

Knowledge, Attitudes, and Factors Associated with Hepatitis B Vaccine Uptake among Women Aged 21 - 49 Years in the Limbe Health District, South-West Region of Cameroon

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Abstract

Background: Hepatitis B virus (HBV) infection remains a major global public health concern, particularly in sub-Saharan Africa, where the burden is high and vaccination coverage remains suboptimal. Considering the possibility of mother-to-child transmission, women of reproductive age constitute a target group in the transmission chain. Despite the availability of effective vaccines, their uptake remains low in many countries, including Cameroon. **Method:** We conducted a cross-sectional community-based study among 372 women aged 21 - 49 using a systematic random sampling technique. Data were collected through the administration of an interviewer-administered questionnaire designed using Epi-info. A questionnaire was used to determine the knowledge and attitudes toward hepatitis B infection and its vaccine. Descriptive and multivariate logistic regression analyses were performed to determine the factors associated with hepatitis B vaccine uptake. **Results:** The mean patient age was 29.8 ± 6.5 years. Among the 372 women, 44.0% had good knowledge, and 73% had a good attitude toward hepatitis B infection and its vaccine. Vaccine uptake was low, with 74.5% reporting that they had not been vaccinated. In the multivariable analysis, women aged 21 - 30 years (aOR = 5.157, 95% CI: 1.376 - 19.328; $p = 0.015$) and 31 - 40 years (aOR = 4.609, 95% CI: 1.174 - 18.101; $p = 0.029$) had higher odds of vaccine uptake than those

aged 41 - 49 years. Women with secondary education had lower odds of vaccine uptake than those with tertiary education (aOR = 0.330, 95% CI: 0.170 - 0.642; $p = 0.001$). Compared with unemployed women, employed (aOR = 2.481, 95% CI: 1.118 - 5.506; $p = 0.026$) and self-employed (aOR = 3.740, 95% CI: 1.851 - 7.557; $p < 0.001$) women had higher odds of vaccination. Poor knowledge (aOR = 0.390, 95% CI: 0.200 - 0.763; $p = 0.006$) and an unfavourable attitude (aOR = 0.385, 95% CI: 0.183 - 0.810; $p = 0.012$) were associated with lower odds of vaccine uptake. **Conclusion:** Hepatitis B vaccine uptake among women aged 21 - 49 years in the Limbe Health District was low. Although most participants had good attitudes toward vaccination, fewer than half had good knowledge. Age, education, employment status, knowledge and attitude were associated with vaccine uptake. Targeted health education, improved access to affordable vaccination services and community sensitisation may help increase vaccine coverage and support hepatitis B elimination efforts.

Keywords

Knowledge, Attitude, Factors, Vaccine Uptake, Hepatitis B

1. Introduction

Hepatitis B virus (HBV) infection remains a major global public health concern despite being preventable through vaccination. In 2024, approximately 240 million people were living with chronic HBV infection worldwide, approximately 0.9 million new infections occurred, and HBV-related cirrhosis and hepatocellular carcinoma caused approximately 1.1 million deaths, representing a 17% increase in HBV-related mortality compared with that in 2015 [1]. HBV is a highly transmissible DNA virus that can remain infectious outside the human body for at least seven days. It is transmitted through exposure to infected blood and body fluids, including during childbirth, sexual contact, unsafe injections and contact with contaminated sharp instruments [1]. With respect to this burden, the World Health Organisation (WHO) global health sector strategy aims to eliminate viral hepatitis as a public health threat by 2030 by reducing new infections by 90%, mortality by 65% and hepatitis B surface antigen prevalence among children younger than five years to 0.1% [2]. However, the WHO Global Hepatitis Report 2024 documented substantial inequalities in access to HBV testing, treatment and preventive services, particularly in low- and middle-income countries [3].

Women of childbearing age constitute an important population for HBV prevention because infection during pregnancy presents a risk of mother-to-child transmission, whereas sexual exposure, unsafe injections and contact with contaminated sharp instruments may increase infection risk [1] [4]. Knowledge and attitudes toward HBV are therefore important for promoting screening, vaccination and other preventive behaviours. Nevertheless, inadequate knowledge and preventive practices have been documented among different population groups,

including medical and health science students who are expected to provide health information and preventive services [5]. Among pregnant women in Nigeria, only 13.2% had received at least one dose of the HBV vaccine, and only 5.0% had completed the three-dose series, with a lack of awareness identified as the principal reason for non-vaccination [6]. In Uganda, information, motivation and behavioural skills are associated with HBV infection prevention practices among pregnant women [7]. Studies in Ethiopia have similarly identified behavioural and socio-demographic risk factors for HBV infection [8], deficiencies in knowledge and preventive practices [9], and associations of education, residence and income with women's knowledge and attitudes towards vertical transmission [10]. Evidence from Uganda also shows that perceptions, cultural beliefs, healthcare access and interactions with healthcare providers influence screening and other health-seeking behaviours among pregnant women [11]. More recently, a Nigerian study reported persistent deficiencies in pregnant women's knowledge, attitudes and perceptions regarding HBV vaccination [12]. Collectively, these findings indicate that the availability of a vaccine alone may be insufficient without adequate knowledge, good attitudes and accessible vaccination services.

Cameroon remains a high-endemicity setting for HBV infection. A systematic review and meta-analysis estimated a pooled national HBsAg prevalence of 11.2%, including 10.1% in the general population, 10.2% among pregnant women and 23.7% among people living with HIV [13]. Among pregnant women in Cameroon, previous research has revealed inadequate knowledge of HBV, limited access to screening and low vaccination coverage, highlighting important missed opportunities for preventing maternal and perinatal infection [14]. More recent evidence from Buea Regional Hospital has confirmed the continuing burden of HBV and demonstrated that infection varies according to demographic and behavioural characteristics [15]. These findings suggest that women of reproductive age remain vulnerable and that knowledge, attitudes and access to preventive services may influence their vaccination decisions.

Within the South-West Region, studies conducted in the Limbe and Muyuka Health Districts have identified deficiencies in pregnant women's knowledge and preventive practices, although knowledge is better in Limbe than in Muyuka [16]. In Fako Division, behaviour-change communication improved the prevalence of the HBV vaccine among health workers, indicating that targeted education and sensitisation can positively influence vaccination behaviour [17]. However, evidence remains limited regarding HBV knowledge, attitudes and vaccine uptake among women of childbearing age in the Limbe Health District, particularly at the community level. Understanding these factors is important for designing locally appropriate interventions to improve vaccine acceptance and coverage and reduce the risk of maternal and vertical transmission. Therefore, this study assessed knowledge and attitudes toward HBV infection and its vaccine and identified factors associated with HBV vaccine uptake among women of childbearing age in the Limbe Health District, South-West Region of Cameroon.

2. Materials and Methods

2.1. Study Design and Settings

A community-based cross-sectional study was carried out in the Limbe Health District (LHD), South-West Region of Cameroon, from February to June 2025. Limbe is a coastal town situated along Amba Bay in the Gulf of Guinea at the foot of Mount Cameroon. The district comprises eight health areas and 22 health facilities, including public, faith-based, and private institutions, providing access to hepatitis B vaccination services.

2.2. Study Population and Sampling

A multistage sampling technique was employed. First, four out of eight health areas of the Limbe Health District were selected using simple random sampling; these included Bojongo, Bota, Moliwe, and Seaport. Two communities within these health areas were subsequently selected using the same procedure. Within each selected community, households were selected systematically after determining the sampling interval and randomly selecting the first household. Eligible women aged 21 - 49 years were then recruited from the selected households. Where more than one eligible woman was present, one was selected by simple random sampling. Overall, 372 women were recruited and their distribution per health areas and selected communities was based on probability proportionate to size, using the latest demographic survey data available at the health district, with a target of 30 to 40 households per community (**Table 1**). Women who were unavailable were revisited, while refusals and unsuccessful follow-up visits were recorded as non-responses.

The sample size was calculated using Cochran's formula.

$$n = \frac{Z^2 p(1-P)}{e^2}$$

With a *z* value of 1.96 as the standard normal variate at the 95% confidence level, the error margin is 5% (*e*), and the prevalence of HBV vaccine uptake is 13.2%, as reported among pregnant women in Nigeria [6]. A minimum sample size of 177 participants was needed. The minimum sample was adjusted for multistage sampling using a design effect of 2, giving 354 participants. A further 5% was added to account for anticipated non-response, resulting in a final target sample of 372 participants.

Table 1. Planned sample and community allocation to health areas proportional to population size.

Health area	Adult women of childbearing age	Number of Participants	Number of communities
Moliwe	14,877	168	4
Bojongo	8925	101	3
Seaport	6494	73	2
Bota	2681	30	1
Total	33,027	372	10

2.3. Selection Criteria

Women aged 21 - 49 years who resided in the Limbe Health District for at least six months prior to the study were eligible, while those who were unable to provide consent due to severe mental illness or acute distress were not included.

2.4. Data Collection

Data were collected using an interviewer-administered questionnaire built using Epi-info. Pretesting was performed among 12 adult women of child-bearing age to ensure the validity and reliability of the findings. The questionnaire was then administered in English to collect data. The questionnaire had four sections. Section one was used to assess the socio-demographics characteristics of the study participants, section two was used to assess knowledge of hepatitis B infection, section three was used to assess attitudes toward hepatitis C, and section D on vaccine uptake.

2.5. Knowledge and Attitudes Scoring

To determine knowledge of hepatitis B infection, 15 scoreable items covering awareness, cause, affected organ, transmission, symptoms, complications, prevention and hepatitis B vaccination. Each correct response was assigned 1 point, while each incorrect or “I do not know” response was assigned 0 points. No reverse coding was required for knowledge items. The question on the source of information was analyzed descriptively but excluded from the composite score. Based on a predefined modified Bloom’s cut-off, a score of 9 - 15 ($\geq 60\%$) represented good knowledge.

Attitude was assessed using all 14 five-point Likert-scale statements. For positively worded statements, “strongly agree” and “agree” were classified as favourable and assigned 1 point; “neutral”, “disagree” and “strongly disagree” were assigned 0 points. Item 6, “I am worried about the side effects of the hepatitis B vaccine” was negatively worded and reverse-coded: “disagree” and “strongly disagree” were assigned 1 point, while “neutral”, “agree” and “strongly agree” were assigned 0 points. Neutral responses were treated as not demonstrating a good attitude. The item scores were summed to obtain a total attitude score ranging from 0 to 14. A score of 9 - 14 was classified as a good attitude.

2.6. Data Management and Analysis

The questionnaires were double-checked for completeness, and data were entered into Microsoft Excel 2016. Data were subsequently imported into the Statistical Package for Social Sciences (SPSS version 26), cleaned and analysed. Descriptive statistics were presented as frequencies and percentages for categorical variables. Binary logistic regression was used to identify factors associated with hepatitis B vaccine uptake. Vaccine uptake was the dependent variable and was coded 1 for women who reported having received at least one dose of hepatitis B vaccine and 0 for those who had not. Each potential explanatory variable like age group, education level, marital status, employment status, religion, number of children, monthly income, overall knowledge and overall attitude was initially examined

using bivariable logistic regression. Variables with an overall bivariable p -value ≤ 0.20 were considered for inclusion in the multivariable logistic regression model. The adjusted model included age group, education, employment status, monthly income, overall knowledge and overall attitude. Crude odds ratios (cORs), adjusted odds ratios (aORs) and their 95% confidence intervals (CIs) were reported. Statistical significance in the adjusted analysis was set at $p < 0.05$. The analysis did not account for the potential correlation of participants within communities.

3. Results

3.1. Socio-Demographic Characteristics of the Study Participants

Among the 372 participants (mean age 29.8 ± 6.5 years), the majority were aged 21 - 30 years (244, 65.6%). In terms of educational level, most had a secondary level of education (159, 42.7%), followed by a tertiary level (145, 39.0%). Most participants were single (213, 57.3%) and self-employed (145, 39.0%). Most were Christians (342, 92.0%) and had no children (150, 39.2%). A majority reported a monthly income of less than 50,000 XAF (202, 54.3%) (**Table 2**).

Table 2. Socio-demographic characteristics of the study participants.

Variable	Category	Frequency (n = 372)	Percentage (%)
Age group (years)	21 - 30	244	65.6
	31 - 40	93	25
	41 - 49	35	9.4
Level of education	No formal education	15	4
	Primary	53	14.3
	Secondary	159	42.7
	Tertiary	145	39
Marital status	Married	138	37.1
	Single	213	57.3
	Widowed/divorced	21	5.6
Employment status	Employed	108	29
	Self-employed	145	39
	Unemployed	119	32
Religion	Christianity	342	92
	Islam	30	8
Number of children	None	146	39.2
	1 - 2	126	33.9
	3 - 4	72	19.4
	>4	28	7.5
Monthly income (XAF)	Less than 50,000	202	54.3
	50,000 - 100,000	139	37.4
	Above 100,000	31	8.3

3.2. Participants' Knowledge of Hepatitis B and Its Vaccine

In terms of knowledge about hepatitis B, most participants (238, 64.0%) were able to identify it as a liver disease caused by a virus, and most (242, 65.1%) were able to identify the liver as the organ most affected by the disease. Almost half correctly identified a virus as the main cause (186, 50.0%), and the majority recognised that there were several modes of transmission, such as sharing needles (231, 62.1%), mother-to-child transmission (225, 64.8%), blood transfusion (224, 64.7%) and unprotected sex (224, 64.7%). The majority of the participants knew that liver cancer or failure may be a complication of hepatitis B (225, 60.5%), and half recognised six common symptoms: nausea, vomiting, loss of appetite, abdominal pain, jaundice and fever (186, 50.0%). Most participants knew about the hepatitis B vaccine (243, 65.3%), heard about it (252, 67.7%) and knew that vaccination can prevent the disease (234, 62.9%). Health facilities (151; 40.6%) were the main source of information. Nevertheless, gaps in knowledge were reported, with only 147 participants (39.5%) knowing that the hepatitis B vaccine is safe for babies, and the majority did not report knowledge of the number of doses needed (213, 57.3%) or the recommended vaccination schedule in Cameroon (234, 62.9%). However, vaccination was recognised as the best preventive tool (174, 46.8%), and 40.3% recognised the vaccine as being very effective (**Table 3**). Among the 372 participants who were sampled, 165 (44%) had good knowledge of hepatitis B infection and its vaccine (**Figure 1**).

Table 3. Participants' knowledge of hepatitis B and its vaccine.

Variable	Category	Frequency (n = 372)	Percentage (%)
Definition of hepatitis B	A bacterial infection affecting the lungs	27	7.3
	A disease caused by mosquito bites	3	0.7
	A viral infection affecting the liver	238	64
	I do not know	104	28
Organ affected by hepatitis B	I do not know	100	26.9
	Kidneys	5	1.3
	Liver	242	65.1
	Lungs	25	6.7
Main cause of hepatitis B	Bacteria	41	11
	Fungus	17	4.6
	I do not know	128	34.4
	Virus	186	50
Transmission of hepatitis B	All of the above	231	62.1
	Blood transfusion	39	10.5
	From mother to child during childbirth	49	13.2
	Sharing needles or sharp objects	11	3
	Unprotected sex	42	11.3
Hepatitis B leads to Liver cancer or liver failure	I do not know	133	35.8
	No	14	3.8
	Yes	225	60.5

Continued

Nausea, vomiting, loss of appetite, abdominal pain and jaundice are common symptoms of hepatitis B virus	I do not know	171	46
	No	15	4
	Yes	186	50
Hepatitis B is a curable disease	I do not know	155	41.7
	No	84	22.6
	Yes	133	35.8
There is a vaccine for Hepatitis B	I do not know	119	32
	No	10	2.7
	Yes	243	65.3
Vaccination can prevent hepatitis B	I do not know	127	34.1
	No	11	3
	Yes	234	62.9
Heard of hepatitis B vaccine	I do not know	37	9.9
	No	83	22.3
	Yes	252	67.7
Source of information	Community events	12	3.2
	Family or friends	18	4.8
	Health facility	151	40.6
	Media (Tv, radio, internet)	27	7.3
	Not heard of it	120	32.3
	School	44	11.8
The vaccine is safe for babies	I do not know	185	49.7
	No	40	10.8
	Yes	147	39.5
Number of doses required for complete vaccination	1 dose	18	4.8
	2 doses	20	5.4
	3 doses	121	32.5
	I do not know	213	57.3
Recommended vaccination schedule in Cameroon	0-month, 1-month, 6-months and booster dose	110	29.6
	I do not know	234	62.9
	One-time shot	12	3.2
	Two-time shot	16	4.3
Most effective method for prevention	Avoiding contact with an infected person	30	8.1
	Getting vaccinated	174	46.8
	I do not know	151	40.6
	Social distancing with infected individuals	17	4.6
How effective is the vaccine in preventing hepatitis B	I do not know	174	46.8
	Not effective	9	2.4
	Somewhat effective	39	10.5
	Very effective	150	40.3

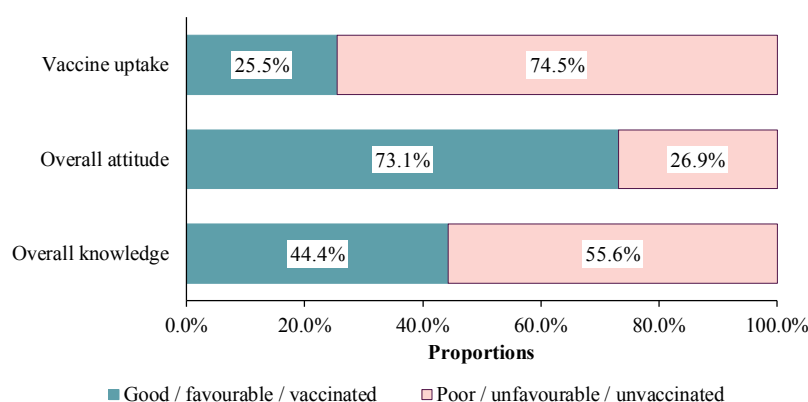


Figure 1. Overall knowledge, attitude and hepatitis B vaccine uptake among participants.

3.3. Participants' Attitudes toward Hepatitis B and Its Vaccine

Regarding attitudes toward hepatitis B and its vaccine, 270 (72.6%) participants agreed or strongly agreed that hepatitis B is a serious health problem, while 217 (58.3%) perceived themselves to be at risk of infection. A total of 248 (66.7%) indicated that they would be worried if they tested positive for hepatitis B. Similarly, 245 (65.9%) considered hepatitis B vaccination necessary, and 248 (66.7%) regarded the vaccine as a safe preventive measure. Furthermore, 218 (58.6%) trusted health workers' advice regarding vaccination, while 234 (62.9%) would recommend hepatitis B vaccination to their family members and babies (Table 4). Overall, 272 (73.1%) participants had a favourable attitude toward hepatitis B vaccination (Figure 1).

Table 4. Attitudes of participants toward hepatitis B and its vaccines.

Variables	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
Hepatitis B is a serious health problem	152 (40.9)	118 (31.7)	85 (22.8)	10 (2.7)	7 (1.9)
At risk of contracting hepatitis B	85 (22.8)	132 (35.5)	112 (30.1)	34 (9.1)	9 (2.4)
Worried if I tested positive for hepatitis B	119 (32.0)	129 (34.7)	98 (26.3)	18 (4.8)	8 (2.2)
I think getting vaccinated against hepatitis B is necessary	127 (34.1)	118 (31.7)	96 (25.8)	24 (6.5)	7 (1.9)
The hepatitis B vaccine is a safe preventive measure	130 (34.9)	118 (31.7)	96 (25.8)	20 (5.4)	8 (2.2)
I am worried about the side effects of the hepatitis B vaccine	54 (14.5)	119 (32.0)	141 (37.9)	45 (12.1)	13 (3.5)
I trust health workers' advice regarding vaccination	82 (22.0)	136 (36.6)	116 (31.2)	30 (8.1)	8 (2.2)
I would recommend vaccination to family members and their babies	84 (22.6)	150 (40.3)	97 (26.1)	30 (8.1)	11 (3.0)
I would take the vaccine if it was free	100 (26.9)	129 (34.7)	92 (24.7)	40 (10.8)	11 (3.0)
Pregnant women should receive hepatitis B vaccination	102 (27.4)	111 (29.8)	94 (25.3)	49 (13.2)	16 (4.3)
My community encourages hepatitis B vaccination	114 (30.6)	109 (29.3)	123 (33.1)	21 (5.6)	5 (1.3)
All unvaccinated people, including babies, should receive the vaccine	92 (24.7)	113 (30.4)	85 (22.8)	64 (17.2)	18 (4.8)
Hepatitis B vaccination is a good use of time and money	71 (19.1)	122 (32.8)	117 (31.5)	47 (12.6)	15 (4.0)
The vaccine is important for community health and well-being	140 (37.6)	115 (30.9)	76 (20.4)	31 (8.3)	10 (2.7)

3.4. Hepatitis B Vaccination Uptake

Among the 372 women who answered the questionnaire, 95 (25.5%) had been vaccinated against hepatitis B infection (**Figure 1**).

3.5. Analysis of Association between Demographics Characteristics, Knowledge, Attitudes with Hepatitis B Vaccine Uptake

In the bivariable logistic regression analysis, age group, education level, employment status, overall knowledge and overall attitude were significantly associated with hepatitis B vaccine uptake. Compared with women aged 41 - 49 years, those aged 21 - 30 years (cOR = 4.121, 95% CI: 1.414 - 17.543; $p = 0.022$) and 31 - 40 years (cOR = 3.710, 95% CI: 1.184 - 16.410; $p = 0.043$) were more likely to have taken hepatitis B vaccine based on their declaration. Compared with women with tertiary education, those with primary education (cOR = 0.320, 95% CI: 0.142 - 0.664; $p = 0.003$) and secondary education (cOR = 0.198, 95% CI: 0.110 - 0.346; $p < 0.001$) had lower odds of vaccination uptake. Self-employed women had higher odds of vaccination than unemployed women (cOR = 2.686, 95% CI: 1.496 - 4.984; $p = 0.001$), whereas the association among employed women was not statistically significant (cOR = 1.754, 95% CI: 0.915 - 3.420; $p = 0.093$). Women with poor knowledge (cOR = 0.200, 95% CI: 0.117 - 0.333; $p < 0.001$) and those with a poor attitude (cOR = 0.216, 95% CI: 0.117 - 0.380; $p < 0.001$) had lower odds of vaccination than women with good knowledge and a good attitude, respectively (**Table 5**). Conventional logistic-regression estimates could not be obtained reliably for religion because none of the Muslim participants reported vaccination; however, Fisher's exact test showed an association between religion and vaccine uptake ($p = 0.0005$).

Table 5. Bivariate analysis of the factors associated with hepatitis B vaccine uptake.

Variable	Category	cOR	95% CI		<i>p</i> -value
			Lower	Upper	
Age group (years)	21 - 30	4.121	1.414	17.543	0.022
	31 - 40	3.71	1.184	16.41	0.043
	41 - 49	1			
Level of education	No formal education	0.501	0.134	1.542	0.255
	Primary	0.32	0.142	0.664	0.003
	Secondary	0.198	0.11	0.346	<0.001
	Tertiary	1			
Marital status	Married	1.674	0.576	6.096	0.380
	Single	1.373	0.482	4.932	0.584
	Widowed/divorced	1			
Employment status	Employed	1.754	0.915	3.42	0.093
	Self-employed	2.686	1.496	4.984	0.001

Continued

	Unemployed	1			
Religion*	Christianity	-	-	-	
	Islam	-	-		-
Number of children	1 - 2	0.881	0.502	1.536	0.655
	3 - 4	1.213	0.639	2.266	0.548
	>4	1.178	0.456	2.819	0.721
	None	1	.	.	.
Monthly income (XAF)	Less than 50,000	0.541	0.25	1.225	0.126
	50,000 to 100,000	0.866	0.351	2.186	0.756
	Above 100,000	1			
Overall knowledge	Poor	0.2	0.117	0.333	<0.001
	Good	1			
Overall attitude	Poor	0.216	0.117	0.38	<0.001
	Good	1			

*For Religion none of the Muslim category reported to have taken vaccine, yielding artefact estimates. However, two tailed Fisher's exact test revealed an association between this variable and the vaccine uptake (p -value = 0.0005).

In the multivariable logistic regression analysis, age, education, employment status, knowledge and attitude remained associated with vaccine uptake after adjustment for the other variables in the model. Women aged 21 - 30 years (aOR = 5.157, 95% CI: 1.376 - 19.328; p = 0.015) and 31 - 40 years (aOR = 4.609, 95% CI: 1.174 - 18.101; p = 0.029) had higher odds of vaccination than those aged 41 - 49 years. Women with secondary education had lower odds of vaccination than those with tertiary education (aOR = 0.330, 95% CI: 0.170 - 0.642; p = 0.001). Compared with unemployed women, employed women had 2.5 times higher odds of vaccination (aOR = 2.481, 95% CI: 1.118 - 5.506; p = 0.026), while self-employed women had 3.7 times higher odds (aOR = 3.740, 95% CI: 1.851 - 7.557; p < 0.001). Poor knowledge (aOR = 0.390, 95% CI: 0.200 - 0.763; p = 0.006) and poor attitudes (aOR = 0.385, 95% CI: 0.183 - 0.810; p = 0.012) were associated with lower odds of vaccine uptake. Monthly income was not independently associated with vaccination (**Table 6**).

4. Discussion

The results of this study revealed that 44% of the participants had good knowledge and that 73% had a good attitude toward hepatitis B infection and its vaccine. Multivariate logistic regression revealed that age group, level of education, employment status, overall knowledge and overall attitude were independently associated with hepatitis B vaccine uptake. Because of the cross-sectional design, these findings did not imply causal or predictive relationships.

Table 6. Multivariate analysis of the factors associated with hepatitis B vaccine uptake.

Variable	Category	95% CI			<i>p</i> -value
		aOR	Lower	Upper	
Age group (years)	21 - 30	5.157	1.376	19.328	0.015
	31 - 40	4.609	1.174	18.101	0.029
	41 - 49	1			
Level of education	No formal education	1.327	0.354	4.975	0.674
	Primary	0.67	0.271	1.657	0.386
	Secondary	0.33	0.17	0.642	0.001
	Tertiary	1	.	.	
Employment status	Employed	2.481	1.118	5.506	0.026
	Self-employed	3.74	1.851	7.557	<0.001
	Unemployed	1			
Monthly income (XAF)	Less than 50,000	0.67	0.241	1.861	0.442
	50,000 to 100,000	0.733	0.235	2.281	0.592
	Above 100,000	1			
Overall knowledge	Poor	0.39	0.2	0.763	0.006
	Good	1			
Overall attitude	Poor	0.385	0.183	0.81	0.012
	Good	1			

4.1. Knowledge of Hepatitis B Infection and Its Vaccine

In the present study, only 44% of women aged 21 - 49 years had good knowledge of hepatitis B and its vaccine. Although many women were aware of HBV and its prevention, more than half had limited knowledge. This finding is of concern because knowledge may be related to preventive behaviours, including screening and vaccination. The observed level of knowledge was higher than that reported in the neighbouring Buea Health District, where only 16% of pregnant women had adequate knowledge of HBV infection [18]. A study in the Limbe and Muyuka Health Districts likewise reported better knowledge among pregnant women in Limbe than among those in Muyuka [16]. More recent community-engagement research in Cameroon has continued to identify gaps in HBV knowledge and preventive practices, with knowledge associated with practice [19]. In the Afar Region of Ethiopia, only 10.4% of pregnant women had good knowledge of HBV [20]. Differences across studies may reflect variations in participant characteristics, measurement instruments, health education exposure and access to preventive services. Even in Toronto, a community outreach and point-of-care testing campaign among people of Chinese descent revealed substantial gaps in HBV knowledge and awareness [21].

4.2. Attitudes toward Hepatitis B Infection and Its Vaccine

Favourable attitudes toward hepatitis B and its vaccine, observed among 73% of participants, are encouraging and suggest broad acceptance of HBV prevention. This proportion was higher than the 19.2% positive-attitude level reported among pregnant women in the Afar Region of Ethiopia [20]. Notably, 73% of participants had good attitudes, whereas only 44% had good knowledge. A Nigerian study similarly reported moderate knowledge alongside generally positive perceptions of HBV vaccination [12]. Thus, good attitudes may coexist with important gaps in knowledge of transmission, vaccination schedules and vaccine benefits.

4.3. Factors Associated with Hepatitis B Vaccine Uptake

Age group was independently associated with hepatitis B vaccine uptake. Compared with women aged 41 - 49 years, those aged 21 - 30 years and 31 - 40 years had approximately fivefold and fourfold higher adjusted odds of vaccination, respectively. Younger women may have had greater exposure to recent vaccination information, reproductive-health services or vaccination opportunities. Nevertheless, these factors were not directly assessed, and the wide confidence intervals indicate limited precision, suggesting cautious interpretation of observed age differences.

Educational level was significantly associated with vaccine uptake: women with secondary education had lower odds of vaccine uptake than those with tertiary education. These findings are consistent with those of a national pilot study among pregnant women in Nigeria, which revealed educational and awareness-related disparities in HBV vaccination coverage [6]. A community study among adults in southern Ethiopia also revealed that educational status was associated with HBV-related knowledge and preventive practices [22]. Higher education may improve access to health information, the ability to evaluate vaccine information and the degree of autonomy in seeking preventive services.

Employment status was independently associated with hepatitis B vaccine uptake. Compared with unemployed women, employed women had approximately 2.5 times higher adjusted odds of vaccination, while self-employed women had approximately 3.7 times higher odds. These findings are consistent with a community-based study in Beijing in which occupation was examined in relation to hepatitis B vaccination coverage [23]. Employment may be associated with greater financial resources, exposure to workplace health information or easier access to vaccination services. However, these explanations remain hypothetical given that vaccine cost, workplace vaccination opportunities and service accessibility were not measured.

Overall knowledge was associated with hepatitis B vaccine uptake. Women with poor knowledge had 61% lower adjusted odds of vaccination than those with good knowledge (aOR = 0.390, 95% CI: 0.200 - 0.763). Awareness of HBV transmission, complications and vaccine effectiveness may increase the perceived need for vaccination. In Buea, Frambo and colleagues reported limited HBV knowledge and

low use of preventive services among pregnant women [18]. A Nigerian national pilot study also identified lack of awareness as an important reason for non-vaccination [6], while a Ugandan study demonstrated the importance of information and motivation for preventive practices [7].

Overall attitude was similarly associated with vaccine uptake. Women with an unfavourable attitude had approximately 62% lower adjusted odds of vaccination than those with a good attitude (aOR = 0.385, 95% CI: 0.183 - 0.810). This finding is consistent with studies in Ethiopia and Uganda showing relationships between attitudes, perceptions, health-system interactions and HBV preventive behaviours [9] [11]. Belief in disease severity, confidence in vaccine protection and trust in healthcare workers may facilitate vaccine acceptance. Conversely, receiving vaccination may improve attitudes; therefore, the temporal direction of this association remains uncertain.

Monthly income met the prespecified $p \leq 0.20$ screening criterion but was not independently associated with vaccine uptake after adjustment, suggesting that its crude relationship with uptake may have been explained partly by related characteristics such as education and employment status.

4.4. Limitations

This study has several limitations. Vaccination status was self-reported and not verified using vaccination cards or health-facility records, potentially introducing recall, social-desirability and vaccine-misclassification biases. The cross-sectional design precludes establishing temporal direction, causality or predictive relationships. Moreover, potentially relevant factors, including previous HBV testing, pregnancy status, vaccine cost, service availability and accessibility, distance to health facilities and healthcare-worker recommendations were not measured, leaving the possibility of residual confounding. Further, the analysis did not account for potential within-community correlation; therefore, the reported confidence intervals may be narrower than cluster-adjusted intervals. Finally, because participants were women aged 21 - 49 years from selected communities in the Limbe Health District, the findings may not be generalizable to women aged 15 - 20 years or those in other settings.

5. Conclusion

Hepatitis B vaccine uptake among women aged 21 - 49 years in the Limbe Health District was low, with 74.5% of participants reporting that they were unvaccinated. Knowledge of hepatitis B and its vaccine was limited, although most participants demonstrated a good attitude toward vaccination. Age group, education level, employment status, knowledge and attitude were associated with vaccine uptake. These findings support the need for targeted health education, improved access to affordable vaccination services, and community sensitisation to increase vaccine uptake, reduce the burden of hepatitis B-related morbidity and mortality and advance progress toward national and global health targets.

Ethics Approval

The study protocol was approved by the Institutional Review Board of the Faculty of Health Sciences, University of Buea (Ref. No: 2025/1670-12/UB/SG/IRB/FHS) and the Regional Ethics Committee, for Human Health Research of the South-West Region (Ref. No: 160/CRERSH/SW/C/03/2025).

Author Contributions

Conceptualization: Sarah Limunga Mosembe, Divine Enoru Eyongeta and Abdel Jelil Njouendou; methodology: Sarah Limunga Mosembe and Nicoline Fri Tanih; validation: Abdel Jelil Njouendou, Nicoline Fri Tanih, Hermann Ngouakam and Takamo Peter; formal analysis: Abdel Jelil Njouendou, Sarah Limunga Mosembe and Takamo Peter; investigation: Sarah Limunga Mosembe, Divine Enoru Eyongeta and Nicoline Fri Tanih; resources: Abdel Jelil Njouendou, Divine Enoru Eyongeta and Sarah Limunga Mosembe; data curation: Sarah Limunga Mosembe and Takamo Peter; writing—original draft preparation: Sarah Limunga Mosembe and Nicoline Fri Tanih; writing—review and editing: Abdel Jelil Njouendou, Hermann Ngouakam and Divine Enoru Eyongeta; visualization: Divine Enoru Eyongeta, Hermann Ngouakam and Abdel Jelil Njouendou; supervision: Abdel Jelil Njouendou and Divine Enoru Eyongeta; project administration: Sarah Limunga Mosembe. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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