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Seroprevalence of Hepatitis B and C and Associated Risk Factors among Healthcare Workers and Medical Students in the Southwest Cameroon

Ojong-Ebot Ayukndip[1*], Emmanuel Bache Bache[2,3], Nicholas Tendongfor[4]
[1]*Department of Public Health, Texila American University/Universidad Central de Nicaragua*
[2]*Masanga Medical Research Unit (MMRU) and Masanga Teaching Hospital, Masanga, Sierra Leone*
[3]*Centre of Tropical Medicine and Travel Medicine, Amsterdam UMC, Department of Infectious Diseases, University of Amsterdam, Amsterdam, The Netherlands*
[4]*Department of Public Health and Hygiene, Faculty of Health Sciences, University of Buea, Buea, Cameroon*

Abstract

Hepatitis B (HBV) and Hepatitis C (HCV) are major viral infections affecting the liver and contribute significantly to global morbidity and mortality. Healthcare workers (HCWs) and medical students are particularly vulnerable to these infections due to frequent exposure to blood, sharp instruments, and bodily fluids during clinical practice. Identifying the burden of these infections among these groups is important for strengthening infection prevention policies and targeted interventions. A cross-sectional study was conducted to determine the seroprevalence of HBV and HCV among three cohorts: HCWs with at least one year of clinical experience, first-year medical and paramedical students with minimal clinical exposure, and final-year medical, nursing, and paramedical students with multiple clinical placements. Participants were screened for HBV and HCV serological markers using Enzyme-Linked Immunosorbent Assay (ELISA) technique and panel rapid test kits, and potential risk factors were collected. Statistical Package for Social Sciences (SPSS) version 25 was used to get proportions and binary logistic regression for associations. A total of 374 participants were included, 51.3% HCWs and 48.7% students. The overall seroprevalence of HBV was 4.8% (95% CI:2.9-7.4), with the highest prevalence observed among final-year students (9.3%, 95% CI:8.8-9.9), compared with 3.7% (95% CI:1.0-7.1) among first-year students and 3.6% (95% CI:1.5-7.3) among HCWs. The overall prevalence of HCV was 2.1% (95% CI:0.9-4.2), with slightly higher prevalence among students (2.7%;95% CI:0.3-9.3) than among HCWs (1.6%;95% CI:0.3-4.5). No demographic or occupational factors were significantly associated with HBV or HCV seropositivity. This study demonstrated a relatively low seroprevalence of HBV and HCV among healthcare workers and medical and paramedical students. Strengthening screening, vaccination programs, and infection prevention strategies is essential to protect these high-risk groups.

Keywords: *Healthcare Workers, Hepatitis B, Hepatitis C, Medical Students, Seroprevalence.*

Introduction

Hepatitis B and C viral infections continue to pose a significant global health challenge, as reported by the World Health Organisation (WHO) [1]. Globally, an estimated 254 million people are living with chronic hepatitis B virus (HBV) infection, while approximately 50

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****Corresponding Author: ojongebot24@gmail.com***

million are affected by hepatitis C virus (HCV) infection [2]. Although the incidence of new viral hepatitis infections declined from 2.5 million cases in 2019 to 2.2 million in 2022, the burden remains substantial [3]. Of these new infections, about 1.2 million were attributed to HBV, and nearly one million to HCV, with the highest incidence observed in the WHO African and Western Pacific regions [4]. In 2022, viral hepatitis was responsible for an estimated 1.3 million deaths globally, underscoring its increasing contribution to communicable disease mortality. Specifically, HBV and HCV were responsible for 1.1 million and 244,000 deaths, respectively [3]. Despite advances in prevention and treatment, progress towards global elimination targets remains insufficient. By the end of 2022, nearly seven million individuals were receiving treatment for HBV infection, and 12.5 million had completed curative treatment for HCV infection, falling short of established global targets [5].

The burden of viral hepatitis varies across regions. In the WHO African region, 63% of new HBV infections are reported, yet only 18% of newborns receive the birth-dose vaccine [5]. The prevalence of HBV in Africa ranges from 6.1% to 8.5%, with Cameroon experiencing a notably higher prevalence of approximately 11.2% [5]. This highlights an urgent need to strengthen public health measures. For HCV, prevalence rates in the African region vary from 1% to 3%, while in Cameroon, it varies from 1.1% to 13.8%, indicating a substantial and heterogeneous public health burden [5].

Healthcare workers (HCWs) and medical students are at increased risk of HBV and HCV infections due to frequent exposure to bloodborne pathogens through contact with patients, sharps, and bodily fluids [6]. Regular screening, vaccination, and strict adherence to infection prevention and control practices are essential and cost-effective strategies to reduce this risk [7]. Similarly, medical training exposes students to comparable occupational hazards, and assessing the prevalence of these infections among them underscores the importance of early education on preventive measures and safe clinical practices [8]. In the South West region of Cameroon, Buea and Limbe regional hospitals serve as major referral facilities to a large and diverse patient population. They also function as key clinical training sites for HCWs, medical and paramedical students. As such, these institutions provide an appropriate setting for investigating HBV and HCV infections and vaccination practices among HCWs and students.

This study investigated the seroprevalence of HBV and HCV among HCWs and medical students at Buea Regional Hospital and Limbe Regional Hospital. It further sought to identify potential risk factors associated with HBV and HCV seropositivity in these cohorts. The insights gained will be pivotal in developing targeted interventions to minimise the prevalence of these infections and enhance health and safety protocols for healthcare providers in the South West region of Cameroon.

Methods and Materials

Study Design and Setting

This cross-sectional study was conducted between 20/06/2025 to 31/09/2025 to assess the seroprevalence of HBV and HCV infections in three cohorts: health care workers with at least one year of work experience in a hospital or clinic, first-year medical and paramedical students (with little or no placement outings), and final year medical, nursing, and paraclinical students (with several placement outings). The study was conducted in the Buea and Limbe Regional Hospitals. The Buea Regional Hospital is in the Fako Division of the South West region of Cameroon. The hospital comprises several clinical and support units, including medical, surgical, paediatrics, maternity, HIV/AIDS, tuberculosis, laboratory, radiology, and outpatient department (OPD), as well as specialized centres such as haemodialysis and diabetes units. Each unit or department is headed by a specialist doctor, such as surgeons, gynaecologists, or paediatricians. However, the day-to-day control of the wards is managed by ward supervisor ("*ward charges*"), including senior nurses and midwives. The hospital employs nurses of various categories, ranging from nursing assistants (NAS) to State Registered Nurses (SRN), Higher National Diploma Nurses (HND), and Bachelor of Nursing Science graduates (BNS). The Buea Regional Hospital (B.R.H) serves clients from Buea and the surrounding areas. Patients come for consultations and treatments or are referred from other health centres and clinics. The hospital admits clients for as long as necessary for their recovery and performs both minor and major surgeries.

Similarly, the Limbe Regional Hospital (LRH) serves as a secondary referral and teaching hospital for medical students. It is situated in the zone two health area of the Limbe Health District, providing comprehensive services across multiple specialties: radiology, surgery, obstetrics and gynaecology, dental surgery, ophthalmology, paediatrics, physiotherapy, maternity care, and general medicine. Both institutions function as principal clinical training sites for medical, paramedical, and healthcare professionals of the University of Buea and were selected for this study due to their large workforce and training capacity.

Sample Size Determination

Sample size was calculated using the single-population proportion formula as described in the WHO manual for sample size determination in health studies [9]. The study was primarily powered on the expected prevalence of HBsAg among HCWs, as this group was anticipated to have the highest prevalence and occupational exposure risk. Separate sample size calculations were then performed for cohorts with finite-population correction (FPC) size and allowance for non-response.

$$n_0 = \frac{Z^2_{1-\frac{\alpha}{2}} p(1-p)}{d^2}, n_{\text{deff}} = n_0 \times \text{DEFF}, n_{\text{FPC}} = \frac{n_{\text{deff}}}{1+\frac{(n_{\text{deff}}-1)}{N}}, n = \frac{n_{\text{FPC}}}{1-r}$$

Where *p* is the estimated prevalence (10%), *d* the precision (0.03), Z the standard normal deviate at 95% confidence level (1.96), N the finite source population from the hospital roster (650: 399 from Buea Regional Hospital (BRH) and 251 from LRH), r the anticipated non-response rate 10%). For HCWs, assuming an HBsAg prevalence of 10% (p=0.10), a precision of 3%, a 95% confidence level, a source population of 650 HCWs from both hospitals (399 from RH Buea and 251 from RH Limbe) and a 10% non-response rate, the minimum required sample size was n=299.95 ≈300 after finite population correction and non-response rate adjustment. This sample was allocated proportionally to hospital size, yielding 184 HCWs from BRH and 116 from LRH.

For students, separate calculations were performed using an assumed HBV prevalence of 5.8% (as per WHO, the estimated prevalence of Hepatitis B in the general population is 5.8%), a precision of 5%, a 95% confidence level, a source population of 312 eligible students, and a 10% non-response rate [5]. The minimum required sample size was 85 participants per student stratum, giving 85 first-year students and 85 final-year students. The total sample size for the study was therefore 470 participants.

Sampling Technique

A stratified random sampling technique was used to ensure adequate representation across departments and job categories within BRH and LRH. For HCWs, staff rosters were used as sampling frames, and participants were selected proportionally to the size of each stratum. For students, stratification was based on level of training (first year or final year) and program (medical, nursing, or paramedical). Participants were randomly selected from a prepared list within each stratum. To account for potential non-response, an additional 10-15% of participants were pre-selected within each stratum as replacements, thereby preserving proportional allocation. This approach minimized selection bias and ensured adequate representation of all cohorts and subgroups.

Data Collection Methods

Serological Testing Procedures

Blood samples were carefully collected from consenting individuals by trained healthcare professionals using sterile venipuncture techniques. These samples were appropriately labelled and transported to the laboratory for serological analysis. Initial screening for HBV infection was performed using the HBV 5-in-1 Hepatitis B virus markers rapid test panel, which simultaneously detects multiple HBV markers, including Hepatitis B surface antigen (HBsAg), Hepatitis B surface antibody (anti-HBs), hepatitis B e antigen (HBeAg), Hepatitis B e antibody (anti-HBe), and Hepatitis B core antibody (anti-Hc). Screening for HCV infection was also initially conducted using rapid diagnostic dipstick test for anti-HCV antibodies. Confirmation of both infections was performed using enzyme-linked immunosorbent assay (ELISA). ELISA tests are specifically designed to identify Hepatitis B surface antigen (HBsAg) for Hepatitis B infection and Hepatitis C antibodies (anti-HCV) for Hepatitis C infection. This method is widely recognized for its ability to accurately diagnose viral infections, providing reliable results to determine the prevalence of Hepatitis B and C within the specific group under study.

Questionnaire for Risk Factors and Demographic Data

We used a structured questionnaire/data capture form to gather comprehensive data on factors that may influence the transmission and prevalence of Hepatitis B and C. This was done during sample collection. The questionnaire/data capture form collected demographic information, including age, gender, and educational background, as well as occupational history, including job title and years of service. This approach helped us analyze the association between seroprevalence rates and specific risk factors and demographic characteristics, providing valuable insights into the epidemiology of Hepatitis B and C among healthcare workers and medical students in the South West region of Cameroon.

Data Variables

The study examined several categories of variables, including demographic, health status, exposure-related, and healthcare policy variables.

Demographic variables included the age of participants, gender, job role (such as nurse, doctor, laboratory technician, or medical student), and years of experience in healthcare settings. These variables were used to describe the study population and assess potential differences across professional groups.

Health status variables focused on the seroprevalence of Hepatitis B and Hepatitis C infections. Hepatitis B seroprevalence was determined by the presence of Hepatitis B surface antigen (HBsAg), while Hepatitis C seroprevalence was assessed through the presence of anti-HCV antibodies. Exposure and risk factor variables included participants' occupational exposure history, particularly incidents of needlestick injuries or contact with infected blood, which are common routes of transmission among healthcare workers. The study also assessed protective practices, including the use of personal protective equipment (PPE), safe needle handling, and other preventive measures to reduce occupational risk.

Healthcare and policy-related variables examined the availability of occupational health policies within healthcare institutions addressing the prevention and control of HBV and HCV infections.

Data Analysis

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics were used to summarize demographic characteristics and risk factor data, and included calculating the prevalence of Hepatitis B and C, with confidence intervals. Associations between risk factors and HBV and HCV seroprevalence were assessed using binary logistic regression analysis. Adjusted odds ratios (aOR) were calculated using multivariate logistic regression models with infection status as the outcome variable. Statistical significance was set at *P*-values less than 0.05.

Ethical Consideration

Ethical clearance was obtained from the Regional Ethics Committee for Human Health Research of the Southwest Region of Cameroon (04/CRERSH/SW/C/01/2025). Authorisations were sought from the Southwest Regional Delegation of Public Health (P42/MINSANTE/SWR/RDPH/RCB.PT/) and from the administrations at Buea Regional Hospital (01/MPH/SWRDPH/BR H/IRB) and Limbe Regional Hospital (334/ MPH/SWR/RDPH/RHL/DO05/2025). All procedures involving human participants were conducted in accordance with the ethical standards of the institutional and national research committees and in compliance with the principles of the Declaration of Helsinki. Written informed consent to participate was obtained from all study participants before data collection. The study was conducted in accordance with the International Council for Harmonisation Good Clinical Practice (ICH-GCP) guidelines and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

Results

Demographic and Baseline Characteristics

In this study, 374 participants were involved, comprising 192 (51.3%) HCWs, 107 (28.6%) first-year students, and 75 (20.1%) final-year students as indicated in Figure 1. The ages of respondents ranged from 18 to 60 years, with a mean age of 28 years (SD = 7.9). The median age was 26 years with an interquartile range (IQR) from 22 to 31 years. Majority of the participants, 278 (74.3), were single. Out of the 374 participants, 314 were females. Among HCWs, 105 (54.7%) were nurses, and 161 (83.9%) had worked for less than 10 years. For students, 122 (67%) were nursing students (Table 1).

Table 1. Demographic and Baseline Characteristics of HCWs with HBV and HCV Infections (n=374)

Variable		**Frequency n (%)**	**HBV seropositive n (%)**	**HCV seropositive n (%)**
Age	15 - <25	154 (41.2)	7(4.5)	4 (2.6)
	25 - <35	152 (40.6)	7(4.6)	2 (1.3)
	35 - <45	48 (12.8)	3(6.3)	2 (4.2)
	45 - <55	18 (4.8)	1(5.6)	
	55 - <65	2 (0.5)		
Gender	Female	314 (83.9)	12(3.8)	6 (1.9)
	Male	60 (16.1)	6(10.0)	2 (3.3)
Marital Status	Single	278 (74.3)	12(4.3)	6 (2.2)
	Married	91 (24.3)	6(6.6)	2 (2.2)
	Widowed	3 (0.8)		

	Divorced	1 (0.3)		
	Separated	1 (0.3)		
Religion	Christian	371 (99.2)	18 (4.9)	8 (2.2)
	Muslim	3 (0.8)		
Designation	HCW	192 (51.3)	7 (3.6)	3 (1.6)
	First-year student	107 (28.6)	4 (3.7)	3 (2.8)
	Final year student	75 (20.1)	7 (9.3)	2 (2.7)
Field of Work	Nursing	105 (54.7)	5 (4.8)	2 (1.9)
	Laboratory	53 (27.6)	2 (3.8)	1 (1.9)
	Medicine	6 (3.1)		
	Other Paramedics	28 (14.6)		
Longevity of Service	≤ 10 years	161 (83.9)	6 (3.7)	2 (1.2)
	> 10 years	31 (16.1)	1 (3.2)	1 (3.2)
Field of Studies (Students)	Nursing Students	122 (67)	7 (5.7)	3 (2.5)
	Medical Students	46 (25.3)	4 (8.7)	1 (2.2)
	Paramedical Students	14 (7.7)		1 (7.1)
BRH	HCW	109 (56.2)	2 (1.8)	
	First-year student	54 (27.8)	3 (5.6)	1 (1.9)
	Final year student	31 (16)	3 (9.7)	2 (6.5)
LRH	HCW	83 (46.1)	5 (6)	3 (3.6)
	First-year student	53 (29.4)	1 (1.9)	2 (3.8)
	Final year student	44 (24.4)	4 (9.1)	
Hospital	RHB	194 (51.8)	8 (4.1)	3 (1.5)
	RHL	180 (48.1)	10 (5.6)	5 (2.8)
Prior screening for HBV or HCV	Yes	194 (51.9)	8 (4.1)	2 (1)
	No	180 (48.1)	10 (5.6)	6 (3.3)
Needlestick Injury	No	187 (50)	12 (6.4)	5 (2.7)
	Yes	187 (50)	6 (3.2)	3 (1.6)
Adherence to IPC	Always	288 (77)	12 (4.2)	5 (1.7)
	Frequently	57 (15.2)	4 (7)	1 (1.8)
	Sometimes	22 (5.9)	2 (9.1)	2 (9.1)
	Never/Rarely	7 (1.9)		
Use PPE	Always	216 (57.8)	10 (4.6)	4 (1.9)
	Frequently	87 (23.3)	5 (5.7)	1 (1.1)
	Sometimes	59 (15.8)	3 (5.1)	3 (5.1)
	Never/Rarely	13 (3.2)		

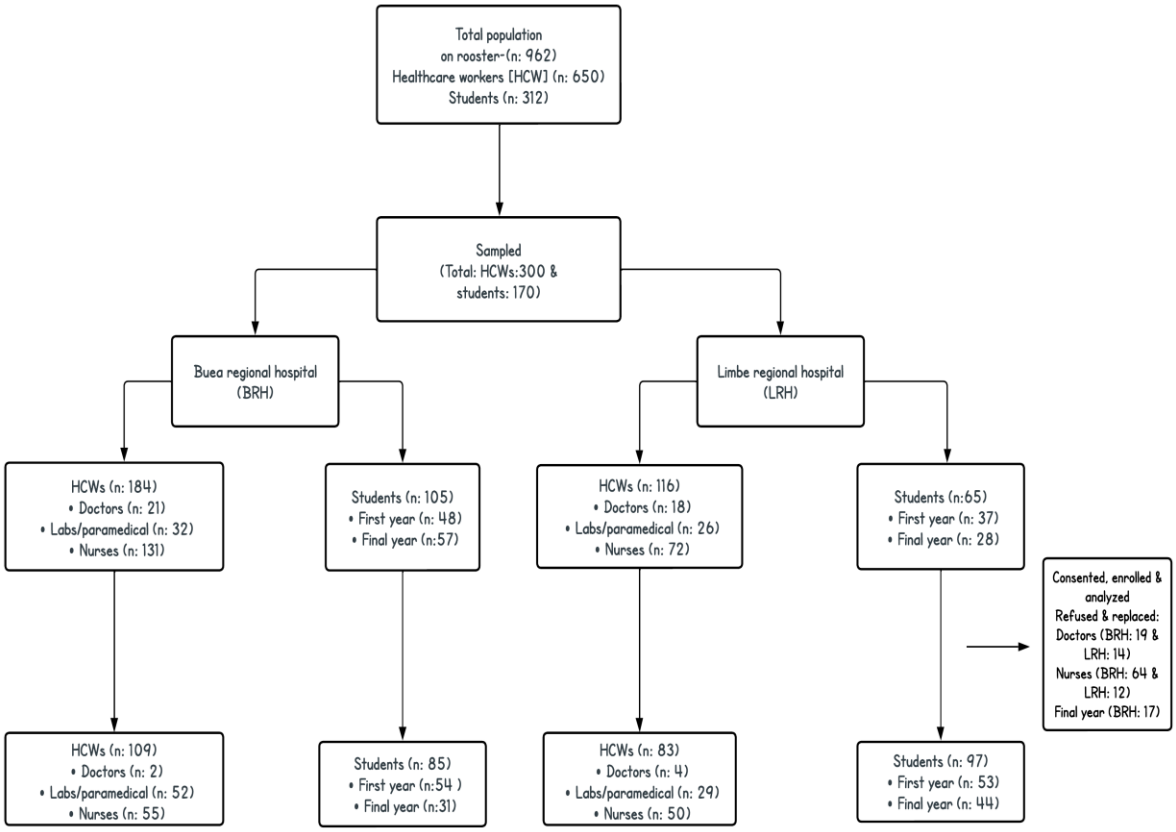

Figure 1. Study Flow Diagram showing Study Population Mix by Site of Recruitment. The Diagram Illustrates Participant Flow from Eligibility through Sampling, Enrolment, and Analysis

Seroprevalence of HBV and HCV Infections among Participants

The overall seroprevalence for HBV was 18 (4.8%; 95% CI: 2.9 – 7.4), and for HCV was 8 (2.1%, 95% CI: 0.9 – 4.2). The co-infection rates (HBV and HCV) were 2 (0.53%,95% CI: 0.1 -4.2). Final year students had the highest HBsAg prevalence of 9.3% (95% CI: 8.8-9.9) as shown in Figure 2.

First-year students had a lower prevalence of 3.7% (95% CI: 1.0-7.1). Among all the students combined, HBsAg prevalence is 6% (95% CI: 3.1-7.8). HCWs showed the lowest HBsAg prevalence, 3.6% (95% CI: 1.5-7.4). Final-year and First-year students had similar HCV seroprevalence of 2.8% (95% CI: 0.6-7.9) and 2.7% (95% CI:0.3-9.3) respectively, with a combined seroprevalence of 2.8% (95% CI: 0.9-6.3). HCWs showed a relatively lower HCV prevalence of 1.6% (95% CI: 0.3-4.5). Males had higher HBV and HCV seroprevalences of 10% and 3.3%, respectively. Married participants had a higher HBV prevalence (6.6%). HBV prevalence was higher (3.7%) among participants who had worked for less than 10 years, while HCV was higher (3.2) among those who had worked for more than 10 years.

Among students, the highest HBV prevalence was among medical students, 8.7%. Those who have never been screened for HBV or HCV showed higher prevalences of 5.6% and 3.3%, respectively. Participants who had never had a needlestick injury had higher prevalence: 6.4% for HBV and 2.7% for HCV. Additionally, it was observed in participants who sometimes adhere to IPC measures (9.1%) for both infections (Table 1).

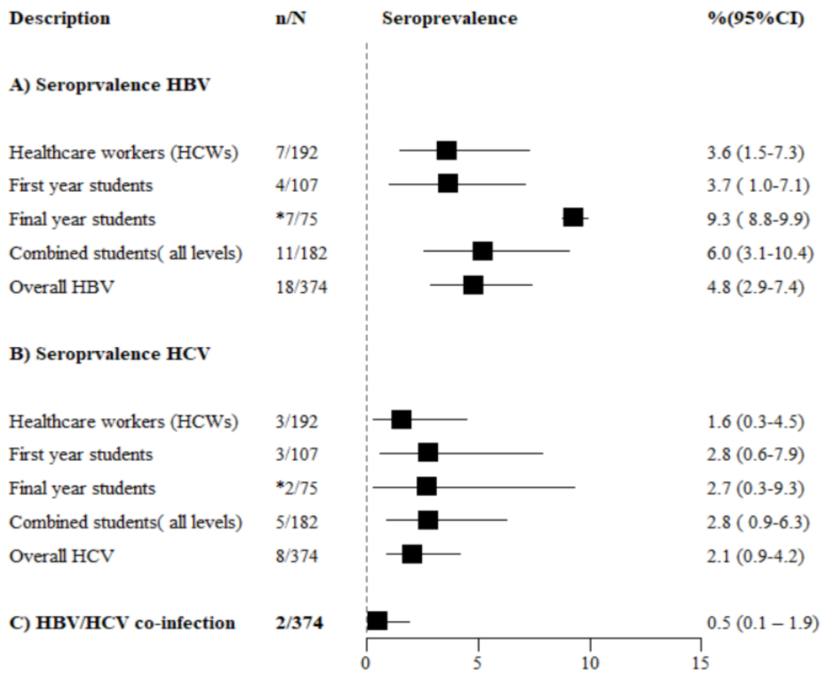

Figure 2. Forest Plot-Seroprevalence of Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and HBV/HCV Co-infection among Healthcare Workers and Students

Risk Factors Associated with HBV and HCV Seropositivity

Multivariable logistic regression analysis showed no statistically significant associations between the investigated factors and HBV seropositivity (p > 0.05). Variables including age, marital status, designation (healthcare worker or student), hospital location, prior HBV screening, history of needlestick injury, adherence to infection prevention and control (IPC) practices, and use of personal protective equipment (PPE) were not significantly associated with HBsAg positivity.

However, gender demonstrated a borderline association with HBV infection. Males had higher odds of HBsAg positivity compared to females in the crude analysis (cOR 2.80, 95% CI: 1.00-7.80; p =0.05), although this association did not remain statistically significant after adjustment (aOR 2.62, 95% CI: 0.92–7.45; p = 0.07). A non-significant trend was observed for adherence to IPC practices, with participants who did not always adhere to IPC measures showing higher odds of HBV seropositivity compared to those who consistently adhered (cOR 1.73, 95% CI: 0.63-4.74; aOR 1.54, 95% CI: 0.55-4.33). Similarly, final-year students exhibited higher odds of HBV seropositivity compared to first-year students (cOR = 2.65, 95% CI: 0.73-9.63), although this association was not statistically significant. (Table 2).

With respect to HCV, bivariate and multivariable logistic regression analyses showed no statistically significant associations between the assessed variables and HCV seropositivity. Variables including age, gender, marital status, designation (healthcare worker or student), hospital location, prior screening for HBV/HCV, history of needlestick injury, adherence to infection prevention and control (IPC) practices, and use of personal protective equipment (PPE) were not significantly associated with HCV positivity.

Although no statistically significant, some trends were observed. Males had higher odds of HCV seropositivity compared to females (cOR 1.77, 95% CI: 0.34-8.98), and participants who did not consistently adhere to IPC practices also showed higher odds of infection (cOR 2.05, 95% CI: 0.48-8.74). Similarly, individuals who did not always use PPE had slightly higher odds of HCV seropositivity (cOR 1.38, 95% CI: 0.34-5.59) (Table 3).

In contrast, prior screening for HBV or HCV appeared to be associated with a much lower odds of HCV seropositivity (cOR 0.30, 95% CI: 0.06–1.52; aOR 0.32, 95% CI: 0.05–1.80), although this association did not reach statistical significance. No meaningful differences were observed between students and healthcare workers (aOR = 1.17, 95% CI: 0.25–5.53), nor between first-year and final-year students (Table 3).

Table 2. Bivariate and Multivariate Analysis of Risk Factors associated with HBV Seropositivity

Variable		**HBV negative-n(%)**	**HBV positive n(%)**	**cOR (95% CI)**	**P-value**	**aOR (95% CI)**	**P-value**
Age	<30	238 (95.2)	12 (4.8)	1			
	>30	118 (95.2)	6 (4.8)	1.01 (0.37-2.75)	1.000		
Gender	Female	302 (96.2)	12 (3.8)	1			
	Male	54 (90)	6 (10.0)	2.80 (1-7.8)	0.051	2.62 (0.92-7.45)	0.073
Marital Status	Single	271 (95.8)	12 (4.2)	1			
	Married	85 (93.4)	6 (6.6)	1.59 (0.6-4.4)			
Designation 1	Students	171 (94.0)	11 (6.0)	1			
	HCW	185 (96.4)	7 (3.6)	0.59 (0.2-1.6)	0.400	2.23 (0.74-6.68)	0.150
Designation 2	First Year	103 (96.3)	4(3.7)	1			
	HCW	185 (96.4)	7(3.6)	0.97 (0.28-3.35)	0.960		
	Final Year	68 (90.7)	7(9.3)	2.65 (0.73-9.63)	0.150		
Hospital	HRH Buea	186 (95.9)	8 (4.1)	1			
	RH Limbe	170 (94.4)	10 (5.6)	1.37 (0.53-3.55)	0.685		
Prior HBV or HCV screening	No	170 (94.4)	10 (5.6)	1			
	Yes	186 (95.9)	8 (4.1)	0.73 (0.28-1.90)	0.686		
Needlestick injury	No	175 (93.6)	12 (6.4)	1			
	Yes	181 (96.8)	6 (3.2)	0.48 (0.18-1.32)	0.227	0.53 (0.9-1.49)	0.215
Adherence to IPC	Always	276 (95.8)	12 (4.2)	1			
	Not Always	80 (93.0)	6 (7.0)	1.73 (0.63-4.74)	0.435	1.54 (0.55-4.33)	0.436
Use PPE	Always	206 (95.4)	10 (4.6)	1			
	Not Always	150 (94.9)	8 (5.1)	1.09 (0.42-2.85)	1.000		

***n:** number of participants, **cOR:** crude estimates, **aOR:** Adjusted OR adjusted for marital status, designation (cohort type HCW or student), needle stick injury & adherence to IPC*

Table 3. Bivariate and Multivariate analysis of Risk factors Associated with HCV Seropositivity

Variable		**HCV negative n(%)**	**HCV positive n(%)**	**cOR (95% CI)**	**P-value**	**aOR (95% CI)**	**P-value**
Age	<30	244 (97.6)	6 (2.4)	1			
	>30	112 (98.2)	2 (1.8)	0.73 (0.13-3.35)	0.472		
Gender	Female	308 (98.1)	6 (1.9)	1			
	Male	58 (96.7)	2 (3.3)	1.77 (0.34-8.98)	0.376		

Marital Status	Single	277 (97.9)	6 (2.1)	1			
	Married	89 (97.8)	2 (2.2)	1.04 (0.21-5.23)	0.618		
Designation 1	Students	171 (97.2)	5 (2.8)	1			
	HCW	189 (98.4)	3 (1.6)	0.56 (0.13-2.38)	0.332	1.17 (0.25-5.53)	0.834
Designation 2	First year student	104 (97.2)	3 (2.8)	1			
	HCW	189 (98.4)	3 (1.6)	0.55 (0.11-2.86)	0.743		
	Final year student	189 (98.4)	2 (2.7)	0.95 (0.15-6.08)	1.000		
Hospital	HRH Buea	191 (98.5)	3 (1.5)	1			
	RH Limbe	175 (97.2)	5 (2.8)	1.82 (0.43-7.72)	0.489		
Prior screening for HBV or HCV	No	174 (96.7)	6 (3.3)	1			
	Yes	192 (99.0)	2 (1.0)	0.30 (0.06-1.52)	0.161	0.32 (0.05-1.8)	0.196
Needlestick injury	No	182 (97.3)	5 (2.7)	1			
	Yes	184 (98.4)	3 (1.6)	0.59 (0.14-2.52)	0.723		
Adherence to IPC	Always	283 (98.3)	5 (1.7)	1			
	Not Always	83 (96.5)	3 (3.5)	2.05 (0.48-8.74)	0.391		
Use PPE	Always	212 (98.1)	4 (1.9)	1			
	Not Always	154 (97.5)	4 (2.5)	1.38 (0.34-5.59)	0.726		

n: *number of participants,* ***cOR:*** *crude odds ratios (OR) estimates,* ***aOR:*** *multivariate OR adjusted for marital status, designation (cohort type HCW or student), & Prior screening for HBV or HCV*

Discussion

HBV and HCV Seroprevalence among First-Year Students, Final-Year Students, and Healthcare Workers

This cross-sectional study assessed the seroprevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) infections, as well as associated risk factors among healthcare workers (HCWs) and medical and paramedical students in two major referral and teaching hospitals in the South West region of Cameroon. The overall HBV seroprevalence of 4.8% observed in this study suggests an intermediate level of endemicity within this sampled population. Notably, HCWs had a lower prevalence of 3.6% compared to the combined student cohort, while final-year students exhibited the highest prevalence (9.3%), followed by first-year students (3.7%). This pattern may reflect the increasing exposure to clinical environments and potential gaps in infection prevention and control practices among trainees, however, causality cannot be inferred due to the cross-sectional design. Notably, the number of positive cases observed is relatively small, resulting in wide, imprecise confidence intervals around the seroprevalence rates. Nonetheless, the observed gradient from HCWs to first-year and final-year students is consistent with epidemiological patterns seen in other sub-Saharan African studies, overall HBV and HCV seroprevalence of 6.1 % and 4.7% [10, 11], respectively.

Our findings are consistent with evidence from other African settings, which demonstrate increased HBV exposure with advancing clinical training. Tawiah et al. (2022) reported a significant rise in HBV exposure among Ghanaian medical laboratory students during clinical training, attributed to high rates of needlestick injuries and mucosal exposures, often occurring under inadequate supervision [12]. Similarly, Funeh et al. (2013) found that senior clinical students in Cameroon had significantly higher HBV exposure compared to pre-clinical students, largely due to cumulative occupational contact with blood and contaminated sharps. Both studies also highlighted low vaccination coverage as an important risk factor as students transition into clinical environments [4, 12, 13]. As students progress from pre-clinical to clinical phases, they are increasingly exposed to blood and body fluids, often in settings where sharps handling and PPE availability is sub-optimal [14]. Overall, the results reaffirm that HBV infection remains endemic among HCWs and medical students, with a particularly concerning burden among final-year students.

In contrast, the overall HCV seroprevalence of 2.1% observed in this study was relatively low and showed no marked differences across cohorts. This is consistent with previous reports indicating lower HCV prevalence compared to HBV in healthcare settings [15]. However, the presence of HCV infection still reflects ongoing exposure risks within clinical environments. The lower prevalence may be explained by the relatively inefficient occupational transmission of HCV compared to HBV. The risk of infection following a needlestick injury from an HCV-positive source is estimated at approximately 1–2%, compared to over 30% for HBV in unvaccinated individuals [16-18].

Risk Factors Associated with Seropositivity

Consistent with the overall findings, multivariable analysis did not identify any statistically significant risk factors for HBV or HCV seropositivity, likely due to the relatively small number of positive cases and limited statistical power. Although a borderline association with gender was observed in crude analysis, this did not persist after adjustment. Similar findings have been reported in other settings, where initial associations with sociodemographic and occupational factors were not sustained in multivariate models, often attributed to low event rates and overlapping exposure pathways [19, 20]. Conversely, other studies in Africa (Ghana, Nigeria) identified factors such as needlestick injury, male sex, and occupational blood exposure as significant predictors of hepatitis seropositivity, highlighting contextual variability in risk profiles [19, 21-23].

Despite the lack of statistically significant associations, the higher prevalence observed among final-year students aligns with previous studies from Cameroon, Congo, and Sudan, which report increased HBV burden among senior trainees due to cumulative exposure to blood and body fluids and lower vaccination coverage [24, 25]. These findings reiterate existing evidence highlighting the role of prolonged clinical exposure and suboptimal adherence to infection prevention measures as key contributors to infection risk in this population.

Strengths and Limitations

Although this study assessed seroprevalence, the findings have important implications for chronic HBV and HCV infection [26]. HBsAg indicates current infection, a proportion of which may progress to chronic disease, while anti-HCV positivity reflects exposure with a high likelihood of persistence. Chronic infection can lead to serious complications, including cirrhosis and hepatocellular carcinoma, particularly in settings where infections remain asymptomatic and undiagnosed [5]. Among students, cumulative clinical exposure and inconsistent adherence to infection prevention measures may further increase this risk without access to routine screening.

A key strength of this study is the use of rapid immunochromatographic screening followed by ELISA confirmation, which enhances the reliability of seroprevalence estimates. While rapid tests may introduce some misclassification due to lower sensitivity and specificity, ELISA's high diagnostic accuracy minimizes this limitation [5]. However, reliance on serological assays alone limits differentiation between acute and chronic HBV infection and does not confirm active HCV infection in the absence of molecular testing [27]. Consequently, the reported seroprevalence likely reflects a mix of current and past infections. In addition, despite an adequate sample size for prevalence estimation, the low number of positive cases and sub-optimal recruitment reduced the statistical power to detect significant associations, as reflected by wide confidence intervals for odds ratios.

Conclusion

This study demonstrated a relatively low seroprevalence of HBV and HCV among healthcare workers and medical and paramedical students. It provides important insights into the burden of HBV and HCV in these high-risk populations and underscores the need for routine screening, early diagnosis, HBV vaccination, and strengthened infection prevention practices.

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Data Management

Survey data were not accessible to participants at participating Health facilities. Responses were transmitted electronically to Kobocollect, linked to the investigator's account, and subsequently exported to GitHub for secure storage. Access to the dataset was restricted to the study statistician for analysis**.**

Authors' Contributions

O.E.A., N.T., and E.B.B participated in the study design. O.E.A oversaw pilot testing and data collection. O.E.A., N.T., and E.B.B contributed to the writing and review of the manuscript and approved the final version. O.E.A and E.B.B assisted in statistical analysis and interpretation of results. O.E.A had overall responsibility for the study design, overseeing survey distribution and interpretation of results.

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Data Availability

The datasets generated and analysed in this study are not publicly available due to institutional regulations but can be obtained from the corresponding author upon reasonable request. All data access requests will be subject to review by the Ethics Committee of the Cameroonian Ministry of Public Health and the Regional Ethics Committee for Human Health Research for the South West Region, to ensure adherence to ethical and legal requirements.

Ethical Approval

Ethical clearance was obtained from the Regional Ethics Committee for Human Health Research of the South West Region of Cameroon (04/CRERSH/SW/C/01/2025). Authorisations were sought from the South West Regional Delegation of Public Health (P42/MINSANTE/SWR/RDPH/RCB.PT/) and from the administrations at Buea Regional Hospital (01/MPH/SWRDPH/BRH/IRB) and Limbe Regional Hospital

(334/MPH/SWR/RDPH/RHL/DO05/2025).
All procedures involving human participants were conducted in accordance with the ethical standards of the institutional and national research committees and in compliance with the principles of the Declaration of Helsinki.

Written informed consent to participate was obtained from all study participants before data collection.

Competing Interests

The authors declare no competing interests.

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