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Original Article

Knowledge and predictors of attitudes of hepatitis B virus infection prevention among adults in Tolon, Northern Ghana

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Abstract

Introduction: Viral hepatitis is one of the major public health concerns, targeted for eradication by 2030. Though previous research has concentrated largely on pregnant women and urban areas, rural populations are reported to be greatly affected in northern Ghana. This study determined knowledge and predictors of attitudes toward hepatitis B virus (HBV) infection prevention among adults in Tolon District, Northern Ghana.

Methodology: This was a population-based cross-sectional descriptive study with a quantitative approach. A multistage stratified random sampling technique was used to select 195 adults. Data were analysed using SPSS version 26. Composite scores were generated for knowledge and attitude levels. At 0.05 precision level, multiple linear regression was performed to determine predictors of respondents' attitudes.

Results: The overall knowledge level (48.7%) of participants on HBV infection was average, with the majority (67.0%) demonstrating unsatisfactory attitudes towards the prevention. The regression equation was statistically significant (F (3,191) = 61.051), $p < 0.001$. About half (49%) of the variance in attitude was explained by the independent variables. Participants predicted attitude score was determined as 3.784 – 0.040 (age) + 0.435 (knowledge), where age was measured in years and knowledge was measured as scores on a continuous variable scale.

Conclusions: Knowledge levels are sub-optimal with unsatisfactory attitudes toward HBV infection prevention in the study setting. Participants' age and knowledge of HBV are significant predictors of attitudes toward its prevention. There is a need to increase access to formal education and health promotion programs in the district, to complement government efforts to attain Sustainable Development Goal 3 (SDG-3).

Key words: Knowledge; predictors of attitudes; HBV infection prevention; Tolon District of Ghana.

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Introduction

Viral hepatitis remains one of the major global public health concerns, earmarked for eradication by 2030 [1–3]. Viral hepatitis has several types which appear to have geographical endemicity. Hepatitis viruses A or D have been noted in Europe, the Middle East, Central Asia, Siberia, and America, B and C in East Asia, F found in Central America, E in Africa, and G in France and the United States of America [4]. Hepatitis B Virus (HBV) infection is an abnormal state of the liver, caused by the hepatitis B virus and characterized by inflammation of the liver cells [5]. The burden of HBV infection varies from country to country with an overall global prevalence of 3.9% [6–9]. Approximately, over two million lives are lost annually and about 380 million people are chronically infected [6,10]. Being a blood-borne and sexually transmitted infection, it has a significant global public health impact, causing so much expense to nations. Thus, the WHO has instituted several measures to control the spread of the infection, including the 28th of July, being set aside annually as global HBV awareness day [11]. Additionally, the Global Health Sector Strategy (GHSS) on viral hepatitis calls for a reduction in incidence by 90% and mortality by 65% [12]. Despite these measures, it remains a threat to global public health. This is particularly so, at the time that sustainable development goal three (SDG 3) target 3.8 calls for "*access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all*" in relation to neglected tropical diseases (NTDs) including viral hepatitis [1]. This challenges the global fight against the spread of the infection.

Several studies have highlighted the need to increase efforts regarding awareness and vaccination against HBV. A study in northern Vietnam emphasised that, in order to increase knowledge, and vaccine coverage and reduce misconception, there is a need to prioritise education [13]. Similarly, Eni *et al.* [14], recommended the need for emphasis on interventions aimed at raising awareness and availability of vaccines for HBV. Another study in Malaysia revealed an impact of certain socio-demographic characteristics on knowledge of the disease [15].

In developing countries including Ghana, HBV continues to spread [6,16] with a national and northern regional prevalence of 12.3% and 10.8% respectively [4,17]. It is suggested that approximately four million Ghanaians are living with hepatitis B or C virus with most of them being undiagnosed [6,18]. Available literature has shown increasing individuals' knowledge and attitude to be key in its prevention; since inadequate knowledge and negative attitudes can increase transmissibility [13]. This serves as a reference tool for the planning of health education and promotion programs for disease prevention and control. Though several studies have been conducted to that effect [4,6,10,19,20], most of these studies are however either among pregnant women or conducted in urban centres. Also, being a sexually transmitted infection, there is the need to ascertain the situation among the adult population, who may be sexually active. Furthermore, Dongdem *et al.* [4] in a hospital-based study among blood donors, highlighted Hepatitis B Surface Antigen (HBsAg) seropositivity to be high among rural populations. Meanwhile, no known empirical literature has been found addressing the issue in the current study setting, which is a rural area. Therefore, this study targeted rural adults as an approach to increase tackling the HBV infection. Thus, the study sought to determine the knowledge and predictors of attitudes towards hepatitis B prevention in the Tolon district of Northern Ghana.

Methodology

Study Design and Site

A cross-sectional descriptive design was employed with a quantitative approach. This study was conducted in the Tolon District, Northern Ghana. The district has an annual growth rate of 2.9%, and an estimated population of 118,101, with females constituting the majority (59,589). There are seventeen (17) health facilities in the district, including; eleven (11) Community-based Health Planning and Services compounds (CHPS), three (3) health centers, one (1) Clinic, and two (2) hospitals [21].

Inclusion and Exclusion criteria

The inclusion criteria for this study considered all indigenes who were between the ages of 18 – 49 years and were not fully vaccinated or undergoing HBV infection treatment. However, those who were less than 18 years or more than 49 years were excluded.

Sampling

The sample size for this study was estimated using Cochrane's [22] formula: $n = \frac{z^2 \times p \times q}{d^2}$;.

Where n = sample size, z = confidence level (95%) = 1.96, p = estimated proportion/prevalence of HBsAg in northern Ghana = 10.8% [4], d = margin error; 5% and q = 1 – p = 1 – 0.108 = 0.892. The sample size was then determined to be 150 participants. Considering hesitancy to participate due to the COVID-19 pandemic, we anticipated a 70% response rate and therefore made provision for a 30% increase in the sample size, leading to 195 participants.

A stratified multistage sampling technique was used. The district was stratified into three main sub-districts; Central, North, and Westwards. This was in line with the traditional zoning of the district by the district assembly. Under each stratum, simple random sampling was used to select five (5) communities using the list of all communities in the district as the frame. Each participant from the selected communities was then selected from households using the balloting method.

Data collection

A closed-ended paper-based questionnaire was used as a tool for data collection after an extensive literature review [10,13,14,20,23–25]. This included 32-item questions structured into three sections; A, B, and C. Section A; Socio-demographic features included gender, age, marital status, religious belief, education qualification, and occupation. Section B: involved 13 item questions intended to collect information regarding participants' knowledge level on HBV infection. Knowledge level was assessed with regard to awareness, transmission, signs/symptoms, types, and complications. Section C: it comprised 13 questions and was used to assess the attitudes of participants regarding HBV infection prevention. The attitude was measured in respective of vaccine awareness, vaccine hesitance, perceived risk of the infection, and preventive measures.

Data collection was conducted within one month (1st to 31st January 2022). A printed questionnaire was administered to participants. The data was collected through an interviewer-administered technique (face-to-face interview). All consented participants received an explanation of the study and the questionnaire before interviews were conducted. All completed questionnaires were assessed daily for accuracy and completeness.

Data analysis

Data was sorted, coded, entered into SPSS version 26, and cleaned. Descriptive statistics were used to present data on the socio-demographic characteristics of participants, and item analysis on knowledge and attitude responses. Composite scores were generated for all responses and overall scores were graded. This has been presented using a bar chart for overall knowledge and a pie chart for overall attitudes. In both knowledge and attitude levels, a correct response to a question was awarded one (1) mark and an incorrect response attracted zero (0). The least score for overall knowledge was 0 and the maximum was 12, while that of attitude was 0 and 11 respectively. In line with Osei et al. [20], scores for knowledge were categorized as 0 – 4 (Poor), 5 – 8 (Average), and 9 – 12 (Good). The overall scores for attitude were statistically normally distributed. Hence, the mean/median (50% obtainable score) was regarded as a midpoint to divide and categorize attitude into Unsatisfactory (score ≤ 5) and Satisfactory (score > 5).

The relationship (correlation) between knowledge scores, socio-demographic characteristics, and attitude scores (dependent variable) were measured. Variables including education qualification, marital status, and occupation, exhibited multicollinearity. A multiple linear regression was performed with age, gender, and knowledge scores as independent variables and attitude score as a dependent variable. An alpha value of < 0.05 was considered statistically significant.

Validity and Reliability

After an extensive literature review [10,13,14,20,23–25], the data collection tool was adapted and revised to suit the objectives of the study. Face and content validity of the questionnaire were carried out. A multi-step forward-backward translation technique of the questionnaire was adopted [26]. They were translated from the English language to Dagbani and back to English by two independent prolific speakers of both languages. Following the initial translation, they then produced a single document by consensus. Further, a third native Dagbani speaker who is also prolific in English language was requested to translate the Dagbani version of the questionnaire back to English language.

Interviewers for this survey were licensed and practicing nurses who were as well native speakers of the local language. They were taken through the questionnaire item by item and their queries were resolved as well. This was done both at the pre-testing and the actual data collection stages. Pretesting of the questionnaire was performed among 25 adults, randomly selected from two non-participating communities in the Kumbugu District, using an interviewer-administered method. Kumbugu and Tolon were once a merged district, hence participants in the pre-test had similar socio-demographic characteristics as the participants in the actual study. Responses from pre-test assisted in rephrasing of few questions, response options, grammatical errors and the duration of time need to complete the actual study. Reliability and internal consistency of the scales for both knowledge level and attitude were measured. A Cronbach's alpha of $\boldsymbol{\alpha_k} = 0.715$, $\boldsymbol{\alpha_a} = 0.701$ and $\boldsymbol{\alpha_c} = 0.755$ were recorded for knowledge, attitude, and cumulative item scales respectively. These values indicated the validity and reliability of the tools [27,28]. This survey followed the Consensus-Based Checklist for Reporting of Survey Studies (CROSS) guidelines.

Ethical Consideration

A formal approval for data collection from site was sought and granted by Tolon district health directorate and community members notified of the data collection period. A protocol was submitted to the Navrongo Health Research Centre (NHRC) for review. An approval was given thereof with a reference number NHRCIRB443. The study protocol was clearly explained to participants as stated in their information sheets. Oral and written informed consents were then obtained from all participants including the use of data, before their participation in the study. The written consent form and procedure was adapted from and approved by the NHRC. All participants granted consent including the use of data, before participating. The methods and procedures required in executing this survey was performed in line with Helsinki's declaration.

Results

Socio-demographic characteristics

A total of 195 participants were enrolled in this study, with a 100% response rate. As indicated in Table

1, the majority (51.3%) of participants were ≤ 23 years of age (median age) and a range of 15 years. More than half (52.3%) were females and people without formal education constituted 56.4%. Less than half (46.2%) of participants were engaged in artisan works. More than half (59.0%) were married and more than three-quarters (84.1%) were Muslims.

Knowledge level on hepatitis B infection

Table 2 below shows that the awareness level of HBV infection was high (79.0%). Among these people, less than half (41.5%) had heard it from Radio/TV, followed by health center (27.2%) and friends (10.3%). Similarly, less than half (31.3%) identified blood contact as HBV mode of transmission. The majority (72.8) correctly reported that mosquito is not a vector for HBV transmission. Regarding the predisposing factors of HBV, multiple sex (8.2%) and unprotected sex (34.9%) were identified. Only 46.7% and more than half (59.5%) confirmed the possibility of a pregnant mother to fetal and breastfeeding mother-to-child transmissions respectively. About one-third (31.3%) affirmed that it has known signs/symptoms. Less than one-fifth (15.4%) of participants could confirm that HBV has types. Less than half (43.1%) of participants reported that positive persons can transmit the disease. The majority (54.9%) identified liver cancer as HBV complication and about half (51.3%) rated HBV as being more infectious than HIV infection.

Table 1. Socio-demographic characteristics (N = 195).

Characteristics	n (%)
Age (years)*	
≤ 23	100 (51.3)
24+	95 (48.7)
Gender	
Male	93 (47.7)
Female	102 (52.3)
Education Qualification	
No Formal Education	110 (56.4)
Primary	35 (18.0)
Higher	50 (25.6)
Occupation	
Farmer	75 (38.5)
Public servant	30 (15.4)
Artisan works	90 (46.1)
Marital Status	
Married	115 (59.0)
Unmarried	80 (41.0)
Religious affiliation	
Islam	164 (84.1)
Christianity	27 (13.8)
Traditionalist	04 (2.1)

*Minimum age (years) = 19; Maximum age (years) = 34; Age Range =15 years; Median Age = 23 years.

Overall Knowledge level on HBV infection

In Figure 1, after computing composite scores and grading, the majority (48.7%) participants were those who demonstrated Average knowledge on HBV prevention.

Table 2. Knowledge on hepatitis B infection (N = 195).

Characteristics	n (%)
Have you heard about HBV before	
Yes	154 (79.0)
No	41 (21.0)
Source of Information	
Radio/Television	81 (41.5)
Friends	20 (10.3)
Health center	53 (27.2)
Not Applicable	41 (21.0)
HBV as hereditary	
Yes	91 (46.7)
No	12 (06.1)
Not sure	92 (47.2)
Mode of HBV transmission	
Blood contact	61 (31.3)
Handshake	134 (68.7)
Mosquito as a vector	
Yes	53 (27.2)
No	142 (72.8)
Not sure	00 (00)
Predisposing factors	
Multiple sex	16 (08.2)
Unprotected sex	68 (34.9)
Paring a room	15 (07.7)
Not sure	96 (49.2)
Pregnant woman ability to transmit	
Yes	91 (46.7)
No	104 (53.3)
Not sure	00 (00)
Breastfeeding mother to transmit	
Yes	116 (59.5)
No	79 (40.5)
Not sure	00 (00)
Any known Symptoms of HBV	
Yes	61 (31.3)
No	19 (09.7)
Not sure	115 (59.0)
Any known types of HBV	
Yes	30 (15.4)
No	22 (11.3)
Not sure	143 (73.3)
Can every positive person transmit	
Yes	84 (43.1)
No	25 (12.8)
Not sure	86 (44.1)
Knowledge on complications	
Stomach ulcer	88 (45.1)
Liver cancer	107 (54.9)
HBV infectious compared to HIV	
Yes	100 (51.3)
No	78 (40.0)
Not sure	17 (08.7)

Attitude of participants on HBV infection prevention

Table 3 demonstrates that few (27.2%) of participants had previously screened for HBV. Vaccine awareness was more than half (59.5%) in the study setting. More than half (53.8%) responded that only uninfected individuals are eligible to take the vaccine. The majority (59.5%) did not know of the essence of sharing toiletries with infected persons while 31.3% responded to the need to always use a condom with an infected partner. Only 5.1% of participants had received at most two doses of hepatitis B vaccine. The majority (71.3%) of participants reported the cost of vaccines for their inability to vaccinate. About 35.4% perceived themselves at risk of the infection and less than half (47.7%) reported that HBV presently has no cure. Most (40.5%) of the participants have never shared razor blades with people and the majority (59.5%) believed having multiple sexual partners increases one's risk for the infection. The overwhelming majority (86.7%) of participants reported their willingness to vaccinate should it be made available.

Table 3. Attitude of participants (N = 195).

Characteristics	n (%)
Previous screening for HBV	
Yes	53 (27.2)
No	142 (72.8)
Awareness of HBV vaccine	
Yes	116 (59.5)
No	79 (40.5)
Who needs the vaccine	
Everybody	90 (46.2)
Uninfected person	105 (53.8)
Willing to eat and share toiletries	
Yes	116 (59.5)
No	79 (40.5)
Condom use with infected partners	
Sometimes	134 (68.7)
Always	61 (31.3)
Never	00 (00)
Ever received any of the vaccine dose	
Once	07 (03.6)
Twice	10 (05.1)
Never	178 (91.3)
Reason for not vaccinating	
Cost involved	139 (71.3)
Others (Vaccine availability and personal beliefs)	56 (28.7)
Perceive oneself at risk	
Yes	69 (35.4)
No	19 (09.7)
Not sure	107 (54.9)
HBV having a cure	
Yes	35 (17.9)
No	93 (47.7)
Not sure	67 (34.4)
Sharing razor blade with people	
Sometimes	77 (39.5)
Always	39 (20.0)
Never	79 (40.5)
Perception of multiple sexual partners as risk	
Yes	116 (59.5)
No	00 (00)
Not sure	79 (40.5)
Willingness to vaccinate	
Yes	169 (86.7)
No	26 (13.3)
Not sure	00 (00)

Figure 1. Overall knowledge level regarding HBV infection prevention.

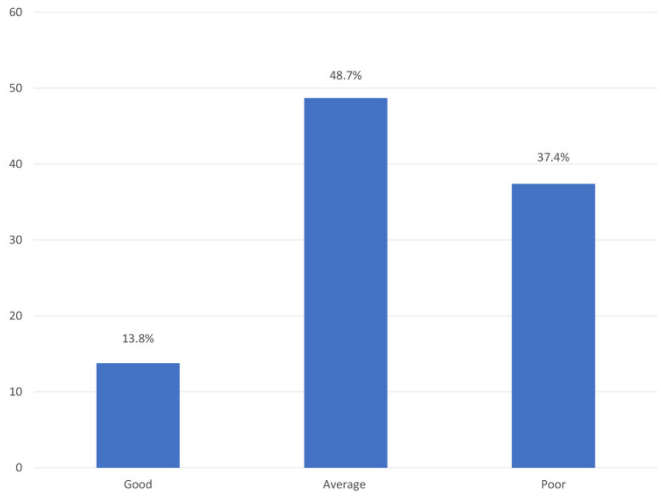
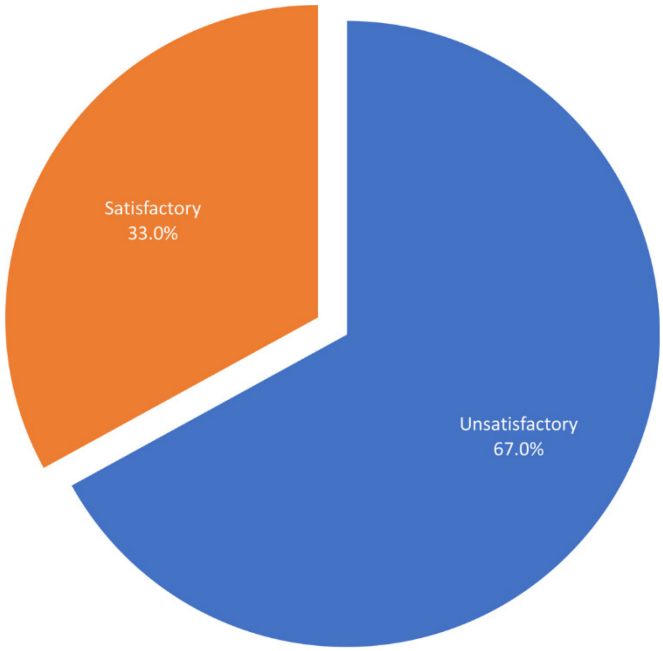


Figure 2. Overall attitude toward HBV infection prevention.



Overall Attitude towards HBV infection

Overall behaviours towards HBV infection prevention in this current study were recorded to be unsatisfactory; 67.0% of participants (Figure 2).

Predictors of HBV infection prevention attitudes

Table 4 shows the results of multiple linear regression computed to predict participant's attitude towards hepatitis B prevention based on their knowledge level of the disease, age, and gender. The regression equation was statistically significant ($F(3, 191) = 61.051$), $p < 0.001$. About half (49%) of variance in attitude was explained by the independent variables. Participants' predicted attitude score was determined as 3.784 – 0.040 (Age) + 0.435 (Knowledge), where age was measured in years and knowledge was measured as scores on a continuous variable scale. Participants attitude scores increased by 0.435 units for each unit increase in their knowledge score and decreased by 0.040 units for each additional year in age. Participants gender was not found to be a significant predictor of attitude.

Discussion

The aim of this survey was to assess the knowledge level and determine the predictors of individuals' attitudes towards HBV infection prevention among rural adult populations. Overall, the current study revealed an average knowledge level of HBV infection in the study setting. This is consistent with findings among high school students in Nanumba North and South in Ghana [25] and Osei *et al.* [20]. The current findings however differ from Eyong *et al* [23] in Cameroon, Frambo *et al.* [10] and Kwadzokpui *et al.* [24] in Ghana. Though a majority of the participants had no formal education qualifications, the awareness level of HBV infection was high. This awareness was attributed to media; specifically, radio and television. This finding on awareness level correlates with that of Sheik Zainal Abidin in Malaysia and differs from the finding among adults in Hong Kong, China [8,15]. The variations in findings may be attributed to the community-based nature of the current study. Moreover, the study setting has a senior high school and a university. Some of the participants were sampled from these institutions. Their participation in the survey might have influenced the overall knowledge level recorded. People with formal education, especially those in the university, may likely possess some understanding of the disease and would be in a better position to provide intellectual responses. Since the majority of people rely heavily on mass media, there is a need for the district health promotions department to streamline the media education content to reflect relevant and specific dimensions of HBV infection prevention.

The current study found unsatisfactory attitudes towards HBV infection prevention measures. This is contrary to the satisfactory attitudes recorded in Malaysia [15]. However, our study indicated high vaccine awareness, which is in tandem with Hang Pharm *et al.* [13] in northern Vietnam. However, this is inconsistent with Eni *et al.* [14] in Nigeria, where low vaccine awareness was recorded. These differences may be plausibly due to variations in socio-demographic characteristics and settings. In rural communities of northern Ghana including our study setting, people perceive themselves as one and live in unison, without particular attention to their respective medical status. In this regard, they tend to have less attention to precautionary measures relating to infectious diseases. It is common to see people sharing cutlery or sometimes fomites. Hence, the tendency for them to provide responses that actually reflect their attitudes, accounting for the high unsatisfactory preventive attitudes. This implies the urgent need for cultural assessment and sensitisation within the setting, in a way to modify certain lifestyles to be in consonance with proactive healthy attitudes. On the other hand, the contribution of formal education remains essential, as the majority of participants had no formal education. Therefore, there is a need, for social marketing of formal education in the setting. This is required to ensure that people acquire and accept the need for formal education, which is expected to culminate into the adoption of healthy lifestyles.

In multiple linear regression, our survey established variation in attitudes towards HBV infection to be significantly influenced by an individual's knowledge score. As the levels in knowledge increased, there is an

Table 4. Predictors of attitudes for HBV prevention.

Variables	Beta coefficient	Standard error	*p* value
Constant	3.748	0.541	< 0.001
Knowledge score	0.435	0.034	< 0.001
Age	-0.040	0.018	0.027
Gender	-0.130	0.171	0.449

$p < 0.05$; significant.

expected marginal increase in attitudes. This has been reported in Malaysia [15]. The indication is that an increase in HBV knowledge levels in the setting can lead to an increase in satisfactory attitudes towards its prevention. This study confirms the knowledge, attitude and practice outcome (KAP – O) model proposed by Rav-Marathe *et al.* [29]. This further highlights the contribution of formal education in improving attitudes toward HBV infection prevention. As proposed by Hang Pham *et al.* [13], we reiterate that to attain improved attitudes towards HBV infection prevention, there is the need to ensure acceptance and increase access to formal education, alongside health promotion programs. Achieving these may have to take several dimensions including continuous community engagements and health education campaigns through the mass media.

Furthermore, age of participants was a significant predictor of attitudes towards HBV infection prevention in this study. Advancing in age was inversely related to scores on attitude. As an individual advances in age, there is an expected marginal reduction in satisfactory attitude. The implication is that older people have unsatisfactory attitudes compared to the younger ones and could stand a greater risk for HBV infection. However, the current finding differs from a cross-sectional survey in Nanumba North and South Districts of Ghana [25], where no statistical association was established. This may be a result of variation in settings and characteristics of participants, as the previous study was conducted among high school students. Additionally, in areas such as our study setting, older people turn to exhibit much of the rural lifestyles than younger people. It is more common for an elderly person to share sharps, spoons, or even fomites than younger people. We recommend that health education programs should be tailored towards the older age group. This should be streamlined through the media, community engagements, and durbar.

Furthermore, except for age, the remaining socio-demographic characteristics were not established to be statistically significantly associated with attitudes in this study, though was reported in Vietnam [13]. However, the multistage stratified random sampling technique employed in this current study enhances its external validity and representativeness. Therefore, these findings could be applicable to populations of similar characteristics.

Strengths and Limitations of this study

The design and methods for this study offer an opportunity for it to be replicated so as to determine variations of features which has been previously or are yet to be examined over time. Most previous studies focused on pregnant or urban population. This was community-based survey, tailored towards the adult population. However, this study was purely quantitative, hence could not triangulate the data collection process in the form of adopting a qualitative approach in addition to the quantitative, for more contextual meaning to the findings. This, therefore, makes generalisation of the findings limited. Additionally, most of the participants needed a translation of the questions into the local dialect, thus, we cannot completely vouch for the accuracy of their responses due to either interviewer or response bias.

Conclusions

The overall knowledge level in the study setting is sub-optimal with unsatisfactory behaviours towards HBV infection prevention. Participant's age and knowledge of HBV are significant predictors of attitudes towards its prevention. Prevalence studies are needed with a relatively much larger population to confirm the position of age as a determinant of HBV infection, and to monitor the progress of the infection within the district. Also, we reiterate that, to attain improved attitudes towards HBV infection prevention, there is the need to ensure acceptance and increase access to formal education, alongside health promotion programs, to compliment government efforts to attaining Sustainable Development Goal three (SDG-3). These health promotion programs should be streamlined to educating people (with much emphasis on the aged) in the district on HBV; the signs and symptoms, mode of transmission, and relevance of vaccination, in order to attain improved attitudes.

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