Alabi *et. al.* Babcock Univ. Med. J.2023 6(1):50-58
https://doi.org/10.38029/ babcockunivmedj.v6i1.185
eISSN: 2756-4657

Knowledge, Perception and Prevention Practices of Hepatitis B virus infection among Health Workers in a Tertiary Health Institution, Southwest Nigeria

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Submitted: 28th May 2023
Accepted: 28th June 2023
Published: 30th June 2023
ID: Orcid ID

Abstract
Objective: Hepatitis B virus (HBV) infection is a major global health concern, with over 2 billion people infected and an estimated 391 million individuals chronically infected. Nigeria has one of the highest burdens of HBV infection; with an estimated 11% prevalence despite the availability of a highly effective vaccine since 1982 and advances in diagnostics. The disease continues to be a significant health problem globally, particularly in Nigeria where health workers are at high risk of infection. This study aimed to assess the knowledge, perception and practice of HBV infection prevention among health workers at Olabisi Onabanjo University Teaching Hospital, a tertiary health facility in Southwest Nigeria.
Methods This research was a descriptive cross-sectional study which was conducted among 348 health workers selected through a stratified random sampling method. Data were elicited using a self-administered semi-structured questionnaire and analysed using IBM SPSS version 20. Relevant descriptive statistics were calculated and the result presented in tables.
Results: The mean age of the respondents was 32.41±0.32 years. The majority had good knowledge (64.7%), positive perception about their risk (89.5%) and good practice (72.1%) of HBV prevention. 52.1% had never taken HBV vaccine and 10.5% did not plan to get screened for HBV.
Conclusion: There is a need for improved awareness and sensitization on the prevention of HBV infection especially immunization among health workers. Also, adherence to infection control measures should be given more priority among the health workers.

Keywords: Health Workers, Hepatitis B prevention, Knowledge, Perception, Practice

Plain English Summary

Hepatitis B virus (HBV) infection is a major public health disease that occurs worldwide. The disease has affected sub-Saharan Africa, especially with a high rate of infection recorded. Health workers are at high risk of contracting the infection at their workplaces. This study was done to assess the knowledge, perception of, and practice of preventive measures against the spread of HBV amongst the health workers in the Olabisi Onabanjo University Teaching Hospital. Findings showed that despite the availability of a potent vaccine, there was low uptake of this vaccine amongst the workers. They however showed good knowledge of how the infection can be spread. There is an urgent need for sensitisation of health workers towards improving the uptake of the vaccine and maintaining preventive measures against the spread of the disease in the hospital.

Introduction

Hepatitis B virus (HBV) infection is a major cause of morbidity and mortality around the world. As one of the chief causes of viral hepatitis in humans, it is an important disease of man due to its social and economic burden. The virus is transmitted by exposure to infectious blood or body fluids and most

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commonly from mother to child in highly endemic regions (1). Liver cirrhosis and hepatocellular carcinoma are complications of chronic infection and the leading cause of mortality in the disease (2). A vaccine for the prevention of HBV infection has been available since 1982 and to date, over one billion doses of the vaccine have been used for the prevention of the disease. The vaccine has a 98%-100% success rate in preventing HBV infection. The vaccine has a pre-exposure efficacy of 80-100% and a post-exposure efficacy of 70-95% depending on whether hepatitis B immune globulin is given with the vaccine (2).

HBV infection has had a negative impact despite the advent of diagnostic tests and a protective vaccine. In 2015, hepatitis B resulted in an estimated 887,000 deaths globally, mostly from cirrhosis and hepatocellular carcinoma i.e. primary liver cancer (3). Within the last decade, 27 million people (10.5% of all people estimated to be living with hepatitis B) were aware of their infection while 4.5 million (16.7%) of the people diagnosed were on treatment (4). As of 2019, over two billion people have been infected with HBV worldwide, with close to four hundred million individuals being chronically infected (5, 6). An estimated 20 million of those chronically infected people are in Nigeria (7). All the regions in the world are affected particularly in sub-Saharan Africa where the seroprevalence of the infection is among the highest with the rates of infected individuals greater than 8% (8). Nigeria has one of the highest burdens of HBV infection in the world with an estimated 11% prevalence. The distribution of HBV by sex is 62.6% of males and 37.4% of females (9). Occupations at risk of infection include health workers (especially surgeons and dental practitioners) who have the highest risk, commercial sex workers and long-distance drivers are also at a significant risk of infection. Risk factors like local circumcision, female genital mutilation, scarification and tribal marks, body piercings and poorly screened blood transfusions are important and highly specific to Nigeria (9).

The World Health Organization reported that an estimate of about 2 million health workers are at risk of exposure to the Hepatitis B Virus at their workplaces annually and 90% of these infections which develop from these exposures are in low-income countries, especially in Sub-Saharan Africa. The risk of acquiring HBV among health workers is four times greater than the general population (10). In Nigeria, among health workers, the problem of HBV infection is such that the vast majority of patients with HBV infection are undiagnosed and thus may present an unknown risk to the health workers that manage them. These health workers who deal directly with bodily fluids and exposed wounds of the patient are at the greatest risk of infection (11). Nigeria is HBV holoendemic, with carrier rates as high as 15–37% (5). Hence, healthcare workers have a reasonable risk of becoming infected, the prevalence of HBV infection among health workers in Nigeria is about 13.6% (12). A high HBV infection prevalence rate of 25.7% among surgeons was recorded in a study in Nigeria (13). The national guidelines developed in 2016 for the prevention, care and treatment of HBV have vaccination of healthcare workers as a preventive strategy, but it is doubtful if any implementation policy is in place for this. Some studies in Nigeria revealed low rates (20–50%) of hepatitis B vaccination among healthcare workers, with reasons for non-vaccination including a lack of opportunity, ignorance and the high cost of the vaccine. The availability of vaccines and a lack of proper channels to prevent mismanagement of resources are also major problems in Nigeria. Although the vaccine is highly effective in preventing the infection, there is no known cure currently for HBV infection once established (10, 14).

The majority of the research on HBV infection knowledge, attitude and uptake done in Nigeria was carried out among health workers. Most of them showed average HBV infection knowledge and a low level of vaccine uptake (10). A negative perception of HBV infection was also observed with the resultant low uptake of the HBV vaccine (10). Another study carried out in Nigeria reported that 8.7% of the sources of occupational exposure to body fluids were positive for Hepatitis B surface antigen at a tertiary referral centre in Nigeria (15). This makes it pertinent for this study to be done to assess the knowledge, perception and practice of prevention of Hepatitis B virus infection among health workers in Olabisi Onabanjo University Teaching Hospital (OOUTH) in Southwest Nigeria.

Methods

Study Design

The research was a facility-based cross-sectional study.

Study Area

Olabisi Onabanjo University Teaching Hospital (OOUTH) Sagamu, Ogun state, Southwest, Nigeria is a 300-bed space referral centre for all other hospitals in Ogun state. It provides healthcare services in the following disciplines; medicine, surgery, obstetrics and gynaecology, paediatrics, public health and pathology.

The hospital has a functional infection control unit that meets regularly. There is an HBV vaccination service domiciled in the Department of Community Medicine and Primary Care. Priority is however given to routine childhood immunisation services.

Study Population
The study population included health workers in OOUTH which comprised doctors, nurses, pharmacists, physiotherapists, nurses, laboratory scientists and hospital attendants

Inclusion criterion
All health care workers in OOUTH that had been employed for at least twelve months. This was to give them enough time to have formed their perception and show preventive practices concerning HBV.

Exclusion criterion
All health workers who were acutely ill during the period of the study

Sample Size Determination
The minimum sample size was determined using the Cochrane formula (16);
$n = Z^2 PQ/D^2$
Where n = Minimum Sample Size
Z= A Confidence Level of 95% (1.96)
P = Measure of Prevalence (the proportion of respondents with good preventive practices for HBV infection from a previous similar study in Ibadan, southwest Nigeria) = 71.4% (0.714) (17).
Q = (1 – p) = 0.286
D = Precision Value at the Level of 95% Confidence Interval = 0.05
Z = 1.96
D = the precision of the study at a 95% confidence interval set at 0.05

$$n = \frac{(1.96)^2 \times 0.714 \times 0.286}{(0.05)^2} = 314$$

Adding 10% non-response to the calculated minimum sample size for this study, 348 samples were used.

Sampling Technique
A stratified (proportional) random sampling technique was used to select the samples based on the categories of the health workers in the facility (doctors, nurses, pharmacists, physiotherapists, laboratory scientists and hospital attendants). The total number of health workers in the hospital was 844. The total number of participants selected was 348.

Research Instrument
The tool used in this study for the data collection was a self-administered semi-structured questionnaire. The questionnaire was structured into four sections, namely: socio-demographic characteristics; knowledge of Hepatitis B virus infection; perception of universal safety precautions; the practice of universal safety precautions and factors influencing the adherence to universal safety precautions.

Data Collection
The self-administered questionnaire was pretested in another tertiary health facility (Federal Medical Centre, Abeokuta) in the state. Data collection was carried out by the investigators.

Data Analysis
Data collected were entered and analysed using Statistical Package for Social Sciences (IBM SPSS) software version 20. Descriptive statistics were done and variables were analysed and presented in tables. The knowledge was scored based on the scores obtained by each respondent from the maximum obtainable score of 25 from the stem options of this section. Respondents who scored between 0-9 were said to have poor knowledge, respondents with a score between 10 and 15 had fair knowledge while respondents that scored between 16 and 25 were said to have good knowledge.
Assessment of perception was done using a 5-point Likert scale ranging from strongly agree to strongly disagree. Strongly Agree to Strongly Disagree were scored 5 to 1 with each positive statement and the scoring reversed for negative statements. There were six statements in all (maximum total score = 30). The scoring was done using 0-14 as negative perception, and 15-30 as positive perception (50% was the cut-off mark).
The practice of universal safety precautions was assessed by asking about the core elements of universal precautions which included hand hygiene, sharps safety, safe injection practice and personal protective equipment. The practice was assessed based on the scores obtained by each respondent from an obtainable score of 16 from 8 questions. Respondents who scored between 0-8 were said to have poor practice while respondents that scored between nine and 16 were said to have good practice.

Results

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency	Percentage
Age distribution (in years)		
≤ 20	7	2.01
21-30	108	31.1
31-40	84	24.2
≥ 41	149	42.6
Mean age	32.41 ±0.32 years	
Sex		
Male	116	33.2
Female	232	66.8
Marital Status		
Single	79	22.6
Married	248	71.2
Divorced/ Separated	21	6.2
Religion		
Christianity	203	58.4
Islam	132	37.9
Others	13	3.7
Ethnic Group		
Yoruba	229	85.8
Igbo	22	6.3
Hausa	11	3.2
Others	16	4.7
Place of work		
Ward	112	32.1
Clinic	151	43.2
Theatre	16	4.7
Laboratory	39	11.1
Pharmacy	31	8.9

The mean age of the respondents was 32.41±0.32 years. The majority were 40 years and above (42.6%), females (66.8%), married (71,2%), Christians (58.4%), Yoruba (85.8%) and worked in the clinics/wards (75.3%) (Table 1).

Table 2: Knowledge of Hepatitis B virus among respondents

Variable	Frequency	Percentage
The causative organism of Hepatitis B		
Virus	311	89.4
Bacteria	22	6.3
Others	13	3.7
Don't know	2	0.6
Methods of Hepatitis B virus transmission*		
Unsterilized syringes	342	98.4
Sharing toothbrushes	84	24.2
Unprotected sex	348	100
Mother to child	269	77.4
Blood transfusion	333	95.8
Touching/Shaking infected persons	53	15.3
Sharing eating utensils	24	6.8
Signs/symptoms in a patient with Hepatitis B virus infection*		
Yellowness of the eyes	273	78.4
Itching of the skin	141	40.5
Generalized body weakness	278	80.0
Swelling of the abdomen	168	48.4
Pain in the abdomen	103	29.5
No signs/symptoms	22	6.3
Organs majorly affected by Hepatitis B virus		
Kidney	22	6.3

Liver	315	90.5
Lungs	9	2.6
Intestine	2	0.6
The commonest complication of the hepatitis B virus		
Infertility	21	6.0
Liver Cirrhosis	222	63.5
Hepatocellular carcinoma	78	22.6
Hypertension	27	7.9
Knowledge score		
Good	225	64.7
Fair	103	29.5
Poor	20	5.8

(*Multiple responses accepted)

Most of the respondents (64.7%) had good knowledge, while 29.5% and 5.8% had fair and poor knowledge, respectively (Table 2).

Table 3: Perception of the Health Workers

Perception	Strongly disagree	Disagree	Indifferent	Agree	Strongly agree
Health workers should know their HBV status	7 (2.1%)	15 (4.2%)	15 (4.2%)	201 (57.9%)	110 (31.6%)
Health workers should know their spouse's HBV status"	28 (7.9%)	48 (14.2%)	75 (21.6%)	123 (35.3%)	73 (21.0%)
HBV is a public health disease affecting health workers especially	9 (2.6%)	13 (3.7%)	15 (4.2%)	201 (57.9%)	110 (31.6%)
Health workers should be interested in knowing more about HBV disease	13 (3.7%)	18 (5.3%)	38 (11.0%)	210 (60.5%)	69 (19.5%)
HBV vaccine is safe and effective	7 (2.1%)	15 (4.2%)	15 (4.2%)	220 (63.2%)	91 (26.3%)
Sitting near HBV-infected persons is dangerous	48 (13.7%)	128 (36.8%)	133 (38.5%)	30 (8.4%)	9 (2.6%)

The majority showed a positive perception towards the prevention of HBV infection, but 10.5% and 43.7% of the respondents did not wish for them or their spouses to get screened, respectively (Table 3).

Table 4: Practice of prevention of HBV infection among respondents

Variable	Frequency	Percentage
Training on safety precautions since employment		
Yes	189	54.2
No	159	45.8
Usage of hand gloves to prevent HBV infection		
Yes	278	80.0
No	70	20.0
Regular use of face mask to prevent HBV infection		
Yes	348	100
Usage of protective gowns to prevent HBV infection		
Yes	251	72.1
No	97	27.9
Sharing of sharp objects with others		
Yes	39	11.1
No	309	88.9
Use of condoms during sexual intercourse		
Yes	284	81.6
No	64	18.4
Practice score		
Good practice	137	72.1
Poor Practice	53	27.9

A majority (72.1%) had good practices in the prevention of HBV infection. However, 20% and 27.9% practised without hand gloves and protective gowns, respectively (Table 4).

Table 5: Practice of immunisation among respondents

Variable	Frequency	Percentage
HBV vaccine uptake		
Yes	167	47.9
No	181	52.1
Reason for not taking vaccine (n = 181)		
It is not readily available	68	37.6
Poor accessibility	25	14.1
I don't have time	45	24.8
I am not aware of the vaccine	36	19.9
It is expensive	7	3.6
Doses of vaccine received (n = 167)		
One	100	60.0
Two	46	27.3
Three	21	12.7
Facility of immunisation (n = 167)		
Private	9	5.5
Public	158	94.5
Complete vaccine doses schedule (n = 21)		
Convenient	8	38.2
The spacing is too long	12	57.1
Doses are too many	1	4.7
Likelihood of recommending the vaccine to others (n = 167)		
Yes	126	75.4
No	41	24.6

Half (52.1%) of the respondents had not taken the HBV vaccine and their major reason (37.6%) was the non-availability of the vaccine (Table 5).

Discussion

The mean age of the respondents in this study was 32.41±0.32 years with the majority of the workers aged above 40 years. This is similar to research done in Edo state, southern Nigeria and Ado-Ekiti, southwest Nigeria to assess factors influencing knowledge of HBV vaccination among healthcare workers with a mean age of 34.90±9.46 years (2) and 35.00±4.50 years (18), respectively. The majority of the respondents were females (66.8%) with a similar occurrence in another study (18) with 66.5% females.

The majority (64.7%) of the respondents in this study demonstrated good knowledge of HBV infection. This finding is encouraging because knowledge is an important factor for behavioural modification. This was in concordance with the 78.2% prevalence of good knowledge of HBV infection among healthcare workers reported in a study done in Usmanu Danfodiyo University Teaching Hospital, Sokoto (3). This result was also similar to those obtained in other studies where the knowledge of the respondents was assessed to be 65.2% (11) and 76.3% (17). This may be due to several pieces of training that the health workers might have undergone. The findings in this study also showed that the respondents were quite aware of the causative agent (89.4%), route of transmission through unsterilized syringes (98.4%), mother-to-child (77.4%) and blood transfusion (95.8%). Another study conducted on health workers in Maiduguri, Northern Nigeria (19), also showed a similarly high level of knowledge amongst them in questions related to aetiology (81.1%), and blood transfusion (70.8%). Also, in this present study, it was found that 15.3% of the respondents felt that the infection could be spread by touching, shaking hands and sharing eating utensils with infected persons (6.8%). There is therefore an urgent need to correct this knowledge status.

Risk perception is the subjective judgment that people make about the characteristic and severity of a hazard. In this study, it was noted that the majority, 311 (89.5%) of the health workers perceived themselves to be more at risk of HBV infection than the general population with 31.6% of them feeling very strongly about this. This finding was in contrast to what was obtained in another study where only 21.3% of the respondents felt they had a high risk of contracting the infection based on

the nature of their job (11). This would affect their attitude toward and practice of general infection control methods in the health facility.
Hospital attendants are known to be frequently exposed to healthcare wastes that could contain infected blood and body fluids; they demonstrated a very low-risk perception of HBV infection. They were found less likely to perceive themselves to be at risk of the infection as compared to doctors, nurses and laboratory personnel, physiotherapists and pharmacist because they were not dealing directly with the patients.
Even though the majority of respondents (64.7%) had good knowledge of hepatitis B viral infection, and most of them (89.5%) perceived themselves to be at increased risk of the infection as compared to the general population, 167 (47.9%) which is a little less than half of the 348 respondents were vaccinated against the infection, and only 21 (12.7%) of those vaccinated took the complete three doses of the vaccine. This finding is a cause for concern because of the inevitable risk of the majority of the respondents contracting hepatitis B viral infection following accidental exposure to infectious healthcare wastes.
Reports from other studies generally showed poor uptake of the hepatitis B vaccine. Findings of similar studies in various parts of Nigeria (13, 17, 20) showed a comparable pattern of low vaccine uptake of 14.2%, 21.2% and 33% respectively. It is even worse to note that the majority of those who claim to have taken the vaccine took only one or two doses and never bothered to complete the regimen (13). Reasons given by the respondents in this current study for non-completion of the vaccine doses included spacing between the vaccine doses being long (57.1%), inconvenience (38.2%) and doses being too many (4.7%). Some of them also felt that the vaccines were not available (37.6%), not accessible (14.1%) and lack of time (24.8%). This brings to the fore the importance of sensitisation and awareness programmes for health workers on the need to be immunised against infection.
This study also showed that 18.4% of the respondents practised unprotected sex and 20% of them do not always wear their hand gloves at work. This is similar to the findings from the study done across three states in Nigeria (Lagos, Ogun and Abia states) (20) where 23.9% and 24% of the respondents practised unprotected sex and had multiple sexual partners. This definitely would make the risk of developing the infection higher among health workers.

Limitations of study
The study participants were selected from the health workers who worked directly with the patients. Other non-health workers may have had contact with patients (products). Also, the design of this study was descriptive. Further studies can still be done on these findings.

Conclusion
Despite the high level of knowledge, positive perception and good practice found among the health workers, there is a need for improved awareness and sensitization programme(s) on immunization against infection among health workers. Adherence to infection control measures should also be given more priority among health workers.

List of abbreviations
HBV: Hepatitis B Virus
OOUTH: Olabisi Onabanjo University Teaching Hospital

Declarations
Ethics approval, and Consent to Participate
The authors got ethical approval from the Ethical Committee of the OOUTH Health Research and Ethics Committee (OOUTH/HREC/450/2021AP). Written informed consent was obtained from all study participants before the administration of the questionnaire. All individuals were informed that participation is voluntary. The participants were assured of strict confidentiality of all information gathered from them and data security done. The research was carried out following the guidelines of the approving institution.

Consent for publication
All the authors gave consent for the publication of the work under the creative commons Attribution-Non-Commercial 4.0 license.

Availability of data and materials
The data and materials associated with this research will be made available by the corresponding author upon reasonable request.

Competing interests
There are no competing interests in this research work from the authors.

Funding
No fund was generated from any external organization.

Authors' contributions
All the authors actively participated in the design and planning of the research work, data collection and analysis, as well as the writing of the report.

Acknowledgement
The authors acknowledge the active support of the staff of the Olabisi Onabanjo University Teaching Hospital.

References

1. WHO. WHO | Hepatitis B WHO | Hepatitis B. WHO Fact sheet. 2015;(204 http://www.who.int/mediacentre/factsheets/fs204/en/. Accessed June 18 2023
2. Awunor NS, Osagiede ET, Abah SO, Osagiede EF. Factors Influencing Knowledge of Hepatitis B Vaccination amongst Healthcare Workers in a Rural Teaching Hospital in Southern Nigeria. Int J Occup Saf Heal. 2022;12(2). https://doi.org/10.3126/ijosh.v12i2.40616
3. Hassan M, Awosan KJ, Nasir S, Tunau K, Burodo A, Yakubu A, et al. Knowledge, risk perception and hepatitis B vaccination status of healthcare workers in Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria. J Public Heal Epidemiol. 2016;8(4). https://doi.org/10.5897/jphe2015.0795
4. Bilounga Ndongo C, Eteki L, Siedner M, Mbaye R, Chen J, Ntone R, et al. Prevalence and vaccination coverage of Hepatitis B among healthcare workers in Cameroon: A national seroprevalence survey. J Viral Hepat. 2018;25(12). https://doi.org/10.1111/jvh.12974
5. Olayinka AT, Oyemakinde A, Balogun MS, Ajudua A, Nguku P, Aderinola M, et al. Seroprevalence of Hepatitis B infection in Nigeria: A national survey. Am J Trop Med Hyg. 2016;95(4). https://doi.org/10.4269/ajtmh.15-0874
6. Umer A, Teklemariam Z, Ayele F, Mengesha MM. Prevalence of hepatitis B infection and its associated factors among pregnant mothers attending antenatal care at public hospitals at Hararghe, Eastern Ethiopia. Front Glob Women's Heal. 2023;4:1056488. https://doi.org/10.3389/FGWH.2023.1056488
7. Ajuwon BI, Yujuico I, Roper K, Richardson A, Sheel M, Lidbury BA. Hepatitis B virus infection in Nigeria: a systematic review and meta-analysis of data published between 2010 and 2019. BMC Infect Dis. 2021;21(1):1–15. https://doi.org/10.1186/S12879-021-06800-6/FIGURES/4
8. Shah SM, Rodin H, Pogemiller H, Magbagbeola O, Ssebambulidde K, Zewde A, et al. Hepatitis B awareness and vaccination patterns among healthcare workers in Africa. Am J Trop Med Hyg. 2020;103(6). https://doi.org/10.4269/ajtmh.20-0521
9. Muhlemann B, Jones TC, de Barros Damgaard P, Allentoft ME, Shevnina I, Logvin A, et al. Erratum to: Ancient hepatitis B viruses from the Bronze Age to the Medieval period Nature 2018, 557, 7705, (418-423). https://doi.org/10.1038/s41586-018-0406-6
10. Oni OI, Osho OP, Oluwole MT, Osho ES, Ogungbeje A, Raji HM. Assessing the level of knowledge, uptake of hepatitis B virus vaccine, and its determinants among health workers across various levels of health facilities in Ondo, South West, Nigeria. Egypt J Intern Med. 2022;34(1). https://doi.org/10.1186/s43162-022-00167-z
11. Abiodun O, Shobowale O, Elikwu C, Ogbaro D, Omotosho A, Mark B, et al. Risk perception and knowledge of hepatitis B infection among cleaners in a tertiary hospital in Nigeria: A cross-sectional study. Clin Epidemiol Glob Heal. 2019;7(1). https://doi.org/10.1016/j.cegh.2017.12.001
12. Ijoma UN, Meka IA, Omotowo B, Nwagha TU, Obienu O, Onodugo OD, et al. Sero-prevalence of Hepatitis B virus infection: A cross-sectional study of a large population of health care workers in Nigeria. Niger J Clin Pract. 2021;24(1). https://doi.org/10.4103/njcp.njcp_671_19
13. Omotowo IB, Meka IA, Ijoma UN, Okoli VE, Obienu O, Nwagha T, et al. Uptake of hepatitis B vaccination and its determinants among health care workers in a tertiary health facility in Enugu, South-East, Nigeria. BMC Infect Dis. 2018;18(1). https://doi.org/10.1186/s12879-018-3191-9
14. Dayyab FM, Iliyasu G, Ahmad BG, Bako AT, Ngamariju SS, Habib AG. Hepatitis B vaccine knowledge and self-reported vaccination status among healthcare workers in a conflict region in northeastern Nigeria. Ther Adv Vaccines Immunother. 2020;8. https://doi.org/10.1177/2515135519900743
15. Abubakar S, Iliyasu G, Dayyab FM, Inuwa S, Tudun Wada RA, Sadiq NM, et al. Post-exposure prophylaxis following occupational exposure to HIV and hepatitis B: An analysis of a 12-year record in a Nigerian tertiary

hospital. J Infect Prev. 2018;19(4). https://doi.org/10.1177/1757177417746733
16. Cochran WG. Note on an approximate formula for the significance levels of z. The Annals of Mathematical Statistics. 1940 Mar 1;11(1):93-5.
17. SE Ibitoye, Ajuwon AJ. Knowledge and vaccination status for hepatitis B infection among health workers in Ibadan, Nigeria. Vol. 47, J. Med. Med. Sci. 2018.
18. Simidele OM, Oladimeji A, Joseph AA, Aduayi V, Samuel NI. Burden of Hepatitis B Viral Infection among Workers in a Tertiary Health Institution in Southwestern Nigeria. Open J Med Microbiol. 2018;08(04). https://doi.org/10.4236/ojmm.2018.84008
19. Kida IM. Assessment of Knowledge, Attitude and Practice Towards Hepatitis B Virus Screening and Vaccination Among Auxiliary Health Workers in University of Maiduguri Teaching Hospital (UMTH). BORNO Med J. 2018;15(2):1–11. https://doi.org/10.31173/bomj.bomj_119_15
20. Eni AO, Soluade MG, Oshamika OO, Efekemo OP, Igwe TT, Onile-Ere OA. Knowledge and awareness of hepatitis B virus infection in Nigeria. Ann Glob Heal. 2019;85(1). https://doi.org/10.5334/aogh.33