



# Knowledge of Hepatitis B Virus Infection and Hepatitis B Vaccination Among Medical Students in a Tertiary Hospital in Jos, Plateau State, Nigeria

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## ABSTRACT

**Background:** Hepatitis B virus is a potentially fatal infection that is one of the major public health problems around the world. It is important to affirm that medical students are future health care workers, and they will be at an increased occupational risk of contracting HBV infection from exposure to percutaneous and non-percutaneous injuries from using instruments containing infected blood during their clinical practice. This study seeks to assess the knowledge of Hepatitis B virus and Hepatitis B vaccination medical students in a Tertiary Hospital in Jos, Plateau State, Nigeria. **Methods:** This was a descriptive cross-sectional study done between March and August 2021 among 236 medical students using Stratified Sampling technique. Data was collected using a self-administered structured questionnaire and analysed using the IBM SPSS 28 (Statistical Package for the Social Sciences). Ethical approval was granted by Bingham University Teaching Hospital, Ethics Committee, Jos, Plateau State. **Results:** The majority 99.6% of the respondents have heard about HBV and 0.4% of the respondents have not heard about it. The majority got their information on Viral Hepatitis B from School (92.7%), and Hospital (72.8%). The Internet (61.2%), Family/Friends (55.6%), and

**mass media (40.9%). Most respondents knew the mode of transmission, complications, asymptomatic clinical presentation, and curability. A majority had knowledge of existence of HBV Vaccine, willing to screen before test, 87.3% of respondents are of the opinion that HBV infected persons should not be vaccinated. Half 128 (54.2%) of the respondents had good knowledge of Hepatitis B infection and vaccination, 102 (43.2%) had fair knowledge, while 6 (2.5%) had poor knowledge. Conclusion: Above half of the students had good knowledge of Hepatitis B infection and vaccination, and a few had poor knowledge. There is a need to improve the general knowledge about hepatitis vaccine among students through teachings and participation in immunization activities and campaigns.**

**Keywords:** knowledge, Hepatitis B virus infection, Hepatitis B vaccination, medical students

## INTRODUCTION

Viral Hepatitis is a preventable disease, with a global health priority which has a predilection for the liver and is known to often lead from acute to chronic infections (1,2). It takes a toll on individuals, communities and the health systems (3). Vaccination is the mainstay of prevention against Hepatitis B infection with 90-100% protection given following complete vaccination (2,4). World Health Organization (WHO) recommends that students and health workers should be given special consideration regarding screening and vaccination for Hepatitis B virus infection because they directly come in contact with patients' body fluid and blood and also deal with blood transfusion and surgical instruments during procedures (2,4). Worldwide, approximately 2 billion people have evidence of past or recent Hepatitis B virus infection, and 500 million people have been estimated to be infected with the virus annually (5). A total of 150 million people, were said to be living with chronic Hepatitis B virus infection worldwide (6). The proportion of people living with this infection is greatest in Asia, Sub-Saharan Africa, and Egypt. Therefore, improving awareness and knowledge about Hepatitis B virus disease and hepatitis B vaccine coverage of health workers in Sub-Saharan Africa is an important public health issue (7). The cure for Hepatitis B infection has not yet been found, but while the World Health Organization approved and has continued to recommend immunization program since 1991, it has been available in Nigeria since 1999. The incidence of Hepatitis B virus infection and liver cancer among infants, children and adolescent has reduced markedly since a global expanded coverage of immunization program (7,8). Needless to state that today's undergraduate medical students, undergoing health training, are tomorrow's health care workers. They have a much-increased risk of contracting Hepatitis B infection and therefore prior identification of their baseline awareness is of paramount importance. The Hepatitis B virus consists of a core containing deoxyribonucleic acid (DNA) and a DNA polymerase enzyme needed for viral replication. Hepatitis B virus is one of the most common causes of chronic liver disease and hepatocellular carcinoma (9). The virus is highly contagious, 50-100 times more infectious than HIV. Hepatitis B virus can be transmitted from mother to child in the perinatal period which is the commonest cause of infection and carries the highest risk of ongoing chronic infection. Other means of transmission include, unprotected sex, infected unscreened blood products, unsafe use of needles, injection drug use (9).

Hepatitis B virus may cause an acute infection which is often asymptomatic, particularly acquired at birth, many individuals with chronic Hepatitis B infection however, may present

with symptoms like jaundice, fatigue, loss of appetite, nausea and/or abdominal pain (10). Chronically infected HBV patients have a 15-25% risk of dying prematurely due to HBV-related cirrhosis and hepatocellular carcinoma. Hepatitis B virus is estimated to be the cause of 30% of cirrhosis and hepatocellular carcinoma (10).

In spite of implementation of good infection control practices including provision of an effective vaccine, Hepatitis B infection remains a common occupational risk for healthcare workers and medical students (11). A healthcare worker has four times greater probability of contracting Hepatitis B infection compared with general population (11). It has been observed that medical students compared to other healthcare students are more endangered to Hepatitis B virus infection not only because they directly come in contact with patients' body fluids and blood and also deal with blood transfusion, surgical instruments during procedures and injections, but they also have a greater prevalence as young adults to have unprotected sexual intercourse with multiple sexual partners (12). Healthcare workers are mostly unaware of their potential exposures to contaminated sources (12). Even when exposures are recognized, healthcare workers often do not seek post-exposure prophylactic management (12).

Hepatitis B virus is a potentially fatal infection which is one of the major public health problems around the world (6). This study is important as Hepatitis B virus infection leads to long term chronic diseases like liver failure, liver cancer and cirrhosis and health care workers and medical students are at risk of these infections (13). Thus, assessing their level of knowledge about Hepatitis B virus and the vaccine is important. It is important to affirm that medical students are future health care workers, and they will be at an increased occupational risk of contracting HBV infection from exposure to percutaneous and non-percutaneous injuries from using instruments containing infected blood during their clinical practice (13). There is therefore a need for these students to acquaint themselves with adequate and optimal knowledge of the virus and the vaccination (2). Inadequate knowledge among these group will affect the behavioral pattern to their risk perception, vaccination and safety precautions (2). This study seeks to assess the knowledge of Hepatitis B virus infection and Hepatitis B vaccination among medical students in a Tertiary Hospital in Jos, Plateau State, Nigeria., and it is hoped that the findings will contribute to the existent body of knowledge on Hepatitis B and Hepatitis B vaccination.

## METHODS

The study was carried out between March and August 2021 at Bingham University Jos Campus, Plateau State, Nigeria. Bingham University is a private University owned by Evangelical Church Winning All (ECWA), established in 2005. The University has two Campuses; the main Campus located in New Karu, Nassarawa state and the Jos Campus, where the College of Medicine and Health Science is located. (14).

The study was a descriptive cross-sectional study among 236 medical students using Structured Self-administered questionnaire to ascertain the Knowledge, of Hepatitis B virus infection and Hepatitis B vaccination among medical students. The study included Undergraduate Medical Students from Fourth year to 6th year in the clinical arm of the College of Medicine and Health Science of Bingham University. A sample size of 236 was calculated using the Cochran equation (15).  $n = z^2pq/e^2$ , with a prevalence,  $p =$  proportion of the

population having the characteristics of interest (obtained from reviewing of data from a similar study done) = 83.2% (16). The calculated minimum sample size was 215. A non-response rate of 10% was added, hence the final value is 236. Stratified sampling technique was used in this study. Each class served as a stratum. Clinical medical students of BHUTH (400-600l). Selection of students from each class was done using proportional allocation.

Proportional allocation based on size of the class using the formula:

$$\text{Proportion (p)} = \frac{\text{number of students in each class (n)}}{\text{Total number of students in BHUTH (t)}} \times \text{sample size}$$

Every person from the class to be studied was assigned a number and using Simple Random Sampling (balloting), Data was collected using pretested structured questionnaires. The questionnaire was made up of four sections including the socio-demographic information of the respondents, their level of knowledge of Hepatitis B infection and knowledge of HBV vaccination. Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 20. Scoring system for Knowledge includes, Good Knowledge – 70 – 100%; Fair Knowledge - 50 - 69; Poor Knowledge – 0 – 49; where a score of “0” is given to wrong answer and a score of “1” to a correct answer. After entry, data was cleaned for quality assurance, analyzed and results were displaced using frequency tables, bi-variate tables. A chi’s square tests were used to test for significance and determine the relationship between the dependent and independent variables. P<0.05 was used as the level at which significance of the result will be determined. Ethical approval was granted by the Bingham University Teaching Hospital health research and ethics committee. Informed consent was appropriately obtained from each prospective participant in the study using consent form attached to the questionnaire and these participants were informed that they could either agree or disagree as well as pull out from this study at any stage and that their information will be treated with utmost confidentiality.

## FINDINGS

**Table 1: Awareness and source of awareness about Hepatitis B Virus**

Awareness of Hepatitis B Virus (HBV)	Frequency	Percent (%)
Yes	235	99.6
No	1	0.4
<b>Total</b>	<b>236</b>	<b>100.0</b>
<b>Source of awareness about HBV</b>		
School	215	92.7%
Hospital	169	72.8%
Internet	142	61.2%
Family/friends	129	55.6%
Mass media	95	40.9%
Others	8	3.4%
<b>Total</b>	<b>236</b>	<b>100.0</b>

### Awareness and Source of Awareness About Hepatitis B Virus

Table 1 shows that 99.6% of the respondents have heard about HBV and 0.4% of the respondents have not heard about it.

The above Table shows that the majority of the respondents got their information on Viral Hepatitis B from School (92.7%), followed by those who heard from the Hospital (72.8%). The Internet, Family/Friends and mass media were the sources of knowledge on Viral Hepatitis B at 61.2%, 55.6% and 40.9% respectively. Others accounts for 3.4%.

**Table 2: Knowledge of HBV Transmission, Complications, asymptomatic clinical presentation and curability**

<b>Mode of HBV transmission</b>	<b>Frequency</b>	<b>Percent (%)</b>
Blood Transfusion	223	94.5%
Unprotected Sexual Intercourse	189	80.1%
Mother To Child	183	77.5%
Unsafe Needles/Sharps	211	89.4%
Contact With Infected Body Fluids	205	86.9%
<b>Knowledge of Complications of HBV Infection</b>	<b>Frequency</b>	<b>Percent (%)</b>
Acute hepatitis	183	77.5%
Chronic hepatitis	215	91.1%
Liver cirrhosis	206	87.3%
Hepatomas	90	38.1%
Others	12	5.1%
<b>Knowledge of Asymptomatic Clinical Presentation of HBV Infection -Can a person who is infected be asymptomatic?</b>	<b>Frequency</b>	<b>Percent (%)</b>
Yes	210	89.0
No	26	11.0
<b>Total</b>	<b>236</b>	<b>100.0</b>
<b>Knowledge of Treatment of HBV Infection by Respondents -Is it curable</b>	<b>Frequency</b>	<b>Percent (%)</b>
Yes	86	36.4
No	91	38.6
I don't know	59	25.0
<b>Total</b>	<b>236</b>	<b>100.0</b>

**Table 2: Knowledge of HBV Transmission, Complications, Asymptomatic Clinical Presentation and Curability**

Table 2, depicts the fact that Blood transfusion (94.5%) is the commonest known means of HBV transmission among respondents followed by Unsafe needles / sharps (89.4%) and contact with infected body fluids (86.9%). Unprotected sexual intercourse (80.1%) and Mother to child transmission (77.5%) are known as routes of transmission. As shown in the Table 2, 91.1% and 87.3% of respondents are aware chronic hepatitis and liver cirrhosis respectively as complications of HBV infection followed by acute hepatitis (77.5%). Also, 38.1% of respondents are aware of hepatomas while 5.1% are aware of others (hepatic encephalopathy and primary liver cell carcinoma). The above Table 2 shows that 38.6% of the respondents are of the opinion that HBV infection is not curable while 36.4% of the respondents are of the opinion that it is curable. 25.0% do not know if HBV infection is curable.

**Table 3: Knowledge of existence of HBV Vaccine, screening before test, vaccination of infected persons**

<b>Awareness of existence of an HBV Vaccine - Is There a Vaccine for HBV?</b>	<b>Frequency</b>	<b>Percent (%)</b>
Yes	235	99.6
No	1	0.4
<b>Total</b>	<b>236</b>	<b>100.0</b>
<b>Should Screening Test Be Done Before Vaccination?</b>		
	<b>Frequency</b>	<b>Percent (%)</b>
Yes	219	92.8
No	14	5.9
I don't know	3	1.3
<b>Total</b>	<b>236</b>	<b>100.0</b>
<b>Should HBV Infected Persons Be Vaccinated?</b>		
	<b>Frequency</b>	<b>Percent (%)</b>
Yes	30	12.7
No	206	87.3
<b>Total</b>	<b>236</b>	<b>100.0</b>

**Knowledge of Existence of HBV Vaccine, Screening Before Test, Vaccination of Infected Persons**

Table 3 shows that 99.6% of respondents are aware that HBV Vaccine exists, while 0.4% are not aware it exists. Table 3 also reveals that 92.8% of respondents believes that screening should be done before Vaccination, while 5.9% of respondents are of the opinion that screening should not be done prior to Vaccination and 1.3% of respondents do not know if screening should be carried out before the Vaccination. The Table 3 above shows that 87.3% of respondents are of the opinion that HBV infected persons should not be vaccinated while 12.7% think HBV infected persons should still be vaccinated.

**Table 4: Knowledge of timing of first dose of Hepatitis Vaccine, complete dosage and duration for complete protection (National Program on Immunization Schedule)**

<b>Knowledge of timing of administration of first dose of Hepatitis Vaccine (NPI Schedule)</b>	<b>Frequency</b>	<b>Percent (%)</b>
At birth	143	60.6
Adulthood	6	2.5
Anytime	21	8.9
I don't know	66	28.0
<b>Total</b>	<b>236</b>	<b>100.0</b>
<b>Knowledge of the number of Doses for complete HBV vaccination (WHO)</b>		
	<b>Frequency</b>	<b>Percent (%)</b>
1 dose	3	1.3
2 doses	25	10.5
3 doses	182	77.1
More than 3 doses	7	3.0
I don't know	19	8.1
<b>Total</b>	<b>236</b>	<b>100.0</b>

Knowledge of duration of protection Following complete HBV Vaccination	Frequency	Percent (%)
<1 year	4	1.7
1-5 years	12	5.1
6-10 years	95	40.3
1-19 years	14	5.9
>20 years	42	17.8
I don't know	69	29.2
<b>Total</b>	<b>236</b>	<b>100.0</b>

### Knowledge of Timing of First Dose of Hepatitis Vaccine, Complete Dosage and Duration for Complete Protection (NPI Schedule)

Table 4 shows that 60.6% of respondents are of the opinion that HBV Vaccine is first administered at birth and 28.0% do not know when the Vaccine is first administered. 8.9% of respondents believe it can be first administered anytime, while 2.5% of respondent think it should be administered first at adulthood. As shown above (table 4), 77.1% of respondents believe that the WHO recommended number is 3 doses, 10.6% say the WHO recommended number are 2 doses. 8.1% do not know the WHO recommended number of doses, 3.0% of respondents believe the WHO recommended number should be more than 3 doses while 1.3% believe the WHO recommended number is 1 dose. In addition, 40.3% of the respondents say the duration of protection following full HBV Vaccination is 6 – 10 years, 29.2% of respondents do not know the duration of protection. 17.8% think that the duration of protection lasts for >20 years while 5.9% are of the opinion that it lasts for 1 - 19 years. The remaining 5.1% and 1.7% of respondents are of the opinion that the duration of protection lasts for 1 – 5 years and <1 year respectively (table 4).

**Table 5: Knowledge Score**

Level of knowledge	Frequency	Percent (%)
Poor knowledge	6	2.5%
Fair knowledge	102	43.2%
Good knowledge	128	54.2%
<b>Total</b>	<b>236</b>	<b>100.0%</b>

Table 5 reveals that about half 128 (54.2%) of the respondents had good knowledge of Hepatitis B infection and vaccination, 102 (43.2%) had fair knowledge, while 6 (2.5%) had poor knowledge.

**Table 6: Bivariate analysis comparing knowledge of HBV Vaccination among batches of medical students.**

Level of the respondents	Knowledge about HBV vaccination				Chi-square value	P-value
	Poor knowledge n (%)	Fair knowledge n (%)	Good knowledge n (%)	Total n (%)		
Batch H	0 (0.0%)	10 (4.2%)	19 (8.1%)	29 (12.3%)	22.610	0.004

Batch I	0 (0.0%)	7 (3.0%)	21 (8.9%)	28 (11.9%)		
Batch J	0 (0.0%)	10 (4.2%)	27 (11.4%)	37 (15.7%)		
Batch K	2 (0.8%)	42 (17.8%)	35 (14.8%)	79 (33.5%)		
Batch L	4 (1.7%)	33 (14.0%)	26 (11.0%)	63 (26.7%)		
<b>Total</b>	<b>6 (2.5%)</b>	<b>102 (43.2%)</b>	<b>128 (54.2%)</b>	<b>236 (100.0%)</b>		

### **Bivariate Analysis Comparing Knowledge of HBV Vaccination Among Batches of Medical Students**

According to the number of respondents that participated in this research, good knowledge of HBV Vaccination is higher among Batches K (14.8%), J (11.4%) and L (11.0%). Batches H (8.1%) and I (8.9%) had lower proportion of students with good knowledge of HBV Vaccination. Fair knowledge of HBV Vaccination was higher in Batches K (17.8%) and L (14.0%) while Batches H (4.2%), J (4.2%) and I (3.0%) had lower proportion of students with fair knowledge. Poor knowledge of HBV Vaccination was seen in Batches K (0.8%) and L (1.7%). This relationship between batches of students and knowledge of HBV Vaccination is statistically significant at p value of 0.004.

### **DISCUSSION**

Almost all (99.6%) of the respondents were found to have heard of HBV and know about viral Hepatitis B, with their main source of information as school (92.7%) and hospital (72.8%). This shows that Bingham University and health care centres contribute to the level of awareness among medical students in BHUTH. In a similar study in a medical college in Nepal, majority of respondents (87.3%) were aware of HBV and viral hepatitis (17). In another study carried out by Baig et al among clinicians and medical students of Rajasthan revealed that almost all respondents (99%) identified Hepatitis B as a viral disease of liver pathology (18). The level of awareness is vital towards full vaccination among the students and future health care workers. It also means that the schools and hospitals are doing a good job in awareness creation about Hepatitis B. This level of awareness can be extended to the Community and general public, in order to improve the hepatitis B vaccination coverage.

This study revealed that 54.0% of the respondents had a good knowledge of HBV and HBV infection, while 43.2% had a fair knowledge of HBV and HBV infection. This finding is in keeping with that from a study conducted among medical students in Haramaya University where 56.2% of the respondents had a good knowledge while 43.8% had a fair knowledge of HBV infection (19). Another study conducted among medical undergraduate students in India, showed that 55% of medical students were correctly aware of HBV infection, this finding corresponds to this study as the value is just slightly lower (18). This level of knowledge corresponds to their level of awareness and thus creates a picture that the medical students are ready to lead the conversation towards improving vaccine acceptance and usage. The medical students who will eventually become doctors and part of the health team will play a significant role in advocacy and implementation of national uptake of hepatitis B vaccine especially among high-risk groups.

Regarding transmission of HBV infection, blood transfusion was the commonest means known by almost all respondents (94.5%), followed by unsafe needles and sharps at 89.4% and contact



with infected body fluids at 86.9%. This compares well to a similar study conducted in a private university at Karachi, where almost all the respondents (95%) knew that blood transfusion was an important source of transmitting HBV (20). Another study conducted by Baig et al, revealed varied proportion of subjects identifying use of unsterilized syringes, needles, surgical instruments (96.3%), contaminated blood and blood products (97.2%) as common routes of disease transmission (18). This knowledge of transmission methods effectively arms this would-be health care worker about the methods they can utilize in preventing the disease.

Knowledge of diseases which result from HBV infection as complications of HBV infection was one of the parameters assessed in the evaluation of the level of awareness of HBV and viral hepatitis B. The knowledge on the complications of HBV infection with chronic hepatitis was adequate (91.1%) being the commonest complication known by most of the respondents followed by liver cirrhosis and acute hepatitis at 87.3% and 77.5% respectively. A remarkable proportion of respondents 38.1% knew that hepatomas could result from HBV infection, which is a complication with potentially disabling morbidity and mortality, for which vaccination against HBV infection prevents this disease from occurring. Similar findings were made by Chingle et al., in University of Jos. (21).

About 99% of the respondents were aware of HBV vaccine. Similar finding were seen in a study conducted among medical students at University of Jos (96.0%) (50) and Uttarakhand foothills at 75.6% (18). The level of knowledge on HBV usually will impact on the practical uptake of the vaccine. The studies above have proven that the knowledge of Hepatitis B virus infection has a fundamental impact on the practices towards Hepatitis B virus vaccination. (22) (21) (23). It is also worthy to note that respondents had good knowledge of timing of first dose of hepatitis vaccine, complete dosage and duration for complete protection in accordance with the National Program on Immunization Schedule. This prepares the student towards health education and promotional activities across the country targeted at improving hepatitis vaccine coverage and reducing the burden of hepatitis B disease.

### **CONCLUSION**

This study revealed that 99.6% of the respondents have heard about HBV, and majority of the respondents got their information on Viral Hepatitis B from School (92.7%) and Hospital (72.8%). Most respondents knew the mode of transmission, complications, asymptomatic clinical presentation and curability. Majority had knowledge of existence of HBV Vaccine, willing to screening before test, 87.3% of respondents are of the opinion that HBV infected persons should not be vaccinated. Summarily about half 128 (54.2%) of the respondents had good knowledge of Hepatitis B infection and vaccination, 102 (43.2%) had fair knowledge, while 6 (2.5%) had poor knowledge.

### **RECOMMENDATIONS**

#### **To the Students**

There is need to improve the general knowledge about hepatitis vaccine among students through teachings and participation in immunization activities and campaigns.

## **To the Government**

Steps should be taken by government health parastatal to build on awareness on HBV and HBV vaccination among medical students.

Government should in collaboration make vaccination against hepatitis available at no cost to the health care students and workers.

## **To Educational and Health institutions**

Educational institutions should improve on health education for all medical students on HBV and HBV prevention.

There should be health advocacy actions and campaigns organized for communities, individuals and educational institutions with the aim of raising awareness on HBV infection and the importance of vaccination.

## **References**

1. WHO | Global hepatitis report, 2017. WHO [Internet]? 2018 [cited 2021 May 13]; Available from: <http://www.who.int/hepatitis/publications/global-hepatitis-report2017/en/>
2. CDC—NIOSH Publications and Products—Preventing Needlestick Injuries in Health Care Settings (2000–108) [Internet]. [cited 2020 May 15]. Available from: <https://www.cdc.gov/niosh/docs/2000-108/default.html> - Bing [Internet]. [cited 2021 May 24].
3. WHO, 2012. Global health sector strategy on viral hepatitis 2016-2021. WHO, Available at: <http://www.who.int/hepatitis/strategy2016-2021/ghss-hep/en/> Accessed on 21 february 2019? - Bing [Internet]. [cited 2021 May 24].
4. WHO, 2020. Hepatitis B [Internet]. 2020 [cited 2021 May 23]. Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-b>
5. Chingle M, Osagie I, Adams H, Gwomson D, Emeribe N, Zoakah A. Risk perception of hepatitis B infection and uptake of hepatitis B vaccine among students of tertiary institution in Jos. *Ann Afr Med*. 2017;16(2).
6. WHO | Global hepatitis report, 2017 [Internet]. [cited 2021 May 13]. Available from: <https://www.who.int/hepatitis/publications/global-hepatitis-report2017/en/>
7. 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 Jan 1;19(4):184–9.
8. Abiola AHO, Agunbiade AB, Badmos KB, Lesi AO, Lawal AO, Alli QO. Prevalence of HBsAg, knowledge, and vaccination practice against viral hepatitis b infection among doctors and nurses in a secondary health care facility in Lagos state, south-western Nigeria. *Pan Afr Med J*. 2016; 23:1–10.
9. Levinson W, Joyce EA, Nussbaum J, Schwartz BS, Chin-Hong P. *Review of Medical Microbiology & Immunology*. McGraw-Hill's AccessMedicine. 2018.
10. Hepatitis B [Internet]. [cited 2021 May 24]. Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-b>
11. Ibrahim N, Idris A. Hepatitis B Awareness among Medical Students and Their Vaccination Status at Syrian Private University. *downloads.hindawi.com* [Internet]. 2014 [cited 2021 May 23]; Available from: <http://dx.doi.org/10.1155/2014/131920>

12. Government of India. Health Ministry to immunize healthcare workers with Hepatitis-B vaccine. Ministry of Health and Family Welfare. 2018. [Last accessed on 2019 Mar 15]. [online] Available from: <http://pib.nic.in/newsite/PrintRelease.aspx?relid=179705>.
13. The burden of viral hepatitis in Africa. - Abstract - Europe PMC [Internet]. [cited 2021 May 23]. Available from: <https://europepmc.org/article/med/9473953>
14. Bongdap N.N, Jos North Local Government Area, Jos, Plateau State. (20170 available at [www.jotscroll.com](http://www.jotscroll.com). Last Accessed 18th February 2019.
15. Cochran, W.G. Sampling Techniques, 2. Aufl. John Wiley and Sons New York, London (1963).
16. Oyebimpe Jumoke Adenlewo et al. Medical and dental students' attitude and practice of prevention strategies against hepatitis B virus infection in Nigerian university. Pan African Medical journal. 2017; 28:33. - Bing [Internet]. [cited 2021 May 24]. Available from: <https://www.bing.com>
17. Shrestha DB, Khadka M, Khadka M, Subedi P, Pokharel S, Thapa BB. Hepatitis B vaccination status and knowledge, attitude, and practice regarding Hepatitis B among preclinical medical students of a medical college in Nepal. PLoS One [Internet]. 2020 Nov 1 [cited 2021 Jul 23];15(11): e0242658. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242658>
18. Disksha Chhabra, Surabhi Mishra,2 Kanchan Gawande,1 Anusha Sharma,1 Surekha Kishore,1 and Ajeet Singh Bhadoria. Knowledge, attitude, and practice study on hepatitis B among medical and nursing undergraduate students of an apex healthcare institute at Utta [Internet]. [cited 2021 Jun 8]. Available from: <https://www.bing.com/search?q=>
19. Yonatan Moges Mesfin, Kelemu TilHUN Kibret. Assessment of Knowledge and Practice towards Hepatitis B among Medical and Health Science Students in Haramaya University, Ethiopia. PLOS ONE| available at [www.plosone.org](http://www.plosone.org) November 2013 - Bing [Internet]. [cited 2021 Jun 8]. Available from: <https://www.bing.com/search?q=57>
20. Knowledge of students regarding hepatitis and HIV/AIDS of a private medical university in Karachi - PubMed [Internet]. [cited 2021 Jul 23]. Available from: <https://pubmed.ncbi.nlm.nih.gov/16108511/>
21. M. P Chingle, I. A. Osagie, H. Adams, D. Gwomson, N. Emeribe, and A. I. Zoakah. Risk perception of hepatitis B infection and uptake of hepatitis B vaccine among students of tertiary institution in Jos. - Bing [Internet]. [cited 2021 Jun 8].
22. Jean Joel Bigna, Marie A Amougou, Serra Lem Asangbeh, Angeladine Malaha Kenne, Steve Raoul N Noumegni, Elodie T Ngo-Malabo, Jean Jacques Noubiap. Seroprevalence of hepatitis B in Cameroon: A systematic review and meta-analysis. - Bing [Internet]. [cited 2021 Jun 8]. Available from: <https://www.bing.com/search?>
23. Setia S, Gambhir R, Kapoor V, Jindal G, Garg S SS. Attitude and awareness regarding hepatitis B and hepatitis C amongst healthcare workers of the tertiary hospital in India. Ann Med Heal Sci Res. 2013;3(551):8.