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## Intentions for the prevention of hepatitis B and C among healthcare workers in a tertiary facility in Ghana

Yvonne Naa Duaba Coffie<sup>1,2</sup>, Vivian Efua Senoo-Dogbey<sup>3,4,\*</sup>, Brightson Tettey Coffie Kennedy<sup>2</sup>, Moses Drah Tetteh<sup>2</sup>, Michael Matey Mensah<sup>2</sup>

<sup>1</sup> Ghana College of Nurses and Midwives, Accra, Ghana

<sup>2</sup> Shai-Osudoku District Hospital, Ghana Health Service, Accra, Ghana

<sup>3</sup> Department of Public Health, School of Nursing and Midwifery, University of Ghana, Legon, Ghana

<sup>4</sup> Ghana Institute of Management and Public Administration (GIMPA), School of Public Service and Governance, Accra, Ghana

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### ABSTRACT

**Objectives:** Hepatitis B and C virus (HBV and HCV, respectively) infections pose a significant occupational hazard to healthcare workers (HCWs) globally, with increased risk due to exposure to blood and body fluids. In Sub-Saharan Africa, including Ghana, the prevalence of these infections among HCWs remains high, despite existing prevention measures. Understanding the factors influencing HCWs' preventive behaviors is crucial for developing effective interventions to reduce transmission risks in healthcare settings. This study aimed to assess HBV and HCV prevention intentions and related factors among HCWs at a tertiary hospital in Ghana.

**Methods:** This cross-sectional, facility-based study was conducted using a quantitative approach. Two hundred HCWs were selected using stratified random sampling. The Theory of Planned Behavior was used as a conceptual framework to determine the behavioral intentions of HCWs toward the prevention of hepatitis B and C. Data were collected using structured questionnaires and analyzed using descriptive statistics, correlation analysis, and multiple linear regression. Cronbach's alpha was used to assess the internal consistency of the scales.

**Results:** Attitudes toward prevention were generally poor ( $M = 1.56 \pm 0.56$ ) and did not significantly influence preventive behaviors ( $\beta = 0.056, P = 0.427$ ). Subjective norms showed a moderate positive influence ( $M = 3.14 \pm 0.64, \beta = 0.208, P = 0.003$ ). Self-efficacy emerged as the strongest predictor of preventive behaviors ( $M = 3.44 \pm 0.59, \beta = 0.566, P < 0.001$ ), followed by behavioral intentions ( $M = 3.55 \pm 0.63, \beta = 0.321, P < 0.001$ ).

**Conclusions:** Interventions aimed at enhancing self-efficacy and leveraging subjective norms may be most effective in improving HBV and HCV preventive behaviors among HCWs. These findings provide valuable insights for the development of targeted prevention strategies in healthcare settings, particularly in the Ghanaian context.

### Introduction

Viral hepatitis is an inflammation of the liver caused by the hepatitis A, B, C, D, and E viruses. The number of lives lost due to viral hepatitis is increasing, with estimates of more than 2.2 million new infections globally in 2022 [1]. Among the viruses that cause viral hepatitis, hepatitis B virus (HBV) and hepatitis C virus (HCV) are of great importance because of their ability to cause both acute and chronic infections with life-threatening complications, such as cirrhosis of the liver and hepatocellular carcinoma [2]. Additionally, reports available indicate that 254 and 50 million people are currently affected by HBV and HCV, respectively [1].

Ghana is listed among countries in Sub-Saharan Africa with the high burden of HBV and HCV in the general population [3] with HCV and

HBV national prevalence estimated to be 3.0% and 12.3%, respectively [4,5].

The high prevalence of HBV and HCV in the general population indicates an increased risk of HBV and HCV acquisition among healthcare workers (HCWs), as it has been established that the risk of bloodborne pathogen acquisition correlates linearly with the prevalence of the disease in the general population [6]. This is because HBV and HCV are important bloodborne pathogens that can be transmitted through contact with blood and body fluids contaminated with the pathogens therefore, the delivery of curative and preventive healthcare services has the potential to transmit HBV and HCV to patients and HCWs in healthcare settings, especially in highly endemic areas [7].

In Ghana and many other developing countries, HCWs experience percutaneous and mucocutaneous exposure which increases their risk

\* Corresponding author: Tel.: +233-244772402.

E-mail addresses: [efuvivi@yahoo.co.uk](mailto:efuvivi@yahoo.co.uk), [vesenoo-dogbey@ug.edu.gh](mailto:vesenoo-dogbey@ug.edu.gh) (V.E. Senoo-Dogbey).

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of acquiring HBV and HCV [8–10]. A shortage of personal protective equipment (PPE) and gaps in infection control practices further increase the risk for HCWs [11]. The translation of the risk to actual HBV and HCV infections among Ghanaian HCWs was proven by the documentation of the intermediate level of endemicity of HBV infection reported among Ghanaian HCWs [12].

The World Health Organization (WHO) and country-specific organizations have outlined HBV- and HCV-specific preventive interventions for HCWs worldwide. Pre- and post-exposure immunoprophylaxis and standard precautions have proven effective in preventing new HBV infections, whereas standard precautions, early testing, and treatment have also proven effective against HCV infections. Unfortunately, in the face of the high risk of HBV and HCV acquisition and high disease burden among HCWs, suboptimal uptake of preventive practices has been reported, and this phenomenon is widespread and propagated at the individual, health facility, and health system levels [13,14].

Individual-level factors that influence the adoption of HBV and HCV preventive interventions are complex and significantly influence the adoption of HBV and HCV preventive behaviors. We hypothesized that these individual-level factors are greatly influenced by HCWs' attitudes, their self-efficacy to adhere to preventive practices, and the environmental support and endorsements they receive from their peers and managers. Therefore, this study aimed to identify the influence of these personal factors on HBV and HCV preventive practices to offer insights into tailored HBV and HCV preventive interventions and strategies.

### *Theoretical framework*

This study was situated within the framework of the Theory of Planned Behavior (TPB) which is a popular theory that connects ideas to behavior [15]. It contends that three basic components—attitude, subjective norms, and perceived behavioral control—collectively affect behavioral intentions [16]. According to the theorist, attitude refers to a person's overall evaluation of a specific behavior, which reflects how favorably or unfavorably an individual views the behavior. Subjective norms refer to social pressures or influences that affect an individual's intention to perform or not perform a specific behavior. It reflects how much an individual perceives important people in their life to approve or disapprove of their behavior [17]. Behavioral control, also known as self-efficacy, refers to an individual's belief in their ability to perform a behavior, considering both internal (skills, knowledge, confidence) and external (resources, time, support) factors that may facilitate or hinder behavior [18].

TPB provides a framework for planning and assessing behavior modification interventions. TPB focuses on conduct itself while also considering other factors related to behavior, such as attitudes, perceived social norms, and self-efficacy beliefs. According to Asare (2015), behavioral intention is the most proximal driver of human social conduct [19].

## **Methods and materials**

### *Study design*

This cross-sectional facility-based study employed quantitative and analytical methods to assess the level of influence of important personal factors (attitudes, subjective norms, and self-efficacy) on HBV and HCV preventive behaviors.

### *Study setting*

The study was conducted at Shai-Osudoku District Hospital in Dodowa, Greater Accra Region, Ghana. This facility was established in 1970 and evolved from a Health Post to a district hospital in mid-2009. The facility is the only major governmental health institution in the Shai-Osudoku District. It is a 150-bed capacity, secondary-level health institution with six inpatient units and two operating theaters. The hospital

has specialized departments that provide a range of services. There is an active total quality management department with Occupational Health and Safety and Infection prevention, and control of focal persons who support HCWs with pre- and post-exposure management of bloodborne infections. Periodic in-service training was conducted to improve the knowledge and skills of HCWs regarding the use of PPE and the uptake of preventive interventions, including HBV testing and vaccination. The facility screens new employees for HBV and HCV. In 2018, some HCWs in the facility were engaged in HBV screening and quantification of anti-HBV levels [12,20–22]. In a recent health facility audit, Shai-Osudoku District Hospital was identified as a health facility in the Greater Accra Region with good facility-level factors that promote adherence to HBV and HCV preventive practices among HCWs [14].

### *Study population*

HCWs belonging to the categories of doctors, physician assistants, nurses/midwives, laboratory personnel, and sanitary workers working in the hospital with an employment history of more than 2 years qualified to be included in the study. All other HCWs within the facility who did not perform direct patient care activities and were not at risk of exposure to bloodborne pathogens were excluded from the study.

### *Sample size estimation*

The formula for estimating proportions [23] guided the sample size estimation in this study. Given that  $n = z^2pq / d^2$  where  $n$  = sample size,  $z$  = reliability coefficient with 95% confidence interval = 1.96,  $d$  = margin of error of 0.5%,  $P$  = estimated prevalence rate of 15.2% [24], and 10% adjustment for nonresponse, a sample size of 198 was deemed appropriate for this study.

### *Sampling technique and procedure*

A stratified random sampling procedure was used to select individual HCWs for this study. HCWs were stratified into their respective professional categories, and cadre-specific lists were used as the sampling frame for each category. Based on proportional allocation procedures, cadre or professional category-specific sample sizes were determined, and a simple random sampling procedure was used to select eligible participants from each professional category.

### *Data collection instruments or tool*

In this study, a structured questionnaire was used to collect data. The instrument was structured into several sections. Section A of the questionnaire sought sociodemographic information from the respondents. Section B focused on HCWs' attitudes and beliefs toward hepatitis B and C. Section C assessed participants' subjective norms (support) for HBV and HCV prevention, whereas Section D focused on self-efficacy or behavioral control for hepatitis B and C prevention. Section E measures the behavioral intentions of HBV and HCV. Sections B, C, D, and E were assessed on a 5-point Likert Scale ranging from strongly disagree ('1') to strongly agree ('5'). The development of the instrument was guided by guidelines for constructing the TPB questionnaire developed by Ajzen Ike [25] There are 13 items on attitude, 6 for subjective norm, 12 items for self-efficacy, and 9 on behavioral control. The instrument has four subscales and good internal consistency and reliability. To ensure the reliability and validity of the questionnaire, experts in hospital-acquired infections, occupational health, and safety reviewed the instruments and inputs. The instrument was pre-tested with 30 HCWs in another primary care facility in the district. The gaps identified during the pretesting phase were corrected, and the instrument was finally approved and deemed accurate for data collection.

**Participant recruitment**

Permission was obtained from the director of the health facility, a tertiary-level hospital. The study was advertised on various social media platforms and notice boards of the study facility. A category-specific staff list was used as a sample frame for each HCW category. Inclusion and exclusion criteria were applied and a random sampling technique was used to select eligible participants. These HCWs were approached individually, and the overall aim of the study and the procedures involved were clarified to potential participants who were recruited after they had signed a written informed consent form. An appointment was then made with them at a convenient time for questionnaire administration.

**Data collection procedure**

The questionnaires were self-administered in print or electronic form based on the participants' preferences. Trained research assistants supervised the entire questionnaire-answering process. The timing of the questionnaire administration was carefully adjusted with a focus on ensuring minimal disruption to the HCWs' routine or daily work activities. Participants answered questions in their offices, consulting rooms, nurses' stations, etc. It took 20-30 minutes on average for the questionnaire to be completed.

**Data analysis**

All questionnaires were reviewed for completeness and assigned unique identifiers. Data from the participants were entered into the Kobo Collect tool, cleaned, and analyzed using STATA version 17. A total of 200 questionnaires were analyzed. Descriptive statistics (mean, standard deviation [SD], range, skewness, and kurtosis) were computed for all the variables. Mean cut-off points were utilized to categorize performance levels: 1.0-2.4 for poor performance, 2.5-3.4 for moderate or intermediate performance, and 3.5-5.0 for high performance, respectively.

We conducted validity tests by assessing the internal consistency of the five scales using Cronbach's alpha. The values obtained for direct reliability measures ranged from 0.64-0.81, indicating an acceptable level of reliability. We employed composite score analysis to reduce the number of variables.

Correlation analysis was performed, with correlation coefficients classified as weak, acceptable, or strong. Additionally, we conducted linear and multiple linear regression analyses to assess the relationships between various constructs at a significance level of 5%.

This comprehensive analytical approach allowed us to thoroughly examine the data, ensuring robust and reliable results that formed the basis for our findings and subsequent recommendations.

**Ethical consideration**

Ethical Approval was obtained from the Dodowa Health Research Committee (clearance number: DHRCIRB/083/03/24). The gatekeepers of the facility approved the study area for the hospital to be used in the study setting. Written informed consent was obtained from all eligible participants before the data collection commenced. The participants' information sheets and informed consent forms contained detailed information that enabled participants to make informed decisions to participate in the study voluntarily or otherwise.

To ensure that the rights of the participants were not violated, the major components of the research ethics were strictly followed, including informed consent, confidentiality, respect for privacy, and beneficence, etc.

**Results**

*Sociodemographic characteristics of respondents*

This study involved 200 HCWs from Shai-Osudoku District Hospital in Dodowa. The majority of the participants were women (155; 77.5%), and the mean age was 31.9 years (SD = ± 6.6). Most participants were in the 26-35-year age group (102; 51%). The majority (84, 42%) of participants had a diploma level of education. Most participants were Christian (n = 183, 91.5%) and single (n = 97, 48.5%). The study included various cadres of staff, with nurses comprising the majority (106; 53.0%), followed by midwives (41; 20.5%), laboratory technicians (16; 8%), housekeepers/orderlies (21; 10.5%), medical doctors (12; 6.0%), and anesthetists (4; 2%).

The mean number of years of work experience was 6.1 (SD = ± 5.4, range = 1-22 years), with the majority (112; 56%) having worked for 5 years or less. The participants worked in various wards within the hospital, including the emergency ward (32; 16%), female ward (35; 17.5%), male ward (27; 13.5%), recovery ward (9; 4.5%), pediatric ward (9; 4.5%), maternity ward (36; 18%), and others (52; 26%). The majority (156, 78%) of the participants had been vaccinated against HBV. Additionally, half of the participants (100; 50%) had received Infection Prevention and Control (IPC) training within the last 6 months (Table 1).

*Performance of HCWs based on the constructs or components of the Theory of Planned Behavior*

This study assessed HCWs' attitudes toward HBV and HCV prevention using a 13-item scale. The overall attitude score was (M = 1.56 ± 0.56) and fell within the poor performance range (1.0-2.4), indicating generally negative attitudes toward HBV and HCV prevention among the participants. The overall subjective norms score (M = 3.14 ± 0.64)

**Table 1**  
Sociodemographic characteristics of respondents.

Characteristics	Frequency, N=200	Percentage (%)
<b>Sex</b>		
Male	45	22.5
Female	155	77.5
<b>Age (years)</b>		
Mean ± SD (min, max)	31.9 ± 6.6 (19, 50)	
<b>Age group (years)</b>		
≤25	39	19.5
26-35	102	51.0
36-45	52	26.0
>45	7	3.5
<b>Educational qualification</b>		
Diploma	84	42.0
Bachelor's degree	79	39.5
Postgraduate	12	6.0
Certified/Chartered	20	10.0
Others	5	2.5
<b>Religion</b>		
Christian	183	91.5
Muslim	13	6.5
Traditionalist	4	2.0
<b>Marital status</b>		
Single	97	48.5
Marrried	97	48.5
Separated	3	1.5
Divorced	3	1.5
<b>Cadre of staff</b>		
Nurse	106	53.0
Midwife	41	20.5
Medical doctor	12	6.0
Laboratory technicians	16	8.0
Anesthetists	4	2.0

**Table 2**  
Mean score and reliability of items of each construct.

Construct	No. of items	Mean score	Mean range <sup>a</sup>	SD range <sup>b</sup>	Overall ( $\alpha$ ) <sup>c</sup>
Attitude	13	1.56 ± 0.56	1.33-3.38	0.72-1.44	0.63
Subjective Norm	6	3.14 ± 0.64	3.28-3.72	0.97-1.24	0.64
Behavioral control	12	3.44 ± 0.59	3.37-4.26	0.79-1.18	0.80
Behavioral intentions	9	3.55 ± 0.63	3.43-4.46	0.71-0.97	0.81

<sup>a</sup> Range of means (lowest to highest mean for each model construct)

<sup>b</sup> Range of standard deviation (lowest to highest SD for each model construct)

<sup>c</sup> Cronbach's alpha.

**Table 3**  
Correlation (r) among constructs.

Constructs	1	2	3	4
1. Attitude	1.00			
2. Subjective norm	-0.01	1.00		
3. Behavioral control	-0.09	0.17	1.00	
4. Behavioral intention	0.04	0.11	0.36	1.00
Mean (M)	1.56	3.14	3.44	3.55
Standard deviation (SD)	0.56	0.63	0.59	0.63

falls within the moderate performance range (2.5-3.4), indicating that HCWs generally perceive a moderate level of social support and expectation for HBV and HCV prevention behaviors.

The data revealed high levels of perceived self-efficacy or behavioral control among the participants in various aspects of HBV and HCV prevention. The overall behavioral control (self-efficacy) score (M = 3.44 ± 0.59) falls just below the threshold for high performance (3.5-5.0), indicating that HCWs generally perceive themselves as capable of engaging in effective HBV and HCV prevention behaviors.

The data revealed consistently high levels of positive behavioral intentions among participants, suggesting a strong commitment to HBV and HCV prevention efforts. The overall behavioral intention score (M = 3.55, SD = 0.63) fell within the high-performance range (3.5-5.0), indicating that HCWs generally had strong intentions to engage in HBV and HCV prevention behaviors. This score is particularly encouraging, as behavioral intentions are often considered strong predictors of actual behavior. The overall preventive measures score (M = 3.35 ± 0.60) falls within the moderate performance range (2.5-3.4), indicating a generally positive but not optimal level of engagement in preventive behaviors among the participants (Table 2).

*Reliability and internal consistency of items in each construct of the Theory of Planned Behavior*

In this study, we tested the reliability or internal consistency of the items in the subscales by computing the reliability coefficient Cronbach's Alpha ( $\alpha$ ). The results presented in Table 2 show that all the subscales had alpha ( $\alpha$ ) values of 0.63-0.81 an indication of acceptable level of internal consistency in each of the subscales.

*Constructs correlations*

The correlation matrix revealed several patterns, with the strongest correlation observed between behavioral control and behavioral intention (r = 0.36). This moderate positive correlation suggests that as HCWs' confidence in their ability to engage in preventive behaviors increases, their intention to perform these behaviors also tends to increase.

Attitude had a weak positive correlation with behavioral intention (r = 0.04). Subjective norms had a weak positive correlation with behavioral control (r = 0.17) and behavioral intention (0.11) (Table 3).

*Relationship between the four constructs and preventive behavior*

Table 4 presents a comprehensive analysis of the relationships between four key constructs and preventive behaviors for HBV and HCV

**Table 4**  
Relationship between the four constructs of preventive behavior.

Pathway	Estimate ( $\beta$ )	S. E	P-value
Attitude → preventive measures	0.084	0.578	0.123
Subjective norm → preventive measures	0.097	0.051	0.078
Behavioral control → preventive measures	0.441	0.059	<0.001 <sup>a</sup>
Behavioral intentions → preventive measures	0.321	0.055	<0.001 <sup>a</sup>

<sup>a</sup> Statistically significant.

prevention. The results revealed varying degrees of influence of each construct on preventive behaviors. Behavioral control (self-efficacy) emerged as the strongest predictor of preventive behaviors ( $\beta = 0.441$ ,  $P < 0.001$ ).

Behavioral intentions also demonstrate a significant positive relationship with preventive behaviors ( $\beta = 0.321$ ,  $P < 0.001$ ). Interestingly, subjective norms show a positive but no significant relationship with preventive behaviors ( $\beta = 0.097$ ,  $P = 0.078$ ). Attitude, however, did not demonstrate a significant relationship with preventive behaviors ( $\beta = 0.084$ ,  $P = 0.123$ ) (Table 4).

*Relationship between participant demographics on preventive measures*

Multiple regression analysis was conducted to assess the impact of several independent variables on preventive behavior. This study identified three significant predictors of preventive behavior. The professional level or rank (cadre) of the HCW emerged as a statistically significant predictor ( $\beta = 0.177$ ,  $P = 0.023$ ), suggesting that the cadre influences adherence to preventive measures against hepatitis B and C. Notably, vaccination against HBV showed a significant negative relationship with preventive measures ( $\beta = -0.185$ ,  $P = 0.012$ ). Lastly, IPC training within the last 6 months demonstrated a significant positive relationship with preventive behavior ( $\beta = 0.144$ ,  $P = 0.048$ ), highlighting the potential effectiveness of recent IPC training in improving adherence to preventive practices (Table 5).

**Discussion**

The present study which was conducted in a tertiary-level facility in Ghana, sought to identify the influence of personal factors on HBV and

**Table 5**  
Relationship between patient's demographics on preventive measures.

Variables	Estimate ( $\beta$ )	S.E	P-value
Sex	0.028	0.107	0.705
Age	-0.073	0.072	0.426
Education	-0.082	0.037	0.262
Religion	-0.082	0.118	0.257
Marital status	-0.043	0.047	0.591
Cadre	0.177	0.031	0.023 <sup>a</sup>
Years of working as a professional	0.037	0.077	0.758
Years of working at the facility	0.044	0.084	0.691
Work unit or department	0.008	0.026	0.905
Vaccination against hepatitis B virus	-0.185	0.105	0.012 <sup>a</sup>
IPC training within the last 6 months	0.144	0.086	0.048 <sup>a</sup>

<sup>a</sup> Statistically significant.

HCV preventive behaviors among HCWs who are at risk of infections due to their continuous exposure to blood and body fluids that may be contaminated with HBV and HCV. Based on the TPB, this study critically assessed the influence of attitudes, subjective norms, and behavioral control on actual HBV and HCV preventive behaviors. Perceived behavioral control (self-efficacy) refers to the perceived ease or difficulty of carrying out a planned task or behavior, and takes into consideration both normative and subjective standards or factors that influence an individual's intentions and behavior. It is important to note that behavioral intentions are about what someone plans or aims to do whereas behavioral control is about the person's perception of their ability to carry out those intentions [18].

In this study, we found that behavioral control (self-efficacy) emerged as the strongest predictor of preventive behavior ( $\beta = 0.441$ ,  $P < 0.001$ ). This observation is not surprising, as a similar study that utilized the constructs of the TPB conducted in Ghana among nurses also found that perceived behavioral control had a positive and significant influence on the actual behavior of Intravenous Fluid (IVF) administration [26]. Similarly, another related study that also applied the TPB in assessing self-care behavior reported that perceived behavioral control had a significant influence on actual self-care behavior [27]. This highly significant relationship indicates that HCWs' confidence in their ability to perform preventive measures is strongly associated with their actual engagement in these behaviors. This substantial effect suggests that interventions targeting self-efficacy may be particularly effective in promoting HBV and HCV prevention.

Behavioral intentions also demonstrate a significant positive relationship with preventive behaviors ( $\beta = 0.321$ ,  $P < 0.001$ ). This finding aligns with established behavioral theories that posit intentions as immediate precursors to action. The moderate effect size suggests that strategies to enhance behavioral intentions could meaningfully contribute to increasing preventive behaviors.

According to Nickell and Hinsz [28], attitudes reflect a critical factor that determines an individual's intentions as well as the subsequent likelihood of performing that behavior. However, in this study, we observed that attitude did not demonstrate a significant relationship with preventive behaviors ( $\beta = 0.084$ ,  $P = 0.123$ ). A similar study that utilized the TPB also reported that the attitude of the study participants had no positive or significant influence on their behavioral intentions or actual behavior [27]. This finding is somewhat surprising given the theoretical importance often attributed to attitudes in behavioral models. This suggests that in this context, attitudes may play a less direct role in influencing preventive behaviors than other factors.

This study also identified the association between sociodemographic factors and HBV and HCV preventive behaviors using multiple logistic regression analysis. It emerged that vaccination against HBV showed a significant negative relationship with preventive measures ( $\beta = -0.185$ ,  $P = 0.012$ ). This finding might indicate that vaccinated individuals may be less likely to engage in other preventive behaviors, possibly due to a sense of security induced by having been vaccinated in the past and knowing that the HBV vaccine is highly effective in preventing new HBV infections. A systematic review clearly outlined the link between high-risk perception of a particular disease and the uptake of vaccination as a preventive behavior [29]. It is assumed that in the face of a low-risk perception of HBV as a result of HBV vaccination, HCWs may have a sense of security and may feel less susceptible to the disease, and hence are no longer motivated to undertake other preventive measures [6,30,31]. This may explain the inverse relationship observed between HBV vaccination and preventive behaviors in this study.

This study also observed a positive and significant association between HBV and HCV preventive behaviors and the attendance of IPC. Many studies have linked IPC training to HBV prevention behaviors. For example, a study conducted in Southern Ghana among six categories of HCWs observed a significant positive relationship between adherence to the mandatory three-dose HBV vaccine regimen and IPC training attendance [13]. IPC training is meant to improve the knowledge,

practice, and performance of HCWs regarding patient care and their safety and protection. Hence, it is not surprising that attendance of such training had a significant positive impact on HBV and HCV preventive behavior.

The influence of professional cadres or categories as a sociodemographic factor in the adoption of hepatitis B virus HBV and HCV preventive measures is a significant research finding. This observation underscores the role of occupational roles, responsibilities, and associated risks in shaping health behaviors. Many other studies reported a significant association between professional categories or cadres and the uptake of HBV and HCV preventive interventions [32,33].

Professionals in higher cadres may have better access to preventive tools, such as vaccines, PPE, and regular health screenings. They may also benefit from institutional policies that prioritize safety. Conversely, lower cadres may face systemic barriers, such as limited access to vaccinations or a lack of targeted workplace training, reducing their likelihood of adopting preventive measures. The finding that professional cadres influenced the adoption of HBV and HCV preventive measures highlights the importance of considering occupational dynamics in public health strategies. Addressing disparities in awareness, access, and behaviors across cadres can enhance overall prevention efforts and reduce the burden of HBV and HCV infections in high-risk environments, such as healthcare settings.

#### Study limitations

This study has some significant limitations. Focusing on a single hospital in Ghana may restrict the generalizability of our findings to other healthcare settings. Reliance on self-reported measures introduces potential bias as participants might over-report socially desirable attitudes or behaviors. This study relied on self-reported preventive behaviors rather than direct observation of compliance with prevention protocols.

#### Recommendations

This study provides valuable insights into the uptake of HBV and HCV preventive behaviors among HCWs. However, the limitations of this study highlight the need for further research in this area. To address these gaps, we recommend conducting in-depth interviews with HCWs to gain a deeper understanding of their experiences and perceptions of HBV and HCV prevention. We also recommend conducting a longitudinal study to assess changes in HCWs' HBV and HCV prevention practices over time as well as the impact of changes in the healthcare setting's structure and governance. By exploring these areas, future research can provide a more comprehensive understanding of the factors influencing HBV and HCV prevention among HCWs and inform the development of effective interventions.

#### Conclusion

This study showed that HCWs' attitudes did not significantly influence their preventive behaviors. Subjective norms demonstrated a moderately positive influence on preventive measures, highlighting the importance of social and professional expectations in shaping HCWs' behaviors. Self-efficacy emerged as the strongest predictor of preventive behaviors and a significant positive relationship was observed. This finding aligns with established health behavior theories and suggests that interventions aimed at enhancing HCWs' confidence in their ability to perform preventive measures may be particularly effective. Behavioral intentions also showed a significant positive relationship with preventive behaviors, albeit to a lesser extent than self-efficacy. This supports the theoretical link between intentions and actions but also highlights the potential gap between intending to perform preventive behaviors and performing or undertaking preventive behaviors.

## Author contributions

**C.Y.N.D:** Conceptualization, Methodology, Data collection, Data Analysis. Writing, Original draft, preparation of manuscript. **S-D V.E:** Methodology, Supervision, Writing, Original draft preparation of manuscript. **K.B.T.C:** Original draft preparation of manuscript. **T.M.D:** Writing, original draft preparation of manuscript. **M.M.M:** Writing, original draft preparation of manuscript.

## Informed consent

Informed consent was obtained from all individuals included in the study.

## Availability of data and materials

The data on which these observations and conclusions were made are available from the corresponding author upon reasonable request.

## Declarations of competing interest

The authors have no competing interests to declare.

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## References

- [1] World Health Organization. WHO sounds alarm on viral hepatitis infections claiming 3500 lives each day, [https://www.who.int/news/item/09-04-2024-who-sounds-alarm-on-viral-hepatitis-infections-claiming-3500-lives-each-day#:~:text=Updated WHO e; 2024](https://www.who.int/news/item/09-04-2024-who-sounds-alarm-on-viral-hepatitis-infections-claiming-3500-lives-each-day#:~:text=Updated%20WHO%20e%2C2024) [accessed 26 August 2024].
- [2] Centre for disease control and prevention. Global viral hepatitis: millions of people are affected. Viral Hepatitis, <https://www.cdc.gov/hepatitis/global/index.htm>; 2021 [accessed 23 February 2024].
- [3] Alberts CJ, Clifford GM, Georges D, Negro F, Lesi OA, Hutin YJF, et al. Worldwide prevalence of hepatitis B virus and hepatitis C virus among patients with cirrhosis at country, region, and global levels: a systematic review. *Lancet Gastroenterol Hepatol* 2022;7:724–35. doi:10.1016/S2468-1253(22)00050-4.
- [4] Ofori-Asenso R, Agyeman AA. Hepatitis B in Ghana: A systematic review & meta-analysis of prevalence studies (1995–2015). *BMC Infect Dis* 2016;16:130. doi:10.1186/s12879-016-1467-5.
- [5] Agyeman AA, Ofori-Asenso R, Mprah A, Ashiagbor G. Epidemiology of hepatitis C virus in Ghana: a systematic review and meta-analysis. *BMC Infect Dis* 2016;16:391. doi:10.1186/s12879-016-1708-7.
- [6] Senoo-Dogbey VE, Naab F, Ohene L. The social life of health data. In: Thiel A, Ntewusu S, editors. *The social life of health data*. Singapore: Palgrave; 2024. p. 117–42.
- [7] Center for disease control and prevention. Viral hepatitis exposure risk among health care providers, Viral Hepatitis, [https://www.cdc.gov/hepatitis/hcp/populations-settings/health-care-providers.html#:~:text=Thedeliveryofhealthcare,C after a potential exposure; 2024](https://www.cdc.gov/hepatitis/hcp/populations-settings/health-care-providers.html#:~:text=Thedeliveryofhealthcare,C%20after%20a%20potential%20exposure;2024) [accessed 26 August 2024].
- [8] Obirikorang C, Opoku SK, Obirikorang Y, Acheampong E, Yorke J, Donkoh ET, et al. Awareness and occupational exposures to needlestick injuries among healthcare workers: a quantitative assessment in a Ghanaian metropolis. *Glob J Qual Saf Healthc* 2019;2:70–7. doi:10.4103/JQSH.JQSH.
- [9] Odonkor ST, Sallar AM. Occupational health and safety knowledge, attitudes and practices among healthcare workers in Accra Ghana. *Sci Afr* 2024;24:e02130. doi:10.1016/j.sciafr.2024.e02130.
- [10] Senoo-Dogbey VE, Klutsey EE. Self-reported exposure to blood and body fluids and serological evidence of lifetime exposure to hepatitis B virus among health care workers in Ghana: a cross-sectional study. *BMC Infect Dis* 2024;24:968. doi:10.1186/s12879-024-09703-4.
- [11] Stockdale AJ, Kreuels B, Henrion MYR, Giorgi E, Kyomuhangi I, de Martel C, et al. The global prevalence of hepatitis D virus infection: systematic review and meta-analysis. *J Hepatol* 2020;73:523–32. doi:10.1016/j.jhep.2020.04.008.
- [12] Senoo-Dogbey VE, Wuaku AD, Armah D. Seroprevalence of hepatitis B virus infection and associated factors among health care workers in Southern Ghana. *IJID Reg* 2023;6:84–9. doi:10.1016/j.ijregi.2023.01.009.
- [13] Senoo-Dogbey VE, Anto F, Quansah R, Danso-Appiah A. Completion of three-dose hepatitis B vaccination cycle and associated factors among health care workers in the Greater Accra Region of Ghana. *PLoS One* 2024;19:e0298771. doi:10.1371/journal.pone.0298771.
- [14] Senoo-Dogbey VE, Armah D, Wuaku DA. Hepatitis B infection prevention: audit of selected healthcare facilities in the Greater Accra Region. *Ghana. Infect Prev Pract* 2023;5:100284. doi:10.1016/j.infpip.2023.100284.
- [15] Brookes E. The theory of planned behavior: behavioral intention. Simply Psychology, <https://www.simplypsychology.org/theory-of-planned-behavior.html>; 2023 [accessed 26 November 2024].
- [16] Ryan MJ, Worthington AK. Theory of planned behavior. *Persuasion Theory in Action. The SAGE Encyclopedia of Corporate Reputation*. Thousand Oaks: SAGE Publications, Inc.; 2016.
- [17] Hagger MS, Hamilton K. Longitudinal tests of the theory of planned behaviour : a meta-analysis. *Eur Rev Soc Psychol* 2024;35:198–254. doi:10.1080/10463283.2023.2225897.
- [18] Jilani MMAK, Uddin MA, Uddin MS, Das AK, Dey M. Extending the theory of planned behavior to envisage social distancing behavior in containing the COVID-19 outbreak. *Heliyon* 2024;10:e26113. doi:10.1016/j.heliyon.2024.e26113.
- [19] Asare M. Using the theory of planned behavior to determine the condom use behaviour among college students. *Am J Health Stud* 2015;30:43–50.
- [20] Senoo-Dogbey VE, Anto F, Quansah R, Danso-Appiah A. Completion of three-dose hepatitis B vaccination cycle and associated factors among health care workers in the Greater Accra Region of Ghana. *PLoS One* 2024;19:e0298771. doi:10.1371/journal.pone.0298771.
- [21] Senoo-Dogbey VE. Serological markers of hepatitis B virus infection among health care workers in Accra, Ghana. *Int J Occup Saf Health* 2021;11:100–7. doi:10.3126/ijosh.v11i2.37105.
- [22] Senoo-Dogbey VE, Armah D, Delali Adwoa W. Hepatitis B virus vaccination post serological testing and antibody levels of vaccinated health care workers in Accra. *Ghana. Vaccin X* 2023;14:100294. doi:10.1016/j.jvaxc.2023.100294.
- [23] Cochran WG. *Sampling techniques*. 3rd ed. New York: John Wiley & Sons New York; 1977.
- [24] Chikwendu A, Unikutelle HL, Olumide AT. Hepatitis B and C virus prevalence among patients and healthcare workers' prevention practices towards the viruses in a secondary healthcare facility in Northern Nigeria. *Pan Afr Med J* 2023;46:82. doi:10.11604/pamj.2023.46.82.40530.
- [25] Ajzen I. Theory of planned behaviour questionnaire construction. *TPB Questionnaire Construction*; 2019. <http://people.umass.edu/iaizen/pdf/tpb.measurement.pdf> [accessed 26 August 2024].
- [26] Kulley Ackah G, Senoo-Dogbey VE. Nurses' behavioural intentions towards intravenous fluid administration for pediatric patients: application of the theory of planned behaviour. *J Pediatr Nurs* 2023;73:e632–8. doi:10.1016/j.pedn.2023.11.010.
- [27] Pourmand G, Doshmangir L, Ahmadi A, Noori M, Rezaeifar A, Mashhadi R, et al. An application of the theory of planned behavior to self-care in patients with hypertension. *BMC Public Health* 2020;20:1290. doi:10.1186/s12889-020-09385-y.
- [28] Nickell GS, Hinsz VB. Applying the theory of planned behavior to understand workers' production of safe food. *Rev Psicol Trab Organ* 2023;39:89–100. doi:10.5093/jwop2023a10.
- [29] Brewer NT, Chapman GB, Gibbons FX, Gerrard M, McCaul KD, Weinstein ND. Meta-analysis of the relationship between risk perception and health behavior: the example of vaccination. *Health Psychol* 2007;26:136–45. doi:10.1037/0278-6133.26.2.136.
- [30] Senoo-Dogbey VE, Wuaku DA. Risk perception for hepatitis B virus (HBV) infection among health care workers in Accra, Ghana. *Clin Epidemiol Glob Heal* 2022;18:101189. doi:10.1016/j.cegh.2022.101189.
- [31] Senoo-Dogbey VE, Ohene LA, Wuaku DA. Occupational exposure to hepatitis B virus, disease burden and pathways for postexposure prophylaxis management: recommendations for healthcare workers in highly endemic settings. *Infect Prev Pract* 2024;6:100354. doi:10.1016/j.infpip.2024.100354.
- [32] Yuan Q, Wang F, Zheng H, Zhang G, Miao N, Sun X, et al. Hepatitis B vaccination coverage among health care workers in China. *PLoS One* 2019;14:e0216598. doi:10.1371/journal.pone.0216598.
- [33] Aaron D, Nagu TJ, Rwegasha J, Komba E. Hepatitis B vaccination coverage among healthcare workers at national hospital in Tanzania: how much, who and why? *BMC Infect Dis* 2017;17:786. doi:10.1186/s12879-017-2893-8.