

Research Article

Therapeutic Compliance Among Chronic HBV Carriers in Burkina Faso, 2021 - 2023

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Abstract

Background: Non-compliance with treatment is a major obstacle to reducing the morbidity and mortality of hepatitis B. According to the World Health Organization, solving the problem of non-compliance with treatment would represent significant progress. Burkina is a country with high endemicity and the factors associated with non-compliance with treatment remain poorly understood. **Objective:** This study aims to identify these factors and guide strategies. **Methodology:** This was a retrospective cohort study of 210 chronic carriers of hepatitis B from 2021-2023 in Burkina. The average scores for compliance with hygiene and dietary measures, compliance with medication intake and follow-up at the 6th; 12th, 18th, 24th month of our study were calculated. We speak of non-compliance with treatment if this average is < 75%. We conducted interviews with patients and performed a documentary review to collect data. The data were processed and analyzed by SAS 9.4® software. **Results:** The incidence of therapeutic non-compliance was 47.9%, including 60.9% among participants with a monthly income of less than 200,000 FCFA compared to 33.3% among those with an income greater than or equal to 200,000 FCFA. Adjusted for the values present, the factors associated with therapeutic non-compliance are monthly income <200,000 FCFA (p-value = 0.0066), inadequate knowledge of hepatitis B (p-value = 0.0440), age ≥ 50 years (p-value = 0.0191) and male gender (p-value = 0.0256). **Conclusion:** Hepatitis B treatment non-compliance remains a public health problem in Burkina. Factors associated with non-compliance include low income, inadequate knowledge of hepatitis B, age and gender. Addressing this requires making care more affordable, increasing awareness, diagnostic and management capacities.

Keywords

Hepatitis B, Chronicity, Treatment Compliance, Burkina Faso

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Received: 30 September 2025; **Accepted:** 3 December 2025; **Published:** 4 December 2025



1. Introduction

Hepatitis B is a contagious viral disease caused by the hepatotropic B virus that causes inflammation of the liver [1]. Hepatitis B is a silent killer and a major public health problem [2, 3]. The World Health Organization (WHO) estimates that 296 million people were living with chronic hepatitis B virus (HBV) infection in 2019. Each year, 1.5 million people are newly infected. Its mortality is increasing and is responsible for 820,000 deaths per year due to liver cancer and cirrhosis [2]. In Africa, 81 million people are chronic carriers of hepatitis B [2]. Burkina Faso is a country with high endemicity of hepatitis B with a prevalence greater than 8% (9.1%), or approximately 2 million chronic carriers [4–6].

Despite efforts to combat hepatitis B, through simpler treatment with a much more accessible cost, it is estimated that two-thirds of people who are informed of their infection do not consult health workers, and more than half of those who are eligible for treatment do not receive it [7]. According to the WHO, 50% of chronic patients are non-compliant [8, 9]. Non-compliance is defined as the inadequacy of patient behavior with medical prescriptions (medication, follow-up appointments, assessments, hygiene and dietary measures) [8, 10–14].

In Europe and the Americas, the frequencies of non-compliance are 18 to 19% and 2 to 3%, respectively [8, 9]. Only 2% of Africans living with chronic hepatitis B infection are diagnosed and 0.1% receive treatment [8, 9]. In Burkina Faso, in the city of Ouagadougou, in 2022, non-compliance with hepatitis B monitoring was 82% [15].

While therapeutic non-compliance reduces the survival of chronic hepatitis B carriers, increases virological breakthroughs and complications [11, 16–19]. Solving the problem of therapeutic non-compliance would represent significant progress [8, 20].

In addition, the studies conducted have focused more on medication non-compliance and/or monitoring, which are only part of therapeutic non-compliance.

Few studies conducted in Burkina have focused on the factors associated with hepatitis B therapeutic non-compliance in all its components. This study aims to determine the factors associated with hepatitis B therapeutic non-compliance in Burkina Faso.

2. Materials and Methods

2.1. Study Setting

This study was conducted in Burkina Faso among subjects voluntarily screened in the community by the non-governmental organizations (NGOs) "SOS Hepatites" or "Assaut-Hepatites" on their fixed or mobile sites. Our participants resided in 8 regions (Centre, Plateau Central, Hauts-Bassins, Cascades, Boucle du Mouhoun, Centre-Est, Centre-Nord, Sud-Ouest, Centre Ouest du Burkina) of Burkina out of the 13 regions.

2.2. Study Design

This is a retrospective cohort study over a period of 24 months, from January 31, 2021 to January 31, 2023.

2.3. Study Population and Sampling

This study concerned people screened positive for HBsAg in the community by the associations "SOS Hepatites" or "Assaut-Hepatites" Burkina, constant, aged at least 18 years, newly declared chronic carriers, and whose first follow-up visit was scheduled for July 2021. Our sample size calculated with the SAS ® software in its version 9.4 for a statistical power of 90%, a reference proportion of 0.25 and an odds ratio (OR) of 1.93 [21], increased by 18%, was 210 or 105 for each group. Through the list of telephone contacts, a simple random sampling had been done.

2.4. Data Collection

The dependent variable is therapeutic non-compliance which is a composite variable. It constituted the average of the proportions of the variables medication compliance if the subject is under medication treatment, compliance with hygiene and dietary measures and compliance with follow-up.

The variable "medication non-compliance" was assessed by the Morisky grid. It had a score of 0-8. The variable "non-compliance with hygiene and dietary measures" is assessed from the avoidance of alcohol consumption, tobacco, hepatotoxic drugs and the practice of sport, over the entire period of the study. It had a score of 0-16. The variable "non-compliance with follow-up" is assessed from assiduity, punctuality at the appointment and the completion of assessments at 6, 12, 18 and 24 months of our study. It had a score of 0-12. Non-compliance was said to be "yes" for each of its variables if the respondent obtained a score lower than 75%. The same is true for the dependent variable.

The independent variable of interest was the "monthly income received in 2020". The other independent variables are: "knowledge of hepatitis B (score 0 to 24, adequate if score ≥ 18 inadequate if not)", "age", "sex", "qualification of the treating health professional", "regularity of visits to the same treating physician", "clinical condition", "comorbidity", "evolutionary stage", "forgetfulness", "level of education", "patient refusal", "health insurance", "side effects of the drug" were collected. Telephone and face-to-face interviews, data extraction and a document review were carried out. These are carried out using respectively an interview guide (individual questionnaire, Morisky therapeutic compliance tools), a secondary data extraction grid, a content analysis grid (salary scale of Burkinabe workers).

2.5. Data Management and Analysis

Statistical analysis was performed using SAS ® 9.4 software after exporting data from KoBocollect software to Ex-

cel format.

In descriptive statistics: Proportions, mean, standard deviation were calculated.

In analytical statistics (etiological): The chi-square test of independence was used for qualitative variables. A univariate logistic regression was performed to select the variables in the full model explaining the variable non-compliance with treatment. Independent variables with a p-value < 20% were retained for the full model. In addition to these variables, the main variable, monthly income in 2020, was forced in all models. Confounding factors or effect modifiers identified in the literature were forced. No first-order interactions were reported. Crude odds ratios (ORb) of association between the independent variables and the non-adherence variable were calculated. For multivariate logistic regression, a backward stepwise reduction approach was used. The independent variables with the highest p-value above 5% were removed from the model. Adjusted odds ratios (ORa) of association between the independent variables and the non-adherence variable were calculated. The Hosmer and Lemeshow test proved that our model was adequate.

2.6. Administrative and Ethical Considerations

On the ethical level, informed consent was obtained from the participants. In addition, we respected the confidential and anonymous nature of the information collected. On the administrative level, a copy of the protocol was validated by the Burkina Field Epidemiology and Laboratory Training Program (BFELTP) coordination and a collection authorization was granted by the general secretariat of the Ministry of Health and Public Hygiene of Burkina Faso.

3. Result

3.1. Socio-demographic Characteristics of Study Participants

We included a total of 210 people. The number of participants with an income greater than or equal to 200,000 FCFA was 105 (50%). The average age in our cohort was 36.5 years with extremes of 18 and 68 years. The age group of [18-40] years was the most represented, i.e. 65.2% (n=137). The male gender represented 68.6% (n=144), i.e. a sex ratio of 2.9 M/F. Employees were 55.2% (n=116) in our cohort.

3.2. Flow of Therapeutic and Drug Non-compliance, Monitoring, and Hygiene and Dietary Measures

No cases of loss to follow-up were reported in our study. The median duration of the study was 12 months. The population was stable. The number at the beginning of the study was the same at the end of the study.

Non-compliance with follow-up was most reported at the peak date (24 months) of our study among exposed and non-exposed patients, respectively 86 and 54 chronic carriers (Figure 1). The incidence of non-compliance with hepatitis B therapy among subjects with a monthly income of less than 200,000 FCFA was 60.9% compared to those with an income greater than or equal to 200,000 which was 33.3%.

Legend

HDM: non-compliance with hygiene and dietary measures

Follow: non-compliance with follow-up

Med: non-compliance with medication

Therap: non-compliance with therapy

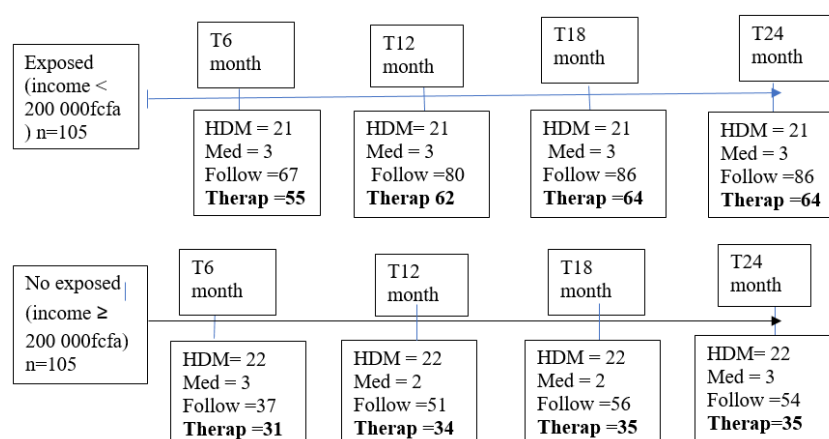


Figure 1. Flow diagram of non-compliance with medication, follow-up, hygiene and dietary measures and therapy among chronic hepatitis B carriers, Burkina Faso, 2021-2023.

3.3. Incidence of Therapeutic Non-compliance

The incidence of non-compliance with follow-up was the most reported, 66.7% (n=140), followed by therapeutic

non-compliance, 47.1% (n=99) (Figure 2).

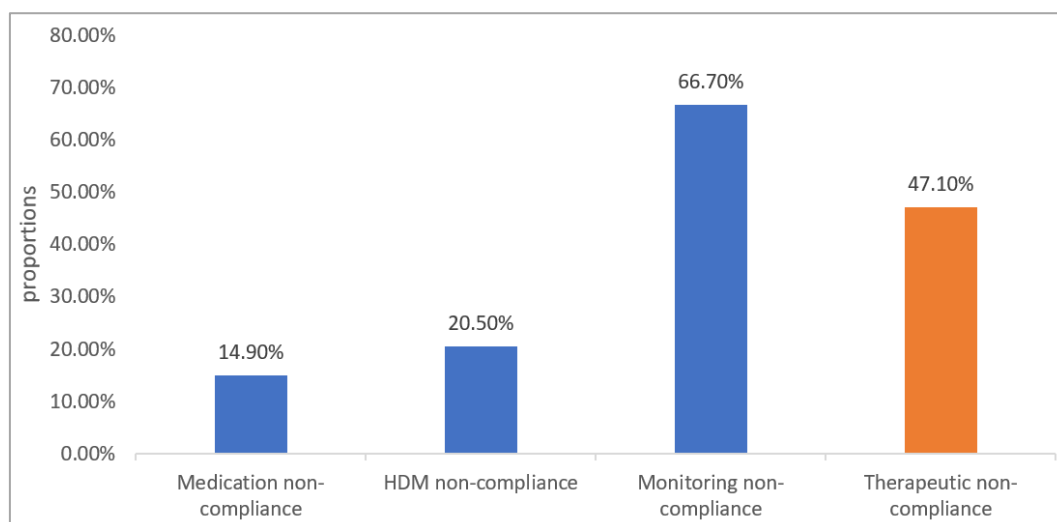


Figure 2. Representation of therapeutic non-compliance among chronic hepatitis B carriers, in 8 regions of Burkina Faso, January 2021 to January 2023.

3.4. Factors Associated with Therapeutic Non-compliance of Chronic Hepatitis B Carriers

In univariate analysis, the variables with a p-value $\leq 20\%$ were: monthly income (p-value < 0.0001), age (p-value = 0.0116), sex (p-value = 0.0699) (Table 1), knowledge of HB (p-value = 0.0041) and regularity with the same treating agent (p-value = 0.1391) (Table 2).

Table 1. Univariate analysis of socio-demographic factors associated with therapeutic non-compliance of chronic hepatitis B carriers, Burkina Faso, 2021-2023.

Variables	Non-compliance Therapy (n/N)	Hazard ratio [95% CI]	p -value
FCFA income			0.0001**
≥ 200,000	35/105	1	
< 200,000	64/105	3.12[1.77 5.48]	
Age in years			0.0116**
[18- 40]	32/57	1	
[40 -50]	55/192	4.47[1.37 14.58]	
≥ 50	12/28	1.90[1.02 3.56]	
Sex			0.0699*
Female	25/66	1	
Male	74/144	1.73[0.95 3.14]	
Activity	22/39	1.58[0.78 3.18]	0.2010
Job	77/171	1	
Unemployed	22/39	1.58[0.78 3.18]	
Matrimonial			0.4461
In a relationship	78/158	1	

Variables	Non-compliance Therapy (n/N)	Hazard ratio [95% CI]	p -value
Bachelor	20/48	0.73[0.38 1.40]	0.0946*
Alone	1/4	0.34[0.03 3.35]	
School level			
University	43/104	1	
None	9/10	12.76[1.56 104.52]	
Primary	8/15	1.62[0.54 4.80]	0.3361
Secondary	39/79	1.31[0.73 2.36]	
Family support			
Yes	87/189	1	
No	12/21	1.56[0.62 3.88]	

Alone = alone with children.

Table 2. Univariate analysis of others factors associated with therapeutic non-compliance of chronic hepatitis B carriers, Burkina Faso, 2021-2023.

Variables	Non-compliance Therapeutic (n/N)	Hazard ratio [95% CI]	p -value
Know HB			0.0041 **
Adequate	84/192	1	0.8845
Inadequate	15/18	6.42[1.80 22.93]	
Treating			0.8845
Hepato- GE	27/85	1	
MD General	8/24	1.07[0.41 2.81]	0.1391*
Same treatment			
Yes	19/70	1	0.7597
No	16/37	1.86[0.81 4.27]	
Oversight			0.1920*
No	29/92	1	
Yes	6/17	1.18[0.39 3.51]	0.3728
Refusal			
No	90/196	1	0.0278**
Yes	9/14	2.12[0.68 6.55]	
Health insurance			0.2492
Yes	11/28	1	
No	88/182	1.44[0.64 3.26]	0.0278**
Use of unconventional medicine			
No	58/139	1	0.2492
Yes	41/71	1.90 [1.07 3.40]	
Comorbidity			

Variables	Non-compliance Therapeutic (n/N)	Hazard ratio [95% CI]	p -value
No	98/205	1	
Yes	1/5	3.66[0.40 33.34]	

MD General = General practitioner

Hepato-G.E = Hepato-gastro-enterologist

3.5. Multivariate Analysis of Therapeutic Non-compliance of Chronic Carriers of HB

At the 5% threshold, the factors associated with therapeutic non-compliance were monthly income level below 200,000 FCFA (p-value = 0.0066), age ≥ 50 years (p-value = 0.0191), male gender (p-value = 0.0256), and inadequate knowledge of HB (0.0440). The results of the final model are presented in [Table 3](#), below.

Table 3. Multivariate analysis of factors associated with therapeutic non-compliance of chronic carriers of hepatitis B, Burkina Faso, 2021-2023.

Variables	Adjusted hazard ratio [95% CI]	p -value
Monthly income FCFA		0.0066**
$\geq 200,000$	1	
$< 200,000$	6.39 [1.67 - 24.37]	
Age in years		0.0209**
[18- 40]	1	
[40 -50]	2.55[0.81 - 7.99]	0.4368
≥ 50	18.26[2.14 - 155.61]	0.0191
Sex		0.0256**
Female	1	
Male	3.98 [1.18 - 13.41]	
Occupation		0.5121
Job	1	
Unemployed	0.57[0.11 - 2.96]	
HB Knowledge		0.0440**
Perfect	1	
Inadequate	11.50[1.06 - 123.96]	
Same treatment		0.2438
Yes	1	
No	1.84[0.65 - 5.18]	
School level		0.5238
University	1	
None	2.21 [0.04 - 112.42]	
Primary	0.17[0.01 - 2.13]	
Secondary	0.64[0.21 - 2]	

4. Discussion

4.1. Incidence of Therapeutic Non-compliance

A therapeutic non-compliance of 47.1% was reported in our cohort, approaching those worldwide 50%. This is due to the high proportion of non-compliance with follow-up (66.7%) similar to the results of Beekmans et al. in 2018 (64.5%) [22]. Yanogo et al, however reported in 2022 a higher irregular follow-up in Burkina (81.9%) [15].

Indeed, the assessments necessary for monitoring hepatitis B are quite expensive, varying between 90,000 and 250,000 FCFA per year [21]. However, Burkina Faso is a poor country [22]. This difference could also be due to the different techniques used to assess drug non-compliance. Some research has used self-reporting of the number of missed doses over a 30-day period, while others have used a 3-month period. Some studies have also used a visual analogue scale, considering subjects as compliant if they scored 90% or more and non-compliant if not. In our study, we used the Morisky therapeutic compliance grid. In addition, in the last two years, antiretroviral drugs have been more affordable (tenofovir: 2830 FCFA/month, lamuvidine: 1260 FCFA/2 months). In addition, the hygiene and dietary measures taken into account in our study are not specific to chronic hepatitis B carriers without complications. They are part of a healthy lifestyle, even in a healthy person. Similarly, its evaluation method based on self-reporting may overestimate or underestimate its rate. Finally, Burkina Faso is a country where the Muslim religion predominates (61.6%) and according to its precepts the consumption of alcohol is prohibited. A huge challenge arises with regard to the monitoring of hepatitis B. Meeting this challenge will help reduce therapeutic non-compliance.

4.2. Factors Associated with Therapeutic Non-compliance

4.2.1. Monthly Income < 200,000 FCFA Was Associated with Therapeutic Non-compliance

Participants with a monthly income of less than 200,000 FCFA had a risk of non-compliance with treatment p -value = 0.0066. Our results are corroborated by Tüncü et al. in Turkey in 2017 ($p = 0.001$), Kerui Xu et al. in China in 2018 ($p = 0.003$), Simona Ispas et al. in the United States in 2019 and Giles Vernick et al. in Burkina Faso in 2016. Indeed, chronic hepatitis B requires permanent, lifelong management and the annual cost of management in Burkina Faso is approximately 200,000 FCFA. Low socioeconomic status can force patients to make choices between these competing priorities. The cost of management then constitutes a major challenge to therapeutic compliance.

4.2.2. Age Was Associated with Medication Nonadherence

Our participants aged ≥ 50 years were at higher risk of

medication nonadherence (p -value = 0.0191). Similarly, Akande K. O. et al. in Nigeria in 2021 with a p -value = 0.01, and Wong Robert et al. in the United States in 2022 with a p -value = 0.012, reported an association between medication adherence and age [11, 23]. This could be due to the likelihood that older adults have more comorbidities, making managing multiple treatments more complex.

4.2.3. Sex Was Associated with Medication Nonadherence

Men were at higher risk of treatment non-adherence than women, with a p -value of 0.0256. Our results were similar to those of Yueyue Li et al. in China in 2021 ($p = 0.02$) [24].

However, Wong Robert in the United States in 2022 and Emin Ediz Tüncü et al. in Turkey in 2017 [23, 24] reported a significant association between male gender and better adherence. These differences could be due to the context of Burkina Faso. Although men are more economically active, they are less receptive to the treatments prescribed for them and have a longer waiting time for consultations. Finally, according to the 2020 statistical yearbook, we observed higher attendance at health centers among women.

4.2.4. Inadequate Hepatitis B Knowledge Was Associated with Medication Nonadherence

Participants with inadequate hepatitis B knowledge had an 11.503-fold (95% CI [1.067 - 123.964]) risk of medication nonadherence compared to those with perfect hepatitis B knowledge. Grace X. Ma et al. in 2022 reported a significant association between adequate HBV knowledge and appointment adherence (OR = 1.24, $p < 0.01$) [25]. A ċha Bhimla et al. in China in 2022 reported that better HBV knowledge was statistically associated with higher odds of moderate or high medication adherence (OR = 1.46, $p = 0.004$) [26]. Similarly, Suzanne Sheppard-Law et al. in Australia in 2018, in patients on antiretroviral therapy, reported that having inadequate health literacy was more likely to be non-adherent (OR = 2.7, 95% CI [1.3 - 5.5], $p < 0.007$) [27].

Adequate knowledge among chronic hepatitis B carriers about their disease, the dangers, complications, and the complexity of management in case of non-compliance would be a source of motivation to improve their level of therapeutic adherence. However, the lack of knowledge among physicians, particularly general practitioners, may stem from the lack of sufficient specialists in some hospitals or clinics, as well as the lack of clear guidelines. Practitioners must be up-to-date with current knowledge about hepatitis B in order to provide good therapeutic education to their patients.

4.3. Limits

Our study has limitations. First, the retrospective nature of our study could lead to information bias, such as memory bias. Indeed, some participants could not find their assessments,

others forgot the results or deteriorated some of their follow-up assessments. In addition, the collection of certain variables concerned data from dates at least 2 years prior to the exposure assessment date. Also, the socioeconomic level at the date of 2020 could vary between 2021 and 2023, which would therefore constitute a non-differential information bias.

5. Conclusion

This study highlights the persistent problem of non-adherence to hepatitis B treatment as a public health issue in Burkina Faso. The overall incidence of non-adherence to treatment remains high (47.1%), as does that of medical follow-up. Factors associated with non-adherence to treatment include a monthly income below 200,000 FCFA, inadequate knowledge, age ≥ 50 years, and male gender. To effectively combat this problem, it is necessary to make care, medications, and follow-up assessments accessible to the population in terms of cost. Also, it is essential to increase awareness to improve the knowledge of at-risk populations about hepatitis B. Furthermore, factors related to non-adherence to treatment due to health workers remain poorly understood. Thus, additional studies are needed to better understand this aspect of non-adherence to hepatitis B treatment and to provide additional information.

6. Recommendations

At the end of our study, inadequate knowledge of hepatitis B was associated with treatment non-adherence. An intervention study using technological innovations to strengthen awareness and therapeutic education should be conducted to better guide strategies for deepening populations' knowledge of the disease.

Our study identified factors related to treatment non-adherence due to "patients," while those that could be due to "healthcare workers" remain poorly understood. Thus, additional studies aimed at evaluating hepatitis B treatment management by health care workers according to national guidelines would be necessary to improve hepatitis B treatment adherence.

Abbreviations

BFELTP	Burkina Field Epidemiology and Laboratory Training Program
HBV	Hepatitis B Virus
HB	Hepatitis B
HDM	Hygiene and Dietary Measures
OR	Odds Ratio
NGOs	Non-governmental Organizations
WHO	World Health Organization

Acknowledgments

We thank the NGOs 'SOS Hepatites' and 'Assaut-Hepatites' for facilitating participant recruitment, and the Burkina Field Epidemiology and Laboratory Training Program for technical support.

Author Contributions

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Nicolas Meda: Funding acquisition, Writing – review & editing

Funding

This work is not supported by any external funding.

Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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