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UPTAKE OF HEPATITIS B VACCINATION AMONG HEALTHCARE WORKERS IN A TERTIARY HOSPITAL IN SOUTH-WEST NIGERIA.

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Abstract— Background and Aim: Hepatitis B virus (HBV) infection is a leading cause of morbidity and mortality worldwide largely from fulminant hepatitis, decompensated liver cirrhosis and hepatocellular carcinoma. Healthcare workers are a high-risk group and occupational exposure is a major risk factor for the acquisition of this virus among them. Vaccination is the most effective defense against the virus. This study investigated the uptake of Hepatitis B vaccination among healthcare workers at the Federal Teaching Hospital, Ido-Ekiti, Nigeria. It also determined the predictors of vaccine uptake among the respondents. **Methods:** A structured questionnaire was used to collect the socio-demographic data and responses of 100 consenting clinical staff of the institution on the subject matter and the data was analyzed using the SPSS version 21.0 software package. **Results:** A total of 100 respondents participated in the study; 40 (40.0%) males and 60 (60.0%) females, with a male to female ratio of 1:1.5. The age range of the participants was 20 – 59years with a mean(±SD) of 38.3±11.0 years. Most of the respondents were non-doctors (73.0%) while doctors constituted 27.0% of the participants. Fifty-eight (58%) of the study participants had received at least a dose of the Hepatitis B vaccine while the remaining 42 (42%) of the participants had not received any dose of the vaccine. The number of doctors who had received the Hepatitis B vaccine was significantly higher than that of non-doctors ($p = 0.015$). Among the 58 respondents who had been vaccinated, 46 (79.3%) of them had received only 1 dose of the Hepatitis B vaccine, 9 (15.5%) had received 2 doses while only 3 (5.2%) respondents had completed the vaccination series of 3 doses. Age above 40 years, female gender, Good knowledge of Hepatitis B and being a doctor are positive predictors of vaccine uptake. **Conclusion**: Hepatitis B vaccine uptake rate in this study is low when compared to similar studies in Nigeria and the vaccination completion rate in this study is even much lower. There is an urgent need to ensure that healthcare workers in the health institution get the Hepatitis B vaccine and more importantly that they complete the vaccination series by receiving the recommended 3 doses of the vaccine. This would ensure that healthcare workers who are at a high risk of contracting the virus are protected against it, thereby preventing the hepatic disease that otherwise would have resulted.

Key words: Hepatitis B, Vaccination, Healthcare workers, Nigeria.

1. Introduction

Hepatitis B virus (HBV) infection is a leading cause of morbidity and mortality worldwide.[1] According to the World Health Organization, about 2 billion people globally have evidence of previous exposure to hepatitis B virus with about 296 million people being chronically infected as at 2019 and 1.5 million new infections occuring each year with about 820,000 deaths annually, largely from fulminant hepatitis, decompensated liver cirrhosis and hepatocellular carcinoma.[2]

Hepatitis B virus (HBV) is a partially double-stranded DNA hepatotropic virus that causes acute and chronic hepatitis.[1] It is highly prevalent in sub-saharan Africa and south-east Asia with endemicity

of over 8% prevalence rate.[3] In areas of a high prevalence of HBV such as Nigeria, most of the infections are acquired at birth or in early childhood with a greater propensity for chronicity and associated complications.[4,5] Other modes of transmission which are seen more in adults include sharing of sharps, unsafe blood transfusion, intravenous drug use, unprotected sexual intercourse and needle stick injury.[6] Healthcare workers are a high-risk group and occupational exposure is a major risk factor for the acquisition of this virus among them.[7,8] The prevalence of HBV among healthcare workers is generally higher than that of the general population.[4,5,9]

Immunity to hepatitis B infection could be acquired naturally after previous exposure to the virus and immunity could also be acquired after the administration of vaccines. The hepatitis B vaccine has been available for more than three decades but just became widely used in Nigeria in the last 10 years.[2,3] Hepatitis B vaccination aims to stimulate the immune system to secrete antibodies against the virus, 3 doses of the vaccines are administered intramuscularly at 0, 1, and 6 months.[2,6] The administration of the hepatitis B vaccine is the most effective defense against the infection and primary prevention by vaccination is a critical strategy at preventing chronic infection and the sequelae of liver cirrhosis and hepatocellular carcinoma.[2,6]

The vaccination coverage in the Nigerian general population is not optimal, as most of the vaccines are administered to children leaving out a significant population of adults who are at risk.[10] Healthcare workers in Nigeria who are at a high-risk are also not better in the HBV vaccine coverage.[11-14] Similarly, many African countries have a low vaccination uptake rate amongst their healthcare workers.[15,19] In contrast however, the vaccination rate of the healthcare workers in the western population is quite high.[20,21]

The fact that healthcare workers are expected to be more knowledgeable than the general public about Hepatitis B virus and the importance of vaccination against this highly infectious virus, the fact that healthcare workers are at a greater risk of contracting this deadly virus than the general public particularly in Nigeria with a very high prevalence, and the fact that healthcare workers work in a health facility where the resources and facilities for the vaccination is available, one would expect that the uptake of Hepatitis B vaccine among healthcare workers in Nigeria would be high. Sadly, this has not been the case based on the findings of a few studies conducted in some health institutions in the country.[11,14]

There is a need for more studies on the uptake of Hepatitis B vaccine among healthcare workers in Nigerian health institutions, hence this study. This study investigated the uptake of Hepatitis B vaccination among healthcare workers at the Federal Teaching Hospital, Ido-Ekiti, Nigeria. It also determined the predictors of vaccine uptake among the respondents. This study provided much-needed information on the subject as well as scientific data for policy makers and for further research.

2. Methodology

2.1 Selection of Study Subjects

This was a cross-sectional study that was carried out at the Federal Teaching Hospital, Ido-Ekiti, Ekiti state in the South Western geopolitical zone of Nigeria between July 2020 and June 2021. The inclusion criteria for this study consisted of members of staff (clinical staff) of the institution who belong to a health professional group and who have contact with patients and/or their samples. This includes doctors, nurses, pharmacists, medical laboratory scientists, physiotherapists and health attendants who must have given written informed consent to be recruited.

The following categories of people were excluded from the study; those who were not members of staff, patients, students, administrative staff and other support staff. A total of 100 study subjects were recruited for the study. Selection of subjects for the study was by consecutive selection of consenting individuals. Ethical approval was obtained from the Ethics and Research Committee of the institution.

2.2 Evaluation of Study Subjects

A structured questionnaire was designed for the study which was used to collect the demographic data and the responses of the participants on the subject matter. The subjects were initially interviewed to ensure that they fulfill the set inclusion criteria for the study. The nature and scope of the research was explained to the subjects and a written informed consent was obtained before they were recruited. All the participants understood English and there was no need for translation.

2.3 Data Analysis

The data obtained was analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.0 computer software package (SPSS Chicago Inc. IL U.S.A). Descriptive statistics used included frequency tables, means and standard deviations. The statistical significance of the findings was determined using appropriate statistical tests. The non-parametric test, chi-square (χ^2) test, was employed for the analysis of qualitative variables. Multivariable binary logistic regression analysis was used to identify significant associations. A p-value of less than 0.05 was considered as statistically significant.

3. Results

A total of 100 respondents participated in the study; 40 (40.0%) males and 60 (60.0%) females with a male to female ratio of 1:1.5. The age range of the participants was 20 – 59years with a mean(±SD) of 38.3±11.0 years. Majority (55.0%) of the respondents attained tertiary level of education, 40.0% had postgraduate education while only 5.0% had just secondary education. Most of the respondents were non-doctors (73.0%) while doctors constituted 27.0% of the participants. The other socio-demographic characteristics are as shown on Table 1.

Fifty-eight (58%) of the study participants had received at least a dose of the Hepatitis B vaccine while the remaining 42 (42%) of the participants had not received any dose of the vaccine. The number of female healthcare workers who had received the Hepatitis B vaccine was significantly higher than that of the males ($p = 0.003$). The number of healthcare workers who were 40 years and above who had received the Hepatitis B vaccine was significantly higher than those below 40 years ($p = 0.021$). On the basis of educational attainment, there was no significant difference in the number of the respondents who had received the Hepatitis B vaccine ($p = 0.147$). The number of doctors who had received the Hepatitis B vaccine was significantly higher than that of non-doctors ($p = 0.015$).

Among the 58 respondents who had been vaccinated, 46 (79.3%) of them had received only 1 dose of the Hepatitis B vaccine, 9 (15.5%) had received 2 doses while only 3 (5.2%) respondents had completed the vaccination series of 3 doses (Table 2).

Among those who had received the Hepatitis B vaccine, the commonest reasons given for getting the vaccine were awareness from public health campaigns (50.0%), fear of contracting Hepatitis B virus (44.8%) and pre-employment requirement (17.2%) while among those who had not received the vaccine, the reasons given were unavailability of the vaccine (45.2%), fear of side-effects (23.8%) and no reason was given by 35.7% of the respondents (Table 2).

As shown in Table 3, the number of respondents who had been vaccinated and who demonstrated Good knowledge of Hepatitis B were significantly higher than those who had been vaccinated but have Poor knowledge of Hepatitis B ($p = 0.016$). Also, the number of respondents who had been vaccinated and who demonstrated a Positive attitude towards Hepatitis B were significantly higher than those who had been vaccinated but have a Negative attitude towards Hepatitis B ($p = 0.035$).

Table 4 shows a multivariate binary logistic regression for the predictors of uptake of Hepatitis B vaccination among the healthcare workers. Age above 40 years, female gender, Good knowledge of Hepatitis B and being a doctor are positive predictors of vaccine uptake.

Majority (57.0%) of the respondents suggested that improving health education on Hepatitis B virus infection would improve uptake of vaccination while 37.0% suggested that making vaccination free would improve Hepatitis B vaccination uptake (Figure 1).

4. Discussion

This study investigated the uptake of Hepatitis B vaccination among healthcare workers at the Federal Teaching Hospital, Ido-Ekiti, Nigeria. It also determined the predictors of vaccine uptake among the respondents. In this study, Hepatitis vaccination uptake rate was 58% but only 5.2% of them completed the vaccination series of 3 doses while 15.5% received 2 doses and 79.3% received 1 dose of the vaccine. This is quite low when compared with other similar studies among healthcare workers in Nigeria [11,14] and globally. [15,22]

Omotowo*et al*[11] in Enugu, South-Eastern Nigeria reported that 14.2% of their study population had received the vaccine out of which 48.9%, 16.0% and 35.1% received 3 doses, 2 doses and 1 dose of the vaccine respectively.Adekanle*et al*[12] in Ile-Ife, South-Western Nigeria reported that 65% of their study population were fully vaccinated against Hepatitis B. Dayyab*et al*[13] in Yobe, Northern Nigeria reported that 46.7% of their respondents had received at least 1 dose of the vaccine while 18.13% had completed the vaccination series. Ogoina*et al*[14] in a cross-sectional study in two teaching hospitals in Nigeria; Jos, North-Central Nigeria and Yenagoa, South-South Nigeria, reported that 64.5% of their respondents had received at least 1 dose of the vaccine while 36.2% had full coverage of three doses. Furthermore, Auta*et al*[15] in a systematic review and meta-analysis of studies conducted in Nigeria reported that 39.1% of healthcare workers in Nigeria are fully vaccinated.

In this study, unavailability of the Hepatitis B vaccine was the most common reason given by the healthcare workers for not receiving the vaccination. Fear of vaccine side-effects and procrastination were the other reasons the respondents gave for not receiving the vaccine. These reasons may explain the low vaccine uptake found in this study.

These identified reasons are similar to what was reported by Dayyab*et al*[13] in which unavailability of the vaccine and not knowing where to access the vaccine were the reasons given by their respondents for not being vaccinated. In contrast however, Omotowo*et al*[11] reported that busy time schedule/lack of time to go for vaccination was the commonest excuse given by the respondents as well as high cost of the vaccine. Auta*et al*[15] reported that unavailability of vaccine, busy work schedule and cost of vaccination were the reasons for non-vaccination.

In Africa, Alege*et al*[18] in Sudan reported that 44.2% of their study population had received the vaccine out of which 22.1%, 29.2% and 48.8% received 3 doses, 2 doses and 1 dose of the vaccine respectively while Ssekamatte*et al*[17] in Uganda reported that 57.8% of their study population were fully vaccinated and Hordofa*et al*[16] in Ethiopia reported that 48% of their respondents had received

at least a dose of the vaccine. Ansa *et al*[19] in Accra, Ghana reported that 53.4% of their respondents had taken the Hepatitis B vaccine with 79.1% of them having completed the vaccination schedule.

Yuan *et al*[22] in China reported that 86% of their study population had received at least 1 dose of the vaccine while 60% had completed the vaccination schedule. In the United States, Byrd *et al*[20] reported that 69.5% of the healthcare personnel had received at least 1 dose of the vaccine while 63.4% had completed the vaccination schedule, and among the healthcare personnel with direct patient contact, 80.7% had received at least 1 dose of the vaccine while 74.0% had completed the vaccination schedule.

The vaccination uptake among healthcare workers in the United States is higher than that reported in many African countries despite the fact that they have a very low prevalence of Hepatitis B virus infection. Nigeria and the rest of Africa therefore need to step-up the drive towards ensuring that their healthcare workers who are at a high risk of contracting the virus get vaccinated.

Various predictors of uptake of the Hepatitis B vaccine among healthcare workers had been documented in the literature. In this study, Age above 40 years, female gender, Good knowledge of Hepatitis B and being a doctor are the positive predictors of vaccine uptake.

This is similar to the findings reported by Omotowo*et al,*[11] that being a doctor, increasing age, increasing duration of work in the hospital and tertiary education were positive predictors of vaccine uptake. Auta*et al*[15] also reported that being a doctor and duration of practice of more than 10years were positive predictors of vaccine uptake. Likewise, Ansa *et al*[19] reported that working for more than 16 years, daily exposure to blood/blood products and sharp instruments, performing invasive procedures daily and frequent exposure to blood-stained linens/waste were predictors of vaccination.

Furthermore, Ssekamatte*et al*[17] reported that male sex, the belief that the Hepatitis B vaccine was safe and ever been screened were positively associated with being fully vaccinated while Byrd *et al*[20] reported that independent predictors of vaccination included direct patient contact, having more than a high school education, influenza vaccination in the past year, and ever having been tested for HIV.

Also, Ogoina*et al*[14] reported that professional category and previous training in infection control were independently associated with Hepatitis B vaccination; consultant doctors, resident doctors and nurses were more likely to be vaccinated than house officers and laboratory scientists. Interestingly however in their study, full vaccine coverage was associated with younger age and shorter years of professional experience; this is in contrast to the finding in this study and many other studies.

Conclusion and Recommendations

The Hepatitis B vaccine uptake rate in this study is low when compared to similar studies in Nigeria and the vaccination completion rate in this study is even much lower. There is an urgent need to ensure that healthcare workers in the health institution get the Hepatitis B vaccine and more importantly that they complete the vaccination series by receiving the recommended 3 doses of the vaccine. This would ensure that healthcare workers who are at a high risk of contracting the virus are protected against it, thereby preventing the hepatic disease that otherwise would have resulted. This would reduce the incidence of liver disease resulting from Hepatitis B virus infection.

The Hepatitis B vaccine should be made available and readily accessible at an affordable cost and if possible free to healthcare workers. Pre-employment screening and vaccination should be mandated. Enlightenment of the healthcare workers and other staff members should be embarked upon, about the

Hepatitis B virus and its clinical sequelae as well as the importance of vaccination against the deadly virus.

These measures would improve the knowledge of the healthcare workers about Hepatitis B and would positively change their attitude towards vaccination which would resultantly greatly improve the uptake of the vaccine and ensure healthcare workers are well protected against the virus. Finally, these measures can also be adopted across other health institutions in Nigeria in order to improve the vaccination status of healthcare workers in Nigeria.

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Previous publication
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Informed consent

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Ethical Approval

Ethical Approval was obtained from the Ethics and Research Committee of the institution.

Conflict of interest disclosure
The author declared no conflict of interest.

References

[1] Pyrsopoulos N.T. Hepatitis B. Available from: https://emedicine.medscape.com/article/177632-overview. [Accessed 11th November 2021].
[2] World Health Organization. Hepatitis B. Available from: https://www.who.int/news-room/fact-sheets/detail/hepatitis-b [Accessed 11th November 2021].
[3] Spearman CW, Afihene M, Ally R, Apica B, Awuku Y, Cunha L, *et al*. Hepatitis B in sub-Saharan Africa: strategies to achieve the 2030 elimination targets. Lancet Gastroenterol Hepatol. 2017;2(12):900-909. doi:10.1016/S2468-1253(17)30295-9.
[4] 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):902–907. doi:10.4269/ajtmh.15-0874.
[5] Ajuwon BI, Yujuico I, Roper K, Richardson A, Sheel M and Lidbury BA. Hepatitis B virus infection in Nigeria: a systematic review and meta-analysis of data published between 2010 and 2019. BMC Infectious Diseases 2021;21(1120):1-15. doi:10.1186/s12879-021-06800-6.
[6] Centers for Disease Control and Prevention. Hepatitis B. Available from: https://www.cdc.gov/hepatitis/hbv/index.htm. [Accessed 11th November 2021].

[7] Ogoina D, Pondei K, Adetunji B, Chima G, Isichei C and Gidado S. Prevalence and determinants of occupational exposures to blood and body fluids among health workers in two tertiary hospitals in Nigeria. Afr. J. Infect. Dis. 2014;8(2):50 – 54. doi:10.4314/ajid.v8i2.7.

[8] Auta A, Adewuyi EO, Tor-Anyiin A, Aziz D, Ogbole E, Ogbonnae BO, *et al*. Health-care workers' occupational exposures to body fluids in 21 countries in Africa: systematic review and meta-analysis. Bull World Health Organ. 2017;95(12):831-841F. doi:10.2471/BLT.17.195735.

[9] Atlaw D, Sahiledengle B and Tariku Z. Hepatitis B and C virus infection among healthcare workers in Africa: a systematic review and meta-analysis. Environmental Health and Preventive Medicine 2021;26(61):1-14. doi:10.1186/s12199-021-00983-9.

[10] Olakunde BO, Adeyinka DA, Olakunde OA, Ogundipe T, Oladunni F and Ezeanolue EE. The coverage of hepatitis B birth dose vaccination in Nigeria: Does the place of delivery matter? Transactions of The Royal Society of Tropical Medicine and Hygiene 2021; trab129. doi:10.1093/trstmh/trab129.

[11] 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 Infectious Diseases 2018;18(288):1-9. doi: 10.1186/s12879-018-3191-9.

[12] Adekanle O, Ndububa DA, Olowookere SA, Ijarotimi O and Ijadunola KT. Knowledge of hepatitis B virus infection, immunization with hepatitis B vaccine, risk perception, and challenges to control hepatitis among hospital workers in a Nigerian tertiary hospital. Hepat Res Treat 2015;2015(439867):1-6. doi:10.1155/2015/439867.

[13] Dayyab FM, Iliyasu G, Ahmad BG, Bako AT, Ngamariju SS and Habi AG. Hepatitis B vaccine knowledge and self-reported vaccination status among healthcare workers in a conflict region in northeastern Nigeria. Therapeutic Advances in Vaccines and Immunotherapy 2020;8:1–11. doi:10.1177/ 2515135519900743.

[14] Ogoina D, Pondei K and Adetunji B. Prevalence of hepatitis B vaccination among health care workers in Nigeria in 2011–12. Int J Occup Environ Med 2014;5:51-56.

[15] Auta A, Adewuyi EO, Kureh GT, Onoviran N and Adeloye D. Hepatitis B vaccination coverage among health-care workers in Africa: A systematic review and meta-analysis. Vaccine 2018;36:4851–4860. doi:10.1016/j.vaccine.2018.06.043.

[16] Hordofa MA and Hassan AH. Hepatitis B Vaccination Status and Associated Factors Among Healthcare Professionals Working in Health Centers at AkakiKalitySubcity of Addis Ababa, Ethiopia: A Cross-Sectional Study. Risk Management and Healthcare Policy 2021;14:1575–1582.

[17] Ssekamatte T, Mukama T, Kibira SPS, Ndejjo R, Bukenya JN, Kimoga ZPA, *et al*. Hepatitis B screening and vaccination status of healthcare providers in Wakiso district, Uganda. PLoS ONE 2020;15(7): e0235470. doi: 10.1371/journal.pone.0235470.

[18] Alege JB, Gulom G, Ochom A and Kaku VE. Assessing Level of Knowledge and Uptake of Hepatitis B Vaccination among Health Care Workers at Juba Teaching Hospital, Juba City, South Sudan. Advances in Preventive Medicine 2020;2020(8888409):1-11. doi: 10.1155/2020/8888409.

[19] Ansa GA, Ofori KNA, Houphouet EE, Amoabeng AA, Sifa JS, Amenuveve CK, *et al.* Hepatitis B vaccine uptake among healthcare workers in a referral hospital, Accra. Pan African Medical Journal 2019;33(96):1-10. doi:10.11604/pamj.2019.33.96.18042.

[20] Byrd KK, Lu P and Murphy TV. Hepatitis B Vaccination Coverage Among Health-Care Personnel in the United States. Public Health Reports 2013;128:498-509.

[21] Murphy E. Hepatitis B, vaccination and healthcare workers. Occup. Med. 2000;50(6):383-386.

[22] 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(5):e0216598. doi: 10.1371/journal.pone.0216598.

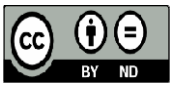

Table 1: Socio-demographics and uptake of Hepatitis B vaccination among healthcare workers.

Variable	Uptake of Hepatitis B Vaccination		Chi square	df	p-value
	Yes (%) 58 (58.0%)	No (%) 42 (42.0%)			
Age (in years)					
20 – 39	21 (45.7)	25 (54.3)	5.332	1	**0.021**
40 – 59	37 (68.5)	17 (31.5)			
Sex					
Male	16 (40.0)	24 (60.0)	8.867	1	**0.003**
Female	42 (70.0)	18 (30.0)			
Marital Status					
Single	14 (53.8)	12 (46.2)	0.249	1	0.618
Married	44 (59.5)	30 (40.5)			
Religion					
Islam	8 (57.1)	6 (42.9)	0.005	1	0.944
Christianity	50 (58.1)	36 (41.9)			
Ethnic group					
Yoruba	50 (58.1)	36 (41.9)	1.236	3	0.744
Igbo	1 (50.0)	1 (50.0)			
Hausa	2 (40.0)	3 (60.0)			
Others	5 (71.4)	2 (28.6)			
Level of Education					
Secondary	1 (20.0)	4 (80.0)	3.829	2	0.147
Graduate	35 (63.6)	20 (36.4)			
Post-graduate	22 (55.0)	18 (45.0)			
Category of occupation					
Doctor	21 (77.8)	6 (22.2)	5.939	**1**	**0.015**
Non-doctor	37 (50.7)	36 (49.3)			

Table 2: Uptake of Hepatitis B vaccination among healthcare workers.

Variable	Frequency	Percentage (%)
Uptake of Hepatitis B vaccination (n=100)		
Yes	58	58.0
No	42	42.0
Number of Doses taken (n= 58)		
1 Dose	46	79.3
2 Doses	9	15.5
3 Doses	3	5.2
Reason (s) for taking the vaccination (n= 58)		
Pre-Employment requirement	10	17.2

Because of high risk of exposure	2	3.4
Advice from relatives/friends	8	13.8
Fear of contracting hepatitis b virus infection	26	44.8
Knows someone suffering from hepatitis b infection	3	5.2
Has lost someone to hepatitis infection before	3	5.2
Due to awareness campaign and enlightenment	29	50.0
Routine immunization	7	16.7
Reason (s) for not taking the vaccination (n= 42)		
Lack of information about hepatitis b vaccination	3	7.1
Fear of side effects	10	23.8
Fear of contracting the virus from the vaccine	1	2.4
Procrastination	9	21.4
Unavailability of the vaccine	19	45.2
Do not believe vaccines work	1	2.4
Due to religious reasons	6	14.3
No reason	15	35.7

Table 3: Relationship between respondents' Knowledge, Attitude and Uptake of Hepatitis B vaccination.

Variable	**Uptake of Hepatitis B Vaccination**				
	Yes (%) 58 (58.0%)	**No (%)** 42 (42.0%)	**Chi square**	**df**	**p-value**
Knowledge					
Good (≥ 70%)	32 (71.1)	13 (28.9)	5.774	1	**0.016**
Poor (< 70%)	26 (47.3)	29 (52.7)			
Attitude					
Positive (≥ 70%)	41 (66.1)	21 (33.9)	4.426	1	**0.035**
Negative (< 70%)	17 (44.7)	21 (55.3)			

Table 4: A multivariate binary logistic regression for the predictors of uptake of Hepatitis B vaccination among the healthcare workers.

Variable	**AOR**	**95% CI for AOR**		**p-value**
		LB	**UB**	
Age (in years)				
20 – 39	1.000			
40 – 59	5.503	1.916	15.807	**0.002**
Sex				
Male	1.000	1.000		
Female	4.356	1.563	12.139	**0.005**
Category of occupation				
Doctor	3.558	1.118	11.381	**0.032**
Non-doctor	1.000			

Knowledge				
Good (≥ 70%)	2.906	1.061	7.958	**0.038**
Poor (< 70%)	1.000			
Attitude				
Positive (≥ 70%)	1.961	0.722	5.328	0.186
Negative (< 70%)	1.000			

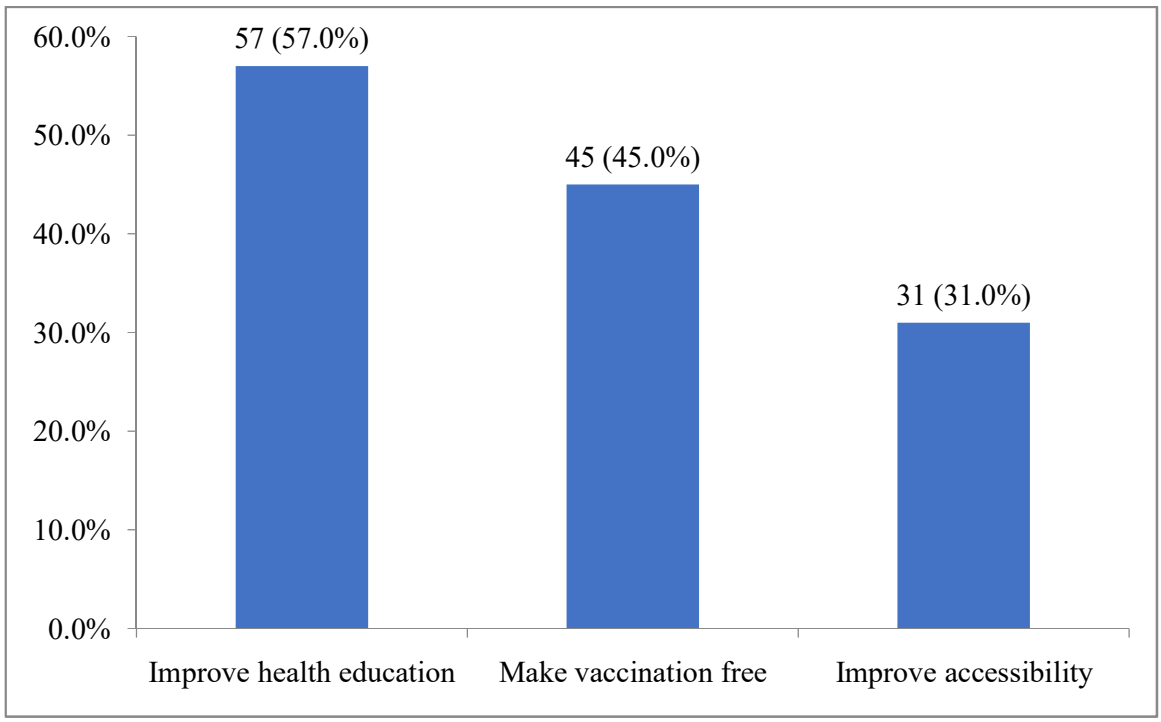

Figure 1: Suggestions to improve uptake of Hepatitis B vaccination among healthcare workers.