

ORIGINAL ARTICLE

Measuring stigma associated with hepatitis B virus infection in Sierra Leone: Validation of an abridged Berger HIV stigma scale

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Abstract

Stigma associated with hepatitis B virus (HBV) is common in endemic countries; however, instruments are lacking to accurately measure HBV-related stigma. We therefore aimed to develop and validate a concise instrument for measuring perceived HBV-related stigma in Sierra Leone. We enrolled 220 people living with HBV (PWVB) aged ≥ 18 years from August to November 2022. The initial Likert-scale instrument entailed 12 items adapted from Berger's HIV Stigma Scale. We included four additional items adapted from the USAID indicators for enacted stigma. The proposed scale's psychometric properties were assessed. After item reduction, the final HBV Stigma Scale consisted of 10 items and had good internal consistency (overall Cronbach's $\alpha = 0.74$), discriminant, and construct validity. Exploratory factor analysis produced a three-dimensional structure accounting for 59.3% of variance: personalized stigma driven by public attitudes (six items), negative self-image (two items), and disclosure concerns (two items). Overall, 72.8% of respondents reported perceived HBV-related

Abbreviations: BGH, Bo Government Hospital; BTS, Bartlett's Test of Sphericity; DI, discrimination index; ETU, Eastern Technical University; HBV, hepatitis B virus; IQR, interquartile ranges; KGH, Kenema Government Hospital; KMO, Kaiser-Meyer-Olkin; NU, Njala University; PWH, people living with HIV; PWVB, people living with HBV; SSA, sub-Saharan Africa; USAID, United States Agency for International Development.

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stigma (mean score 29.11 ± 4.14) and a similar proportion (73.6%) reported at least one instance of enacted stigma. In assessing criterion-related validity, perceived HBV-related stigma correlated strongly with enacted stigma ($r=0.556$) and inversely with having family/friends with HBV ($r=-0.059$). The 10-item HBV Stigma Scale demonstrated good internal consistency and validity and is suitable for screening for HBV-related stigma in Sierra Leone. The psychometric properties of the scale can be optimized with item additions/modifications and confirmatory factor analysis. The scale may help in combating stigma as a barrier to achieving HBV global elimination goals.

KEYWORDS

hepatitis B virus, mental health, Sierra Leone, stigma, sub-Saharan Africa

1 | INTRODUCTION

Stigma associated with communicable diseases is widely recognized as an important social determinant of health, and hepatitis B virus (HBV) infection is no exception. Globally, there were an estimated 296 million chronic cases of HBV and 850,000 attributable deaths in 2021.¹ Sierra Leone and other West African countries are highly endemic (HBV prevalence >8%) and are among the most adversely impacted by the HBV epidemic.^{1,2} Although there are concerted efforts to achieve the global elimination of HBV by 2030,³ millions of people living with HBV (PWHB), especially in sub-Saharan Africa (SSA) lack access to quality healthcare and further face the added social burden of stigma and discrimination associated with the disease.³⁻⁵

1.1 | Conceptual framework

In 1963, Goffman⁶ defined stigma as an *attribute that is deeply discrediting*, which results in being *disqualified from full social acceptance*.⁶ Later, in 2001, Link and Phelan⁷ proposed a pathway through which stigma operates within power structures. This usually starts with *stereotyping and labelling*, which *separates* the affected individual from the rest of society as the “other” and culminates in *loss of status*, which then invites unfair treatment and discrimination.⁷ Additionally, pervasive stigma disrupts many aspects of life in such profound ways as to be considered a fundamental social determinant of health outcomes.⁸

Despite the huge global burden of HBV, less is known about the characteristics of stigma associated with HBV, due in part to the lack of validated instruments to accurately measure HBV-related stigma. The existing literature on HBV-related stigma is sparse and largely comes from developed countries, with little representation from SSA.^{4,5} The emerging evidence suggests that HBV-related stigma often arises from knowledge deficits and misconceptions of disease processes,^{4,5,9} although paradoxically, higher levels of knowledge

especially of disease transmission dynamics has been associated with more societal stigma.^{10,11} Additionally, stigma serves as a major barrier to HBV status disclosure. In more collectivist communities, status disclosure can lead to myriad negative social consequences including family and social isolation,¹²⁻¹⁵ denial of sexual intimacy and in extreme cases partner/spousal abandonment,¹⁶⁻¹⁸ and loss of employment opportunities.^{15,19} In the healthcare setting, PWHB may face neglect from providers, which can result in treatment non-adherence and disengagement from care.^{14,20-22} Such negative experiences can cause significant emotional distress such as shame, anger, despair and resignation, resulting in serious mental health problems including anxiety, depression and post-traumatic stress disorder.^{18,23,24} Thus, identifying and addressing stigma is of the utmost importance, as it has the potential to alleviate social marginalization,^{4,5} enhance mental well-being and quality of life,²²⁻²⁵ and improve healthcare experiences.²⁶⁻²⁸

To design evidence-based interventions that can effectively address HBV-related stigma in endemic countries in SSA, it is crucial to accurately measure stigma levels and its dimensions using culturally-sensitive instruments with robust psychometric properties. Thus, the aim of this study was to develop and validate an HBV Stigma Scale in a cohort of PWHB in Sierra Leone.

2 | METHODS

2.1 | Participants, research sites and recruitment

Study participants were recruited at two hospital-based treatment clinics in Sierra Leone from August to November 2022. Bo Government Hospital (BGH) is a secondary health facility located in Bo, Sierra Leone's second-largest city. The facility is a 400-bed referral hospital in the Southern Province and provides vital services to over 1 million people. Kenema Government Hospital (KGH) is a 350-bed regional hospital serving 670,000 people in Kenema and other districts in the Eastern Province of Sierra Leone.

Potential study participants were approached in treatment clinics at BHG and KGH by trained research staff and informed of the purpose of the study. Those who expressed interest and signed the consent form were enrolled in the study. The inclusion criteria were: (1) age > 18 years; (2) confirmed HBV infection status by an approved diagnostic method such as serological testing, polymerase chain reaction methods or documentation of HBV infection in clinic records; (3) aware of HBV infection status for ≥ 2 weeks; and (4) able and willing to give informed consent. Exclusion criteria included: (1) age < 18 years; (2) unable or unwilling to give informed consent; and (3) having complicated or terminal illness (e.g., current hospital admission for gastrointestinal bleeding, decompensated liver cirrhosis, or hepatocellular carcinoma).

The research staff were from two public tertiary educational institutions in Sierra Leone. Njala University (NU) is located at two campuses in Njala and Bo in southern Sierra Leone. NU is divided into 8 schools and several departments and divisions. The Eastern Technical University (ETU) is Kenema, with several campuses located throughout the Eastern Province. The ETU consists of 2 schools and 4 faculties. Researchers from the School of Community Health Sciences (NU, Bo Campus) and the School of Nursing and Medical Laboratory Sciences (ETU, Kenema Campus) participated in this study. All the research staff who administered the questionnaires to the study participants were native Sierra Leoneans with experience in survey methods and intimate knowledge of the local context, including local languages, norms and customs. A one-week training seminar was conducted prior to the commencement of the study, during which the survey methods and instrument contents were discussed and modified where necessary based on the feedback received from researchers.

2.2 | Instrument development and procedures

Survey questionnaire and stigma instrument development were informed by our experiences gained from interactions with PWHB in the clinical and community settings in Sierra Leone, our preliminary work describing the epidemiological, clinical, and social aspects of the HBV epidemic in Sierra Leone^{11,29-33} and the broad literature on

measuring HIV-related stigma,^{34,35} which has been adapted to inform studies in understanding HBV-related stigma.^{4,5}

The first section of the survey tool entailed a questionnaire capturing the sociodemographic characteristics and HBV-related history of the study participants, i.e., HBV status disclosure, duration since diagnosis, and having family/friends who were PWHB. Furthermore, we included four indicators of enacted stigma, which were adapted from the United States Agency for International Development (USAID)-recommended indicators for assessing discriminatory attitudes towards people living with HIV.³⁶ The selected indicators assessed (1) partner/spousal abandonment; (2) isolation from family members; (3) social exclusion; and (4) loss of financial resources (workplace stigma).³⁶ Responses were recorded as “yes”, indicating that a participant had been the subject of a discriminatory experience, and “no”, indicating the contrary experience. A question answered “yes” earned 1 point, while “no” earned no points, with possible scores ranging from 0–4 for enacted HBV stigma.

The second section of the survey tool entailed a 12-item HBV Stigma Scale (Figure 1), which was adapted from Reinius et al.³⁷ This is an abridged version of the 40-item Berger HIV Stigma Scale originally developed and validated by Berger et al.³⁴ The full-length Berger scale is one of the most widely used instruments for assessing perceived HIV-related stigma from the perspective of people living with HIV (PWH). It measures stigma across four domains (subscales), as follows: (1) *personalized stigma* (perceived consequences of people knowing about one's HIV status); (2) *disclosure concerns* (worries about HIV status disclosure); (3) *concern with public attitudes* (assesses discriminatory attitudes from the public); and (4) *negative self-image* (harbouring negative feelings towards self).³⁴ All items were positively keyed and responses were rated on a 4-point Likert scale with equidistant scores, as follows: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree, with higher scores indicating higher levels of perceived stigma. The original Berger HIV Stigma Scale demonstrated excellent psychometric properties with high internal consistency (overall Cronbach's $\alpha=0.96$) and test-retest correlation ($r=0.89-0.92$).³⁴ The Berger HIV Stigma scale has been validated for use in SSA,^{38,39} and full-length or abridged versions have been validated for measuring stigma related to HBV,⁴⁰ hepatitis C⁴¹ and coronavirus disease 2019.⁴²

Personal & Public	-0.101	0.345**	0.478**	0.366**	0.151*	0.416**
Negative Self-image	0.022	0.191**	0.241**	0.095	-0.091	0.137*
Disclosure Concerns	0.010	0.555**	0.548**	0.564**	0.415**	0.643**
Total Perceived Stigma	-0.057	0.495**	0.599**	0.480**	0.219**	0.556**
	Family/Friend With HBV	Partner Abandonment	Family Isolation	Social Exclusion	Workplace Stigma	Total Enacted Stigma

FIGURE 1 Heatmap of Pearson correlations of the subscales of perceived and enacted HBV stigma. **Correlation is significant at the 0.01 level (two-tailed). *Correlation is significant at the 0.05 level (two-tailed).

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

The abridged Berger HIV Stigma Scale by Reinius et al³⁷ was adapted for this study after examining its *content* and *construct validity*. The abridged scale contains 12 items (total score range: 12–40) and replicated the 4-dimensional structure of the original Berger HIV scale while retaining high internal consistency (Cronbach's $\alpha=0.80$ – 0.88 across subscales).³⁷ In our adaptation of the scale, we replaced “HIV” with “Hepatitis B” in all questions and instructions. After slight modifications, the English language version was translated by a local professional translation service into the Krio language, the lingua franca and de facto national language spoken by nearly the entire population of Sierra Leone. The accuracy of the content and cultural appropriateness of the Krio language version was verified by the local researchers who are fluent in both the English and Krio languages through back-translation. The Krio language version was used to assist participants who could not read or write in English in answering the survey questions. The final English and Krio language versions of the questionnaires (Supplementary Materials) were piloted to 10 individuals who were not included in the final study to ascertain the instruments' clarity and cultural appropriateness. Lastly, to assess *criterion-related validity*, our hypothesis was that PWHB who had experienced at least one instance of discrimination (enacted stigma) would report higher levels of perceived stigma, while having family/friends with HBV would inversely correlate with overall perceived stigma in accordance with Allport's contact hypothesis.⁴³

2.3 | Statistical analysis

All analyses were performed in SPSS Version 29.0 (IBM Corp). Baseline sociodemographic and clinical characteristics were collected. Descriptive statistics were used to summarize baseline sociodemographic and health characteristics. Categorical variables were reported as counts (percentages) and continuous variables were presented as medians (interquartile ranges, IQR). The distribution of stigma scores was accessed by means of the Kolmogorov–Smirnov test of normality and Levene's test for homoscedasticity, which assumed homogeneity of variances under the null hypothesis.

The psychometric properties of the adapted 12-item HBV Stigma Scale were accessed by estimating its internal consistency (reliability), the discriminant validity of the items, and construct validity of the scale. The internal consistency was demonstrated by means of the following criteria: (1) communality value (h_i) > 0.20; (2) corrected item-total correlation ≥ 0.32 ; and (3) coefficient of Cronbach's $\alpha > 0.70$. To assess discriminant validity, we calculated the discrimination index (DI) of each item using Kelley's method,⁴⁴ which compared the highest (73rd percentile) and lowest (27th percentile) stigma scores, with a DI ≥ 0.20 considered acceptable. We performed exploratory factor analysis using principal axis factoring with orthogonal (Varimax) rotation to assess the dimensional structure of

the scale. For factor retention, eigenvalues >1 and loading saturations >0.4 were considered. Adequacy of sampling was ascertained using the following conditions: (1) determinant of correlation matrix tending towards 0 ($|r| < 0.0001$); (2) Kaiser-Meyer-Olkin (KMO) index >0.6; and (3) a statistically significant Bartlett's Test of Sphericity (BTS). The correlations between factors (subscales) were calculated by Pearson's correlation coefficient (r). In all analyses, statistical significance for associations was set at $p < .05$.

3 | RESULTS

3.1 | Sociodemographic and health-related characteristics of respondents

We enrolled 220 PWHB in the survey (100% response rate for all 12 items), of which 53.6% were from Kenema (Eastern Province) and 46.4% were from Bo (Southern Province). **Table 1** describes the baseline sociodemographic characteristics of study participants. The majority were male (54.5%) and the median age was 33 years (IQR 27–41). Nearly half (48.2%) were single and Muslim (49.5%). Most (78.2%) had received primary education or higher and could read and write. The median duration from HBV diagnosis was 2 years (IQR 1–3) and most (91.4%) were on treatment. The self-reported HBV disclosure rate was high (72.7%); however, fewer than two-fifths (39.5%) reported knowing someone living with HBV. Of the USAID-derived indicators of enacted stigma tested, 66.4% reported workplace stigma, 46.3% had experienced social exclusion, 43.6% reported spousal/partner abandonment, and 49.6% felt isolated within their own families.

3.2 | Descriptive statistics, internal consistency and discriminant validity

The internal consistency of all 12 items (Q1–Q12) was first accessed. The overall Cronbach's α was 0.67. After removing items Q5 and Q12, the internal consistency of the remaining 10 items improved, with overall Cronbach's $\alpha=0.74$. **Table 2** shows the descriptive statistics, DI and psychometric properties of the remaining 10 items. The mean stigma score was 29.11 (SD=4.14). The item mean scores were normally distributed ($Z_{K-S}=0.29$, $p=.200$) and the assumption of equal variances (homoscedasticity) was met ($F=5.11$, $p=0.330$). The coefficients of Cronbach's α of the individual items on the 10-item HBV Scale varied from 0.67 to 0.74 (**Table 2**), indicating acceptable reliability of responses. The 10-item scale was therefore retained, as deleting additional items did not improve its overall internal consistency (Cronbach's $\alpha=0.74$). Initial communalities ranged from 0.47 to 0.71 and corrected item-total correlation ranged from 0.21 to 0.63 except for item Q6, which had corrected item-total correlation of 0.08. Items had acceptable discriminant validity (DI range: 0.20 to 0.38), except for items Q4 and Q9, which

TABLE 1 Baseline characteristics of participants (N=220)

Characteristics	N (%)
Gender	
Male	120 (54.5)
Female	100 (45.5)
Age, years	
Median (IQR)	33 (27–41)
<30	80 (35.4)
30–49	97 (44.1)
≥50	43 (19.5)
Relationship status	
Single	107 (48.6)
Married	80 (36.4)
Divorced/widowed	33 (15.0)
Highest education attained	
None	48 (21.8)
Primary	25 (11.4)
Secondary	80 (36.4)
Tertiary	67 (30.5)
Religion	
Christian	111 (50.5)
Muslim	109 (49.5)
Residence	
Kenema (Eastern Province)	118 (53.6)
Bo (Southern Province)	102 (46.4)
Time living diagnosed with HBV	
Median (IQR), years	2 (1–3)
Disclosed HBV status	
Yes	160 (72.7)
No	60 (27.3)
Has family member or friend with HBV	
Yes	86 (39.1)
No	134 (60.9)
Felt abandoned by spouse or partner	
Yes	96 (43.6)
No	124 (56.4)
Felt isolated by family members	
Yes	87 (39.5)
No	133 (60.5)
Felt excluded from social activities	
Yes	103 (46.8)
No	117 (53.2)
Think illness has affected career progression	
Yes	147 (66.8)
No	73 (33.2)

had DI=0.18 (below the 0.20 threshold). Thus, overall, the 10-item HBV scale demonstrated good psychometric properties and was retained for further analysis.

3.3 | Construct validity and dimensional structure

Table 3 shows the results of principal axis factoring with Varimax rotation. The estimated (KMO) index=0.701, reflecting adequacy of the sample size for the analysis. Bartlett's Test of Sphericity (BTS) indicated adequacy of the factor extraction model ($\chi^2=512.11$, $df=45$, $p<.001$). The determinant of the correlation matrix was 0.092, which fulfilled the condition ($|r|<0.0001$). These results showed that the 10-item scale was appropriate for factor extraction.

The factorial organization of the extracted items consisted of three dimensions which accounted for 59.3% of the total variance (Table 3). The loading saturations were >0.4. The first factor comprised of six items (Q2, Q9, Q1, Q11, Q7, Q7 and Q4) and represented "personalized stigma due to public attitudes", with subscale Cronbach's $\alpha=0.74$. The second factor consisted of two items (Q8 and Q10) and described "negative self-image", with Cronbach's $\alpha=0.66$. The third factor integrated two items (Q6 and Q3) and represented HBV "disclosure concerns", with Cronbach's $\alpha=0.67$. The corrected item-total correlation was high for all items (range: 0.36–0.63) except for item Q4 which was below the threshold ($r=0.28$). These results indicated construct validity of the scale.

3.4 | Prevalence of perceived and enacted HBV stigma

The overall mean perceived HBV stigma score was 29.11 ± 4.14 , corresponding to 72.8% of participants (Table 3). Across subscales, personalized stigma in response to public attitudes contributed the highest to overall perceived stigma (77.5%, mean score 18.60 ± 2.79), followed by disclosure concerns (66.2%, mean score 5.30 ± 1.48) and negative self-image (65.3%, mean score 5.30 ± 1.48) (Table 3). Based on the USAID-adapted indicators, 73.6% of participants reported at least one instance of enacted stigma. Nearly two-thirds (66.8%) reported having lost career opportunities due to their HBV status. Social exclusion was the most frequently reported (46.8%), followed by spousal/partner abandonment (43.6%) and feeling isolated from family members (39.5%).

3.5 | Criterion-related validity and correlations between stigma subscales

As shown in Figure 1, total perceived stigma correlated strongly with total enacted stigma ($r=0.556$, $p<.001$). Furthermore, total perceived stigma correlated highly with three of the four dimensions of enacted stigma: family isolation ($r=0.599$, $p<.001$), spousal/partner abandonment ($r=0.495$, $p<.001$) and disclosure concerns ($r=0.480$). In contrast, total enacted stigma was highly correlated with two of the three dimensions of perceived stigma: disclosure concerns ($r=0.643$, $p<.001$). Loss or resources and negative self-image did not appear to be strongly correlated with overall perceived or enacted stigma. As

TABLE 2 Descriptive statistics, homoscedasticity, discrimination and internal consistency of adapted HBV stigma scale

Item	Descriptive Statistics			Kolmogorov-Smirnov test			Homoscedasticity			Discrimination			Internal consistency		
	Mean ± SD	Skewness	Kurtosis	Z	p	F	F	p	DI	t	df	p	h_i	rITC	α_{t-i}
Q1	3.05 ± 0.83	-0.49	-0.50	0.23	<.001	8.70	.004	<.001	0.32	10.4	95.03	<.001	0.47	0.46	0.67
Q2	2.56 ± 0.82	0.03	-0.54	0.23	<.001	0.60	.440	<.001	0.38	14.9	116.71	<.001	0.63	0.63	0.68
Q3	2.63 ± 0.95	-0.26	-0.83	0.25	<.001	0.61	.437	<.001	0.38	12.6	106.99	<.001	0.71	0.50	0.67
Q4	3.36 ± 0.70	-1.11	1.58	0.28	<.001	3.82	.053	<.001	0.18	2.9	106.08	.005	0.58	0.19	0.72
Q6	2.67 ± 0.85	-0.54	-0.25	0.32	<.001	12.35	<.001	<.001	0.20	4.2	112.56	<.001	0.65	0.08	0.74
Q7	3.03 ± 0.75	-0.57	0.26	0.29	<.001	6.24	.014	<.001	0.22	7.1	105.40	<.001	0.62	0.34	0.69
Q8	2.50 ± 0.91	-0.23	-0.79	0.27	<.001	1.04	.310	<.001	0.32	9.2	116.88	<.001	0.67	0.36	0.71
Q9	3.43 ± 0.58	-0.70	1.12	0.31	<.001	3.32	.071	<.001	0.18	7.1	91.98	<.001	0.44	0.42	0.69
Q10	2.72 ± 0.75	-0.76	0.48	0.36	<.001	10.11	.002	<.001	0.21	5.6	113.22	<.001	0.61	0.30	0.70
Q11	3.17 ± 0.63	-0.59	1.37	0.33	<.001	4.35	.039	<.001	0.25	9.2	100.74	<.001	0.54	0.58	0.67

Abbreviations: M, mean; SD, standard deviation; df, degrees of freedom; rITC, correlation between the item and the scale; h_i , communality; α_{t-i} , Cronbach's alpha coefficient after removing the item (significance $\alpha \geq 0.70$).

anticipated, having family/friends with HBV was inversely correlated with perceived stigma ($r = -0.057, p = .339$).

4 | DISCUSSION

HBV-related stigma is common in SSA; however, only a small number of studies from the region have described individual and societal perceptions of the disease.^{11,12,14,20,21,45} Most of these were either qualitative studies which enrolled a small sample size or cross-sectional “knowledge, attitude and practices” studies which incorporated a few items to assess negative attitudes/perceptions of PWHB. Few studies have used validated instruments to measure HBV-related stigma levels in this region. Thus, our study is among the first to develop and validate an instrument for measuring HBV-related stigma in a highly endemic setting in SSA. As such, this study addresses a major gap in the literature. The final HBV Stigma Scale consisted of 10 items and measures stigma from the perspective of PWHB. The scale demonstrated robust psychometric properties, with good internal consistency, content, discriminant and construct validity. An additional advantage of the scale is that because it is concise, it can be completed within a few minutes, which makes it suitable for screening for HBV-related stigma in the clinical and community settings.

Exploratory factor analysis of the items revealed a three-dimensional structure. This was in contrast with the original 12-item abridged HIV Stigma Scale which captures four dimensions of HIV-related stigma.³⁷ The two items each representing the subcategories of “negative self-image” and “status disclosure concerns”, respectively, loaded as distinct factor solutions. Interestingly, however, six items representing “personalized stigma” and “stigma due to public attitudes” merged as a unified factor solution. This suggests that personalized stigma may be driven largely by concerns about public attitudes towards PWHB in this setting. The three-dimensional structure accounted for 59.3% of variance and the Kaiser-Meyer-Olkin index and Bartlett's test of sphericity confirmed construct validity of the scale. Although there was cross-loading of three items with high loading saturations (i.e., Q3, Q4 and Q7), the items had higher loading saturations and congruity with their parent factors, and therefore did not affect the three-dimensional structure of the scale. The factorial construct in our study concurs with many of the common themes uncovered from other studies on stigma among PWHB.^{12-15,20-24}

The internal consistency of the 10-item HBV Stigma Scale was assessed by three different methods—i.e., communalities, item-total correlation and the coefficient of Cronbach's α . The overall reliability of the scale was good (Cronbach's $\alpha = 0.74$) but lower than the abridged Berger Scale by Reinius et al³⁷ which was adapted for this study (Cronbach's $\alpha = 0.80-0.88$). Across the three subscales, internal consistency was highest for the “personalized stigma due to public attitudes” subscale (Cronbach's $\alpha = 0.74$), while the subscales “negative self-image” and “disclosure concerns” were less reliable (Cronbach's $\alpha = 0.66$ and 0.67 , respectively). Further item reduction did not result in improvement of the coefficient of Cronbach's α of these two subscales. However, the items fulfilled all other conditions

TABLE 3 Factor loadings from exploratory factor analysis of HBV Stigma Scale

Item	Statement	Factor			Stigma score (Mean ± SD)	% Respondents
		1	2	3		
Q2	People I care about stopped talking to me after learning I have Hepatitis B	0.75			18.60 ± 2.79	77.5%
Q9	Most people are uncomfortable around someone with Hepatitis B	0.65				
Q1	Some people avoid touching me once they know I have Hepatitis B	0.64				
Q11	People's attitudes about Hepatitis B make me feel worse about myself	0.59				
Q7	People with Hepatitis B are treated like outcasts or rejects	0.59		-0.48		
Q4	Telling someone I have Hepatitis B is risky	0.56	-0.51			
Q8	Most people believe a person who has Hepatitis B is dirty		0.77		5.22 ± 1.39	65.3%
Q10	I feel ashamed because I have Hepatitis B		0.76			
Q6	I did not tell anyone I have Hepatitis B except close family and friends			0.81	5.30 ± 1.48	66.2%
Q3	I have lost friends by telling them I have Hepatitis B	0.47		0.64		
	Eigenvalue	2.8	1.7	1.5	29.11 ± 4.14	72.8%
	Cumulative Percent of Variance	31.2%	45.5%	59.3%		
	Kaiser-Meyer-Olkin Index of Sampling Adequacy	KMO=0.701				
	Bartlett's Test of Sphericity	$\chi^2=512.11$, $df=45$, $p < .001$				
	Determinant	$r=0.092$				

for reliability, i.e., all communalities $h_i > 0.20$ and $r_{ITC} > 0.20$, except for items which tested for disclosure concerns, i.e., Q4 (Telling someone I have Hepatitis B is risky) and Q6 (I did not tell anyone I have Hepatitis B except close family and friends). These findings are likely a reflection of cultural differences in how stigma is experienced and perceived.^{45,46} Thus, despite the two items (Q4 and Q6) having low corrected item-total correlations (i.e., $r_{ITC} < 0.20$), they were retained in the final scale owing to their relevance to the conceptual framework. The psychometric indices of the overall scale and in particular the subscales assessing “negative self-image” and “disclosure concerns” can be strengthened by increasing the number of items and/or rephrasing questions to improve their discriminant property.

In the present study, 72.8% of PWHB reported perceived stigma and a similarly high proportion (73.6%) reported at least one instance of enacted stigma, confirming a high burden of stigma suffered by PWHB in this setting. Across subscales, “personalized stigma due to public attitudes” contributed the highest to overall perceived stigma (77.5%). Of particular interest was the finding that although status disclosure rates were high (72.7%), nonetheless, nearly two-thirds (66.2%) of participants expressed disclosure concerns. The negative social and mental health consequences of status disclosure have been more extensively studied than other domains of HBV-related stigma. A qualitative study of PWHB from Ghana by Adjei et al¹² showed that fear of stigma and previous negative experiences were consistently expressed as reasons for non-disclosure of status. In a study evaluating the well-being of PWHB in China, Li et al,¹⁸ HBV status disclosure to sexual partners was associated with significant decrease in all four domains of the World Health Organization Quality of Life assessment

(i.e., physical, psychological, social and environmental). However, the study from Ghana by Adjei et al¹² noted that despite fear of repercussions, status disclosure was also perceived as beneficial in enhancing HBV testing, prevention (vaccination), building trust in relationships and obtaining social/financial support. Similar healthcare benefits from status disclosure (i.e., increased likelihood of HBV testing) have been reported by Franklin et al²¹ in Zambia.

Furthermore, our analysis showed that the scale met the conditions for criterion-related validity. Total perceived stigma and its subscales correlated well with total enacted stigma and its components, with the correlation strongest for disclosure concerns ($r=0.415$ – 0.643) (Figure 1). Similarly, PWHB reporting having disclosed HBV their status correlated highly with the subscale of stigma associated with disclosure concerns ($r=0.605$) and total enacted stigma and its subscales ($r=0.327$ – 0.464). On the other hand, interpersonal relationships are an important coping mechanism and the support of family and friends is crucial in reducing stigma and prejudice related to disease. This was tested with the statement “Do you have a family member, close friend or colleague who has Hepatitis B?” As expected, having family/friends with HBV had an inverse relationship with overall perceived stigma ($r=-0.057$), underscoring the importance of family and other social support networks in designing interventions seeking to reduce stigma as a barrier to elimination efforts.

Our study had some limitations worthy of discussing. Firstly, this was a cross-sectional study rather than a mixed-methods approach which would have offered some insights into causal relationships. Secondly, this was a healthcare-based study from two geographic regions in Sierra Leone; thus, its generalizability may be limited.

Thirdly, although the overall internal consistency of the scale was good, the reliability of the subscales on “negative self-image” and “disclosure concerns” should be considered with caution and can be improved. This can be achieved by increasing the total number of items in each subscale and/or modified to strengthen their discriminant property and cultural sensitivity. Additionally, we were unable to perform confirmatory factor analysis due to the small sample size. Finally, lack of other validated HBV stigma instruments from SSA did not allow for comparison of our findings with that of others. Nonetheless, our analysis is among the first to develop and validate an instrument with good psychometric properties for measuring stigma from the perspective of PWHB and will contribute to efforts seeking to combat stigma as a major barrier to HBV elimination in SSA.

5 | CONCLUSION

In summary, the 10-item HBV Stigma Scale demonstrated good internal consistency and discriminant and construct validity and is suitable for measuring stigma from the perspective of PWHB. The scale had three dimensions including “personalized stigma due to public attitudes” (6 items), “negative self-image” (2 items) and “disclosure concerns” (2 items). The psychometric properties of the HBV Stigma Scale can be optimized with item additions/modifications and further studies are suggested for confirmatory factor analysis. A high proportion of PWHB (72.8%) reported perceived HBV-related stigma in Sierra Leone, with a similarly high proportion (73.6%) reporting at least one instance of enacted stigma, confirming a high burden of stigma suffered by PWHB in this setting. This scale is suitable for use in both the clinical and community setting and will help to combat stigma as a major barrier to HBV elimination in SSA.

AUTHOR CONTRIBUTIONS

GAY, LSB and RAS conceptualized and designed the study. EJS, RAK, PBJ, SAY, PEC, LMB, SPM and MG contributed to study concept and design. EJS, RAS, LSB collected the data. GAY conducted the statistical analysis. BBJ, PO and SL contributed important intellectual content. All authors contributed to the interpretation of data. GAY wrote the initial manuscript draft. All authors critically revised and approved of the final version. GAY is acting as the guarantor of this manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors report no relevant financial disclosures or conflicts of interests.

DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethical approval was obtained from the Njala University Institutional Review Board (approval date 11 June 2022). Prior to enrolment, it was explained to participants that providing written consent and answering the survey questions implied informed consent.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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