FACTORS INFLUENCING THE UPTAKE OF HEPATITIS B VACCINE AMONG
HEALTH CARE WORKERS AT KENYATTA NATIONAL HOSPITAL

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD
OF DEGREE OF MASTERS OF PUBLIC HEALTH OF THE UNIVERSITY OF
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DECLARATION

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CMEs</td>
<td>Continued Medical Education</td>
</tr>
<tr>
<td>CO</td>
<td>Clinical Officer</td>
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<td>COC</td>
<td>Corporate Outpatient Center</td>
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<td>DALYs</td>
<td>Disability Adjusted Life Years</td>
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<td>FGD</td>
<td>Focus Group Discussion</td>
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<tr>
<td>HBeAg</td>
<td>Hepatitis B endogenous antigen.</td>
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<td>HBIG</td>
<td>Hepatitis B Immunoglobin</td>
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<td>HBsAg</td>
<td>Hepatitis B Surface Antigen</td>
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<td>HBV</td>
<td>Hepatitis B Virus</td>
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<tr>
<td>HCW</td>
<td>Kenyatta National Hospital</td>
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<tr>
<td>Health Care Worker</td>
<td></td>
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<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<tr>
<td>IPC</td>
<td>Infection Prevention &amp; Control</td>
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<tr>
<td>KEMRI</td>
<td>Kenya Medical Research Institute</td>
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<tr>
<td>KNH</td>
<td>CDC  Centre of Disease Control Prevention and Control</td>
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<tr>
<td>NSI</td>
<td>Needle stick injury</td>
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<tr>
<td>NSIs</td>
<td>Needle Stick Injuries</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Authority</td>
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<td>OSHE</td>
<td>Occupational Health &amp; Safety</td>
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<td>PEP</td>
<td>Post Exposure Prophylaxis</td>
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<td>SIDs</td>
<td>Sudden Infant Deaths</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences.</td>
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<tr>
<td>TBP</td>
<td>Theory of Planned Behavior</td>
</tr>
<tr>
<td>TPB</td>
<td>TATA-Binding Protein</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>UoN</td>
<td>University of Nairobi</td>
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<td>US</td>
<td>United States.</td>
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<td>WHO</td>
<td>World Health Organization</td>
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LIST OF OPERATIONAL DEFINITIONS

**Acute Hepatitis B**: A newly acquired HBV infection which may not be symptomatic. Symptoms usually appear in 1-4 months. Clinical symptoms and signs include anorexia, malaise, nausea, vomiting, abdominal pains, and jaundice. Symptoms typically resolve in a week to few months as the patient is cured, but a few develop severe, life-threatening form of acute hepatitis called fulminant.

**Attitude**: The way a person views something or tends to behave towards it.

**Chronic HBV infection**: Carriage of HBeAg for longer than six months.

**Hepatitis B (HB)**: A liver disease caused by the hepatitis B virus (HBV).

**Hepatitis B endogenous antigen (HBeAg)**: An accessory protein produced during active replication of HBV. The presence of HBeAg is associated with increased infectivity of the individual.

**Hepatitis B surface antigen (HBsAg)**: The outer envelope surface protein of the HBV. Testing positive for this antigen indicates that the patient is either newly infected or carrier.

**Hepatocellular carcinoma**: This is cancer of the liver and is one of the consequences of chronic HBV.

**Liver cirrhosis**: This is an end-stage liver disease characterized by replacement of liver tissue by fibrous scar tissue as well as regenerative nodules leading to progressive loss of liver function or liver cancer.

**Vaccination**: Injection of a killed microbe to stimulate the immune system against the microbe, thereby preventing disease.

**Immunization**: The process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine.
ABSTRACT

Introduction: Hepatitis B disease affects the liver resulting from an infection with the Hepatitis B virus. It is an occupational danger to health care workers. Not only is it potentially fatal but it also carries the risk of exposure to chronic infection and transmission to patients. A recombinant yeast-derived Hepatitis B vaccine has been in use since 1987, but the rate of uptake in the face of high risks and free provision among health workers at Kenyatta National Hospital (KNH) is not known.

Objectives: The study sought to determine the availability and accessibility of Hepatitis B vaccine, the prevalence of hepatitis B vaccine uptake, and assess the level of Post Exposure Prophylaxis utilization after blood-borne occupational exposure among healthcare workers at KNH.

Methods: The study was cross-sectional descriptive one that was carried out in KNH. Complementary mixed methods consisting of a structured questionnaire and in-depth interviews were used to collect data from health workers with direct patient contact primarily by stratified sampling and simple random sampling procedures.

Data management: Data was cleaned and entered into SPSS version 2.0 for analysis. The presentation was done by tables, pie charts and bar graphs and correlation analysis by chi-square and T-tests done to test relationships between the variables.

Results: The study was able to determine that 40% of the study participants were nurses; 28% were working in the medicine department. It was revealed that 87% had been immunized, with only 10% having received the complete three doses. It was also found out that 50% of the ones who were not fully immunized stated to have forgotten to return for the remaining doses; 55% stated that they had encountered challenges. The demographic characteristics of hepatitis B uptake were found to be significant (P<0.05). Doctors, nurses,
lab personnel and CO’s were the highest numbers of healthcare workers immunized. Knowledge and HBV uptake was also significant (P<0.05) with health care workers who had heard about the vaccine being reported to have the highest levels of uptake.

**Conclusion:** The Uptake of HBV is still low based on the 45% prevalence obtained in the study. Most healthcare workers were not fully immunized among them defaulters with the main challenges experienced being lack of education and sensitization. The PEP uptake amongst the staff was found to be good..

**Recommendations:** HBV administration points should be made mobile to reach all staff in their work areas; the institution should create a database of all staff receiving the vaccine to be able to track full immunization and follow up on immunity status using antibody tests; a 24/7 staff support center should be established to deal with needle prick injuries.

**Dissemination:** This will be done through a presentation to management and publishing in a refereed journal.
CHAPTER ONE: INTRODUCTION

1.1. Background

The Hepatitis B virus (HBV) is contracted from exposure to infected blood and/or body fluids such as vaginal secretions and semen as well as prenatally through an infected mother to her child. The virus is among the important blood borne pathogens that poses an occupational associated risk to health-care workers. Hepatitis B vaccination virtually eliminates this risk. Hepatitis B disease imposes a heavy burden on the national economy and individual families due to resultant health care cost associated with chronic and acute morbidity. It is a worldwide problem; with evidence of over 2 billion cases of past or current infection and 350 million chronic carriers globally. It is estimated that more than Three-quarters of the global population live in areas with high levels of Hepatitis B infection (Lavanchy, 2004).

It is estimated that 1 in 20 people in Pakistan is a hepatitis B carrier (The News, 2004). The nature of work that exposes one to contact with infectious patients and or infective substance during delivery of care poses a hazard to health-care workers (HCWs) due to the risk of transmission. Vaccination is therefore, an integral part of staff health programs for maintenance of immune status of health workers.

Establishment of immunization programs for health care workers safeguards the health of staff and guarantees patient safety through protection from exposure to infected health care worker. Hepatitis B virus is highly contagious and present in copious amounts in the blood and secretions of persons who are infected. This means exposure to even a minute single isolate can transmit this infection. The overall estimated risk of Hepatitis B infection following an occupational exposure ranges from 20 to 30%, even worse is that statistically, 5-10% of these infected workers end up with a chronic infection (Halpen & Asch, 2006).
Persons suffering from chronic HBV infection are at increased risk of chronic liver disease (i.e., primary hepatocellular carcinoma, chronic active hepatitis, cirrhosis) and continue to be infectious for life.

Promoting healthy work places includes three main components, which ultimately fall under the responsibility of management. According to WHO (2012), the three components include: a healthy and safe work place, staff training in health promotion skills and health promotion activities for staff.

Hepatitis B infection from an occupational exposure poses a hazard to healthcare workers (HCWs) globally. Hepatitis B infection is 10 times more common among surgeons than in the general public (Cauruana et al., 1994). The probable risk of infection is largely related to one's extent of contact with infectious blood and to the Hepatitis B antigen (HBeAg) status of the source person.

The risk posed by percutaneous exposure while operating is underrated, the risk of becoming infected with Hepatitis B virus if exposed, and the degree of protection provided by the vaccine (Halpen & Asch, 2006) The department of Labor in the US in conjunction with Health and Human Services made recommendations for Universal Precautions to protect against blood borne exposure. Following these recommendations, the Occupational Safety and Health Administration in 1991 published the Federal Bloodborne Pathogens Standard. This document instructed that all HCWs with the risk of exposure to blood pathogens and other infectious materials be offered a free hepatitis B vaccine.

1.2. The Hepatitis B Vaccine

The hepatitis B vaccine is made from smaller pieces of the whole hepatitis virus. The vaccine contains one of the viral envelope proteins and hepatitis B surface antigen (HBsAg) (Centers for Disease Control, 2009). It is produced by yeast cells, into which the genetic code for
HBsAg has been inserted. A dose of three (3) injections is administered whereby the second injection is given at least one month after the first dose and the third injection is given six months after the first dose.

The first and second dose offer complete protection. The final injection (second or third depending on the number of vaccines being administered) is to prolong protection against the hepatitis B virus (Hepatitis B Foundation, 2009). Subsequently, the body learns to attack the hepatitis B virus if the individual is exposed. There after, an immune system known as anti-\( \text{HBs} \) against HBsAg is established in the body.

The Food and Drug Administration in the year 1981 approved the first vaccine for hepatitis B. It was a plasma-derived vaccine. The use of this vaccine has since been discontinued in the US and is no longer available in the market. Currently, the vaccines in use are made synthetically, using a different technology and are now referred to as DNA recombinant. The DNA recombinant vaccine is achieved by the use of a baker's yeast to grow the Hepatitis B virus which then undergoes purification after harvesting.

1.2.1. Medical uses of Hepatitis B Vaccine

Neonates born to infected mothers are vaccinated with hepatitis B vaccine and injected with hepatitis B immunoglobulin (HBIG) (Mast & Margolis et al., 2005). Many countries have now adapted the routine vaccination of pediatric population. In countries where Hepatitis B is endemic, childhood vaccination has not only reduced the risk of infection but also to notable reduction in hepatocarcinoma cases. In Taiwan, the adoption of a country wide Hepatitis B immunization program in 1984 was linked to a reduction in the incidence of childhood liver cancer (Chan, Chen, et al., 1997). Previously it was believed that the vaccine only provided an effective cover of between five and seven years (Pasricha et al., 2006)
1.2.2. Effectiveness of the Vaccine

After undergoing the complete course of three vaccinations, it is recommended that a blood test be taken after a period ranging between 1–4 months to ascertain if sufficient response has been achieved. The response is called an anti-hepatitis B surface antigen (anti-Hbs) antibody. A level above 100 mIU/ml is a full response that is estimated in about 85–90% of persons in a given population (Joint Committee on Vaccination and Immunization, 2006). An antibody level of 10 to 100 mIU/ml is considered a poor response, and these people should receive a single booster vaccination at this time, but do not need further retesting (Joint Committee on Vaccination and Immunization, 2006). Individuals who don’t respond (anti-Hbs antibody level below 10 mIU/ml) should be tested to exclude present or past history of Hepatitis B infection and given a repeat course of 3 vaccinations this is followed by further retesting 1–4 months after the second course. Those who still do not respond to the second course of vaccination may respond to intradermal administration to a high dose or a double dose of a combined Hepatitis A and B vaccine (Cardell et al., 2008). Finally those who still fail to respond require hepatitis B immunoglobulin (HBIG) in case exposed to the Hepatitis B virus (Joint Committee on Vaccination and Immunization), 2006.

1.2.3. Risks and side effects

Most persons who get Hepatitis B vaccine rarely get side effects. They may have minor occurrences such as soreness and redness at the injection site or a mild fever. Serious problems are rare and are mainly due to allergic reactions to a part of the vaccine. The vaccine use is not advised for those with known yeast allergies or to those who have reacted before to it. Generally, it is considered one of the safest, effective vaccines in use currently. Several Studies by the Centers for Disease Control, the World Health Organization and other
medical associations confirm this position. There has not been any documented evidence of the vaccine causing multiple sclerosis, neurological disorders or sudden infant deaths (SIDs).

1.3. **Global Occupational Burden.**

Health care workers are at an increased risk of HBV infection from occupational exposure to blood secretions and the incidence among them has been estimated to be 2-4 times the rate in the general population (Kesieme et al., 2011). The risk of contracting HBV infection after an exposure that is percutaneous is about 30%. This is documented as higher than the probability of transmission following exposure with other bloodborne pathogens (CDC, 2009). It is also the most important mode of transmission for health care workers. In the United States of America (USA) the incidence of HBV infection among all Hospital workers is estimated to be 3.5 to 4.6 infections per 1000 workers, which is 2–4 times the rate in the general population (CDC, 2009).

In the Global scene, 66,000 health employees are infected by HBV annually through percutaneous injuries with an estimated 261 deaths (Pruss-Ustán et al., 2005). Avoidance of HBV transmission among healthcare workers is thus a significant challenge in Occupational Health and Safety. Furthermore, prevention of HBV infection in healthcare workers is important to protect the patients they treat.

In the Czech Republic, Hepatitis has been a reportable disease for decades and monitored closely since the 1970s. Despite limited resources, control of nosocomial hepatitis was a high priority action by the state in the early 1980s. In 1983, vaccination of all “high-risk” HCWs was made mandatory. High-risk HCWs included dialysis workers; internal medicine, surgery, and pathology specialists; biochemistry and hematology laboratory workers; medical and nursing students; and laboratory technicians (CDC, 1985).
A study done in the same country found that in 1982, the incidence rate of Hepatitis B infection among healthcare workers was 177 per 100,000 population and 587 per 100,000 workers in the high-risk groups. This compared to the rate in the general population of 27 per 100,000 from 1980 to 1984.

The possibility of developing clinical hepatitis if the blood is both Hepatitis B surface antigen (HBsAg) and HBeAg positive is around 1:4 to one in three; this risk drops to significantly below one in ten if the blood is HBeAg positive and HBsAg negative (CDC, 2001). In some of Saudi Arabia's governmental Health Centre policies, HBeAg positive employees are not allowed to perform procedures that are exposure-prone. Vaccination is mandatory, and HCWs are not allowed to decline the series.

1.4. Occupational Hepatitis in Kenya
Healthcare workers (HCWs) in resource limited countries like Kenya remain at risk; about 88% of the global populations live in habitats whose prevalence of chronic HBV infection is moderate to high (Mahoney, 1999). In 1991 The Global Advisory Group recommended the inclusion of Hepatitis B vaccine into the Extended Programme of Immunization (EPI) for childhood immunizations as a cost-effective public health measure (WHO, 2001). In 2000, the Government of Kenya introduced Hepatitis B vaccine in the childhood vaccination schedule. While immense progress has achieved in targeting the pediatric population, the adult population is yet to benefit and it will be a while before this is achieved in Kenya.

Carriers of blood borne pathogens remain a threat to healthcare workers during carriage of their duty even though the exact risk is a rarely quantified (Beltrami 2000). Other studies conducted on Hepatitis B amongst HCWs in limited resource settings report a high prevalence rates coupled by low vaccination coverage. The increased risk posed by procedures with increased exposure are reported to be more prevalent among medical staff within the first five years of getting employed (Luksamijarulkul & Watagulsuin, 2001).
According to Mwangi (1999), in countries with moderate-prevalence such as Kenya, chronic Hepatitis B carrier rates range between 3% to 7% and local policies recommend vaccination of HCWs. The health care system in Kenya is over burdened by the effect of the Human Immunodeficiency Virus (HIV) therefore implementation of an Hepatitis B program is not considered a priority. Pre-vaccination screening is not conducted, and reagents are only available through government suppliers for the screening of blood for Hepatitis B surface antigen (HBeAg). In Kenya HCW employed by government institutions are expected to purchase their own vaccine which is usually not readily available in pharmacies in the smaller towns.

A study was carried out in Thika District in Kenya with the aim of evaluating the extent of HCWs susceptibility to HBV infection, the degree of possible exposure through needle stick injuries (NSIs), and the probability of expanding the routine EPI for childhood immunization to include hepatitis B vaccination of HCWs. This study showed that a vaccination program implemented using the already existing systems for childhood immunization could promote the rates of vaccine uptake. However, this would require significant resources and training for pre- or post-vaccination (Corrao et al., 1987).

In the same study, 87% of participants reported that they had not been vaccinated for hepatitis B however, the rest had received the vaccine between 1 - 22 years previously. Neither of the two groups of HCWs had conducted a pre/ post-vaccination screening for hepatitis B infection nor were they aware if they had been exposed previously (thus not requiring vaccination) or whether they had acquired sufficient response to the vaccine or needed boosters (Nguku et al., 2006). These findings are a great cause of alarm and a further demonstration of policymakers in Kenya and HCW. There is an urgent need for on-going hepatitis B vaccination in low income countries.
1.5. Problem Statement
Despite the provision of the vaccine free of charge to staff by the administration of Kenyatta National Hospital (KNH), the uptake of the vaccine has remained poor among clinical staff as reported by the Infection Prevention & Control (IPC) team and suggested by the available data. Approximately 1200 (24%) out of a staff capacity of 5000 have been immunized, with defaulters who initiate the first dose but fail to complete the successive doses at almost 400 (10%).

The IPC team has reported cases of staff requesting for the vaccine after exposure, and in such cases, the vaccine is administered. However, the affected staff is advised that the vaccine is not curative and it may be late to arrest an infection in case it has occurred. There is a disparity on what the ideal situation should be which 100% immunization coverage is, and what is evident. This is especially among the knowledgeable cadres like doctors and nurses.

IPC having been mandated by the hospital administration to oversee the staff Hepatitis B immunization program, have previously undertaken efforts to create awareness about the vaccines availability and facts. This has been done through the orientation program of new employees. As for the other employees, they have been routinely reminded through sensitizations held monthly. Pamphlets and fliers demystifying the vaccine through collaboration with the manufacturers have also been made available, albeit uptake remains poor.

Having realized the increase of defaulters among those who initiate to get vaccinated the IPC team resolved to take phone numbers and reminding the staff when their next vaccines were due, however still much was not achieved and the practice was abandoned. These efforts have not achieved the anticipated results. There is, therefore, need to address this issue after
carrying out a detailed research to avail more information on the factors that influence this poor uptake intended to improving the vaccine uptake.

1.6. Research Questions

1. What factors influence the Hepatitis B vaccine uptake among KNH health care workers?

2. Is the hepatitis vaccine readily available and accessible to healthcare workers at KNH?

3. What is the prevalence of Hepatitis B vaccine uptake among health care workers at KNH?

4. What is the level of PEP utilization among healthcare workers with bloodborne Occupational exposure at KNH?

1.7. Objectives

1.7.1. Broad Objective.

To establish the factors influencing hepatitis B vaccine uptake among health care workers at KNH.

1.7.2. Specific Objectives

1. To determine the availability and accessibility of the Hepatitis B vaccine to health care workers at KNH.

2. To determine the prevalence of hepatitis B vaccine uptake among health care workers at KNH.

3. To assess the level of PEP utilization among healthcare workers at KNH after bloodborne occupational exposure.
1.8. Study Justification

The Occupational Health & Safety Program (OSHA) at KNH recommends that health care workers receive pre-exposure immunization against HBV. The fact that the government of Kenya has taken no position concerning policy addressing vaccination of health workers further complicates the problem of uptake of vaccination services. The impact of low and or incomplete uptake of Hepatitis B vaccine among health workers has both health and economic consequences. The risk of exposure to blood-borne pathogens more so Hepatitis B if not detected in time and treatment initiated can result to irreversible damage of liver, hepatic-cellular cancer, liver failure, and death with additional cost implication of treatment. Individuals suffering from chronic HBV infection carry a 15–25% risk of premature death from HBV and related complications like cirrhosis and hepatic-cellular carcinoma (Obi & Ofili, 2013).

The World Health Report of 1999 states that in 1998, Hepatitis contributed 0.1% of Disability Adjusted Life Years (DALYs). The increase in cases of non-communicable diseases and cancers in low income settings like Kenya coupled with challenges faced by the health sector in the aspects of equipment, skilled human resources, infrastructure among other issues raises a lot of doubts on the capacity to manage these challenges with grave socio-economic impact.

KNH will not only lose its workforce but also cater to the cost implication of treating the healthcare worker with hepatitis B and its eminent complications. There is also a reported increase of needlestick injuries among KNH staff, although reporting in the incidence book is rarely done in specific units. The Post Exposure Prophylaxis (PEP) Program of KNH recorded a high staff turnover of over 200 needlestick injuries and other occupational exposure among staff between 2010 and 2012. This may not be the actual number as others stay away for fear of being tested for HIV as a preliminary test in the PEP program.
This scenario is not in line with the strategic objectives of the hospital, that advocates for staff and patient safety in the hospital. In view of the fact that majority of HCW in KNH are unprotected, there is need to determine the vaccination status of different cadres of HCW and profile the factors that influence the uptake of vaccine among them. This would assist the hospital administration in meeting its strategic objectives.

According to research by Kenya Medical Research Institute (KEMRI) (2010), the prevalence of HBV is 10% among pregnant women in Kenya and more than 30% among other patients attending a clinic. KEMRI also cautions the rise in HBV among blood donors; out of 150,000 screened nationwide, 3000 were HBV positive. The researchers contend that the prevalence of the general population may be much high and a cause of alarm. This high prevalence of HBV among patients seeking health care contrasted by low rates of vaccine uptake and combined with the high incidence of needlestick injury among healthcare workers at KNH is a pool for infection and a health care cost to the hospital. The findings of this study will be considered to inform ways and means for improving immunization status of KNH staff on the factors, make recommendations that will see the hospital save both financially, and labor hours lost in staff absenteeism during illness.

Appraisal of the current hepatitis B vaccination program may also be necessary if patient safety and OSHA regulations have to be met. It may necessitate such drastic actions by KNH.
CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter provides an in-depth analysis of previous research work done by experts in the field on the same subject matter. The literature review has been done as per the research objectives, which focus on the factors that influence the uptake of Hepatitis B among healthcare workers.

2.1. Factors that Influence the Hepatitis B Vaccine Uptake

In general, hospitals and healthcare institutions are relatively unhealthy workplaces for staff members who may experience various physical and psychosocial burdens during work hours. Thereby aggravating the health of their staff, it is, therefore, necessary to focus on promoting healthy workplaces in all health institutions.

The main reasons for non-immunization differ among the health cadres. A recent study report in Nigeria showed that the main reason for non-immunization were lack of motivation (38%), the high cost of the vaccine (28%) and other causes (20%) (Fatusi & Fatusi, 2000). In the study, cadres with more knowledge and higher risk of exposure to hepatitis B infection within the healthcare setting included doctors, nurses, and laboratory workers however, ironically this cadres had the most apathy to the immunization program (Fatusi & Fatusi, 2000).

According to Nasir et al. (2010) in Allama Iqbal Medical College, Lahore, it was reported that the most common reason for non-immunization was high cost, (47.7%). In this study, high cost was also the main reason given by the paramedics (23%), surprisingly no motivation was the most common cause of non-immunization among the most educated group i.e. doctors (15%) (Nasir et al., 2010).
Only 8% of the health care workers said that they did not believe in immunization. In the same study nurses (36.4%) and paramedics (33.2%) believed that Hepatitis B posed no risk (Nasir et al., 2000). Similarly, a Taiwan study indicated that doubts concerning the vaccine efficacy, constraint of time, repeat injections and vaccine cost were the main impeding factors amongst nursing students for non-immunization. Lower perception of risk among doctors was the main reason for poor vaccine uptake (Llewellyn and Harvey, 1994). At Aga Khan University in Pakistan, the most common reported reasons for defaulting the vaccine were ignorance, cost of immunization and difficulty in accessing vaccines, whereas the study in Fatima Jinnah Medical College, Lahore, cited vaccine cost followed by vaccine unavailability as the main reasons for discontinuation of uptake. (Llewellyn & Harvey, 1994).

Different factors can be linked to the reluctance of some surgeons at King Fahd General Hospital, Jeddah, Saudi Arabia. In spite of its availability and at no cost in all government health care centers; probably the most significant one is the lack of knowledge about its protective effect since only around half knew that it provides 95% protection. In contrast, being vaccinated did not significantly correlate with being less cautious during surgery which could be explained by the surgeons' knowledge that the vaccine is not 100% protective or fear of acquiring other infections like HIV and Hepatitis C (Nasir et al., 2000).

It was concluded that a significant proportion of health workers handling patients in King Fahd tertiary care hospital were not adequately immunized for Hepatitis B (Nasir et al. 2000). Immunization coverage among various cadres of health workers was very low notably the paramedics and nurses despite susceptibility to exposure. The highest proportion of non-immunized doctors was witnessed in surgical compared to medical units.

In the United Kingdom (UK), during a 5-year period between 1980 and 1984, 364 cases of acute hepatitis B were reported amongst health service staff in England, Wales and Ireland representing 5.4% of all cases of the disease (Palakof, 1986). A study by Burden and
Whorwell (1991) at The University Hospital of South Manchester (UK) reported that 33% of doctors and 61% of nurses were not immunized. Non-immunized persons in this study indicated a desire to be immunized. Amongst nursing staff, lack of advice and fear of the vaccine were important factors. A prominent feature reported amongst doctors was apathy which was a much more difficult problem to address. In this same study, some subjects reported friends advised them or colleagues, although a considerable number reported that no one had ever advised them to be vaccinated.

The high rate of uptake amongst doctors in the above study is encouraging as this is a group at particularly high risk (Burden and Whorwell, 1991). Also shown in this study is that many junior doctors experience needle stick injuries early in their training, it would therefore be prudent to immunize them as students before they experience any clinical exposure.

It is a documented fact that not all persons seroconvert after hepatitis B immunization. Many Health workers in the above studies had no confirmation of immunity possibly giving some a false sense of security. More studies confirming the immunity status of the immunized health workers should be done as confirmatory of being hepatitis B free. The practice of profiling HCWS into particularly high-risk groups for immunization, such as those working in the dialysis units, is outdated. Trainee nurses rotate in various specialties and may be allocated to 'relieve' in the high-risk areas during staff shortages. Similarly, junior doctors cannot be realistically classified into high or low-risk groups. The strong potential for infection in all groups is also indicated by the remarkably high incidence of needlestick injury among workers (Scarpa et al., 1989).
2.2. Availability and Accessibility of Hepatitis B Vaccine

A vaccine that offers immunity against acquiring HBV has been available since 1981. It is considered both effective and safe. This vaccine has a protective effect of 90–95% (Obi & Ofil, 2013). According to the WHO, there is an estimated global burden of 40% for hepatitis B among Health Care Workers (HCWs) and poor vaccine uptake especially in developing countries (Kesieme et al., 2011). Hepatitis B vaccination program for HCWs is yet to be implemented fully in sub-Saharan countries.

In a study at the University of Yaounde in Cameroon, the uptake of the HBV among surgical residents was constrained by time (38.5%), finance (23.1%), and inadequate information concerning the vaccine (19.2%) (Jean et al., 2014). Their training institutions had only sensitized (20.4%) residents on the importance of HBV vaccination. According to (Kesieme et al., 2011) other studies have also constantly shown poor vaccination status among healthcare workers practicing in low-income countries as well as middle-income countries. Identical to this study, in Nigeria, it was reported that 70% of personnel working in the theatre were not vaccinated despite good knowledge on risk factors of HBV infection and the significance of HBV vaccine. Other factors identified to have influenced incomplete vaccine uptake among doctors in this study are such as vaccine unavailability, change of location and missed doses (Kesieme et al., 2011).

Numerous reasons could explain the poor HBV vaccine uptake in Cameroon. The findings are similar to Kesieme et al., (2011) findings, which likewise were: vaccine cost, constrain of time for vaccination and lack of sufficient information regarding vaccine. Surveys conducted in health care systems where HBV vaccine is offered for free to healthcare workers have shown a marked vaccine uptake (Ali & Jamal et al., 2005).
Worth noting is that making the vaccine readily accessible and free without pay to health workers may not be necessarily enough (Chaudhari et al., 2009). Other documented studies have shown the poor vaccine acceptance could be associated with the fear of side effects and the dread in acquiring HBV infection from the vaccine (Chaudhari et al., 2009). At least half of the Yaoundé University hospital resident doubts about the safety of HBV vaccine, this could to a degree explain poor vaccination coverage among them. As for the Kenyan study on hepatitis B uptake of HCW's at Aga Khan Nairobi by Herman et al. (2010) like KNH, the hospital has a comprehensive vaccination program as part of staff medical scheme. The hepatitis B vaccination rate was relatively low although better than the previous study conducted in Thika. Unlike in Aga Khan, the vaccine was not readily available to the staff in Thika. Perhaps this can be blamed for the low uptake. However, it would be expected that in the setting like Aga Khan where the vaccine is readily available, the coverage would be higher.

2.3. Prevalence of Hepatitis B Vaccine Uptake.

World Health Organization (WHO) according to Prus-utan et al. (2005) has given an estimate that HBV vaccination coverage among healthcare workers is at 18-39% in low as well as middle-income countries, a sharp contradiction to 67-79% estimates reported in high-income countries. Kesieme et al., 2011 Nigerian study showed that only 26.8% of the personnel working in the theatre were sufficiently vaccinated despite their good knowledge of factors for HBV and significance HBV vaccine.

This compares to a study among Cameroon medical residents whose coverage was equally poor as only 18% of the participants had completed the three doses of HBV vaccination. Further, only 10% of adequately vaccinated participants had taken post-vaccination test to ascertain a sufficient immune response and thus effective immunity against HBV infection.
A study in India (Chaudhari et al., 2009), was a contrast of the above findings. In this study majority (72.3%) of HCWs in tertiary health facilities had been vaccinated against Hepatitis B, however 27.7% were unvaccinated but indicated the importance of booster vaccination after 10 years to ensure Health Care Workers are adequately protected. In all the above studies, respondents were considered vaccinated if they had been given a minimum of three doses at a schedule of 0, 1 and 6 months. Participants were considered not sufficiently vaccinated if they had started HBV vaccination but failed to complete the necessary three doses of vaccination, and not vaccinated if a dose of an HBV vaccine had never been received.

A study at the Aga Khan hospital in Nairobi by Herman and Gerald (2010) had a relatively low vaccination rate of 56.02%. This is despite the hospital having a staff health vaccination program, a hospital policy on staff vaccination and free vaccine available to HCWs. However, the results were more acceptable compared to a previously conducted survey in Thika District with a vaccination rate of (12.8%), not far from the rates found among HCWs in other developing countries, hence confirming the WHO position that developing countries are yet to realize hepatitis B coverage among healthcare workers.

2.3.1. Occupational Factors for Non-Immunization In Kenya

Exposure to hepatitis B remains an important risk to HCW in developing countries given the high prevalence of HBV in the general and patient population (Mwangi, 1999). Unsafe injections are reportedly common in low-income countries (Scarpa et al., 1989).

In a study at Aga Khan Hospital Nairobi, both organizational and individual factors were considered. More than 95.5% of the HCWs knew about hepatitis B, and more than 86.8% knew the routes of transmission. There was a statistically significant relationship observed
between having knowledge on Hepatitis B and ones vaccination status \( (p=0.01) \) (Herman et al., 2010).

The results obtained from the same study also revealed that Fifty-three percent \( (53\%) \) of the non-vaccinated HCWs did not know either the need or procedure for vaccination, while 19.6\% were concerned about side effects and costs of vaccination. Other individual factors included staff not thinking they were at risk and others had either no reason or time. The organizational factors that were included are lack of proper implementation of Hepatitis B policy and high staff turnover.

2.4. Utilization of the PEP Program.

The healthcare workforce is globally estimated at about 59 million who are exposed on a daily basis to various health and safety hazards (Obi, Ofili, 2013). Injection administration is a routine procedure in a health care setting. The World Health Organization (WHO), defines a safe injection as that which is administered using the appropriate equipment, causes no harm the receiver, causes no exposure during administration to the provider, and does not result in dangerous waste to others (WHO, 2002).

The risk of infection with blood-borne viruses can significantly reduce through adherence to universal standard precautions and practicing of infection prevention control procedures which includes prompt reporting of incidents. Several Studies have documented the highest occupational exposure risk of HBV to occur during professional training before qualification (Pruss- Ustan et al., 2005). In the study among Cameroon resident doctors, an estimated three-fifth of the participants reported having had at least one accidental occupational exposure to blood since the commencement of their training.

Staff shortage, lack of experience, inadequate training, duty overload and fatigue, are some of the reasons that may lead to sharp occupational injuries. Findings were that 55.9\% of the
study participants had previously experienced at least one accidental exposure to blood since the commencement of their training and a further 58% of them never reported these incidents (Jean et al., 2014).

Comparatively, in Nigeria, it was found that 48% of medical students surveyed admitted having had a previous needle stick injury (Okeke et al., 2008). Likewise, a study among interns and medical students in Palestine reported that 40% of the study participants had experienced at least one needle stick injury and failure to report the incident to health representatives was recorded at 48.6% of needlestick injuries (Al dabbas et al., 2012). Failing to report an unintentional occupational exposure to blood and secretions increases the risk of HBV infection; this is because no post-exposure prophylaxis is undertaken to decrease the risk of infection.

In a study based in a London teaching hospital, it was reported that 81% of the interviewed surgeons said that they did not report accidental exposure to blood (Obi & Ofili, 2013). In a Kenyan district (Thika) routine testing of HCWs for chronic carriage of HBV and/or HIV was conducted but had ethical, economic and practical implications for policymakers if treatment was to be offered, or if positive HCWs were to have restrictions placed on their practice (Suckling & Taegtmeyer et al., 2006). In this study, 30% of HCWs reported one or more NSIs in the preceding year. The annual incidence in this cohort was 0.97 NSIs/HCW/year.

The HCWs expressed their suspicion about giving a blood sample for analysis implying that they were well aware of the potential implications and stigma associated. A vaccination strategy that requires blood samples from HCWs is not likely to have high coverage in a setting such as this. The true rate of exposure, however, is likely to be higher as underreporting, especially among doctors, and in particular, surgeons, is well-documented (Smith et al., 1996).
2.5. Theoretical Frame Work

Theory of Planned Behavior (TPB) will be used to define this study:

Efforts employed to maximize vaccine uptake among KNH staff have been slow at achieving the desired outcome of 100% coverage among the staff. Utilization of the TPB is a means of elucidating fully the underlying factors that influence vaccination decision-making; it has the potential to enhance hepatitis B uptake among KNH staff.

Its application proposes that ‘intentions’, which in this case is the most important antecedent of behavior is based and guided by 3 constructs; (Armitage and Conner 2001), attitude towards the behavior (in this case vaccination), subjective norms (influenced by others) and perceived behavioral control (factors that impede or facilitate behavior). The more favorable the attitude and subjective norm, then the greater the perceived control and the urge to perform the behavior (Armitage and Conner, 2001).

Attitude refers to the favorable or unfavorable evaluation one places on the consequence of getting vaccinated. In this theory attitude is consistently a strong predictor of outcome (Hagger et al., 2002).

Subjective norms refer to the beliefs about expectation of others. In the hospital setup work colleagues opinion regarding whether or not to get vaccinated is desirable, affects the outcome.

Perceived behavioral control factors under this study Included social demographic factors such as sex, cadre, years of working, cost of the vaccine, vaccine availability and perceived risk.
Figure 1: Diagrammatic Representation of the Theory of Planned Behaviour.
CHAPTER THREE: METHODOLOGY

3.0. Introduction

This chapter describes the components of methods that were used to carry out the study such as the research design, scope, and sample size. Sampling technique, data collection technique and instruments, analysis techniques and ethical considerations are involved in the study.

3.1. Study site

The study was conducted at Kenyatta National Hospital (KNH) situated in Nairobi, Dagorreti constituency, Golf Course ward along Hospital road at the upper hill area. It is the oldest hospital in Kenyan history Founded in 1901 at that time it had bed capacity of 40 then was it was the Native Civil hospital. In 1952 it was later changed to King George VI before finally being called Kenyatta National Hospital at independence to date. Currently it is also the largest referral and teaching hospital in the East and Central Africa.

Kenyatta National Hospital has a capacity of 1800 beds with a total of 5000 staff members. The hospital covers an area of 45.7 hectares. Within its complex and environs are College of Health Sciences, (University of Nairobi); the Kenya Medical Training College; Kenya Medical Research Institute and National Laboratory Service (Ministry of Health). KNH was elevated to a State Corporation in 1987 with a Board of Management and is at the apex of Kenya's referral system in the Health Sector. It consists of 24 theatres (16 are specialized) 50 wards, 22 outpatient clinics and a walk in Accident & Emergency unit.

Out of the total bed capacity of 1800, 209 beds are for Private Wing. KNH has a Hepatitis B vaccine program for all its health workers and their next of kin. This service is part of the staff health program, and no fee is charged. The 3-course vaccine is available to workers every day at the KNH Vaccine Centre and is run by the Infection Prevention and Control
Unit, which is also charged with the responsibility of creating awareness on Hepatitis B to the KNH staff.

3.2. Study design

A cross-sectional descriptive study was used to describe the phenomena and identify factors that influence the uptake of the vaccine. A complementary mixed method design that consists of a structured questionnaire focus group discussion and key informant interview was used. In the quantitative part of this study, the structured questionnaire was adopted as the dominant method, whereas the Focus Group Discussion and Key Informant interviews were adopted in the qualitative phase to explore and clarify the quantitative results generated in the study. The decision to use both was determined by the research objectives and the position that mixed methods provide researchers the opportunity to understand social reality from different research paradigms (Cameron, 2009).

3.3. Study population

The study population comprised of health care workers at risk of contracting occupational hepatitis B Infection KNH.

3.4. Exclusion and Inclusion Criteria

Inclusion criteria:

a) Health care workers (Nurses, Lab Technicians, Cleaners, Doctors, and Clinical Officers) with the work-related risk of HBV infection.

b) In full-time employment at KNH.

c) Those who gave informed consent to participate.
Exclusion criteria:

a) Those that declined to provide informed consent.

b) Hospital workers who had no direct contact with patients.

3.5. Study variables

**Dependent variable**: HBV immunization status.

**Predictor variables**: age, sex, cadre, department, academic qualification, years of employment, availability of vaccine, staff attitude.

3.6. Sampling and Sample size determination.

3.6.1. Sample Size Determination

This was determined by the following Cochrane’s (1999) formula;

\[ n = \frac{Z^2 pq}{e^2} \]

Where;

- \( n \) = for minimum sample size.
- \( Z \) = Z value (95% confidence (=1.96)
- \( P \) = Estimated Hepatitis B vaccination rate (0.5602) from a study at Aga Khan Hospital Nairobi.
- \( q = 1 - p \)
- \( e \) = level of precision with a 95% confidence interval which gives a margin of error of 0.05.

In substituting the formula

\[ n = 1.96^2 \times 0.5602(1-0.5602)/0.05^2 = 378 \]
The sample size given being more than 5% of the total population of HCW’s. A finite population correction was done.

\[ n = \frac{Z^2 \cdot P \cdot q}{e^2 (N-1) + Z^2 P q} \]

\( n = \) sample size with finite population correction.

\( N = \) Population size of interest which is 4000.

\( Z = \) Z statistic for a 95% level of confidence (1.96).

\( P = \) estimated hepatitis B vaccination rate (0.56).

\( e = \) Precision with 95% confidence interval which gives a margin error of 0.05.

\[ n = 4000 \times 1.96^2 \times 0.56 (1-0.56) \frac{1}{0.05^2(4000-1) + 1.96^2 \times 0.56 (1-0.56)} = 3786.280 \]

10.94

Therefore, the sample size of 346 was selected for the study.

3.6.2 Sampling Procedure

A sampling frame was obtained from the KNH administration with a list of all health workers practicing within hospital. The sampling frame consisted of laboratory technicians, doctors, nurses, clinical officers, and cleaners. A stratified random sampling technique was used to ensure proportional representation of the different cadres.

A two-stage sampling scheme was utilized. The primary sampling units were categories of professions under study, which were stratified, while the secondary sampling units were the participants who were picked randomly to achieve the number under each stratum. The sample frame was obtained from the hospital’s Human Resource registry requested for this study. The staff under study were categorized into five strata; nurses, doctors, cleaners,
Laboratory Technologists and Clinical Officers. The number of staff in each category was determined by a mathematical proportionate ratio as;

\[ X = \frac{P \times S}{N} \]

\(X\) = Determined proportionate sample.

\(P\) = total number of category of staff as per HR ratios.

\(N\) = total number of clinical staff under study in the hospital

\(S\) = There was approximately 2987 staff under the study where 1570 were nurses, 400 Laboratory technologists, 700 cleaners and 70 are Clinical Officers.

Substituting above figures with a sample size (346).

\[ X = \frac{P \times 346}{2987} \]

There was a likelihood for the unit and item non-response resulting from a range of issues associated with the participants such as refusals, inability to participate, off-duties, units closed, away on leave (Krosnick, 2002). Extra effort was made by the researcher by preparing the participants and giving them time to be ready for the interview, sensitizing research assistants to be keen on minimizing non-response rate, making Call-Backs and Reminders for the interview and finally sub-sampling the – of those who don't respond.

This was a standard method to make a compensation for unit non-response by process of ‘weighting adjustment' post stratification as discussed by Kronsick (2002). The following formula by Graul et al. (2002) will be used;

\[ \varphi_c = \frac{r_c}{n_c} \]

Where

\(\Phi_c\) = calculated weighted adjustment (added to the proportionate sample after stratification).
\( r_c = \) the number of respondents in weighting class.

\( n_c = \) the total number of sampled cases in weighting class.

The table below shows the final sample sizes that were obtained for the study.

**Table 1: Approximate Number of Staff under study in each category**

<table>
<thead>
<tr>
<th>Staff category</th>
<th>Total number of staff (P)</th>
<th>Proportionate sample size (X)</th>
<th>Final Adjusted sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
<td>1570</td>
<td>182</td>
<td>190</td>
</tr>
<tr>
<td>Lab Techs</td>
<td>400</td>
<td>46</td>
<td>55</td>
</tr>
<tr>
<td>Cleaners</td>
<td>700</td>
<td>81</td>
<td>90</td>
</tr>
<tr>
<td>Doctors</td>
<td>247</td>
<td>29</td>
<td>38</td>
</tr>
<tr>
<td>Clinical Officers</td>
<td>70</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2987</td>
<td>346</td>
<td>391</td>
</tr>
</tbody>
</table>

Therefore, the total number of staff picked was 391. The staff were picked randomly by use of excel entry from the units so that all the staff could have an equal chance of participating and hence limit bias.

Simple random sampling was used in each stratum to recruit the number required from each stratum. Using Microsoft excel, a list of names of that stratum was listed in column A of the excel spreadsheet. A list of random numbers was generated in column B and A will be sorted according to B in descending order. Whenever HCW refused to participate, they were excluded, and the next respondent approached until the required sample size was reached.
3.7. Data collection.

3.7.1. The Data collection tool

Three instruments were used in the study to explore factors that influence the uptake of the vaccine. A designed structured questionnaire was used in the collection of data. The questions were both closed and open-ended, and an instrument for in-depth interview was used.

The data collection instruments were administered to sample population from KNH satellite hospital, which was not included in the study; this enabled identification of the various deficiencies in data collection to eliminate ambiguity and to be vague. This also checked whether the questionnaire was pragmatic and understandable. Recall bias was minimized by asking participants for their immunization cards.

The questionnaire was divided into three sections: The first section comprised of questions which elicited respondents' demographical factors, i.e. age, gender, cadre, department and years of service. The second sections comprised of vaccine factors that include knowledge of the availability of vaccine, immunization status and reasons for non-immunization.

In the qualitative phase, further insights into some responses elicited from the survey were explored from 2 Focus Group Discussions by 12 healthcare workers of different cadre, which was focused on reasons behind non-immunization and experience with the vaccine, as well as reasons for defaulting the vaccine schedule. As for the Key Informant interviews, heads of units of the sampled health care workers were the respondents to delve deeper into factors surrounding the vaccine uptake.

Demographic profile was done using measures of central tendencies, i.e. mean, mode, median and tabulated in frequency tables. Bi-variate association between categorical variables (age, sex, cadres' immunization status and years in employment) was evaluated. Also used was a
Chi-square test to establish the strength and directions of these associations among the variables, correlation coefficients were measured and tested for their significance and $P<0.05$ was considered statistically significant.

The Focus Group Discussion and Key Informant Interview information were recorded as well as broken down into units and blocks of information examined. Thereafter the data units were combined according to the same topics or themes to produce coherent meaning. Conclusions and recommendation were finally drawn in the order of the objectives and findings of the study.

3.8. Ethical considerations

Clearance to conduct the study was obtained from KNH and University of Nairobi (UoN) ethics & research committee before data collection. The nature and purpose of the study were explained to the respondents. To ensure confidentiality names of study participants were not recorded on forms and information obtained was used for study analysis and write up only.

At every stage, participants were informed about the objectives of the study, and consent was given either verbally or by filling informed consent forms before research protocols were administered. Additionally, the study participants were informed on their right to withdraw from participating in the study at any stage.

3.9. Expected Application

The study results will be used to inform the policy-makers on the health risk associated with non-immunization and the factors influencing non-immunization.
CHAPTER FOUR: PRESENTATION OF FINDINGS

4.0. Introduction
A total of 391 healthcare workers were interviewed for the study, and the findings are presented in this chapter.

4.1. Demographic factors
A total of 391 healthcare workers were interviewed. Of the 391 HCWs, 51.9% (203) were females while 48.1% (188) were males. The distribution of ages was as follows: 31-40 years 37.7% (147), 41-50 years 35.7% (140), 20-30 years 14.8% (58), 51-60 years 11.5% (45) and 0.3% (1) above 60 years. More than two thirds (68.6%; n=269) of the participants were married, 23.5% (92) single, 5.5% (21) separated and (2.4%; n=9) widowed. Years of service distribution was as follows: below 5 years 25.7% (n=100); 5-10 years 41.6% (n=163); 11-15 years 20.6% (n=81); 16-20 years 7.5% (n=29) and more than 20 years 4.6% (n=18) as shown in table 2.

Table 2: Characteristics of the study participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group (Years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30 years</td>
<td>58</td>
<td>14.8</td>
</tr>
<tr>
<td>31-40 years</td>
<td>147</td>
<td>37.7</td>
</tr>
<tr>
<td>41-50 years</td>
<td>140</td>
<td>35.7</td>
</tr>
<tr>
<td>51-60 years</td>
<td>45</td>
<td>11.5</td>
</tr>
<tr>
<td>Above 60 years</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>188</td>
<td>48.1</td>
</tr>
<tr>
<td>Female</td>
<td>203</td>
<td>51.9</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>92</td>
<td>23.5</td>
</tr>
<tr>
<td>Married</td>
<td>269</td>
<td>68.6</td>
</tr>
<tr>
<td>Separated</td>
<td>21</td>
<td>5.5</td>
</tr>
<tr>
<td>widowed</td>
<td>9</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>Years of service</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 5 years</td>
<td>100</td>
<td>25.7</td>
</tr>
<tr>
<td>5-10 years</td>
<td>163</td>
<td>41.6</td>
</tr>
<tr>
<td>11-15 years</td>
<td>81</td>
<td>20.6</td>
</tr>
<tr>
<td>16-20 years</td>
<td>29</td>
<td>7.5</td>
</tr>
<tr>
<td>21 years and above</td>
<td>18</td>
<td>4.6</td>
</tr>
</tbody>
</table>
Figure 2 shows the cadre of respondents interviewed. Of them, 11.9% (n=47) participants were doctors, 44.5% (n=174) nurses, 15.5% (n=60) laboratory technicians, 6.2% (n=25) clinical officers and 21.9% (n=85) cleaners.

**Figure 2: Cadre of respondents**

Table 3 shows the distribution of the study respondents according to their stations of work. It indicated that 28.3% (n=110) work in the medical department, 15.7% (n=61) reproductive health, 11.1% (n=43) surgical, 11.1% (n=43) orthopedics, and 10.6% (n=41) pediatrics department. The others were from critical care, nephrology, Accident and Emergency, dental, laboratory, renal unit, outpatient oncology ward and radiotherapy departments.
Table 3: Station of work of the Study Participants

<table>
<thead>
<tr>
<th>Workstation</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Department</td>
<td>110</td>
<td>28.3</td>
</tr>
<tr>
<td>Surgical department</td>
<td>43</td>
<td>11.1</td>
</tr>
<tr>
<td>Orthopedics Department</td>
<td>43</td>
<td>11.1</td>
</tr>
<tr>
<td>Pediatrics department</td>
<td>41</td>
<td>10.6</td>
</tr>
<tr>
<td>Critical care</td>
<td>37</td>
<td>9.8</td>
</tr>
<tr>
<td>Reproductive health</td>
<td>61</td>
<td>15.7</td>
</tr>
<tr>
<td>Nephrology</td>
<td>18</td>
<td>4.9</td>
</tr>
<tr>
<td>Accident and emergency</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Dental department</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Laboratory Department</td>
<td>4</td>
<td>1.0</td>
</tr>
<tr>
<td>Renal unit</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Outpatient</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Oncology ward</td>
<td>4</td>
<td>1.0</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>2</td>
<td>0.5</td>
</tr>
</tbody>
</table>

4.2. The availability and accessibility of the Hepatitis B vaccine to health care workers at KNH

Table 4 shows the availability and accessibility of the Hepatitis B vaccine in the Hospital. A majority (92.8%; n=363) of the respondents were aware of Hepatitis B vaccine, 7.2% (n=28) were not and 88% (n=345) of the participants indicated that Hepatitis B vaccine was available in the Hospital. In contrast, 88% (n=340) of the respondents had never done the Hepatitis B antibody test to check their immunity against the vaccine, although over half (55%; n=213) had challenges with the service rendered by the immunization programme. Sixty-two percent of the study respondents had been sensitized or educated on the Hepatitis B vaccine.
Table 4: Availability and accessibility of Hepatitis B Vaccine to Healthcare workers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awareness of Hepatitis B vaccine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>363</td>
<td>92.8</td>
</tr>
<tr>
<td>No</td>
<td>28</td>
<td>7.2</td>
</tr>
<tr>
<td><strong>Availability of vaccine in the hospital</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>345</td>
<td>88.2</td>
</tr>
<tr>
<td>No</td>
<td>46</td>
<td>11.8</td>
</tr>
<tr>
<td><strong>Done Hepatitis B antibody test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>51</td>
<td>12.4</td>
</tr>
<tr>
<td>No</td>
<td>340</td>
<td>87.6</td>
</tr>
<tr>
<td><strong>Challenges with immunization programme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>215</td>
<td>55</td>
</tr>
<tr>
<td>No</td>
<td>176</td>
<td>45</td>
</tr>
<tr>
<td><strong>Sensitization/education on Hepatitis B vaccine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>242</td>
<td>62.1</td>
</tr>
<tr>
<td>No</td>
<td>149</td>
<td>37.9</td>
</tr>
</tbody>
</table>

In the focus group discussion many of the participants in the Focus Group Discussion were aware of the hepatitis B virus. One of the doctors defined hepatitis B as

“…an infection caused by a virus called hepatitis B virus…“

Another participant, a nurse was aware of how the virus is contracted

“…..that one contracts the virus by coming into contact with blood from an infected person...”

Some of the cleaners reported being forced to be vaccinated by a decree that required all medical practitioners get vaccinated. This is what two different participants said:

"...I was working in a medical ward at the time, and there was a decree that all must be vaccinated..."
“......I saw flyers all over that you must come for vaccination and staff training, so I went...”

Another respondent, a cleaner said that the person who was charged with the hepatitis injection did not come to give them the administration made the third dose and no follow.

“...We had been told that they were to come to the pediatric level, the person who gives the heparin injection who is allocated from the staff clinic, he did not come for the third dose and it was not followed up by the administration...”

On the service related factors that could be making staff not to be vaccinated against hepatitis B virus, this is what the doctors said:

“......instead of having a service provision point, the vaccine should go to the workers...”

“...people should be tasked with taking the service to the workers.

“...the service providers are not there as required.”

".....administrative laxity, it should prompt people to go for the injection.”

The respondents unanimously affirmed that the Hospital has a staff vaccination program against hepatitis B virus. However, one of the informants expressed concern that the program in KNH is not gazetted thus not recognized by the government.

"...I'm aware and what I know is that you are not gazetted, so you are not recognized by the government, unlike the airports.”

Further, one of the clinical officers said;

"...let me say not exactly because what we normally do even for other vaccines is that we forward a list of our staff to the area where the vaccination is being done, we advise them, we even write a memo that everyone should undertake immunization because we have had several, even meningitis, so that is usually our procedure.”

Some of the unit heads agreed that they had conducted the awareness campaigns where the KNH staff is sensitized on the importance of vaccination adherence. A laboratory respondent said that the awareness is done during CMEs.
“...yes. being new, most of the vaccination was being undertaken by the infection prevention control unit before we took over about a year ago and we have been working with them, we accompany them and we discuss with KNH staff the importance of vaccination adherence. So yes we have been reaching out to them.”

“...let me say that It’s one on one, but occasionally we discuss as awareness when we are doing our CMES.”

4.3. Hepatitis B vaccine uptake among health care workers at KNH

4.3.1. Health care Workers who have received the vaccine (including defaulters)

Figure 3 below shows that 86.8% (n=340) of the respondents had been immunized against Hepatitis B, while 13.2% (n=51) had not.

![Figure 3: Immunization against Hepatitis B](image.png)

One of the participants, a laboratory staff said that s/he had been tested positive for the hepatitis B virus and was told that he could not be vaccinated since he/she already had the infection. S/he said that s/he ignored the vaccine since the subsequent blood tests tested negative of the virus and the hospital refused to administer the vaccine.

“...there is a time I did a blood test and I was told I had hepatitis B, and cannot get the vaccine. I did another one that was negative, twice negative; when I enquired I was told I cannot get the vaccine. I was told I had an infection at Nairobi Hospital so
I couldn’t get the vaccine. It was long time ago. I have done others which have turned negative. I think I just ignored...”

Further to this, another participant, a cleaner said she was told that since she had suffered once there was no need of getting the vaccination.

“...I was told I had suffered and once you suffer you don’t get vaccinated...”

"...I'd advise you go and do your Titus level and see the levels; if they are low you need to be vaccinated, if they are sufficient then you are ok."

During the discussion, majority of the participants said that they had been vaccinated at least once.

Many of the key informant respondents were not aware of the exact number of staff who have been vaccinated in their departments. However, some stated that they knew that quite a big number had been vaccinated and that the vaccination program is for all Kenyatta National Hospital staff. One of the nurses said that he didn’t know due to lack of communication/feedback while another one said he wasn’t concerned.

"...I don't know the number, but I know that the vaccination is supposed to be for all staff in KNH. I do not have the exact number. There should be a list of all the staff that have been vaccinated. "

"...yes I know a few, but I have no data unless you check you can get that information from the records..."

"...let me say not exactly because what we normally do even for other vaccines is that we forward a list of our stuff to the area where the vaccination is being done, we advise them we even write a memo that everyone should undertake immunization, because we have had several even meningitis, so that is usually our procedure..."

“...I don’t have the exact number, because there are those who do not want to be vaccinated. However we have always asked them to go especially those who work in criminology lab and microbiology since they handle blood and even blood transfusion... “
Among the health workers 4% (n=16) had received the first dose, 9% (n=35) the second dose 45%(n=176) the third dose, 29% (n=113) had defaulted immunization and 13% (51) had not been vaccinated.

![Prevalence of Hepatitis B uptake](image)

**Figure 4: Prevalence of Hepatitis B uptake**

Among the participants who had not been immunized and those who had defaulted the Hepatitis B vaccine, 29% (n=34) stated that they feared the injection, 48.2% (n=80) had forgotten to return for the vaccine, 7.4% (n=12) had reacted to the vaccine, said that the vaccine was not always available, 1.2% found the service provider impolite and 10.5% (n=17) had gotten pregnant.

**Table 4: Reason for not completing Hepatitis B Vaccination**

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Number</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear of the injection</td>
<td>34</td>
<td>21.0</td>
</tr>
<tr>
<td>Forgot to return for the vaccine</td>
<td>80</td>
<td>48.2</td>
</tr>
<tr>
<td>Reacted to the vaccine</td>
<td>12</td>
<td>7.4</td>
</tr>
<tr>
<td>The vaccine was not always available</td>
<td>17</td>
<td>10.5</td>
</tr>
<tr>
<td>The service provider was impolite</td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>Got pregnant</td>
<td>17</td>
<td>10.5</td>
</tr>
</tbody>
</table>
In the FGD, a cleaner indicated not being aware that the full dose of the vaccine is supposed to be three.

“... I was given two doses and I was not informed that I needed a third dose. “

One of the doctors cited the nurse’s absence as the reason he/she was not given the second dose.

“...I went to staff clinic and I was told the nurse who was there had just gone for a staff seminar, yet she had given us that date to come for the second dose. I tried calling, but she said she was a bit busy, so I just went home....”

Another reason for not getting the full dose of the vaccine that was identified is procrastination. It was noted that the vaccine is administered on specific days thus some staff that are not on duty miss out. One of the laboratory staff asserted that,

“...they have a specific day, and you find you are not on duty on that day, so you keep procrastinating...”

The following are the reasons that were given by three nurses who had gone for the vaccine when asked what had compelled them to go for it.

“...when we got the information, it was up to us to go for the injection...”

“...the one giving the vaccine emphasized that we should take three doses...”

“...I was taking care of somebody who was hepatitis B positive, so fear drove me to finish the vaccination...”

4.4. The level of PEP utilization among healthcare workers at KNH after blood borne occupational exposure

4.4.1. Post Exposure Prophylaxis (PEP) utilization

A majority (92%; n=356) of the participants were aware of post-exposure prophylaxis as shown in figure 5.
The results show that (69.2%; n=268) of the participants stated that they had not experienced an injury from a needle prick or blood splash in the past one year, while 30.8% (n=122) had. Only half (n=61) of the respondents who had experienced needle stick injury or blood splash exposure went for PEP. Of the remaining half (n=61) who did not go for PEP, 54.1% (n=33) of them reported to have fear of antiretroviral (ARV’S) given during PEP, 42.6% (n=26) fear the serological testing (HIV test) and 26.2% (n=16) did not know about it as shown in figure 6.

From nurses, doctors and clinical officers, it was established that the hospital has come up with a PEP procedure and protocol that is followed in case a staff pricks themselves or get
exposed to the hepatitis B virus. Once a staff has been exposed to a needle prick or a patient bite he/she should report to their team leader or the workmates. The pricked area is cleaned with a lot of water without pressing, then a report is made to the staff clinic, after which they send you to the COC to undergo counseling, and voluntarily you can go through a HIV testing too.

The hospital has come up with a protocol for staff who are exposed to a needle prick, or a bite from the patient, the staff is supposed to report to their team leader immediately, there is a procedure where you clean the pricked area with a lot of water without pressing, we have a staff clinic during the day where you are supposed to report where they send you to the COC, you undergo counseling and voluntary you can go through a HIV testing which if you test positive there is a procedure, if you not willing you are put on PEP for 30days. When you complete the ARV you come back and taken through testing if you feel that you don't need to be tested you are not forced. If you are tested you are managed as per the outcome. During the night you report to the accident and casualty department, so you report to the team leader where you undergo counseling testing depending on your choice and put on PEP, You are referred to COC the following day for further treatment."

Another nurse reported that;

"...there is a circular that was distributed to all sections. They know what to do once they prick themselves or get exposed..."

Another doctor indicated that;

"...In our unit yes we had a doctor who pricked himself; we followed the necessary procedure for s/he to get the ARVS and they went through the process albeit challenging due to complications and side effects of the ARVS, but finally, he pulled through and is back on duty."

One of the clinical officers during the interview expressed the need to streamline PEP services and said;
"The ones directly under my department I know, we have forms, and also they are recorded, we are aware. Unfortunately, a few refuse to go for PEP. You see you can't force them to go for PEP. Three weeks ago one of the interns turns out had a needle prick but refused to go, the once from laundry also suffer, we had one case this year. There is need for the nurses in charge should be fully aware of PEP and waste management instead of leaving them on their own”.

“...many people in the health sectors are not willing to undergo HIV testing because of fear. Unless the fear is demystified, I think people still have fear to be tested for HIV; you know that PEP is mandatory.”

4.4.2. Improving the rate of Hepatitis B uptake

According to the respondents, majority 82.4% (n=322) of the study participants indicated that the Hepatitis B vaccine should be made mandatory for all the KNH staff while 17.6% (n=69) said that it should not. The results show that 72.3% (n=309) of the Healthcare workers recommended that the hospital should create awareness to the staff on the dangers of Hepatitis B infection, 49.2% (n=192) recommended on strengthening policy and guidelines on Hepatitis B program, 41% (n=160) testing staff for presence of Hepatitis B virus and 3.8% (n=15) providing the services daily instead of once per week as illustrated in table 6.

A laboratory staff supported the argument of making the vaccination mandatory. One of the key informants suggested that;

"...it should be made mandatory for all health workers. You can have a schedule for departments and heads of units. Administrators should avail a list, where you expect workers to be vaccinated then you analyze each department and go for those who refused, as it has social-economic impact, if they don't go. There should be a policy that compels all health workers to go for vaccination.”

“It should be mandatory for all staff to get the vaccination.”
Table 6: Respondents’ recommendations to improve the rate of vaccination amongst staff

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthening policy and guidelines on Hepatitis B program</td>
<td>192</td>
<td>49.2</td>
</tr>
<tr>
<td>Creating awareness to staff on the dangers of Hepatitis B infection</td>
<td>309</td>
<td>72.3</td>
</tr>
<tr>
<td>Providing the services daily instead of once per week</td>
<td>15</td>
<td>3.8</td>
</tr>
<tr>
<td>Testing staff for the presence of Hepatitis B virus</td>
<td>160</td>
<td>41</td>
</tr>
</tbody>
</table>

A clinical officer indicated that;

“...it is necessary to vaccinate them on the point of service delivery ...”

A doctor suggested that;

"...sensitize the staff so that by the time a staff is making a decision not to get injected, it's their own choice, already."

4.5. Association of Hepatitis B vaccine uptake and demographic factors

Gender, marital status and years of service were not significantly associated with Hepatitis B vaccine uptake nor was age and cadre. Staff awareness of the availability of the vaccine was found to be statistically associated with uptake Hepatitis B (P<0.005) uptake. The health workers who have ever heard about the vaccine were reported to have a higher uptake of the Hepatitis B vaccine. If the staff were sensitized/educated on Hepatitis B, there is a significant change in uptake of the vaccine (P<0.05). Similarly, being aware of PEP was noted to significantly increase uptake of Hepatitis B (P<0.05).
Table 7: Association of Hepatitis B vaccine uptake and demographic factors

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Vaccination against Hepatitis B</th>
<th>Chi-square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes n(%)</td>
<td>No n(%)</td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>49 (86)</td>
<td>8(14.0)</td>
<td>12.464</td>
</tr>
<tr>
<td>31-40</td>
<td>117 (80.1)</td>
<td>29(19.9)</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>128 (92.1)</td>
<td>11(7.9)</td>
<td></td>
</tr>
<tr>
<td>51-60</td>
<td>43 (95.6)</td>
<td>2(4.4)</td>
<td></td>
</tr>
<tr>
<td>Above 60</td>
<td>1(100)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>159 (85.9)</td>
<td>26 (14.1)</td>
<td>0.3148</td>
</tr>
<tr>
<td>Female</td>
<td>174 (87.9)</td>
<td>24 (12.1)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Single</td>
<td>77(86.5)</td>
<td>12(13.5)</td>
<td>0.9759</td>
</tr>
<tr>
<td>Married</td>
<td>225(87.5)</td>
<td>32(12.5)</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>16(80)</td>
<td>4(20)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>8(88.9)</td>
<td>1(11.1)</td>
<td></td>
</tr>
<tr>
<td>Cadre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>45(97.8)</td>
<td>1(2.2)</td>
<td>95.5364</td>
</tr>
<tr>
<td>Nurse</td>
<td>162(96.7)</td>
<td>11(3.3)</td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td>55(93.22)</td>
<td>4(6.8)</td>
<td></td>
</tr>
<tr>
<td>Clinical officer</td>
<td>24(100)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cleaner</td>
<td>46 (56.1)</td>
<td>36(43.9)</td>
<td></td>
</tr>
<tr>
<td>Years of service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 5 years</td>
<td>78 (78.8)</td>
<td>21(21.2)</td>
<td>9.142</td>
</tr>
<tr>
<td>5-10 years</td>
<td>141 (88.1)</td>
<td>19(11.9)</td>
<td></td>
</tr>
<tr>
<td>11-15 years</td>
<td>73 (92.4)</td>
<td>6(7.6)</td>
<td></td>
</tr>
<tr>
<td>16-20 years</td>
<td>27 (93.1)</td>
<td>2(6.9)</td>
<td></td>
</tr>
<tr>
<td>21 years and above</td>
<td>16 (88.9)</td>
<td>2(11.1)</td>
<td></td>
</tr>
<tr>
<td>Heard about the Hepatitis B vaccine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>335 (93.1)</td>
<td>25 (6.9)</td>
<td>156.91</td>
</tr>
<tr>
<td>No</td>
<td>3(10.7)</td>
<td>25(89.3)</td>
<td></td>
</tr>
<tr>
<td>Staff awareness of vaccine availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>314(90)</td>
<td>32(10)</td>
<td>25.78</td>
</tr>
<tr>
<td>No</td>
<td>29(63)</td>
<td>17(37)</td>
<td></td>
</tr>
<tr>
<td>Sensitized/educated on Hepatitis B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>239(97.2)</td>
<td>7(2.8)</td>
<td>61.79</td>
</tr>
<tr>
<td>No</td>
<td>102(69.4)</td>
<td>45(30.6)</td>
<td></td>
</tr>
<tr>
<td>Awareness of PEP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>327(90.8)</td>
<td>33(9.2)</td>
<td>57.56</td>
</tr>
<tr>
<td>No</td>
<td>14(43.8)</td>
<td>17(56.3)</td>
<td></td>
</tr>
</tbody>
</table>

4.6. Logistic regression on factors influencing Hepatitis B uptake

The variables which were noted to be significantly associated with uptake of Hepatitis B in table 5 were taken to logistic regression. Table 6 above shows the results of logistic
regression. The results indicate that sensitization/education on Hepatitis B will significantly increase uptake of Hepatitis B by 12.67 times (95% CI 4.23 to 37.42) compared to when it was not done. Similarly, if staff were informed about the vaccine, it was likely to improve uptake by 81.3 times (95% C.I: 17.1 to 385.9). The older the respondent, the higher the likelihood of the Hepatitis B vaccine. This was not statistically significantly associated with an increase in uptake (P>0.05). Availability of Hepatitis B and awareness of PEP was also reported to be not significantly associated with Hepatitis B uptake.

Table 8: Results of Logistic regression on factors influencing Hepatitis B uptake

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds Ratio</th>
<th>Std. Err.</th>
<th>Z</th>
<th>P-value</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>0.56</td>
<td>0.32</td>
<td>-1.01</td>
<td>0.31</td>
<td>0.18</td>
</tr>
<tr>
<td>41-50</td>
<td>1.80</td>
<td>1.21</td>
<td>0.88</td>
<td>0.38</td>
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<td>Awareness of PEP</td>
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<td>7.00</td>
<td>4.6</td>
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</tr>
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<td>64.60</td>
<td>5.53</td>
<td>0.001*</td>
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</table>
CHAPTER FIVE: DISCUSSION

5.0. Introduction
The chapter discusses the study findings within the perspective of the previous research literature developed by other scholars.

5.1. Socio-demographic findings
The findings of the study showed that 37.3% of the respondents were aged between 31 and 40 years while 35.7% of the respondents were aged between 41 and 50 years. There was no statistical significance between age and the Hepatitis B uptake. This contrasts with a study in India (Chaudry et al. 2013) whereby older respondents had a higher rate of acceptance and completion of the vaccine.

The study also revealed that 51.9% of the participants were female while 48.1% were males. There was no statistically significant association between the Hepatitis B vaccine uptake and the gender of the participants. This showed that gender does not influence the uptake of Hepatitis B. These results are consistent with results from a previous study by Ali et.al (2005) which found that gender has no significant association with Hepatitis B vaccine uptake.

The study also found out that 41.6% of the respondents had worked as healthcare service providers for a period between 5 and 10 years with only 7.5% of healthcare service providers serving between 16 and 20 years. There was no significant association between the years of service worked and the uptake of Hepatitis B vaccine as observed from the results of the study conducted. The years of service do not provide significant information on the Hepatitis B vaccine uptake. This compares to a study by Azodo et al. 2012 whereby there was no significant association between years of service worked and uptake of Hepatitis B.

The results of the study showed that 39.4% of the participants were nurses while 11.9% of the respondents were doctors. There was 97.8% Hepatitis B vaccine among the doctors followed
by the nurses who had an uptake of 96.7% while there was a low uptake of Hepatitis B vaccine cleaners at 56.1%. This shows that the uptake of Hepatitis B vaccine increases with the close association of healthcare providers with patient thus the ease of infection. The results thus concurred with past studies, which had indicated that healthcare provider profession has a significant influence on the uptake of Hepatitis B vaccine (Burden and Whorwell, 1991; Beltrami et al., 2000; Ali et al., 2005).

5.2. Availability and accessibility of HBV

The study findings showed that a majority of the study participants were aware of the availability of hepatitis B vaccine, and had been vaccinated. There was a statistically significant association between the participant's awareness and the Hepatitis B vaccine uptake. The study revealed that majority of the participants (90%) who had an awareness of the availability and accessibility of the Hepatitis B received at least one dose. This finding compares with Jean et al., [2014] who found that in a University of Yaoundé in Cameroon, the residents had undergone prior sensitization during their training on the significance of HBV vaccination. It is clear that majority of the staff were aware of the availability of the vaccine owing to availability of literature in form of pamphlets in various sections of the hospital as well as from the attendance of mandatory continuous medical education programs for staff that are organized by the department of infection and prevention control, regularly held to sensitize the workers on the same.

However, less than 50% of the respondents had been fully immunized after receiving the three doses, with only 10% having received the first, second and third dose of the vaccine. A similar finding in Nigeria reported that 70% of personnel working theatre were not sufficiently vaccinated despite the being knowledgeable on the significance of HBV vaccine and HBV infection risk factors (Kesieme et al., 2011).
Despite the availability of literature, there is expected to be apathy among the workers who due to one reason or another choose not to comply with the completion of the recommended dosage of immunization, or false belief that one jab is sufficient in providing full immunity.

The study found out that 88.2% of the participants asserted the availability of the Hepatitis B vaccine at the hospital. The study also found a statistically significant association between the awareness of the availability of the vaccine and the uptake levels among the healthcare providers within the hospital. Availability of the vaccine, therefore, increases the chances of healthcare providers to be vaccinated. The findings correspond with the previous studies which indicated that availability of the vaccine in healthcare facilities have a significant influence on the levels of uptake among healthcare providers (Chaudhari et al., 2009; Kesieme et al., 2011). The study reported that half of the participants who had not completed their immunization schedule stated that they had forgotten to return for the vaccine, with only 10% citing unavailability of the vaccine as the reason. The finding agrees with Kesieme et al. (2011) who found that in Cameroon low HBV vaccine uptake was attributed to no time to attend vaccination, lack of adequate information on the vaccine and no money for the vaccine fee. However, Ali and Jamal (2005) noted that healthcare institutions which offer HBV vaccine to healthcare workers had a significantly high vaccine uptake. The huge time gap of six months between the vaccine dosages, especially between the second and third dosage may be the main reason as to why the healthcare workers forget to complete the schedule.

The study findings determined that majority (62.1%) of the study respondents had been sensitized or educated on the Hepatitis B vaccine while 37.9% of the respondents had not been sensitized. There was a significant association between Hepatitis B uptake and sensitization on Hepatitis B vaccine. A higher level of Hepatitis B vaccine sensitization has a
significant influence on the uptake among healthcare service providers. This study compares to a study in India Pathak et al., 2013 where a high uptake of the vaccine was associated with knowledge on Hepatitis B vaccine.

Three-quarters of the staff interviewed had been vaccinated for hepatitis B. Among the ones who had not, the fear of vaccine side effects was the main reason given, as well as lack of time and knowledge of the vaccine availability. A study report in Nigeria showed that the main causes of non-immunization were lack of motivation, high cost of the vaccine and other causes. In the study, workers with the highest level of knowledge and more prone to exposure to Hepatitis B infection within the hospital setting included doctors, nurses, and laboratory workers but showed the greatest apathy to the immunization program (Fatusi & Fatusi, 2000). There is a false belief among non-clinical staff that they are not at risk of exposure to Hepatitis since they are not in direct patient contact and therefore the failure to get the vaccination, even though it is recommended for all the healthcare workers, clinical and non-clinical.

5.3. Prevalence of Hepatitis B uptake among healthcare workers
The findings showed that only 45% of the respondents had been fully immunized against Hepatitis B while 13% had not been immunized. The study also showed that the majority (86.8%) of the health workers who had reported to have at least had an injection against Hepatitis B, 5% had only received the first dose, 9.7% the second dose, 52 % the third dose and 39.1% had defaulted immunization. Receiving a full dose has been a significant challenge among healthcare providers. The results are similar to the findings from Corrao et al. (2000) which highlighted that few healthcare providers finish the vaccination doses due to various challenges which are related to their level of practice and their concerns (Corrao et al., 2000).
The study findings also indicated that about two-thirds of the respondents indicated that insufficient education regarding HBV to be the main challenge they had experienced. This compares to a study by Nassir et al. (2000) that found that in spite of its availability and at no cost in all government health care centers healthcare workers still did not get vaccinated and probably the most significant reason was the lack of knowledge about its protective effect since only around half knew that it provides 95% protection. Similarly, at Aga Khan University in Pakistan, the main reasons for defaulting the immunization were ignorance, cost implications and difficulty in accessing vaccines whereas the study in Fatima Jinnah medical college, Lahore, cited vaccine cost followed by vaccine unavailability as the main reasons for discontinuing (Llewellyn & Harvey, 1994). The education and sensitization for the vaccine may have been available, but healthcare workers may not have been informed of the grave consequences of contracting the disease, thus the possession of inadequate information.

The study also found that 72% of the participants had never done antibody tests to check their immunity against hepatitis B. This was mainly based on the common understanding that an antibody test to test immunity to hepatitis b is not a regular or recommended practice at KNH and staff did not follow up on it after the completion of immunization. The test in most cases is done when a person falls ill or is required to by their health provider for some reason. The results of the study are much in line with a study conducted among Cameroon medical residents whose coverage was poor, and only 10% of adequately vaccinated participants had a post-vaccination test (Kesieme et al. 2011).

5.4. Level of PEP utilization after blood borne exposure
The study findings showed that 92% of the participants were aware of post-exposure prophylaxis. There was a statistically significant association between the level of PEP
awareness after blood borne exposure and the level of Hepatitis B vaccine uptake. High level of PEP utilization after blood borne exposure increases the level of Hepatitis B vaccine uptake. The results concurred with studies, which significantly focused on improving the level of awareness on PEP utilization, which has a high influence on Hepatitis vaccine uptake (Scapa et al., 1989; Halpern et al., 2006).

Needlestick injuries are common among clinical staff, even though they do go unreported due to fear of taking the antiretroviral thereafter provided due to the side effects. There is also a tendency to test the patients when they are known, and a negative result provides false security of not having to take the antiretroviral.
CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.0. Introduction
This chapter delves into significant details of the results from the study in summary conclusion and offering the recommendations regarding the factors influencing the uptake of Hepatitis B vaccine among healthcare workers at Kenyatta National Hospital.

6.1. CONCLUSION
According to data collected and analyzed in this study, there are salient findings identified. Majority of the respondents who were aware of the availability and accessibility of the vaccine had undergone vaccination. Therefore, awareness of the availability increases vaccines uptake. However, despite the awareness of vaccine availability, some of the respondents cited lack of time and lack of sufficient information on the vaccine with few of the respondents reporting lack of the vaccine as their challenges. The study findings also determined that two-thirds of the respondents had been sensitized or educated on the vaccine with a higher uptake among those who had been sensitized.

The findings of the study showed over half of the respondents had been immunized at first with second and third dose cases defaulted. A majority of those who had been immunized had attained the third dose. The prevalence of Hepatitis B vaccine uptake in Kenyatta National Hospital does not meet the WHO recommended standards which states that all healthcare workers must be vaccinated against Hepatitis B.

The study showed that a majority of the respondents had information on the availability of PEP policy in the hospital. The study further showed that needle stick injuries although common in the hospital, go unreported. The main reason for unreported needle stick injuries were found to be fear of HIV testing and antiretroviral taking which are stipulated in the KNH PEP policy. Some of the respondents reported false security provided by the tendency
to carry out the patient's serology test, whereby a negative result was assumed as a guarantee of safety, therefore, needing no PEP. Also shown in the study was that the respondents who utilized PEP after occupational exposure had a positive acceptance of the vaccine. Therefore, as noted from the study, availability and accessibility of Hepatitis B vaccine, level of PEP utilization after occupational exposure are key factors that influence the uptake of Hepatitis B vaccine among healthcare workers at KNH.

6.2. RECOMMENDATIONS

These recommendations outline key ways on how the identified factors can be positively incorporated to improve the uptake of Hepatitis B vaccine among healthcare workers, which is a key consideration in this case.

1. The Hospital to ensure that all healthcare workers are aware of the points at which the Hepatitis B vaccine are available through constant engagement from the COC regarding availability and accessibility of Hepatitis B vaccine. Therefore developing such like communication process where information from the COC can be accessed by all the departments regarding the availability and the accessibility of the vaccine to improve its uptake among the healthcare workers at Kenyatta National Hospital.

2. The uptake of Hepatitis B vaccine among the healthcare workers should be monitored; within the hospital. Vaccination center to create a database of all staff where they are able to monitor the different stages of vaccination, notified on their current stage of vaccination and encouraged to finish the remaining stages to reduce the time wasted in the whole process.

3. Kenyatta National Hospital to develop an overall policy for staff that requires all new employees to be fully immunized and followed up with antibody
test to confirm their immunization status. This means that the prevention and control unit should work in collaboration with other hospital departments to ensure that all the healthcare workers within the hospital seriously consider hepatitis B vaccination.

4. Kenyatta National Hospital to issue Hepatitis B vaccination certificates which should be regularly checked to ensure that they are up to date on vaccinations.

5. Kenyatta National Hospital to develop different sensitization policies, which would focus on demystifying the existing stereotypes surrounding PEP utilization. Most of the respondents significantly focused more on the stereotypes that are associated with PEP utilization, which were severely detrimental to the number of workers who received PEP. The sensitization program should address such issues and create a conducive environment where healthcare workers can embrace PEP utilization.

6. The hospital to have a staff support Centre to deal with healthcare workers who sustain occupational exposure during the night and weekends to reach them within the recommended 72 hours and begin PEP immediately, to prevent default and delays that staff who sustain the injuries at night and weekends experience.
REFERENCES


Herman, E., Mahesh, V. Shah & Gerald, Y. (2010) *Hepatitis B vaccination rate and determinant factors amongst health care workers at Aga khan University Hospital, Nairobi*.


APPENDICES

Appendix I: Letter to KNH-UON Ethics and Research Committee

Kenyatta National Hospital

P.O. Box 20723-00200,

Nairobi, Kenya.

6th March, 2015

The Chairperson,
KNH/ UON Ethics Research Committee.

Dear Sir/ Madam,

REF: REQUEST FOR APPROVAL OF HEPATITIS RESEARCH AT KNH

I wish to kindly request for your approval to carry out research on Factors Influencing the Uptake of Hepatitis B Vaccine among Health Care Workers at Kenyatta National Hospital.

The objective of this study is to determine the Hepatitis B vaccination coverage among all categories of health workers in KNH, and the factors that influence its uptake.

This study results could be used to inform the policy-makers on the health risks associated with non immunization and the factors influencing non-immunization, which could lead to improvement in prevention of Hepatitis disease.

Attached, kindly find my proposal and submission forms.

Thank you.

Yours faithfully,

Lillian Mbori
APPENDIX II: WORK PLAN

The study is anticipated to take a maximum of one year. The period allocated for each section of this research work is as shown:

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<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
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# APPENDIX III: BUDGET

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<td><strong>Stationery</strong></td>
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<tr>
<td>Pens, pencils, printing paper, notebooks, felt pens, staplers, pins</td>
<td>Buy in Bulk</td>
<td>20,000/=</td>
<td>Printing papers for questionnaires and any other research material. Pens, pencils and notebooks to record information in questionnaire and during interviews.</td>
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<td>USB flash disk, CD-RW, computer</td>
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<td>4,000/=</td>
<td>2 storage devices, one as a back-up. Computer for data entry and typing of reports.</td>
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<td>2 CD-RW @ 500</td>
<td>1,000/=</td>
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<tr>
<td></td>
<td>Computer</td>
<td>30,000/=</td>
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<td>30,000/=</td>
<td>Printing and photocopy of questionnaire and final report. Binding of proposal and Dissertation</td>
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<td><strong>Allowances</strong></td>
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<td></td>
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<tr>
<td>4- Research Assistant</td>
<td>1000/= per day for 4 weeks</td>
<td>40,000/=</td>
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<tr>
<td><strong>Total</strong></td>
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Appendix IV: Informed Consent Explanation/Form

My name is Lillian Mbori. I am carrying out a study entitled “Factors influencing the uptake of Hepatitis B vaccine among Health care workers at Kenyatta National Hospital”. This study is submitted in partial fulfillment for the degree of masters of public health of the university of Nairobi.

You are invited to take part in a research entitled “Factors that influence the uptake of hépatites B vaccine among health care workers at Kenyatta National Hospital.

The objective of this study is to determine the Hepatitis B vaccination Coverage among all categories of health workers in KNH, and the factors that influence its uptake.

You are requested to read and understand the contents of this form before accepting to take part in the study. You are free to ask any questions or demand for clarifications in regard to you participation in the study.

Procedure of the study

After consenting to participate in this study, the questioner will be administered to the participants. The questionnaires will be used to collect demographic, occupational health and safety practice.

Risks

No known risks are involved with being participant a in this study.

Benefits of the study

You may not directly benefit from participating in the study but the study results will be used to inform the policy-makers on health risk associated with non immunization and the factors influencing non-immunization.

Study costs to the interviewee

There will be no costs to be incurred in your participation. Taking part in the study is absolutely free of charge.
Research related injuries

There no injuries associated with this study. However, in case of any questions, information will be provided free of charge.

Confidentiality

The information you provide will be used for the study purposes only. All the data will be kept in a secure place and no one will be allowed to access it apart from the research team.

Voluntarism

Your involvement in this study is on voluntary basis. It is within your right to withdraw your participation from the study if you wish so any time. In case you so wish, there will be no intimidation for you to remain in the study.

Contacts

If you have any questions about the research as concerns, your rights of participation, please feel free to contact either me on Mobile No: 0721868971.

P.O BOX 307556- 00100, Nairobi.

Email: lilianmbori@yahoo.com

Or the Secretary, KNH-UoN ERC on

..................................................
APPENDIX V: Consent form

Declaration of the study by participant

I …………………………………………………………………………… here by freely consent to Ms, Lilian Mbori / her assistant to include me in this study entitled factors that influence the uptake of hepatitis B vaccine among health care workers at Kenyatta National Hospital. I have read and understood the information in part A of this document. All my concerns and questions regarding the study have been answered to my satisfaction. I understand that the participation is voluntary and that I may refuse to participate or withdraw my consent and stop taking part at any time without any penalties.

I hereby freely consent to take part in the study.

Name of the participant …………………Date………. Signature/ left thumb print………………

Name of the person taking the consent/ Investigator………………………………………..

Signature…………………………

Date……………………………


Appendix VI: QUESTIONNAIRE
Date: _____/____/____

FACTORS THAT INFLUENCE THE POOR UPTAKE OF HEPATITIS B VACCINE AMONG HEALTHCARE WORKERS AT THE KENYATTA NATIONAL HOSPITAL

A. DEMOGRAPHIC FACTORS

1. Age of respondent
   1) 20-30 yrs  
   2) 31-40 yrs  
   3) 41-50 yrs  
   4) 51-60 yrs  
   5) Above 60 yrs

2. Gender
   1) Male  
   2) Female

3. Marital status?
   1) Single  
   2) Married  
   3) Separated  
   4) Widowed

4. What cadre are you?
   1) Doctor  
   2) Nurse,  
   3) Laboratory technician  
   4) Clinical officer  
   5) Cleaner

5. Station of work
   1) Medical department  
   2) Surgical department  
   3) Orthopaedics department
4) Paediatrics department
5) Critical care
6) Reproductive health
7) Nephrology.
8) Other

6. Number of Years of employment service
   1) Below 5yrs
   2) 5–10yrs
   3) 11–15yrs
   4) 16–20yrs
   5) 21yrs and above

B. VACCINE FACTORS

7. Have you ever heard of hepatitis B vaccine?
   1) Yes                      2) No

8. Is the vaccine available in the hospital?
   1) Yes                      2) No

9. Have you been immunized against hepatitis B?
   1) Yes                      2) No

10. If yes, which does have you received?
    1) First dose,
    2) Second dose
    3) Third dose,
    4) Incomplete (defaulted)

11. If you did not complete the dose (defaulted) PLEASE give the reason(s)
    1) Fear of the injection
    2) I forgot to return for the vaccine
    3) I reacted to the vaccine
    4) The vaccine was out of stock
    5) The service provider was impolite
6) I got pregnant

7) Others ........................................................................................................

12. Have you done the hepatitis B antibody test, to check your immunity against hepatitis B?
   1) Yes □  2) No □

13. If you have not had the Hepatitis B vaccine, what is the reason?
   1) No reason □
   2) Lack of time □
   3) Fear of side effects □
   4) There is no risk of infection. □
   5) I did not know the vaccine is available to staff □
   6) Didn’t know need for vaccine □
   7) Others specify-----------------------------------------------

14. Do you have any challenges with the service rendered by the immunization programme?
   1) Yes □  2) No □

15. If YES, what is the challenge you face?
   1) Lack of proper information □
   2) The schedule is not flexible □
   3) Education about the vaccine is insufficient □
   4) The vaccine is not always available □
   5) Vaccine not accessible (PLACE) □
   6) Negative attitude by staff. □
   7) Others specify ---------------------------------------------------------------

16. Are you aware of the post exposure prophylaxis (PEP)?
   1) Yes □  2) No □

17. Have you had a needle stick injury/ blood splash in the past one year?
1) Yes □ 2) No □

18. If yes did you go for post exposure prophylaxis (PEP)?

1) Yes □ 2) No □

19. If you did not go for the post exposure prophylaxis please give the reason(s)

   1) I did not know about it □
   2) It is not available in the hospital □
   3) I fear the serological testing (HIV test) □
   4) I fear the antiretroviral (ARV’S) given during PEP □
   5) Others specify-----------------------------------------------

20. Should hepatitis B vaccination be made mandatory to the staff at KNH?

1) Yes □ 2) No □

21. Have you been sensitized/ educated on hepatitis B vaccine?

1) Yes □ 2) No □

22. What recommendation can you give the hospital on improving the rate of vaccination amongst staff?

   1) Strengthening policy and guide lines on hepatitis B programme □
   2) Creating awareness to staff on the dangers of hepatitis B infection □
   3) Providing the service daily instead of once a week. □
   4) Testing staff for presence of hepatitis B virus □

Others (specify) -----------------------------------------------
Appendix IV: Focus Group Discussion Guide

My names are Lilian Mbori; I am conducting a research into the factors influencing the uptake of Hepatitis B vaccine uptake among healthcare workers at KNH. The aim of the research is to gain insight into the factors that determine whether health care workers get vaccinated with a view of increasing the vaccine uptake. In order to complete this academic research, your participation as health care worker at KNH will be highly appreciated.

The study is a descriptive study and data will be collected through this Focus Group Discussion which will contain open ended questions and will take the form of a discussion. During this focus group I will ask questions and facilitate the conversation. The interview will not be longer than an hour and will be recorded in order to capture the salient features of this interview and confidentiality guaranteed. You are participating on voluntary basis and is allowed withdraw at any time without penalty. Data collected and personal information will remain in confidence. Your participation in this interview is a confirmation that you have volunteered to participate in this research. Do you have any questions before we begin?

Introduction

1. What id Hepatitis B, and how does one contract It.?
2. Have you been vaccinated against hepatitis B and how many vaccines did you get?

Interview Body

3. If you have been vaccinated, what prompted you to get the vaccine?
4. If you have not been vaccinated, please explain the reasons why.
5. Is it important for all staff in KNH to be vaccinated against hepatitis B? State your reasons for or against.
6. What are the vaccine related factors that make health care workers not to be vaccinated?
7. What are the personal related factors that hinder health care workers from getting vaccinated?
8. What are the service related factors that hinder health care workers at KNH from seeking vaccination?
9. What compels health care workers to seek hepatitis B vaccination services?

Conclusion

10. What recommendation would you give KNH hospital administration to encourage healthcare workers to seek hepatitis B vaccination services?
The information you have provided together with others will be analyzed and a draft report submitted to the organization in one month. I will be delighted to send you an advance copy to review if you are interested. Thank you for your cooperation.
Appendix V: The Key Informant Interview Guide with Heads of Units

My names are Lilian Mbori, I am conducting a research into the factors influencing the uptake of Hepatitis B vaccine uptake among healthcare workers at KNH. The aim of the research is to gain insight into the factors that determine whether health care workers get vaccinated with a view of increasing the vaccine uptake. In order to complete this academic research, your participation as Head of unit will be highly appreciated. The study is a descriptive study and data will be collected through this Key informant interview which will contain open ended questions and will take the form of a conversation. During this interview I will ask questions and facilitate the conversation. The interview will not be longer than an hour and will be recorded in order to capture the salient features of this interview and confidentiality guaranteed. Data collected and personal information will remain in confidence. Your participation in this interview is a confirmation that you have volunteered to participate in this research. Do you have any questions before we begin?

Demographics
Age: ...........................................................................................................
Sex: ............................................................................................................
How many years have you worked in your current position?.......................

Introduction
1. What is your typical schedule in a day as Head of unit?

Interview body
2. Are you aware that KNH has staff vaccination programme for Hepatitis B?
3. How many staff in your unit have been vaccinated against Hepatitis?
4. Have you ever had a discussion with your staff on hepatitis B and the need to be vaccinated?
5. What are the procedures in your unit that can expose staff to acquire Hepatitis Virus?
6. What is the procedure for a staff in need of PEP service?
7. Are incidences of occupational exposure among your staff reported?
8. What is your role as the head of unit in the prevention of hepatitis B infection among your staff?
9. What factors influence the uptake of hepatitis B vaccine among your staff.
Conclusion

10 Do you have any additional suggestions about how the media can improve its health journalism and especially on RH reporting for readers in the future?

11. What recommendations do you have for future coverage of RH stories at the Daily Nation?

12. Is there anything more you would like to add?

The information you have provided together with others will be analyzed and a draft report submitted to the organization in one month. I will be delighted to send you an advance copy to review if you are interested. Thank you for your cooperation.