

# Factors Associated with Death in Patients with Liver Cirrhosis at Tengandogo University Hospital Center

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## Abstract

**Introduction:** Liver cirrhosis is a major public health problem in sub-Saharan Africa, where it is often diagnosed at an advanced stage and associated with high mortality. This study aimed to identify the factors associated with death in patients with liver cirrhosis at the Tengandogo University Hospital (CHUT). **Materials and Methods:** This was an analytical cross-sectional study conducted over a period of ten and a half years at CHUT in Ouagadougou. We collected the medical records of patients with liver cirrhosis. Sociodemographic and diagnostic data were collected. A univariate and then a multivariate logistic regression analysis was performed to identify factors associated with death. Authorization from the general management of CHUT was obtained, and patient confidentiality was maintained. **Results:** The hospital mortality rate was 38.5% (79/205). The majority of patients were male (76.1%) and viral hepatitis B was the main etiology (59.4%). The majority of patients were classified as Child-Pugh B or C (92.2%). The most common complications were ascites (78.5%), cancer (48.3%), hepatic encephalopathy (21.5%), and associated infections (15.1%). In multivariate analysis, hepatic encephalopathy, infections, and the presence of cancer were independently associated with death, while age, sex, etiology, and Child-Pugh score were not independent predictive factors. **Conclusion:** Mortality among hospitalized cirrhotic patients remains high and is mainly related to cirrhosis-related complications, reflecting late diagnosis. Strengthening HBV screening, early follow-up of patients, and optimal management of complications are essential to improve

prognosis.

## Keywords

Hepatic Cirrhosis, Mortality, Ascites, Hepatocellular Carcinoma, Burkina Faso

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## 1. Introduction

Liver cirrhosis is the final stage of most chronic liver diseases. It is characterized by debilitating fibrosis leading to a disorganization of the liver parenchyma [1]. It is a major public health problem responsible for significant morbidity and mortality. It causes more than 1.4 million deaths per year worldwide, making it one of the ten leading causes of death [2] [3].

The causes of cirrhosis vary by region. Alcoholic and metabolic causes are the most reported in industrialized countries. In developing countries, particularly in sub-Saharan Africa, viral hepatitis B and C remain the main causes [4] [5].

The aim of this study was to identify factors associated with death in cirrhotic patients at the Tengandogo University Hospital in Ouagadougou, Burkina Faso.

## 2. Materials and Methods

This was an analytical cross-sectional study with retrospective data collection from January 1, 2014, to June 30, 2024 (10 years and 6 months) in the hepatogastroenterology unit of the CHU de Tengandogo in Burkina Faso.

Included were patients seen in consultation or hospitalized, in whom a diagnosis of cirrhosis was made based on clinical, biological, radiological, and/or histological evidence. Excluded were incomplete or unusable records.

Data were collected on a collection form from medical records, hospitalization and consultation registers.

The dependent variable was death (yes/no). The independent variables included age, sex, causes of cirrhosis, Child-Pugh score, and the presence or absence of ascites, hepatic encephalopathy, digestive hemorrhage, hepatorenal syndrome, and infection (infection of ascitic fluid, urinary, pulmonary, or septicemia).

A descriptive analysis was conducted to describe the characteristics of the population. The bivariate analysis compared deceased patients with survivors. Significant variables ( $p < 0.05$ ) were included in a multivariate logistic regression to identify independent factors associated with death. The study received approval from the general management of Tengandogo University Hospital (CHUT). Anonymity and confidentiality of records were maintained.

## 3. Results

- Sociodemographic and Diagnostic Characteristics

Out of 230 cases recorded, 25 were excluded due to incomplete or unusable files, and 205 patients were included. The mean age was  $51.6 \pm 14.9$  years (range: 15 to 83 years). Subjects under 50 years old accounted for 50.7% of our study population. There was a male predominance (76.1% of cases;  $n = 156$ ). The sex ratio was 3.2. In-hospital mortality was 38.5% ( $n = 79$ ). The main etiology was hepatitis B virus; 59.4% of cases and 74.1% of cases when including forms associated with HBV (HBV-alcohol, HBV-HCV, HBV-HCV-alcohol). Ascites (78.5% of cases) and degeneration (48.3%) were the most commonly observed complications (**Table 1**).

**Table 1.** Sociodemographic and diagnostic characteristics of patients.

Variables	Total n = 205 (%)	Deceased (n = 79)	Survivors (n = 127)
<b>Sex</b>			
Men	156 (76.1%)	61	95
Women	49 (23.9%)	16	33
<b>Age (years)</b>			
<50 years	103 (50.7%)	38	65
≥50 years	100 (49.3%)	37	63
Not specified	2		
<b>Etiologies</b>			
HBV	121 (59.4%)	45	76
HBV-Alcohol	19 (9.3%)	7	12
Indeterminate	19 (9.3%)	9	10
HCV	17 (8.3%)	4	13
Alcohol	17 (8.3%)	7	10
HBV-HCV	10 (4.9%)	5	5
HBV-HCV-Alcohol	1 (0.5%)	1	0
<b>Child-Pugh Score</b>			
A	16 (7.8%)	1	15
B	98 (47.8%)	35	63
C	91 (44.4%)	41	50
<b>Ascites</b>	161 (78.5%)	65	96
<b>Esophageal varices</b>	44 (21.5%)	9	35
<b>Hepatic encephalopathy</b>	44 (21.5%)	34	10
<b>Associated infection</b>	31 (15.1%)	17	14
<b>Digestive hemorrhage</b>	21 (10.2%)	0	21
<b>Hepatorenal syndrome</b>	7 (3.4%)	6	1
<b>Cancer</b>	99 (48.3%)	56	43

- **Analysis**

In univariate analysis, death was significantly associated with the presence of hepatic encephalopathy (OR = 8.84;  $p < 0.001$ ), infection (OR = 2.21;  $p = 0.047$ ), hepatorenal syndrome (OR = 10.36;  $p = 0.014$ ), and cancer (OR = 4.76;  $p < 0.001$ ).

In contrast, sex, age, viral B etiology, ascites, and the Child-Pugh score alone were not significantly associated with death (**Table 2**).

**Table 2.** Univariate analysis.

Variables	Crude OR	p-value
Male sex	1.14	0.74
Age $\geq$ 50 years	0.89	0.77
HBV	0.89	0.77
Child-Pugh C	1.66	0.085
Ascites	1.5	0.3
<b>Hepatic encephalopathy</b>	<b>8.84</b>	<b>&lt;0.001</b>
<b>Associated infection</b>	<b>2.21</b>	<b>0.047</b>
<b>Hepatorenal syndrome</b>	<b>10.36</b>	<b>0.014</b>
<b>Hepatocellular carcinoma</b>	<b>4.76</b>	<b>&lt;0.001</b>

After adjustment, only hepatic encephalopathy and hepatocellular carcinoma remained independent mortality risk factors. The association between infection and death persisted marginally, suggesting a significant clinical impact despite statistical limitations (**Table 3**). Hepatorenal syndrome and gastrointestinal bleeding were not included in the model due to insufficient numbers and statistical separation.

**Table 3.** Multivariate analysis.

Variables	Adjusted OR (aOR)	95% CI	p-value
<b>Hepatic encephalopathy</b>	<b>8.32</b>	<b>3.45 - 20.08</b>	<b>&lt;0.001</b>
<b>Hepatocellular carcinoma</b>	<b>4.41</b>	<b>2.12 - 9.18</b>	<b>&lt;0.001</b>
<b>Associated infection</b>	<b>2.05</b>	<b>1.01 - 4.18</b>	<b>0.048</b>
Child-Pugh C	1.39	0.72 - 2.68	0.32

## 4. Discussion

- **Study Limitations**

This study has several limitations that must be considered when interpreting the results.

First, its retrospective nature introduces a risk of information bias, particularly related to missing data, which led to the exclusion of certain records.

Second, the study was conducted in a single university hospital center, which may limit the generalizability of the results to the entire national population.

Third, certain severe complications, such as hepatorenal syndrome or gastrointestinal bleeding, were underrepresented, reducing the statistical power for their inclusion in the multivariate analysis. Finally, the lack of data on certain modern prognostic parameters (MELD score, antiviral treatment, prior follow-up status) did not allow for a more detailed analysis of the determinants of mortality.

Despite these limitations, this study provides recent and relevant data on cirrhosis-related mortality in a resource-limited setting and highlights clear priorities in terms of prevention and management.

- **Sociodemographic and diagnostic aspects**

In our study, the majority of patients were men (76.1% of cases) with a median age of  $51.6 \pm 14.9$  years. This male predominance and the median age observed in our series are consistent with the current global epidemiology of cirrhosis, where the disease burden is generally higher in men than in women. A study conducted in Ghana showed that over 70% of patients with cirrhosis were men, with a predominance in the 30 - 60 years age group [6]. In a Beninese series, the mean age of cirrhotic patients was  $55 \pm 14$  years, with a sex ratio greater than 2 [7]. In Burkina Faso, in 2021, Somé *et al.* found a male predominance and a median age of 47 years [8]. These data confirm that cirrhosis primarily affects middle-aged adults in West African countries, particularly men, which aligns with trends observed in other African and international contexts [8]-[10]. They reflect a general trend where cirrhosis is often more common in male subjects, which may be related to higher exposure to risk factors [6]-[8] [11]-[13].

From a diagnostic standpoint, hepatitis B was by far the leading cause (59.4% of cases) and reached 74.1% of cases when including forms associated with HBV (HBV-alcohol, HBV-HCV, HBV-HCV-alcohol). This predominance of HBV is widely reported in sub-Saharan African countries, where the infection is often acquired early, mainly through perinatal or horizontal transmission during childhood, promoting progression to chronic hepatitis and then cirrhosis in adulthood [8] [14]. The most recent global data confirm that HBV remains a major contributor to cirrhosis-related mortality in low- and middle-income countries, despite advances in vaccination [9] [11].

In our study, the diagnosis of liver cirrhosis was mostly made at a late stage, as evidenced by the high proportion of patients classified as Child-Pugh B and C (92.2%) and the high frequency of complications in our series, including ascites (78.5% of cases), hepatocellular carcinoma (48.3%), hepatic encephalopathy (21.5%), infections (15.1%), and gastrointestinal bleeding (10.2%). This late diagnosis is a situation frequently reported in sub-Saharan African countries. In Burkina Faso, Somé *et al.* reported that more than 80% of patients were diagnosed at the stage of decompensated cirrhosis, with ascites being the main presenting feature [8]. Comparable results have been observed in Benin and Ghana, where the majority of patients sought consultation late, often during a complication [6] [7].

The overall in-hospital mortality was 38.5% (79 deaths out of 205 patients),

which is comparable to other African series. In Benin, Sehonou [7] reported an in-hospital mortality of 41%, while in Ghana [6], it ranged between 35% and 40% depending on the presence or absence of complications such as encephalopathy or infections. Several factors explain this situation. On one hand, chronic hepatitis B, the main etiology in our series, progresses asymptotically for a long time, delaying access to care [14]. On the other hand, limited access to systematic screening, insufficient follow-up of chronic HBV carriers, poverty, and limited diagnostic resources contribute to the late detection of the disease. Finally, the absence of structured surveillance programs for the early detection of cirrhosis and hepatocellular carcinoma worsens this situation [10] [11] [14] [15].

- **Analysis**

In univariate analysis, certain clinical variables were significantly associated with death, notably hepatic encephalopathy, associated infections, hepatorenal syndrome, and the presence of hepatocellular carcinoma. These results suggest that mortality occurs mainly in patients with advanced liver failure or multisystem involvement.

Conversely, sociodemographic variables such as age and sex were not significantly associated with death. This indicates that, in our population, survival depends less on individual characteristics than on the disease's stage of progression. Similarly, certain etiologies, although common (notably HBV), were not directly associated with mortality in univariate analysis, suggesting that etiology mainly acts indirectly through the occurrence of complications. Regarding the Child-Pugh score, although a mortality gradient was observed with worsening score, this variable was not consistently significant in univariate analysis, probably due to the high proportion of patients already classified as stages B and C, limiting the discriminative capacity of the score in our cohort.

In multivariate analysis, after adjustment for confounding factors, only certain variables remained independently associated with death, particularly hepatic encephalopathy, infections, and cancer. These results show that these complications are major prognostic markers, reflecting severe and often irreversible liver failure. Hepatic encephalopathy appears as a central determinant of mortality, indicating advanced liver insufficiency and profound metabolic imbalance. Associated infections worsen liver dysfunction through systemic inflammatory mechanisms, promoting acute decompensation and multiorgan failure. Recent reviews indicate that it multiplies the risk of short-term death by 5 to 10 times, particularly in resource-limited settings [15] [16]. As for hepatocellular carcinoma, its strong association with death is explained by its late diagnosis and the limited therapeutic options in our context [13] [17]. Associated infections, although marginally significant in multivariate analysis, play a major role in the acute decompensation of cirrhosis. Recent studies show that they significantly increase in-hospital mortality by promoting acute-on-chronic liver failure and multiorgan failure [16] [18]. Hepatorenal syndrome, although strongly associated with death in univariate analysis, was not retained in the multivariate analysis due to the small number of

patients affected.

## 5. Conclusion

This study, conducted at CHUT, highlights a high in-hospital mortality among patients with liver cirrhosis, reflecting management at an advanced stage of the disease. Cirrhosis mainly affected adult men, and hepatitis B virus was the primary cause, confirming its central role in our context.

The majority of patients were diagnosed at a stage of decompensated cirrhosis. Analysis showed that mortality was independently associated with hepatic encephalopathy, infections, and the presence of cancer, emphasizing that survival mainly depends on the occurrence of severe complications rather than sociodemographic characteristics or the etiology itself.

These results highlight the urgent need to strengthen hepatitis B prevention and early screening strategies, improve the monitoring of cirrhotic patients, and optimize the management of complications in order to reduce cirrhosis-related mortality in resource-limited settings.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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