Sociodemographic and Clinical Predictors of Health Insurance Coverage among Patients Seeking Viral Hepatitis B and C Services in Nigeria: A Cross-Sectional Facility-Based Study

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Article

Sociodemographic and Clinical Predictors of Health Insurance Coverage among Patients Seeking Viral Hepatitis B and C Services in Nigeria: A Cross-Sectional Facility-Based Study

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Abstract: Background: Viral hepatitis B and C (HBV and HCV) pose significant public health challenges globally, particularly in Nigeria, where access to healthcare and treatment affordability are major concerns. This study aims to identify sociodemographic and clinical predictors of health insurance coverage among patients with HBV and HCV in Nigeria. **Methods:** A cross-sectional facility-based study was conducted at two secondary hospitals in Nasarawa State, Nigeria. Participants included patients diagnosed with HBV, HCV, or both and are > 18 years old. Data were collected using a structured questionnaire covering sociodemographic and clinical information, health insurance details, and economic impact. Logistic multivariate regression analysis was used to analyze the relationship between sociodemographic/clinical variables and health insurance status. **Results:** Out of 295 participants included in the final analysis, 67.1% had health insurance, primarily covering hepatitis screening and vaccination. Being aged 31-45 years (adjusted Odds Ratio [aOR]: 5.72, 95% Confidence Interval [CI]: 1.4 - 23.28, p = 0.02), having post-secondary education (aOR: 11.73, CI: 4.09 - 33.66, p < 0.001), and being HIV-positive (aOR: 2.86, CI: 1.02 - 8.02, p = 0.046) were significant predictors of health insurance coverage. Being unemployed significantly reduced the likelihood of having health insurance (aOR: 0.04, CI: 0.01 - 0.11, p < 0.001).**Conclusions:** This study reveals high insurance coverage among patients seeking viral hepatitis services in Nasarawa state, Nigeria and provides critical insights into the sociodemographic predictors of health insurance coverage. It also highlights the need for the expansion health insurance benefit package that covers for viral hepatitis diagnosis and treatment, especially for the younger adults, unemployed and less educated populations. This should be followed with adequate budgeting and policy implementation monitoring efforts, which are crucial for Nigeria's journey towards universal health coverage and elimination of viral hepatitis.

Keywords: health insurance; nigeria; universal health coverage; sociodemographic predictors; viral hepatitis B and C

1. Introduction

Globally, the challenge posed by viral hepatitis B and C (HBV and HCV) is significant and deeply concerning, particularly with the risk of liver cirrhosis and liver cancer. The World Health Organization (WHO) estimated that in 2019, a staggering figure of nearly 296 million people was living with chronic hepatitis B, and an additional 58 million were suffering from chronic hepatitis C globally [1]. Despite the availability of effective treatments and vaccines, the widespread impact of

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viral hepatitis on mortality and morbidity continues unabated. This is largely attributed to barriers such as the prohibitive cost of treatment and the lack of comprehensive health insurance coverage. Although many people are suffering and dying from viral hepatitis, only 21 percent are aware of their hepatitis status. As of 2019, the WHO projects that merely 62 percent of people with the disease had received treatment.

Reflecting on the situation in the United States, a study revealed worrying trend as individuals without health insurance who have HCV are significantly less likely to be aware of their infection compared to those who are insured [2]. This underscores a critical disparity in access to hepatitis care based on the individual insurance status. A similar scenario is observed in mainland China, where despite high levels of health insurance coverage, patients with chronic hepatitis C are burdened with substantial out-of-pocket expenses [3]. These findings are a stark reminder of the pressing need for comprehensive insurance coverage to bridge the gap in hepatitis care. In the Republic of Korea, another study reported a significant rise in the total cost of hepatitis B treatment over a period of 13 years [4] while in the United States, despite the increase in treatment rates for hepatitis C among insured individuals, disparities in access to care and the increasing economic burden persists [5]. These studies collectively highlight the financial barriers in managing hepatitis and emphasize the indispensable role of health insurance in facilitating access to treatment.

In Nigeria, the burden of viral hepatitis, coupled with its associated financial costs, presents a grim picture. With a population of 220 million, theNational AIDS Indicator and Impact Survey reported the prevalence of 1.1% and 8.1% respectively for hepatitis B and C. However, this could be up to 13% in Nasarawa state [6,7]. The prevalence rates translate to about 20 million Nigerians infected with viral hepatitis B and C. Nasarawa confronts challenges such as the low disease awareness and high disease burden. To combat this, in 2020, the state government committed to a five-year plan to screen 2.5 million and treat 141,000 people for HCV by 2025. Nasarawa state also provides free HCV services to patients dual infected with hepatitis and HIV within its HCV micro-elimination strategy.

Nigeria is grappling with the dual burden of communicable and non-communicable diseases, all within the context of limited healthcare resources and the limitations of universal health coverage. Studies like those conducted in two tertiary hospitals in Rivers state, Nigeria, have shown that the financial cost of managing viral hepatitis in Nigeria is overwhelming, often surpassing the financial capabilities of individuals and families, particularly in areas with limited resources [8,9]. This burden is further compounded by Nigeria's low minimum wage of ₦30,000 ($79), rendering the cost of hepatitis screening, diagnosis, treatment, and follow-up prohibitively expensive for a large segment of the population [8].

A critical component of this challenge is the issue of health insurance coverage in Nigeria. The National Health Insurance Authority (NHIA), which aims to provide universal health coverage, is yet to reach its full potential. Despite recent efforts to expand the benefit package to cover viral hepatitis diagnosis and treatment at secondary and tertiary facilities, its implementation is not evident on the field. The coverage for viral hepatitis is still limited, leaving many Nigerians to shoulder the high costs of healthcare services out-of-pocket. This situation is especially complex for patients with viral hepatitis B, who require continuous and often costly medical care. Report from the 2018 Nigeria Demographic and Health Survey indicated that only 3% of Nigerians have any form of health insurance [10]. According to another survey conducted by the Lagos Bureau of Statistics, only 11% of household members in Lagos state are covered by any form of health insurance [11]. The Lancet Nigeria Commission highlighted the challenges in Nigeria's health system, including low health investment and high out-of-pocket expenditures, which account for a staggering 77% of total health spending. This significantly hampers the progress towards achieving universal health coverage [12].

Despite the well-acknowledged importance of health insurance in managing viral hepatitis, there exists a notable gap in the literature concerning the sociodemographic and clinical predictors of health insurance coverage among HBV and HCV patients in Nigeria. Understanding these predictors is vital for developing targeted interventions aimed at improving health insurance benefit

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package and, subsequently, access to viral hepatitis services. This study investigated these predictors within the Nigerian context, where the burden of viral hepatitis is high, and the financial cost of care presents a formidable barrier to effective disease management.

The goals of this study are twofold: to identify the sociodemographic and clinical factors that predict health insurance coverage among patients with viral hepatitis B and C in Nigeria, and to understand how these factors influence access to and utilization of healthcare services for hepatitis. By addressing these objectives, the study seeks to contribute to the broader goal of achieving universal health coverage and reducing the burden of viral hepatitis in Nigeria. This research is particularly relevant in the context of Nigeria's ongoing efforts to reform its health system and expand health insurance coverage to include more comprehensive services through the Honorable Minister for Health's Nigeria Health Sector Renewal Investment Initiative.

2. Materials and Methods

Study Design

This is a cross-sectional, facility-based study, conducted at the General Hospital Akwanga (GH Akwanga) and Our Lady Apostle Hospitals (OLA) in Nasarawa State, Nigeria between November-December 2023.

Study setting

Nasarawa state is in North Central Nigeria with approximately 4 million inhabitants. Nasarawa state has a high prevalence of viral hepatitis, with 14% for HBV and 13.2% for HCV. The selection of Nasarawa State was strategic, given its high burden of both viral hepatitis B and C. GH Akwanga operates as a government-owned secondary health facility, while OLA is a faith-based institution. Both facilities are known for their comprehensive prevention, care, and treatment services for HIV, as well as viral hepatitis B and C, and offer diagnostic and testing services for tuberculosis, including GeneXpert machines optimized for viral load testing.

National and State Health Insurance Programs in Nigeria

The new National Health Insurance Act (NHIA) 2022, recently replaces the older 1999 Act. The aim is to provide mandatory health insurance for all Nigerians and legal residents. NHIA focuses on integrating and regulating health insurance schemes. It includes a fund for vulnerable groups and promotes the establishment of state health insurance schemes. In 2019, about 19 states were implementing these schemes [13]. These state schemes, funded partly by state revenues, aim to cover the poor and vulnerable, addressing the previous coverage gap. The Nasarawa State Health Insurance Agency (NASHIA) was established under the law in 2019. By September 2023, the NASHIA has successfully enrolled over 188,000 residents in its health insurance scheme [14]. The beneficiaries, registered under various packages like public sector, informal sector, vulnerable groups, and students, have been accessing healthcare services across the state. The Nasarawa State Government has implemented a compulsory health insurance policy for all state and local government employees. This mandate includes automatic coverage extension to an employee's spouse and up to four biological children 18 years old or less, under the same plan. The annual premium for this coverage is established at 15,000 Naira. The policy is designed with adaptability in mind, allowing the inclusion of additional dependents beyond the immediate nuclear family, such as older children, elderly parents, or other dependents, with the condition of an additional fee determined by NASHIA. Moreover, the Basic Healthcare Provision Fund mechanism is strategically utilized to subsidize health insurance, with a focus on aiding the more vulnerable segments of the population. This strategy ensures a comprehensive reach of healthcare benefits, catering to a wide array of demographic groups within Nasarawa State.

Participants

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To be included in the study, participants must be aged 18 years and above, diagnosed with hepatitis B, C, or both. These participants were either in the process of receiving, awaiting, or had completed treatment at either GH Akwanga or OLA hospitals. Individuals who tested negative for HbsAg or anti-HCV antibodies were systematically excluded from the study.

Data Collection

Data collection took place between November and December 2023. Two trained data collectors were deployed to administer an electronic, interviewer-assisted questionnaire, initially developed using Google Forms. To enhance data reliability and validity, this questionnaire was pilot tested at a health facility not included in the study, with subsequent revisions and feedback integrated into the final version before the actual administration. The questionnaire was designed to capture a wide array of sociodemographic and clinical information, alongside details on health insurance and the economic impact of viral hepatitis treatment. Moreover, patient medical records were meticulously reviewed to validate the diagnoses of hepatitis B or C, aligning with the study's inclusion criteria. Informed consent was obtained from all participants prior to questionnaire administration.

Questionnaire Structure

There was a total of 33 questions in the questionnaire, divided across four distinct sections: Section 1 (14 questions): Gathered sociodemographic and clinical information, including age, sex, area of residence, marital status, employment status, monthly household income, education level, population type, HIV status, and HBV/HCV status. Section 2 (5 questions): Concentrated on health insurance coverage and specific viral hepatitis services, delineating the type of health insurance and any accompanying restrictions. Section 3 (8 questions): Assessed the cost and affordability aspects of viral hepatitis services covered by health insurance. Section 4 (6 questions): Gathered information on comorbidity, patient experience, and recommendations for insurance coverage.

The responses from the electronic questionnaire saved in csv file format were exported into SPSS version 25 for efficient handling and analysis. Categorical variables within the dataset were systematically coded to facilitate quantitative analysis in SPSS. Each categorical variable was assigned a numeric code representing different categories or responses. For open-ended responses, a systematic coding process was used to transform the qualitative aspects of the dataset, making it ready for analysis using SPSS software. This involved assigning numeric codes to specific themes or categories derived from the qualitative data.

The dependent variable was the health insurance status of the participants, while independent variables included sociodemographic and clinical characteristics. Quantitative variables such as age, monthly household income, and education level were categorized for analysis. Age was grouped into predefined ranges (e.g., 18-30, 31-45, etc.) to facilitate age-specific analysis. Monthly household income was categorized into brackets (e.g., less than $500, $500-1000 and > $1000.) to assess the economic impact across different income levels. Education level was classified into categories such as no formal education, primary, secondary, and tertiary education. These groupings were chosen to enable a nuanced understanding of the sociodemographic factors influencing health insurance coverage among the study participants.

Bias and Study Size

The study acknowledged the potential for recall bias and implemented strategies to minimize its impact. The sample size was determined using Cochran's formula for cross-sectional studies, factoring in a 95% confidence level, a 50% proportion of catastrophic expenditure, a margin of error of 10%, and a non-response rate of 10% [15]. This calculation yielded a minimum sample size of 304 viral hepatitis patients.

Statistical Analysis

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Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics were presented in tables and charts, and logistic multivariate regression analysis was employed to examine the relationship between sociodemographic/clinical variables and health insurance status. In this study, missing data were addressed using listwise deletion. This approach was chosen as the amount of missing data was minimal. Out of the total responses, nine were from individuals who tested negative or had missing results for both HBV and HCV, thus not meeting the inclusion criteria. These responses were excluded from the final analysis. The impact of missing data was considered negligible on the overall study findings due to the robust sample size.

Ethics

The study received ethical clearance before its commencement. The Nigerian Health Research Ethics Committee (NHREC) approved the study protocol, with the approval number **NHREC/01/01/2007** dated **September 15, 2023**. Before recruitment, each participant provided verbal consent, ensuring their informed and voluntary participation. This study is part of a larger study titled "A multidimensional assessment of viral hepatitis in Nasarawa State, Nigeria".

3. Results

Table 1: Sociodemographic Characteristics of Participants

Majority of the study population were females (61.7%), with the majority within the 31-45 years age group (66.1%). Most participants were married (75.6%), and over half were employed (57.5%). The largest category of the respondents had a monthly household income less than $500 (66.1%) and had attained tertiary education (63.4%). About 58.3% of the participants reside in urban area while 41.7% reside in rural areas. The majority were either people living with HIV (55.3%) or from the general population (44.4%), with a small representation (0.3%) of persons who inject drugs (PWID). Notably, the distribution of HBV mono-infection, HCV mono-infection, and HBV/HCV co-infection among the studied population vary as follows: 18.3%, 68.1%, and 13.6%, respectively.

Table 1. Sociodemographic and clinical characteristics.

Variable	Category	Frequency(%)
Gender	Male	113(38.3)
	Female	182(61.7)
Age Group	18 - 30 years	35(11.9)
	31 - 45 years	195(66.1)
	46 - 60 years	60(20.3)
	> 60 years	5(1.7)
Marital Status	Single	48(16.3)
	Widowed	13(4.4)
	Married	223(75.6)
	Divorced	11(3.7)
Employment Status	Employed	170(57.6)
	Unemployed	101(34.2)
	Student	17(5.8)
	Retired	7(2.4)
Monthly Household Income ($)	<500	195(66.1)

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	500 - 1,000	74(25.1)
	>1,000	26(8.8)
Education	No post-secondary education	108(36.6)
	Post-secondary education	187(63.4)
Area of Residence	Urban	172(58.3)
	Rural	123(41.7)
Population Type	Persons Who Inject Drugs (PWID)	1(0.3)
	Population of people living with HIV	163(55.3)
	General population	131(44.4)
HIV Status	Negative	131(44.4)
	Positive	164(55.6)
Hepatitis Status	HBV mono-infection	54(18.3)
	HCV mono-infection	201(68.1)
	HBV/HCV co-infection	40(13.6)

3.2. Figures, Tables and Schemes

Table 2: Health Insurance Status and Coverage

Approximately two-thirds of the participants (67.1%) had health insurance while 32.9% do not have health insurance coverage. The majority were covered by government (state or federal) insurance schemes. The most common hepatitis services covered by insurance included testing for HBsAg/anti-HCV antibody (34.7%) and HBV vaccination (28.8%). Notably, a significant majority (98.5%) of respondents faced restrictions in insurance coverage for viral hepatitis services.

Table 2. Health Insurance Coverage and Hepatitis Service Access.

Variable	**Category**	**Frequency(%)**
Health Insurance Status	Yes	198(67.1)
	No	97(32.9)
Covered Hepatitis Services	Testing for HBsAg/anti-HCV antibody	70(35.4)
	HBV vaccination	55(27.8)
	HBV vaccination, Testing for HBsAg/anti-HCV antibody, Free Consultation for viral hepatitis	30(15.2)
	Treatment with DAAs or Tenofovir for HBV	19(9.6)
	Testing for HBsAg/anti-HCV antibody, Free Consultation for viral hepatitis	11(5.6)
	Free Consultation for viral hepatitis	7(3.5)
	Free confirmatory PCR	4(2)
	Free confirmatory PCR, Free Consultation for viral hepatitis	1(0.5)
	HBV vaccination, Free confirmatory PCR	1(0.5)

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Insurance Restrictions for Hepatitis	Yes	195(98.5)
	No	3(1.5)
Type of Health Insurance	Government (State)	125(63.1)
	Government (Federal)	48(24.2)
	Community Based Health Insurance	13(6.6)
	Private	6(3)
	Employer-based	5(2.5)
	Others	1(0.5)

Table 3: Association between Sociodemographic Factors and Health Insurance Coverage

Statistical analysis revealed significant associations between health insurance status and several sociodemographic factors. Age group, marital status, employment status, monthly household income, and education level showed significant differences between insured and uninsured groups. Specifically, individuals aged 31-45 years, married, employed, with higher household income, and higher education levels were more likely to be insured. Gender and area of residence did not show a significant association with insurance status.

	Health Insurance Status			
Sociodemographic factors	**Insured**	**Uninsured**	**X^2**	**p-value**
Gender			2.46	0.12
Male	82(41.5%)	31(32%)		
Female	116(58.6%)	66(68.1%)		
Age Group			19.43	<0.001[a]
18 - 30 years	14(7.1%)	21(21.6%)		
31 - 45 years	146(73.7%)	49(50.5%)		
46 - 60 years	36(18.2%)	24(24.7%)		
> 60 years	2(1%)	3(3.1%)		
Marital Status			32.73	<0.001[a]
Single	24(12.1%)	24(24.7%)		
Widowed	1(0.5%)	12(12.4%)		
Married	167(84.3%)	56(57.7%)		
Divorced	6(3%)	5(5.2%)		
Employment Status			165.47	<0.001[a]
Employed	159(80.3%)	11(11.3%)		
Unemployed	20(10.1%)	81(83.5%)		
Student	14(7.1%)	3(3.1%)		
Retired	5(2.5%)	2(2.1%)		
Monthly Household Income ($)			25.07	<0.001
<500	112(56.6%)	83(85.6%)		
500 - 1,000	62(31.3%)	12(12.4%)		
>1,000	24(12.1%)	2(2.1%)		

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Education Level			119.48	<0.001
No post-secondary education	30(15.2%)	78(80.4%)		
Post-secondary education	168(84.8%)	19(19.6%)		
Area of Residence			0.75	0.39
Urban	112(56.6%)	60(61.9%)		
Rural	86(43.4%)	37(38.1%)		
HIV Status			17.82	<0.001
Negative	71(35.9%)	60(61.9%)		
Positive	127(64.1%)	37(38.1%)		
Hepatitis Status			26.08	<0.001
HBV mono-infection	22(11.1%)	32(33%)		
HCV mono-infection	153(77.3%)	48(49.5%)		
HBV/HCV co-infection	23(11.6%)	17(17.5%)		
[a]Fisher's Exact Test	X^2 = Chisquare			

Table 4 presents the results of a binary logistic regression assessing the impact of sociodemographic factors on health insurance coverage among viral hepatitis patients. The unadjusted logistic regression model incorporated gender, age group, marital status, employment status, monthly household income, education level, and area of residence as independent variables. In the unadjusted analysis, individuals aged 31-45 years (compared to those aged 18-30 years; OR:4.47, 95% CI: 2.11 - 9.46, $p < 0.001$), those in a higher household income bracket of over $1000 (compared to less than $500; OR: 8.89, 95% CI: 2.04 - 38.68, $p < 0.001$), and those with tertiary education (compared with no post-secondary education; OR: 22.99, 95% CI: 12.19 - 43.35, $p < 0.001$) exhibited significantly increased odds of having health insurance. Conversely, being unemployed (compared to being employed; OR: 0.02, 95% CI: 0.01 - 0.04, $p < 0.001$) and being widowed (compared with being single; OR: 0.08, 95% CI: 0.01 - 0.69, $p = 0.02$) were significantly associated with decreased odds of having health insurance.

Upon adjustment for potential confounders in the logistic regression, only age, employment status, education level, and HIV status remained significant predictors of having health insurance among patients with viral hepatitis. Among these predictors, being aged 31-45 years (aOR: 5.72, 95% CI: 1.4 - 23.28, $p = 0.02$), having tertiary education (aOR: 11.73, 95% CI: 4.09 - 33.66, $p < 0.001$), and being HIV-positive (aOR: 2.86, CI: 1.02 - 8.02, $p = 0.046$) were identified as significant determinants of having health insurance in the adjusted model. Conversely, being unemployed (aOR: 0.03, 95% CI: 0.01 - 0.09, $p < 0.001$) significantly reduced the likelihood of having health insurance.

In viral hepatitis patients, being married was associated with significantly higher odds of having health insurance (COR = 2.98, 95% CI [1.57 - 5.66]) compared to individuals who were single. Likewise, individuals with a household income between $500 and $1000 demonstrated significantly increased odds of having health insurance (COR = 3.38, 95% CI [1.94 - 7.56]) compared to those earning less than $500. Moreover, viral hepatitis patients with a household income exceeding $1000 exhibited notably higher odds of having health insurance (COR = 8.89, 95% CI [2.04 - 38.68]) compared to those earning less than $500. However, upon adjustment for other socio-demographic factors, the observed differences in the odds of having health insurance ceased to remain significant.

Table 4. Binary Logistic Regression Analysis Assessing the Influence of Sociodemographic Factors on Health Insurance Coverage.

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)[a]	p-value
Gender				

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Male	Ref.		Ref.	
Female	0.66(0.4 - 1.11)	0.12	1.62(0.63 - 4.16)	0.31
Age Group				
18 - 30 years	Ref.		Ref.	
31 - 45 years	4.47(2.11 - 9.46)	<0.001	5.72(1.4 - 23.28)	0.02
46 - 60 years	2.25(0.96 - 5.27)	0.06	2.98(0.5 - 17.65)	0.23
> 60 years	1.00(0.15 - 6.77)	1.00	102.5(0.82 - 12796.28)	0.06
Marital Status				
Single	Ref.		Ref.	
Widowed	0.08(0.01 - 0.69)	0.02	0.03(0.001 - 1.45)	0.08
Married	2.98(1.57 - 5.66)	<0.001	1.12(0.33 - 3.77)	0.86
Divorced	1.2(0.32 - 4.47)	0.79	0.21(0.02 - 2.12)	0.18
Employment Status				
Employed	Ref.		Ref.	
Unemployed	0.02(0.01 - 0.04)	<0.001	0.04(0.01 - 0.11)	<0.001
Student	0.32(0.08 - 1.29)	0.11	0.32(0.04 - 2.82)	0.30
Retired	0.17(0.03 - 1)	0.049	0.08(0.01 - 1.01)	0.05
Monthly Household Income ($)				
<500	Ref.		Ref.	
500 - 1,000	3.83(1.94 - 7.56)	<0.001	1.17(0.33 - 4.11)	0.81
>1,000	8.89(2.04 - 38.68)	<0.001	0.85(0.13 - 5.59)	0.86
Education Level				
No post-secondary education	Ref.		Ref.	
Post-secondary education	22.99(12.19 - 43.35)	<0.001	11.73(4.09 - 33.66)	<0.001
Area of Residence				
Urban	Ref.		Ref.	
Rural	0.8(0.49 - 1.32)	0.39	2.33(0.8 - 6.79)	0.12

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HIV Status				
Negative	Ref.		Ref.	
Positive	2.9(1.76 - 4.79)	<0.001	2.86(1.02 - 8.02)	0.046
Hepatitis Status				
HBV/HCV co-infection	Ref.		Ref.	
HBV mono-infection	0.51(0.22 - 1.16)	0.11	0.38(0.07 - 1.91)	0.24
HCV mono-infection	2.36(1.16 - 4.77)	0.02	0.78(0.19 - 3.18)	0.73

[a]Adjusted for gender, age group, marital status, employment status, monthly household income, education, area of residence, HIV status, and hepatitis status. CI: Confidence interval, OR: Odds ratio.

4. Discussion

This study found that 67.1% of patients with viral hepatitis in Nigeria had health insurance, predominantly covering hepatitis B and C screening and HBV vaccination. However, a striking 98.5% faced some form of restriction in accessing viral hepatitis services, underscoring the challenges in achieving comprehensive health insurance coverage in Nigeria. A significant 63% of the insured respondents were commendably covered by the state government health insurance scheme, reflecting publicity and awareness and marketing efforts of the state health insurance program. The restriction scenario resonates with findings in the United States, where insured patients, particularly those on Medicaid, encounter barriers to initiating Direct Antiviral Agents (DAA) treatment and are 46% less likely to start treatment compared to those with private health insurance [16].

In mainland China, for instance, patients with chronic hepatitis C, despite having high health insurance coverage, still face substantial out-of-pocket expenses [3,4]. This mirrors the situation in Nigeria, where the high cost of hepatitis treatment remains a significant barrier. The economic burden of hepatitis treatment, highlighted in the Republic of Korea [3], further underscores the urgent need for affordable healthcare solutions. The type of insurance significantly influences healthcare affordability, particularly for high efficacy but costly anti-viral medications against viral hepatitis in low- and middle-income countries. The implementation of global price reduction for hepatitis B and C medications is therefore crucial to make treatment affordable for patient community in poor resource setting like Nigeria.

Our findings regarding the sociodemographic and clinical predictors of health insurance among patients with viral hepatitis in Nigeria resonates with the global call for action to address healthcare disparities and inefficiencies and provide critical insights for healthcare providers, policymakers, and the public. The Lancet Nigeria Commission emphasizes the need for a holistic, whole-of-government approach to universal health coverage and health insurance systems in Nigeria, supported by contributions and taxation, to address health inequities and economic challenges [12]. This aligns with our study, which showed that being aged 31–48 years, having higher education (tertiary), and being employed significantly increased the likelihood of having health insurance. These findings are consistent with other studies from Nigeria, Ghana, Nepal, China, and the United States [2-3,17-19]. However, a critical observation is the relatively low overall health insurance coverage among the general population in Nigeria, ranging between 2.1% and 9.5% [10, 17, 20], and 0.5% to 57.9% across various African countries [21]. This highlights a substantial gap in the existing health insurance systems in Nigeria and across Africa.

A recent study from Rivers State, Nigeria, revealed the formidable economic burden of hepatitis B management, where the annual cost for a single patient amounts to ₦564,959 (approximately $1,487), translating to a monthly expense of ₦47,070 (around $124). This cost exceeds the monthly

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income of an individual earning the minimum wage in Nigeria, which is ₦30,000 ($79), signifying that managing hepatitis B could consume more than their entire monthly earnings [8]. The scenario is even more challenging for those without formal or informal employment. This situation highlights the financial barriers faced by average Nigerians, especially those on minimum wage, who may end up spending almost double their monthly income on treatment.

Nigeria's high out-of-pocket healthcare expenditure, constituting 77% of total health spending—compared to the African average of 37% and the global average of 18%—calls for a strategic reform of the healthcare system to enhance both equity and efficiency [12]. Such a financial burden not only impedes healthcare access but also exacerbates existing health disparities. The World Health Organization's 2023 report on Nigeria's path to achieving universal health coverage underscores the critical need to integrate health insurance schemes into broader health system reforms [22]. This integration is pivotal to ensure that essential viral hepatitis prevention, care and treatment services are accessible to everyone, irrespective of their socioeconomic status.

Interestingly, our study also found that rural residents in Nigeria are more likely to have health insurance, which deviates from the typical urban-rural disparity in healthcare access. This finding might reflect recent initiatives aimed at expanding health insurance in rural areas of Nigeria, aggressive marketing strategy of the state insurance program and political commitment of the government of Nasarawa state towards universal health coverage. This may also indicate a higher disease burden in these areas that necessitates insurance coverage. However, it contrasts with the global trend where urban residents usually have better access to healthcare services.

In Nigeria, health insurance coverage, at National and state levels, reveals gaps in addressing viral hepatitis across specific age groups. The NHIA Operational Guidelines 2023 reveal disparities in health insurance coverage across different age groups, which may particularly exclude the demographics that are typically at risk of viral hepatitis [23]. Per the operational guidelines, the plan covers employees (enrollees), their spouses, and up to four biological children under the age of 18 years. This framework, however, overlooks dependents over 18 years, unless they are included in specialized schemes like the Tertiary Institution Social Health Insurance Program (TISHIP) or any other available mechanisms after paying additional fee. The study found a higher likelihood of health insurance coverage among individuals aged 31-45 years, who primarily belong to the working-age group. This underscores a significant coverage gap for younger adults and elderly populations, who are at higher risk for infection with hepatitis B and C respectively. In addition, the public health imperative of family contact tracing following the diagnosis of hepatitis B and C warrants family-centered approach to coverage with no age exception. The imperative for more inclusive and comprehensive health insurance policies is evident from this finding. There are several limitations of our study, which include the potential for recall bias, the inherent constraints of a cross-sectional design, and the focus on only two hospitals, both of which are equipped with NHIA clinics. This specific focus may have inadvertently led to an overestimation of insurance coverage among patients with viral hepatitis.Notwithstanding, the findings are relevant and applicable to other poor resource settings.

In conclusion, this study highlights a high insurance coverage among patients seekig viral hepatitis services in Nasarawa state, Nigeria. The findings underscore significant disparities in healthcare access and insurance coverage among patients with viral hepatitis in Nigeria. A critical recommendation is the global price reduction for Direct-Acting Antivirals (DAAs) for the management of HCV and Tenofovir for HBV, especially in low- and middle-income countries (LMICs). These treatments, being pan-genotypic and effective, must be made more affordable and accessible. Additionally, similar price reductions for confirmatory and follow-up PCR diagnostics are critical, as diagnostic costs are increasingly becoming barriers in these regions. Innovations like Xpert optimization could greatly enhance access to these essential diagnostics. The findings highlight the urgent need for increased investment in health insurance reforms in Nigeria and other LMICs. This should cater for broader coverage of populations at higher risk of viral hepatitis and underrepresented demographics. The study also highlights the need for the expansion health insurance benefit package that covers for viral hepatitis diagnosis and treatment, especially for the

younger adults, unemployed and less educated populations. This should be followed with adequate budgeting and policy implementation monitoring efforts, which are crucial for Nigeria's journey towards universal health coverage and elimination of viral hepatitis. Integrating health insurance schemes into broader health system reforms is crucial to achieving universal health coverage and ensuring equitable access to essential viral hepatitis prevention, care, and treatment services for all.

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References

1. World Health Organization. Global progress report on HIV, viral hepatitis and sexually transmitted infections, 2021. Available at: https://www.who.int/publications/i/item/9789240027077
2. Ditah I, Al Bawardy B, Gonzalez HC, Saberi B, Ditah C, Kamath PS, Charlton M. Lack of health insurance limits the benefits of hepatitis C virus screening: insights from the National Health and Nutrition Examination Hepatitis C follow-up study. Am J Gastroenterol. 2015 Aug;110(8):1126-33. doi: 10.1038/ajg.2015.31. Epub 2015 Mar 10. PMID: 25756239. https://journals.lww.com/ajg/abstract/2015/08000/lack_of_health_insurance_limits_the_benefits_of.2.aspx
3. Zhou HY, Liu S, Zheng SJ, Peng XX, Chen Y, Duan C, Zheng QF, Wang Z, Duan ZP. Coverage of different health insurance programs and medical costs associated with chronic hepatitis C infection in mainland China: a cross-sectional survey in 20 provinces. Hepatol Med Policy. 2016 Apr 28;1:7. doi: 10.1186/s41124-016-0008-6. PMID: 30288311; PMCID: PMC5918569.
4. Baik D, Kim BW, Oh JK, Kim KA, Ki M. Costs of viral hepatitis B in the Republic of Korea, 2002-2015. J Viral Hepat. 2020 Feb;27(2):156-167. doi: 10.1111/jvh.13219. Epub 2019 Nov 14. PMID: 31638305. https://onlinelibrary.wiley.com/doi/10.1111/jvh.13219
5. Harris AM, Khan MA, Osinubi A, Nelson NP, Thompson WW. Hepatitis C Treatment Among Commercially or Medicaid-Insured Individuals, 2014-2018. Am J Prev Med. 2021 Nov;61(5):716-723. doi: 10.1016/j.amepre.2021.05.017. Epub 2021 Aug 3. PMID: 34362617. https://linkinghub.elsevier.com/retrieve/pii/S0749-3797(21)00348-2
6. Nasarawa State 2022. Building through the Pandemic. Viral Hepatitis Elimination Program https://nasarawastate.gov.ng/wp-content/uploads/2022/07/NS-VHTWG-Newsletter_2022_FV_3_13072022-Updated-2.pdf
7. Federal Ministry of Health, Nigeria. Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) 2018: Technical Report. Abuja, Nigeria. October 2019.
8. Alali, AA; Dan-Jumbo, A; Ogaji, DS (2023). Cost of Managing Chronic Hepatitis B in a Resource-Poor Setting; The Implications for Universal Health Coverage Reform. *Greener Journal of Medical Sciences*, 13(2): 155-163, https://doi.org/10.5281/zenodo.8332533.
9. Nathanie Gbaoron 2020. NGO calls for insurance coverage for treatment of Hepatitis in Nigeria. https://businessday.ng/health/article/ngo-calls-for-insurance-coverage-for-treatment-of-hepatitis-in-nigeria/
10. National Population Commission (NPC) [Nigeria] and ICF. 2019. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF. 2019. Accessed January 14, 2024. Accessed January 14, 2024 from from https://www.dhsprogram.com/pubs/pdf/FR359/FR359.pdf

11. Lagos State Government 2016. Household Survey 2016 Report. Accessed January 14, 2024 from https://mepb.lagosstate.gov.ng/wp-content/uploads/sites/29/2020/08/House-Hold-REPORT-Y2016.pdf
12. Abubakar I, Dalglish SL, Angell B, Sanuade O, Abimbola S, Adamu AL, Adetifa IMO, Colbourn T, Ogunlesi AO, Onwujekwe O, Owoaje ET, Okeke IN, Adeyemo A, Aliyu G, Aliyu MH, Aliyu SH, Ameh EA, Archibong B, Ezeh A, Gadanya MA, Ihekweazu C, Ihekweazu V, Iliyasu Z, Kwaku Chiroma A, Mabayoje DA, Nasir Sambo M, Obaro S, Yinka-Ogunleye A, Okonofua F, Oni T, Onyimadu O, Pate MA, Salako BL, Shuaib F, Tsiga-Ahmed F, Zanna FH. The Lancet Nigeria Commission: investing in health and the future of the nation. Lancet. 2022 Mar 19;399(10330):1155-1200. doi: 10.1016/S0140-6736(21)02488-0. Epub 2022 Mar 15. PMID: 35303470; PMCID: PMC8943278.
13. Price Water Cooper Sustainability of State Health Insurance Schemes in Nigeria: Beyond the Launch. Available from: https://www.pwc.com/ng/en/assets/pdf/sustainability-state-health-insurance-nigeria.pdf
14. Nathaniel Gbaoron 2023. Over 188,000 people enrolled on Nasarawa health insurance scheme – NASHIA. Accessed from https://tribuneonlineng.com/over-188000-people-enrolled-on-nasarawa-health-insurance-scheme-nashia/
15. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. Gastroenterol Hepatol Bed Bench. 2013 Winter;6(1):14-7. PMID: 24834239; PMCID: PMC4017493
16. Thompson WW, Symum H, Sandul A, et al. Vital Signs: Hepatitis C Treatment Among Insured Adults — United States, 2019–2020. MMWR Morb Mortal Wkly Rep 2022;71:1011-1017. DOI: http://dx.doi.org/10.15585/mmwr.mm7132e1. Accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9400534/
17. Aregbeshola BS, Khan SM. Predictors of Enrolment in the National Health Insurance Scheme Among Women of Reproductive Age in Nigeria. Int J Health Policy Manag. 2018 Nov 1;7(11):1015-1023. doi: 10.15171/ijhpm.2018.68. PMID: 30624875; PMCID: PMC6326643.
18. Aaron Alesane et al. Uptake of health insurance by the rural poor in Ghana: determinants and implications for policy. Pan African Medical Journal. 2018;31:124. Accessed from: https://www.panafrican-med-journal.com/content/article/31/124/full/
19. Bhusal UP, Sapkota VP. Predictors of health insurance enrolment and wealth-related inequality in Nepal: evidence from Multiple Indicator Cluster Survey (MICS) 2019. BMJ Open. 2021 Nov 26;11(11):e050922. doi: 10.1136/bmjopen-2021-050922. PMID: 34836898; PMCID: PMC8628343. Accessed from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8628343/
20. Erinoso, Olufemi, Afolabi Oyapero, Oluwabukunmi Familoye, Adenike Omosun, Adeyinka Adeniran, and Yetunde Kuyinu. "Predictors of health insurance uptake among residents of Lagos, Nigeria". Population Medicine 5 no. July (2023): 19. doi:10.18332/popmed/169666. Available from: http://www.populationmedicine.eu/Predictors-of-health-insurance-uptake-among-residents-nof-Lagos-Nigeria,169666,0,2.html
21. Shao L, Wang Y, Wang X, Ji L, Huang R (2022) Factors associated with health insurance ownership among women of reproductive age: A multicountry study in sub-Saharan Africa. PLoS ONE 17(4): e0264377. https://doi.org/10.1371/journal.pone.0264377. Accessed from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264377
22. WHO 2023 In Nigeria, stakeholders are charting a sustainable pathway to achieving Universal Health Coverage for all. Accessed from: https://www.afro.who.int/countries/nigeria/news/nigeria-stakeholders-are-charting-sustainable-pathway-achieving-universal-health-coverage-all
23. National Health Insurance Authority Operational Guideline, 2023. Available from: https://www.nhis.gov.ng/