Perceived Risk and Vaccine Uptake: Analyzing Hepatitis B Prevention Among Healthcare Workers in Sierra Leone

Prince T. Lamin-Boima[1]*, Prof. Alhaji Brima Gogra[2]

1. School of Community Health Sciences, Njala University, Sierra Leone
2. Ernest Bai Koroma University of Science and Technology, Sierra Leone
*Corresponding author: Prince T. Lamin-Boima (princelboima@yahoo.com)

DOI: 10.29322/IJSRP.15.11.2025.p16729
https://dx.doi.org/10.29322/IJSRP.15.11.2025.p16729

Paper Received Date: 29th October 2025
Paper Acceptance Date: 27th November 2025
Paper Publication Date: 2nd December 2025

Abstract

Background: Hepatitis B virus (HBV) poses a persistent occupational threat to healthcare workers (HCWs), particularly in resource-constrained settings like Sierra Leone. Despite global recommendations for routine screening and vaccination, vaccine uptake remains suboptimal. This study investigates the association between perceived risk, institutional support, and vaccine uptake among HCWs across diverse health facilities.

Methods: A cross-sectional mixed-methods study was conducted among 432 HCWs from public, private, NGO, and faith-based institutions in Sierra Leone. Quantitative data were collected using structured surveys via Kobo Collect and analyzed with SPSS v26. Qualitative data were obtained through in-depth interviews with 12 senior staff and analyzed thematically.

Results: While 65% of HCWs had been screened for HBV, only 43.2% completed the full three-dose vaccine series. Clinical cadres had significantly higher screening and vaccination rates than non-clinical staff, of whom 76% lacked knowledge of correct dosage. Risk perception strongly predicted vaccine uptake, with those perceiving HBV as a high threat being 1.7 times more likely to be vaccinated. Institutional factors—such as advocacy programs, vaccine sponsorship, and employment duration—were also significantly associated with uptake.

Conclusion: Gaps in HBV prevention among HCWs are shaped by both individual-level perceptions and institutional shortcomings. Recommendations include mandatory vaccination policies, education for non-clinical staff, and strengthened workplace advocacy and monitoring to support national HBV elimination goals. Recommendations include implementing mandatory vaccination policies, expanding educational campaigns to non-clinical staff, and ensuring equitable access to free or subsidized vaccines. Strengthening workplace advocacy and routine program monitoring will be critical to enhancing HBV prevention and supporting national public health goals.

Keywords: Hepatitis B, healthcare workers, Sierra Leone, vaccine uptake, screening, missed opportunities, prevention, risk perception, screening, public health.

Background

Hepatitis B virus (HBV) continues to pose a major public health challenge worldwide, particularly in low- and middle-income countries. With more than 296 million people living with chronic HBV infection globally (WHO, 2021), the virus remains a leading cause of liver cirrhosis and hepatocellular carcinoma. Healthcare workers (HCWs) are among the most vulnerable populations due to frequent occupational exposure to blood and bodily fluids. The World Health Organization (WHO) reports that HCWs are up to four times more likely to contract HBV than the general population. In Sierra Leone, a country with a fragile healthcare system and a general HBV prevalence of approximately 8.2%, HCWs are especially at risk, yet preventive measures remain limited.

Recent literature highlights the continued low uptake of HBV vaccination among HCWs across sub-Saharan Africa, despite the availability of a safe and effective vaccine since 1982. Barriers such as inadequate institutional policies, poor vaccine access, limited knowledge, and weak surveillance systems hinder implementation. For instance, studies by Ansumana et al. (2018) and Kachimanga et al. (2020) report high HBV seroprevalence rates among HCWs in the region, emphasizing a critical need for systematic prevention strategies. In Sierra Leone, the absence of national policies mandating routine HBV screening and vaccination for HCWs compounds the risk, reflecting broader gaps in occupational health safety measures within healthcare institutions.

Despite the known risks and the existence of global guidelines advocating for HBV protection among HCWs, there remains a significant gap in understanding how individual-level perceptions and systemic factors interact to influence vaccine uptake in Sierra Leone. While existing studies document prevalence and access issues, few have critically explored how HCWs' perceived risk shapes their engagement with HBV preventive services. This gap limits the development of targeted, context-specific interventions that could enhance vaccine coverage and reduce occupational transmission.

This study, seeks to explores how risk perception, cadre, institutional policy, and access to services influence vaccine uptake. By identifying the barriers and enablers to HBV prevention among HCWs, the study aims to inform policy and practice for occupational health protection in Sierra Leone's health sector.

Methods

This study, titled "*Tested but Unprotected? Uncovering Missed Opportunities in Hepatitis B among Healthcare Workers in Sierra Leone*," employed a mixed-methods, descriptive cross-sectional design to investigate the gap between hepatitis B virus (HBV) screening and vaccination among healthcare workers (HCWs). The primary aim was to explore the interplay of individual behaviors and institutional factors influencing HBV prevention and to identify missed opportunities in promoting vaccine uptake in clinical settings.

The research combined both quantitative and qualitative data collection methods to obtain a holistic perspective. Quantitative data were gathered using a structured questionnaire administered digitally through the Kobo Collect (ODK) platform. This ensured data quality, efficiency, and ease of management during fieldwork. The questionnaire was composed of both closed- and open-ended items, designed to explore a wide range of factors relevant to HBV screening and vaccination.

Key variables captured in the survey included demographic characteristics, such as age, sex, professional cadre, level of education, years of professional experience, and the type of healthcare facility where each respondent worked. These demographic details allowed for disaggregated analysis and better understanding of trends across different professional groups and institutional settings.

The questionnaire also examined participants' screening history by asking whether they had ever been tested for HBV, if they knew their test results, and why they might not have been tested. This was important for understanding the level of engagement with HBV

prevention services among HCWs. Vaccination status was thoroughly investigated, including the number of vaccine doses received, locations and timing of vaccinations, and whether vaccinations were self-funded or institutionally sponsored. Additionally, respondents were asked to explain any incomplete vaccination series, providing insights into the barriers preventing full immunization.

A significant component of the study focused on the respondents' knowledge and perceptions of HBV. Questions were designed to assess their awareness of HBV transmission and prevention, their understanding of the recommended vaccination schedule, their perceived occupational risk, and their belief in the effectiveness of the HBV vaccine. These factors were key to assessing behavioral drivers and barriers to prevention efforts.

Another critical area explored was institutional support for HBV prevention. The questionnaire included items on the availability of workplace vaccination programs, follow-up mechanisms such as reminders, sponsorship opportunities, and facility management attitudes toward staff immunization. These variables provided a picture of the systemic and organizational enablers or obstacles to effective HBV prevention within healthcare settings.

To complement the survey, qualitative data were collected through in-depth interviews (IDIs) with 12 purposively selected senior HCWs and facility administrators. These interviews examined themes such as institutional policy enforcement, perceived challenges to vaccine uptake, communication strategies regarding occupational risks, and the role of outreach or sponsorship programs. The qualitative findings enriched the quantitative data by offering deeper contextual understanding and narrative explanations for observed trends.

The sample consisted of 432 healthcare workers from diverse health sectors, including public, private, NGO, and faith-based facilities. It covered both urban and rural contexts, ranging from tertiary hospitals to primary care units. Participants included a wide range of cadres, such as doctors, nurses, laboratory technicians, pharmacists, community health officers (CHOs), cleaners, porters, and administrative staff—all of whom had served in their roles for at least six months and were involved in direct or indirect patient care.

Quantitative data analysis was performed using SPSS version 26, applying descriptive statistics, chi-square tests, and cross-tabulations to explore associations between key variables. A significance threshold of $p < 0.05$ was used. Thematic analysis of qualitative data was conducted manually, identifying recurring themes related to institutional barriers, vaccine accessibility, risk perception, and programmatic support. Findings from both strands of data were triangulated to enhance the validity and depth of analysis.

Ethical approval was secured from Njala University and the Sierra Leone Ethics and Scientific Review Committee. All participants gave informed consent, and confidentiality was strictly maintained throughout the study.

By combining quantitative rigor with qualitative depth, the study provided valuable insights into the multifaceted challenges and opportunities in strengthening HBV prevention among Sierra Leone's healthcare workforce.

Results

The findings of this study reveal critical insights into the screening and vaccination status of healthcare workers (HCWs) in Sierra Leone. Out of 432 participants, 65% had been screened for hepatitis B virus (HBV), with private hospitals reporting the highest screening coverage (77.3%), followed by NGO-run and public institutions, while faith-based facilities had the lowest (56.4%). Urban health workers were more likely to have been screened than their rural counterparts. In terms of vaccination, 58.3% of respondents had received at least one dose of the HBV vaccine, but only 43.2% completed the recommended three-dose series, with private facility staff again

showing the highest completion rates. Clinical cadres, especially doctors and nurses, were significantly more likely to be fully vaccinated compared to non-clinical staff such as cleaners, security personnel, and administrators.

Perception of Health Care Workers on Hepatitis B (HBsAg)

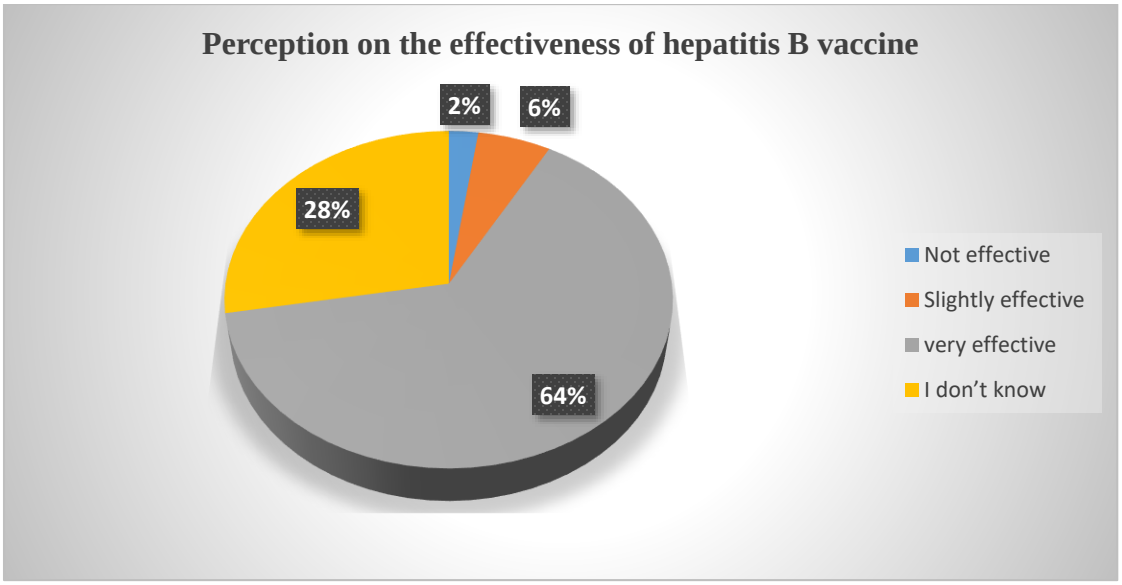


Figure 1: Perception on effectiveness of Vaccine (N=432). Source: Author's Research Data, 2024

Risk perception and knowledge of HBV prevention played a significant role in determining vaccine uptake. Approximately 64.2% of respondents believed the HBV vaccine to be "very effective," and this belief was strongly associated with actual vaccination status ($p < 0.05$). Furthermore, 71.8% of participants acknowledged being at high risk of contracting HBV, particularly those in direct clinical roles and 27.8% expressed uncertainty about its effectiveness. However, knowledge gaps persisted, especially among non-clinical staff—76% of whom were unaware of the correct vaccination schedule. These findings suggest that while awareness of HBV risk exists, it is not uniformly distributed across all cadres, leading to differential vaccine uptake rates. Moreover, 90.1% of all participants believed that HBV could be prevented and controlled, but this belief was lowest among those already infected with the virus (only 1 of 16 positive cases). Those vaccinated were also more likely to believe in HBV control (92.9%) than those unvaccinated (87.0%), further emphasizing how vaccine uptake reinforces positive prevention perceptions.

Table 1: HCWs Perception on prevention/Control and Vaccine uptake

Hepatitis B Vaccine Received	Yes (Prevented & Controlled)	No (Not Prevented & Controlled)	Total
Yes	**208**	**16**	**224**
No	**181**	**27**	**208**
Total	**389**	**43**	**432**

Source: Author's Research Data, 2024

Systemic and institutional barriers were also evident. Respondents identified key obstacles to vaccination, including unavailability of vaccines, lack of institutional mandates, cost-related barriers, and misinformation. Interview data underscored a pressing need for institutional advocacy, with many HCWs expressing support for mandatory vaccination policies and enhanced education on HBV

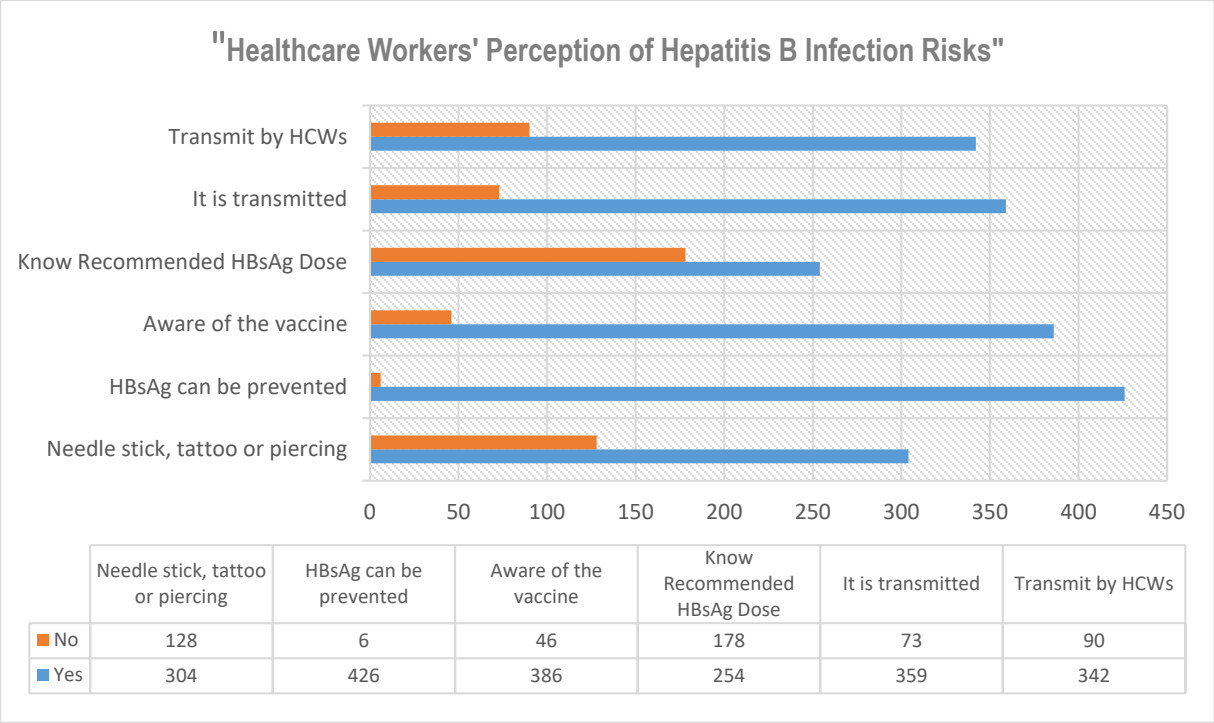
transmission and prevention. Facilities that offered in-house vaccine sponsorships or actively promoted HBV prevention through staff training and advocacy initiatives showed significantly higher vaccination coverage.

Table 2: HCWs Perception on the HBsAg Transmission

	Transmission from HCWs to Patients				Transmission from Mother to Child			
Cadre	**Yes**	**No**	**Total**	**Proportion Yes**	**Yes**	**No**	**Total**	**Proportion Yes**
Doctor	42	9	51	42/51 = 0.82 (82%)	45	6	51	45/51 = 0.88 (88%)
Nurse	110	31	143	110/143 = 0.77 (77%)	121	22	143	121/143 = 0.85 (85%)
CHO	42	11	53	42/53 = 0.79 (79%)	47	6	53	47/53 = 0.89 (89%)
Lab Technician	39	9	48	39/48 = 0.81 (81%)	44	4	48	44/48 = 0.92 (92%)
Pharmacist/Tech	36	7	43	36/43 = 0.84 (84%)	33	10	43	33/43 = 0.77 (77%)
Essential Staff	50	18	68	50/68 = 0.74 (74%)	48	20	68	48/68 = 0.71 (71%)
Administrative	10	0	10	10/10 = 1.00 (100%)	7	3	10	7/10 = 0.70 (70%)
Others	13	3	16	13/16 = 0.81 (81%)	14	2	16	14/16 = 0.88 (88%)
Total	342	88	432	342/432 = 0.79 (79%)	359	73	432	359/432 = 0.83 (83%)

Source: Author's Research Data, 2024

Facilities that implemented internal advocacy programs, provided vaccine sponsorship, or conducted staff training reported notably higher coverage rates. Multivariate analysis further confirmed the impact of several determinants on vaccine uptake. HCWs who perceived themselves at high risk of HBV infection were 1.7 times more likely to be vaccinated (OR = 1.72; 95% CI: 1.12–2.64). Institutional factors were equally influential: the presence of advocacy programs (OR = 1.9; 95% CI: 1.2–3.1), vaccine sponsorship schemes (OR = 2.6; 95% CI: 1.7–4.1), and employment duration of over two years (OR = 1.5; 95% CI: 1.0–2.3) were all significantly associated with higher vaccine uptake. These results indicate that both individual-level perceptions and structural enablers must be addressed to close the existing HBV prevention gap among HCWs in Sierra Leone.



	Needle stick, tattoo or piercing	HBsAg can be prevented	Aware of the vaccine	Know Recommended HBsAg Dose	It is transmitted	Transmit by HCWs
No	128	6	46	178	73	90
Yes	304	426	386	254	359	342

Figure 2: HCWs perception on HBsAg infection risk (N=432). Source: Author's Research Data, 2024

Finally, perception of transmission routes and understanding of vaccination protocols varied by cadre. Clinical staff exhibited greater knowledge of both mother-to-child and healthcare worker-to-patient transmission, with over 75% agreement in these areas, compared to lower levels among non-clinical personnel. While 386 of 432 respondents were aware of the HBV vaccine, only 254 correctly identified the three-dose requirement. Alarmingly, 76% of essential staff responded "I don't know" regarding correct dosage, pointing to significant knowledge gaps. These results underscore the need for targeted educational strategies, particularly for non-clinical HCWs, to enhance awareness, reduce occupational vulnerability, and strengthen comprehensive HBV prevention efforts across the health workforce.

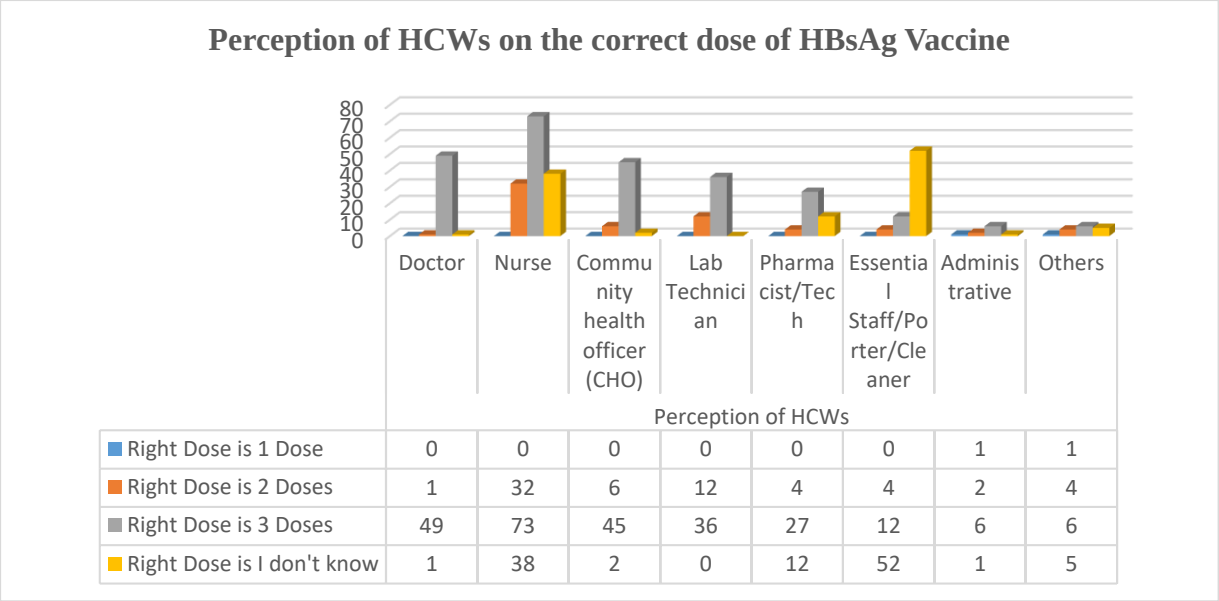


Figure 3: HCWs perception on the correct dose (N=432). Source: Author's Research Data, 2024

Discussion

This study provides compelling evidence on the status of hepatitis B virus (HBV) prevention among healthcare workers (HCWs) in Sierra Leone, emphasizing the role of perceived risk, professional cadre, and institutional support in influencing screening and vaccine uptake. Despite global recommendations and the availability of an effective vaccine since 1982, the findings show that just 65% of HCWs had been screened and only 43.2% had completed the three-dose vaccination schedule. These findings are consistent with those from similar low- and middle-income countries, including Nigeria and Ethiopia, where screening and vaccination rates remain suboptimal due to a combination of personal and systemic barriers (Okonkwo et al., 2020; Yenealem et al., 2019).

The disparities observed among different cadres of HCWs, particularly between clinical and non-clinical staff, align with findings from a cross-sectional study in Ghana, which reported that clinical workers were more likely to be vaccinated than non-clinical personnel due to better access to information and risk awareness (Adjei et al., 2018). In our study, doctors and nurses showed the highest knowledge of vaccine dosage and HBV transmission, while 76% of essential staff (e.g., cleaners, porters) were unaware of the correct dosage. Similarly, a study in Uganda noted that lower-cadre staff often lacked access to health education and were omitted from occupational health policies (Nsubuga et al., 2021), reinforcing the need for inclusive training strategies in HBV control.

Risk perception significantly influenced vaccine uptake in this study, with 64.2% of HCWs believing the vaccine to be "very effective" and 71.8% acknowledging a high risk of infection. Multivariate analysis showed that HCWs with high risk perception were 1.7 times more likely to be vaccinated. These findings are comparable to those of Abiola et al. (2016) in Nigeria, who found that perceived susceptibility was a key motivator for completing the HBV vaccine series. However, in contrast to studies from some high-income settings, such as Germany (Poethko-Müller & Schmitz, 2020), where vaccine uptake is nearly universal among HCWs due to strict mandates and workplace policies, the lack of institutional mandates in Sierra Leone remains a barrier to full coverage.

Institutional support emerged as a critical enabler in this study. Facilities offering in-house sponsorship, staff training, or advocacy had significantly higher vaccination rates. This supports earlier research from Kenya and Cambodia, where health system interventions,

including free vaccine campaigns and workplace reminders, were shown to improve HCW vaccination coverage (Mungai et al., 2017; Touch et al., 2022). The significant association between vaccine uptake and variables such as in-house advocacy (OR = 1.9), sponsorship (OR = 2.6), and employment duration (OR = 1.5) confirms that structural investments are just as important as individual awareness in driving behavior change.

In conclusion, this study affirms that HBV prevention among HCWs in Sierra Leone is hindered by uneven knowledge distribution, limited access, and weak institutional structures—challenges echoed across similar resource-constrained settings. It further underscores the importance of addressing both individual and systemic determinants to close the HBV prevention gap. By enhancing workplace advocacy, training non-clinical staff, and ensuring vaccine accessibility, national and facility-level health leaders can improve HBV vaccine uptake and occupational health safety among HCWs.

Conclusion

This study provides vital insights into the current state of hepatitis B virus (HBV) prevention among healthcare workers (HCWs) in Sierra Leone. The findings reveal a moderate level of HBV screening (65%) and a lower level of full vaccine coverage (43.2%) among HCWs, with substantial variation across facility types and professional cadres. Clinical staff, particularly doctors and nurses, demonstrated significantly higher awareness and vaccination rates compared to non-clinical staff, such as cleaners and administrative personnel. While the majority of respondents (64.2%) perceived the vaccine as “very effective” and 90.1% believed HBV can be prevented and controlled, notable knowledge gaps and uncertainty were evident—especially among non-clinical staff and those unaware of their HBV status.

The study also identified key systemic and institutional barriers to vaccine uptake, including limited vaccine availability, lack of mandatory vaccination policies, misinformation, and inadequate workplace advocacy. Encouragingly, facilities that implemented in-house advocacy programs, sponsorships, or staff training initiatives recorded significantly higher screening and vaccination rates. Multivariate analysis confirmed that both perceived risk and institutional support are strong predictors of vaccine uptake. Ultimately, the study underscores the urgent need to strengthen HBV prevention strategies, particularly by addressing disparities in knowledge and access among different categories of HCWs.

Recommendations

To address the identified gaps in hepatitis B virus (HBV) prevention among healthcare workers (HCWs) in Sierra Leone, several evidence-based and policy-relevant recommendations are proposed. These measures aim to improve vaccine uptake, reduce occupational exposure risks, and strengthen the overall health system response to HBV within healthcare settings.

Firstly, the Ministry of Health and Sanitation (MoHS) should introduce a mandatory HBV vaccination policy for all healthcare workers, including non-clinical staff. This national directive would help standardize protection levels across different health facilities and cadres, ensuring that every HCW, regardless of their role, is adequately protected against HBV. Such a policy would also promote institutional accountability and harmonize preventive strategies across both public and private health institutions.

Secondly, targeted education and training programs should be developed and implemented, particularly for non-clinical staff who demonstrated substantial knowledge gaps in this study. These programs must focus on key areas such as HBV transmission routes, risk factors, vaccine effectiveness, and the required three-dose vaccination schedule. Regular in-service training and awareness campaigns

would empower all HCWs with the information necessary to make informed decisions and reduce the spread of misinformation within health facilities.

Moreover, institutional support and advocacy mechanisms need to be strengthened. Health facilities should establish or expand in-house health advocacy units responsible for promoting HBV awareness, organizing regular vaccination drives, and disseminating accurate health education materials. Evidence from the study showed that facilities with active advocacy and training structures had significantly higher vaccination coverage, demonstrating the critical role of institutional engagement in public health interventions.

Additionally, the government and its development partners should prioritize the provision of free or subsidized HBV vaccines, especially within public and faith-based institutions where financial constraints were noted as barriers to vaccine uptake. Eliminating cost-related obstacles would improve equitable access to vaccination services and enhance coverage among lower-paid and non-clinical staff.

It is also essential to ensure that all healthcare workers, regardless of role or status, are included in occupational health programs. Cleaners, porters, security personnel, and administrative staff must be granted the same access to screening, vaccination, and HBV-related education as their clinical counterparts. An inclusive approach will not only improve individual health outcomes but also strengthen overall infection control within healthcare settings.

Finally, a robust system for monitoring and evaluating HBV prevention programs should be established. Routine data collection on screening and vaccination coverage, knowledge levels, and program performance will help identify bottlenecks, inform evidence-based planning, and ensure accountability. By institutionalizing continuous evaluation, health authorities can adapt strategies to emerging challenges and ensure the long-term sustainability of HBV prevention efforts.

Collectively, the implementation of these recommendations will contribute significantly to reducing HBV transmission among healthcare workers, enhancing workplace safety, and supporting Sierra Leone’s progress toward meeting the WHO’s hepatitis elimination targets.

References

1. Abiola AH, Agunbiade AB, Badmos KB, Osinubi MA. Knowledge, attitude, and uptake of hepatitis B vaccine among healthcare workers in a tertiary health facility in Lagos, Nigeria. Nigerian Journal of Clinical Practice. 2016;19(1):129–135. https://doi.org/10.4103/1119-3077.173724

2. Adjei ME, Asamoah R, Atibila F, Ti-enkawol GN, Ansah-Nyarko M. Hepatitis B vaccination coverage and seroprotection among health care workers in a tertiary hospital in Ghana. Journal of Public Health. 2018;26(6):625–631. https://doi.org/10.1007/s10389-018-0903-0

3. Ansumana R, Lamin JM, Jacobsen KH, Idriss BR, Bangura U, Bockarie AS. Seroprevalence of hepatitis B virus and associated risk factors among health care workers in a tertiary hospital in Sierra Leone. The Pan African Medical Journal. 2018;31(102). https://doi.org/10.11604/pamj.2018.31.102.17362

4. Kachimanga C, Mwagomba B, Chimphambano C, Kawalazira G, Mbeta E, Nyirenda L. Prevalence and factors associated with hepatitis B vaccination status among health care workers in Malawi: A cross-sectional study. BMC Public Health. 2020;20:1011. https://doi.org/10.1186/s12889-020-09111-0

5. Mungai M, Muriuki B, Wanjiru H, Kihara A. Improving uptake of hepatitis B vaccine among health workers in Kenya through outreach and policy support. East African Medical Journal. 2017;94(4):238–245.

6. Nsubuga F, Nagaddya R, Bazeyo W, Nuwaha F. Knowledge and uptake of hepatitis B vaccination among health care workers in Uganda. BMC Infectious Diseases. 2021;21(1):221. https://doi.org/10.1186/s12879-021-05936-w

7. Okonkwo UC, Ijeoma NS, Nnadozie UW, Anazodo MU. Hepatitis B virus vaccination coverage and determinants among health care workers in a Nigerian tertiary hospital. The Pan African Medical Journal. 2020;36(289). https://doi.org/10.11604/pamj.2020.36.289.24115

8. Poethko-Müller C, Schmitz R. Vaccination coverage among healthcare workers in Germany and strategies to improve it. Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz. 2020;63:411–420. https://doi.org/10.1007/s00103-020-03091-6

9. Touch S, Samnang C, Sovannarith S, Chea N. Improving hepatitis B vaccine coverage among healthcare workers in Cambodia: A policy-driven intervention. Asian Pacific Journal of Tropical Medicine. 2022;15(6):261–267. https://doi.org/10.4103/1995-7645.345772

10. World Health Organization (WHO). Global health sector strategy on viral hepatitis 2016–2021: Towards ending viral hepatitis. 2016. https://www.who.int/publications/i/item/9789241565455

11. World Health Organization (WHO). Hepatitis B. 2021. https://www.who.int/news-room/fact-sheets/detail/hepatitis-b