American Journal of Public Health and Epidemiology
Volume.9, Number 5;September-October, 2023;
ISSN: 2644-0032 | Impact Factor: 7.08
https://zapjournals.com/Journals/index.php/ajphe
Published By: Zendo Academic Publishing

HEPATITIS B INFECTION: A SURVEY OF AWARENESS AND PREVALENCE AMONG MEDICAL LABORATORY PROFESSIONALS

Chidinma Uchechi Mbah[1], Ngozi Chukwudi Eze[2], Emeka Uchenna Okafor[3]

Article Info

Keywords: Hepatitis B, viral hepatitis, public health, developing countries, transmission routes.

Abstract

Viral hepatitis, a necro-inflammatory liver disease, poses a significant public health challenge worldwide, particularly in developing countries. This condition is primarily caused by the hepatitis B virus (HBV), a 42nm DNA virus from the hepadnaviridae family. HBV infection can manifest in both acute and chronic forms, and it is highly contagious, primarily transmitted through contact with infectious blood or body fluids. Transmission can occur through percutaneous routes, such as needle pricks, or permucosal exposure via direct contact with mucous membranes or non-intact skin. Additionally, it can result from exposure to contaminated surfaces, unprotected sexual contact, sharing of needles among intravenous drug users, needle injuries, and transfusion of contaminated blood. Vertical transmission from mother to child during birth is another common mode of HBV infection. The consequences of HBV infection are severe and can lead to the development of liver cirrhosis, hepatocellular carcinoma (HCC), and various other liver-related diseases.

This paper provides an overview of the global burden of hepatitis B and its impact on public health, with a focus on developing countries. The incidence and prevalence of HBV infection in these regions are significantly higher, making it a pressing concern for policymakers, healthcare providers, and researchers alike. Understanding the dynamics of HBV transmission, risk factors, and the clinical outcomes of infection is crucial for designing effective prevention and control strategies

[1] Department of Medical Laboratory Sciences, Faculty of Health Sciences, University of Nigeria[1&3]

[2] Department of Microbiology, Faculty of Biological Sciences, University of Nigeria Nsukka, Enugu State[2]

1. Introduction

Viral hepatitis is a necro-inflammatory liver disease of variable severity (Thad *et al*., 2019). It is caused by hepatitis B virus which is an enveloped 42nm DNA virus, belonging to the family hepadnaviridae(Lisa and Adam, 2015). The infection occurs in both rapidly developing (acute) and long-lasting (chronic) forms (WHO, 2011). HBV is highly contagious and is transmitted by exposure to infectious blood or body fluids. This can occur percutaneously (needle pricks) or permucosal exposure by direct contact with mucous membrane or non-intact skin exposure to HBV (Nega, 2017). It involves actions like exposure to contaminated surfaces, unprotected sex, sharing needles by intravenous drug users, needle injury and transfusion of contaminated blood. Infection can also occur around the time of birth, from mother to child. Infection can lead to the development of liver cirrhosis, hepatocellular carcinoma (HCC) and many other liver related diseases (Jessica *et al*., 2015). Hepatitis B Virus is a major public health problem world wide and is more prevalent in the developing countries.

Hepatitis B virus infection is a recognized occupational hazard and non-vaccinated health care workers (HCW) stand a risk of getting infected from their work place. Millions of healthcare professionals that work in health institutions encounter cuts or puncture injuries almost on daily bases and it is estimated that 600,000 to 800,000 cut and puncture injuries occur among them per year and of which approximately 50% are not recorded(Safa *et al*., 2017). The risk of contracting HBV by health care workers (HCWs) is four-times greater than non-health workers (Zibara, 2010).

Generally HCW who perform invasive procedures like the dentists, surgeons, dialysis workers, nurses and those who handle human specimens like the laboratory scientists, laboratory technicians and hospital cleaners have been reported to have higher prevalence of hepatitis B virus infection than their counterparts (CDC, 2004).

The symptoms of HBV infection may not manifest until 10years after viral transmission(Burns and Thompson, 2014) and about 60-85% of HBV infections result in liver cirrhosis and liver cancer(Lewis *et al*., 2015). The rising prevalence of infection is due to the lack of knowledge, non-compliance to standard precautions(Candotti and Laperche, 2018), wrong attitude towards safe practice as well as bad practices such as bending of needles, recapping of needles, detachment of used needles from syringe, reuse of needles and lack of adequate facilities for the disposal of sharps, wearing of turned gloves, spillage of contaminated blood from needle or specimen container, breakage of test tubes that contains infected blood and contaminated work benches. All these can put the medical laboratory scientists at risk of hepatitis B infection (Young Kwon and Lee, 2011).

Standard precautions is practiced in high income countries to protect laboratory scientists from occupational exposure to blood and the consequent risk of infection with blood-borne pathogens, but the situation is different in low income countries, where standard precautions are partially practiced or not practiced at all due to inadequate supply of personal protective equipment (PPE) and most often unsafe procedures are adopted and practiced. Also, hepatitis B vaccination rate among the health care workers is very poor as is their perception of their occupational risk for the disease (Daboer *et al*., 2010).

The aim of this study is to expose the level of awareness, attitude and practice of standard precautions of Hepatitis B viral infection among the Medical Laboratory Scientists working in health institutions in Enugu State.

2. Material And Methods

2.1 Setting and Study Population:

This study was a cross sectional descriptive study of Hepatitis B virus infection awareness among Medical Laboratory Scientists practicing within Enugu State in Nigeria. It was carried out between July and September, 2020. The study populations were, therefore, Medical laboratory Scientists working in health facilities in Enugu

metropolis who were willing to participate in the study and who also gave their consent to participate in the study. Ethical clearance for the research was obtained from Enugu State Ministry of Health Research Ethics Committee.

2.2 Sampling and Data Collection

Using random selection, 200 participants were used as the sample size. The 100 participants /respondents came from Government (Public) Hospitals Laboratories while 100 came from Private Laboratories all in Enugu State. Questionnaire was employed for collection of data for the study. The questionnaires were first drafted and sent to some two researchers who are experts in that field and understood the topic. They read through your questionnaires to evaluate whether the questions effectively captured the topic under investigation. The items within the questionnaires were critically examined to ensure that it was capable of collecting the desired information for the study. It was also crosschecked by questionnaire expert to eliminate common errors, like repetitions, confusing, and misleading questions. A pilot test was thereafter conducted by giving out the questionnaires to a few of the respondents at first. The pilot data was analysed and errors in the questions were eliminated before sharing out the corrected questionnaires to the study respondents.

2.3 Laboratory Analysis

Blood samples were also aspirated from the respondents to use for HBsAg screening. About 2ml of their blood samples were collected by venipuncture and allowed to clot, the serum collected was used for analysis. Two different whole blood /serum/plasma HBs Agrapid test strips were used in a stepwise order to test for HBsAg in the blood samples. The brand used were SKYTEC(LOT: 202110) and TELL(LOT: 20200925). The tests were carried out according to manufacturer's instructions and interpretations of test results were performed according to the manufacturer's specifications.

2.4 Data management and statistical analysis

Data collected and were analyzed using SPSS version 21.0. The chi square test was applied for evaluating associations using 95% level of confidence. Independent variables like age, sex was measured using nominal scale while dependent variables like years of service, attitude, practice, perception and precautionary measures taken by the scientists to prevent infection were measured using ordinal scale.

RESULTS

The demographic data of the respondents is represented in Table 1, it shows that two hundred (200) laboratory scientists participated in the study of which 100(50%) were working in Government (public) hospital laboratories while 100(50%) were working in Private laboratories, 138(69%) were males while 62(31%) were females, They were within the age range of 25years to 60years and a greater number 71(35%) of the scientists had worked for 6-10years while a fewer number 16(8.0%) of them worked for 16years or more.

Table: 1: Socio-Demographic characteristic of the respondents that participated in the study.

Age	**Sample size n=200**	**Percentage %**
20-30	35	17.5
31-40	63	31.5
41-50	72	36.0
50 and above	30	15.0
Sex		
Male	138	69.0
Female	62	31.0

Years of service		
1-5yrs	54	27.0
6-10yrs	71	35.5
11-15yrs	59	29.5
16yrs – above	16	8.0
Place of work		
Private Labs	100	50.0%
Government(Public) Labs	100	50.0%

The responses they gave concerning their knowledge on the risky behavior that could predispose them to hepatitis B viral infection is shown in table 2. All the respondents had good knowledge of the risky behavior that predisposes to hepatitis B virus infection. All of them (100%) each, were aware that needle prick injury due to recapping of used needle and transfusion of contaminated blood were risk factors to HBV infection. Some other risky behaviors included blood spillage (97%), non-washing of hand after working in the laboratory (96.5%) and improper disposal of other specimen containers contaminated with blood (98.5%), improper disposal of used needles (85.5%), recapping of blood stained specimen containers with un-gloved hands(66.0%) and not wearing of protective laboratory coat (49.0%).

Table 2: Respondents Knowledge of Risky Behaviors.

Risky behaviours that predispose to hepatitis B virus infection	**Responses**	**Rate (%)**	
Non wearing of Lab. Coats	98	49.0	76.5
Working with contaminated sharps	153	86.0	
Working on contaminated laboratory benches/tables Improper	172	85.5	
disposal of used needles	171		
Recapping of blood stained specimen containers with un-gloved hands	132	66.0	
Transfusion of contaminated blood	200	100.0	
Needle prick due to recapping of needle	200	100.0	
Blood splash or spillage	194		
Lack of proper hand washing after work	193	97.0	
Improper disposal of blood contaminated	197	96.5	
		98.5	

Table 3 shows the prevalence of accidental needle prick from used needles, 63(45.7%) of the 138males that participated in the study have had needle prick injury from used needles while collecting patients samples, while 17(27.4%) of the 62 females that participated in the study also had needle prick injury, therefore

out of the 200 respondents,80(40.0%) of them have had needled prick injury while collecting or recapping used needles,(RR = 0.66). Most of them reported that they had knowledge of what to do in the event of such accident. Table 4 shows that 77(38.5%) of respondents had taken HBV vaccine while 123(61.5%) of the respondents were not vaccinated, (P = 0.025).

Table 3: Prevalence of Accidental Needle Prick from used Needles among Respondents.

Variable	Prevalence of accidental needle prick from used needle			
	Yes	No	Total	Relative Risk
Male	63(45.7%)	75(54.3%)	138(100%)	
Female	17(27.4%)	45(72.6%)	62(100%)	
Total	80(40.0%)	120(60.0%)	P=0.015	0.66

Table 4: The Respondents that were vaccinated against Hepatitis B Virus

Variables (Sex)	Vaccinated	Not Vaccinated	Total	X^2	Relative Risk
Male	46(23%)	92(46%)	138 (69%)		
Female	31(15.5%)	31(15.5%)	62 (31%)		
Total	77(38.5%)	123(61.5%)	P=0.025	5.019	0.62

Fig.1 shows the percentage ratio of the vaccinated subjects that were compliance in their use of personal protective wears as precautions to prevent the HBV infection. Out of the 77 vaccinated respondents, 12.0% used gloves while working while 88.0% of them used bare hands and merely washed hands after working. Among the 123 non-vaccinated ones, 43% of the them felt no need to use personal protective equipment (fig.2).

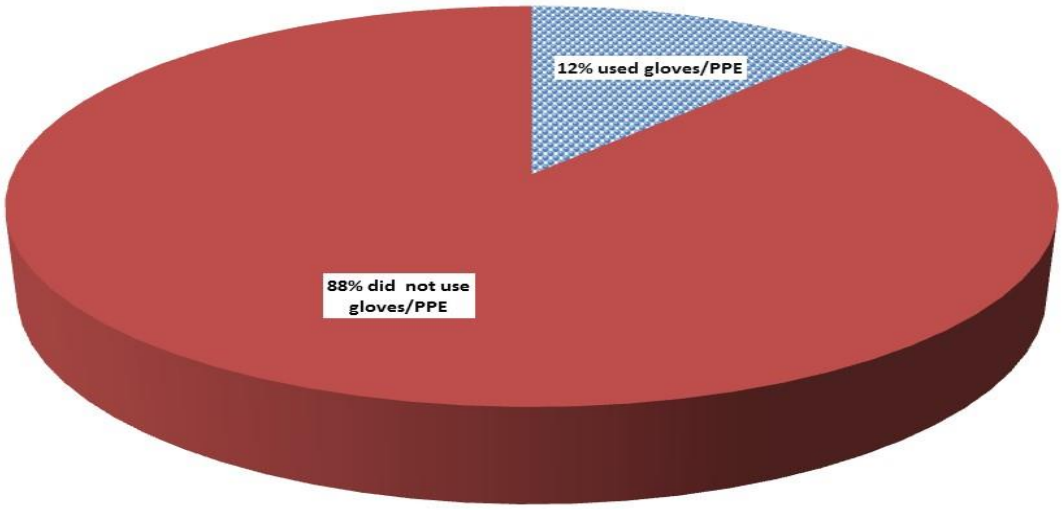

FIGURE 1: PERCENTAGE RATIO OF VACCINATED RESPONDENTS THAT USED GLOVES AND PPE

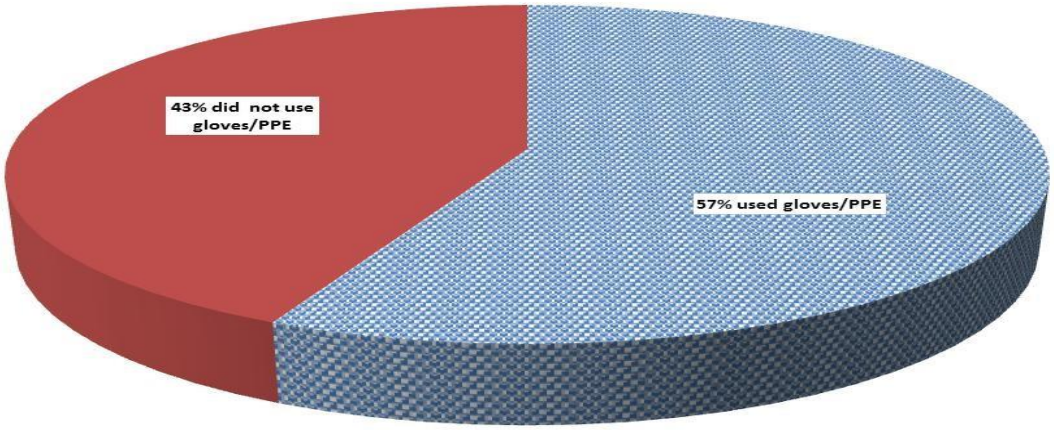

FIGURE 2: PERCENTAGE RATIO OF NON-VACCINATED RESPONDENTS THAT USED GLOVES AND PPE

Fig 3 shows the prevalence of HBV among laboratory scientists. The total rate of hepatitis B infection amongst the laboratory health workers tested was 4%. The rate of subjects from private laboratories that were positive was 2.5% and those from government laboratories was 1.5% while 96.0% had negative results.

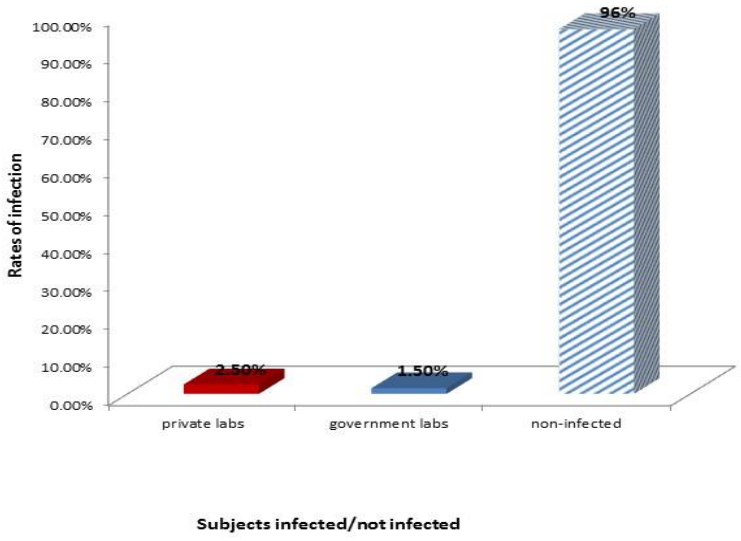

FIG: 3. PREVALENCE OF HEPATITIS B VIRAL INFECTION ON LABORATORY SCIENTISTS

Discussion

Hepatitis B virus is an important occupational hazard for health workers. It is generally assumed that health workers by virtue of their proximity to the health facility should have adequate knowledge about diseases and health conditions. The result of this study undertaken on 100 laboratory scientists working in two government hospitals and 100 laboratory scientists working in private laboratories in Enugu revealed that most of them were between 41-50 years and that most of them had worked for up to 10 years. This indicates that they were

experienced professionals. The demographic status of the respondents also showed that there were more male participants than the female participants, the reason could be because the medical laboratory science job is tasking so females keep away and also tend to have phobia for human specimens like blood, stools and others.

This study showed that majority of the respondents demonstrated a high level of knowledge of hepatitis B infection, its infective agent, routes of transmission of the infection, the predisposing factors and the ways of preventing the infection. This finding compares well with another study carried out in Jos, Nigeria where the health workers also had good knowledge at the rate of 86.5 %. It also agrees with the work of Samuel and his colleagues (Samuel *et al*., 2009) where the knowledge was very good. This finding is encouraging, considering the fact that knowledge is usually the first step towards modification to a desirable behavior and adequate knowledge is very vital for the control of the infection. Studies have also shown that knowledge is one of the primary determinants of compliance to HBV preventive programs (Gershon *et al*., 2009). The respondents were also conversant with the occupational predisposing factors like working with contaminated sharps, contaminated working bench, improper disposal of used syringes needle prick due to recapping of needle, recapping of blood stained specimen containers with ungloved hands, blood spillage. The factors that predispose one to the HBV infection are numerous. The safety precaution as listed by the respondent is in agreement with the WHO standard (WHO, 2014) which states that the use of personal protective equipment (PPE) like lab coats, hand gloves and face mask, appropriate disposal of blood contaminated wastes, use of retractable needles, avoidance of needle prick from used needles and non-recapping of needles will help one to evade the occupational hazard like hepatitis B virus infection. He categorically stated that the above listed precautionary measures and vaccination are all very necessary for complete protection against hepatitis B virus.

There may be some accident occurring while using the syringes the most hazardous one is the needle prick and some of these scientists must have been accidentally pricked by used needle. Recapping of used needle have always been the leading cause of accidental needle prick injury, hence one of the ways of transmission of HBV infection. The percentage of the respondents that reported that they have not had needle prick injury during their occupation was 60%, while 40% had been pricked by used needle; coincidentally the prevalence of needle prick accident was higher in the male (45.7%) than in the female (27.4%). This shows that the males are not very careful in the laboratory practice as the females. This needle pricking accident is one of the predisposing factors to HBV infection among health care workers however; their attitude and health seeking behavior will go a long way to minimize the transmission of HBV infection. In this work the respondents reported the sequence of steps they will take if they were accidentally pricked with used needle; their report showed that most of the respondents knew what to do in the event of an accidental needle prick. Their knowledge and attitude or steps of the correct actions to take were good and this corroborates with the work of Ola *et al*(2012) which recommending that prophylactic measures should be given promptly in all cases of suspected blood or body fluid inoculation as this could reduce HBV infection.

Vaccination is 95% effective way in preventing infection but from this study, 61.5% of the respondents were not vaccinated while only 38.5% were vaccinated. The attitude of the respondents to vaccination was very poor. The female scientists who were vaccinated were more in number than the males and when statistically compared there was a significant difference, ($P = 0.025$). This still goes a long way to show the health seeking behavior of females as against the nonchalant attitude of the male respondents. However, it was observed that in this study, vaccination gave the laboratory workers false sense of protection making a lot of them to relax or become non-compliance in their use of personal protective devices like gloves and laboratory coats.

The preventive measures practiced by the respondent was seen to be very poor, most of them did not use the adequate PPE and precautions needed to safeguard themselves while handling patients' samples. This poor attitude in practice actually may have predisposed them to HBV and any other blood-borne infection. Hepatitis B virus screening test carried out in this study yielded seropositive prevalence rate of 4%. The HBV infection prevalence rate in occupational exposures in public safety workers was discovered to be 8.6% and was comparable to the overall US prevalence (Averhoff *et al*., 2002). In this study those working in private laboratories were mostly affected than those in government hospitals.

The high incidence rate in the private hospitals could be a result of inadequate supply of PPE, noncompliance to standard precautions due to non-availability of the PPE, these laboratory health workers might not have taken the appropriate precautions to safeguard themselves from getting infected while those working in government hospitals were being sponsored, possibly, the government supplied some of the PPE and provides a better working environment for the workers and this helps to reduce the rate of contamination and infection. This study has shown that the scientists do not normally practice under adequate precautionary measures due to no availability of the PPE and their poor health-seeking behavior in their practice hence predisposing themselves to HBV infection. These respondents also reported that they seldom used hand gloves because it kept them uncomfortable when they are working hence they did not like using them, this probably must have been one of the reasons why they got infected.

Conclusion

The respondents in this study had good knowledge of practices but poor attitude towards health seeking behavior and hepatitis B vaccination. However, a healthy practice entails the appropriate use of personal protective apparels and the sequential use of standard operational procedure. Taking appropriate doses of HBV vaccination will generally provide adequate protection against the infection. Therefore, appropriate and consistent safety measures against HBV infection should be taken by the health care worker and that HBV vaccination should be made mandatory for all health workers.

References

Averhoff, F.M., Moyer, L.A, Woodruff, B.A, Deladisma, A.M, Nunnery, J., Alter, M.J, Margolis, H.S (2002). Occupational exposures and risk of hepatitis B virus infection among public safety workers. *Journal of Occupation and Environmental Medicine*. 44:591-596.

Burns, G. S and Thompson, A. J. (2014). Viral Hepatitis B: Clinical and Epidemiological Characteristics, *Cold Spring HarbalPerspectMedicus*.4: 24-35.

Candotti, D., and Laperche, S. (2018) Hepatitis B Virus Blood Screening: Need for Reappraisal of Blood Safety Measures. *Frontiers in Medicine*. doi.org/10.3389/fmed.2018.00029

CDC. (2004)Viral Hepatitis, Center for Disease Control and Prevention. National Center for Infectious Diseases. 3, 1-3.

Daboer , J.C., Chingle M.P., Benwat, M.I. (2010). Knowledge, Risk Perception and Vaccination against Hepatitis B Infection by Primary Healthcare Workers In Jos, North Central Nigeria. *The Nigerian Health Journal.* 10: 1 -2.

Gershon, R.R., Pearson J.M, Sherman MF. (2009) "The prevalence and risk factor percutaneous injuries in registered nurses in the home health care sector". *American Journal of Infection Control*..37:525–533.

Jessica D L, Kyle B E, and Costi D S. Hepatitis B in healthcare workers: Transmission events and guidance for management. *World J Hepatol.* 2015; 7: 488–497.

Lewis, J.D., Enfield K.B, and Sifri C.D. (2015). Hepatitis B in healthcare workers: Transmission events and guidance for management. *World J Hepatol.*; 7: 488–497.

Naga, S. S. (2017). How is hepatitis B virus (HBV) transmitted? *Gastroenterology Viral Hepatitis*. https://www.medscape.com/answers/775507-38249/how-is-hepatitis-b-virus-hbv-transmitted

Ola, S.O., Odaibo, G.N., Olaleye, O.D., Ayoola, E.A.. (2012). Hepatitis B and E viral infections among Nigerian healthcare workers. *African Journal of Medical Science*.;41:387-391.

SafaAbdalla, Spenser, S. Apramian, Linda F. Cantley, and Mark R. Cullen. (2017). Occupation and Risk for Injuries.; National Library of Medicine 3rd Ed. 167-175.

Samuel, S.O, Aderibigbe, S.A, Salami, T.A, and Babatunde, A.T. (2009). Health workers'knowledge, attitude and behaviour towards hepatitis B infection in Southern Nigeria.*International Journal of Medicine and Medical Sciences*.; 1: 418-424.

Thad, W., Richard, S. and Mary, C. (2019). Hepatitis B: Screening, Prevention, Diagnosis, and Treatment. *Am Fam Physician.* 2019 ;99:314-323.

Lisa, S. and Adam, Z. (2015). Assembly and Release of Hepatitis B Virus. *Cold Spring HarbPerspect Med.* 5: 12.doi: 10.1101/cshperspect.a021394

World Health Organization (2011). Hepatitis B factsheet number 204.. www.who.int/mediacentre/factsheets/fs204/en/

World Health Organization (2014). Laboratory biosafety manual, 3rd edition. Geneva: World Health Organization..

Young Kwon, S.O and Lee, C. H. (2011).Epidemiology and prevention of hepatitis B virus infection. *Korean Journal of Hepatol*.17: 87–95.

Zibara, A.K., Bwogi, J., Namale, A., Wainaina, C., WandMayanja-Kizza, H. (2010). Sero- prevalence and risk factors for hepatitis B virus infection among health care workers in a tertiary hospital in Uganda, *BMC Infectious Diseases*. 10.