of data; analysis and interpretation of data; drafting of the manuscript. Daniela Moreno Villamil: Acquisition of data; analysis and interpretation of data; drafting of the manuscript. Javier Hernando Eslava-Schmalbach: Analysis and interpretation of data; drafting of the manuscript; critical revision of the manuscript for important intellectual content; statistical analysis; administrative support; study supervision. Jose Daniel Debes: Drafting of the manuscript; critical revision of the manuscript for important intellectual content; administrative support; study supervision.

### Funding

This study was conducted using the authors' own resources and without any external funding sources.

### Declaration of interests

None.

### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.aohep.2026.102186.

### References

- Ginès P, Krag A, Abraldes JG, Solà E, Fabrellas N, Kamath PS. Liver cirrhosis. *Lancet* 2021;398:1359–76. [https://doi.org/10.1016/S0140-6736\(21\)01374-X](https://doi.org/10.1016/S0140-6736(21)01374-X).
- Anthony PP, Ishak KG, Nayak NC, Poulsen HE, Scheuer PJ, Sobin LH. The morphology of cirrhosis. Recommendations on definition, nomenclature, and classification by a working group sponsored by the World Health Organization. *J Clin Pathol* 1978;31:395–414. <https://doi.org/10.1136/jcp.31.5.395>.
- Tsochatzis EA, Bosch J, Burroughs AK. Liver cirrhosis. *Lancet* 2014;383:1749–61. [https://doi.org/10.1016/S0140-6736\(14\)60121-5](https://doi.org/10.1016/S0140-6736(14)60121-5).
- Ge PS, Runyon BA. Treatment of patients with cirrhosis. *N Engl J Med* 2016;375:767–77. <https://doi.org/10.1056/NEJMra1504367>.
- Rinella ME, Lazarus JV, Ratzliff V, Francque SM, Sanyal AJ, Kanwal F, et al. A multi-society Delphi consensus statement on new fatty liver disease nomenclature. *Ann Hepatol* 2024;29(1):101133. <https://doi.org/10.1016/j.aohep.2023.101133>.
- D'Amico G, Pasta L, Morabito A, D'Amico M, Caltagirone M, Malizia G, et al. Competing risks and prognostic stages of cirrhosis: A 25-year inception cohort study of 494 patients. *Aliment Pharmacol Ther* 2014;39:1180–93. <https://doi.org/10.1111/apt.12721>.
- D'Amico G, Garcia-Tsao G, Pagliaro L. Natural history and prognostic indicators of survival in cirrhosis: A systematic review of 118 studies. *J Hepatol* 2006;44:217–31. <https://doi.org/10.1016/j.jhep.2005.10.013>.
- De Franchis R, Bosch J, Garcia-Tsao G, Reiberger T, Ripoll C. On behalf of the Baveno VII Faculty. Baveno VII-renewing consensus in portal hypertension. *J Hepatol* 2022;76:959–74. <https://doi.org/10.1016/j.jhep.2021.12.022>.
- GBD 2017 Cirrhosis Collaborators. The global, regional, and national burden of cirrhosis by cause in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet Gastroenterol Hepatol* 2020;5:245–66. [https://doi.org/10.1016/S2468-1253\(19\)30349-8](https://doi.org/10.1016/S2468-1253(19)30349-8).
- GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet* 2020;396:1204–22. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9).
- GBD 2021 Causes of Death Collaborators. Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 sub-national locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024;403:2100–32. [https://doi.org/10.1016/S0140-6736\(24\)00367-2](https://doi.org/10.1016/S0140-6736(24)00367-2).
- Gonçalves PL, Zago-Gomes MP, Marques CC, Mendonça AT, Sandoval Gonçalves C, Lima Pereira FE. Etiology of liver cirrhosis in Brazil: chronic alcoholism and hepatitis viruses in liver cirrhosis diagnosed in the state of Espírito Santo. *Clinics* 2013;68:291–5. [https://doi.org/10.6061/clinics/2013\(03\)0A02](https://doi.org/10.6061/clinics/2013(03)0A02).
- Sanhueza E, Contreras J, Zapata R, Sanhueza M, Elgueta F, López C, et al. Comparative evaluation of survival prognosis using MELD or Child-Pugh scores in patients with liver cirrhosis in Chile. *Rev Med Chil* 2017;145(1):17–24. <https://doi.org/10.4067/S0034-98872017000100003>.
- Vazquez C, Gutierrez-Acevedo MN, Barbero S, Notari LDC, Agozino M, Fernandez JL, et al. Clinical and microbiological characteristics of bacterial infections in patients with cirrhosis: A prospective cohort study from Argentina and Uruguay. *Ann Hepatol* 2023;28:101097. <https://doi.org/10.1016/j.aohep.2023.101097>.
- Abarca J, Peña-Herrera V, Garcés C, Córdova A, Carrillo L. Etiología SáenzR. sobrevida, complicaciones y mortalidad en cirrosis hepática en el Ecuador. *Evaluación retrospectiva de 15 años (1989–2003)*. *Gastr Latinoam* 2006;17:29–34.
- Bustíos C, Dávalos M, Román R, Zumaeta E. Características epidemiológicas y clínicas de la cirrosis hepática en la unidad de hígado del HNERM. *Es-Salud. Rev Gastroenterol Perú* 2007;27:238–45.
- Escorcía-Charris E, Marrugo-Balceiro W. Caracterización epidemiológica y clínica de la cirrosis hepática en un centro regional del Caribe colombiano: clínica general del norte. Enero 2012 a marzo 2017. *Bioc* 2018;13:31–5. <https://doi.org/10.18041/2390-0512/bioc.1.2242>.
- Méndez-Sánchez N, Zamarripa-Dorsey F, Panduro A, Purón-González E, Coronado-Alejandro EU, Cortez-Hernández CA, et al. Current trends of liver cirrhosis in Mexico: Similarities and differences with other world regions. *World J Clin Cases* 2018;6:922–30. <https://doi.org/10.12998/wjcc.v6.i15.922>.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG, Research electronic data capture (REDCap). A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42:377–81. <https://doi.org/10.1016/j.jbi.2008.08.010>.
- Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, et al. The REDCap consortium: building an international community of software platform partners. *J Biomed Inform* 2019;95:103208. <https://doi.org/10.1016/j.jbi.2019.103208>.
- European Association for the Study of the Liver. EASL Clinical Practice Guidelines for the management of patients with decompensated cirrhosis. *J Hepatol* 2018;69:406–60. <https://doi.org/10.1016/j.jhep.2018.08.009>.
- Mancia G, Kreutz R, Brunström M, Burnier M, Grassi G, Januszewicz A, et al. 2023 ESH Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Hypertension: Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). *J Hypertens* 2023;41:1874–2071. <https://doi.org/10.1097/HJH.0000000000003480>.
- American Diabetes Association Professional Practice Committee; 2. Diagnosis and classification of diabetes: standards of care in diabetes-2025. *Diabetes Care* 1 January 2025;48(Supplement 1):S27–49. <https://doi.org/10.2337/dc25-S002>.
- Grundy SM, Stone NJ, Bailey AL, Beam C, Birtcher KK, Blumenthal R, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APHA/ASPC/NLA/PCNA guideline on the Management of Blood Cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation* 2019;139:e1082–143. <https://doi.org/10.1161/CIR.0000000000000625>.
- Kwo PY, Cohen SM, Lim JK. ACG clinical guideline: evaluation of abnormal liver chemistries. *Am J Gastroenterol* 2017;112:18–35. <https://doi.org/10.1038/ajg.2016.517>.
- Jophilin LL, Singal AK, Bataller R, Wong RJ, Sauer BG, Terrault NA. ACG clinical guideline: alcohol-associated liver disease. *Am J Gastroenterol* 2024;119:30–54. <https://doi.org/10.14309/ajg.0000000000002572>.
- Brunt EM, Janney CG, Di Bisceglie AM, Adrian M, Neuschwander-Tetri B, Bacon BR. Nonalcoholic steatohepatitis: a proposal for grading and staging the histological lesions. *Am J Gastroenterol* 1999;94:2467–74. <https://doi.org/10.1111/j.1572-0241.1999.01377.x>.

- [28] Nilsson E, Anderson H, Sargenti K, Lindgren S, Prytz H. Incidence, clinical presentation and mortality of liver cirrhosis in Southern Sweden: a 10-year population-based study. *Aliment Pharmacol Ther* 2016;43:1330–9. <https://doi.org/10.1111/apt.13635>.
- [29] Calderón-Gerstein W, Ascanio-Paredes M, Yarinsueca-Mata PR. Características clínicas y complicaciones de la cirrosis hepática en una población de altura (Huancayo, 3250 m s. n. m.). *Horiz. Med.* 2020;20:e1186. <https://doi.org/10.24265/horizmed.2020.v20n2.08>.
- [30] Gonzalez-Chagolla A, Olivas-Martinez A, Ruiz-Manriquez J, Servín-Rojas M, Kauffman-Ortega E, Chávez-García LC, et al. Cirrhosis etiology trends in developing countries: transition from infectious to metabolic conditions. Report from a multicentric cohort in central Mexico. *Lancet Reg Health Am* 2022;7:100151. <https://doi.org/10.1016/j.lana.2021.100151>.
- [31] Mayorga A, Cabrera M, Pincay R, García CT. Caracterización de los pacientes cirróticos atendidos en el Hospital Eugenio Espejo durante el año 2018. *Revista científica INSPILIP* 2019;2:1–10.
- [32] John JA, de Mattos AA, da Silva Miozzo SA, Comerlato PH, Porto M, Contiero P, et al. Survival and risk factors related to death in outpatients with cirrhosis treated in a clinic in Southern Brazil. *Eur J Gastroenterol Hepatol* 2015;27:1372–7. <https://doi.org/10.1097/MEG.0000000000000480>.
- [33] Veissetes D, González A. Evaluación nutricional de pacientes con cirrosis hepática hospitalizados y el impacto en el pronóstico de la enfermedad: estudio de corte transversal. *Acta Gastroenterológica Latinoamericana* 2022;52:367–77. <https://doi.org/10.52787/agl.v52i3.235>.
- [34] Alonso F, Garmendia M, De Aguirre M, Searle J. Análisis de la tendencia de la mortalidad por cirrosis hepática en Chile: Años 1990 a 2007. *Rev Med Chil* 2010;138:1253–8. <https://doi.org/10.4067/S0034-98872010001100007>.
- [35] Younossi Z, Anstee QM, Marietti M, Hardy T, Henry L, Eslam M, et al. Global burden of NAFLD and NASH: trends, predictions, risk factors and prevention. *Nat Rev Gastroenterol Hepatol* 2018;15:11–20. <https://doi.org/10.1038/nrgastro.2017.109>.
- [36] Rojas Y, Cuellar C, Barrón K, Arab JP, Lozano M. Non-alcoholic fatty liver disease prevalence in Latin America: a systematic review and meta-analysis. *Ann Hepatol* 2022;27:e100706. <https://doi.org/10.1016/j.aohep.2022.100706>.
- [37] World Health Organization (WHO). Global Health Observatory (GHO) data. World Health Organization (WHO) 2019 <https://www.who.int/gho/en/> (accessed May 2019).
- [38] Guías ALAD sobre el Diagnóstico, Control y Tratamiento de la Diabetes Mellitus Tipo 2 con Medicina Basada en Evidencia, Revista de la Asociación Latinoamericana de Diabetes. Disponible en 2019 [https://www.revistaalad.com/guias/5600AX191\\_guias\\_alad\\_2019](https://www.revistaalad.com/guias/5600AX191_guias_alad_2019).
- [39] Prieto JE, Sánchez S, Prieto RG, González L, Mendivelso F. Características clínicas y descompensación en pacientes con cirrosis hepática atendidos en dos centros de hepatología en la ciudad de Bogotá D.C., 2010-2014. *Rev Col Gastroenterol* 2016;31:1–8. <https://doi.org/10.22516/25007440.66>.
- [40] Debes JD, Chan A, Balderramo D, Kikuchi L, Gonzalez Ballera E, Prieto JE, et al. Hepatocellular carcinoma in South America: Evaluation of risk factors, demographics and therapy. *Liver International* 2018;38:136–43. <https://doi.org/10.1111/liv.13502>.
- [41] Farah M, Anugwom C, Ferrer JD, Baca E, Mattos AZ, Possebon JP, et al. Changing epidemiology of hepatocellular carcinoma in South America: A report from the South American liver research network. *Ann Hepatol* 2023;28:100876. <https://doi.org/10.1016/j.aohep.2022.100876>.
- [42] De Mattos AZ, Bombassaro IZ, Vogel A, Debes JD. Hepatocellular carcinoma—the role of the underlying liver disease in clinical practice. *World J Gastroenterol* 2024;30:2488–95. <https://doi.org/10.3748/wjg.v30.i19.2488>.
- [43] Park H, Wang W, Henry L, Nelson DR. Impact of all-oral direct-acting antivirals on clinical and economic outcomes in patients with chronic hepatitis C in the United States. *Hepatology* 2019;69:1032–45. <https://doi.org/10.1002/hep.30303>.
- [44] Marciano S, Haddad L, Borzi SM, D'Amico C, Gaité LA, Aubone MV, et al. Access to direct-acting antivirals for the treatment of hepatitis C in a country with limited resources. *Rev Gastroenterol Mex* 2018;83:208–11. <https://doi.org/10.1016/j.rgmex.2018.05.013>.
- [45] Ramos-Casals M, Brito-Zeron P, Kostov B, Sisó-Almirall A, Bosch X, Buss D, et al. Google-driven search for big data in autoimmune geoepidemiology: analysis of 394,827 patients with systemic autoimmune diseases. *Autoimmun Rev* 2015;14:670–9. <https://doi.org/10.1016/j.autrev.2015.03.008>.
- [46] Miller FW. The increasing prevalence of autoimmunity and autoimmune diseases: an urgent call to action for improved understanding, diagnosis, treatment, and prevention. *Curr Opin Immunol* 2023;80:102266. <https://doi.org/10.1016/j.coi.2022.102266>.
- [47] Farias AQ, Curto-Vilalta A, Momoyo-Zitelli P, Pereira G, Goncalves L, Torre A, et al. ACLARA Study Collaborators. Genetic Ancestry, Race, and Severity of Acutely Decompensated Cirrhosis in Latin America. *Gastroenterology* 2023;165:696–716. <https://doi.org/10.1053/j.gastro.2023.05.033>.
- [48] Aguirre-Villarreal D, Servín-Rojas M, Sánchez-Cedillo A, Chávez-Villa M, Hernández-Alejandro R, Arab JP, et al. Liver transplantation in Latin America: reality and challenges. *Lancet Reg Health Am* 2023;28:100633. <https://doi.org/10.1016/j.lana.2023.100633>.
- [49] Díaz LA, Villota-Rivas M, Barrera F, Lazarus J, Arrese M. The burden of liver disease in Latin America. *Ann Hepatol* 2024;29:101175. <https://doi.org/10.1016/j.aohep.2023.101175>.
- [50] Díaz L, Idalsoaga F, Fuentes-López E, Márquez-Lomas A, Ramírez C, Roblero JP, et al. Impact of public health policies on alcohol-associated liver disease in Latin America: an ecological multinational study. *Hepatology* 2021;74:2478–90. <https://doi.org/10.1002/hep.32016>.