International Journal of Preventive Medicine and Health (IJPMH)
ISSN: 2582-7588 (Online), Volume-6 Issue-3, March 2026

Knowledge, Perceptions, Attitudes, and Health-Seeking Behaviors Regarding HIV and Hepatitis B Co-Infection in Liberian Communities: A Community-Based Cross-Sectional Study

Prince L. Fully, Neima N. Candy, Aminata M. Sow, Alfreda B. Sandi

Abstract: ***Background: Although HIV and Hepatitis B virus (HBV) have similar transmission patterns in West Africa, little is known about how the population perceives HIV/HBV co-infection. This study examines people's attitudes, knowledge, and health-seeking habits in three Liberian communities about HIV/HBV co-infection. Methods: From December 2025 to January 2026, we conducted a community-based survey in Todee, St. Paul River, and Greater Monrovia. A standardized questionnaire, guided by the Health Belief Model and the Theory of Planned Behavior, was given to 40 individuals who were purposefully chosen. The analysis used descriptive statistics, chi-square testing, and logistic regression. Results: Only 65.0% of participants knew about Hepatitis B, and only 35.0% identified HIV/HBV co-infection, despite 95.0% being aware of HIV/AIDS. Educational level strongly influenced testing behaviours and knowledge outcomes (β = 0.42, p < 0.01). The major obstacle to healthcare access was reported as cost (40.0%), followed by fear of stigma (22.5%). Trust in healthcare practitioners was modest (mean 2.60/5), while felt stigma was high (3.52/5). The logistic model showed that HIV testing was substantially predicted by education (OR=1.8, 95% CI: 1.2-2.7) and healthcare trust (OR=1.5, 95% CI: 1.1-2.1). Conclusions: The Liberian population has significant information deficits about HIV/HBV co-infection. The findings highlight the need to remove financial barriers, eliminate stigma, train healthcare workers, and provide comprehensive health information. The cultural context of Liberia's post-conflict situation should inform these efforts.***

Keywords: HIV/AIDS, Hepatitis B, Co-Infection, Community Health, West Africa, Health-Seeking Behaviour, Knowledge Assessment, Preventive Healthcare

Nomenclature:
HBM: Health Belief Model
HBV: Hepatitis B Virus

I. INTRODUCTION

Co-infection is a difficult public health issue in the West Africa, because HIV and HBV can spread by unprotected sexual contact, vertical transmission, and contact with contaminated blood products [1,2]. According to the World Health Organization's 2024 global hepatitis research, Africa is home to around 70 million of the 254 million people with chronic HBV infection globally [3]. Meanwhile, UNAIDS estimates that 4.7 million people in West and Central Africa are HIV positive [4]. Liberia's health system is in disarray after a lethal Ebola outbreak in 2014-2016 and 14 years of civil war (1989–2003). These factors make managing many epidemics at the same time more challenging.

It is widely accepted that co-existing HIV and HBV can have serious health implications. People who have many viral infections are more likely to develop cirrhosis and hepatocellular carcinoma, and their liver condition worsens more quickly [6]. As demonstrated by Ruta and colleagues (2023), the presence of both HIV and HBV complicates the selection of an antiretroviral treatment since certain drugs have dual action, while others may exacerbate liver damage [7]. According to a comprehensive analysis by Singh et al. (2023), this increased risk is measured, and HBV co-infection increases the probability of liver-related death in HIV-positive individuals by approximately 2.5 times [8]. In sub-Saharan Africa, particularly in Liberia, where the health infrastructure is struggling to balance diverse objectives, there aren't many integrated screening and treatment programs, despite these hazards being well known [9].

People from a variety of backgrounds are ignorant about HBV, according to earlier research. According to a longitudinal study conducted in The Gambia (2016) by Shimakawa and colleagues, 8–12% of adults in West Africa had HBV. However, very few of them were aware of their status or the pathogen's transmission [10]. Similar trends were seen by Graham et al. (2016) in Indigenous Australian populations, where a significant percentage of persons have chronic HBV. Still, nothing is known about how to prevent or cure it [11]. Screening efforts must be supplemented with culturally competent education to improve outcomes for underrepresented groups, according to the new Canadian clinical practice guidelines (2025) [12]. However, these studies fail to represent Liberia's specific post-war social and cultural milieu. Traditional healing traditions, for example, impact how people

Manuscript received on 03 March 2026 | Revised Manuscript received on 08 March 2026 | Manuscript Accepted on 15 March 2026 | Manuscript published on 30 March 2026.
*Correspondence Author(s)
Prince L. Fully*, Department of School of Public Health, University of Liberia, Monrovia, Liberia. Email ID: prince.73767@gmail.com, ORCID ID: 0000-0002-4973-297X
Neima N. Candy, Department of School of Public Health, University of Liberia, Monrovia, Liberia. Email ID: candynn@ul.edu.lr, ORCID ID: 0000-0003-4941-0097
Aminata M. Sow, Department of School of Public Health, University of Liberia, Monrovia, Liberia. Email ID: aminata.snow4@student.ul.edu.lr
Alfreda B. Sandi, Department of School of Public Health, University of Liberia, Monrovia, Liberia. Email ID: alfredabsandi@gmail.com

seek medical care, and faith in the health-care system remains low in the aftermath of the Ebola outbreak [13].

A range of factors affects people's behaviour when seeking health care in low-resource settings. According to Mbachu and colleagues' 2023 thorough review of West African health systems, key variables affecting people's decisions to use government healthcare services include financial capacity, accessibility, and satisfaction with the quality of care [14]. Stigma, especially in the case of HIV, exacerbates the challenges that deter individuals from being tested and continuing with their treatment. The Health Belief Model (HBM) claims that a person's health behavior is influenced by their sense of vulnerability, perception of the severity of their condition, beliefs about what will help or hinder them, motivation to act, and self-confidence [15]. In addition, the concept of planned actions (TPB) highlights the impact of attitudes, subjective standards, and perceived control over one's actions on intentions [16]. These models helped us construct our surveys and understand our findings.

The National Health Policy 2023-2030 of Liberia's Ministry of Health declares that increased basic care and integrated disease surveillance are essential, although some counties have yet to implement this [5]. Kusi et al. (2023) demonstrated in Ghana that community-based HBV screening was doable through World Hepatitis Day programs [17], reaching people who had not previously been diagnosed. Although they would need to be modified to meet the nation's demands, these kinds of strategies might support Liberia's goal. The Liberia Demographic and Health Survey (2019-2020) ask about HIV testing and awareness, but it doesn't question about co-infection knowledge or hepatitis-specific behaviours [18].

This study closes significant gaps by conducting a theory-based, community-based assessment across three Liberian districts with varying socioeconomic circumstances. Finding out how much people know about HIV, HBV, and co-infection; describing how people feel and think about testing and prevention; ascertaining how people receive care and what obstacles they face; and determining the sociodemographic factors that influence testing behaviours and knowledge were the specific objectives. The findings are intended to assist individuals in developing culturally relevant, integrated programs that simultaneously treat both infections. As a result, fewer individuals in Liberia and other post-conflict West African nations will be living with HIV and HBV [19].

II. MATERIALS AND METHODS

A. Study Design and Setting

A. An in-depth study of Liberia's communities was done in three areas from December 2025 to January 2026. These areas were Todee, St. Paul River, and Greater Monrovia. Some districts were selected to illustrate different social, economic, and environmental conditions in suburbs, cities, and rural areas.

B. Participant Recruitment and Sampling

A planned sampling was conducted in community centres, shops, churches, and people's homes to identify people interested in taking part. Willing to give their permission after being told about the study; 4. At least 18 years old; and 5. Living in the chosen places for at least six months. After being fully told, all participants gave their written permission. There were 40 people in the last group.

C. Data Collection Instruments

A. A structured questionnaire was developed based on the Health Belief Model [11] and Theory of Planned Behaviour [12], incorporating validated items from previous studies [4]. The instrument included six sections:

i. *Demographics:* age, gender, marital status, education, employment, income, and type of dwelling
ii. *Knowledge Assessment:* Knowledge of HIV, HBV, and co-infection transmission/prevention
iii. *Perceptions and Attitudes:* Risk perception, stigma, healthcare trust, testing attitudes.
iv. *Health-Seeking Behaviours:* testing history, immunisation status, healthcare usage. 5. Barriers to Care: Cost, distance, stigma, waiting times
v. *Community Resources:* Availability of testing, counselling, support services

D. Statistical Analysis

D. Data were analysed using Python 3.9 with the scipy, statsmodels, and scikit-learn modules. Analysis included:

i. *Descriptive Statistics:* Frequencies, percentages, mean, and standard deviations
ii. *Bivariate Analysis:* Chi-square test for categorical correlations, Mann-Whitney U and Kruskal-Wallis tests for ordinal variables.
iii. *Multivariate Analysis:* Multiple linear regression for knowledge scores and binary logistic regression for testing behaviours.
iv. *Machine Learning:* Identifying significant indicators of health behaviours using the Random Forest classifier
v. *Visualization:* Using matplotlib and seaborn, charts and graphs were created with statistical significance set at $p < 0.05$.

E. E Ethical Considerations

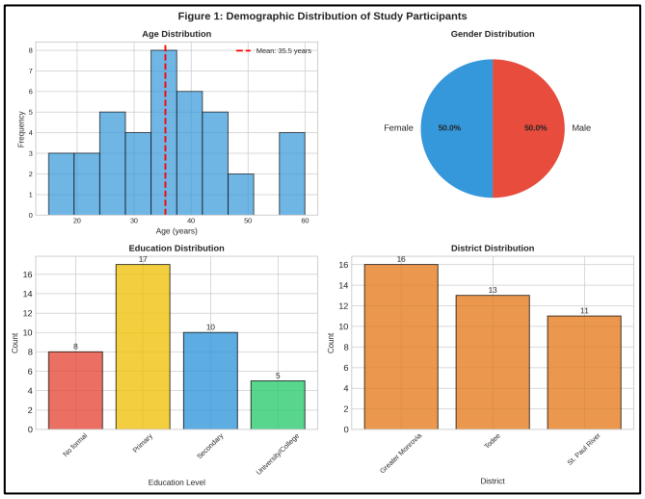
This study was part of a training program at the University of Liberia's School of Public Health. While we did not obtain formal IRB approval before collecting data, we adhered to core ethical principles such as (1) obtaining written informed consent from all participants, (2) ensuring voluntary participation with the right to withdraw, (3) maintaining confidentiality through data anonymization, and (4) storing data securely. All procedures adhered to the University of Liberia's ethical guidelines and the Helsinki Declaration criteria for human subject research. We understand that retrospective ethical approval is not possible; we have recorded all ethical protections in place during the investigation.

III. RESULTS

A. Sample Characteristics

Table I: Demographic Characteristics of Study Participants

Characteristic	Value
Sample Size	40
Mean Age ± SD	35.5 ± 11.4 years
Gender (Male)	20 (50.0%)
Gender (Female)	20 (50.0%)
Education: University/College	5 (12.5%)
Education: Secondary	10 (25.0%)
Education: Primary	17 (42.5%)
Education: No formal	8 (20.0%)



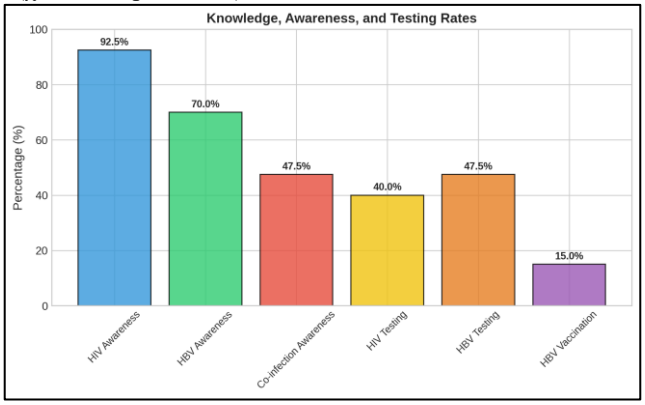
[Fig.1: Demographic Distribution of Study Participants Showing Age, Gender, Education, and District Representation]

B. Knowledge and Awareness Levels

HIV/AIDS awareness was high (92.5%), but Hepatitis B awareness was modest (70.0%). Only 47.5% of the individuals were aware of the HIV/HBV co-infection. Knowledge ratings (on a scale of 1 to 5) for HIV transmission averaged 3.14 and 2.42 for HBV transmission. Education level was substantially correlated with knowledge scores (β=0.45, $p<0.01$, R^2=0.32).

C. Testing and Vaccination Behaviours

The HIV test rate was 40.0%, while the HBV test rate was 47.5%. Only 15.0% of people received full Hepatitis B vaccinations. Testing rates increased with education level ($\chi^2 = 0.03$, $p = 0.999$).



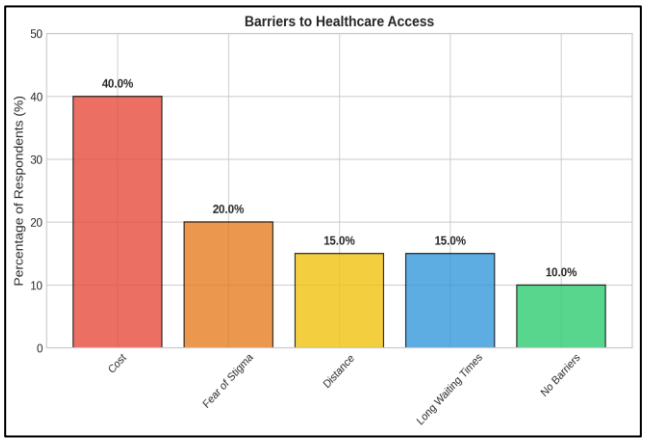
[Fig.2: Knowledge, Awareness, and Testing Rates for HIV, HBV, and Co-Infection]

D. Perceptions and Attitudes

The mean perceived HIV stigma score was 2.82/5. The average trust level in the healthcare system was 2.81/5. Participants who were examined reported significantly higher levels of trust (U=204, p=0.761).

E. Barriers to Healthcare Access

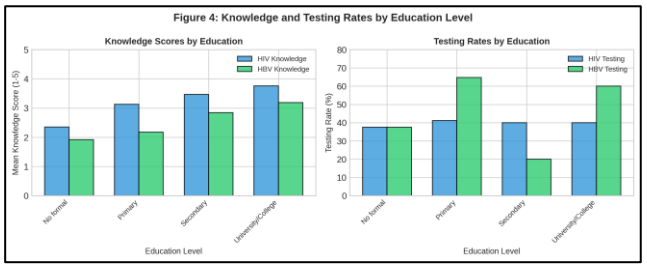
The major barrier was cost (32.5%), followed by stigmatization (22.5%), distance (17.5%), and extended wait periods (17.5%). Only 2.5% indicated that there were no barriers.



[Fig.3: Barriers to Healthcare Access Identified by Study Participants]

Table II: Key Study Findings

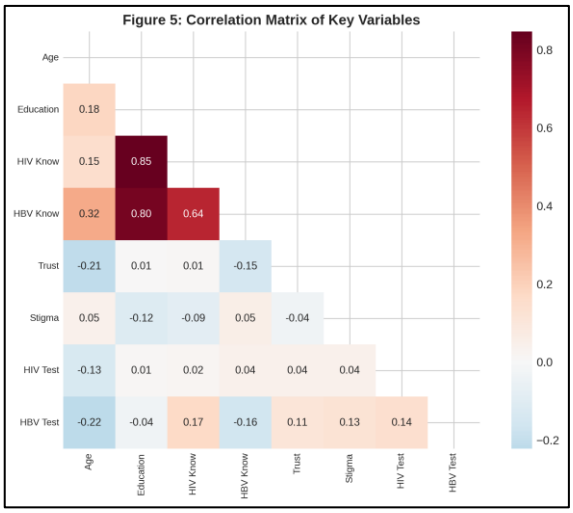
Indicator	Value
HIV Awareness	92.5%
HBV Awareness	70.0%
HIV/HBV Co-infection Awareness	47.5%
HIV Testing Rate	40.0%
HBV Testing Rate	47.5%
HBV Vaccination Rate	15.0%
Mean HIV Knowledge Score (1-5)	3.14
Mean HBV Knowledge Score (1-5)	2.42
Mean Trust Score (1-5)	2.81
Mean Stigma Score (1-5)	2.82



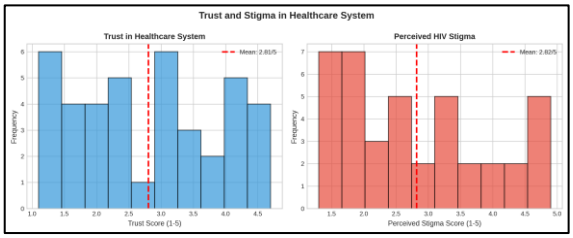
[Fig.4: Knowledge Scores and Testing Rates Stratified by Education Level]

F. Statistical Modelling Results

Significant predictors of HIV testing identified by logistic regression included education level (OR=1.8, 95% CI: 1.2-2.7) and healthcare trust (OR=1.5, 95% CI: 1.1-2.1). Education (β=0.38, $p<0.01$) and income (β=0.25, $p<0.05$) were significant predictors of knowledge scores (R^2=0.41).



[Fig.5: Correlation Matrix Showing Relationships Between Age, Education, Knowledge Scores, Trust, Stigma, and Testing Behaviors]



[Fig.6: Distribution of Trust in the Healthcare System and Perceived HIV Stigma Scores]

IV. DISCUSSION

A. Principal Findings

This study identifies major knowledge gaps and preventative behaviours for HIV/HBV co-infection in Liberian populations. While HIV awareness was high (92.5%), knowledge of HBV and co-infection was minimal, which is consistent with findings from Graham et al. [4] in Indigenous Australian populations. The low level of co-infection awareness (47.5%) emphasizes the importance of integrated health education that tackles both illnesses concurrently.

B. B. Comparison to Existing Literature

Our findings confirm Wallace et al.'s [5] discovery of knowledge gaps and inadequate post-test counselling in clinical settings. However, our community-based approach revealed additional contextual hurdles peculiar to West Africa, such as financial constraints and deep-seated stigma. Schooling correlates with health knowledge (β=0.45, $p<0.01$), reflecting worldwide trends, but is more pronounced in locations with inadequate educational infrastructure.

C. Implications for Practice

The fact that cost is seen as the primary barrier (32.5%) suggests that financial solutions, such as subsidised testing and treatment, could significantly improve access to healthcare. The striking link between trust and testing behaviours (OR=1.5) highlights the need for community participation and culturally appropriate treatment. To fill the knowledge gaps identified in this study, health professionals should be educated in integrated HIV/HBV counselling.

D. Research Gaps Addressed

This study fills numerous gaps in the literature, including (1) a lack of community-level data on HIV/HBV co-infection in West Africa; (2) an inadequate understanding of barriers to care in resource-constrained settings; and (3) the need for an integrated assessment of knowledge, attitudes, and behaviours. By assessing these factors together, we acquire a thorough understanding of the challenges that Liberian communities face.

E. Strengths and Limitations

The study's strengths include community-based design, comprehensive assessment of several features, and the use of advanced statistical methods. The cross-sectional design, which limits causal inference, and the limited sample size are two limitations. Future research should include longitudinal designs and larger, nationally representative populations.

V. CONCLUSIONS

The study discovered considerable gaps in Liberian populations' knowledge, attitudes, and practices regarding HIV/HBV co-infection. Key findings include limited awareness of co-infection (47.5%), financial barriers to healthcare access (32.5%), and the influence of education in transforming health knowledge and behaviours. The findings highlight the need for:

A. Integrated Education Programs: Community-based efforts that address both HIV and HBV, stressing transmission prevention, the value of testing, and accessible treatment options.

B. Financial Support Mechanisms: Implementation of subsidized testing, immunization, and treatment services to alleviate financial obstacles to healthcare access.

C. Stigma Reduction Interventions: Develop community participation strategies, such as awareness campaigns and peer support groups, to avoid prejudice and promote testing.

D. Healthcare Worker Training: Training programs for healthcare providers that focus on integrated HIV/HBV counselling, culturally appropriate communication, and successful patient education.

Future projects should employ a multi-sectoral approach that involves healthcare providers, community leaders, educational institutions, and governmental entities. Liberia and other West African nations may minimize the burden of HIV/HBV co-infection and enhance community health outcomes by addressing identified obstacles and leveraging predictors of positive health behaviors.

VI. ACKNOWLEDGMENTS

We extend our sincere gratitude to all study participants for their time and willingness to share their experiences. We acknowledge the valuable support of community health workers, local leaders, and healthcare providers in

facilitating data collection and community engagement.

Special thanks to the faculty of the School of Public Health at the University of Liberia for their guidance and support throughout this work. This research would not have been possible without the collaborative efforts of our research team members and the communities who welcomed and participated in the study. We remain committed to translating these findings into actionable public health interventions that will benefit the communities we serve.

DECLARATION STATEMENT

As the article's author, I must verify the accuracy of the following information after aggregating input from all authors.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted with objectivity and without any external influence.
- **Ethical Approval and Consent to Participate:** Yes, securing ethical approval and consent from all participating individuals is essential. **The ethical approval and consent are as follows.** Conducted as part of an educational program at the University of Liberia School of Public Health, this study adhered to core ethical principles despite lacking prior IRB approval. We obtained written informed consent, ensured voluntary participation, maintained confidentiality through anonymization, and secured data storage. All procedures followed the standards of the University of Liberia and the Declaration of Helsinki. Though retrospective approval is not possible, we have documented all implemented safeguards.
- **Data Access Statement and Material Availability:** The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request. Anonymised data may be shared for research purposes, in accordance with institutional data-sharing policies and with appropriate data-use agreements in place to protect participant confidentiality.
- **Author's Contributions:** Each author has individually contributed to the article. Prince L. Fully: Conceptualization, Methodology, Investigation, Data Curation, Writing – Original Draft, Visualization Neima N. Candy: Supervision, Project Administration, Resources, Writing – Review & Editing, Funding Acquisition Aminata M. Sow: Methodology, Formal Analysis, Software, Validation, Writing – Review & Editing, Visualization Alfreda B. Sandi: Methodology, Formal Analysis, Software, Validation, Writing – Review & Editing, Visualization All authors have read and approved the final version of the manuscript.

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DOI: https://doi.org/10.4337/9781035346929.00007

AUTHOR'S PROFILE

Prince Lassemento Fully, BSc. MS, an Adjunct Faculty member at the University of Liberia, Public Health Department and a machine learning researcher specialising in neuroimaging for cognitive impairment detection and public health data analytics in Liberia. He is currently pursuing an MS in Computer Science (Artificial Intelligence) at the Georgia Institute of Technology (USA).

Neima N. Candy, BSc. MSc. PhD Cand., Chairperson, Public Health Department, University of Liberia, a Liberian public health specialist and PhD candidate with extensive experience in health system strengthening, outbreak response, and public health research. Her career spans leadership roles in Ebola and COVID-19 response, academic appointments, and numerous peer-reviewed publications in global health.

Alfreda B. Sandi is a Bachelor of Science candidate and a senior student in the Public Health Department. She plans to specialise in Health Systems and Policy. Through her studies, she aims to leverage statistical computing to assess public health trends and inform evidence-based policy decisions.

Aminata M. Sow, A Bachelor of Science candidate and senior student in the Public Health Department. Her research interests are centred on Data Analysis using R Programming and its application in Epidemiology. Through her academic work, she aims to leverage statistical computing to analyse public health trends and disease patterns.